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Case Study

Financial Confidence in Dealing with Unexpected Expenditure and Consumer Financial Satisfaction: The Moderating Role of Subjective Financial Knowledge

Fuzhong Chen[*], **Haoyue Chen**

School of International Trade and Economics, University of International Business and Economics, Beijing, China
Email: uibesitechen@126.com

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Abstract: Utilizing data from the U.S. National Financial Capability Study in 2018, the purpose of this study is to investigate the associations between financial confidence in dealing with unexpected expenditure (FCDUE) and consumer financial satisfaction, which is informative for policymakers and financial institutions to carry out more effective measures to improve consumer financial satisfaction. Besides, this study further explores the moderating role of subjective financial knowledge. To produce more accurate estimates, this study employs the approach of ordered probit regression. The results indicate positive associations between FCDUE and consumer financial satisfaction. Besides, the results suggest that the moderating role of subjective financial knowledge enhances the positive effects of FCDUE on consumer financial satisfaction. The empirical findings imply that maintaining appropriate financial confidence in emergency savings and adequate financial literacy is in favor of enhancing consumer financial satisfaction.

Keywords: financial confidence, financial satisfaction, subjective financial knowledge, unexpected expenditure, ordered probit regression

JEL Code: D12, E21, P36

1. Introduction

For nearly two decades, consumer financial satisfaction has been extensively investigated. A large number of extant studies have successively examined related areas of life satisfaction, including consumer financial satisfaction. As a component of subjective wellbeing, consumer financial satisfaction is also affected by many factors that may influence consumer subjective wellbeing (Hsieh, 2001). Furthermore, several prior studies have suggested that consumer financial satisfaction affects life satisfaction positively since the former is a specific domain of consumer life satisfaction (Plagnol, 2011). Previous studies have explored various determinants correlated to consumer financial satisfaction directly and indirectly, such as demographic and socioeconomic characteristics, income, risk tolerance, and financial behaviors (Hsieh, 2003; Joo & Grable, 2004; Vera-Toscano et al., 2006). According to the U.S. National Financial Capability Study, consumer financial satisfaction rises steadily starting at age 18 and peaks in middle age, while consumer financial wellbeing continues to decline after middle age, following an inverted U-shaped curve. Furthermore, it is shown

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evidence that different types of financial behaviors have various effects on consumer financial satisfaction. Specifically, consumer financial satisfaction benefits from desirable financial behaviors, whereas risky financial behaviors adversely affect consumer financial satisfaction (Xiao et al., 2014). In addition, empirical evidence from existing studies on consumer financial satisfaction mainly comes from the United States and developed European countries. Nevertheless, few studies have found a strong link between consumer financial satisfaction and life satisfaction in developing countries (Chen et al., 2020c). Thus, unlike previous studies, this study mainly focuses on the associations between FCDUE and consumer financial satisfaction and further explores the moderating role of subjective financial knowledge.

In terms of life cycle theory, consumers usually have the motivation to save for an emergency or unexpected expenditure (Ando & Modigliani, 1963). However, Caner and Wolff (2004) suggested that substantial households generally lack emergency assets regardless in developed or developing countries. By examining households' financial capability to come up with $2,000 in 30 days, prior research has found that approximately one-quarter of Americans respond that it is hard for them to be capable to provide such funds (Lusardi et al., 2011). Moreover, the lack of an emergency fund is more common among those consumers with lower subjective financial knowledge and less financial confidence (Babiarz & Robb, 2014). When coupled with financial confidence, financial knowledge has a stronger link with having an emergency fund (Despard et al., 2020). Besides, Shim et al. (2012) indicated that savings are positively associated with subjective wellbeing. Most prior studies have addressed retirement savings, yet the short-term financial behaviors concerning consumers' capability to deal with unexpected expenses are rarely discussed. Moreover, utilizing the data from the National Financial Capability Study (NFCS), recent research verifies that financial confidence is positively associated with financial behaviors, where financial confidence is a reflection of the state of financial problems, financial calculation, and financial knowledge (Chen et al., 2020a). The results also suggest that subjective financial confidence affects proactive decisions significantly. By contrast, overconfidence is likely to lead to negative financial behaviors and outcomes, such as credit card usage. Such financial behaviors are closely related to consumer financial satisfaction (Atlas et al., 2019; Chen et al., 2020d). Thus, this study contributes to filling the gap in the literature concerning the associations between financial confidence related to dealing with unexpected expenditure and consumer financial satisfaction.

In addition to examining the associations between FCDUE and consumer financial satisfaction, this study also further concentrates on the moderating role of subjective financial knowledge in the influence channel between FCDUE and consumer financial satisfaction. Having different levels of subjective financial knowledge will have various degrees of impact on consumer financial satisfaction. It is informative and practically significant for policymakers and financial institutions to formulate more effective measures to enhance consumer financial satisfaction under the synergy between subjective financial knowledge and FCDUE.

Utilizing data from the NFCS in 2018, this study firstly conducts a bivariate analysis to address the correlations between FCDUE and consumer financial satisfaction. Secondly, the OLS estimation and ordered probit regression are performed to examine the associations between FCDUE and consumer financial satisfaction, as well as the moderating role of subjective financial knowledge. The remainder of this paper is structured as follows. Section 2 reviews previous literature on FCDUE, subjective financial knowledge, and consumer financial satisfaction. Besides, this study puts forward hypotheses as well. Section 3 introduces model specification, data source, variable measurements, and statistical descriptions. Section 4 illustrates the empirical results. Section 5 concludes and offers policy recommendations.

