Financial Literacy and Mobile Payment Behaviors

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A survey data of National Financial Capability Study (NFCS) is applied to investigate the relationships between financial literacy and the adoption of mobile/electronic payments in the US. The results show that financial literacy is significantly negatively related to the usage of mobile payment, indicating that people with higher financial literacy are less likely to use mobile payments since such mobile payment service is considered as a type of high-cost borrowing. We also find that gender, age, and level of income are the important factors that might affect the mobile payment services. Therefore, strengthening people's financial education is needed following the era of FinTech and expansive financial services.

Keywords: financial literacy, mobile payment, electronic payment, FinTech

INTRODUCTION

When compared to traditional financial services within the extant literature, there appears to be considerably less focus placed on the determinants of mobile/electronic payment use, which has become a rather common financial service in recent years. The main goal of this study represents an important issue for policymakers and government officials alike, since it has been argued that an increase in mobile payment use among individuals for consumption and convenience purposes would lead to a corresponding increase in social welfare. In the meantime, the exponential growth in financial technology (fintech) revolutionizes the way people make payments, decide about their financial investments, and seek financial advice. Another key background of the paper is that, in the US, the shift from using checks to other electronic payments seems much slower than that in other countries (Humphrey et al., 2000). Under this context, it is important to understand how financially knowledgeable people are and to what extent their knowledge of finance affects their financial decision-making.

Payment is the one area where the fintech industry has concentrated itself so far. Mobile payments such as Google Wallet, Apple Pay, Samsung Pay, Android Pay, or Starbucks mobile becomes increasingly popular. In fact, according to the U.S. Federal Reserve, 24% of smartphone owners reported the use of mobile payments in 2015, rising 100% from only four years earlier (Federal Reserve Board, 2016). New and rapidly expanding mobile payment options have made transactions easier, quicker, and more convenient than before (Falk et al., 2016). As this tool becomes more prevalent, it is increasingly important to understand what types of users they attract and whether technological innovation changes people's financial behaviors.

Given the importance of gaining a good understanding over mobile payment use by individuals, the purpose of this study is to investigate whether financial literacy plays a key role in this activity, since financial literacy is seen as an important determinant of the ability of individuals to process economic information and make a series of financial decisions. There has been a distinct lack of research effort placed into the relationship between financial literacy and individuals' mobile payment use. Financial literacy is defined as people's ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions (Lusardi & Mitchell, 2014). Although there are substantial empirical works of financial literacy's effects on financial behaviors, relatively scant studies have found a strong relationship between financial literacy and mobile payment.

To fill this research gap, we focus on mobile financial services and apply survey data of 2015 and 2018 National Financial Capability Study (NFCS), conducted by the Financial Industry Regulatory Authority (FINRA) Investor Education Foundation. These data set is the same with Lusardi et al. (2018) and Meyll and Walter (2019). Lusardi et al. (2018) studies the impact of financial technology on the financial behavior of the millennial generation in the U.S. Meyll and Walter (2019) investigate whether the use of mobile payment technology is associated with individuals' credit card behavior. Using the same NFCS dataset is helpful to confirm and expand this field about the relationship between financial literacy and mobile payment behaviors. We construct a measurement of financial literacy relating to mobile payment and then test whether individuals with lower levels of financial literacy tend to use mobile payment more frequently than individuals with higher levels of financial literacy. In other words, given that mobile payment can be viewed as a type of high-cost borrowing, understanding whether improving the financial literacy levels of individuals can assist them at using mobile payment more healthily is important.

We employ a list of six questions relating to interest rate, inflation, compound interest rate, bond prices, mortgage, and diversification to assess individual financial literacy levels, since this construction methodology enables us to measure certain aspects of financial knowledge closely relating to people's financial decisions. We use the frequency usage of mobile payment as the dependent variable, while the set of explanatory variables utilized in the regression analyses comprise financial literacy along with demographic controls (age, gender, education level, marital status, occupational status, residential location, and individual income).

Our regression results indicate the significant and diminishing relationships between financial literacy and the frequency usage of mobile payment and support the argument that mobile payment can be viewed as form of high-cost borrowing, as individuals with relatively low financial literacy levels are more likely to use it. This finding helps us to document the result from Meyll and Walter (2019), who find that individuals using smartphones to conduct mobile payments are more likely to exhibit costly credit card behavior.

