

Financial Literacy and the Demand for Cash*

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Abstract

Financial literacy has previously been seen to predict positive financial outcomes such as retirement planning, stock market participation, and better habits related to credit card debt. Using the “Big Three” questions, this paper examines financial literacy in the context of the adoption and use of payment methods. We find that low financial literacy is associated with the use of cash and debit cards for purchases at the expense of credit cards. We also find a positive correlation between low literacy and the use of emerging technologies like mobile payments and digital currencies. We explore some of the demand and supply side factors that could explain these differences in behaviour. In particular, we find that low-literacy respondents view debit and credit cards as easier, less costly, and more secure to use relative to their high-literacy counterparts. Further, they are less likely to own a credit card, have poorer credit, and are more likely to revolve on their debt.

JEL Codes: E41, E42, D12.

Bank of Canada Topics: Bank notes, digital currencies, financial services.

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1 Introduction

The Bank of Canada, as the sole issuer of banknotes, monitors trends in the adoption and use of cash and other methods of payment. As part of this research the Bank published the 2017 Methods-of-Payment Survey Report ([Henry et al. \(2018\)](#)), which found that cash use for retail payments has declined between 2009 and 2017—in terms of number of transactions, from 54 to 33 percent, and in terms of value of transactions, from 23 to 15 percent. The report identified financial literacy to be associated with several indicators of cash usage. In particular, lower literacy was found to be associated with a higher amount of cash held in the respondents’ purse or wallet (in particular the holding of large-denomination notes), a greater number of trips to the ABM to withdraw cash, and a greater likelihood of using cash at the point-of-sale. In this paper, we dig deeper into the low-literacy population, observing that literacy is a significant predictor of various aspects of payment behaviour even after controlling for other factors in a regression setting. We also identify some of the demand- and supply-side factors that may ultimately be driving these behaviours.

The “Big Three” literacy questions were developed in the context of studying the effects of literacy on retirement planning ([Lusardi and Mitchell \(2011a\)](#)) and have appeared on many national surveys around the globe ([Lusardi and Mitchell \(2011b\)](#)). Further, lower literacy has been found to be associated with lower stock market participation ([Van Rooij et al. \(2011\)](#)). In a payments context, the effect of financial literacy on payment behaviour has been studied before mostly in the context of credit card behaviour. For example, [Lusardi and Tufano \(2015\)](#) find a link between debt illiteracy and incurring unnecessary costs associated with credit card fees, and measure a so-called “cost of ignorance.” [Allgood and Walstad \(2013\)](#) additionally find literacy to be associated with positive credit card behaviours such as paying balances in full and avoiding unnecessary interest charges and fees.

Using the “Big Three” questions, we classify respondents into low, medium, and high financial literacy. We find that low-literacy respondents are more likely to have used payment innovations in the past year to make purchases and person-to-person transfers. This includes mobile payments, online payment accounts like PayPal, and digital currencies like Bitcoin. Additionally, lower literacy respondents make a greater share of their payments using cash and debit at the expense of credit cards. To explain behavioural differences, we examine some demand- and supply-side factors. We find that low-literacy respondents perceive payment innovations to be more widely accepted by merchants than their high-literacy counterparts. Further, they view debit and credit cards as easier, less costly, and more secure to use. Debit and credit are viewed similarly by low-literacy respondents except that credit cards are viewed to be more costly. This group uses cash and debit more often than credit, perhaps due to these perceived costs or to supply-side constraints: they are less likely to own a credit card, have poorer credit, and are more likely to revolve on their debt.

2 2017 Methods-of-Payments Survey

Our work relies mostly on the 2017 Methods-of-Payments survey conducted in late 2017. The survey consisted of two components; the Survey Questionnaire (SQ), and the Diary Survey Instrument (DSI). The SQ asked respondents retrospectively about certain payment behaviours—for example, if a respondent had used a method of payment in the last year, the number and value of cash withdrawals made in a typical month, and the number of times each method of payment was used in a typical month. The DSI is a three-day payment diary, where respondents were asked to report the purchases they made, the amount spent on the purchase, and the method of payment used to complete the transaction. Survey weights were calibrated with respect to various demographic variables to account for biases resulting from non-response, and bootstrap replication is used for variance estimation; see [Chen et al. \(2018\)](#) for more details on survey methodology.

