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## Financial inclusion, financial capability, and financial fragility during the COVID-19 pandemic

Kyoung Tae Kim

Jing Jian Xiao

*University of Rhode Island, jjxiao@uri.edu*

Nilton Porto

*University of Rhode Island, nilton\_porto@uri.edu*

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**Financial inclusion, financial capability, and financial fragility during the COVID-19 pandemic**

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**Abstract**

**Purpose:** Financial inclusion can be proxied by banking status. The purpose of this study is to investigate the potential effects of financial capability on the financial fragility of U.S. adults with various banking statuses during the COVID-19 pandemic.

**Design/methodology/approach:** This study utilized the 2021 National Financial Capability Study (NFCS) dataset to investigate the relationship between financial capability and financial fragility among consumers with different banking statuses. The analysis controlled for employment shocks, health shocks, and other consumer characteristics. Banking statuses included fully banked, under-banked (utilizing both banking and alternative financial services), and unbanked individuals. Logistic regression analyses were conducted on both the entire sample and subsamples based on banking statuses.

**Findings:** The results showed that financial capability was negatively associated with financial fragility. The magnitude of the potential negative effect of financial capability was the greatest among the fully banked group, followed by the underbanked and unbanked groups. Respondents who were underbanked or unbanked were more likely to experience financial fragility than those who were fully banked. Additionally, respondents who were laid off or furloughed during the pandemic were more likely to experience financial fragility than those without employment shocks. The effect size of financial capability factors was greater than that of COVID-19 shock factors. These results suggest that higher levels of both financial capability and financial inclusion may be effective in reducing the risk of financial fragility.

**Originality:** This study represents one of the first attempts to examine the potential effects of financial capability on financial fragility among consumers with various banking statuses during the COVID-19 pandemic. Furthermore, this study offers new evidence to determine whether COVID-19 shocks, as measured by health and employment status, are associated with financial fragility. Additionally, the effect size of financial capability factors is greater than that of COVID-19 shock factors. The results from the 2021 NFCS dataset provide valuable insights for banking professionals and public policymakers on how to enhance consumer financial wellbeing.

**Keywords:** financial fragility, financial capability, banking status, COVID-19 pandemic, health shock, labor shock

## 1. Introduction

To better meet consumer needs, banking professionals should gain a deeper understanding of consumer behaviors, including those of vulnerable populations (Moliner Tena & Monferrer Tirado, 2022). Research on consumer vulnerability should be encouraged and applied to marketing strategies with a sense of corporate social responsibility (Moliner et al., 2020; Schröder, 2021; Tosun & Köylüoğlu, 2023; Zainuldin et al., 2021). One indicator of consumer vulnerability is financial fragility, which refers to the inability to cope with unexpected expenditures or income shocks (Hasler et al., 2018). According to recent household-level data in the United States, nearly a third of Americans probably or certainly could not come up with \$2,000 if faced with an unexpected expense within the next month (Lin et al., 2022). The inability to cope with this financial shock is often labeled as financial fragility (Lusardi et al., 2011) and can also be considered the flip side of financial resilience (Clark & Mitchell, 2022). Financial fragility can indicate a lack of precautionary savings, limited access to affordable credit, and even the absence or fragility of social support networks for borrowing needs. Additionally, some factors influencing financial fragility include financial knowledge (Kim et al., 2022), financial control (Bialowolski et al., 2021), and financial confidence (Chhatwani & Mishra, 2021a). Similarly, financial capability and its components may have impacts on financial fragility.

Financial capability is defined by researchers in various ways (Atkinson et al., 2007; Lusardi & Mitchell, 2014; Xiao et al., 2022). In this study, to emphasize the importance of both financial knowledge and financial behavior, financial capability is defined as the ability to apply financial knowledge and engage in desirable financial behaviors to improve financial wellbeing (Xiao et al., 2014). This definition takes into consideration that financial knowledge and financial behavior are important components of financial capability. While previous research has found associations between some of these components and financial fragility, the current study, to the best of our knowledge, represents one of the first attempts

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to examine the association between financial capability and financial fragility among consumers with various banking statuses during the COVID-19 pandemic.

Access to affordable financial products and services, such as low-cost small-dollar credit and no-fee bank accounts, provides consumers with the necessary tools to make sound financial decisions and build financial well-being (Sherraden, 2013). This access is an important component of building financial capability, as it empowers consumers to apply their knowledge and skills. Bank status, a measure of financial inclusion, is divided into three categories in this study: banked, unbanked, and underbanked. Banked households have a checking or other account and do not rely on alternative financial services (AFS) like pawn shops and payday lending. Unbanked households are those without a bank checking or other account. Our third banking status category, the underbanked, refers to households that have a checking or other bank account but have also used some form of alternative financial services. These three definitions of banking statuses align with the approaches used by both the Federal Reserve in their report on the Economic Well-Being of US Households (Canilang et al., 2020) and the FDIC National Survey of Unbanked and Underbanked Households (FDIC, 2021). Further, Barcellos and Zamarro (2021) argue that being unbanked and underbanked are distinct concepts deserving separate examinations.

Given that the COVID-19 pandemic has brought forth a new set of financial and health challenges for American consumers (Porto & Mottola, 2022), this study aims to investigate the potential effects of banking status, financial capability, and COVID-19 shocks on the financial fragility of US adults during the COVID-19 pandemic. For empirical analyses, we used the 2021 National Financial Capability Study (NFCS) data, which provides the most recent overview of financial fragility among US adults. The 2021 NFCS data was collected between June and October 2021, during the surge of the Delta variant of the infection and increasing availability of vaccines. Consequently, many respondents in the dataset were impacted by health shocks (COVID-19 household contagion) and/or financial shocks (job loss due to the pandemic). Our analysis takes into account the dual impacts of the pandemic on the financial fragility of our sample. Recent research indicates that both financial fragility and financial resilience have been affected by the pandemic (Clark & Mitchell, 2022). However, to our knowledge, no

previous studies have compared the potential effects of COVID-19 shocks and financial capability on financial fragility.

This study contributes to the existing literature as one of the first attempts to examine whether financial capability and pandemic-related shocks are associated with financial fragility among consumers with various banking statuses. The findings reveal that the effect size of financial capability factors is greater than that of COVID-19 shock factors, which is a unique contribution to the literature. In the US, during the COVID-19 pandemic, consumers suffer both health and financial shocks caused by this global crisis. Many consumers lost jobs and faced income reduction, which put them in the vulnerable position (Lin et al., 2022; Porto & Mottola, 2022). From the research perspective, this pandemic provides an opportunity to test if financial capability, a potential coping tool can be effective to combat the health and economic shocks caused by the pandemic. The findings provide confirmative evidence to show the potential of consumer financial capability, especially the subjective financial knowledge, desirable financial behavior, and perceived financial capability to reduce financial fragility, which is echoed a study examining financial capability trend before and after the start of the pandemic in which financial capability is positively associated with financial wellbeing over time (Xiao et al., 2023).

The results of this study offer important insights for banking industry professionals on how to increase corporate social responsibility (CSR) and for public policymakers on how to reduce the risk of financial fragility and improve the financial wellbeing of consumers. CSR refers to a set of business practices that benefit social welfare (Deigh & Farquhar, 2021) and has been shown to enhance trust in financial institutions (Hurley et al., 2014). Banks with a sense of CSR would develop programs to meet the needs of consumers, including those who are financially vulnerable (Monferrer Tirado et al., 2023). Research shows that maintaining a long-term customer base through CSR activities helps marketers achieve sustainable competitive advantage (Shah & Khan, 2020).

## 2. Literature Review and Hypotheses

### 2.1. Previous Research on Financial Fragility

Financial fragility is an indicator that reveals a negative aspect of consumer financial wellbeing. Consumer financial wellbeing refers to the situation in which consumers are faring well financially (Xiao, 2015). Financial wellbeing can be measured by both positive and negative indicators. For example, financial satisfaction is a positive indicator, while financial fragility is a negative one regarding financial wellbeing. Financial fragility refers to the situation in which consumers experience difficulties in obtaining \$2,000 for emergencies (Clark et al., 2021a). Financial fragility can be assessed in various ways. One approach involves using consumer balance sheet data to calculate a measure of financial fragility (Ampudia et al., 2016; Brunetti et al., 2016; Jappelli et al., 2013). Another method is to ask consumers if they are in such a financially challenging situation (Lin et al., 2022). In the current study, due to limitations in the dataset, we employ a self-reported measure of financial fragility from consumers.

Research on financial fragility can be categorized into three main types. The first type aims to describe the status of financial fragility using national or international data (Demertzis et al., 2020; Lin et al., 2022). The second type focuses on exploring the outcomes associated with financial fragility, where financial fragility serves as a contextual background factor (Bialowolski et al., 2021; Chhatwani & Mishra, 2021b; Preston, 2022; Yu et al., 2022). The third type seeks to identify factors that are linked to financial fragility, encompassing both risk factors that may increase the likelihood of financial fragility and coping factors that can help reduce it (Ali et al., 2020; Cardona-Montoya et al., 2022; Clark et al., 2021a, 2021b; Lusardi et al., 2021; West & Mottola, 2016). Incidents of financial fragility are prevalent in the United States and other countries. In the U.S., in 2021, when respondents were asked whether they could come up with \$2,000 in the event of an unexpected need arising within the next month, 30% stated that they probably or certainly could not (Lin et al., 2022). A similar prevalence is observed in the European Union (EU), where one in three EU households is unable to handle an unexpected financial shock during normal times (Demertzis et al., 2020).