2. Literature review and hypotheses

2.1 *Financial satisfaction*

The concept of financial satisfaction can be simply defined as the level of subjective assessment derived from an individual financial situation (Vera-Toscano et al., 2006), which is a subjective and overall self-evaluation. Financial satisfaction is usually perceived as an aspect of individual subjective wellbeing that incorporates a comprehensive series of phenomena, such as personal emotional responses and overall judgments of life satisfaction (Chen et al., 2020b; Diener et al., 1999). Numerous previous studies have conceptualized and measured financial satisfaction in various ways. For instance, Loibl and Hira (2005) measured financial satisfaction with a five-item Likert scale, with which respondents are asked about their satisfaction related to financial affairs over the past six months. Besides, the concept

of perceived income adequacy (PIA) optimism or pessimism bias as a possible predictor of financial satisfaction has been introduced in a hypothesis approach (Grable et al., 2013). According to the domain satisfaction approach, satisfaction in different areas relies on the extent to which the objective environment meets individual aspirations. Financial satisfaction tends to be associated with objective financial circumstances, such as income and wealth, as well as individuals' perceived financial needs (Plagnol, 2011).

To be more specific, prior studies have shed light on exploring determinants of financial satisfaction. Firstly, several studies have suggested that financial factors such as income, risk tolerance, financial behaviors, as well as demographic and socioeconomic characteristics, may directly or indirectly affect financial satisfaction (Hsieh, 2001; Joo & Grable, 2004; Vera-Toscano et al., 2006). Moreover, Plagnol (2011) indicated that not only income but also assets and liabilities have a significant impact on financial satisfaction, using data from the second and third waves of the National Survey of Families and Households. In recent decades, a great deal of literature has come up with empirical evidence to examine the effects of financial capability on financial satisfaction (Arifin, 2018; Xiao et al., 2014). Joo and Grable (2004) provided a comprehensive insight into the contributing factors of financial satisfaction with the approach of path analysis, indicating that increasing levels of financial knowledge, reducing financial stress, and improving individual financial behaviors are beneficial for individuals to enhance financial satisfaction. Extant literature has also documented that taking steps to strengthen financial education, confidence in knowledge and ability are of multiple benefits for individual financial satisfaction (Xiao & Porto, 2017).

2.2 *Financial confidence in dealing with unexpected expenditure and consumer financial satisfaction*

There is a burgeoning literature dealing with financial confidence and consumer financial satisfaction although this literature is not without conflict. Issues concerning whether consumers are financially capable to deal with unexpected financial expenditures have been increasingly highlighted. Hasler et al. (2018) examined the confidence of providing a fixed amount of money in the event of a shock to identify whether different cohort groups are likely to be financially fragile, in which middle-aged cohort (40-49 years old), low-income individuals, women and individuals with lower education are particularly vulnerable in finance. Using the sample of 3,102 Italian households, Anderloni et al. (2012) documented that the inability to handle unexpected expenses is a crucial symptom of financial vulnerability, which may cause the households to hold unsecured debts and make individuals conduct more impulsive, impatient, and short-sighted financial behaviors. Besides, previous studies have shown that improper financial behaviors are harmful to consumer financial satisfaction. In turn, Anderloni et al. (2012) argued that a higher degree of financial education can relieve financial vulnerability to some extent. Kim et al. (2019) revealed the antecedents of short-term financial behaviors such as spending and emergency saving behaviors, indicating that both objective and subjective financial literacy significantly affect short-term financial behaviors, and further indicating that financial knowledge is conducive to solving the problem from an inability to deal with unexpected expenditure.

A great deal of literature has examined the role of financial confidence. As a subjective factor, financial confidence is closely linked with decision-making, yet financial overconfidence may cause a series of negative financial behaviors, such as credit card usage, and the like (Atlas et al., 2019). Utilizing a large and representative sample from NFCS, Babiarz and Robb (2014) indicated that financial confidence and knowledge appreciably bear a positive relationship with financial advice, specifically related to investment and saving advice, while they are inversely associated with debt counseling. Financial confidence is suggested to be a crucial element of financial literacy and plays a vital role in all levels of financial knowledge (Tokar, 2015). Thus, the hypothesis is put forward as follows:

Hypothesis 1 (H1): Given control variables, FCDUE is positively associated with consumer financial satisfaction.