We also use data from the 2018 Bitcoin Omnibus Survey, a small survey conducted in late 2018 on the adoption and use of digital currencies in Canada. For the 2018 iteration, the “Big Three” literacy questions were added to drill down on Bitcoin owners and to see if their behaviour is linked to financial literacy.

3 Financial literacy in Canada

Our measure of financial literacy is based on the “Big Three” questions, as defined by Lusardi and Mitchell (2011), relating to an individual’s understanding of financial instruments (Table 1). The questions test the respondents knowledge of simple compound interest, inflation, and risk diversification, respectively. The questions are multiple choice, with the option for respondents to answer “Don’t Know.” Overall, we found that 83 per cent of respondents answered the question about interest rates correctly, 64 per cent answered the inflation question correctly, and only 58 answered per cent answered the question on risk diversification correctly. Furthermore, 42 per cent of respondents answered all three questions correctly. When examining “don’t know” rates, we find a similar trend, with the smallest proportion of respondents answering “don’t know” to the first question (6.6 percent) and the highest to the third question (34 percent), while 12.5 per cent responded “don’t know” to the second question. In an international context, we find that Canadians seem to be in the middle of the pack, performing better than countries such as the United States (30 per cent) and Russia (4 per cent), but worse than Germany (53 per cent) and Switzerland (50 per cent) (Table 2). Our results are most similar to those of Australia (43 per cent).

Other surveys have been conducted in Canada that test various aspects of financial

literacy. A recent Equifax survey¹ found that 52 per cent of Canadians check their credit scores at least once in their lives, in contrast to 27 per cent of Americans. Our results are consistent with a previous study using the same questions (Boisclair, Lusardi, and Michaud (2015)) which similarly found that 42 per cent of Canadians answered all three literacy questions correctly.

For this paper, we construct a single measure of financial literacy, dividing the population into low, medium, and high literacy categories. To do this we measure a score equal to the number of correct responses minus the number of incorrect responses, treating “Don’t know” responses as 0.² High financial literacy is then defined as a score of 3 (all three questions answered correctly), medium financial literacy as a score of 2 or 1 (more correct than incorrect responses, but not perfect), and low financial literacy as a score of 0 or less (answered “Don’t know” to all questions or answered more incorrect than correct).

Regressing our measure of literacy on various sociodemographic characteristics, we find that financial literacy tends to increase with age, education, and income. Across genders, females tend to be less financially literate than males. Household size does not appear to be significant except in the case of households with 3 or more members, which tend to have lower financial literacy than households with one member. Other demographic variables included in the Methods-of-Payment survey such as employment status, marital status, and urban/rural do not appear to be significant overall.

Demographic trends for individual questions are the same with respect to age, income, and education, but sometimes differ for other demographic groups (Table 3). For example, women are more likely than men to answer the first two questions incorrectly, but are less likely to answer question 3 incorrectly, although they are also more or equally likely to answer “Don’t know” for all questions. Other anomalies include the unemployed group, which tends to perform better than their employed counterparts only for the test of inflation, and large households, which perform worse than smaller households on the same question. Finally, separated or divorced individuals seem to perform better on tests of risk management.

4 Financial literacy and payment use

As a first look into how cash demand is related to financial literacy, we use the international comparison of literacy collected by Lusardi and Mitchell (2014) and compare to the country’s cash intensity as measured by the value of banknotes in circulation as a fraction of nominal GDP (Figure 1). Financial literacy is measured here by the percentage of individuals in

¹<https://www.nasdaq.com/press-release/making-the-grade-in-financial-literacy-canadians-still-have-a-lot-to-learn-20181127-00177>

²This corresponds to score₂ in Henry et al. (2018)

each country who got all questions correct—i.e. our measure of “high” literacy. We note the presence of outliers: first is Japan, known to be highly cash-intensive, and second are Romania and Russia, with very low levels of financial literacy. For remaining countries there does appear to be a positive trend between literacy and cash usage, with Germany the most literate and second-most cash-intensive. As we will see our findings of a positive relationship between literacy and cash does not carry over to the micro level, suggesting perhaps that while transactional demand for cash is higher for low-literacy countries, other sources of cash demand may be lower.

