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An Empirical Analysis of Bill Payment Choices

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Abstract

The aim of this paper is to examine which payment instruments Canadians use for paying bills and to assess the factors driving their bill payment behaviour. I use 2019 survey data collected among over 4,000 Canadians and estimate a set of binomial and multinomial regressions to assess the factors influencing consumers' use and perception of different bill payment options. I find that there is no single dominant payment method for all consumer groups: demographics, financial situation, new technology adoption and POS payment habits play a significant role in the usage of bill payment methods as well as in consumers' stated reasons and barriers of use. Moreover, I demonstrate that consumers' bill payment behaviour strongly varies by bill type. The conclusions are useful for policy discussions on how to encourage a migration away from paper-based payment methods and how to (re)design a retail payments system to accommodate end-user needs.

Topics: *Bank notes, Econometric and statistical methods, Financial services, Payment clearing and settlement systems*

JEL codes: *D1, D9, G2*

1 Introduction

The aim of this paper is to examine how Canadians pay their bills. Many papers have been written around consumers' payment behaviour in stores and other points-of-sale (POS). Henry, Huynh, and Welte (2018), for example, show that in 2017, Canadians used cash for about 30% of their POS purchases and that cash is commonly used among the elderly, low-income groups and those having a low level of education and financial literacy. We know very little, however, about how Canadians pay their monthly electricity costs, their rent and other bills. Even less is known about the factors driving consumers' bill payment behaviour. Yet, bill payments make up a large share of total transactions made in an economy. In Canada, bill payments accounted for at least 25% of total household consumption in 2019.[1]

Bill payments differ from POS payments in various ways. POS payments refer to purchases of goods and services that are immediately paid for, whereas bill payments concern the discharge of outstanding obligations for services rendered, such as rent, utilities and internet subscriptions.[2] As such, bill payments often have a recurrent nature (e.g. monthly or bi-weekly) and can be anticipated. Also, the average amount of a bill is generally higher than a POS purchase, and for recurring bills the amount can even be fixed. Moreover, bills can be paid using different payment methods than those commonly used at the POS, such as online banking or automatic payments. Because of these differences, the drivers underlying people's choice of payment method for bill payments might differ from the drivers underlying POS payment choices. Hence the importance of studying bill payments separately from POS payments.

I use a unique set of 2019 survey data collected among over 4,000 Canadian consumers and employ econometric techniques to assess how the use and perception of different bill payment options are influenced by demographics, financial situation, adoption of new technologies, general payment behaviour and bill type. The key conclusions from the descriptive statistics are (1) On average, Canadians use between two and three payment methods to pay their bills, (2) pre-authorized debits (PADs), online bill payments (OBPs) and credit cards are used most frequently, (3) e-Transfers seem to be used as a substitute for PADs and cheques, (4) convenience and speed are most often mentioned as reasons for use, and (5) cheques, cash, prepaid cards and money orders are often used due to choice restrictions. Moreover, the results of the binomial and multinomial regressions show that there is currently no single dominant payment method for all consumer groups and uses. Demographics, financial situation, new technology adoption and POS payment habits play a significant role in both the usage and intensity of use of bill payment methods, as well as in consumers' stated drivers and barriers. Moreover, I show that consumers' bill payment behaviour strongly varies by bill type.

This paper not only fills an important gap in the Canadian and international retail payments literature, but it is also helpful for central banks, payment system operators and payment service providers who are (re)designing their retail payment infrastructures. The results demonstrate which attributes consumers care about and, hence, which end-user needs to accommodate when building a new or upgrading an existing payment system. Also, the

[1] Source: Statistics Canada, Table 36-10-0124-01 Detailed household final consumption expenditure.

[2] Bill payments are sometimes also referred to as remote payments.

conclusions are useful for policy discussions on how to encourage a migration away from paper-based payment methods, such as cheques and cash.

2 Related Literature

This paper adds to an extensive number of papers that examine consumers' payment behaviour at the POS.[3] Overall, consumers' decision about how to pay for their POS purchases is found to be influenced by consumer demographics, transaction-related features, situational characteristics and payment instrument–related features. Bagnall et al. (2016), for example, measure consumers' use of cash in Canada, Australia, Austria, France, Germany, the Netherlands and the U.S. They find that the use of cash is strongly correlated with transaction size, demographics and POS characteristics, such as merchant card acceptance and venue. Focusing on Canada, Arango, Huynh, and Sabetti (2011) study the effect of socio-economic characteristics, payment instrument attributes and transaction-related features on the probability of using cash, debit and credit cards. They find that cash is extensively used for lower-value transactions, mostly due to speed, merchant acceptance and low costs. By contrast, they show that debit and credit cards are more often used for larger-value transactions and that there is a strong substitution from debit to credit due to credit card rewards. On top of these factors, Kosse and Jansen (2013) present evidence of payment habits playing a role. They examine the use of cash and debit cards among Dutch consumers with a foreign background and conclude that their payment choices are still influenced by the general payment habits in their countries of origin. Schuh and Stavins (2010) and Arango and Welte (2012) are among those who find that specific payment instrument characteristics (e.g. convenience, speed, cost, timing, acceptance, anonymity and record keeping) are important determinants of consumer POS payment behaviour. Moreover, consumers' views on the safety of payment instruments have been extensively studied. Kosse (2013b) investigates the impact of consumers' safety perception and shows that preferences for cash and debit cards are strongly affected by how consumers assess the likelihood and seriousness of safety incidents related to cash, debit cards and cash withdrawals. Apart from perceived safety, actual safety levels have also been shown to affect people's use of payment instruments. Kosse (2013a) uses daily debit card transaction data and newspaper announcements from 2005 to 2008 and finds that the number of debit card payments drops significantly on the days when newspapers report on debit card fraud.

Only a handful of papers specifically investigate consumers' bill payment behaviour. It is therefore uncertain whether the drivers found in the POS literature also apply to non-POS payments, such as bill payments. Mantel (2000) was one of the first to study consumers' bill payment behaviour. Using survey data from 1,300 Americans, the author finds that several broad factors influence consumers' preference for electronic (instead of paper-based) bill payment instruments: 1) demographics and wealth, 2) personal preferences for control, convenience, incentives, personal involvement and/or privacy, and 3) transaction-specific factors associated with different bill types. Hayashi and Klee (2003) also survey U.S. consumers and find a significant role for consumers' propensity to adopt new technologies. They show that consumers who use new technologies or computers are more likely to pay their

[3] See Kosse (2014) and Stavins (2017) for a synopsis.

bills online. In fact, they conclude that new product adoption is a more important predictor of online bill payment use than demographics or financial characteristics. Furthermore, they show that bill payment choice depends on a bill's frequency and value variability: frequent bills are more often paid online or automatically instead of via a cheque, and consumers are more (less) likely to use automatic (online) payments for bills with a fixed dollar value. Karjaluoto (2002) uses survey data collected among Finnish consumers and finds that the primary factors affecting the choice of bill payment method are speed, security, trustworthiness, ease of use and the dollar value of the bill. Also, significant differences are found based on household income, with higher-income people primarily valuing speed and flexibility (in terms of when and where to make the payment). When investigating how U.S. consumers pay their rent, Zhang (2016) also finds that income is significantly correlated with payment method choice, with higher-income people being less likely to pay their rent using cash. Interestingly, Zhang (2016) also demonstrates how rental payment choices are correlated with respondents' other payment decisions: those who frequently use cash for POS payments are found to be more likely to pay their rent with cash.

Bounie and François (2011) explicitly address the question whether the standard framework for studying the choice of payment instruments at the POS is relevant to study bill payments. Using French survey data, they conclude that consumers do not seem to be sensitive to the fixed costs of using payment instruments and that the transaction size does not influence the choice of payment instruments either. In fact, they find that the higher the bill frequency, the lower the use of an automatic payment solution. These findings contradict the standard approach to payment choice at the POS, where costs and transaction values do play a role. Therefore Bounie and François (2011) argue that there is a need for an alternative model of payment instrument choice when it comes to bill payments. Greene and Stavins (2020) also show that consumers' payment choice for bill payments differs from payment choices at the POS. They find that, contrary to POS purchases, demographics, income and the type of bill are more important factors determining the payment method chosen than the dollar value of the bill.

In conclusion, the existing literature suggests that there are factors that correlate both with POS and bill payment choices, such as consumer demographics and transaction-related features. However, it also hints at considerable differences. Moreover, none of the studies specifically focus on the choices of Canadians and Canadian bill payment methods, which is exactly the scope of this paper.

3 Bill Payment Methods in Canada

Canadian businesses can offer their customers a wide range of bill payment methods. Most billers accept more than one of the following options:

- Pre-authorized debits (PADs): these are automatic payments for which the consumer agrees in advance that the biller may collect the payment at a predetermined frequency. PADs are permitted for both fixed and variable amounts. PADs are also known as direct deposits or direct debits. Once set up, PADs do not require any additional effort from the consumer.

- Online bill payments (OBPs): these allow consumers to pay their bills through internet banking or a mobile banking app. In there, they select the company they want to pay and specify the amount and frequency of the payment, as well as the account from which it has to be paid.

- Cheques: these are written "orders to pay" signed by the payer, instructing their bank to transfer the amount from their account to the person or organization that is depositing the cheque. To pay a bill using a cheque, consumers simply send the cheque to the biller through regular mail.

- Credit cards: consumers can pay their bills using a credit card in various ways, such as online on the biller's website, by setting up pre-authorized credit card payments, through a telephone call with a biller's representative or by bringing a copy of the bill to their bank. Also, some billers, such as internet and telephone providers, have physical locations where consumers can pay their bill through an in-person credit card payment.