2.3 *Subjective financial knowledge and consumer financial satisfaction*

In recent decades, the research area of financial knowledge has also been gaining prominence. In previous studies, the concepts of financial literacy and financial knowledge are often used indiscriminately (Chen et al., 2020c; Xiao et al., 2014). Concerning financial knowledge, it is closely associated with financial capability. Xiao et al. (2014) indicated that financial capability incorporates financial literacy, self-perceived financial capability, and desirable financial behaviors. Financial literacy may be subdivided into two aspects: subjective financial knowledge and objective financial

knowledge. Despite the subtle differences between financial literacy and financial knowledge exists, these two concepts are used interchangeably in this study. In the field of consumer finance, prior studies tend to investigate the role of financial literacy, especially objective financial knowledge, whereas to the best of our knowledge, most extant literature has failed to address the effects of subjective financial knowledge. Objective measures are more concentrated on quantifying how much concrete knowledge individuals have grasped (Bellofatto et al., 2018). The assessment is based on correct answers to a series of questions designed on the following components: The understanding and computing abilities related to interest rates, dealing with inflation, and capability of risk diversification (Lusardi & Mitchell, 2008). On the contrary, subjective financial knowledge primarily focuses on levels of self-assessment of respondents' financial knowledge and expertise, which contributes to handling psychological factors affecting the consumer decision-making process and financial state (Bellofatto et al., 2018). Besides, a strong correlation between financial knowledge and financial behaviors has been verified in previous studies. For instance, the higher a consumer scores on financial literacy questions, the more likely he or she is to plan for retirement (Lusardi & Mitchell, 2011). Besides, several previous studies have also argued that both subjective and objective financial knowledge have direct effects on long- and short-term financial behaviors (Henager & Cude, 2016; Robb & Woodyard, 2011).

Numerous studies have shed light on whether consumers are financially sophisticated to deal with personal financial affairs. According to the conceptual framework proposed by Huston (2010), financial literacy is defined as the degree to which individuals understand and use personal financial information. Two dimensions are generalized to conceptualize financial literacy, incorporating personal financial knowledge, as well as understanding and use of financial knowledge (Huston, 2012). The attempts to conduct different types of measuring financial knowledge are proliferating. For instance, in terms of the responses to five questions about the interest rate, inflation, mortgages, bond pricing, and portfolio diversification from the NFCS, consumers who get higher scores will be deemed as having a higher level of financial knowledge (Robb et al., 2012). Henager and Cude (2016) suggested that individuals with greater financial knowledge show a more desirable financial planning and managing behavior. Moreover, as a part of financial knowledge, subjective financial knowledge tends to be assessed by the level of self-assessment of personal knowledge about their financial condition (Deenanath et al., 2019).

A large and growing body of literature has addressed the associations between financial knowledge and consumer financial satisfaction. For instance, Bellofatto et al. (2018) conducted the Markets in Financial Instruments Directive (MiFID) tests to measure the level of the investors' subjective financial knowledge, indicating that higher subjective financial knowledge contributes to smarter investments. Xiao et al. (2014) suggested that subjective financial knowledge is positively associated with consumer financial satisfaction. Besides, Xiao and O'Neill (2018) indicated that as a financial capability variable, subjective financial knowledge has a positive impact on financial planning, which, in turn, can improve consumer financial satisfaction. Thus, prior studies have directly or indirectly examined the possible impacts of subjective financial knowledge on consumer financial satisfaction. In terms of the aforementioned discussions, this study further comes up with the following hypothesis:

Hypothesis 2 (H2): Subjective financial knowledge positively enhances the effects of FCDUE on consumer financial satisfaction.

3. Methodology and data description

3.1 *Data source*

The data is available from the NFCS in 2018 which is a large-scale, multi-year, and nationally representative project that measures Americans' financial capability. This national survey was commissioned by the FINRA Investor Education Foundation in consultation with the U.S. Department of the Treasury and other federal agencies. The purpose of this project is to benchmark key indicators of financial competence, evaluating how they change with underlying demographic, behavioral, attitudinal, and financial characteristics. The information on Americans' financial capability obtained by the NFCS is based on a sample of over 25,000 respondents. The dataset in the questionnaire from the NFCS also contains essential information on respondents' financial behaviors, subjective attitudes, and the like.

3.2 *Model specification and variables*

Table 1. Variable specification

Variables	Attribute
Consumer financial satisfaction	"How satisfied are you with your current personal financial condition?" 1-not at all satisfied, 10-extremely satisfied
Consumer FCDUE	"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
Subjective financial knowledge	"How would you assess your overall financial knowledge, on a scale from 1 to 7?" 1-very low, 7-very high
Risk attitude	"When thinking of your financial investments, how willing are you to take risks?" 1-not at all willing, 10-very willing
Age 18 to 24	If the respondent is aged 18 to 24, the variable is recoded as 1, and 0 otherwise.
Age 25 to 34	If the respondent is aged 25 to 34, the variable is recoded as 1, and 0 otherwise.
Age 35 to 44	If the respondent is aged 35 to 44, the variable is recoded as 1, and 0 otherwise.
Age 45 to 54	If the respondent is aged 45 to 54, the variable is recoded as 1, and 0 otherwise.
Age 55 to 64	If the respondent is aged 55 to 64, the variable is recoded as 1, and 0 otherwise.
Age 65 or older	If the respondent is aged 64 or older, the variable is recoded as 1, and 0 otherwise.
Gender	1 = male, 0 = female
Marital status	1 = being married, 0 = not married
Children	The number of children financially dependent on their parents**.** 1-1, 2-2, 3-3, 4-4 or more
High school or lower	1-yes, 0-no
Some college to Bachelor's degree	1-yes, 0-no
Postgraduate degree or higher	1-yes, 0-no
Annul income	1 ≤ \$15,000, 2 = \$15,000-\$25,000, 3 = \$25,000-\$35,000, 4 = \$35,000-\$50,000, 5 = \$50,000-\$75,000, 6 = \$75,000-\$100,000, 7 = \$10,000-\$150,000, 8 ≥ \$150,000
Participating in financial markets	"Do you have any investments in stocks, bonds, mutual funds, or other securities?" 0-no, 1-yes
Desirable financial behaviors (The sum of responses to six financial behaviors test questions)	"Over the past year, would you say your household's spending was less than, more than, or about equal to your income?" 0-more than income, 1-less than or equal to income
	"In a typical month, how difficult is it for you to cover your expenses and pay all your bills?" 0-very difficult or somewhat difficult, 1-not at all difficult
	"In the past 12 months, which one of the following best describes your income?" 0-varies quite often from month to month, 1-roughly the same amount each month or occasionally varies from month to month
	"Have you set aside emergency or rainy day funds that would cover your expenses for 3 months, in case of sickness, job loss, economic downturn, or other emergencies?" 0-no, 1-yes
	"Are you setting aside any money for your children's college education?" 0-no, 1-yes
	"Have you ever tried to figure out how much you need to save for retirement?" 0-no, 1-yes

