



Influences of Mobile Payment Usage on Financial Behaviors

Chih-Feng Liao^{1,*} and Chun-Da Chen²

1. *Department of Finance and Banking, Shih Chien University, Taiwan*

2. *Department of Economics and Finance, Lamar University, U.S.A.*

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ABSTRACT

This study analyzes the usage of mobile payment in various financial behaviors in the US. Results of the 2015 and 2018 National Financial Capability Study indicate that mobile payment usage negatively associates with the performance of positive financial behaviors. The results are robust across different measurements of financial behaviors and particularly address a potential reverse causality issue. This study provides a comprehensive financial profile of mobile payment users with important insights for policymakers and financial practitioners.

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Keywords: Mobile payment; Financial behavior; Financial literacy; Fintech

JEL classification: D12, D14

* Corresponding author: Chih-Feng Liao, E-mail: 100160@mail.usc.edu.tw, Associate Professor of Finance, Department of Finance and Banking, Shih Chien University, No. 70, Dazhi St., Zhongshan Dist., Taipei City, Taiwan, 10065. TEL: (886) 2-2538-1111 ext. 8713. FAX: (886) 2-2538-1111 ext. 8714.

1. Introduction

The usage of mobile payment has become a common financial service in recent years. However, extant literature has placed little focus on its determinants compared with those of traditional financial services. An increasing usage of mobile payment among different individuals for consumption and convenience purposes has been argued to result in a corresponding increase in social welfare. The main goal of this study represents an important issue for policymakers and government officials among others. The present exponential growth in financial technology (fintech) has revolutionized people's payment modes, financial investment decisions, and financial consultation. Another key background of this study is that the transition of payment forms from writing checks to other electronic types of payments, which is much slower in the U.S. than those in other countries (Humphrey et al., 2000). Therefore, understanding people's level of financial knowledge and the extent to which this knowledge affects their financial decision-making is important.

The fintech industry has concentrated on the area of payment thus far. Mobile payments, such as Google Wallet, Apple Pay, Samsung Pay, Android Pay, and Starbucks mobile, become increasingly popular. According to the U.S. Federal Reserve, 24% of smartphone owners reported the use of mobile payments in 2015, rising 100% higher than that in only 4 years earlier (Federal Reserve's 2016 Survey of Consumer Finances, 2016). New and rapidly expanding mobile payment options have made regular transactions easier, quicker, and more convenient than before (Falk et al., 2016). Afawubo et al. (2019) also show that following mobile money adoption, households benefit from weak ties of social groups, such as religious and informal saving groups. Understanding the types of users that mobile payment attracts and whether technological innovations change people's financial behaviors is increasingly becoming important as mobile payment options become more prevalent.

Obtaining a good understanding of mobile payment use by individuals is necessary for this study to investigate whether financial literacy plays a key role in such activity. Financial literacy is viewed as an important determinant of individuals' ability to process economic information and make various financial decisions. The relationship between individuals' mobile payment use and financial behaviors is comprehensively examined in the literature. Financial literacy refers to people's ability to process economic information and make informed decisions in financial planning, wealth accumulation, debt, and pensions (Lusardi & Mitchell, 2014). The effects of financial literacy on financial behaviors have been substantially investigated in empirical works. However, to our knowledge, no studies have found a strong relationship between mobile payment and financial behaviors.

We fill this research gap by focusing on mobile financial services and apply the survey data of the 2015 and 2018 National Financial Capability Study (NFCS) conducted by the Financial Industry Regulatory Authority (FINRA) Investor Education Foundation. The dataset applied in the research is the same as that in Lusardi et al. (2018) and Meyll and Walter (2019). Lusardi et al. (2018) study 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. However, Mora and Prior (2018) find a significant reduction in late repayment for an average user of mobile financial systems in an environment where loans have been paid late at least once. Using the 2015 and 2018 NFCS dataset helps confirm and expand this field on the relationship between mobile payment usage and financial behaviors. We construct a measure of financial behaviors toward mobile payment and then test whether individuals with a lower frequency of mobile payment usage tend to have healthier financial behaviors than those with a higher frequency. In other words, whether enhancing individuals' financial literacy can support them correctly in mobile payment must be determined as mobile payment can be viewed as high-cost borrowing.

We employ three questions about spending and overdraft to assess individual financial behaviors. This approach enables us to measure certain aspects of financial behaviors that are closely related to people's financial decisions. We use the frequency of mobile payment usage as the dependent variable, whereas a set of explanatory variables comprising of financial literacy and demographic controls (age, gender, education level, marital status, occupational status, residential location, and individual income) are utilized in regression analyses.

The results show that the frequency of mobile payment usage and financial behaviors have a significantly diminishing relationship. This finding suggests that mobile payment can be viewed as a type of high-cost borrowing, that is, people with healthy financial behaviors are less likely to use mobile payment. The finding is consistent with Meyll and Walter (2019), who find that individuals using smartphones for mobile payments are more likely to experience costly credit card behaviors.

The rest of this paper is divided into five sections. Section 2 presents a literature review of relevant studies on mobile payment and financial behavior. Section 3 summarizes the research questions and hypotheses. Section 4 explains the sources of the samples employed herein. Section 5 describes the procedures involved in measuring financial behaviors and the empirical model and investigates the effects of mobile payment on financial behaviors. Lastly, Section 6 presents the conclusions.