Prior research demonstrates that financial fragility has adverse impacts on life outcomes. For example, using data from the U.S., researchers have shown negative impacts of financial fragility on 17 wellbeing outcomes (Bialowolski et al., 2021). A negative link between financial fragility and financial



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3 optimism has also been identified among Americans (Chhatwani & Mishra, 2021b). Utilizing data from a  
4 sample of older adults in the U.S., researchers have shown that financially fragile older adults are more  
5 susceptible to scams (Yu et al., 2022). Being financially fragile increases the likelihood of making an  
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9 early withdrawal from retirement savings, as demonstrated with data from Australia (Preston, 2022).  
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12 Researchers have explored factors associated with financial fragility. They have demonstrated  
13 that consumers with specific background characteristics, such as low income and being African  
14 American, are more likely to experience financial fragility (Lusardi et al., 2021). Among a sample of  
15 consumers aged 45-75, younger respondents, those with larger families, Hispanics, and individuals with  
16 lower incomes are more likely to be financially fragile (Clark et al., 2021a). Using data from the 2015  
17 National Financial Capability Study (NFCS), researchers have found that factors associated with financial  
18 fragility include a lack of assets and high levels of indebtedness (Clark et al., 2021b). Based on data from  
19 the 2012 NFCS, researchers have shown that renters are 75% more likely to experience financial fragility  
20 (West & Mottola, 2016). A study using data from Pakistan reveals that education, employment status, and  
21 the industry of employment of the household head are the main determinants of financial fragility (Ali et  
22 al., 2020). Utilizing data from Colombia, researchers have demonstrated that workers with more financial  
23 education are better prepared to mitigate the negative effects on their finances, thereby reducing the  
24 probability of becoming financially fragile (Cardona-Montoya et al., 2022).  
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39 Certain background factors can be considered coping mechanisms, including education, assets,  
40 and a lack of debt (Lusardi et al., 2011). Researchers have also identified other coping strategies aimed at  
41 reducing financial fragility. Using data collected from multiple countries, researchers have highlighted the  
42 various methods people employ to deal with financial shocks. While savings often serve as the primary  
43 coping mechanism, people also frequently turn to family and friends, utilize formal and alternative credit  
44 sources, increase their work hours, and sell items to manage emergencies (Lusardi et al., 2011). A study  
45 using data from multiple countries finds that individuals' cognitive (i.e., financial literacy) as well as non-  
46 cognitive abilities (i.e., internal locus of control; psychological resilience) help to reduce financial  
47 fragility (Kleimeier et al., 2023). These factors can also be used to develop coping strategies. In this  
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study, we specifically focus on one of these coping factors that may help reduce the risk of financial fragility. Our attention centers on financial capability, as measured by an index and its components, including financial literacy (both objectively and subjectively assessed), perceived financial capability, and the number of desirable financial behavior.

**2.2. Financial Capability and Financial Fragility**

In this study, we define financial capability as the ability to apply appropriate financial knowledge and engage in desirable financial behaviors to achieve financial wellbeing (Xiao et al., 2014). This definition has been measured using a financial capability index (Xiao et al., 2015) and its components, which include objective financial literacy, subjective financial literacy, desirable financial behavior, and perceived financial capability (Xiao & Porto, 2017; Xiao & Kim, 2022). Theoretically, financial capability assumes that consumers possess a certain level of financial literacy, engage in desirable consumer behaviors, and have a certain level of confidence in achieving financial wellbeing. The theoretical foundation of financial capability is initially rooted in the theory of self-efficacy (Bandura, 1982). However, the theoretical foundation used in this study extends beyond psychological aspects and emphasizes personal abilities in terms of financial knowledge and financial behavior that aid individuals in achieving financial wellbeing (Xiao et al., 2022).

Based on this extended conceptual framework of financial capability, consumers with higher levels of financial capability should have a greater probability of achieving financial wellbeing. Consequently, financial capability should be positively associated with positive financial outcomes and negatively associated with negative financial outcomes. This theoretical prediction has been supported by empirical evidence (Babiartz & Robb, 2014; Birkenmaier & Fu, 2020; Henager & Wilmarth, 2018; Huang et al., 2016; Robb et al., 2019; Tharp et al., 2020). However, no study has been found to examine the association between financial capability and financial fragility. Therefore, we propose the following hypothesis.

*H<sub>1</sub>: Financial capability is negatively associated with financial fragility.*

Financial capability comprises several components, including financial knowledge, financial behavior, and perceived financial capability. Their effects on financial fragility may differ. Previous studies have found that financial knowledge is negatively associated with financial fragility (Clark et al., 2021a; Lusardi et al., 2021). Using data from the 2015 NFCS, researchers demonstrated a negative relationship between financial knowledge and financial fragility using an instrumental variable approach (Kim et al., 2022). Financially capable millennials are less likely to experience financial fragility than their peers who are excluded from mainstream financial services (Friedline & West, 2016). Additionally, based on U.S. data, researchers have shown that financial knowledge reduces the odds of experiencing financial fragility by 9.1%, and financially literate consumers with high financial confidence are less financially fragile during COVID-19 (Chhatwani & Mishra, 2021b).

However, the potential impacts of other components of financial capability, such as desirable financial behavior and perceived financial capability, on financial fragility have not been explored in the current literature. Prior research has demonstrated that these components may have varying effects on financial outcomes, including financial behavior (Xiao et al., 2011), financial satisfaction (Xiao & Porto, 2017), financial stress (Xiao & Kim, 2022), and financial wellbeing (Xiao & Porto, 2022). Thus, we propose the following hypothesis:

*H<sub>2</sub>: Financial capability components are negatively associated with financial fragility.*

### **2.3. COVID-19 Shocks and Financial Fragility**

The COVID-19 pandemic has fundamentally changed the world and has brought about shocks to various aspects of consumer life. In this study, we focus on two types of shocks: health shocks and economic shocks. Intuitively, these shocks have an adverse impact on consumer wellbeing and increase the likelihood of financial fragility. Previous research confirms this intuition. Using data from the 2021 NFCS, researchers showed that individuals in households with positive test results reported significantly lower levels of financial wellbeing and financial satisfaction, along with higher levels of financial fragility (Porto & Mottola, 2022). Research conducted in 2020 and 2021, based on a sample of older

adults aged 45-75, indicated that higher initial levels of resilience were, in fact, associated with lower levels of financial fragility a year into the pandemic (Clark & Mitchell, 2022). Government policies can also influence financial fragility. Researchers demonstrated that the expiration of the CARES Act's Pandemic Unemployment Compensation benefits, which augmented unemployment insurance by \$600 a week, significantly increased the financial fragility of unemployed workers in America (Schneider et al., 2020).

The COVID-19 pandemic has created a profoundly challenging environment for consumers, who are adversely affected by both health and economic shocks stemming from the pandemic. Consumers are utilizing their resources to cope with these shocks. It is crucial to understand the potential role of financial capability as a coping mechanism to mitigate the impact of these shocks. In this study, we operate under the assumption that financial fragility results from a combination of long-term factors that have accumulated over many years and short-term factors such as the shocks caused by COVID-19. Furthermore, we hypothesize that the potential effects of financial capability factors can offset the impact of these pandemic-related shocks. Thus, we propose the following hypothesis:

*H<sub>3</sub>: Potential effect sizes of financial capability are greater than those of COVID shocks (health and employment shocks) on financial fragility.*

**2.4. Banking Status and Financial Fragility**

Banking statuses are divided to three categories in this study, banked, unbanked, and underbanked. An estimated 4.5% of U.S. households were “unbanked” in 2021, meaning that no one in the household had a checking or savings account at a bank or credit union. This proportion represents approximately 5.9 million U.S. households (FDIC, 2022). An estimated 14.1% of U.S. households—representing approximately 18.7 million households—were “underbanked” in 2021, meaning that the household was banked and in the past 12 months used at least one of the following nonbank transaction or credit products or services that are disproportionately used by unbanked households to meet their transaction and credit needs: money orders, check cashing, or international remittances (i.e., nonbank transactions) or rent-to-

own services or payday, pawn shop, tax refund anticipation, or auto title loans (i.e., nonbank credit) (FDIC, 2022).

Research on the unbanked aims to identify factors associated with the unbanked to provide policy recommendations for more financial inclusion in banking services. Financial inclusion – the availability and equal access to mainstream financial services and products – is associated with factors such as poverty levels, financial literacy, and regulatory framework (Ozili, 2021). Based on a recent review, research on banking status focuses on the reasons for being unbanked, bank access for racial and ethnic minority households, and the consequences of financial exclusion on payments (Boel & Zimmerman, 2022). For example, an international study examines financial inclusion, the access to formal financial services that provides an entry key for people to participate in the economy and finds financial inclusion is higher under right-wing regimes than under left-wing governments (De Jong et al., 2022). Households in poverty are more likely to be unbanked, especial among Black and Hispanic households. Even though the proportions have decreased compared to 1980s, they are still 38.4% and 31.8% in 2019, much higher than 22.8% of average households (Creamer & Warren, 2022). A study uses the data from World Bank Global Findex in India to conclude that financial inclusion should be backed by financial literacy to achieve the best results (Menon, 2019).

Researchers have also explored factors associated with the underbanked. With data from the 2015 NFCS, researchers find that the underbanked group is a sizable, distinctively different group in which income volatility and welfare benefit receipt are both associated with being underbanked rather than unbanked (Chen & Friedline, 2022). With data collected by FDIC, research shows that bank fees are associated with the likelihood for underbanked households to obtain alternative financial services (AFS), especially nonbank credit. Households' attitudes and experience with banks are important in the choice of getting AFS. Furthermore, most underbanked households used AFS temporarily (Xu, 2019). Researchers find that racial gaps in unbanked and AFS use are explained differently; gaps in unbanked status are mostly explained by differences in endowments across groups, for AFS gaps differences in returns to endowments have the largest explanatory power (Barcellos & Zamarro, 2021).

Previous research shows that banking status is associated with financial fragility (FDIC, 2022).