Note: The content is arranged by the authors.

This study seeks to examine the associations between FCDUE and consumer financial satisfaction, and further

explores the moderating role of subjective financial knowledge. Based on the aforementioned hypotheses, this study specifies the baseline regression as follows:

$$finsat_i = \varphi_0 + \beta_i fcdue + \sum_{k=1}^{M} \delta_k * CV_{k,i} + \varepsilon_i \quad (1)$$

In equation (1), φ_0 is the constant item, the subscript i stands for the sampling consumer, and the superscript M represents the number of control variables. In addition, ε is the random disturbance term. In detail, the dependent variable of consumer financial satisfaction is denoted by *finsat*. To accurately measure consumer financial satisfaction, this study utilizes a related question in the NFCS, which is a 10-point scale based on"How satisfied are you with your current personal financial condition?" Responses range from 1 (not at all satisfied) to 10 (extremely satisfied). The independent variables comprise FCDUE (*fcdue*) and a series of control variables (*CV*). More specifically, *fcdue* is measured by the question "In a typical month, how difficult is it for you to cover your expenses and pay all your bills?" The responses range from 1 to 3, where 1 denotes very difficult, 2 means somewhat difficult, and 3 represents not at all difficult, respectively.

As for consumer subjective financial knowledge (*subfink*), respondents were asked "How would you assess your overall financial knowledge, on a scale from 1 to 7?" Responses range from 1 (very low) to 7 (very high). Due to colinearity, the variables of *fcdue* and *subfink* are excluded, and only the interactive term (*fcdue* subfink*) is entered when investigating the moderating role of subjective financial knowledge. For consumer participation in financial markets, it is re-coded to a binary variable, with 1 having any investments in stock, bonds, mutual funds, or other securities and 0 otherwise. Besides, consumer desirable financial behaviors are also incorporated, which is measured by the sum of responses to six financial behaviors test questions, regarding whether income can be capable of covering the household's costs over the past year, the status of debt-paying, the stability of income in the past year, whether respondents set aside rainy day funds that would meet expenses for 3 months, whether respondents set aside money for children's college education and savings for retirement. Furthermore, the answers are coded as binary variables, with 1 as having performed the activity and 0 otherwise. Also, consumer risk attitude is included, respondents were asked "When thinking of your financial investments, how willing are you to take risks?" Responses range from 1 (not at all willing) to 10 (very willing).

Moreover, the control variables consist of ages sub-grouped into six categories (18-24, 25-34, 35-44, 45-54, 55-64, and 65 or older), gender (two categories, 0 for female and 1 for male), marital status (1 stands for being married and 0 otherwise), the number of financially dependent children. Apart from the above control variables, other demographic characteristics such as annual income (ranging from 1-8) and education level divided into 3 categories (high school or lower, some college to bachelor's degree, and postgraduate degree or higher) are incorporated as well. All variable specifications are displayed in Table 1.

3.3 *Estimation method*

In this study, the dependent variable of consumer financial satisfaction is not continuous but an ordered variable ranging from 1 to 10. Since the approach of ordinary least squares (OLS) may fail to produce accurate estimates, this study employs the method of ordered probit regression to further improve the estimated results and contribute to eliminating estimation bias. Concerning evaluating the moderating role of subjective financial knowledge, this study utilizes the approach of the ordered probit regression as well.

3.4 *Statistical description*

The results of descriptive statistics are presented in Table 2. After excluding samples with substantial missing values, the sample size is 22,966. As for the dependent variable, namely consumer financial satisfaction, the average score of the sampled respondents equals 5.883 on the 10-point scale, which suggests a comparatively high degree of the subjective financial assessment. The mean of consumer FCDUE is 2.455 out of 3, which implies that only a few respondents lack confidence in dealing with covering a typical month's expenses and paying all the bills. Consumer subjective financial knowledge is a subjective indicator that reflects how consumers assess their overall financial

knowledge. The average value of it is 5.181 measured on a 7-point scale, indicating a significantly high level of subjective financial knowledge. Less than one-half of the sampling respondents have ever participated in financial markets with a mean value of 0.368, indicating a relatively low proportion of investments in stocks, bonds, mutual funds, or other securities. In terms of consumer desirable financial behaviors, the mean value concerning the sum of responses to six financial behaviors test questions is 3.285 out of 6, which shows that more than half of the consumers have conducted desirable activities in dealing with financial affairs. Simultaneously, additional information on the demographic variables is elaborated in Table 2.