The rest of this paper is divided into five sections. Section 2 presents a literature review of the relevant studies on mobile payment and financial literacy. Section 3 summarizes the research questions and the hypotheses. Section 4 explains the sources of the samples employed herein. Section 5 describes the procedures involved in measuring financial literacy and the empirical model and how the financial literacy indices are developed and used to investigate the possible effects of financial literacy on mobile payment. Section 6 presents the conclusions.

LITERATURE REVIEW

The analysis models in terms of mobile payment are introduced to explain computer-usage behaviors. Several models on the adoption of information technologies, such as the technology acceptance model (TAM), the unified theory of acceptance and use of technology (UTAUT), and the diffusion of innovation (DOI) theory, have been applied to conceptual as well as empirical studies before 2007, as described by Dahlberg et al. (2008). In addition to the factors in those models, trust, security, and cost are reported to strongly affect mobile payment adoptions.

Consumer adoption has become the largest category of mobile payment research since 2007 as measured by the number of articles. Slade et al. (2013) exclusively review mobile payment adoption papers,

while Dahlberg et al. (2015) consider that understanding consumer preferences and the reasons to use or not use a specific technology-enabled service is important for designing viable services that generate value to consumers and to other stakeholders of an ecosystem. Moreover, the only factor not reported to be important in articles prior to 2007 among the top-10 factors after 2007 is demographics (including age, gender, marital status, education, residential area, family origin, job, personal income, and household income).

Following this trend, the U.S. Federal Reserve Board began conducting annual surveys of consumers' use of mobile financial services in 2011. The series examines trends in the adoption and use of mobile banking, payments, and shopping behavior and how the evolution of mobile financial services affects consumers' interaction with financial institutions. In this series of annual surveys, demographics are necessarily and important factors, including age, gender, education, ethnicity, marital status, income, living area, and occupation. The key findings of the 2016 survey are: (1) 24% of all mobile phone owners reported having made a mobile payment in the 12 months prior to the survey; and (2) Higher shares of younger adults, Hispanics, and non-Hispanic blacks reported using mobile banking and mobile payments than the overall survey averages.

Whereas research has been done on factors that lead individuals to adopt and use mobile payment systems, little is known with regard to how mobile payment use impacts their spending behaviors. Such studies tend to emphasize the benefits to merchants of mobile payments, positioning these services as a means of increasing consumer spending (Alliance, 2008). From a consumer perspective, mobile payments are promoted for the benefit of convenience, with little attention to the potential downside of increased spending. Meyll and Walter (2019) find that individuals using their smartphones to conduct mobile payments are more likely to exhibit costly credit card behavior. Their findings suggest a positive relationship between innovative payment methods and increases in individuals' overall spending.

There is also evidence that financial literacy affects consumer spending. People who are more financially literate are less likely to have credit card debt and more likely to pay the full balance of their credit card each month rather than just the minimum due (Lusardi and Tufano, 2015). Similarly, Mottola (2013) finds that those with low financial literacy are more likely to engage in costly credit card behavior, while individuals with greater financial literacy levels are less likely to use high-cost borrowing methods, e.g., payday loans, pawn shops, auto title loans, and refund anticipation loans (Lusardi and de Bassa Scheresberg, 2013; Farías, 2019). A recent report on the millennial generation in the U.S. (currently, 18- to 34-year-olds) notes the impact of financial technology (fintech) on their financial behavior (Lusardi et al., 2018). They consider that mobile payment users of the young generation display expensive financial behaviors, such as spending more than they earn, using alternative financial services, and occasionally overdrawing their checking accounts. Thus, they suppose that mobile payment users display lower levels of financial literacy, but their sample is limited to the young generation in the U.S.

Four sets of general conclusions emerge from this literature review. The first refers to mobile payment use growth follows along with the growth in smartphones and the Internet. The second refers to the relationship between mobile payment use and demographic variables. These studies discover a strong correlation between the former and age, education, income level, and ethnicity. Evidence appears that younger adults, higher educated individuals, and those at the higher income level are more likely to use mobile payment technology. The third refers to the relation between the financial literacy level and borrowing behavior. It has been proven that highly literate people are less likely to have credit card debt and more likely to pay the full balance of their credit card bill each month than low literate people. Highly literate people are less likely to use high-cost borrowing methods, whereas low literate people prefer to use high-cost borrowing methods. The fourth conclusion refers to the gap that exists in previous works on the relationship between financial literacy and mobile payment use. Our study examines the relationship between financial literacy and payment decisions.