The unbanked and underbanked are more likely to be financially fragile than those who are banked (Chen & Friedline, 2022; Creamer & Warren, 2022). For households with lower resources levels, their financial capability should help them better manage their resources. In that sense, potential effects of financial capability on financial fragility among households with different banking statuses should vary. To our knowledge, no prior research has examined potential effects of financial capability on financial fragility among households with different banking statuses. Thus, we propose the following hypothesis:

*H<sub>4</sub>: Negative associations between financial capability and financial fragility vary among consumers with various banking statuses.*

**3. Methods**

***3.1. Dataset and analytics sample***

This study utilized the 2021 National Financial Capability Study (NFCS), which was released by the FINRA Investor Education Foundation. The NFCS has been conducted triennially since 2009, with data collection taking place on a state-by-state basis using non-probability quota sampling. The NFCS dataset encompasses financial perceptions, attitudes, experiences, and behaviors of adults in the United States. The 2021 NFCS was conducted through online surveys from June to October 2021, encompassing the period of the COVID-19 pandemic. The total sample size for the 2021 NFCS was 27,118, with approximately 500 observations per state, including the District of Columbia. Our final analytical sample consisted of 23,068 individuals after excluding observations with missing values for selected variables.

***3.2. Dependent variables: Financial fragility***

The measures were developed based on the theoretical prediction that financial capability is linked to financial outcomes (Xiao et al., 2022). Financial outcomes can be assessed as either positive or negative. In this study, we measure financial outcomes negatively using financial fragility. Consistent with previous studies (e.g., Lusardi et al., 2011), financial fragility was assessed by gauging the ability to cope with an

emergency fund, using the following question: "How confident are you that you could come up with \$2,000 if an unexpected need arose within the next month?" The dependent variable is a binary indicator, coded as 1 if the respondents answered, "I could probably not come up with \$2,000" or "I am certain I could not come up with \$2,000," and coded as 0 otherwise.

### **3.3. Focal independent variables**

#### **3.3.1. Financial capability**

Based on the theoretical concept of financial capability, it refers to a person's ability to integrate financial knowledge and financial behavior to achieve financial wellbeing (Xiao et al., 2022). In empirical terms, we measured financial capability in two ways, following previous research (Xiao & Porto, 2017; Xiao & Kim, 2022): (1) four components of financial capability and (2) one comprehensive index. The four components of financial capability include (a) objective financial knowledge ranged 0 to 6; (b) subjective financial knowledge ranged 1 to 7; (c) perceived financial capability ranged 1 to 7; and (d) desirable financial behaviors ranged 0 to 6. Additionally, we constructed a composite index of financial capability by summing the Z-scores of the four financial capability measures.

#### **3.3.2. Banking status**

Banking status was assessed using two survey questions: one regarding bank account ownership and the other regarding the experience of using alternative financial services (AFS). Bank account ownership was determined by whether respondents had a checking account. Respondents were also asked whether they had utilized any of four AFS products in the past five years, including auto title loans, payday loans, pawn shops, and rent-to-own stores. To establish mutually exclusive categories of banking status, we first created binary indicators for being banked and AFS usage. Subsequently, we categorized banking status into three groups as follows: (a) fully banked (bank account = yes, AFS use = no), (b) underbanked (bank account = yes, AFS use = yes), and (c) unbanked (bank account = no, AFS use = yes or no).



As previously mentioned, these definitions for banking statuses align with those used by the Federal Reserve Economic Well-Being of US Households and the FDIC National Survey of Unbanked and Underbanked Households. However, it's worth noting that in the current study, the question about past AFS use spanned a five-year period, whereas in other surveys, it covers only the previous 12 months. This difference in the timeframe for AFS usage could potentially result in more respondents being classified as underbanked in this analysis compared to the other two surveys. Both the five-year and twelve-month approaches to identify AFS usage have been employed in prior research, often driven by the dataset available. In our multivariate analyses, we used "fully banked" as the reference group.

3.3.3. *COVID-19 shock variables*

The 2021 NFCS dataset included several variables related to the COVID-19 pandemic. In this study, we utilized two questions to gauge potential shocks attributable to COVID-19. Respondents were asked the following questions: "As a result of the pandemic, were you laid off or furloughed at any time in 2020 or 2021?" and "Have you or anyone living with you tested positive for or been diagnosed with COVID-19?" Based on these questions, we created two binary indicators for COVID-19 shocks: employment shock and health shock, respectively.

3.4. *Control variables*

In addition to three sets of focal variables, the following control variables were included in our models; age, gender (male, female), marital status (married, single, separated/divorce/widow), having a dependent child, race/ethnicity (White, Black, Hispanic, AAPI, others), employment status (full-time working, self-employed, part-time worker, homemaker, student, disabled, unemployed, retired), education (high school or lower, some college, associate degree, bachelor's degree, post-bachelor's degree), household income, homeownership and health insurance ownership. We also controlled for the state of residence to account for the variation of financial fragility and other local factors due to the unobserved state characteristics.



### 3.5. Empirical analyses

We conducted multiple sets of logistic regression analyses on financial fragility to test our four hypotheses described above. The following equation describes the odds for being financially fragile where  $\pi$  is the probability of being financially fragile, and  $X_i$  is the set of control variables and  $STATE_i$  is the current state of residence for the  $i^{\text{th}}$  respondent.

$$\log\left(\frac{\pi}{1-\pi}\right)_i = \beta_0 + \beta_1 \text{Financial capability}_i + \beta_2 \text{Banking status}_i + \beta_3 \text{COVID shocks}_i + \gamma X_i + STATE_i$$

In Model 1 and 2, we conducted logistic regression analyses based on the full sample and tested two different measures of financial capability variables. For Model 3 and 4, we conducted similar analyses based on subsample of three different banking status. Our empirical models are as follows:

*Model 1 (Full sample): Financial fragility = f(financial capability index, banking status, COVID-19 shocks, control variables, state of residence)*

*Model 2 (Full sample): Financial fragility = f(financial capability components, banking status, COVID-19 shocks, control variables, state of residence)*

*Model 3 (subsamples of banking status): Financial fragility = f(financial capability index, COVID-19 shocks, control variables, state of residence)*

*Model 4 (subsamples of banking status): Financial fragility = f(financial capability components, COVID-19 shocks, control variables, state of residence)*

## 4. Results

### 4.1. Descriptive results

Table 1 displays weighted descriptive statistics for the entire sample and three subsamples categorized by banking status. In the complete sample, 68% of respondents were categorized as "banked," while 26% fell into the "underbanked" category, and nearly 6% were classified as "unbanked." The rate of unbanked respondents aligns with the most recent FDIC National Survey of Unbanked and Underbanked Households (FDIC, 2022), while our figures for the underbanked group were somewhat lower. This

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difference may be attributed to variations in term definitions (five years versus 12 months of past AFS usage) and survey populations.

Across several key variables of interest in this study, we observed a pattern where the underbanked and unbanked individuals fared worse than the fully banked group (those with a checking account and no AFS usage). For instance, only 21% of those who were fully banked experienced financial fragility, while this condition affected nearly half of the underbanked and two-thirds of the unbanked. In terms of financial knowledge, the fully banked scored the highest, both objectively and subjectively, compared to the other two groups. Regarding the number of desirable financial behaviors, on average, the underbanked engaged in just over one behavior, and the unbanked in 2.5 behaviors, while the fully banked group averaged 3.64 behaviors. When asked to assess their own financial capability, the fully banked rated themselves the highest (5.9 out of 7), the unbanked the lowest (4.7), and the underbanked fell in between (5.2). In summary, the fully banked scored the highest, the unbanked the lowest, and the underbanked somewhere in between across all components of financial capability.

Regarding variables related to COVID-19, the fully banked were the least likely to have lost a job due to the pandemic (14%), while 36% of the underbanked and 25% of the unbanked experienced an employment shock. The incidence of health shocks due to the pandemic followed a similar trend, with the fully banked being the least affected (12%), the underbanked being the most affected (23%), and the unbanked falling somewhere in between (17%), reporting that either themselves or someone living with them had tested positive for or been diagnosed with COVID-19. In this sample, the typical fully banked respondent was more likely to be older, white, married, retired, a homeowner, and have some college or a bachelor’s degree compared to the other two banking status groups. Half of the unbanked had a high school diploma or lower education, and a little over one-third (36%) of them had an annual income of less than \$15,000. Among Black and Hispanic households, the proportions of unbanked and underbanked individuals were greater than those among the fully banked.

[Insert Table 1]

#### 4.2. Multivariate results

The results of the logistic regression analyses are presented in Table 2. We included the same set of variables in each of the two regression models, except for different measures of financial capability in each model. First, in model 1, financial capability was found to be negatively associated with financial fragility. The odds of experiencing financial fragility decreased by 29% for every unit increase in the financial capability index, which supports H1. In model 2, which considered the four components of financial capability, subjective financial knowledge, perceived financial capability, and desirable financial behaviors were negatively associated with financial fragility. However, the negative effect of objective financial knowledge was insignificant. Therefore, H2 was mostly supported. Our results are consistent, to some extent, with past findings but provide a more comprehensive understanding of the negative relationship between financial capability and financial fragility (e.g., Kim et al., 2022). Furthermore, respondents who were categorized as underbanked and unbanked were more likely to experience financial fragility than those who were fully banked. Specifically, based on model 1, the underbanked group had 79.7% higher odds of experiencing financial fragility, while the unbanked group had 43.6% higher odds, compared to those who were fully banked. However, in model 2, when financial capability components were considered, the underbanked group had 50.4% higher odds of experiencing financial fragility compared to the fully banked group, while there was no significant difference for the unbanked group.

We also examined both employment shock and health shock resulting from the COVID-19 pandemic. Respondents who were laid off or furloughed in 2020 or 2021 were more likely to experience financial fragility than those who did not experience the employment shock. However, health shock was not significantly associated with financial fragility in either of the models. Notably, the negative effect of the financial capability index was greater in magnitude than the effect size of the employment shock. Furthermore, we observed that the combined coefficients of financial capability indicators were greater than those of the COVID-19 employment shock, providing support for H<sub>3</sub><sup>1</sup>.

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<sup>1</sup> For the comparison, we calculated standardized coefficients of selected variables. In model 1, standardized coefficients for the financial capability index and employment shock were -.5473 and .0285, respectively. In model

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Among the control variables, several factors were positively associated with financial fragility, including age, being female, being separated/divorced/widowed, having dependent children, being disabled, and being unemployed. White respondents were more likely to experience financial fragility compared to minority groups. Respondents with post-bachelor's degrees were less likely to experience financial fragility, while those with some college or an associate degree were more likely to experience it than those with a high school diploma or lower education. The odds of experiencing financial fragility decreased gradually as household income levels increased. Lastly, homeowners and individuals with health insurance ownership had a lower likelihood of experiencing financial fragility compared to their counterparts.