Table 2. Descriptive statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Consumer financial satisfaction	22,966	5.883	2.833	1	10
Consumer FCDUE	22,966	2.455	0.672	1	3
Subjective financial knowledge	22,966	5.181	1.365	0	7
Gender	22,966	0.448	0.497	0	1
Age 18 to 24	22,966	0.091	0.288	0	1
Age 25 to 34	22,966	0.168	0.374	0	1
Age 35 to 44	22,966	0.164	0.371	0	1
Age 45 to 54	22,966	0.172	0.377	0	1
Age 55 to 64	22,966	0.188	0.391	0	1
Age 65 or older	22,966	0.215	0.411	0	1
High school or lower	22,966	0.244	0.429	0	1
Some college to Bachelor’s degree	22,966	0.612	0.487	0	1
Post graduate degree or higher	22,966	0.144	0.351	0	1
Married	22,966	0.558	0.497	0	1
Children	22,966	0.653	1.047	0	4
Annual income	22,966	4.697	2.003	1	8
Participating in financial markets	22,966	0.368	0.482	0	1
Desirable financial behaviors	22,966	3.285	1.361	0	6

Note: The results are arranged by the authors.

The results of dummy variables show that 44.8% of respondents are male and 44.8% of consumers have married. As for age, the average percentage of the age-related variable ranging from 18 to 24 is 9.1%, accounting for the minimum proportion. On the contrary, the mean value of age ranging from 65 or older is 21.5%, the highest among all the six age groups. Besides, age ranging from 55 to 64, accounts for 17.2%, followed by respondents whose age range from 45-54 (17.2%) and 35-44 (16.4%). In terms of education, the average ratio for consumers who acquired some college to Bachelor’s degree is 61.2% for the largest share, followed by consumers who graduated from high school or lower, whereas barely 14.4% of consumers obtained a postgraduate degree or higher. The mean value of annual income

is 4.697 out of 8, which is located in the span of $35,000 to $50,000. Moreover, the average number of financially dependent children is 0.653 on a 4-point scale, which means each family bears less than one child on average.

4. Empirical results and discussions

4.1 *Results of correlation analysis*

Table 3 presents the correlations among the variables of consumer financial satisfaction, FCDUE, subjective financial knowledge, annual income, participating in financial markets, and desirable financial behaviors. Most correlations are consistent with expectations. FCDUE is positively associated with consumer financial satisfaction, and the correlation coefficient is 0.511 at a significance of 1%. The coefficient between subjective financial knowledge and consumer financial satisfaction is 0.438 at a significance of 1%. Moreover, subjective financial knowledge is positively associated with consumer FCDUE at a significant level of 1% as well. In terms of the control variables, most correlations are as expected. To be more specific, the correlations between participating in financial markets and consumer financial satisfaction, as well as subjective financial knowledge, are all statistically positive. Similarly, annual income and desirable financial behaviors are both positive determinants of consumer financial satisfaction as well. On the whole, all the correlations are statistically positive at a significance of 1%, which suggests that all explanatory variables are positive determinants of improving consumer financial satisfaction.

Table 3. The results of correlations

Variables	Consumer financial satisfaction	Consumer FCDUE	Subjective financial knowledge	Annual income	Participating in financial markets
Consumer FCDUE	0.511***				
Subjective financial knowledge	0.438***	0.242***			
Annual income	0.380***	0.353***	0.260***		
Participating in financial markets	0.375***	0.234***	0.269***	0.349***	
Desirable financial behaviors	0.570***	0.629***	0.352***	0.469***	0.378***

Notes: The sample size is 22,966. Besides, ***, ** and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

4.2 *Results of multiple ols and ordered probit regression*

Table 4 reports the regression results of FCDUE on consumer financial satisfaction. In Column (1), only control variables are entered. In Columns (2) to (4), the independent variable of FDCUE is included. To be more specific, in Columns (1) and (2), the approach of OLS regression is utilized, while in Columns (3) and (4), the method of ordered probit regression is employed. In addition, the dummy variables of the U.S. state have been controlled in the estimations to eliminate estimation bias caused by state heterogeneity.