2. Literature Review

Numerous studies have investigated the effects of financial knowledge on financial behaviors. Hilgert et al. (2003) distinguished household financial behaviors into four categories: cash flow management, credit management, saving, and investing. They found the largest percentage in cash flow management (66%), followed by credit management (45%), saving (33%), and investing (19%) in groups with high-level financial participation. Their results indicated that financial knowledge has been associated with positive financial behaviors, such as having checking and saving accounts, paying bills on time, tracking expenses, and setting an emergency fund. Lusardi (2008) also found that insufficient financial knowledge has been associated with behaviors that led to financial mistakes, such as over-borrowing, high interest-rate mortgages, and limited savings and investments. Moreover, high levels of financial knowledge have been positively related with timely credit card payments monthly (Allgood and Walstad 2016), sound retirement plans (Lusardi and Mitchell 2014), timely mortgage payments (Gerardi et al. 2013), low costs associated with credit cards and mortgage loans (Huston 2012), precautionary savings (de Bassa Scheresberg 2013), and financial consultation (Allgood and Walstad 2016).

Several important control variables are also considered when examining the relationship between financial literacy and financial behaviors. These variables include gender, age, race, marital status, presence of children, employment status, education, and income. For example, Henager and Cude (2016) examined the relationships between financial literacy and financial behaviors among different age groups. Wagner and Walstad (2019) suggested that the effects of financial education courses at different education stages and combinations, namely, high school, college, and employment, are greater and more significant on long-term behaviors than on short-term behaviors.

Potential factors that contribute to positive financial behaviors have been researched. However, studies about how mobile payment usage influences financial behaviors are limited. Such studies tend to emphasize the benefits of mobile payments to merchants, positioning these services as a means of increasing consumer spending. Nevertheless, mobile payments are promoted due to convenience from the consumers' viewpoint, with little attention to the potential spending raise. However, Meyll and Walter (2019) found that individuals using their smartphones for mobile payments are more likely to conduct costly credit card behaviors. Their findings suggested a positive relationship between

innovative payment methods and increases in individuals' overall spending.

A review of the above-mentioned literature establishes four sets of general conclusions. First, the relationships between financial behaviors and financial literacy show that highly literate people are less likely to have good financial behavior and less likely to use high-cost borrowing methods, whereas less literate people prefer applying high-cost borrowing methods. Second, financial behaviors and demographic variables, namely, age, education, income level, and ethnicity, are strongly correlated. Evidence presents that senior, highly educated, and higher-income-level individuals are more likely to have healthy financial behaviors. Third, mobile payment usage and costly credit card behaviors positively correlate. Individuals who use their smartphones for mobile payment transactions are more likely to experience costly credit card behavior. Fourth, previous works on the relationships between mobile payment usage and short-term financial behaviors have certain gaps. Thus, our study fills this gap by examining the relationships between mobile payment and short-term financial behaviors.

3. Research Questions and Hypotheses

This study intends to answer the following question: How does mobile payment usage affect financial behaviors significantly? We believe answering such a question will help determine the key factors in the decision-making process in mobile payment usage in the U.S. context.

We develop the following hypotheses based on the research purpose and question:

H1. Mobile payment usage negatively relates to financial behaviors.

H2. The frequency of mobile payment usage reduces the likelihood of positive financial behaviors.

We formulate these hypotheses to examine how mobile payment usage affects financial behaviors. Meyll and Walter (2019) held that people who use mobile payments are more likely to exhibit costly credit card behaviors. How does mobile payment development affect individuals' financial decisions, and who are affected mainly? For example, are the younger generation's financial behaviors toward mobile payments usage worse than those of the seniors? If yes, what gender and income level have the worst financial behaviors? Similarly, considering the effect of financial literacy, type of work, and employment status may also be important. Finally, the relationship between the frequency of mobile payment usage and financial behaviors can also be considered as reflected in H2.

4. Data Sources

4.1 Dataset and sample selection

This study uses a dataset from the 2015 and 2018 state-by-state version of the NFCS commissioned by FINRA as part of its Investor Education Foundation (FINRA Foundation). FINRA commissioned the first NFCS in 2009 with a consultation from the U.S. Department of the Treasury to explore the financial capability of U.S. households and investigate the differences in their demographic characteristics, namely, attitude, behavior, and financial literacy. This survey contains information collected from approximately 500 respondents in each state, with a total sample size of 27,091. The previous survey results are used in Birkenmaier and Fu (2015), Meyll and Walter (2019), Wagner and Walstad (2019), and Lusardi et al. (2018). Our sample totals 8,543 after excluding missing responses.

In order to assess the robustness of the empirical results, we also use the 2015 NFCS survey to investigate the relationship between mobile payment use and financial behaviors. Similarly, the 2015 NFCS survey contains information collected from approximately 500 respondents in each state, with a total sample size of 27,564. The 2015 sample totals 9,345 after excluding missing responses.

4.2 Measurement of variables

Financial behaviors are set as dependent variables for this study and were measured using previously developed indices (Henager and Cude 2016; Kim and Seay 2019). A financial behavior index was constructed based on three questions about income spending, checking account overdraft, and difficulty to cover expenses. Each answer was coded as a binary variable, and responses were summed to construct the index that ranged from 0 to 3. Table 1 presents the specific questions used from the 2015 and 2018 NFCS.