RESEARCH QUESTIONS AND HYPOTHESES

This study intends to answer the following questions.

RQ1. What are the main factors that affect Americans' frequent use of mobile payments?

RQ2. Does financial literacy affect the use of mobile payments significantly? Why?

We believe that answering the first question will help to explore the level of mobile payments in the U.S. Answering the second question will help us find out the most influencing factors in the decision-making process of Americans concerning their use of mobile payments.

Based on the stated purpose of this study and on the research questions, we develop the following hypotheses.

H1. American's use of mobile payments is associated with financial literacy, age, gender, ethnicity, education, and income.

H2. Financial literacy negatively relates to the frequency usage of mobile payments.

H3. Younger, non-white, higher educated, or higher income individuals are more likely to use mobile payments frequently.

We set up these hypotheses to examine what factors influence the frequent usage of mobile payments. According to Meyll and Walter (2019), people who use mobile payments are more likely to exhibit costly credit card behavior. For financial planning improvement, what is the educational program most needed, and at whom should it be directed? For example, does the younger generation need more financial education than seniors, and in what gender or at what income level? For the same reason, it also might be important to consider the effect of education level, type of work, and employment status. Finally, the relationship between mobile payment use and financial literacy can also be considered, and this is reflected in H2.

DATA SOURCES

Dataset and Sample Selection

This study uses a dataset from the 2015 and 2018 state-by-state version of the National Financial Capability Study (NFCS) commissioned by the Financial Industry Regulatory Authority (FINRA) Investor Education Foundation. This survey contains information collected from approximately 500 respondents per state, with a total sample size of 25,509. NFCS provides detailed measures of financial literacy, as well as socio-demographic, behavioral, and attitudinal traits of U.S. households. Our sample is 21,374 after excluding missing responses.

Measurement of Variables

Respondents were asked about their usage frequency of mobile payment (dependent variable) according to three categories: 1 = never, 2 = sometimes, 3 = frequently. NFCS also collects the answers to a series of questions designed to measure financial literacy.

Financial literacy is measured by six questions about the fundamental concepts of personal finance as it relates to financial literacy, covering interest rates, inflation, bond price, mortgage, and diversification. This study uses the financial literacy variable in the iterated principal factor method. Following van Rooij, Lusardi, and Alessie (2011) and Lusardi and Mitchell (2014), we generate factor loadings from the iterated principal factor method that capture the extent to which each variable contributes to the shared variation among the financial literacy measures. Thus, we obtain a composite index of financial literacy derived by the Bartlett method.

Descriptive Statistics and Correlation Tests

To explore the relationship between mobile payment and demographic characteristics, we employ the following characteristics to determine which type of respondent frequently uses mobile payments: financial literacy, region, age, gender, ethnicity, marital status, education, income, and employment. These demographic characteristics have been shown to impact personal financial behavior and the probability of using mobile payments when making decisions over payment methods.

First, the survey results in Table 1 indicate that 18.60% of respondents with a financial literacy index of less than 2 have used mobile payments, or about four times as much as that of respondents with an index higher than 4 (4.30%). This result implies that the financial literacy of the respondents does influence their mobile payment use, which is consistent with the finding of Lusardi et al. (2018). Second, younger respondents demonstrate a higher tendency for mobile payment use versus senior respondents. Third, among respondents who are Non-White, 9.60% use mobile payments frequently, or about 2.4 times that of respondents who are White Alone. Fourth, there is no significant difference in mobile payment experience between respondents who are Married and Single. Finally, the group of respondents who are self-employed exhibits a high frequency rate of mobile payment use.