[Insert Table 2]

To assess the association between financial capability and financial fragility across different subsamples of banking status (i.e., fully banked, underbanked, unbanked), we conducted additional logistic regression analyses, as presented in Table 3. We observed that financial capability was consistently associated negatively with financial fragility across all three subsamples of banking status. The magnitude of the negative effect of financial capability was the greatest among the fully banked group, followed by the underbanked and unbanked groups<sup>2</sup>. Moreover, there were variations in the associations of COVID-19 shocks with financial fragility across these different subsamples. Among fully banked respondents, both health and employment shocks were positively associated with financial fragility. However, among the underbanked group, only the effect of the employment shock was found to be significant, while the effects of both shocks were not significant among the unbanked group. Regarding control variables, our findings were consistent with what we observed in the full sample.

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2, standardized coefficients for three financial capability components that showed significant differences (subjective financial knowledge, perceived financial capability, and desirable financial behavior) were -.1106, -.1195, and -.6728, respectively, while the standardized coefficient for employment shock was .0384. Full results are available from the authors upon request.

<sup>2</sup> We conducted Chow Test (Chow, 1960) to test whether the estimated coefficients of financial capability index were different statistically between subsample of banking status. Full results are available from the authors upon request.

[Insert Table 3]

Table 4 presents the results from the logistic regression analysis using four financial capability components across three subsamples of banking statuses. Among these components, subjective financial knowledge, perceived financial capability, and desired financial behaviors were negatively associated with financial fragility in both the banked and underbanked groups. However, objective financial knowledge was positively related to financial fragility among the underbanked group. Finally, among the unbanked, only subjective financial knowledge and perceived financial capability were negatively associated with financial fragility. Our findings regarding COVID-19 shocks are consistent with those presented in Table 3.

[Insert Table 4]

## 5. Discussion and Implications

This study investigated whether financial capability, banking status, and COVID-19 shocks are associated with the financial fragility of US adults during the COVID-19 pandemic. The results from the 2021 NFCS indicate that financial capability was negatively associated with financial fragility, and this association held true in both the full sample and the subsamples categorized by banking status. Additionally, banking status and COVID-19 employment shocks were found to be linked with financial fragility. Notably, the effect size of financial capability factors was greater than that of COVID-19 shock factors on financial fragility. Further results from logistic regressions reveal both similarities and differences in contributing factors across subsamples of banking status. This study contributes to the existing literature on financial fragility with the most recent data available during the COVID-19 pandemic. The findings demonstrate that when two sets of financial capability variables are employed—one being the financial capability index and the other being financial capability components—the financial capability component approach may yield more nuanced results that provide valuable insights into the theoretical understanding of

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financial capability. These insights can inform managerial strategies and guide the development of public policy.

These findings contribute to the development of financial capability theory. The initial theoretical foundation of financial capability drew inspiration from Bandura's theory of self-efficacy (Bandura, 1982), which emphasized a psychological state—confidence—in achieving goals. However, the extended theoretical framework of financial capability, as proposed by Xiao et al. (2022), underscores a person's ability to integrate financial knowledge and financial behavior for attaining financial wellbeing. This extended framework highlights the multidimensional nature of a person's capability and its relationship with their financial wellbeing. This study provides empirical evidence demonstrating a negative association between financial capability factors and financial fragility. Notably, during the COVID-19 pandemic, the effect sizes of financial capability factors were found to be greater than those of COVID-19 shock factors. Another recent study also found that financial knowledge and skills (components of financial capability) lead to better resilience (the other side of the financial fragility coin) during a financial shock such as the COVID-19 pandemic (Nguyen et al., 2022). This strong support for the theoretical prediction suggests that financial capability is indeed positively associated with financial wellbeing.

The findings of this study hold important implications for banking and other financial service professionals who are committed to corporate social responsibility and strive to reduce social injustice and enhance financial inclusion. A recent review of the social media postings of Fortune 100 companies during the peak of the pandemic showed a push towards CSR topics and congruence with social movements (Farmaki et al., 2022). When designing financial service products aimed at attracting underbanked and unbanked consumers, it is crucial to recognize that encouraging desirable financial behavior is the most critical factor in helping these consumers reduce the risk of financial fragility. Therefore, new products should be tailored to meet these specific needs and to minimize barriers to access. In response to the pandemic, Grameen Bank established a series of key initiatives to help expand

financial inclusion in 2020, including increase their micro loan portfolio by 39% from the previous year (Al Amin et al., 2022). Moreover, professionals should be mindful of the variations in financial capability factors among underbanked and unbanked consumers. Our results indicate that objective financial knowledge does not have a significant effect on financial fragility among the unbanked but has a positive effect on financial fragility among the underbanked. Consequently, when developing new products to appeal to the underbanked, product information and marketing efforts should emphasize the advantages of banking products over alternative financial services, particularly in terms of pricing and service. Financial professionals within banks and other financial institutions, driven by a sense of corporate social responsibility, can also collaborate with communities, especially those facing disadvantages, to establish specialized programs. These programs can aid individuals who lack trust in banks and refrain from using banking services due to their disadvantaged backgrounds. The aim would be to educate them about basic banking services and encourage the use of banking services to enhance their financial well-being (Monferrer Tirado et al., 2023).

While individual motivations for being unbanked may vary and could potentially result from a fully rational decision, the most commonly cited reason is often "not having enough money to meet minimum balance requirements" (FDIC, 2021). Financial institutions that offer accounts with no minimum balance requirements or provide free accounts with minimal prerequisites, such as direct deposit, are well-positioned to connect with the unbanked population. Furthermore, financial institutions can better serve their existing underbanked clients by offering small-dollar, short-term loans, such as paycheck anticipation loans, to replace often costly alternative financial services (AFS) options. Engaging with community organizations, offering free workshops on financial management and bank products, promoting diversity among bank staff (Gomez & Bernet, 2019), and implementing targeted marketing strategies to reach underserved groups (Mori, 2019) can assist financial institutions not only in attracting new clients for financial gain but also in reducing the financial fragility of those who are currently unbanked or underbanked.



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The results also hold implications for public policymakers concerned with consumer financial well-being. If policymakers aim to enact policies that enhance consumer financial well-being and reduce the prevalence of financial fragility, they should allocate resources to promote financial education among consumers. Encouraging consumers to enhance their financial capability by utilizing available financial education programs and specialized services tailored to their needs is vital. Access to more credit and technology, for instance, have been found to improve financial inclusion of Latin American and Caribbean women during the pandemic (Kazemikhasragh & Buoni Pineda, 2022). For policymakers seeking to expand financial inclusion within the economy, it is crucial to recognize both the similarities and differences among consumers with various banking statuses. Among all consumers, desirable financial behaviors, rather than other components of financial capability, emerge as the most crucial means to reduce the likelihood of financial fragility. Public programs should be designed to motivate consumers to engage with mainstream banking services, particularly those designed for low- and middle-income consumers, such as Individual Development Accounts and Child Savings Accounts.

The federal Community Development Financial Institutions (CDFI) Fund, established in 1994 to enhance access to mainstream banking in underserved communities like minorities and rural areas, holds the potential to drive improvements in financial inclusion (Sherraden, Birkenmaier & Collins, 2018). However, recent evaluations of the program have encountered challenges in determining its impact, with funding issues remaining prevalent (McCall & Hoyman, 2023). In light of our findings, another influential factor is subjective financial knowledge. Government programs may emphasize the significance of personal money management and encourage consumers to build confidence in managing their finances, thereby reducing the likelihood of financial fragility.

Differences in financial capability among consumers with varying banking statuses are noteworthy. Objective financial knowledge does not exhibit effects on both the fully banked and unbanked, but it does show a positive effect on financial fragility among the underbanked. These findings suggest that government programs should be designed to incorporate pertinent information and action



plans for desirable financial behavior. This would assist consumers who use both mainstream banking services and alternative financial services in making effective financial decisions when faced with choices between banks and AFS.

## 6. Limitations and Future Research Directions

However, it is important to acknowledge the limitations of this study, which could be addressed in future research. First, this study utilized a single indicator of financial fragility available from the NFCS dataset, although it has been widely used in existing literature. Future studies could enhance this by developing a more comprehensive measure of financial fragility to assess this concept more thoroughly. Second, due to the cross-sectional nature of the NFCS dataset, we can only demonstrate a positive association between financial capability and financial fragility, without establishing causality. Future research could utilize panel or experimental data to investigate whether financial capability and its components act as coping factors in reducing financial fragility. Third, the sample size of the unbanked group is relatively smaller compared to other subsample groups, limiting more detailed research on this group. As an extension of this study, future research could use different datasets to overcome this limitation. Fourth, this study exclusively used data from one country, the US. To generalize the findings to other countries, data from various countries should be employed for international comparisons in future research.

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## Financial inclusion, financial capability, and financial fragility during COVID-19 pandemic

### Abstract

**Purpose:** Financial inclusion can be proxied by banking status. The purpose of this study is to investigate the potential effects of financial capability on the financial fragility of U.S. adults with various banking statuses during the COVID-19 pandemic.

**Design/methodology/approach:** This study utilized the 2021 National Financial Capability Study (NFCS) dataset to investigate the relationship between financial capability and financial fragility among consumers with different banking statuses. The analysis controlled for employment shocks, health shocks, and other consumer characteristics. Banking statuses included fully banked, under-banked (utilizing both banking and alternative financial services), and unbanked individuals. Logistic regression analyses were conducted on both the entire sample and subsamples based on banking statuses.