The key independent variables for this analysis are the levels of mobile payment usage. Respondents were asked about their usage frequency of mobile payment using three categories: “1 = never,” “2 = sometimes,” and “3 = frequently.” Moreover, we label a respondent as a mobile payment user if her/his frequency of mobile payment use is “sometimes” or “frequently.”

Various demographic and socioeconomic characteristics are associated with financial behaviors (Finke et al., 2016; Henager and Cude, 2016). Thus, this study included household characteristics as control variables: age, gender (male or female), ethnicity (white alone NH or non-white), education (below high school, high school diploma, college level, bachelor degree, or post-bachelor degree), marital status (married, single, or separated/divorced/widowed), presence of dependent child(ren) (yes or no), household income, and employment status (self-employed, full-time worker, part-time worker, homemaker, student, disabled, or unemployed). Additionally, we controlled for region using the state of residence variable (Northeast, Midwest, South, West) to account for financial behavior variations due to unobserved regional sentiments toward various financial behaviors or differences in state-level policies. Lastly, we also controlled for financial literacy based on Lusardi and Mitchell’s (2014) six questions. Financial literacy was summed in the number of correct answers, with scores ranging from 0 to 6. A binary indicator was created to indicate correct answers to all six questions (“1 = yes” and “0 = no”). Table 1 presents the specific questions used from the 2015 and 2018 NFCS.

Table 1 Description of key variables in the 2018 NFCS

| Variable | Description |
|------------------------------|--|
| Financial Behaviors | |
| Spending | “Over the past year, would you say your spending was less than, more than, or about equal to your income? Please do not include the purchase of a new house or car or other big investments you may have made.” 1. Yes 2. No |
| Overdrafts | “Do you overdraw your checking account occasionally?” 1. Yes 2. No |
| Difficulty covering expenses | “In a typical month, how difficult is it for you to cover your expenses and pay all your bills?” 1 = Very difficult 2 = Somewhat difficult 3 = Not at all difficult |
| Mobile payment | How often do you use your mobile phone to pay for a product or service in person at a store, gas station, or restaurant? 1 = Never 2 = Sometimes 3 = Frequently |

4.3 Descriptive statistics and correlation tests

Table 2 reports the financial characteristics of the sample. The mean of the composite score of financial behaviors is 1.9848, as shown in Table 2. Particularly, more than half of the respondents in the sample exhibited positive results in the three financial behaviors investigated: spending less than income (68.15%), not experiencing overdraft (76.58%), and no difficulty covering expenses (53.75%).

Next, we perform a variance inflation factor (VIF) test to prevent the correlation of the variables from influencing the empirical validity. The results presented in Table 3 show that all the VIF values of the variables employed herein do not exceed 10, and their total average VIF value is 1.7641. This result indicates the absence of collinearity in the samples.¹

Table 2 Financial characteristics of the 2018 NFCS

| Variable | Percentage |
|-----------------------------------|------------------------------|
| Financial behaviors | Mean (S.D.): 1.9848 (1.0847) |
| Spending less than income | 68.15% |
| No overdrafts | 76.58% |
| No difficulty covering expenses | 53.75% |
| Mobile payment | |
| Never | 57.68% |
| Sometimes | 26.95% |
| Frequently | 15.37% |
| Financial literacy questions | |
| Number of corrected answers (0–6) | Mean (S.D.): 3.39 (1.59) |
| All corrected answers | 9.67% |
| Interest rate | 79.54% |
| Inflation | 59.41% |
| Bond price | 29.88% |
| Compounded interest | 36.98% |
| Mortgage | 82.63% |
| Portfolio | 51.02 |

Table 3 Variance inflation factor test results of the variables

| Variable | VIF |
|----------------------------------|-------|
| region | 1.016 |
| gender | 1.179 |
| age | 1.570 |
| ethnicity | 1.091 |
| education | 1.272 |
| single | 1.634 |
| separated/divorced/widowed | 1.264 |
| presence of dependent child(ren) | 1.255 |
| income (\$15K-\$24,999) | 1.933 |
| income (\$25K-\$34,999) | 2.129 |
| income (\$35K-\$49,999) | 2.744 |
| income (\$50K-\$74,999) | 3.612 |
| income (\$75K-\$99,999) | 3.581 |
| Income (\$100K-\$149,000) | 3.756 |
| income (> \$150,000) | 3.018 |
| self-employed | 1.078 |
| part-time worker | 1.152 |
| homemaker | 1.214 |
| student | 1.187 |

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.

| Variable | VIF |
|--------------------|--------|
| disabled | 1.239 |
| unemployed | 1.149 |
| mobile payment | 1.149 |
| financial literacy | 1.352 |
| Average VIF | 1.7641 |

5. Results and Analysis

5.1 Mobile payment and financial behaviors

We employ logit and ordered logit regression models to investigate the relationship between mobile payment use and financial behaviors. First, we show logistic regression results based on individual financial behaviors presented in the 2018 column of Table 4. The coefficient on mobile payment use is statistically significantly negative. In other words, mobile payment use is negatively linked to individual financial behaviors, though a complete set of control variables is considered. Similarly, the 2015 column of Tables 4 also indicates that mobile payment use significantly negatively influences financial behaviors. The behaviors of spending less than income (spending), not experiencing an overdraft (no overdrafts), and not having difficulty covering expenses (cover expenses) were considered positive financial behaviors for this analysis. Mobile payment use negatively related to positive financial behaviors. The odds ratios (OR) of spending less than income, not experiencing an overdraft, and not having difficulty covering expenses are 22.6%, 46.93%, and 26.38%, respectively. Moreover, Table 5 shows that the frequency of mobile payment usage decreases the likelihood of healthy financial behaviors in the 2018 NFCS. These results are consistent with Lusardi et al. (2018), who stated that among the mobile payment users in the U.S., the young generation is more likely to engage in costly spending behaviors.