To prevent the correlation of the variables from influencing the empirical validity, we next perform a variance inflation factor (VIF) test. Table 2 summarizes the results, showing that all the VIF values for the variables employed herein do not exceed 10, and the average VIF value is 2.5082, indicating the absence of collinearity in the samples.[1]

TABLE 1
SURVEY RESULTS OF MOBILE PAYMENT IN 2015 AND 2018 NATIONAL FINANCIAL CAPABILITY STUDY

	Definitions	Observations	Average Percentage of Respondents: How often do you use your mobile phone to pay for a product or service?		
			Never	Sometimes	Frequently
Total Number of Respondents	The effective sample from the 2015 and 2018 NFCS.	21374	77.63%	16.91%	5.46%
Financial Literacy Index					
0	The number of questions the survey respondent answered correctly ranging from 0 to 6	828	67.00%	23.20%	9.80%
1		1723	68.40%	22.80%	8.80%
2		3277	68.80%	21.20%	10.00%
3		4335	75.50%	18.10%	6.40%
4		4717	81.40%	14.80%	3.80%
5		4225	84.10%	13.30%	2.60%
6		2269	85.50%	12.70%	1.70%
Census Region					
Northeast	Only one category can be selected: The selected category is defined as 1, and otherwise 0.	3896	75.46%	18.92%	5.62%
Midwest		5005	80.70%	15.00%	4.20%
South		6985	76.50%	17.30%	6.20%
West		5488	77.80%	16.70%	5.50%
Age					
18-24	Only one category can be selected:	1796	53.51%	33.96%	12.53%
25-34		3856	58.20%	30.40%	11.40%
35-44		3591	69.80%	22.60%	7.60%

	Definitions	**Observations**	**Average Percentage of Respondents:** **How often do you use your mobile** **phone to pay for a product or service?**		
			Never	**Sometimes**	**Frequently**
45-54	The selected category is defined as 1, and otherwise 0.	3968	82.40%	14.00%	3.60%
55-64		3894	91.10%	7.50%	1.40%
65 or senior		4269	95.20%	4.00%	0.80%
Gender					
Male	Only one category can be selected: The selected category is defined as 1, and otherwise 0.	9839	75.06%	19.12%	5.82%
Female		11535	79.80%	15.00%	5.20%
Ethnicity					
While Alone NH	Only one category can be selected: The selected category is defined as 1, and otherwise 0.	15693	81.99%	14.03%	3.98%
Non-White		5681	65.60%	24.90%	9.60%
Marital Status					
Married	Only one category can be selected: The selected category is defined as 1, and otherwise 0.	12354	78.70%	16.30%	5.10%
Living with partner		1449	70.53%	21.39%	8.07%
Single		7571	77.30%	17.10%	5.60%
Education					
< High School	Only one category can be selected: The selected category is defined as 1, and otherwise 0.	334	81.6%	14.70%	5.70%
High School		3181	77.2%	13.30%	5.10%
GED		1225	79.6%	14.80%	8.00%
Some college		5880	77.4%	16.00%	4.40%
Associate's degree		2382	74.7%	17.10%	5.50%
Bachelor's degree		5148	74.9%	19.60%	5.70%
Post-graduate degree		3224	77.6%	18.80%	6.30%
Income					
<$15,000	Only one category can be selected: The selected category is defined as 1, and otherwise 0.	1797	80.40%	13.20%	6.40%
$15K-$24,999		2148	81.60%	13.50%	4.90%
$25K-$34,999		2244	78.00%	16.70%	5.30%
$35K-$49,999		3151	80.80%	14.80%	4.40%
$50K-$74,999		4628	76.70%	18.10%	5.20%
$75K-		3120	74.20%	19.10%	6.60%

	Definitions	Observations	Average Percentage of Respondents: How often do you use your mobile phone to pay for a product or service?		
			Never	Sometimes	Frequently
$99,999					
$100K-$149,000		2875	75.30%	18.70%	6.00%
> $150,000		1411	75.50%	19.50%	5.00%
Employment					
Self-employed	Only one category can be selected:	1543	78.48%	15.36%	12.64%
Full-time	The selected category	8890	68.80%	23.30%	7.90%
Part-time	is defined as	1981	75.70%	18.10%	6.30%
Homemaker	1, and otherwise 0.	1822	80.80%	16.00%	3.20%
Student		770	60.10%	32.10%	7.80%
Disabled		857	90.00%	7.60%	2.50%
Unemployed		914	79.20%	14.70%	6.10%
Retired		4597	94.30%	4.60%	1.00%