- e-Transfers: launched in 2002, this is an online funds transfer service that enables consumers and businesses to transfer money directly from one bank account to another, 24 hours a day, 7 days a week. An e-Transfer payment can be initiated in one's online or mobile banking account, using the email address or mobile phone number of the payee. Once the payee receives and accepts the payment, the money is received in near-real-time (up to 30 minutes). e-Transfer is specific for Canada, but approximates faster payment solutions in other countries.

- Store-offered money orders (MOs): these can be purchased at post offices and other non-bank financial service providers, such as MoneyMart or CashMoney. MOs are prepaid paper-based payment instructions, similar to bank drafts or certified cheques, and can be sent directly to the biller through regular mail. MOs allow consumers to pay their bills even if they do not have a bank account or a payment card.

- In-store electronic bill payments (EBP): these require consumers to bring a paper copy of the bill to a post office or another non-bank financial service provider, who, on their behalf, initiates the payment through their electronic payment system. Similar to store-offered MOs, this method can be paid for in cash and hence does not require a bank account or a payment card.

- Cash: consumers can pay bills in cash by bringing a copy of the bill to their bank or, if available, to a physical store of the biller.

- Prepaid cards: some billers allow consumers to pay bills with a reloadable prepaid card. These cards are issued by banks, retailers and other financial institutions and use the Visa, Mastercard or American Express payment network. A prepaid card payment works in the same manner as a regular credit card bill payment. However, prepaid cards do not provide access to a line of credit and hence can be used by people who are unable to qualify for a regular credit card.

- Debit cards: these are similar to credit cards: consumers can pay bills with a debit card either online on the biller's website, by setting up pre-authorized debit card payments, through a telephone call with a biller's representative or by bringing a copy of the bill to their bank or a store of the biller (if available). Contrary to credit cards, payments are directly made from the payer's bank account. Also, debit cards allow for paying bills at automated teller machines (ATMs).

Over the past decades, payment service providers and billers in Canada have increased their efforts to improve the cost efficiency of payments by stimulating the use of electronic payment methods. This, in combination with the rapid and widespread adoption of internet and mobile phones, has resulted in a steady decline in the usage of paper-based payment methods. Payments Canada (2019) demonstrates that in 2013, cheque and paper items represented 46% of the total value of transactions made in Canada, while in 2018 this ratio had dropped to 39%. Kosse et al. (2017) study the costs of payments in Canada and show that for larger-size transactions, cash payments are more costly for society than credit and debit card payments. A similar study conducted in Australia also examined the costs of cheques and demonstrated that the cost of paying by cheque is 2.5 times the cost of paying by credit card in non-POS transactions (Schwartz and Carter (2007)). This suggests that a further substitution of cash and cheques by electronic alternatives will likely generate additional cost savings.

4 Data and Summary Statistics

4.1 Data collection

The data used for this research is from the 2019 Canadian Consumer Payments & Transactions (CCPT) Survey conducted by Leger Marketing Inc. on behalf of Payments Canada.[4] The survey was conducted online among thousands of Canadian consumers to explore the type of payment instruments used for POS and remote transactions.[5] The data collection took place in four months (April, June, October and December) and yielded 7,652 responses from 4,056 unique consumers.[6] The sample was drawn using stratified random sampling based on gender, age and region. The final sample shows a slight under- and

[4]Payments Canada is the owner and operator of the two core payment systems in Canada: the Large Value Transfer System (LVTS) and the Automated Clearing Settlement System (ACSS).

[5]Online panels may introduce sampling errors due to selection biases, which may also be the case for the CCPT Survey data. That is, people who do not have access to the internet are by default excluded from participation, while their payment behaviour might significantly differ from that of online panellists. People without internet, for example, are not able to pay their bills online and might have a different attitude towards electronic ways of paying in general. As a result, the use of online and electronic bill payment methods might be slightly overestimated in the CCPT Survey data. Yet, I expect this bias to be small given the high internet penetration in Canada. In 2018, 94% of the population aged 15 years and older had access to the internet at home (source: Statistics Canada, Table 22-10-0113-01, Use of Internet services and technologies by age group and household income quartile, 2018).

[6]The number of unique consumers is smaller than the total number of responses, as some consumers took part in multiple waves.

overestimation of some strata. Table 1 shows, however, that the data is fairly representative of the Canadian population after applying survey weights.[7]

The survey touched upon a large variety of payments-related topics, such as people's recent cash and card use, bill payments, online shopping behaviour, virtual currency use and cross-border payments. For this paper, the key variables of interest include 1) consumers' self-reported use of payment methods for paying 13 different bill types, 2) their total monthly value of bill expenses by payment method, and 3) the main reasons for using that method.[8] The 13 bill types include expenses for cable, car, car insurance, cell phone, daycare/tutoring fees, electricity, home insurance, home services, internet, gas/heating, rent/mortgage, tax and water/sewer. For each of these expenses, respondents were asked which of the following 10 payment methods they had recently used: PADs, OBPs, cheques, credit cards, e-Transfers, store-offered MOs, in-store EBPs, cash, prepaid cards and debit cards. Moreover, the survey data contains a large number of demographic and socio-economic variables, and allows for detecting variations across consumers based on their POS payment habits, online shopping behaviour and use of alternative payment solutions.

4.2 General bill payment behaviour

Tables 2 and 3 present some descriptive statistics about bill payment behaviour in Canada. On average, Canadian consumers have about eight different bills to pay, and they use between two and three payment methods to do so (see Table 2). PADs and OBPs are the most widely used bill payment methods, followed by credit cards and cheques (see Table 3). 75% and 69% of consumers had used a PAD and OBP, respectively, for one or more of their recent bills, while credit cards and cheques were used by less than half and a quarter of consumers, respectively. The usage of e-Transfer and cash for paying bills is considerably lower, i.e. 16% and 14%, respectively. Alternative methods, such as store-offered MOs, in-store EBPs, prepaid cards and debit cards are only used sporadically.

PADs, OBPs and credit cards also take the lead in terms of value. On average, consumers recently transferred most through a PAD (CAD 1,060), followed by credit card (CAD 873) and OBP (CAD 866). However, the total bill value paid by cheque (CAD 691) and e-Transfer (CAD 631) is not negligible. The large PAD and OBP value is mainly driven by the fact that consumers use these for, on average, four different bill types. The other methods are commonly used for one or two (or, in the case of credit cards, for three) bills. By contrast, the relatively large value paid through cheques and e-Transfers seems to be caused by the fact that consumers use these for relatively large bills. Their average bill sizes are CAD 428 and CAD 374, respectively, as opposed to CAD 268 for PADs and CAD 209 for OBPs.

[7] Very large or small weights can increase instability of estimates. The weighting factors in the data vary between 0.3581727 and 4.407708, and the median weighting factor is 0.9020495. The absence of extremely high or low weights suggests that the weights are not likely to have introduced instabilities.

[8] The survey contained the following bill-related questions: 1) "Please indicate how you most recently paid the following (13) bills or household expenses."; 2) "What was the total value of your monthly expenses paid using [...]?"; and 3) "Why did you pay a bill or household expense using [...]?"

4.3 Bill payment choice

Figure 1 reveals a couple of interesting patterns as to how consumers pay their bills. First, the mix of payment methods used for electricity, water, gas and tax is very similar, with most bills being paid with an OBP. Second, OBP is also the most often used payment method for cable, internet and cell phone bills, although credit cards are frequently used here as well. Third, rent/mortgage, car, home insurance and auto insurance bills are most often paid via a PAD. This might be due to the fact that these expenses are often of a fixed nature. Fourth, consumers use a large variety of methods for their home services and daycare/tutoring bills. There is not one unique payment method, and, compared to other bills, these two expense types are relatively often paid via cheque, cash and e-Transfer. This is likely because home, daycare and tutoring services are often provided between individuals, which requires a person-to-person (P2P) payment solution.

Figure 2 presents the same data as in Figure 1, but from a payment method angle. It clearly shows how each method has a different set of use cases. PADs and OBPs are used for a large variety of bills, and the same is true for store-offered MOs and in-store EBPs, as well as debit cards. Some payment methods, however, are mainly used for a selected number of bills. Cheques, e-Transfers and cash are most often used for rent/mortgage bills and for home services, whereas prepaid cards are mainly used for cell phone bills.

The fact that the use of payment methods strongly varies by bill type might be driven by various factors, such as consumers' preferences based on, for example, the bill size, bill frequency or their trust in the biller. Alternatively, consumers' decisions might be influenced by stimuli or requirements put in place by billers to steer consumers towards certain payment methods. The CCPT Survey asked consumers why they had used a particular payment method for one or more of their bills. The results are summarized in Figure 3 and show that convenience and speed are the most commonly mentioned reasons for nearly all payment methods. This corresponds to the findings from Greene and Stavins (2020) and suggests that consumers really care about ease of use and speed when making a payment. On top of that, there are a few interesting differences across methods. Being able to control the timing or size of the payment is an often-cited reason for people to use an OBP or a cheque. Receiving rewards is a strong motive for paying with a credit card, while prepaid cards and store-offered MOs and in-store EBPs are frequently used for cost reasons. Apart from these consumer-driven motives, Figure 3 also suggests that consumers do not always have full freedom of choice, as having no other choice was frequently cited as well. Especially cheques are heavily used because consumers had no other choice.

Table 4 shows for each bill payment method how its usage (i.e. whether consumers had used it for at least one bill) is correlated with that of the other methods. The significant correlations are denoted with a star. Overall, there is a significant negative correlation between PADs and OBPs on the one hand, and the majority of the less prevailing methods on the other. This suggests that the latter rather serve as substitutes for PADs and OBPs, which might insinuate that consumers do not (need to) use these alternative methods when they are already used to paying with a PAD or OBP, or vice versa. By contrast, the significantly strong and positive correlations towards the bottom right corner of the table point to a large complementarity among the non-traditional methods; i.e. consumers (have to) use a combination of these methods to pay all their bills. Table 4 also suggests that

e-Transfers are significantly competing with PADs and cheques, and that consumers tend to use cash instead of PADs, OBPs and credit cards. Hence, a further increase in the uptake of e-Transfer might lead to a decline in PADs and cheques, whereas a potential drop in cash use may result in a further uptake of PADs, OBPs and credit cards.