Table 4 Logistic regression results of financial behaviors and mobile payment usage in the 2018 and 2015 NFCS

| | 2018 | | | 2015 | | |
|--------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-----------------------------------|------------------------------------|
| | Spending less than income | No difficulty covering expenses | No overdrafts | Spending less than income | No difficulty covering expenses | No overdrafts |
| Mobile payment usage (reference: no) | -0.2562 (0.0001)*** [0.7740] | -0.3062 (0.0001)*** [0.7362] | -0.6335 (0.0001)*** [0.5307] | -0.2637 (0.0001)*** [0.7682] | -0.3496 (0.0001)*** [0.705] | -0.7621 (0.0001)*** [0.4667] |
| Constant | 0.2251 (0.1969) | -1.6327 (0.0001)*** | 0.4259 (0.0282)** | 0.2662 (0.1128) | -1.8418 (0.0001)*** | 0.3830 (0.0496)** |
| Region | -0.0424 (0.0724)* [0.9584] | 0.0202 (0.3944) [1.0204] | 0.0146 (0.5791) [1.0147] | 0.0011 (0.9625) [1.0011] | 0.0694 (0.0017)*** [1.0719] | -0.0116 (0.6601) [0.9885] |
| Female(reference: male) | 0.0138 (0.7967) [1.0139] | 0.1519 (0.0045)*** [1.1641] | -0.1276 (0.0324)** [0.8802] | 0.0784 (0.1251) [1.0815] | 0.2224 (0.0001)*** [1.2491] | 0.0830 (0.1609) [1.0865] |
| Age | 0.1034 (0.0001)*** [1.1089] | 0.0948 (0.0001)*** [1.0994] | 0.1577 (0.0001)*** [1.1708] | 0.0235 (0.2673) [1.0238] | 0.0208 (0.3148) [1.021] | 0.0762 (0.0024)*** [1.0791] |
| White alone NH(reference: non-white) | 0.1906 (0.0005)*** [1.2100] | 0.0672 (0.2320) [1.0696] | 0.1999 (0.0008)*** [1.2212] | 0.0183 (0.7313) [1.0185] | 0.0741 (0.1617) [1.0769] | 0.1821 (0.0023)*** [1.1997] |
| Education | -0.0271 (0.0995)* [0.9732] | 0.0245 (0.1354) [1.0248] | -0.0115 (0.5313) [0.9886] | -0.0287 (0.0697)* [0.9717] | 0.0339 (0.0283)** [1.0345] | -0.0289 (0.1142) [0.9715] |
| Married status (reference: married) | | | | | | |