**Findings:** The results showed that financial capability was negatively associated with financial fragility. The magnitude of the potential negative effect of financial capability was the greatest among the fully banked group, followed by the underbanked and unbanked groups. Respondents who were underbanked or unbanked were more likely to experience financial fragility than those who were fully banked. Additionally, respondents who were laid off or furloughed during the pandemic were more likely to experience financial fragility than those without employment shocks. The effect size of financial capability factors was greater than that of COVID-19 shock factors. These results suggest that higher levels of both financial capability and financial inclusion may be effective in reducing the risk of financial fragility.

**Originality:** This study represents one of the first attempts to examine the potential effects of financial capability on financial fragility among consumers with various banking statuses during the COVID-19 pandemic. Furthermore, this study offers new evidence to determine whether COVID-19 shocks, as measured by health and employment status, are associated with financial fragility. Additionally, the effect size of financial capability factors is greater than that of COVID-19 shock factors. The results from the 2021 NFCS dataset provide valuable insights for banking professionals and public policymakers on how to enhance consumer financial wellbeing.

**Keywords:** financial fragility, financial capability, banking status, COVID-19 pandemic, health shock, labor shock

**1. Introduction**

To better meet consumer needs, banking professionals should gain a deeper understanding of consumer behaviors, including those of vulnerable populations (Moliner Tena & Monferrer Tirado, 2022). Research on consumer vulnerability should be encouraged and applied to marketing strategies with a sense of corporate social responsibility (Moliner et al., 2020; Schröder, 2021; Tosun & Köylüoğlu, 2023; Zainuldin et al., 2021). One indicator of consumer vulnerability is financial fragility, which refers to the inability to cope with unexpected expenditures or income shocks (Hasler et al., 2018). According to recent household-level data in the United States, nearly a third of Americans probably or certainly could not come up with \$2,000 if faced with an unexpected expense within the next month (Lin et al., 2022). The inability to cope with this financial shock is often labeled as financial fragility (Lusardi et al., 2011) and can also be considered the flip side of financial resilience (Clark & Mitchell, 2022). Financial fragility can indicate a lack of precautionary savings, limited access to affordable credit, and even the absence or fragility of social support networks for borrowing needs. Additionally, some factors influencing financial fragility include financial knowledge (Kim et al., 2022), financial control (Bialowolski et al., 2021), and financial confidence (Chhatwani & Mishra, 2021a). Similarly, financial capability and its components may have impacts on financial fragility.

Financial capability is defined by researchers in various ways (Atkinson et al., 2007; Lusardi & Mitchell, 2014; Xiao et al., 2022). In this study, to emphasize the importance of both financial knowledge and financial behavior, financial capability is defined as the ability to apply financial knowledge and engage in desirable financial behaviors to improve financial wellbeing (Xiao et al., 2014). This definition takes into consideration that financial knowledge and financial behavior are important components of financial capability. While previous research has found associations between some of these components and financial fragility, the current study, to the best of our knowledge, represents one of the first attempts



to examine the association between financial capability and financial fragility among consumers with various banking statuses during the COVID-19 pandemic.

Access to affordable financial products and services, such as low-cost small-dollar credit and no-fee bank accounts, provides consumers with the necessary tools to make sound financial decisions and build financial well-being (Sherraden, 2013). This access is an important component of building financial capability, as it empowers consumers to apply their knowledge and skills. Bank status, a measure of financial inclusion, is divided into three categories in this study: banked, unbanked, and underbanked. Banked households have a checking or other account and do not rely on alternative financial services (AFS) like pawn shops and payday lending. Unbanked households are those without a bank checking or other account. Our third banking status category, the underbanked, refers to households that have a checking or other bank account but have also used some form of alternative financial services. These three definitions of banking statuses align with the approaches used by both the Federal Reserve in their report on the Economic Well-Being of US Households (Canilang et al., 2020) and the FDIC National Survey of Unbanked and Underbanked Households (FDIC, 2021). Further, Barcellos and Zamarro (2021) argue that being unbanked and underbanked are distinct concepts deserving separate examinations.

Given that the COVID-19 pandemic has brought forth a new set of financial and health challenges for American consumers (Porto & Mottola, 2022), this study aims to investigate the potential effects of banking status, financial capability, and COVID-19 shocks on the financial fragility of US adults during the COVID-19 pandemic. The ongoing COVID-19 pandemic has brought forth a new set of financial and health challenges for American consumers (Porto & Mottola, 2022). For empirical analyses, we used the 2021 National Financial Capability Study (NFCS) data, which provides the most recent overview of financial fragility among US adults. The 2021 National Financial Capability Study (NFCS) data was used in this study were collected between June and October 2021, during the surge of the Delta variant of the infection and increasing availability of vaccines. Consequently, many respondents in the dataset were impacted by health shocks (COVID-19 household contagion) and/or financial shocks (job loss due to the pandemic). Our analysis takes into account the dual impacts of the pandemic on the

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financial fragility of our sample. Recent research indicates that both financial fragility and financial resilience have been affected by the pandemic (Clark & Mitchell, 2022). However, to our knowledge, no previous studies have compared the potential effects of COVID-19 shocks and financial capability on financial fragility.

This study aims to investigate the potential effects of banking status, financial capability, and COVID-19 shocks on the financial fragility of US adults during the COVID-19 pandemic. For empirical analyses, we used the 2021 NFCS data, which provides the most recent overview of financial fragility among US adults. This study contributes to the existing literature as one of the first attempts to examine whether financial capability and pandemic-related shocks are associated with financial fragility among consumers with various banking statuses. The findings reveal that the effect size of financial capability factors is greater than that of COVID-19 shock factors, which is a unique contribution to the literature. In the US, during the COVID-19 pandemic, consumers suffer both health and financial shocks caused by this global crisis. Many consumers lost jobs and faced income reduction, which put them in the vulnerable position (Lin et al., 2022; Porto & Mottola, 2022). From the research perspective, this pandemic provides an opportunity to test if financial capability, a potential coping tool can be effective to combat the health and economic shocks caused by the pandemic. The findings provide confirmative evidence to show the potential of consumer financial capability, especially the subjective financial knowledge, desirable financial behavior, and perceived financial capability to reduce financial fragility, which is echoed a study examining financial capability trend before and after the start of the pandemic in which financial capability is positively associated with financial wellbeing over time (Xiao et al., 2023).

The results of this study offer important insights for banking industry professionals on how to increase corporate social responsibility (CSR) and for public policymakers on how to reduce the risk of financial fragility and improve the financial wellbeing of consumers. CSR refers to a set of business practices that benefit social welfare (Deigh & Farquhar, 2021) and has been shown to enhance trust in financial institutions (Hurley et al., 2014). Banks with a sense of CSR would develop programs to meet the needs of consumers, including those who are financially vulnerable (Monferrer Tirado et al., 2023).

Research shows that maintaining a long-term customer base through CSR activities helps marketers achieve sustainable competitive advantage (Shah & Khan, 2020).

## 2. Literature Review and Hypotheses

### 2.1. Previous Research on Financial Fragility

Financial fragility is an indicator that reveals a negative aspect of consumer financial wellbeing. Consumer financial wellbeing refers to the situation in which consumers are faring well financially (Xiao, 2015). Financial wellbeing can be measured by both positive and negative indicators. For example, financial satisfaction is a positive indicator, while financial fragility is a negative one regarding financial wellbeing. Financial fragility refers to the situation in which consumers experience difficulties in obtaining \$2,000 for emergencies (Clark et al., 2021a). Financial fragility can be assessed in various ways. One approach involves using consumer balance sheet data to calculate a measure of financial fragility (Ampudia et al., 2016; Brunetti et al., 2016; Jappelli et al., 2013). Another method is to ask consumers if they are in such a financially challenging situation (Lin et al., 2022). In the current study, due to limitations in the dataset, we employ a self-reported measure of financial fragility from consumers.

Research on financial fragility can be categorized into three main types. The first type aims to describe the status of financial fragility using national or international data (Demertzis et al., 2020; Lin et al., 2022). The second type focuses on exploring the outcomes associated with financial fragility, where financial fragility serves as a contextual background factor (Bialowolski et al., 2021; Chhatwani & Mishra, 2021b; Preston, 2022; Yu et al., 2022). The third type seeks to identify factors that are linked to financial fragility, encompassing both risk factors that may increase the likelihood of financial fragility and coping factors that can help reduce it (Ali et al., 2020; Cardona-Montoya et al., 2022; Clark et al., 2021a, 2021b; Lusardi et al., 2021; West & Mottola, 2016). Incidents of financial fragility are prevalent in the United States and other countries. In the U.S., in 2021, when respondents were asked whether they could come up with \$2,000 in the event of an unexpected need arising within the next month, 30% stated that they probably or certainly could not (Lin et al., 2022). A similar prevalence is observed in the

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European Union (EU), where one in three EU households is unable to handle an unexpected financial shock during normal times (Demertzis et al., 2020).

Prior research demonstrates that financial fragility has adverse impacts on life outcomes. For example, using data from the U.S., researchers have shown negative impacts of financial fragility on 17 wellbeing outcomes (Bialowolski et al., 2021). A negative link between financial fragility and financial optimism has also been identified among Americans (Chhatwani & Mishra, 2021b). Utilizing data from a sample of older adults in the U.S., researchers have shown that financially fragile older adults are more susceptible to scams (Yu et al., 2022). Being financially fragile increases the likelihood of making an early withdrawal from retirement savings, as demonstrated with data from Australia (Preston, 2022).

Researchers have explored factors associated with financial fragility. They have demonstrated that consumers with specific background characteristics, such as low income and being African American, are more likely to experience financial fragility (Lusardi et al., 2021). Among a sample of consumers aged 45-75, younger respondents, those with larger families, Hispanics, and individuals with lower incomes are more likely to be financially fragile (Clark et al., 2021a). Using data from the 2015 National Financial Capability Study (NFCS), researchers have found that factors associated with financial fragility include a lack of assets and high levels of indebtedness (Clark et al., 2021b). Based on data from the 2012 NFCS, researchers have shown that renters are 75% more likely to experience financial fragility (West & Mottola, 2016). A study using data from Pakistan reveals that education, employment status, and the industry of employment of the household head are the main determinants of financial fragility (Ali et al., 2020). Utilizing data from Colombia, researchers have demonstrated that workers with more financial education are better prepared to mitigate the negative effects on their finances, thereby reducing the probability of becoming financially fragile (Cardona-Montoya et al., 2022).