Next we consider payment adoption as measured by whether a respondent has used a method of payment in the past year. We find that low financial literacy is found to be associated with emerging technologies. For example, low-literacy respondents are more likely than high-literacy respondents to have completed a purchase or P2P transfer with a mobile app or digital currency in the past year, and are less likely to use cash for P2P. Despite higher technology adoption, results from the BTCOS suggest that low-literacy respondents are more likely to state that their main reason for not owning Bitcoin is a lack of understanding about the technology. Further, they are more likely to have completed a purchase using both chip-and-pin and tap-and-go debit cards, while they are less likely to have used the same features on credit cards. Financial literacy does not appear to be associated with the use of Interac eTransfer, either for purchases or P2P transfers. See Figure 2.

As for intensity of usage³, we find that higher financial literacy is associated with a larger share of credit card transactions, both in terms of the number and value of transactions (Figure 3). Specifically, those with low financial literacy complete 24 percent of their transactions (40 percent of value) using credit cards while high-literacy respondents are about twice as likely to use credit cards (47 percent of volume and 64 percent of value). This corresponds to a lower share of both cash and debit cards. For instance, 36 percent of transactions are completed using cash among those with low financial literacy compared with 30 percent among the highly literate. The share of value spent with cash similarly decreases from 20 to 13 percent. The trend is more pronounced for debit cards: 38 percent of volume among those with low financial literacy compared with 20 percent among those with high literacy.⁴ In summary, these results imply that debit cards are the most preferred option for low-literacy respondents and credit the least preferred, while this is reversed for those with high literacy.

To check the robustness of the above results we run a multinomial logit model where respondents are able to pick from three possible methods of payment: cash, debit, and credit (Table 4). Their choice of payment method is determined by the purchase amount as

³For this section we include the small percentage of respondents who do not have credit cards. We find that it does not significantly alter the qualitative or quantitative findings if they are excluded.

⁴Value shares are nearly identical.

well several socioeconomic indicators such as age, gender, province of residence, employment status, and income. After controlling for these variables we find that high financial literacy remains associated with lower debit card use and higher credit card use relative to cash.

5 Demand and supply side factors

We now consider the various demand- and supply-side factors that may drive differences in outcomes between low- and high-literacy individuals. Respondents were asked to rate methods of payment on a 5-point scale based on whether the method is easy, costly, or secure to use (Figure 4). Those with low literacy tend to be more cynical, less often rating any method of payment as easier to use, less costly, or more secure. To standardize comparisons we look at relative measures of perceptions using cash as the baseline (Table 5). We find that low-literacy respondents view debit and credit cards as easier to use, less costly, and more secure compared with their higher-literacy counterparts.

6 Conclusions

To be completed.