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| | 2018 | | | 2015 | | |
|--|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | Spending less than income | No difficulty covering expenses | No overdrafts | Spending less than income | No difficulty covering expenses | No overdrafts |
| Single | -0.0047 (0.9429) [0.9953] | -0.2360 (0.0004)*** [0.7898] | -0.1153 (0.1105) [0.8911] | -0.009 (0.8924) [0.991] | -0.0310 (0.6352) [0.9695] | 0.2253 (0.0034)*** [1.2527] |
| Separated/divorced / widowed | -0.0944 (0.2542) [0.9099] | -0.2147 (0.0102)** [0.8068] | -0.0234 (0.8077) [0.9769] | -0.0347 (0.6671) [0.9659] | -0.0559 (0.4829) [0.9456] | 0.1827 (0.0608)* [1.2005] |
| Have children (reference: no) | -0.6414 (0.0001)*** [0.5266] | -0.7475 (0.0001)*** [0.4736] | -0.8774 (0.0001)*** [0.4159] | -0.5851 (0.0001)*** [0.557] | -0.7351 (0.0001)*** [0.4795] | -0.6233 (0.0001)*** [0.5362] |
| Income (reference: less than \$15,000) | | | | | | |
| \$15K-\$24,999 | -0.1012 (0.3799) [0.9037] | 0.0638 (0.6382) [1.0659] | 0.0291 (0.8201) [1.0295] | 0.1265 (0.2440) [1.1348] | 0.4559 (0.0003)*** [1.5776] | 0.0559 (0.6592) [1.0574] |
| \$25K-\$34,999 | -0.1061 (0.3662) [0.8994] | 0.3440 (0.0096) [1.4106] | 0.1453 (0.2664) [1.1564] | 0.0509 (0.6420) [1.0522] | 0.6886 (0.0001)*** [1.991] | 0.1023 (0.4227) [1.1077] |
| \$35K-\$49,999 | 0.2533 (0.0221)** [1.2883] | 0.7257 (0.0001)*** [2.0663] | 0.3871 (0.0019)*** [1.4727] | 0.3922 (0.0002)*** [1.4802] | 0.9144 (0.0001)*** [2.4954] | 0.2365 (0.0555)* [1.2669] |
| \$50K-\$74,999 | 0.4103 (0.0002)*** [1.5072] | 1.0538 (0.0001)*** [2.8686] | 0.2392 (0.0520)* [1.2703] | 0.5611 (0.0001)*** [1.7526] | 1.3988 (0.0001)*** [4.0502] | 0.3324 (0.006)*** [1.3944] |
| \$75K-\$99,999 | 0.5564 (0.0001)*** [1.7444] | 1.1764 (0.0001)*** [3.2425] | 0.1067 (0.4021) [1.1126] | 0.9775 (0.0001)*** [2.6577] | 1.8015 (0.0001)*** [6.0589] | 0.5864 (0.0001)*** [1.7975] |
| \$100K-\$149,000 | 0.9156 (0.0001)*** [2.4983] | 1.8431 (0.0001)*** [6.3161] | 0.6102 (0.0001)*** [1.8408] | 1.2963 (0.0001)*** [3.6556] | 2.2805 (0.0001)*** [9.7814] | 0.7711 (0.0001)*** [2.1621] |
| Employment (reference: full-time worker) | | | | | | |
| Self-employed | 0.0237 (0.7875) [1.0239] | -0.0558 (0.5175) [0.9457] | 0.0717 (0.4726) [1.0744] | 0.0230 (0.7917) [1.0233] | -0.1411 (0.0871)* [0.8684] | 0.1395 (0.1867) [1.1497] |
| Part-time worker | -0.1197 (0.1537) [0.8872] | 0.0042 (0.9606) [1.0042] | 0.0145 (0.8807) [1.0146] | 0.0248 (0.7496) [1.0251] | 0.0986 (0.1928) [1.1036] | 0.0272 (0.7616) [1.0276] |
| Homemaker | 0.0502 (0.6163) [1.0514] | 0.2299 (0.0241)** [1.2584] | 0.1153 (0.2964) [1.1222] | 0.1983 (0.0302)** [1.2193] | 0.2742 (0.0021)*** [1.3154] | 0.2349 (0.0235)** [1.2648] |
| Student | 0.1521 (0.2455) [1.1643] | 0.1472 (0.2646) [1.1585] | 0.3238 (0.0281)** [1.3824] | -0.0104 (0.9282) [0.9897] | -0.1252 (0.2948) [0.8823] | 0.2826 (0.0381)** [1.3266] |
| Disabled | -0.9685 (0.0001)*** [0.3797] | -1.1247 (0.0001)*** [0.3248] | -0.6198 (0.0001)*** [0.5380] | -0.4505 (0.0003)*** [0.6373] | -0.4316 (0.0016)*** [0.6495] | -0.3261 (0.0255)** [0.7217] |
| Unemployed | -0.3679 (0.0045)*** [0.6922] | -0.6057 (0.0001)*** [0.5457] | -0.0320 (0.8309) [0.9685] | -0.3026 (0.0065)*** [0.7389] | -0.7867 (0.0001)*** [0.4553] | 0.0486 (0.7166) [1.0498] |
| Financial literacy | 0.1094 (0.0001)*** [1.1157] | 0.2257 (0.0001)*** [1.2532] | 0.2196 (0.0001)*** [1.2456] | 0.1011 (0.0001)*** [1.1064] | 0.1414 (0.0001)*** [1.1519] | 0.2391 (0.0001)*** [1.2702] |
| R-squared | 0.0886 | 0.1860 | 0.1269 | 0.0643 | 0.1476 | 0.0984 |
| Adjusted R-squared | 0.0840 | 0.1818 | 0.1216 | 0.0601 | 0.1439 | 0.0933 |

Note: Detailed definitions of the variables are provided in Table 1. The dependent variables in this table are spending less than income, no difficulty covering expenses, and no overdrafts. We use the logit model to investigate the relationship between mobile payment usage and financial behaviors. We report p-values and odds ratios in parentheses and brackets, respectively. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5 Logistic regression results of financial behaviors and frequency of mobile payment use in the 2018 NFCS