5 Empirical Analysis

I use a series of binomial regressions to examine what drives consumers to use a particular payment method for paying their bills. First, I study the usage of the 10 different bill payment methods by examining, for each of these methods, how users differ from non-users. Second, again for each method, I compare the characteristics of low users with those of high users to further understand the drivers behind the intensity of use. Third, I assess the self-reported reasons for using a particular method to see how preferences and challenges differ across consumers. Finally, I estimate a multinomial logit model to examine how payment choices differ across the 13 bill types.

5.1 Usage of bill payment methods

5.1.1 Model

In this section, I examine the determinants of the likelihood that consumers have used a particular payment method for paying bills. For this purpose, I estimate the usage of payment method j by consumer i with the following binomial logit specification:

$$A_{ij} = A(DEM_i, FIN_i, INNO_i, POScash_i) \tag{1}$$

where

$$A_{ij} \equiv \begin{cases} 1 & \text{if consumer } i \text{ has used payment instrument } j \\ 0 & \text{otherwise} \end{cases} \tag{2}$$

and where j = PAD, OBP, cheque, credit card, e-Transfer, store-offered MO, in-store EBP, cash, prepaid card or debit card. The explanatory variables are motivated by the empirical bill payments literature as well as economic intuition. DEM_i is a vector of consumer i's demographic characteristics that includes gender, generation, and whether they live in a rural or urban environment. Earlier papers, including Mantel (2000), find that consumers' payment choices significantly vary by sex and age. Moreover, the urbanization degree of consumers' living environment has been shown to impact the use of electronic (versus paper-based) payment methods—at least at the POS; see e.g. Jonker (2007). I might find similar results for bill payments. Urban areas generally have a higher density of bank branches, automated teller machines (ATMs) and stores that offer payment services. This might, for example, be reflected in a different usage rate of cheques, cash, cards, store-offered MOs and in-store EBPs. FIN_i is a set of variables about consumer i's financial situation.

Inspired by Mantel (2000), who finds that the lowest-income people are less likely to use electronic bill payment solutions, this vector includes consumer i's income. Moreover, it contains a dummy variable equal to 1 if consumer i is responsible for their household's finances and a dummy indicating whether consumer i is self-employed. People who manage their household's finances might be more aware of the available payment options and likely have more experience using these. As a result, they might have different preferences than those who less often transfer funds. The same might hold for self-employed consumers. $INNO_i$ is a vector of variables on consumer i's general technology adoption, including their frequency of online purchases in the past month and if they recently initiated a payment with Alexa, Google Home, Instagram, Facebook or Apple Siri (hereafter referred to as big tech companies). Following Hayashi and Klee (2003) and Schuh and Stavins (2010), the idea behind these regressors is that people who are more open to using new technologies in general might also be more willing to use innovative bill payment methods. Moreover, people who more often use alternative purchasing channels are likely to be more familiar with using non-traditional payment methods, which may also be reflected in their bill payment behaviour. The variable $POScash_i$ is added as an indicator of consumer i's use of cash for POS payments. It takes on three values: 'low', 'medium' or 'high', depending on whether consumer i pays with cash less often than, just as often as or more often than with debit and credit cards when making payments to businesses.[9] When describing the results, I will refer to these consumers as either low, medium or high POS cash users, respectively. The purpose of this variable is to assess how POS payment habits play a role. As shown by Zhang (2016), consumers who regularly use cash in stores and at other points-of-sale might also be found to be more likely to use cash for bills.

Table 5 shows the results of the 10 binomial logit models comparing users with non-users of each payment method j. The results are reported as average marginal effects reflecting the likelihood of a consumer being a user of method j relative to those in the base category of a particular explanatory variable while assuming all other characteristics to be the same. Since some consumers participated in the survey multiple times, I clustered the standard errors by respondent to account for potential correlation across different bill payment choices made by the same person.[10]

[9] $POScash_i$ is calculated based on the number of cash, debit and credit card payments made to businesses in the past seven days prior to the survey. For some respondents, this variable may not only refer to POS payments, but also to bill payments if these were paid within these seven days. Unfortunately, the timing of the bill payments made by the respondents is unknown, and therefore I am not able to exclude these when calculating $POScash_i$. Yet, the total cross-sectional variation in $POScash_i$ is most likely caused by variations in the use of cash (and cards) for POS payments given the relatively low number of bills paid with cash (and cards). For example, the weighted mean number of (monthly) bills paid with cash across all respondents is 0.22, while the weighted mean number of total (weekly) cash payments made to businesses equals 2.6.

[10] Alternatively, I estimated a random effects model, treating the data as panel data. However, the unbalanced nature of the panel data resulted in large standard errors: only 68 respondents out of the 4,056 participated in each of the four waves. Hence my decision to treat the data as pooled cross-sectional data and to adjust the standard errors to correct for potential correlation between unobserved characteristics of same respondents.

5.1.2 Results

Overall, Table 5 reveals that there are considerable and significant differences between users and non-users of each payment method.[11] This suggests that targeted measures may be a valuable tool if one wants to encourage or discourage usage of particular methods. First, consumers' demographic characteristics are important in explaining how they pay their bills. Males are significantly less likely than females to use a PAD or OBP, but more likely to use alternative options, such as credit and debit cards, store-offered MOs and in-store EBPs. For instance, the probability of using a PAD and OBP is on average about 4 percentage points (pp) lower for men than for women with the same other characteristics. Also, older generations are more likely than those in the base category, i.e. the youngest, to use a PAD, OBP, cheque and credit card. By contrast, the youngest are significantly more likely to use an e-Transfer, debit card or store-offered MO. The impact of age on e-Transfer usage is rather strong, as the marginal effects vary between -7 pp and -22 pp, depending on the generation. The environment in which people live plays a very significant role in whether people use a credit card or debit card. People from urban areas are almost 6 pp more likely to pay bills with a credit card than those residing in rural areas. By contrast, the latter are about 3 pp more likely to use a debit card. Inspection of the data shows that there are no significant differences between urban and rural respondents in terms of debit and credit card possession, which suggests that the results may be driven by supply-side effects.

Second, users and non-users of the various methods significantly differ in terms of their financial situation. The probability of using a PAD, OBP, cheque and credit card is about 8 pp, 10 pp, 4 pp and 12 pp, respectively, higher for people who generally pay for their household's bills than for those who do not. By contrast, the latter are 3 pp more likely to use a debit card. A potential explanation could be that the former are more aware of the available payment options, have better access to these and have more experience using these. In line with Zhang (2016) and Greene and Stavins (2020), income is a strong predictor too. Medium and high-income people are more likely to use a PAD, OBP and a credit card than those from the lowest income group, with the marginal effects varying between around 5 pp for OBP and 22 pp for credit cards. Those with the lowest incomes, however, are significantly more probable to use an e-Transfer, cash and a debit card. This seems intuitive, as lower-income people have lower financial buffers and are therefore more likely to be concerned about ending up having a negative balance or payments being rejected in case of automatic payments (i.e. PADs). Instead, they might rather pay each bill individually and without tapping into a credit line, and therefore prefer an e-Transfer, cash or a debit card. The self-employed are 6 pp less likely than their counterparts to use a PAD, but 9 pp more likely to use cheques. Self-employed may have similar concerns about automatic payments due to limited financial buffers. Also, being entrepreneurs themselves, they may be more likely to regularly receive cheques, and hence be more familiar with using them.

[11] I used the Hosmer-Lemeshow test to test for the goodness-of-fit of each model (Hosmer, Lemeshow, and Sturdivant (2013)). Contrary to the Pearson chi-squared goodness-of-fit test, the Hosmer-Lemeshow test can be applied if the number of covariate patterns is close to the number of 'positive' observations, which is the case in my models. The test results (available upon request) show that after removing a few influential observations, the models are a good fit. Only for model (8), the null hypothesis of good fit has to be rejected at a 15% significance level.

Third, general technology adoption is significant in whether consumers use a certain payment method. This is consistent with the conclusion of Hayashi and Klee (2003). The likelihood of using an OBP or in-store EBP significantly increases with the number of online purchases made. The marginal effect is strongest for OBPs—the payment method for which consumers also need to go online. This points at an important role of habits, experiences and perhaps confidence in using online technologies. Interestingly, people who have recently initiated a payment with one of the large technology companies are more likely to have used every single method but a PAD. This suggests that they tend to use a more differentiated mix of payment methods, including the less mainstream ones, instead of paying automatically using a PAD. This might potentially imply that these people are more open to trying everything and that they would rather choose their bill payment method on a bill-by-bill basis.

Finally, similar to Zhang (2016), I find that people's POS payment behaviour is a significant factor in distinguishing users and non-users. Consumers who more often pay with cash than with a payment card at the POS (i.e. high cash users) are 15 pp more likely to pay their bills with cash than low cash users. Also, the former are more likely to use a store-offered MO, in-store EBP, prepaid or debit card. By contrast, high POS cash users are less likely to pay their bills with a PAD, OBP or credit card. This strong and significant correlation between POS and bill payment choices might be driven by preferences, but possibly also by limited access to a bank account or credit card. That is, cash, MOs, in-store EBPs, prepaid cards and debit cards are all methods that do not require access to a bank account and/or credit line, while PADs, OBPs and credit cards do. Unfortunately, the survey data lacks the necessary information to further assess the underlying driver, such as reliable financial inclusion data or credit ratings.