Certain background factors can be considered coping mechanisms, including education, assets, and a lack of debt (Lusardi et al., 2011). Researchers have also identified other coping strategies aimed at reducing financial fragility. Using data collected from multiple countries, researchers have highlighted the various methods people employ to deal with financial shocks. While savings often serve as the primary

1 coping mechanism, people also frequently turn to family and friends, utilize formal and alternative credit  
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3 sources, increase their work hours, and sell items to manage emergencies (Lusardi et al., 2011). A study  
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5 using data from multiple countries finds that individuals' cognitive (i.e., financial literacy) as well as non-  
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7 cognitive abilities (i.e., internal locus of control; psychological resilience) help to reduce financial  
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9 fragility (Kleimeier et al., 2023). These factors can also be used to develop coping strategies. In this  
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11 study, we specifically focus on one of these coping factors that may help reduce the risk of financial  
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13 fragility. Our attention centers on financial capability, as measured by an index and its components,  
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15 including financial literacy (both objectively and subjectively assessed), perceived financial capability,  
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17 and the number of desirable financial behavior.  
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## 24 **2.2. Financial Capability and Financial Fragility**

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26 In this study, we define financial capability as the ability to apply appropriate financial knowledge and  
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28 engage in desirable financial behaviors to achieve financial wellbeing (Xiao et al., 2014). This definition  
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30 has been measured using a financial capability index (Xiao et al., 2015) and its components, which  
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32 include objective financial literacy, subjective financial literacy, desirable financial behavior, and  
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34 perceived financial capability (Xiao & Porto, 2017; Xiao & Kim, 2022). Theoretically, financial  
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36 capability assumes that consumers possess a certain level of financial literacy, engage in desirable  
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38 consumer behaviors, and have a certain level of confidence in achieving financial wellbeing. The  
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40 theoretical foundation of financial capability is initially rooted in the theory of self-efficacy (Bandura,  
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42 1982). However, the theoretical foundation used in this study extends beyond psychological aspects and  
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44 emphasizes personal abilities in terms of financial knowledge and financial behavior that aid individuals  
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46 in achieving financial wellbeing (Xiao et al., 2022).  
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50 Based on this extended conceptual framework of financial capability, consumers with higher  
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52 levels of financial capability should have a greater probability of achieving financial wellbeing.  
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54 Consequently, financial capability should be positively associated with positive financial outcomes and  
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56 negatively associated with negative financial outcomes. This theoretical prediction has been supported by  
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empirical evidence (Babiartz & Robb, 2014; Birkenmaier & Fu, 2020; Henager & Wilmarth, 2018; Huang et al., 2016; Robb et al., 2019; Tharp et al., 2020). However, no study has been found to examine the association between financial capability and financial fragility. Therefore, we propose the following hypothesis.

*H<sub>1</sub>: Financial capability is negatively associated with financial fragility.*

Financial capability comprises several components, including financial knowledge, financial behavior, and perceived financial capability. Their effects on financial fragility may differ. Previous studies have found that financial knowledge is negatively associated with financial fragility (Clark et al., 2021a; Lusardi et al., 2021). Using data from the 2015 NFCS, researchers demonstrated a negative relationship between financial knowledge and financial fragility using an instrumental variable approach (Kim et al., 2022). Financially capable millennials are less likely to experience financial fragility than their peers who are excluded from mainstream financial services (Friedline & West, 2016). Additionally, based on U.S. data, researchers have shown that financial knowledge reduces the odds of experiencing financial fragility by 9.1%, and financially literate consumers with high financial confidence are less financially fragile during COVID-19 (Chhatwani & Mishra, 2021b).

However, the potential impacts of other components of financial capability, such as desirable financial behavior and perceived financial capability, on financial fragility have not been explored in the current literature. Prior research has demonstrated that these components may have varying effects on financial outcomes, including financial behavior (Xiao et al., 2011), financial satisfaction (Xiao & Porto, 2017), financial stress (Xiao & Kim, 2022), and financial wellbeing (Xiao & Porto, 2022). Thus, we propose the following hypothesis:

*H<sub>2</sub>: Financial capability components are negatively associated with financial fragility.*

**2.3. COVID-19 Shocks and Financial Fragility**

The COVID-19 pandemic has fundamentally changed the world and has brought about shocks to various aspects of consumer life. In this study, we focus on two types of shocks: health shocks and economic

shocks. Intuitively, these shocks have an adverse impact on consumer wellbeing and increase the likelihood of financial fragility. Previous research confirms this intuition. Using data from the 2021 NFCS, researchers showed that individuals in households with positive test results reported significantly lower levels of financial wellbeing and financial satisfaction, along with higher levels of financial fragility (Porto & Mottola, 2022). Research conducted in 2020 and 2021, based on a sample of older adults aged 45-75, indicated that higher initial levels of resilience were, in fact, associated with lower levels of financial fragility a year into the pandemic (Clark & Mitchell, 2022). Government policies can also influence financial fragility. Researchers demonstrated that the expiration of the CARES Act's Pandemic Unemployment Compensation benefits, which augmented unemployment insurance by \$600 a week, significantly increased the financial fragility of unemployed workers in America (Schneider et al., 2020).

The COVID-19 pandemic has created a profoundly challenging environment for consumers, who are adversely affected by both health and economic shocks stemming from the pandemic. Consumers are utilizing their resources to cope with these shocks. It is crucial to understand the potential role of financial capability as a coping mechanism to mitigate the impact of these shocks. In this study, we operate under the assumption that financial fragility results from a combination of long-term factors that have accumulated over many years and short-term factors such as the shocks caused by COVID-19. Furthermore, we hypothesize that the potential effects of financial capability factors can offset the impact of these pandemic-related shocks. Thus, we propose the following hypothesis:

*H<sub>3</sub>: Potential effect sizes of financial capability are greater than those of COVID shocks (health and employment shocks) on financial fragility.*

#### **2.4. Banking Status and Financial Fragility**

Banking statuses are divided to three categories in this study, banked, unbanked, and underbanked. An estimated 4.5% of U.S. households were “unbanked” in 2021, meaning that no one in the household had a checking or savings account at a bank or credit union. This proportion represents approximately



5.9 million U.S. households (FDIC, 2022). An estimated 14.1% of U.S. households—representing approximately 18.7 million households—were “underbanked” in 2021, meaning that the household was banked and in the past 12 months used at least one of the following nonbank transaction or credit products or services that are disproportionately used by unbanked households to meet their transaction and credit needs: money orders, check cashing, or international remittances (i.e., nonbank transactions) or rent-to-own services or payday, pawn shop, tax refund anticipation, or auto title loans (i.e., nonbank credit) (FDIC, 2022).

Research on the unbanked aims to identify factors associated with the unbanked to provide policy recommendations for more financial inclusion in banking services. Financial inclusion – the availability and equal access to mainstream financial services and products – is associated with factors such as poverty levels, financial literacy, and regulatory framework (Ozili, 2021). Based on a recent review, research on banking status focuses on the reasons for being unbanked, bank access for racial and ethnic minority households, and the consequences of financial exclusion on payments (Boel & Zimmerman, 2022). For example, an international study examines financial inclusion, the access to formal financial services that provides an entry key for people to participate in the economy and finds financial inclusion is higher under right-wing regimes than under left-wing governments (De Jong et al., 2022). Households in poverty are more likely to be unbanked, especial among Black and Hispanic households. Even though the proportions have decreased compared to 1980s, they are still 38.4% and 31.8% in 2019, much higher than 22.8% of average households (Creamer & Warren, 2022). A study uses the data from World Bank Global Findex in India to conclude that financial inclusion should be backed by financial literacy to achieve the best results (Menon, 2019).

Researchers have also explored factors associated with the underbanked. With data from the 2015 NFCS, researchers find that the underbanked group is a sizable, distinctively different group in which income volatility and welfare benefit receipt are both associated with being underbanked rather than unbanked (Chen & Friedline, 2022). With data collected by FDIC, research shows that bank fees are associated with the likelihood for underbanked households to obtain alternative financial services (AFS),



especially nonbank credit. Households' attitudes and experience with banks are important in the choice of getting AFS. Furthermore, most underbanked households used AFS temporarily (Xu, 2019). Researchers find that racial gaps in unbanked and AFS use are explained differently; gaps in unbanked status are mostly explained by differences in endowments across groups, for AFS gaps differences in returns to endowments have the largest explanatory power (Barcellos & Zamarro, 2021).

Previous research shows that banking status is associated with financial fragility (FDIC, 2022). The unbanked and underbanked are more likely to be financially fragile than those who are banked (Chen & Friedline, 2022; Creamer & Warren, 2022). For households with lower resources levels, their financial capability should help them better manage their resources. In that sense, potential effects of financial capability on financial fragility among households with different banking statuses should vary. To our knowledge, no prior research has examined potential effects of financial capability on financial fragility among households with different banking statuses. Thus, we propose the following hypothesis:

*H<sub>4</sub>: Negative associations between financial capability and financial fragility vary among consumers with various banking statuses.*

### 3. Methods

#### 3.1. Dataset and analytics sample

This study utilized the 2021 National Financial Capability Study (NFCS), which was released by the FINRA Investor Education Foundation. The NFCS has been conducted triennially since 2009, with data collection taking place on a state-by-state basis using non-probability quota sampling. The NFCS dataset encompasses financial perceptions, attitudes, experiences, and behaviors of adults in the United States. The 2021 NFCS was conducted through online surveys from June to October 2021, encompassing the period of the COVID-19 pandemic. The total sample size for the 2021 NFCS was 27,118, with approximately 500 observations per state, including the District of Columbia. Our final analytical sample consisted of 23,068 individuals after excluding observations with missing values for selected variables.