Table 4. Regression results of FCDUE on consumer financial satisfaction

Variables	(1)	(2)	(3)	(4)
	Consumer financial satisfaction	Consumer financial satisfaction	Consumer financial satisfaction	Consumer financial satisfaction
Consumer FCDUE		0.838***		0.360***
		(0.035)		(0.018)
Constant	2.629***	1.358***		
	(0.119)	(0.128)		
Male	0.329***	0.336***	0.158***	0.162***
	(0.030)	(0.029)	(0.014)	(0.014)
Age 25 to 34	-0.666***	-0.452***	-0.289***	-0.207***
	(0.048)	(0.048)	(0.023)	(0.023)
Age 35 to 44	-1.072***	-0.900***	-0.502***	-0.439***
	(0.049)	(0.049)	(0.024)	(0.024)
Age 45 to 54	-1.225***	-1.079***	-0.580***	-0.529***
	(0.045)	(0.044)	(0.022)	(0.022)
Age 55 to 64	-0.630***	-0.550***	-0.300***	-0.271***
	(0.041)	(0.040)	(0.020)	(0.019)
Some college to Bachelor’s degree	-0.371***	-0.341***	-0.189***	-0.178***
	(0.037)	(0.036)	(0.018)	(0.018)
Post graduate degree or higher	-0.362***	-0.347***	-0.184***	-0.178***
	(0.050)	(0.049)	(0.024)	(0.024)
Being married	0.267***	0.220***	0.111***	0.094***
	(0.034)	(0.034)	(0.016)	(0.016)
Children	-0.172***	-0.098***	-0.073***	-0.042***
	(0.017)	(0.017)	(0.008)	(0.008)
Annual income	0.191***	0.163***	0.089***	0.079***
	(0.010)	(0.010)	(0.005)	(0.005)
Participating in financial markets	0.784***	0.842***	0.384***	0.411***
	(0.033)	(0.033)	(0.016)	(0.016)
Desirable financial behaviors	0.943***	0.695***	0.415***	0.316***
	(0.013)	(0.017)	0.158***	0.162***
State fixed effect	Yes	Yes	Yes	Yes
Observations	22,966	22,966	22,966	22,966
Adjusted R^2	0.408	0.429		
Pseudo R^2			0.108	0.114

Notes: The reference group is aged 18 to 24. In Columns (1) and (2), the method of OLS regression is utilized. The approach of ordered probit regression is employed in Columns (3) and (4), and hence, the constant item is not reported. Besides, the data in parentheses are robust standard errors.

In Column (1), all the control variables are statistically significant at the 1% level. In detail, the coefficient for gender is 0.329 at a significance of 1%, indicating that male consumers are more likely to feel satisfied with their current financial condition than females. Besides, the age groups show a negative and significant relationship with dependent variables in all estimates, indicating a consistent trend. Among these groups, the coefficient for those aged 45 to 54 is -1.225, while the coefficient for those aged 25 to 34 is -0.666. The linear relationship between age and consumer financial satisfaction indicates that when consumers get older, they feel less satisfied with their financial condition, especially those who are in their thirties and forties. As regards education, the coefficients for the variables of some college to the Bachelor's degree and postgraduate degree or higher are both negative and the magnitudes are quite close. The results imply that consumers who have received a college to bachelor's degree or higher tend to be financially dissatisfied; that is, consumer financial satisfaction tends to decline in the case of consumers with higher education. Compared with unmarried, married consumers appear to be statistically and positively associated with financial satisfaction indicated by the positive coefficient at a significance of 1%. Moreover, the coefficient of annual income is statistically positive just as expected, which suggests that higher-income consumers will be more satisfied with their financial conditions. Consumers who have ever participated in financial markets, as well as those with desirable financial behaviors, both have a greater sense of financial satisfaction indicated by the positive coefficient at the significant level of 1%. With regard to the number of financially dependent children, the negative coefficient implies that the more children the consumers have to bear financial burdens on, the less satisfied they are likely to feel.

The ordered probit regression results only for control variables in Column (3) are similar to those in Column (1) estimated by the approach of OLS, where the coefficients are all statistically positive at a significance of 1%. In Columns (2) and (4), the main independent variable with regard to consumer FCDUE is added. Furthermore, the approach of OLS is employed in Column (2) while the method of ordered probit regression is utilized in Column (4). The positive coefficients of consumer FCDUE are 0.838 and 0.360 respectively, both at the significant level of 1%. Meanwhile, estimated results specific to the control variables remain consistent with these in Columns (1) and (3). The results illustrate that FCDUE is positively associated with consumer financial satisfaction, which is as hypothesized in H1. Consumers with higher financial confidence are usually derived from their financial education and ample financial knowledge. Therefore, given the evidence that financial education can improve consumer financial satisfaction indirectly via financial knowledge and financial behavior (Atkinson et al., 2007), FCDUE and consumer financial satisfaction appear to achieve a positive connection consequently.

4.3 *Robustness check*

To produce more robust estimates, this study conducts a comprehensive check. Firstly, this study uses an alternative method to perform re-estimation. To be more specific, the approach of ordered logit regression is employed to replace the methods of OLS and ordered probit regression. Secondly, samples with an annual income that is less than $15,000 or more than $150,000 are excluded to eliminate estimation bias caused by outliers specific to consumers' income-related variables. Thirdly, this study also takes the heterogeneity of risk attitude into account. In detail, samples with the risk attitude whose scores are no less than 5 and less than 5 are incorporated in Columns (3) and (4), respectively.

Table 5 presents the results of the robustness check. The coefficients of consumer FCDUE are all statistically positive at a significance of 1% in Columns (1) to (4), which further verifies that FCDUE positively contributes to consumer financial satisfaction. In sum, no matter what kind of regression methods or samples are employed, the results remain unchanged, which is identical to H1.