5.2 Intensity of use of bill payment methods

5.2.1 Model

In this section, I investigate the factors that influence the intensity with which a consumer i uses a certain bill payment method j, i.e. how many bills they pay with each payment method j. For this analysis I follow the approach of Mantel (2000) and classify consumers as either 'low users' or 'high users' of a certain payment method. To do so, I first calculate S_{ij}, which reflects the share of bills paid by consumer i using payment method j:

$$S_{ij} = \frac{P_{ij}}{\sum_{j} P_{ij}} \tag{3}$$

where P_{ij} denotes the total number of bills paid by consumer i using payment method j. I subsequently define a consumer i as a 'low user' of payment method j if their share of payment method j is lower than the fourth decile of the mean share of payment method j across all consumers ($\overline{S_j}$). By contrast, I classify 'high users' as those for which the share of payment method j is higher than the sixth decile of $\overline{S_j}$. These cut-offs ensure

that the shares between the two groups are sufficiently distinctive while not removing too many observations.[12] Based on this, I estimate the following binomial logit specification to explore which factors determine whether a consumer is a 'low' versus a 'high' user of a certain payment method:

$$HIGH_{ij} = HIGH(DEM_i, FIN_i, INNO_i, POScash_i) \tag{4}$$

where

$$HIGH_{ij} \equiv \begin{cases} 1 & \text{if } S_{ij} > \text{sixth decile of } \overline{S_j} \\ 0 & \text{if } S_{ij} < \text{fourth decile of } \overline{S_j} \end{cases} \tag{5}$$

The binomial logit models as specified in (4) contain the same regressors as in specification (1), and again, I clustered the standard errors by respondent to account for potential correlation across different payment choices made by the same person. Due to the above methodology for distinguishing low from high users, those consumers for whom the share of payment method j is between the fourth and the sixth decile of $\overline{S_j}$ are excluded from the analysis. Therefore, the total number of observations is too small to run the model for store-offered MOs, in-store EBPs and prepaid cards. Hence, Table 6 shows the average marginal effects of the binomial logit models estimated for the seven remaining payment methods.

5.2.2 Results

A couple of key conclusions emerge from the results in Table 6.[13] First, demographics have far less impact on the intensity with which people use certain payment methods than on usage in general. Gender only weakly affects the intensity of OBP and credit card usage, with men being 4 pp less (more) likely than women to be a high user of OBPs (credit cards). For all other methods, once being a user, male and female use it equally often. Also, the impact of one's living environment is only significant in the debit card model: people living in urban areas are 14% pp more likely than those in rural areas to be a frequent debit card user. Of all demographic variables included in the model, age is the most significant and considerable predictor of intensity of use. Compared to the base category, i.e. people born after 1996, the older generations less frequently pay their bills via a PAD, cheque, e-Transfer or debit card. However, they are more likely to be a frequent user of OBPs.

Second, people's financial situation influences usage intensity. Those managing their household's expenses are less likely to be a high user of five out of the seven payment methods studied. This corresponds with the finding in Section 5.1.2 that they are more likely to pay their bills with a larger variety of payment instruments than those who only rarely pay a bill.

[12] The signs and significances of the estimated coefficients barely change when using different cut-off points. Results of these alternative specifications are available upon request.

[13] The Hosmer-Lemeshow test results (available upon request) show that after removing a few influential observations, the models are a good fit, except for model (3). Hence, the results of the latter should be interpreted with some caution.

Indeed, further exploration shows that those responsible for their household's finances use on average 2.7 different methods, versus 2.3 for their counterparts. Apparently, the latter more often stick to a limited number of methods when paying their bills, which may be caused by a lack of familiarity with the existence or functioning of other payment options. Moreover, low-income people are significantly more likely than those with higher incomes to be frequent users of OBPs, cheques, e-Transfers, cash and debit cards. The income effect is particularly strong for cash, with marginal effects of 33 pp (medium income) and 62 pp (high income).

Third, high and low users of payment methods also differ in their use of new technologies in general. In particular, those who have initiated a payment through one of the big techs are less likely to be a high user of PADs, OBPs, credit cards or debit cards. This is in line with the finding in Section 5.1.2 that they are more likely to use a larger variety of methods for paying bills compared to those who have never transacted with a big tech company such as Alexa, Google Home, Instagram, Facebook or Apple Siri—perhaps because they are more technology savvy and more open to trying and experimenting with different options. The survey data indeed reveals that the average number of bill payment methods used by big tech users is 3.5, versus 2.6 for their counterparts.

Finally, consumers' relative use of cash at the POS plays a role in distinguishing high and low users of payment methods. The impact is particularly strong in the cash model: high POS cash users are 22 pp more likely than the base category (i.e. frequent POS card users) to be a high user of cash when it comes to paying bills.

5.3 Reasons for bill payment choice

5.3.1 Model

The CCPT Survey asked respondents why they had recently used a certain payment method for paying one or more bills. The answers to this question can be seen as a reflection of consumers' preferences and encountered barriers when choosing how to pay. That is, when someone mentions safety as a reason, this likely implies that safety is an important feature to them. Similarly, when someone indicates that they had no other choice, they probably had a limited set of payment methods to choose from and potentially would have preferred another method if available to them. Therefore, in this section I examine the stated reasons for use to better understand which features consumers care about and who is restricted most in their payment choice. I do so using the following binomial logit model:

$$R_{ik} = R(DEM_i, FIN_i, INNO_i, POScash_i) \tag{6}$$

where

$$R_{ik} \equiv \begin{cases} 1 & \text{if consumer } i \text{ has mentioned reason } k \\ 0 & \text{otherwise} \end{cases} \tag{7}$$

and where k = cheapest option, no choice, fast and easy, control (over payment timing and amount), for rewards, and most secure.[14] Driven by the available data, the empirical retail payments literature and economic intuition, I use the same regressors as in specifications (1) and (4). Also, the standard errors are again clustered by respondent to account for potential correlation across different reasons stated by the same person. Table 7 shows the average marginal effects of the six binomial logit models—one for each reason.

5.3.2 Results

Overall, the results in Table 7 show that the reasons for choosing a bill payment method significantly differ across people.[15] In terms of demographics, men are more likely to have chosen a particular method for cost reasons and to receive rewards, whereas women's choices are more likely to be driven by convenience and control. Also, the youngest are more probable to make their choices based on costs and security, whereas the older generations' choices were more often driven by control and rewards. The latter might be caused by the elderly having more generous credit card reward programs than younger people. Finally, people living in urban areas are significantly more likely than those from rural regions to mention rewards as a motivation of their payment choice. As mentioned in Section 5.1.2, the data does not point at significant differences between urban and rural respondents in terms of credit card possession, so perhaps this is driven by heterogeneity in the reward programs that they have. More data is needed to further assess this claim.

Financial characteristics also influence consumers' stated reasons. Those responsible for their household's finances are more likely to decide on a payment method based on its costs, rewards and security, whereas medium- and high-income people more often make their choices based on convenience, control and rewards. People from the lowest income group, by contrast, are more likely to cite security as a driver. This latter finding may be explained by lower-income people having fewer financial buffers and therefore being more risk averse. Kosse (2013b), for example, shows how higher-income people tend to think less seriously about the likelihood as well as consequences of cash and payment card-related safety incidents compared to people from the lowest income category. Costs are an important reason for the self-employed when deciding how to pay a bill.

Consumers' reasons for choosing a particular method also significantly vary depending on their online shopping behaviour and their use of big tech companies. In particular, people who have initiated a payment via big tech are 23 pp and 7 pp more likely to be driven by costs and security, respectively, than those who have not. Moreover, the probability of mentioning control and rewards (and, to a lesser extent, convenience) significantly increases with consumers' online purchasing behaviour. The significant negative coefficients for the squared e-commerce variable in the control, rewards and convenience models, however, show that as people buy more online, the effect is lessened. Moreover, the significantly negative (positive) marginal effects of the e-commerce variable (squared) in model (6) suggest that the more people shop online, the less their bill payment choices are driven by security-related

[14] Due to the limited number of respondents mentioning 'no bank account' as a reason, this reason is excluded from the analysis.

[15] The Hosmer-Lemeshow test results (available upon request) show that the models are a good fit, except for model (1) and (4). Hence, the results of these should be interpreted with some caution.

reasons.

Finally, consumers' POS payment behaviour is a significant predictor of people's stated reasons for use. The impact is most significant and strongest in model (5), which is intuitive: the more people use cash for their POS purchases, the less likely they are to go for rewards (i.e. to pay with a credit card), compared to those who pay most of their POS purchases with a card. By contrast, and perhaps more interesting, is that fervent POS cash users are significantly more likely to pay their bills based on the costs and security of a payment method.

Apart from the above-mentioned drivers, a considerable number of consumers feel limited in their choice. The marginal effects from Model (2) demonstrate that millennials in particular, as well as people living in urban areas, those managing their household's finances, the highest-income people, the self-employed, those who frequently buy online and, although only significant at the 10% level, those who transact via big techs, are most likely to have cited 'no choice' as a reason. This suggests that these population groups may have paid differently if offered a larger or different choice set of payment methods. People who use cash for most of their POS purchases, however, are significantly less likely than their counterparts to have stated the 'no choice' reason, which shows that they are rather satisfied with the bill payment options offered to them. Hence, the earlier conclusion that they are also more inclined to use cash for their bills mainly seems to be caused by personal preferences instead of choice restrictions.