TABLE 2
VARIANCE INFLATION FACTOR TEST RESULTS OF THE VARIABLES

Variable	VIF
Midwest	1.767
South	1.906
West	1.816
Female	1.137
Age_25	3.027
Age_35	3.073
Age_45	3.284
Age_55	3.446
Age_65	4.653
Non_White	1.109
Education	1.289
Married	4.268
Single	4.198
Income	1.763
employment_1	4.067
employment_2	2.118
employment_3	2.176
employment_4	1.694
employment_5	1.589
employment_6	1.587
employment_7	3.9
FL_Index	1.314
Average VIF	2.5082

RESULTS AND ANALYSIS

Mobile Payment and Financial Literacy

We employ the OLS and ordered logit regression model to investigate the relationship between mobile payment use and the financial literacy measures. First, we analyze how respondents' personal characteristics influence their mobile payments by OLS in Table 3. The coefficient on the literacy term is negative and statistically significant. In other words, financial literacy is negatively linked to mobile payment use, even after accounting for a rather complete set of control variables. This result supports the finding of Lusardi et al. (2018), who state that mobile payment users in the U.S. young generation are more likely to engage in costly spending behaviors.

TABLE 3
REGRESSION ANALYSIS OF FINANCIAL LITERACY AND MOBILE PAYMENT

	Model 1. OLS			Model 2. Order Logit			
	Coefficient	Std.	P Value	*Coefficient*	Std.	P Value	Odds Ratio
Constant	1.4572	0.0264	0.0001***				
Financial Literacy Index	-0.0813	0.0040	0.0001***	-0.3636	0.0195	0.0001***	0.6951
Census Region (reference category: Northeast)							
Midwest	-0.0567	0.0109	0.0001***	-0.3139	0.0558	0.0001***	0.7306
South	-0.0235	0.0102	0.0219**	-0.1355	0.0507	0.0076***	0.8733
West	-0.0386	0.0107	0.0003***	-0.209	0.0536	0.0001***	0.8114
Age (reference category: 18-24)							
Age_25	-0.0976	0.0158	0.0001***	-0.3671	0.0628	0.0001***	0.6927
Age_35	-0.2407	0.0163	0.0001***	-0.8443	0.0676	0.0001***	0.4299
Age_45	-0.3823	0.0162	0.0001***	-1.4701	0.0715	0.0001***	0.2299
Age_55	-0.4620	0.0168	0.0001***	-2.094	0.0841	0.0001***	0.1232
Age_65	-0.4821	0.0188	0.0001***	-2.5511	0.1132	0.0001***	0.078
Gender							
Female	-0.0652	0.0074	0.0001***	-0.3469	0.0377	0.0001***	0.7069
Ethnicity							
Non-White	0.1182	0.0083	0.0001***	0.5143	0.0384	0.0001***	1.6725
Marital Status (reference category: Living-with-partner)							
Married	0.0157	0.0146	0.2809	0.0452	0.0673	0.5013	1.0463
Single	0.0075	0.0149	0.6163	-0.0306	0.0691	0.6573	0.9698
Education	0.0114	0.0024	0.0001***	0.0646	0.0122	0.0001***	1.0668
Income	0.0245	0.0023	0.0001***	0.13	0.0118	0.0001***	1.1388
Employment (reference category: Self-employed)							
Full-time	0.0288	0.0142	0.0431**	0.1249	0.0706	0.077*	1.133
Part-time	-0.0171	0.0175	0.3275	-0.0504	0.0878	0.5655	0.9508
Homemaker	-0.1039	0.0184	0.0001***	-0.4024	0.0945	0.0001***	0.6687
Student	-0.0813	0.0243	0.0008***	-0.1752	0.1059	0.0981*	0.8393
Disabled	-0.0725	0.0224	0.0012***	-0.5074	0.1376	0.0002***	0.6021
Unemployed	-0.0506	0.0217	0.0196**	-0.2317	0.1109	0.0367**	0.7932
Retired	-0.0275	0.0167	0.1005	-0.3018	0.1078	0.0051***	0.7395