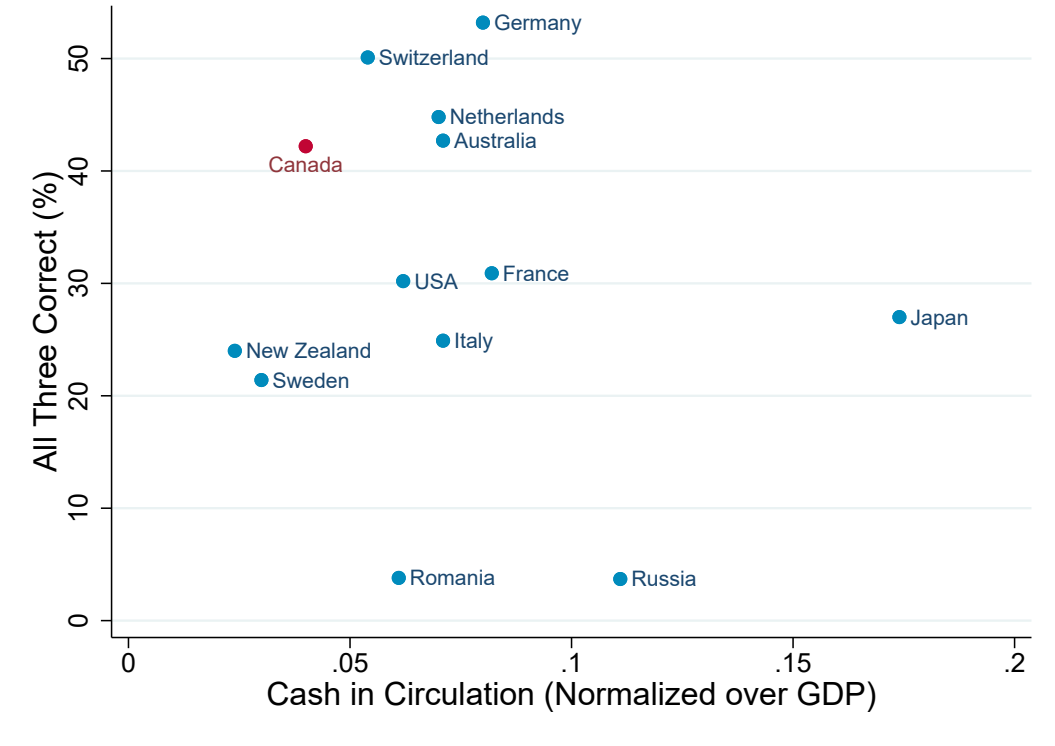
References

- Allgood S, Walstad W. 2013. Financial literacy and credit card behaviors: A cross-sectional analysis by age. *Numeracy* **6**: 3.
- Chen H, Felt MH, Henry C, et al. 2018. 2017 methods-of-payment survey: Sample calibration and variance estimation. Technical Report 114, Bank of Canada.
- Henry C, Huynh K, Welte A, et al. 2018. 2017 methods-of-payment survey report. Staff Discussion Paper 18-17, Bank of Canada.
- Lusardi A, Mitchell OS. 2011a. Financial literacy and planning: Implications for retirement well-being. *Financial Literacy: Implications for Retirement Security and the Financial Marketplace* : 17.
- Lusardi A, Mitchell OS. 2011b. Financial literacy around the world: an overview. *Journal of Pension Economics & Finance* **10**: 497–508.
- Lusardi A, Mitchell OS. 2014. The economic importance of financial literacy: Theory and evidence. *Journal of economic literature* **52**: 5–44.

Lusardi A, Tufano P. 2015. Debt literacy, financial experiences, and overindebtedness. *Journal of Pension Economics & Finance* **14**: 332–368.

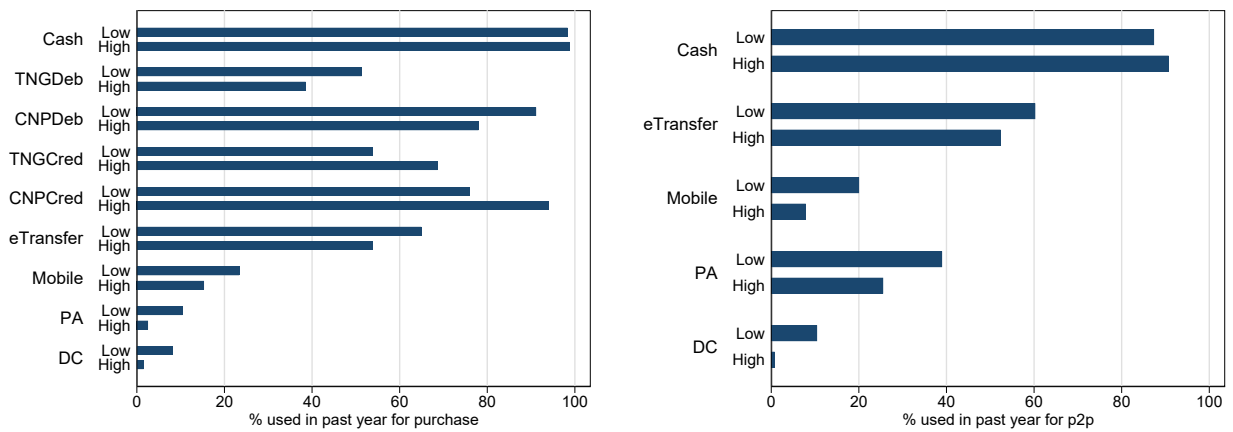
Van Rooij M, Lusardi A, Alessie R. 2011. Financial literacy and stock market participation. *Journal of Financial Economics* **101**: 449–472.