Table 5. Results of the robustness check

Variables	(1)	(2)	(3)	(4)
	Consumer financial satisfaction	Consumer financial satisfaction	Consumer financial satisfaction	Consumer financial satisfaction
Consumer FCDUE	0.731***	0.320***	0.150***	0.758***
	(0.035)	(0.020)	(0.023)	(0.026)
Male	0.249***	0.174***	0.124***	0.070***
	(0.024)	(0.015)	(0.018)	(0.023)
Age 25 to 34	-0.436***	-0.219***	-0.173***	-0.454***
	(0.040)	(0.025)	(0.031)	(0.035)
Age 35 to 44	-0.816***	-0.453***	-0.465***	-0.530***
	(0.040)	(0.026)	(0.031)	(0.038)
Age 45 to 54	-0.934***	-0.551***	-0.590***	-0.491***
	(0.036)	(0.024)	(0.028)	(0.034)
Age 55 to 64	-0.478***	-0.282***	-0.313***	-0.206***
	(0.033)	(0.021)	(0.026)	(0.030)
Some college to Bachelor's degree	-0.279***	-0.179***	-0.251***	-0.108***
	(0.030)	(0.019)	(0.025)	(0.025)
Post graduate degree or higher	-0.268***	-0.168***	-0.247***	-0.061
	(0.041)	(0.027)	(0.032)	(0.039)
Being married	0.181***	0.083***	0.134***	0.095***
	(0.028)	(0.017)	(0.022)	(0.025)
Children	-0.073***	-0.044***	-0.047***	-0.042***
	(0.014)	(0.009)	(0.011)	(0.013)
Annual income	0.140***	0.087***	0.073***	0.069***
	(0.008)	(0.006)	(0.006)	(0.008)
Participating in financial markets	0.696***	0.415***	0.393***	0.290***
	(0.027)	(0.017)	(0.020)	(0.027)
Desirable financial behaviors	0.518***	0.334***	0.314***	0.245***
	(0.014)	(0.009)	(0.010)	(0.013)
State fixed effect	Yes	Yes	Yes	Yes
Observations	22,966	19,342	13,116	9,850
Pseudo R^2	0.118	0.107	0.088	0.140

Notes: The reference group is aged 18 to 24. ***, ** and * stand for the significant level of 1%, 5%, and 10%, respectively. In Column (1), the approach of ordered logit regression is utilized, and the method of ordered probit regression is employed in Columns (2) to (4). The data in parentheses are robust standard errors.

4.4 *Moderating role of subjective financial knowledge*

Table 6. Results of subjective financial knowledge as a moderator

Variables	(1)	(2)	(3)
	Consumer financial satisfaction	Consumer financial satisfaction	Consumer financial satisfaction
Consumer FCDUE	0.360^{***}		
	(0.018)		
Subjective financial knowledge		0.243^{***}	
		(0.008)	
Moderating effect coefficient			0.083^{***}
			(0.002)
Male	0.162^{***}	0.105^{***}	0.119^{***}
	(0.014)	(0.014)	(0.014)
Age 25 to 34	-0.207^{***}	-0.245^{***}	-0.140^{***}
	(0.023)	(0.023)	(0.024)
Age 35 to 44	-0.439^{***}	-0.452^{***}	-0.381^{***}
	(0.024)	(0.024)	(0.024)
Age 45 to 54	-0.529^{***}	-0.551^{***}	-0.493^{***}
	(0.022)	(0.022)	(0.021)
Age 55 to 64	-0.271^{***}	-0.297^{***}	-0.262^{***}
	(0.019)	(0.020)	(0.019)
Some college to Bachelor's degree	-0.178^{***}	-0.213^{***}	-0.195^{***}
	(0.018)	(0.018)	(0.018)
Post graduate degree or higher	-0.178^{***}	-0.216^{***}	-0.208^{***}
	(0.024)	(0.024)	(0.024)
Being married	0.094^{***}	0.093^{***}	0.071^{***}
	(0.016)	(0.016)	(0.017)
Children	-0.042^{***}	-0.076^{***}	-0.038^{***}
	(0.008)	(0.008)	(0.008)
Annual income	0.079^{***}	0.081^{***}	0.071^{***}
	(0.005)	(0.005)	(0.005)
Participating in the financial markets	0.411^{***}	0.318^{***}	0.360^{***}
	(0.016)	(0.016)	(0.016)
Desirable financial behaviors	0.316^{***}	0.373^{***}	0.268^{***}
	(0.008)	(0.007)	(0.008)
State fixed effect	Yes	Yes	Yes
Observations	22,966	22,966	22,966
Pseudo R^2	0.114	0.125	0.128

Notes: The reference group is aged 18 to 24. ***, ** and * stand for the significant level of 1%, 5%, and 10%, respectively. In Columns (1) to (3), the approach of ordered probit regression is used and the constant item is not reported. The data in parentheses are robust standard errors.

To further explore the influence channel of the effects of FCDUE on consumer financial satisfaction, this study investigates the moderating role of subjective financial knowledge as well. In detail, this study constructs an interactive term for subjective financial knowledge and consumer FCDUE. In this study, both consumer FCDUE and subjective financial knowledge are not continuous variables. Due to colinearity, both of them are excluded when entering their interactive term.