R-squared	0.1656	
Adjusted R-squared	0.1648	
Pseudo R^2		0.1630

Note: Detailed definitions of the variables are provided in Table 1; the dependent variable in this table is the frequency usage of mobile payment. We use OLS (Model 1) and ordered logit model (Model 2) to investigate the relationship between mobile payment usage and financial literacy. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The OLS empirical results also indicate that Region, Age, Female, Non-White, Education, Income, and Employment all significantly influence respondents' mobile payment use. Moreover, Non-White, higher educated, and higher income individuals are significantly positively related with the frequent usage of mobile payment. We also find a decreasing negative relationship between the frequent usage of mobile payment, Age Groups, and Female. Full-time employed people and those in the Northeast are most likely to use mobile payments compared with the other categories under Employment and Region. Overall, our hypothesis H1 is supported. The usage of mobile payment in the U.S. is indeed associated with demographic characteristics.

We next input the ordered logit model into our empirical model, and the results suggest that even though the personal characteristic variables are controlled, the financial literacy index still negatively influences mobile payment use significantly - that is, financially literate respondents are less likely to use mobile payments. We examine the odds ratio (OR) as indicated in Model 2 (Table 3), identifying when financial literacy increases by one unit that the probability of mobile payment use drops by 30.49%.[2] It shows that financial literacy does affect the behaviors of the respondents' mobile payment use, verifying that financial literacy among U.S. people is the key variable influencing their use of mobile payments. Moreover, this result also explains the finding from Meyll and Walter (2019), who state that individuals using their smartphones to conduct mobile payments are more likely to exhibit costly credit card behavior. Based on our finding, mobile payments are usually connected with a credit card, and so they can be viewed as form of a high-cost borrowing. This is the reason why people with lower levels of financial literacy are more likely to use mobile payments and confirms H2 for a negative significant relationship between financial literacy level and the frequency usage of mobile payments.

Consistent with the OLS results, we also find that other demographic characteristics are still related with the frequency usage of mobile payment. Except for females, the coefficients of other demographic variables are in line with prior studies analyzing the determinants of individuals' credit card behavior (Mottola, 2013; Meyll and Walter, 2019). We examine OR regarding gender, determining when the respondent group comprising males is employed as the reference variable that the probability of mobile payment use by them is 1.41 times higher than that by females.[3] In other words, the probability of mobile payment use by men is higher than that by women. This gender gap could be explained from Meyll and Paul (2019). Their studies found women to be less likely to become over-indebted even after controlling for risk attitude, financial literacy and socio-demographic characteristics. Furthermore, we also find a monotonically decreasing probability of greater frequency of mobile payment use for higher Age Groups. Non-White is associated with a 67% increase in the probability of mobile payment use. Higher education levels and higher income levels raise the probability of mobile payment use.

In summary, using both OLS and Ordered Logit models, we find that financial literacy has a negative influence on the frequency usage of mobile payments, even after controlling for demographics. Individuals who use mobile payments frequently suggest that they are also more likely to use costly credit card spending due to being less financially literate.

Robustness Tests: Exploring the Endogenous Problem
In Table 4 we take up the ancillary question of whether financial literacy may itself be endogenous. In other words, financial literacy might be the result of choice. Thus, for example, some who will use mobile payments may invest in financial education that in turn boosts their financial literacy levels. For this reason,

a negative relationship between mobile payment use and financial literacy could be contaminated due to reverse causality.

To address the endogenous problem, it is useful to re-estimate the impact of financial literacy on mobile payment by controlling for possible causality with an Instrumental Variables (IV) approach and two- stage Probit regression. The purpose is to verify that an increase in financial literacy is the reason that people tend to not use mobile payments. Furthermore, among the relevant studies on financial literacy, Van Rooij et al. (2011 and 2012) already evaluate the problems of endogeneity. Therefore, we refer to the research methods proposed by Van Rooij et al. (2011) for verifying endogeneity, employing the following questionnaire questions as IVs: "Are you covered by health insurance?" and "How would you rate your current credit record?."[4,5]

Table 4 presents the results of using IVs in the two-stage Probit regression model, showing that financial literacy has a significant negative influence on mobile payments. Specifically, the empirical results in Table 4 verify the findings presented in Table 3 that financially literate respondents are less likely to use mobile payments. Our results indicate that the impact of financial literacy on mobile payments is still negative and statistically significant. It appears that financial literacy does drive mobile payment use, even after accounting for endogeneity and possible error in the financial literacy measures.