Figure 1: **Financial literacy and cash in circulation: international comparison**



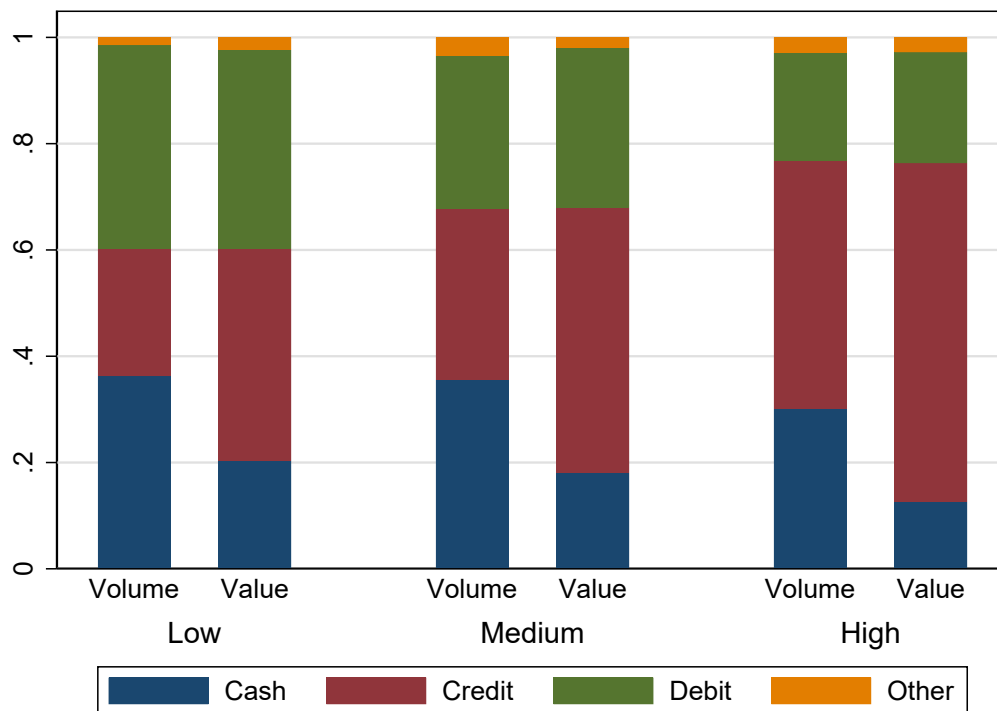
Note: The vertical axis shows the percentage of respondents who answered all three financial literacy questions correctly, as define in Table 1. Canadian numbers come from the 2017 MOP Survey. Other countries come from various studies, collected and summarized by Lusardi and Mitchell (2014). The horizontal axis shows the total value of cash in circulation (source: Bank of Canada) as a share of nominal GDP (source: IMF). Note that methodologies for measuring financial literacy sometimes differ across countries – see Lusardi and Mitchell (2014) for full details.