| | Spending less than income | No difficulty covering expenses | No overdrafts |
|--|------------------------------------|------------------------------------|------------------------------------|
| Frequency of mobile payment use | | | |
| Sometimes | -0.1944 (0.0010)*** [0.8233] | -0.1724 (0.0039)*** [0.8416] | -0.3977 (0.0001)*** [0.6719] |
| Frequently | -0.3762 (0.0001)*** [0.6864] | -0.5740 (0.0001)*** [0.5633] | -1.0465 (0.0001)*** [0.3512] |
| Constant | 0.2376 (-0.1735) | -1.6041 (0.0001)*** | 0.4619 (0.0179)** |
| Region | -0.0432 (0.0674)* [0.9577] | 0.0190 (0.4229) [1.0192] | 0.0119 (0.6539) [1.0120] |
| Female(reference: male) | 0.0219 (0.6829) [1.0221] | 0.1701 (0.0015)*** [1.1855] | -0.0951 (0.1140) [0.9093] |
| Age | 0.1021 (0.0001)*** [1.1075] | 0.0918 (0.0001)*** [1.0961] | 0.1528 (0.0001)*** [1.1651] |
| White alone NH (reference: non-white) | 0.1865 (0.0007)*** [1.2050] | 0.0561 (0.3199) [1.0577] | 0.1844 (0.0022)*** [1.2025] |
| Education | -0.0292 (0.0772)* [0.9713] | 0.0204 (0.2159) [1.0206] | -0.0199 (0.2824) [0.9803] |
| Married status (reference: married) | | | |
| Single | 0.0032 (0.9617) [1.0032] | -0.2210 (0.0009)*** [0.8017] | -0.0810 (0.2660) [0.9222] |
| Separated/divorced/widowed | -0.0926 (0.2635) [0.9115] | -0.2102 (0.0120)** [0.8104] | -0.0180 (0.8521) [0.9822] |
| Have children (reference: no) | -0.6347 (0.0001)*** [0.5301] | -0.7342 (0.0001)*** [0.4799] | -0.8544 (0.0001)*** [0.4255] |
| Income (reference: less than \$15,000) | | | |
| \$15K-\$24,999 | -0.0981 (0.3945) [0.9065] | 0.0730 (0.5905) [1.0758] | 0.0385 (0.7630) [1.0393] |
| \$25K-\$34,999 | -0.0983 (0.4025) [0.9064] | 0.3596 (0.0068)*** [1.4327] | 0.1769 (0.1771) [1.1935] |
| \$35K-\$49,999 | 0.2632 (0.0175)** [1.3010] | 0.7465 (0.0001)*** [2.1096] | 0.4293 (0.0006)*** [1.5362] |
| \$50K-\$74,999 | 0.4193 (0.0002)*** [1.5210] | 1.0722 (0.0001)*** [2.9219] | 0.2780 (0.0245)** [1.3204] |
| \$75K-\$99,999 | 0.5791 (0.0001)*** [1.7845] | 1.2216 (0.0001)*** [3.3925] | 0.1966 (0.1259) [1.2172] |

Influences of Mobile Payment Usage on Financial Behaviors

| | Spending less than income | No difficulty covering expenses | No overdrafts |
|--|------------------------------------|------------------------------------|------------------------------------|
| \$100K-\$149,000 | 0.9307 (0.0001)*** [2.5364] | 1.8774 (0.0001)*** [6.5362] | 0.6793 (0.0001)*** [1.9726] |
| > \$150,000 | 1.6117 (0.0001)*** [5.0115] | 2.6509 (0.0001)*** [14.1671] | 1.2329 (0.0001)*** [3.4312] |
| Employment (reference: full-time worker) | | | |
| Self-employed | 0.0239 (0.7859) [1.0241] | -0.0551 (0.5235) [0.9464] | 0.0709 (0.4803) [1.0735] |
| Part-time worker | -0.1248 (0.1371) [0.8827] | -0.0050 (0.9531) [0.9950] | -0.0096 (0.9206) [0.9904] |
| Homemaker | 0.0450 (0.6535) [1.0460] | 0.2196 (0.0314)** [1.2456] | 0.0966 (0.3836) [1.1014] |
| Student | 0.1461 (0.2647) [1.1573] | 0.1336 (0.3119) [1.143] | 0.3017 (0.0415)** [1.3522] |
| Disabled | -0.9675 (0.0001)*** [0.3800] | -1.1264 (0.0001)*** [0.3242] | -0.6143 (0.0001)*** [0.5410] |
| Unemployed | -0.3768 (0.0037)*** [0.6861] | -0.6218 (0.0001)*** [0.537] | -0.0713 (0.6345) [0.9312] |
| Financial literacy | 0.1061 (0.0001)*** [1.1119] | 0.2182 (0.0001)*** [1.2439] | 0.2077 (0.0001)*** [1.2308] |
| R-squared | 0.0886 | 0.1860 | 0.1269 |
| Adjusted R-squared | 0.0840 | 0.1818 | 0.1216 |

Note: Detailed definitions of the variables are provided in Table 1. The dependent variables this table are spending less than income, no difficulty covering expenses, and no overdrafts, respectively. We use the logit model to investigate the relationship between the frequency of mobile payment use and financial behaviors. We report p-values and odds ratios in parentheses and brackets, respectively. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The empirical results in Tables 4 and 5 also indicate that presence of dependent child(ren), income, employment, and financial literacy significantly influence respondents' financial behaviors. Moreover, the higher-income, and financially literate individuals are significantly positively related to healthy financial behaviors. We also find a decreasing negative relationship between healthy financial behaviors, presence of dependent child(ren), disabled workers, and unemployment. These results are consistent with Wagner and Walstad (2019) and Kim and Seay (2019).

Then, we input the ordered logit model into our empirical model. The results suggest that although personal characteristic variables are controlled, the significantly negative influence of mobile payment use on financial behaviors remains. Thus, mobile payment users are less likely to have a high level of composite indices of financial behaviors. We examine Ordered logistic regression (OR) results as indicated in the 2018 column of Table 6. We identified that when the respondents begin to use mobile payment, their probability of healthy financial behaviors drops by 34.92%.² Therefore, mobile payment use affects their financial behaviors and is the key variable that influences financial behaviors. Moreover, this result also explains Meyll and Walter's (2019) finding that individuals who use their smartphones for mobile payments are more likely to exhibit costly credit card behavior. Based on our findings, mobile

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

payments are commonly connected with a credit card and thus can be viewed as a form of high-cost borrowing. Hence, people with insufficient financial literacy are more likely to use mobile payments. This finding confirms H2 that a significantly negative relationship exists between financial literacy level and frequency of mobile payment usage.