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3 **3.2. Dependent variables: Financial fragility**  
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5 The measures were developed based on the theoretical prediction that financial capability is linked to  
6 financial outcomes (Xiao et al., 2022). Financial outcomes can be assessed as either positive or negative.  
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8 In this study, we measure financial outcomes negatively using financial fragility. Consistent with previous  
9 studies (e.g., Lusardi et al., 2011), financial fragility was assessed by gauging the ability to cope with an  
10 emergency fund, using the following question: "How confident are you that you could come up with  
11 \$2,000 if an unexpected need arose within the next month?" The dependent variable is a binary indicator,  
12 coded as 1 if the respondents answered, "I could probably not come up with \$2,000" or "I am certain I  
13 could not come up with \$2,000," and coded as 0 otherwise.  
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24 **3.3. Focal independent variables**  
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26 **3.3.1. Financial capability**  
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28 Based on the theoretical concept of financial capability, it refers to a person's ability to integrate financial  
29 knowledge and financial behavior to achieve financial wellbeing (Xiao et al., 2022). In empirical terms,  
30 we measured financial capability in two ways, following previous research (Xiao & Porto, 2017; Xiao &  
31 Kim, 2022): (1) four components of financial capability and (2) one comprehensive index. The four  
32 components of financial capability include (a) objective financial knowledge ranged 0 to 6; (b) subjective  
33 financial knowledge ranged 1 to 7; (c) perceived financial capability ranged 1 to 7; and (d) desirable  
34 financial behaviors ranged 0 to 6. Additionally, we constructed a composite index of financial capability  
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46 **3.3.2. Banking status**  
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48 Banking status was assessed using two survey questions: one regarding bank account ownership and the  
49 other regarding the experience of using alternative financial services (AFS). Bank account ownership was  
50 determined by whether respondents had a checking account. Respondents were also asked whether they  
51 had utilized any of four AFS products in the past five years, including auto title loans, payday loans, pawn  
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shops, and rent-to-own stores. To establish mutually exclusive categories of banking status, we first created binary indicators for being banked and AFS usage. Subsequently, we categorized banking status into three groups as follows: (a) fully banked (bank account = yes, AFS use = no), (b) underbanked (bank account = yes, AFS use = yes), and (c) unbanked (bank account = no, AFS use = yes or no).

As previously mentioned, these definitions for banking statuses align with those used by the Federal Reserve Economic Well-Being of US Households and the FDIC National Survey of Unbanked and Underbanked Households. However, it's worth noting that in the current study, the question about past AFS use spanned a five-year period, whereas in other surveys, it covers only the previous 12 months. This difference in the timeframe for AFS usage could potentially result in more respondents being classified as underbanked in this analysis compared to the other two surveys. Both the five-year and twelve-month approaches to identify AFS usage have been employed in prior research, often driven by the dataset available. In our multivariate analyses, we used "fully banked" as the reference group.

### 3.3.3. COVID-19 shock variables

The 2021 NFCS dataset included several variables related to the COVID-19 pandemic. In this study, we utilized two questions to gauge potential shocks attributable to COVID-19. Respondents were asked the following questions: "As a result of the pandemic, were you laid off or furloughed at any time in 2020 or 2021?" and "Have you or anyone living with you tested positive for or been diagnosed with COVID-19?" Based on these questions, we created two binary indicators for COVID-19 shocks: employment shock and health shock, respectively.

### 3.4. Control variables

In addition to three sets of focal variables, the following control variables were included in our models; age, gender (male, female), marital status (married, single, separated/divorce/widow), having a dependent child, race/ethnicity (White, Black, Hispanic, AAPI, others), employment status (full-time working, self-employed, part-time worker, homemaker, student, disabled, unemployed, retired), education (high school

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or lower, some college, associate degree, bachelor’s degree, post-bachelor’s degree), household income, homeownership and health insurance ownership. We also controlled for the state of residence to account for the variation of financial fragility and other local factors due to the unobserved state characteristics.

**3.5. Empirical analyses**

We conducted multiple sets of logistic regression analyses on financial fragility to test our four hypotheses described above. The following equation describes the odds for being financially fragile where  $\pi$  is the probability of being financially fragile, and  $X_i$  is the set of control variables and  $STATE_i$  is the current state of residence for the  $i^{th}$  respondent.

$$\log \left( \frac{\pi}{1-\pi} \right)_i = \beta_0 + \beta_1 Financial\ capability_i + \beta_2 Banking\ status_i + \beta_3 COVID\ shocks_i + \gamma X_i + STATE_i$$

In Model 1 and 2, we conducted logistic regression analyses based on the full sample and tested two different measures of financial capability variables. For Model 3 and 4, we conducted similar analyses based on subsample of three different banking status. Our empirical models are as follows:

- Model 1 (Full sample): Financial fragility = f(financial capability index, banking status, COVID-19 shocks, control variables, state of residence)*
- Model 2 (Full sample): Financial fragility = f(financial capability components, banking status, COVID-19 shocks, control variables, state of residence)*
- Model 3 (subsamples of banking status): Financial fragility = f(financial capability index, COVID-19 shocks, control variables, state of residence)*
- Model 4 (subsamples of banking status): Financial fragility = f(financial capability components, COVID-19 shocks, control variables, state of residence)*

**4. Results**

**4.1. Descriptive results**

Table 1 displays weighted descriptive statistics for the entire sample and three subsamples categorized by banking status. In the complete sample, 68% of respondents were categorized as "banked," while 26% fell into the "underbanked" category, and nearly 6% were classified as "unbanked." The rate of unbanked respondents aligns with the most recent FDIC National Survey of Unbanked and Underbanked Households (FDIC, 2022), while our figures for the underbanked group were somewhat lower. This difference may be attributed to variations in term definitions (five years versus 12 months of past AFS usage) and survey populations.

Across several key variables of interest in this study, we observed a pattern where the underbanked and unbanked individuals fared worse than the fully banked group (those with a checking account and no AFS usage). For instance, only 21% of those who were fully banked experienced financial fragility, while this condition affected nearly half of the underbanked and two-thirds of the unbanked. In terms of financial knowledge, the fully banked scored the highest, both objectively and subjectively, compared to the other two groups. Regarding the number of desirable financial behaviors, on average, the underbanked engaged in just over one behavior, and the unbanked in 2.5 behaviors, while the fully banked group averaged 3.64 behaviors. When asked to assess their own financial capability, the fully banked rated themselves the highest (5.9 out of 7), the unbanked the lowest (4.7), and the underbanked fell in between (5.2). In summary, the fully banked scored the highest, the unbanked the lowest, and the underbanked somewhere in between across all components of financial capability.

Regarding variables related to COVID-19, the fully banked were the least likely to have lost a job due to the pandemic (14%), while 36% of the underbanked and 25% of the unbanked experienced an employment shock. The incidence of health shocks due to the pandemic followed a similar trend, with the fully banked being the least affected (12%), the underbanked being the most affected (23%), and the unbanked falling somewhere in between (17%), reporting that either themselves or someone living with them had tested positive for or been diagnosed with COVID-19. In this sample, the typical fully banked respondent was more likely to be older, white, married, retired, a homeowner, and have some college or a bachelor's degree compared to the other two banking status groups. Half of the unbanked had a high

school diploma or lower education, and a little over one-third (36%) of them had an annual income of less than \$15,000. Among Black and Hispanic households, the proportions of unbanked and underbanked individuals were greater than those among the fully banked.

[Insert Table 1]

**4.2. Multivariate results**

The results of the logistic regression analyses are presented in Table 2. We included the same set of variables in each of the two regression models, except for different measures of financial capability in each model. First, in model 1, financial capability was found to be negatively associated with financial fragility. The odds of experiencing financial fragility decreased by 29% for every unit increase in the financial capability index, which supports H1. In model 2, which considered the four components of financial capability, subjective financial knowledge, perceived financial capability, and desirable financial behaviors were negatively associated with financial fragility. However, the negative effect of objective financial knowledge was insignificant. Therefore, H2 was mostly supported. Our results are consistent, to some extent, with past findings but provide a more comprehensive understanding of the negative relationship between financial capability and financial fragility (e.g., Kim et al., 2022). Furthermore, respondents who were categorized as underbanked and unbanked were more likely to experience financial fragility than those who were fully banked. Specifically, based on model 1, the underbanked group had 79.7% higher odds of experiencing financial fragility, while the unbanked group had 43.6% higher odds, compared to those who were fully banked. However, in model 2, when financial capability components were considered, the underbanked group had 50.4% higher odds of experiencing financial fragility compared to the fully banked group, while there was no significant difference for the unbanked group.

We also examined both employment shock and health shock resulting from the COVID-19 pandemic. Respondents who were laid off or furloughed in 2020 or 2021 were more likely to experience financial fragility than those who did not experience the employment shock. However, health shock was not significantly associated with financial fragility in either of the models. Notably, the negative effect of

the financial capability index was greater in magnitude than the effect size of the employment shock.

Furthermore, we observed that the combined coefficients of financial capability indicators were greater than those of the COVID-19 employment shock, providing support for  $H_3$ <sup>1</sup>.

Among the control variables, several factors were positively associated with financial fragility, including age, being female, being separated/divorced/widowed, having dependent children, being disabled, and being unemployed. White respondents were more likely to experience financial fragility compared to minority groups. Respondents with post-bachelor's degrees were less likely to experience financial fragility, while those with some college or an associate degree were more likely to experience it than those with a high school diploma or lower education. The odds of experiencing financial fragility decreased gradually as household income levels increased. Lastly, homeowners and individuals with health insurance ownership had a lower likelihood of experiencing financial fragility compared to their counterparts.