Figure 2: Payment adoption by financial literacy



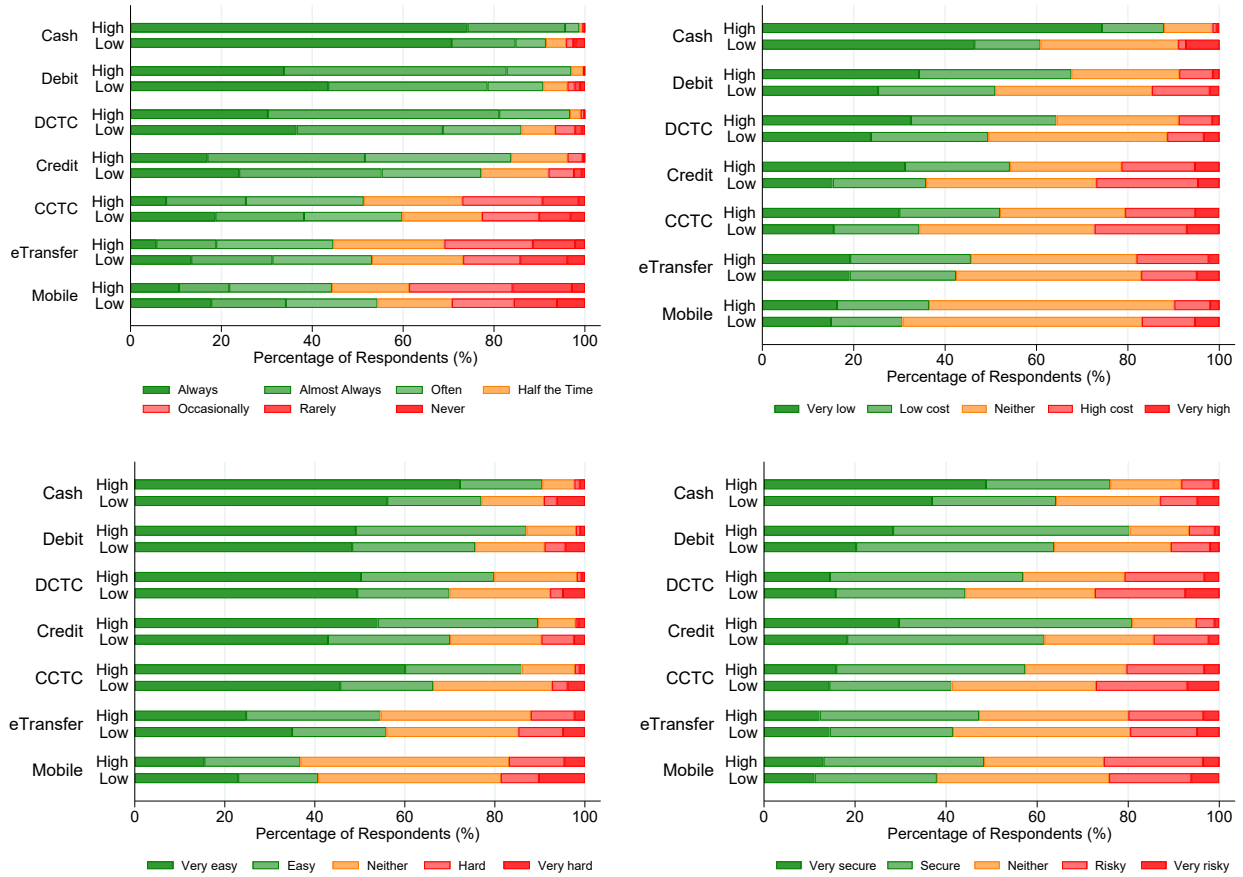
Note: This figure shows the percentage of low- and high-literacy respondents who used each method of payment in the past year to make a purchase at a retailer or business (left) or a person-to-person transfer (right). TNG refers to the tap and go feature of a debit or credit card. CNP refers to the chip and pin feature of a debit or credit card. PA refers to an online payment account such as PayPal. DC refers to a digital currency such as Bitcoin.

Figure 3: Payment volume and value shares by financial literacy



Note: Volume measures the share of transactions made using each method of payment. Value measure the share of the value of these transactions by each method of payment. Results are shown by level of financial literacy.