Table 6 Ordered logistic regression results of financial behaviors in the 2018 and 2015 NFCS

| Year | 2018 | 2015 |
|--|------------------------------------|------------------------------------|
| Mobile payment using (reference: no) | -0.4296 (0.0001)*** [0.6508] | -0.5025 (0.0001)*** [0.6050] |
| Region | 0.0103 (0.6050) [1.0104] | 0.0224 (0.2392) [1.0226] |
| Female(reference: male) | 0.0146 (0.7470) [1.0147] | 0.1245 (0.0036)*** [1.1326] |
| Age | 0.1246 (0.0001)*** [1.1327] | 0.0424 (0.0165)** [1.0433] |
| White alone NH(reference: non-white) | 0.1867 (0.0001)*** [1.2052] | 0.0966 (0.0317)** [1.1014] |
| Education | -0.0077 (0.5790) [0.9923] | -0.0078 (0.5553) [0.9922] |
| Married status (reference: married) | | |
| Single | -0.1068 (0.0570)* [0.8987] | 0.0416 (0.4570) [1.0425] |
| Separated/divorced/widowed | -0.1046 (0.1370) [0.9007] | 0.0034 (0.9601) [1.0034] |
| Have children (reference: no) | -0.8110 (0.0001)*** [0.4444] | -0.7178 (0.0001)*** [0.4878] |
| Income (reference: less than \$15,000) | | |
| \$15K-\$24,999 | -0.0712 (0.4660) [0.9313] | 0.1616 (0.0795)* [1.1754] |
| \$25K-\$34,999 | 0.0610 (0.5430) [1.0629] | 0.2363 (0.0117)** [1.2666] |
| \$35K-\$49,999 | 0.4169 (0.0001)*** [1.5172] | 0.5220 (0.0001)*** [1.6854] |
| \$50K-\$74,999 | 0.6092 (0.0001)*** [1.8390] | 0.8474 (0.0001)*** [2.3336] |
| \$75K-\$99,999 | 0.6856 (0.0001)*** [1.9850] | 1.2755 (0.0001)*** [3.5806] |
| \$100K-\$149,000 | 1.3000 (0.0001)*** [3.6694] | 1.6925 (0.0001)*** [5.433] |

| Year | 2018 | 2015 |
|--|------------------------------------|------------------------------------|
| > \$150,000 | 2.0275 (0.0001)*** [7.5953] | 2.0823 (0.0001)*** [8.0226] |
| Employment (reference: full-time worker) | | |
| Self-employed | -0.0407 (0.5760) [0.9601] | -0.0642 (0.3687) [0.9378] |
| Part-time worker | -0.0652 (0.3620) [0.9369] | 0.0324 (0.6206) [1.0329] |
| Homemaker | 0.1466 (0.0940)* [1.1579] | 0.2309 (0.0029)*** [1.2597] |
| Student | 0.1716 (0.1190) [1.1872] | -0.0486 (0.6158) [0.9526] |
| Disabled | -0.9481 (0.0001)*** [0.3875] | -0.4805 (0.0001)*** [0.6185] |
| Unemployed | -0.3768 (0.001)*** [0.6861] | -0.4023 (0.0001)*** [0.6688] |
| Financial literacy | 0.2013 (0.0001)*** [1.223] | 0.1677 (0.0001)*** [1.1826] |
| Pseudo R ² | 0.1026 | 0.0842 |

Note: Detailed definitions of the variables are provided in Table 1. The dependent variables in this table are financial behaviors. We use the ordered logit model to investigate the relationship between mobile payment use and financial behaviors. We report p-values and odds ratios in parentheses and brackets, respectively. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Consistent with the logit results, we also find that other demographic characteristics relate to financial behaviors. The coefficients of single and ethnicity are consistent with prior studies on the determinants of individuals' financial behavior (Mottola, 2013; Meyll and Walter, 2019) and otherwise for the coefficients of age, presence of dependent child(ren), income, employment, and financial literacy. We examine OR in terms of gender and find that, when the respondent group comprising males is employed (as the reference variable), the probability of their mobile payment use is 1.41 times higher than those of females.³ Thus, males' probability of mobile payment use is higher than that of females. Furthermore, we also find a monotonically increasing probability of healthy financial behaviors for higher age groups. White is associated with a 20% increase in the probability of healthy financial behaviors. Higher-income levels also raise the probability of healthy financial behaviors.

In sum, using the logit and ordered logit models, we find that mobile payment use negatively influences financial behaviors, though demographic characteristics are controlled for. Individuals who use mobile payments frequently suggest that they are also more likely to over-consume.

5.2 Robustness tests: exploring the endogenous problem

To solve endogenous problem and avoid bias, Two-Stage Least Squares (2SLS) estimation is applied in this research by integrating instrument variables into the estimation model. Several studies employ 2SLS to control endogeneity problem because of mistakes in measurement and/or unobserved variables. Moreover, another potential problem for endogeneity is the reverse causality caused by people who have

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.

positive financial behaviors may invest in financial education by mobile payment. Thus, a negative relationship between mobile payment usage and financial behaviors could be contaminated due to the reverse causality.