TABLE 4
TWO-STAGE ORDERED PROBIT REGRESSION ANALYSIS OF FINANCIAL
LITERACY AND MOBILE PAYMENT

Dependent Variable	Respondents Who Have Used Mobile Payments		
	Coefficient	Standard Error	P value
First-Stage Financial Literacy Index	-0.1842	0.0395**	0.0001
Census Region			
Midwest	-0.1847	0.0311**	0.0001
South	-0.0743	0.0286**	0.0093
West	-0.1314	0.0300**	0.0001
Age			
Age_25	-0.2144	0.037**	0.0001
Age_35	-0.5292	0.0394**	0.0001
Age_45	-0.9114	0.0406**	0.0001
Age_55	-1.2605	0.0454**	0.0001
Age_65	-1.4830	0.0574*	0.0001
Gender			
Female	-0.1230	0.0207**	0.0001
Ethnicity			
Non-White	0.3317	0.0217**	0.0001
Marital Status			
Married	0.0280	0.0382**	0.4640
Single	-0.0144	0.0391**	0.7130
Education	0.0117	0.0067***	0.0802
Income	0.0601	0.0068***	0.0001
Employment			
Full-time	0.0765	0.0392**	0.0512
Part-time	-0.0086	0.0487**	0.8591
Homemaker	-0.2389	0.0522*	0.0001
Student	-0.1256	0.0608*	0.0388
Disabled	-0.2434	0.0714*	0.0007
Unemployed	-0.1371	0.0611*	0.0249

	-0.1255	0.0547*	0.0218
Retired			
Pseudo R²	0.1300		

Note: The dependent variable of the first-stage is financial literacy index and dependent variable of the second-stage is the frequency usage of mobile payment. Please see Table 1 for definition of our variables. The instrumental variables in the first stage are from the two NFCS questionnaire question results. These two questions are as follow: "Are you covered by health insurance?" and "How would you rate your current credit record?". ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.

Robustness Tests: Ordered Logit Regression of Mobile Payment and Different Financial Literacy

In order to assess the robustness of the empirical results, we employ two additional measurements of financial literacy: (1) one is set equal to the number of questions the survey respondent answered correctly ranging from 0 to 6; and (2) the other follows the three basic questions (since dubbed the "Big Three") measure from Lusardi and Mitchell (2008 and 2014). The Big Three measure has been fielded in many surveys in the U.S., including the National Financial Capability Study (NFCS) and more recently the Survey of Consumer Finances (SCF), as well as in many national surveys around the world. It has also become the standard way to measure financial literacy in surveys used by the private sector.

Table 5 shows the results of the robustness check, indicating that financial literacy has a significant negative influence on mobile payment use. Furthermore, senior respondents and females use mobile payments less than younger respondents and males. Overall, the robustness results in Table 5 support the empirical results in Table 3.

TABLE 5
ORDERED LOGIT REGRESSION ANALYSIS OF DIFFERENT FINANCIAL LITERACY LEVELS AND MOBILE PAYMENT

	Model 1				Model 2			
	Coefficient	Std.	P Value	Odds Ratio	Coefficient	Std.	P Value	Odds Ratio
Big Three Financial Literacy Index	-0.4292	0.0188	0.0001***	0.651				
Financial Literacy Index					-0.2048	0.0124	0.0001***	0.8148
Census Region								
Midwest	-0.3117	0.0560	0.0001***	0.7322	-0.3193	0.0557	0.0001***	0.7267
South	-0.1402	0.0509	0.0059***	0.8692	-0.1368	0.0507	0.0069***	0.8722
West	-0.2000	0.0538	0.0002***	0.8187	-0.2155	0.0536	0.0001***	0.8061
Age								
Age_25	-0.3676	0.063	0.0001***	0.6924	-0.3688	0.0627	0.0001***	0.6915
Age_35	-0.8292	0.0678	0.0001***	0.4364	-0.8585	0.0675	0.0001***	0.4238
Age_45	-1.4366	0.0717	0.0001***	0.2377	-1.4924	0.0713	0.0001***	0.2248
Age_55	-2.0547	0.0844	0.0001***	0.1281	-2.1206	0.0840	0.0001***	0.1200
Age_65	-2.5109	0.1133	0.0001***	0.0812	-2.5807	0.1131	0.0001***	0.0757
Gender								
Female	-0.3648	0.0378	0.0001***	0.6943	-0.3412	0.0377	0.0001***	0.7109
Ethnicity								
Non-White	0.5121	0.0385	0.0001***	1.6688	0.5252	0.0383	0.0001***	1.6908
Marital Status								
Married	0.0427	0.0675	0.5265	1.0437	0.0467	0.0672	0.4870	1.0478
Single	-0.0221	0.0692	0.7497	0.9782	-0.0270	0.0690	0.6957	0.9734