Figure 4: Perceptions of payment methods by financial literacy



Note: Respondents were asked to rank how commonly accepted, costly, easy of use, and risky each method of payment is. Acceptance was measured on a 7-point scale while others were measured on a 5-point scale. This graph shows the proportion of responses in each category by method of payment for low- and high-literacy individuals. CTC is the contactless feature of a credit or debit card.

Table 1: Financial literacy questions

Concept	Question	Response options
Interest	<i>Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have left in the account if you left the money to grow?</i>	More than \$102 Exactly \$102 Less than \$102 Do not know
Inflation	<i>Imagine the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with this money in this account?</i>	More than today Exactly the same Less than today Do not know
Risk	<i>Please tell me whether or not this statement is true or false: Buying a single company's stock usually provides a safer return than a mutual fund of stocks.</i>	True False Do not know

Note: This table shows the “Big Three” financial literacy questions included in the 2017 MOP Survey. Correct responses are highlighted in bold. The questions were developed by [Lusardi and Mitchell \(2011a\)](#).

Table 2: **Financial literacy: international comparison**

Country	Year	Correct1	DK1	Correct2	DK2	Correct3	DK3	All3Correct	AtLeastOneDK	N
USA	2009	0.649	0.135	0.643	0.142	0.518	0.337	0.302	0.424	1,488
Netherlands	2010	0.848	0.089	0.769	0.135	0.519	0.332	0.448	0.376	1,665
Germany	2009	0.824	0.110	0.784	0.170	0.618	0.323	0.532	0.370	1,059
Japan	2010	0.705	0.125	0.588	0.286	0.395	0.561	0.270	0.615	5,268
Australia	2012	0.831	0.064	0.693	0.130	0.547	0.376	0.427	0.413	1,024
N. Zealand	2009	0.860	0.040	0.810	0.050	0.490	0.020	0.240	0.070	850
Switzerland	2011	0.793	0.028	0.784	0.042	0.735	0.130	0.501	0.169	1,500
Italy	2007	0.400	0.282	0.593	0.307	0.522	0.337	0.249	0.449	3,992
Sweden	2010	0.352	0.156	0.595	0.165	0.684	0.184	0.214	0.347	1,302
France	2011	0.480	0.115	0.612	0.213	0.668	0.146	0.309	0.334	3,616
Russia	2009	0.363	0.329	0.508	0.261	0.128	0.354	0.037	0.537	1,366
Romania	2011	0.413	0.344	0.318	0.404	0.147	0.635	0.038	0.755	1,030
Canada	2017	0.835	0.066	0.640	0.125	0.582	0.339	0.422	0.386	3,101

Note: 2017 Canadian numbers come from the 2017 MOP Survey. Other countries come from various studies, and were collected by [Lusardi and Mitchell \(2014\)](#). Questions 1 to 3 correspond to the three financial literacy questions defined in Table 1, though methodologies sometimes differ across countries – see [Lusardi and Mitchell \(2014\)](#) for full details.