Among the relevant studies on financial literacy, van Rooij et al. (2011, 2012) also evaluated the problems of endogeneity. Therefore, we follow the methods proposed by van Rooij et al. (2011) to verify the endogeneity problems with employing instrumental variables (IV), including region, female, separated/divorced/widowed, part-time worker, and homemaker.

Table 7 presents the results of using IVs in the 2SLS model and shows that mobile payment use significantly negatively influences financial behaviors. The results in Table 7 reveal that frequent users of mobile payment are negatively correlated and statistically significant with positive financial behaviors. Meanwhile, age, income, and financial literacy are found to have a positively and statistically significant correlation with financial behaviors. These results are also consistent with Wagner and Walstad (2019) and Kim and Seay (2019).

Table 7 IVs and 2SLS regression analysis of financial behaviors and mobile payment using

| | Coefficient | p-value |
|--|---------------------|-----------|
| Constant | 1.5514 | 0.0001*** |
| Estimation of mobile payment using (reference: no) | -0.1946 | 0.0460** |
| Age | 0.0522 | 0.0001*** |
| White alone NH(reference: non-white) | 0.0828 | 0.0050*** |
| Education | -0.0036 | 0.5980 |
| Single(reference: married) | -0.0429 | 0.1300 |
| Have children (reference: no) | -0.3874 | 0.0001*** |
| Income (reference: less than \$15,000) | | |
| \$15K-\$24,999 | -0.0035 | 0.9470 |
| \$25K-\$34,999 | 0.0769 | 0.1630 |
| \$35K-\$49,999 | 0.2925 | 0.0001*** |
| \$50K-\$74,999 | 0.3883 | 0.0001*** |
| \$75K-\$99,999 | 0.4300 | 0.0001*** |
| \$100K-\$149,000 | 0.7071 | 0.0001*** |
| > \$150,000 | 0.9384 | 0.0001*** |
| Employment (reference: full-time worker) | | |
| Self-employed | -0.0073 | 0.8350 |
| Student | 0.1252 | 0.0270** |
| Disabled | -0.5187 | 0.0001*** |
| Unemployed | -0.2023 | 0.0010*** |
| Financial literacy | 0.0996 | 0.0001*** |
| R-squared | 0.2269 | |
| Durbin (score) chi2 (2) | 0.0136 (p = 0.9073) | |
| Wu-Hausman F (1,8523) | 0.0135 (p = 0.9074) | |
| First-stage regression (F- test) | 40.4893 | |

| | Coefficient | p-value |
|--|-------------|---------|
|--|-------------|---------|

Note: The dependent variables of the first and second stages are mobile payment use and financial behaviors, respectively. Please see Table 1 for the definitions of our variables. IVs in the second stage are from the NFCS questionnaire question results, including region, female, separated/divorced/ widowed, part-time worker and homemaker. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.

The empirical results in Table 7 verify the findings presented in Table 6 that frequent users of mobile payment are less likely to conduct positive financial behaviors. Our results also indicate that the impact of mobile payment use on financial behaviors remains statistically significantly negative. Thus, mobile payment use drives financial behaviors, though endogeneity is accounted for.

Moreover, in the Two-Stage Least Squares (2SLS) model, the potential endogeneity of mobile payment use is tested along with other instrument variables applied in this model. This research employs Wu-Hausman test and F-statistics to check the endogenous problem of financial literacy and remove the weak problem of instrument variables. Consequently, the results confirm that mobile payment using is not endogenous variables based on an insignificant p value. Likewise, with F-statistics in the first stage regression of 2SLS of 40.4893 for mobile payment use, the results confirm that instrument variables are not weak.

6. Conclusion

Fintech innovations are rapidly evolving from payments to other areas of consumer finance. The industry’s rapid growth has significantly impacted people’s spending habits and financial decision-making. However, limited research exists on this subject as it concerns mobile payment use. Thus, this study examines the impacts of mobile payment usage on the consumption and payment decisions of retail investors. The 2015 and 2018 state-by-state version of the NFCS in the U.S. is utilized to investigate the relationships between mobile payment usage and financial behaviors. The empirical results reveal that people with a high frequency of mobile payment usage have less probability of having positive financial behaviors. They also demonstrate several risk factors connected with their financial management. For example, they are more likely to overdraw their checking accounts, overspend, and have difficulty covering their expenses.

The practical implications arise in this study. The use of mobile payment improves the consumption’s convenience but will increase the chance of negative financial behavior. High financial literacy would reduce the shortcomings of mobile payment services. Therefore, improving and enhancing people’s financial literacy is critical following the era of fintech and expansive financial services. We strongly recommend policymakers to start integrating financial education as a compulsory part of every school’s curriculum. For example, colleges and other higher education institutions may also consider introducing financial education to their non-business students.

This study has some limitations and opportunities for future research. Although we have discussed the issue of reverse causality to infer the relationship with the mobile payment usage and the financial behaviors, future researchers might conduct similar analyses using a longitudinal dataset to account for the causal inference. Another limitation is the frequency measurement of mobile payment usage. In this study, we use the NFCS dataset directly. A well-designed measure of mobile payment usage will help researchers improve the assessment of people’s mobile payment usage and identify the effect of mobile payment more accurately. Regardless of these limitations, however, this study opens important avenues for future research on mobile payment usage and the financial behaviors.

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