5.4 Impact of bill type

5.4.1 Model

The CCPT Survey allows for an investigation of the impact of the type of bill on consumers' decision how to pay. For this purpose, I first transpose the data from being a set of respondents to a set of bills, which lists the known features of each bill paid by the respondents, i.e. the type of expense and the characteristics of the payer. Following Greene and Stavins (2020), I use this reshaped data to run a multinomial discrete choice model to estimate the likelihood that a certain bill type b is paid with payment method j, using the following specification:

$$J_b = J(DEM_b, FIN_b, INNO_b, POScash_b, TYPE_b) \tag{8}$$

An important assumption of multinomial logit models is that the outcome categories have the property of independence of irrelevant alternatives (IIA). The IIA assumption assumes that the relative probability of choosing between two options is independent of any additional alternatives in the choice set. If this assumption is violated, multinomial logit models lead to unrealistic predictions. I tested for the validity of this assumption using the suest-variant of the Hausman test, which, contrary to the classic Hausman test, allows for clustering. The test results showed that the IIA assumption is satisfied when merging store-offered MOs, in-store EBPs, prepaid cards and other payment methods

into one category, 'other'.[16] [17] This suggests that there is correlation between the tendencies of using these instruments, for example because they can all be used without having a bank account or credit line. Moreover, store-offered MOs and in-store EBPs both require consumers to visit a post office or other non-bank financial service provider. In most cases, these locations offer both options. Hence, it is not surprising to find that the relative probability of using a store-offered MO increases when consumers are no longer offered the option of initiating an in-store EBP, and vice versa. Therefore, J_b in model (8) denotes the payment method used for bill b and takes on the following categories:

$$J_b \equiv \begin{cases} 1 & \text{if bill } b \text{ is paid with a PAD} \\ 2 & \text{if bill } b \text{ is paid with an OBP} \\ 3 & \text{if bill } b \text{ is paid with a cheque} \\ 4 & \text{if bill } b \text{ is paid with a credit card} \\ 5 & \text{if bill } b \text{ is paid with an e-Transfer} \\ 6 & \text{if bill } b \text{ is paid with cash} \\ 7 & \text{if bill } b \text{ is paid with a debit card} \\ 8 & \text{if bill } b \text{ is paid otherwise} \end{cases} \tag{9}$$

Compared to the previous analyses, this analysis is at the bill level rather than at the consumer level, i.e., I assess for each bill which payment method was used. This specification contains the same regressors as in the earlier specifications, with the addition of $TYPE_b$. The interpretation of DEM_b, FIN_b, $INNO_b$ and $POScash_b$ is, however, slightly different than before. DEM_b is a vector of the gender, generation and living environment of the payer of bill b, and FIN_b contains variables reflecting the payer's financial situation. $INNO_b$ is a vector of variables reflecting the attitudes towards new technologies of the payer of bill b, while $POScash_b$ denotes their relative POS cash usage. Finally, $TYPE_b$ is a vector of the 13 bill types listed in Section 4.

Table 8 shows the average marginal effects of the multinomial logit regression, as well as the standard errors that are again clustered by respondent. Although the regression included the full set of variables specified in (8), for reasons of convenience the table only presents the marginal effects of the different bill types. These effects should all be interpreted relative to the base category, which is a cable bill.

5.4.2 Results

The results in Table 8 confirm that, after controlling for characteristics of the payer, bill payment choices significantly vary across bills. This is in line with the findings of Greene and Stavins (2020). For example, electricity, gas, internet, taxes and water bills are significantly more likely (than cable bills) to be paid using an OBP, whereas home services are significantly

[16] Results are available upon request.

[17] An alternative approach would be to estimate a nested logit model. However, this requires information about bill method-specific characteristics, which I am lacking.

more likely (than a cable bill) to be paid with a cheque, e-Transfer or cash. The results also demonstrate that the two most common paper-based payment methods, i.e. cheques and cash, are particularly used for daycare/tutoring and home service expenses.

These findings suggest that the use of bill payment methods is greatly influenced by bill-specific factors, for example by their bill size, variability and frequency, which is in line with the conclusions of Hayashi and Klee (2003) and Bounie and François (2011). However, further research is needed to examine whether this is demand-driven or supply-driven. Does the nature of a bill, for example, influence consumers' demand for control, security and ease of use? Or, alternatively, do the results demonstrate that consumers are subject to supply-side factors, such as stimuli or constraints put in place by billers? The acceptance and encouragement of payment methods by merchants have been found to significantly influence POS payment choices, and the same might be true for bills. For reasons of convenience and efficiency and when there is limited competition, billing companies might be eager to steer their clients towards certain payment methods, for example by accepting only a limited number of methods or by using financial incentives, such as fees, rewards or discounts. The observation in Section 4.3 that 'no choice' was a frequently cited reason for use suggests that consumers' do not always have full freedom of choice, which could mean that their choice is indeed limited and/or affected by preferences of the payee. Also, certain expenses are oftentimes person-to-person (P2P) payments that cannot be paid using many of the electronic payment methods, simply because the receiving person is not technically able to accept these (e.g. PADs, OBPs and credit cards). This might explain the finding that day-care/tutoring and home services, as opposed to cable bills, are more (less) likely to be paid via a cheque or cash (a PAD or OBP).

6 Summary and Discussion

Using data from the CCPT Survey, I provide insight into how Canadians paid for their bills in 2019. The key conclusions from the descriptive statistics are (1) on average, Canadians use between two and three different payment methods to pay their bills, (2) PADs, OBPs and credit cards are used most frequently, (3) e-Transfers seem to be used as a substitute for PADs and cheques, (4) convenience and speed are most often mentioned as reasons for usage, and (5) cheques, cash, prepaid cards and money orders are often used due to choice restrictions. These are useful insights for the Canadian payments industry leaders who are developing a new batch payments system, as it sheds light on the key use cases and reasons for use of the various payment methods in Canada.

Moreover, I fill an important gap in the academic retail payments literature by studying the factors that influence bill payment behaviour. The results of the binomial and multinomial regressions show that there is currently no single dominant payment method for all demographics and uses. In particular, I demonstrate that (1) demographics, financial situation, new technology adoption and POS payment habits play a significant role in both the usage and intensity of use of bill payment methods, as well as in consumers' stated drivers and barriers, and (2) consumers' bill payment behaviour strongly varies by bill type. Whether the latter is because consumers' preferences are influenced by specific bill features, or whether their decisions are determined by stimuli or constraints put in place by billers,

remains unclear and requires future research.

The findings presented in this paper are also relevant for policy makers, authorities and payment service providers intending to increase the uptake and use of digital payments. First, the results clearly show the importance of targeting specific markets when shaping a vision and developing alternate solutions for cash and cheques. Low-income people, those who transact through big tech firms, and those paying the majority of their POS purchases in cash are significantly more likely (than their counterparts) to pay their bills with cash. Hence, these are the population groups to target when stimulating the use of non-cash alternatives. Similarly, the elderly, self-employed, those paying most of their household's expenses and big tech users are more likely to use cheques as compared to their counterparts. Therefore, they are the ones to be affected most if the acceptance of cheques were to be reduced or discouraged.

Second, the regression results demonstrate that the specific population groups identified above mostly care about costs, rewards, security and having control over the payment. This suggests that their migration away from cash and cheques will hinge on the financial incentives (e.g. fees and rewards), security and the degree of control of alternate solutions. The findings also show that some of these groups, such as low-income people and big tech users, are also more probable than their counterparts to have used an e-Transfer. Hence, potential measures to discourage the use of paper-based bill payments could result in a migration towards e-Transfer or similar digital instant P2P payment solutions.

Finally, the analyses demonstrate that preferences of billers might play an important role in consumers' bill payment choice. This means that any further migration towards non-paper-based bill payments may depend more on businesses than on overcoming consumer resistance. More research into this is warranted, because if this is indeed the case, it is important for policy makers and payment service providers to understand and address the bill preferences of businesses. For example, the use of cash and cheques might be further reduced by developing payment products specifically targeted to the needs of businesses in the daycare/tutoring and home services sector where cash and cheques are still commonly used.

Apart from research into the bill payment preferences of billers, this paper also provides a foundation for further research on the uptake of new innovative payment methods and the speed with which these will displace the legacy methods. For example, should we expect a creative destruction, and if so, how quickly will that materialize? I show that the use of payment methods significantly varies across demographics, some of which are predictable, such as age. Hence, it would be worthwhile to study if a changing age composition would be sufficient to generate a significant shift to the newest forms of payment, such as e-Transfers, over the next ten years. Similarly, current policy discussions will benefit from future research studying how the general decline in POS cash usage and the growing technological awareness will impact consumers' bill payment behaviour over the next decade. The current paper provides a good starting point for exploring future projections like these.

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Tables and Figures

Table 1: Composition of sample and Canadian population

Strata	Category	Sample share Unweighted	Sample share Weighted	Population share 2016 Census
Gender	Female	48%	51%	51%
	Male	52%	49%	49%
Age	18 to 24	11%	11%	12%
	25 to 34	20%	16%	17%
	35 to 44	18%	16%	16%
	45 to 54	20%	18%	18%
	55 to 64	14%	18%	17%
	65 to 74	12%	16%	12%
	65 or older	4%	5%	9%
Region	Alberta	9%	11%	12%
	British Columbia	12%	14%	13%
	Manitoba	4%	4%	4%
	New Brunswick	2%	2%	2%
	Newfoundland and Labrador	1%	1%	1%
	Northwest Territories	0%	0%	0%
	Nova Scotia	2%	3%	3%
	Nunavut	0%	0%	0%
	Ontario	38%	38%	38%
	Prince Edward Island	1%	1%	0%
	Quebec	28%	24%	23%
	Saskatchewan	3%	3%	3%
	Yukon	0%	0%	0%
Income bracket	Low	25%	26%	26%
	Medium	66%	65%	59%
	High	9%	8%	15%

Source: 2019 CCPT Survey and Statistics Canada – 2016 Census. Weighted sample shares are calculated using weights based on gender, age and region. Income bracket categories are defined as follows: Low = CAD 39.999 or less; Medium = CAD 40.000 – CAD 149.999; High = CAD 150.000 and more.