Table 3: Demographic effects on answering the “Big Three” questions

	Q1		Q2		Q3	
	Correct	DK	Correct	DK	Correct	DK
REGION						
Atlantic	-	-	-	-	-	-
Quebec	-0.127	-0.467	-0.022	-0.016	-0.254	-0.585*
Ontario	0.115	-0.486	0.253	-0.202	-0.003	-0.456
Prairies	0.473*	0.092	0.282	0.014	0.139	-0.157
BC	0.524*	-0.154	0.352	-0.192	0.189	-0.166
AGE						
18-34	-	-	-	-	-	-
35-54	0.224	0.059	0.711***	0.112	0.919***	0.690***
55+	0.441**	0.521*	1.346***	-0.468**	0.955***	0.196
INCOME						
<\$45K	-	-	-	-	-	-
\$45K–\$85K	0.260	-0.172	0.219*	-0.080	0.255	-0.172
\$85K+	0.828***	0.244	0.362**	-0.547***	0.243	-0.694***
GENDER						
Male	-	-	-	-	-	-
Female	-0.324**	0.282	-0.450***	0.420***	0.299*	0.966***
EDUCATION						
High School	-	-	-	-	-	-
College	0.392**	-0.135	0.576***	0.144	0.426**	0.203
University	0.539***	-0.439*	1.210***	0.050	0.700***	-0.073
EMPLOYMENT						
Full-time	-	-	-	-	-	-
Part-time	0.299	0.170	0.144	-0.104	-0.547**	-0.499**
Unemployed	0.07	0.485**	0.271**	0.600***	-0.521***	-0.231
MARITAL STATUS						
Single	-	-	-	-	-	-
Married/common law	-0.197	-0.183	0.209	-0.065	-0.376	-0.413*
Separated/divorced	-0.09	-0.098	0.163	0.093	0.810**	-0.650*
HOUSEHOLD SIZE						
1	-	-	-	-	-	-
2	0.241	0.184	0.036	0.163	0.427*	0.296
3+	0.057	-0.265	-0.497***	-0.337	0.070	0.272
URBAN/RURAL						
Rural	-	-	-	-	-	-
Urban	-0.01	0.187	-0.94	-0.304	-0.332	-0.415

Note: This table presents the results from three multinomial choice models for each of the “Big Three” financial literacy questions. For each question, a respondent could answer correctly, incorrectly, or with “Don’t Know.” For each model, incorrect answers are chosen as the baseline, so that estimates should be interpreted relative to it. For example, a positive value for university education under “Correct” implies those with a university education are more likely to answer a question correctly.

Table 4: Multinomial logit of payment choice

	Cash	Debit	Credit
Constant		-1.145***	-2.953***
Transaction value		0.0411***	0.0489***
Transaction value ²		-0.0000894***	-0.0000996***
Revolve		0.740***	-0.695***
Rewards		-0.250**	1.220***
FINANCIAL LITERACY			
Medium		-0.0173	0.393***
High		-0.167	0.556***
AGE			
25 to 34		-0.199	0.574*
35 to 44		-0.391	0.138
45 to 54		-0.406	-0.139
55 to 64		-0.687**	-0.394
65+		-0.785**	-0.150
Education			
College		-0.0874	0.181*
University		-0.0794	0.483***
INCOME			
\$45-\$85		0.0816	0.0740
\$85+		0.254*	0.160
GENDER			
Female		0.222**	0.0248
REGION			
Atlantic		0.345**	-0.136
Quebec		-0.174	-0.0368
Prairies		0.149	0.120
B.C.		-0.0266	0.171
HOME OWNERSHIP			
Own		-0.277***	0.0393
Live for free		-0.700***	-0.133
HOUSEHOLD SIZE			
2		0.0814	-0.127
3+		0.182	-0.139
EMPLOYMENT			
Full-time		0.306***	0.141
Part-time		0.229*	0.108
IMMIGRATION			
Not born in Canada		-0.00928	0.240**
URBAN / RURAL			
Urban		0.102	0.376***
<i>N</i>	8507		

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table estimates a multinomial logit where respondents could choose to pay with cash, debit, or credit for each transaction. Only the population owning credit cards is included. “Revolve” means that a respondent reported not paying the full balance on their credit card.

Table 5: **Relative perceptions of payment methods by financial literacy**

Perception	Financial literacy		
	Low	Medium	High
Ease			
Cash	1.000	1.000	1.000
Debit	1.047	0.944	0.969
Credit	1.034	0.942	0.989
Cost			
Cash	1.000	1.000	1.000
Debit	1.011	0.867	0.858
Credit	0.921	0.791	0.795
Security			
Cash	1.000	1.000	1.000
Debit	0.997	0.915	0.973
Credit	1.005	0.913	0.984

Note: Respondents rated each method of payment on ease, cost, and security from a scale of 1 to 5. This table measures relative perceptions as the rating of each method divided by the rating of cash. Therefore a measure above 1 implies a method of payment is viewed better than cash on average while a rating below 1 implies it is viewed worse.