Table 6 exhibits the regression results of the moderating role of subjective financial knowledge. To be more specific, the interactive term of consumer FCDUE and subjective financial knowledge is denoted by the moderating effect coefficient. In Columns (1) to (3), the approach of ordered probit regression is utilized, where the differences lie in the independent variables. In Columns (2) and (3), the variables of subjective financial knowledge and the interactive term are incorporated, respectively. In Column (2), the results suggest that the coefficient of subjective financial knowledge is statistically positive at a significance of 1%, revealing that the better performance of subjective financial knowledge appreciably bears a positive relationship with higher consumer financial satisfaction. In Column (3), the moderating effect coefficient is statistically and positively associated with consumer financial satisfaction at a significance of 1%. The results suggest that subjective financial knowledge as the moderator positively contributes to the effects of FCDUE on consumer financial satisfaction, which is aligned with H2.

The involvement of the moderating variable verifies that subjective financial knowledge is a major contributor to boosting consumer financial satisfaction if accompanied by FCDUE. Therefore, consumers who are financially sophisticated coupled with more confidence in their financial condition will perform well in feel a greater sense of financial satisfaction. When considering the single factor of subjective financial knowledge, prior studies have suggested that the more financially literate consumers believe they are, the higher their financial satisfaction (Chen et al., 2020b; Chen et al., 2020d).

5. Conclusion and implications

Using data from the NFCS in 2018, this study attempts to explore the associations between FCDUE and consumer financial satisfaction, especially the role of subjective financial knowledge as a moderator. The findings of this paper are as follows. First, the positive and significant associations between FCDUE and consumer financial satisfaction have been verified. Second, this study examines the moderating role of subjective financial knowledge, revealing that the effects of FCDUE on consumer financial satisfaction tend to be enhanced if subjective financial knowledge serves as a moderator. Alternative methods are employed in this paper to perform a comprehensive check of robustness. More specifically, multiple estimation approaches and related measures such as excluding the outliers are utilized.

In the recent decade, a large and growing body of literature has focused on the associations between financial capability and consumer financial satisfaction. In terms of financial knowledge, previous studies have already found that financially sophisticated consumers, that is, with more financial knowledge, usually contribute to raising the level of financial satisfaction. Moreover, extant research further subdivides the variables of financial literacy into two types of variables, objective and subjective financial knowledge, and suggests that subjective financial knowledge positively contributes to consumer financial satisfaction while objective financial knowledge has just the opposite effect. Simultaneously, few studies attempt to enquire how subjective financial knowledge takes effect on individuals' subjective mental state, especially functioning as a moderator. Besides, little research has focused on the associations between FCDUE and consumer financial satisfaction as well. Accompanied by increasing financial knowledge, financial confidence shows a stronger association with consumer overall financial satisfaction. Empirical evidence is provided to explore that financial literacy contributes to building up rainy day savings, which indirectly implies that FCDUE is improved with the enhancement of financial literacy. This study directly shows evidence that the positive associations between FCDUE and consumer financial satisfaction. More importantly, this study provides new perspectives on developing the variable of consumer financial satisfaction from the subjective aspect, since financial satisfaction and subjective financial knowledge are all related to individuals' subjective evaluation.

With the deepening of financial markets' complexity, more consumers are willing to financially equip themselves better to capture favorable investment opportunities, hoping for a decent return. Prior studies have also concluded that financial knowledge tends to affect financial confidence positively. But with more financial knowledge, consumers are likely to decrease the diversification of portfolios, which may decrease their financial satisfaction. Therefore, this study

enriches the field of financial satisfaction by providing a new interaction term for exploring the effects on consumer financial satisfaction. Thus, subjective financial knowledge, as a moderator, enhances the positively significant link between FCDUE and consumer financial satisfaction.

Several limitations of this study should be acknowledged. The first one is that cross-sectional data are utilized to explore the associations between FCDUE and consumer financial satisfaction. However, there is no panel data related to this issue. Consequently, it is difficult to analyze the dynamic changes in the associations between FCDUE and consumer financial satisfaction. The second is that even if three estimation methods have been employed in this study, more sophisticated approaches may be utilized to get more accurate results when panel data are available. The third limitation is that the dataset utilized in this study is from the U.S. NFCS and the data may be biased due to the different national conditions. Hence, related research can be repeatedly conducted in different countries, especially in developing countries to conclude with higher universality under the background of economic globalization. In brief, future studies can be conducted and developed by implementing the additional survey and using more comprehensive data to improve the research results in the related fields.

In light of the conclusions, the moderating role that subjective financial knowledge plays a managerial implication in the impacts of FCDUE on consumer financial satisfaction. The findings of this study provide a channel to improve consumer financial satisfaction. Policymakers are recommended to increase the input of financial education and enhance consumer financial knowledge to improve their financial satisfaction. Besides, policymakers are also encouraged to carry out education programs to increase consumer financial confidence in emergency savings and emphasize financial risks to raise the consumers' risk awareness. From the consumers' perspective, maintaining appropriate financial confidence and adequate financial literacy is in favor of enhancing the sense of financial satisfaction. However, financial overconfidence may cause a biased self-cognition of their financial condition and make consumers overestimate subjective financial knowledge, thereby ignoring the potential risks behind financial markets. Therefore, consumers need to enhance their perceptions of risk.

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Conflict of interest

We declare that we have no conflict of interest.

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