Table 2: Summary of bill payers

	Sample summary
Bill payers (% of obs.)	98%
Number of bills paid (mean)	8.4
Number of payment methods used (mean)	2.7

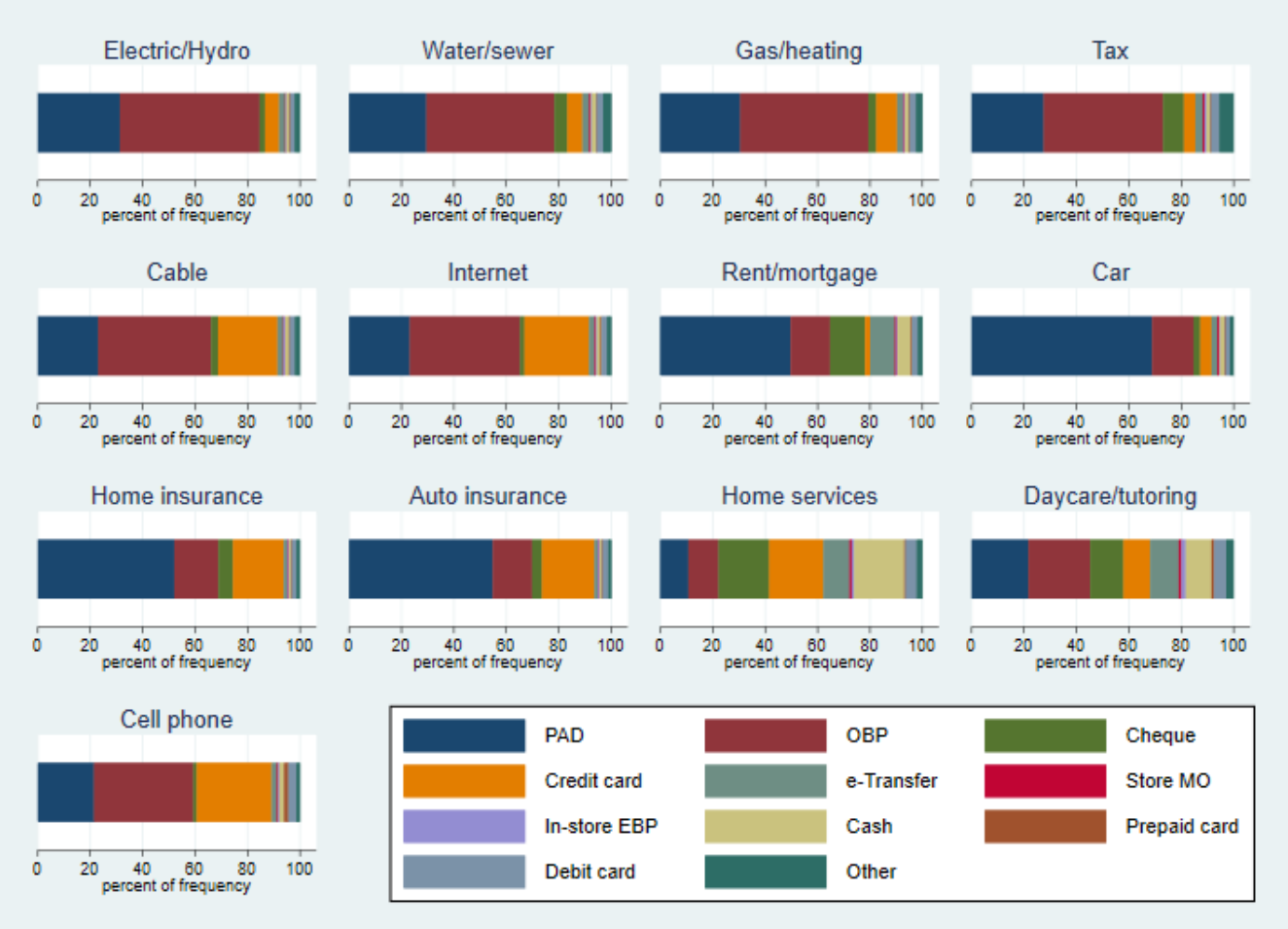
Source: 2019 CCPT Survey. Based on weighted data. Bill payers are defined as those who have recently paid one or more bills.

Table 3: Statistical summary of the use of bill payment methods

	PAD	OBP	Cheque	Credit card	e-Transfer	Store-offered MO	In-store EBP	Cash	Prepaid card	Debit card
Use of payment method (% of bill payers)	75%	69%	26%	43%	16%	2%	2%	14%	3%	9%
Mean value of recent bill expenses ($)	1,060	866	691	873	631	266	411	453	290	527
Mean number of bills paid	4.0	4.2	1.6	2.9	1.7	1.6	1.9	1.5	1.4	2.2
Average value per bill ($)	268	209	428	298	374	163	229	293	193	246

Source: 2019 CCPT Survey. Based on weighted data. Use of payment method represents, for each method, the percentage share of bill payers who had used it for at least one bill.

Figure 1: How did you most recently pay for ...?

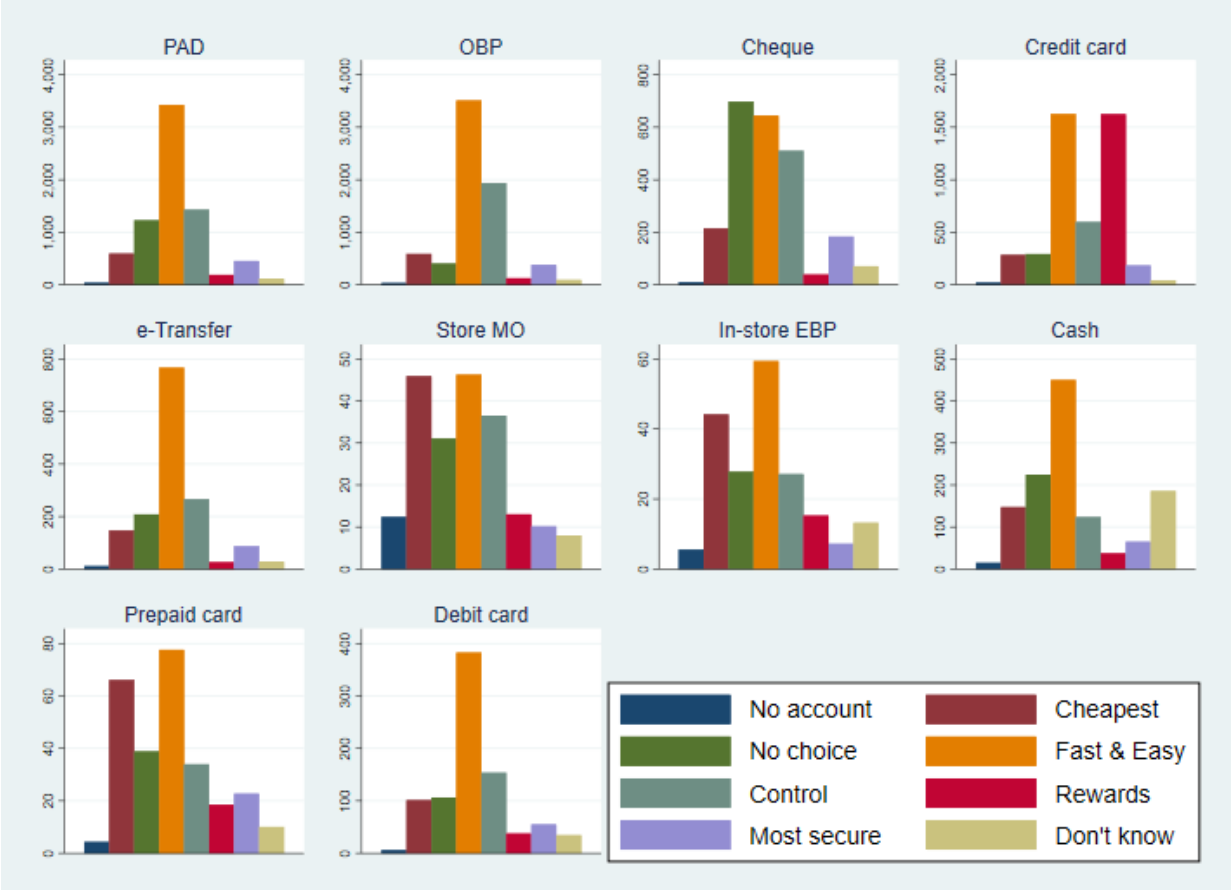


Source: 2019 CCPT Survey. Based on weighted data. Each bar shows the percentage breakdown by payment method of all respondents who had recently paid for that particular bill type.

Figure 2: Breakdown of payment method by bill type

Source: 2019 CCPT Survey. Based on weighted data. Each bar displays the percentage share of respondents (out of the total respondents using that payment method) that had recently used that particular payment method for a certain purpose.

Figure 3: Why did you use ...?



Source: 2019 CCPT Survey. Based on weighted data. Each bar shows the total number of respondents mentioning a particular reason for using a payment method. Respondents were able to provide multiple reasons.

Table 4: Pairwise correlation coefficients of the usage of bill payment methods

	PAD	OBP	Cheque	Credit card	e-Transfer	Store MO	In-store EBP	Cash	Prepaid card	Debit card
PAD	1									
OBP	-0.0122	1								
Cheque	-0.0218	0.0201	1							
Credit card	0.0000	-0.0974*	0.0526*	1						
e-Transfer	-0.0792*	-0.0209	-0.0333*	0.0083	1					
Store-offered MO	-0.0409*	0.0264*	0.1398*	0.0831*	0.1978*	1				
In-store EBP	-0.0302*	0.0071	0.0930*	0.0612*	0.1512*	0.4336*	1			
Cash	-0.0837*	-0.0443*	-0.008	-0.0434*	-0.002	0.1227*	0.1033*	1		
Prepaid card	-0.0506*	-0.0501*	0.0803*	0.006	0.0974*	0.2894*	0.2794*	0.1375*	1	
Debit card	-0.0842*	-0.0821*	-0.0181	-0.0712*	0.0551*	0.1302*	0.1107*	0.0837*	0.1111*	1

Source: 2019 CCPT Survey. Pairwise (Pearson) correlation coefficients. * Denotes significance at the 0.05 significance level.