Education	0.0705	0.0122	0.0001***	1.0731	0.0593	0.0122	0.0001***	1.0611
Income	0.1302	0.0118	0.0001***	1.1390	0.1269	0.0118	0.0001***	1.1353
Employment								
Full-time	0.1328	0.0708	0.0609*	1.1420	0.1231	0.0705	0.0809*	1.1310
Part-time	-0.0509	0.0881	0.5633	0.9504	-0.0447	0.0876	0.6102	0.9563
Homemaker	-0.4173	0.0949	0.0001***	0.6588	-0.3985	0.0944	0.0001***	0.6713
Student	-0.1606	0.1063	0.1307	0.8516	-0.1783	0.1058	0.0918*	0.8367
Disabled	-0.4864	0.1379	0.0004***	0.6148	-0.5031	0.1374	0.0003***	0.6047
Unemployed	-0.2195	0.1114	0.0487**	0.8029	-0.2278	0.1107	0.0395**	0.7962
Retired	-0.2981	0.1079	0.0057***	0.7422	-0.3010	0.1077	0.0052**	0.7401
Pseudo R^2	0.1540				0.1420			

Note: Detailed definitions of the variables are provided in Table 1. The financial literacy index of Model 1 follows the traditional three basic financial literacy questions measure from Lusardi and Mitchell (2008) and of Model 2 set equal to the number of questions the survey respondent answered correctly. Then we use ordered logit model to re-investigate the relationship between frequency usage of mobile payment and different financial literacy measures. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

CONCLUSION

Rapid innovation in financial technology (FinTech) is spreading from payments to other areas of consumer finance, but despite the industry's rapid growth and its impact on the way people spend money and make financial decisions, little research exists on this subject as it concerns mobile payment use. This study examines the ways in which financial literacy affects the consumption payment decisions taken by retail investors. The 2015 and 2018 state-by-state version of the National Financial Capability Study (NFCS) in the U.S. is utilized to investigate the relationships of financial literacy and the adoption of mobile payments. The empirical results reveal that people with lower levels of financial literacy are more likely to use mobile payment technology and these users demonstrate several risk factors connected with their financial management. For example, they are much more likely to overdraw their checking accounts, use credit cards expensively, and use high-cost borrowing methods. However, younger, male, highly educated, and people with higher incomes would increase the usage frequency of mobile payment services. Therefore, improving and enhancing people's financial education is ctitical following the era of FinTech and expansive financial services.

ENDNOTES

[1.] The correlation coefficients of all the variables range from -0.7 to 0.7; thus, no high correlation is present. However, because of word limits, we do not list a table of the correlation coefficient matrix, but offer it upon request.

[2.] When financial literacy increases by one unit, the probability of mobile payment use by respondents falls by (0.6951-1)*100% = - 30.49%.

[3.] Because the group comprising male respondents is employed as the reference variable with an odds ratio set as one, the ratio of the odds ratio for females to the odds ratio for males is 1.4146.

[4.] Van Rooij et al. (2012) report that obtaining an appropriate IV is difficult; consequently, we maintain a state of reservation for the selected IVs employed herein to fully resolve the doubts regarding the endogeneity problem.

[5.] The Question H1 and J32 of the 2015 and 2018 NFCS investigate respondents about their health insurance and credit record, separately. The main items of H1 are "Yes" and "No". The main items of J32 include "Very bad", "Bad", "About average", "Good", and ₃ Very good".

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