Table 5: Factors influencing usage of bill payment methods

VARIABLES	(1) PAD	(2) OBP	(3) Cheque	(4) Credit card	(5) e-Transfer	(6) Store MO	(7) In-store EBP	(8) Cash	(9) Prepaid card	(10) Debit card
Sex - Male	-0.0379***	-0.0438***	0.0125	0.0548***	-0.00938	0.0153***	0.0115***	0.00764	0.00379	0.0192**
	(0.0118)	(0.0123)	(0.0118)	(0.0132)	(0.0101)	(0.00341)	(0.00361)	(0.00955)	(0.00445)	(0.00787)
Generation - Millennials	0.0643**	0.112***	-0.00763	0.0628**	-0.0745***	-0.00675	-0.00406	0.0177	-0.00588	-0.0690***
	(0.0256)	(0.0285)	(0.0232)	(0.0277)	(0.0261)	(0.00814)	(0.00761)	(0.0197)	(0.00865)	(0.0213)
Generation - Gen X	0.0661**	0.177***	0.0214	0.0497*	-0.153***	-0.0200**	-0.0127	0.0138	-0.00511	-0.0883***
	(0.0265)	(0.0288)	(0.0246)	(0.0288)	(0.0265)	(0.00860)	(0.00800)	(0.0212)	(0.00937)	(0.0218)
Generation - Baby boomers	0.0705***	0.149***	0.0660***	0.0766***	-0.196***	-0.0290***	-0.0138*	-0.0113	-0.00575	-0.100***
	(0.0262)	(0.0287)	(0.0247)	(0.0287)	(0.0260)	(0.00804)	(0.00826)	(0.0205)	(0.00955)	(0.0215)
Generation - Silent Generation	0.0731**	0.0155	0.196***	0.109***	-0.224***	-0.0293***	-0.00395	-0.000219	0.0134	-0.115***
	(0.0329)	(0.0374)	(0.0347)	(0.0374)	(0.0285)	(0.00888)	(0.0112)	(0.0261)	(0.0143)	(0.0241)
Living environment - Urban	-0.0275*	-0.0161	-0.00434	0.0591***	-0.0139	-0.00180	-0.00614	-0.00508	-0.00125	-0.0301***
	(0.0146)	(0.0154)	(0.0152)	(0.0165)	(0.0130)	(0.00479)	(0.00521)	(0.0118)	(0.00594)	(0.0105)
Responsible for household expenses	0.0843***	0.101***	0.0424**	0.121***	0.0170	0.00101	-0.00452	0.00268	0.00160	-0.0227*
	(0.0191)	(0.0200)	(0.0183)	(0.0199)	(0.0141)	(0.00588)	(0.00650)	(0.0148)	(0.00679)	(0.0132)
Income - Medium	0.144***	0.0619***	0.0149	0.105***	-0.0383***	-0.000890	0.00443	-0.0286**	-0.00940	-0.0483***
	(0.0150)	(0.0153)	(0.0141)	(0.0159)	(0.0128)	(0.00435)	(0.00398)	(0.0113)	(0.00588)	(0.0104)
Income - High	0.159***	0.0488**	-0.0102	0.220***	-0.0418**	-0.00491	0.0131	-0.00917	-0.00972	-0.0775***
	(0.0232)	(0.0248)	(0.0223)	(0.0259)	(0.0197)	(0.00615)	(0.00831)	(0.0195)	(0.00843)	(0.0137)
Self-employed	-0.0574***	0.0105	0.0849***	0.0324	0.00847	0.0162***	0.0156***	0.0113	0.0163**	-0.00356
	(0.0198)	(0.0198)	(0.0201)	(0.0218)	(0.0154)	(0.00584)	(0.00578)	(0.0149)	(0.00738)	(0.0117)
Total e-commerce purchases	0.00193	0.00496***	0.000906	0.00296*	0.00225**	0.000457	0.000918***	-0.00105	0.000622	0.000896
	(0.00151)	(0.00184)	(0.00144)	(0.00169)	(0.00113)	(0.000303)	(0.000305)	(0.00114)	(0.000398)	(0.00114)
Total e-commerce purchases-squared	-8.82e-06	-2.30e-05	-8.62e-06	-5.74e-05**	-1.81e-05	-1.69e-06	-1.04e-05**	2.53e-05*	-7.75e-06	-4.14e-05*
	(2.19e-05)	(2.84e-05)	(2.00e-05)	(2.65e-05)	(1.70e-05)	(4.23e-06)	(4.72e-06)	(1.50e-05)	(5.88e-06)	(2.30e-05)
Use of big tech	-0.0515**	0.0364*	0.210***	0.0324	0.0971***	0.0823***	0.0769***	0.0950***	0.0938***	0.0889***
	(0.0206)	(0.0207)	(0.0222)	(0.0223)	(0.0180)	(0.0101)	(0.00998)	(0.0183)	(0.0131)	(0.0163)
POS cash use - Medium	-0.0859***	-0.0501*	0.00607	-0.126***	-0.0145	0.000785	-0.00569	0.0770***	-0.00934	0.0134
	(0.0287)	(0.0280)	(0.0268)	(0.0285)	(0.0241)	(0.00686)	(0.00569)	(0.0247)	(0.00681)	(0.0174)
POS cash use - High	-0.0751***	-0.0952***	-0.00532	-0.163***	-0.00327	0.0142**	0.0180***	0.147***	0.0152**	0.0348***
	(0.0183)	(0.0200)	(0.0177)	(0.0197)	(0.0154)	(0.00636)	(0.00681)	(0.0175)	(0.00762)	(0.0130)
Observations	6,428	6,428	6,428	6,428	6,428	6,428	6,426	6,428	6,426	6,423

This table reports the average marginal effects of the binomial logit regressions as specified in equation (1). Standard errors (in parentheses) are clustered by respondent. Observations are weighted based on gender, age and region. Generations refer to Millennials (born 1977–1995), Gen X (born 1965–1976), Baby boomers (born 1946–1964) and Silent Generation (born 1945 and before). The reference category is a female born after 1995, living in a rural environment, who does not pay most of the household bills or expenses, is from the lowest income group, not self-employed, has never transacted through a big tech company and is a low POS cash user. A few influential observations were removed from Models (7), (9) and (10) as they affected the models' goodness of fit. ***/**/* denotes significance at the 1%/5%/10% level, respectively.

Table 6: Factors influencing intensity of use of bill payment methods

VARIABLES	(1) PAD	(2) OBP	(3) Cheque	(4) Credit card	(5) e-Transfer	(6) Cash	(7) Debit card
Sex - Male	-0.0113	-0.0442**	-0.0195	0.0434*	-0.0493	0.0168	0.0595
	(0.0182)	(0.0180)	(0.0287)	(0.0239)	(0.0339)	(0.0368)	(0.0452)
Generation - Millennials	-0.0923**	0.0633	-0.177**	0.0449	-0.0852	0.0981	-0.205***
	(0.0384)	(0.0414)	(0.0704)	(0.0540)	(0.0550)	(0.0733)	(0.0725)
Generation - Gen X	-0.144***	0.145***	-0.161**	0.0740	-0.179***	0.0582	-0.281***
	(0.0396)	(0.0422)	(0.0722)	(0.0561)	(0.0603)	(0.0753)	(0.0834)
Generation - Baby boomers	-0.116***	0.147***	-0.117*	0.0482	-0.127*	-0.0239	-0.163**
	(0.0389)	(0.0422)	(0.0704)	(0.0558)	(0.0651)	(0.0783)	(0.0824)
Generation - Silent Generation	-0.0687	0.0683	-0.0905	0.0809	-0.117	-0.0198	-0.0790
	(0.0496)	(0.0551)	(0.0797)	(0.0680)	(0.115)	(0.100)	(0.134)
Living environment - Urban	-0.0355	0.0194	0.0329	0.0496	0.0491	-0.0383	0.144***
	(0.0232)	(0.0230)	(0.0354)	(0.0330)	(0.0413)	(0.0444)	(0.0533)
Responsible for household expenses	-0.0717**	-0.0893***	-0.123***	-0.00669	-0.183***	-0.188***	-0.0937
	(0.0286)	(0.0297)	(0.0463)	(0.0421)	(0.0490)	(0.0509)	(0.0620)
Income - Medium	0.0360	-0.0993***	-0.224***	-0.0409	-0.226***	-0.327***	-0.201***
	(0.0233)	(0.0227)	(0.0355)	(0.0310)	(0.0390)	(0.0404)	(0.0488)
Income - High	0.0506	-0.154***	-0.290***	0.00707	-0.387***	-0.616***	-0.379***
	(0.0355)	(0.0350)	(0.0544)	(0.0431)	(0.0610)	(0.0576)	(0.0895)
Self-employed	-0.0330	-0.0555*	0.0121	-0.0482	0.0370	-0.0642	0.122*
	(0.0296)	(0.0285)	(0.0426)	(0.0363)	(0.0519)	(0.0602)	(0.0678)
Total e-commerce purchases	-0.000322	-0.00308	-0.00396	-0.00198	-0.00952**	0.00459	-0.0102
	(0.00226)	(0.00219)	(0.00398)	(0.00286)	(0.00385)	(0.00368)	(0.00853)
Total e-commerce purchases-squared	-3.58e-05	4.10e-05	6.15e-05	2.33e-05	0.000152**	-6.95e-05	1.55e-05
	(3.15e-05)	(3.06e-05)	(6.17e-05)	(3.81e-05)	(6.00e-05)	(4.64e-05)	(0.000194)
Use of big tech	-0.0780***	-0.155***	0.0892**	-0.264***	-0.0667	0.0804*	-0.171***
	(0.0299)	(0.0297)	(0.0441)	(0.0362)	(0.0476)	(0.0453)	(0.0585)
POS cash use - Medium	0.0396	0.0432	0.0180	-0.0440	-0.0585	0.174***	0.169**
	(0.0419)	(0.0448)	(0.0591)	(0.0622)	(0.0745)	(0.0662)	(0.0781)
POS cash use - High	-0.0344	0.115***	0.118***	-0.0565	0.0239	0.216***	0.143**
	(0.0292)	(0.0290)	(0.0437)	(0.0441)	(0.0527)	(0.0443)	(0.0603)
Observations	3,628	3,549	1,378	2,091	929	737	465

This table reports the average marginal effects of the binomial logit regressions as specified in equation (4). Standard errors (in parentheses) are clustered by respondent. Observations are weighted based on gender, age and region. Generations refer to Millennials (born 1977–1995), Gen X (born 1965–1976), Baby boomers (born 1946–1964) and Silent Generation (born 1945 and before). The reference category is a female born after 1995, living in a rural environment, who does not pay most of the household bills or expenses, is from the lowest income group, not self-employed, has never transacted through a big tech company and is a low POS cash user. A few influential observations were removed from Models (5), (6) and (7) as they affected the models' goodness of fit. ***/**/* denotes significance at the 1%/5%/10% level, respectively.

Table 7: Factors influencing stated reasons for use

VARIABLES	(1) Cheapest	(2) No choice	(3) Fast & Easy	(4) Control	(5) Rewards	(6) Secure
Sex - Male	0.0500***	-0.0177	-0.0313***	-0.0620***	0.0298**	0.0188*
	(0.0109)	(0.0129)	(0.0105)	(0.0134)	(0.0118)	(0.00962)
Generation - Millennials	-0.0581**	0.0909***	0.0317	0.0655**	0.0497**	-0.0670***
	(0.0254)	(0.0273)	(0.0240)	(0.0283)	(0.0230)	(0.0233)
Generation - Gen X	-0.0785***	0.0507*	0.0170	0.0955***	0.0460*	-0.0721***
	(0.0261)	(0.0285)	(0.0252)	(0.0291)	(0.0238)	(0.0240)
Generation - Baby boomers	-0.0578**	-0.0180	0.0337	0.166***	0.106***	-0.0542**
	(0.0264)	(0.0281)	(0.0248)	(0.0289)	(0.0243)	(0.0241)
Generation - Silent Generation	-0.0426	-0.0186	-0.0347	0.135***	0.119***	-0.0146
	(0.0325)	(0.0360)	(0.0326)	(0.0375)	(0.0336)	(0.0308)
Living environment - Urban	-0.00998	0.0372**	0.00406	-0.00610	0.0633***	-0.00809
	(0.0145)	(0.0165)	(0.0130)	(0.0171)	(0.0142)	(0.0124)
Responsible for household expenses	0.0641***	0.0852***	0.000123	0.0115	0.0797***	0.0446***
	(0.0157)	(0.0187)	(0.0167)	(0.0210)	(0.0173)	(0.0136)
Income - Medium	-0.0170	0.0231	0.0543***	0.0413**	0.0893***	-0.0242**
	(0.0139)	(0.0156)	(0.0132)	(0.0168)	(0.0134)	(0.0121)
Income - High	-0.0371*	0.0568**	0.0548***	0.0286	0.186***	-0.0457**
	(0.0206)	(0.0251)	(0.0207)	(0.0264)	(0.0242)	(0.0182)
Self-employed	0.0527***	0.0430**	-0.00591	-0.0366*	-0.00608	-0.00811
	(0.0184)	(0.0212)	(0.0172)	(0.0217)	(0.0199)	(0.0153)
Total e-commerce purchases	-0.00101	0.00609***	0.00296**	0.00703***	0.00445***	-0.00304**
	(0.00128)	(0.00159)	(0.00142)	(0.00182)	(0.00144)	(0.00122)
Total e-commerce purchases-squared	1.53e-05	-7.08e-05***	-3.16e-05*	-7.10e-05**	-5.28e-05**	5.17e-05***
	(1.73e-05)	(2.44e-05)	(1.80e-05)	(2.76e-05)	(2.25e-05)	(1.64e-05)
Use of big tech	0.231***	0.0350*	-0.100***	-0.0171	-0.0161	0.0660***
	(0.0217)	(0.0209)	(0.0203)	(0.0223)	(0.0193)	(0.0179)
POS cash use - Medium	0.0106	-0.0319	-0.0482*	-0.0380	-0.0760***	-0.0182
	(0.0246)	(0.0289)	(0.0250)	(0.0307)	(0.0262)	(0.0209)
POS cash use - High	0.0379**	-0.0488**	-0.0343**	-0.0358*	-0.133***	0.0340**
	(0.0177)	(0.0199)	(0.0166)	(0.0206)	(0.0158)	(0.0154)
Observations	6,428	6,428	6,428	6,428	6,428	6,428

This table reports the average marginal effects of the binomial logit regressions as specified in equation (6). Standard errors (in parentheses) are clustered by respondent. Observations are weighted based on gender, age and region. Generations refer to Millennials (born 1977–1995), Gen X (born 1965–1976), Baby boomers (born 1946–1964) and Silent Generation (born 1945 and before). The reference category is a female born after 1995, living in a rural environment, who does not pay most of the household bills or expenses, is from the lowest income group, not self-employed, has never transacted through a big tech company and is a low POS cash user. ***/**/* denotes significance at the 1%/5%/10% level, respectively.

Table 8: Impact of bill type

VARIABLES	(1) PAD	(2) OBP	(3) Cheque	(4) Credit card	(5) e-Transfer	(6) Cash	(7) Debit card	(8) Other
Car	0.117***	-0.0387*	0.0122	-0.0953***	-0.000795	0.0167*	-0.00872	-0.00204
	(0.0196)	(0.0208)	(0.0155)	(0.0169)	(0.0125)	(0.00938)	(0.00674)	(0.0134)
Car insurance	0.0858***	-0.0427**	-0.0134	-0.0334*	-0.00565	0.00779	0.00767	-0.00617
	(0.0195)	(0.0195)	(0.0130)	(0.0176)	(0.0106)	(0.00967)	(0.00811)	(0.0112)
Cell phone	-0.0170	-0.0157	-0.0261**	0.0109	0.00478	0.00912	0.0157	0.0184
	(0.0153)	(0.0174)	(0.0128)	(0.0158)	(0.0115)	(0.00848)	(0.00956)	(0.0117)
Daycare/tutoring	-0.0540***	-0.0389*	0.0507***	-0.0610***	0.0172	0.0601***	0.0218**	0.00398
	(0.0171)	(0.0204)	(0.0158)	(0.0168)	(0.0123)	(0.0120)	(0.00978)	(0.0131)
Electricity	0.0846***	0.0732***	-0.00998	-0.0783***	-0.0223**	-0.00512	-0.00935	-0.0327***
	(0.0190)	(0.0189)	(0.0126)	(0.0161)	(0.00947)	(0.00675)	(0.00634)	(0.0113)
Gas	0.0253	0.0506***	0.0138	-0.0734***	-0.00856	0.00590	0.00469	-0.0184
	(0.0166)	(0.0162)	(0.0142)	(0.0162)	(0.00971)	(0.00715)	(0.00743)	(0.0123)
Home insurance	0.0676***	-0.0437**	0.0173	-0.0344**	-0.0144	0.00678	0.00262	-0.00193
	(0.0189)	(0.0208)	(0.0148)	(0.0166)	(0.00980)	(0.00839)	(0.00786)	(0.0119)
Home services	-0.0692***	-0.0822***	0.0534***	-0.0267	0.0346**	0.0661***	0.0164*	0.00759
	(0.0167)	(0.0180)	(0.0157)	(0.0177)	(0.0141)	(0.0116)	(0.00929)	(0.0122)
Internet	-0.0102	0.0318**	-0.0187	-0.0109	-0.00573	0.00634	-0.00539	0.0128
	(0.0127)	(0.0143)	(0.0116)	(0.0144)	(0.0106)	(0.00727)	(0.00644)	(0.0123)
Rent/mortgage	0.116***	-0.0691***	0.0276*	-0.100***	0.00808	0.00862	0.00725	0.00133
	(0.0204)	(0.0194)	(0.0152)	(0.0178)	(0.0116)	(0.00844)	(0.00871)	(0.0133)
Taxes	0.00828	0.0465**	0.0305**	-0.0838***	-0.0113	0.00597	0.00826	-0.00443
	(0.0186)	(0.0200)	(0.0145)	(0.0178)	(0.00970)	(0.00749)	(0.00739)	(0.0125)
Water	0.0330*	0.0611***	-0.00934	-0.0766***	0.00112	0.00835	-0.00416	-0.0135
	(0.0171)	(0.0187)	(0.0145)	(0.0168)	(0.0115)	(0.00819)	(0.00711)	(0.0116)
Observations	8,697							

This table reports the average marginal effects of the multinomial logit regressions as specified in equation (8). Standard errors (in parentheses) are clustered by respondent. Observations are weighted based on gender, age and region. The model includes a full set of variables as described in Section 5.4.1. The table shows results for the various bill types only. The reference category is a cable bill. ***/**/* denotes significance at the 1%/5%/10% level, respectively.