[Insert Table 2]

To assess the association between financial capability and financial fragility across different subsamples of banking status (i.e., fully banked, underbanked, unbanked), we conducted additional logistic regression analyses, as presented in Table 3. We observed that financial capability was consistently associated negatively with financial fragility across all three subsamples of banking status. The magnitude of the negative effect of financial capability was the greatest among the fully banked group, followed by the underbanked and unbanked groups<sup>2</sup>. Moreover, there were variations in the associations of COVID-19 shocks with financial fragility across these different subsamples. Among fully

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<sup>1</sup> For the comparison, we calculated standardized coefficients of selected variables. In model 1, standardized coefficients for the financial capability index and employment shock were -.5473 and .0285, respectively. In model 2, standardized coefficients for three financial capability components that showed significant differences (subjective financial knowledge, perceived financial capability, and desirable financial behavior) were -.1106, -.1195, and -.6728, respectively, while the standardized coefficient for employment shock was .0384. Full results are available from the authors upon request.

<sup>2</sup> We conducted Chow Test (Chow, 1960) to test whether the estimated coefficients of financial capability index were different statistically between subsample of banking status. Full results are available from the authors upon request.



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banked respondents, both health and employment shocks were positively associated with financial fragility. However, among the underbanked group, only the effect of the employment shock was found to be significant, while the effects of both shocks were not significant among the unbanked group. Regarding control variables, our findings were consistent with what we observed in the full sample.

[Insert Table 3]

Table 4 presents the results from the logistic regression analysis using four financial capability components across three subsamples of banking statuses. Among these components, subjective financial knowledge, perceived financial capability, and desired financial behaviors were negatively associated with financial fragility in both the banked and underbanked groups. However, objective financial knowledge was positively related to financial fragility among the underbanked group. Finally, among the unbanked, only subjective financial knowledge and perceived financial capability were negatively associated with financial fragility. Our findings regarding COVID-19 shocks are consistent with those presented in Table 3.

[Insert Table 4]

**5. Discussion and Implications**

This study investigated whether financial capability, banking status, and COVID-19 shocks are associated with the financial fragility of US adults during the COVID-19 pandemic. The results from the 2021 NFCS indicate that financial capability was negatively associated with financial fragility, and this association held true in both the full sample and the subsamples categorized by banking status. Additionally, banking status and COVID-19 employment shocks were found to be linked with financial fragility. Notably, the effect size of financial capability factors was greater than that of COVID-19 shock factors on financial fragility. Further results from logistic regressions reveal both similarities and differences in contributing factors across subsamples of banking status. This study contributes to the existing literature on financial fragility with the most recent data available during the COVID-19 pandemic. The findings demonstrate

that when two sets of financial capability variables are employed—one being the financial capability index and the other being financial capability components—the financial capability component approach may yield more nuanced results that provide valuable insights into the theoretical understanding of financial capability. These insights can inform managerial strategies and guide the development of public policy.

These findings contribute to the development of financial capability theory. The initial theoretical foundation of financial capability drew inspiration from Bandura's theory of self-efficacy (Bandura, 1982), which emphasized a psychological state—confidence—in achieving goals. However, the extended theoretical framework of financial capability, as proposed by Xiao et al. (2022), underscores a person's ability to integrate financial knowledge and financial behavior for attaining financial wellbeing. This extended framework highlights the multidimensional nature of a person's capability and its relationship with their financial wellbeing. This study provides empirical evidence demonstrating a negative association between financial capability factors and financial fragility. Notably, during the COVID-19 pandemic, the effect sizes of financial capability factors were found to be greater than those of COVID-19 shock factors. Another recent study also found that financial knowledge and skills (components of financial capability) lead to better resilience (the other side of the financial fragility coin) during a financial shock such as the COVID-19 pandemic (Nguyen et al., 2022). This strong support for the theoretical prediction suggests that financial capability is indeed positively associated with financial wellbeing.

The findings of this study hold important implications for banking and other financial service professionals who are committed to corporate social responsibility and strive to reduce social injustice and enhance financial inclusion. A recent review of the social media postings of Fortune 100 companies during the peak of the pandemic showed a push towards CSR topics and congruence with social movements (Farmaki et al., 2022). When designing financial service products aimed at attracting underbanked and unbanked consumers, it is crucial to recognize that encouraging desirable financial

behavior is the most critical factor in helping these consumers reduce the risk of financial fragility.

Therefore, new products should be tailored to meet these specific needs and to minimize barriers to

access. In response to the pandemic, Grameen Bank established a series of key initiatives to help expand

financial inclusion in 2020, including increase their micro loan portfolio by 39% from the previous year

(Al Amin et al., 2022). Moreover, professionals should be mindful of the variations in financial capability

factors among underbanked and unbanked consumers. Our results indicate that objective financial

knowledge does not have a significant effect on financial fragility among the unbanked but has a positive

effect on financial fragility among the underbanked. Consequently, when developing new products to

appeal to the underbanked, product information and marketing efforts should emphasize the advantages of

banking products over alternative financial services, particularly in terms of pricing and service. Financial

professionals within banks and other financial institutions, driven by a sense of corporate social

responsibility, can also collaborate with communities, especially those facing disadvantages, to establish

specialized programs. These programs can aid individuals who lack trust in banks and refrain from using

banking services due to their disadvantaged backgrounds. The aim would be to educate them about basic

banking services and encourage the use of banking services to enhance their financial well-being

(Monferrer Tirado et al., 2023).

While individual motivations for being unbanked may vary and could potentially result from a

fully rational decision, the most commonly cited reason is often "not having enough money to meet

minimum balance requirements" (FDIC, 2021). Financial institutions that offer accounts with no

minimum balance requirements or provide free accounts with minimal prerequisites, such as direct

deposit, are well-positioned to connect with the unbanked population. Furthermore, financial institutions

can better serve their existing underbanked clients by offering small-dollar, short-term loans, such as

paycheck anticipation loans, to replace often costly alternative financial services (AFS) options. Engaging

with community organizations, offering free workshops on financial management and bank products,

promoting diversity among bank staff (Gomez & Bernet, 2019), and implementing targeted marketing

1 strategies to reach underserved groups (Mori, 2019) can assist financial institutions not only in attracting  
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3 new clients for financial gain but also in reducing the financial fragility of those who are currently  
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5 unbanked or underbanked.  
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10 The results also hold implications for public policymakers concerned with consumer financial  
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12 well-being. If policymakers aim to enact policies that enhance consumer financial well-being and reduce  
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14 the prevalence of financial fragility, they should allocate resources to promote financial education among  
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16 consumers. Encouraging consumers to enhance their financial capability by utilizing available financial  
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18 education programs and specialized services tailored to their needs is vital. Access to more credit and  
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20 technology, for instance, have been found to improve financial inclusion of Latin American and  
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22 Caribbean women during the pandemic (Kazemikhasragh & Buoni Pineda, 2022). For policymakers  
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24 seeking to expand financial inclusion within the economy, it is crucial to recognize both the similarities  
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26 and differences among consumers with various banking statuses. Among all consumers, desirable  
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28 financial behaviors, rather than other components of financial capability, emerge as the most crucial  
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30 means to reduce the likelihood of financial fragility. Public programs should be designed to motivate  
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32 consumers to engage with mainstream banking services, particularly those designed for low- and middle-  
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34 income consumers, such as Individual Development Accounts and Child Savings Accounts.  
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38 The federal Community Development Financial Institutions (CDFI) Fund, established in 1994 to  
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40 enhance access to mainstream banking in underserved communities like minorities and rural areas, holds  
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42 the potential to drive improvements in financial inclusion (Sherraden, Birkenmaier & Collins, 2018).  
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44 However, recent evaluations of the program have encountered challenges in determining its impact, with  
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46 funding issues remaining prevalent (McCall & Hoyman, 2023). In light of our findings, another  
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48 influential factor is subjective financial knowledge. Government programs may emphasize the  
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50 significance of personal money management and encourage consumers to build confidence in managing  
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52 their finances, thereby reducing the likelihood of financial fragility.  
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Differences in financial capability among consumers with varying banking statuses are noteworthy. Objective financial knowledge does not exhibit effects on both the fully banked and unbanked, but it does show a positive effect on financial fragility among the underbanked. These findings suggest that government programs should be designed to incorporate pertinent information and action plans for desirable financial behavior. This would assist consumers who use both mainstream banking services and alternative financial services in making effective financial decisions when faced with choices between banks and AFS.

**6. Limitations and Future Research Directions**

However, it is important to acknowledge the limitations of this study, which could be addressed in future research. First, this study utilized a single indicator of financial fragility available from the NFCS dataset, although it has been widely used in existing literature. Future studies could enhance this by developing a more comprehensive measure of financial fragility to assess this concept more thoroughly. Second, due to the cross-sectional nature of the NFCS dataset, we can only demonstrate a positive association between financial capability and financial fragility, without establishing causality. Future research could utilize panel or experimental data to investigate whether financial capability and its components act as coping factors in reducing financial fragility. Third, the sample size of the unbanked group is relatively smaller compared to other subsample groups, limiting more detailed research on this group. As an extension of this study, future research could use different datasets to overcome this limitation. Fourth, this study exclusively used data from one country, the US. To generalize the findings to other countries, data from various countries should be employed for international comparisons in future research.

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Table 1. Descriptive statistics of sample characteristics, 2021 NFCS

Variables	Full sample (N=23,068)	Fully banked (N=15,976)	Underbanked (N=5,824)	Unbanked (N=1,268)
Financial fragility	30.1%	21.2%	46.3%	62.0%
Financial capability components, Mean (SD)				
Objective financial knowledge	3.08 (1.66)	3.39 (1.63)	2.51 (1.48)	2.04 (1.51)
Subjective financial knowledge	5.10 (1.31)	5.17 (1.20)	5.04 (1.46)	4.46 (1.67)
Perceived financial capability	5.69 (1.47)	5.92 (1.32)	5.29 (1.62)	4.73 (1.79)
Desired financial behaviors	3.19 (1.77)	3.64 (1.65)	2.49 (1.60)	1.08 (1.22)
Banking status				
Banked	68.0%	100%	-	-
Underbanked	26.2%	-	100%	-
Unbanked	5.8%	-	-	100%
COVID-19 shocks				
Employment shock	20.5%	14.1%	36.1%	25.1%
Health shock	15.6%	12.7%	23.0%	17.3%
Age, Mean (SD)	48.3 (17.0)	52.2 (16.6)	39.8 (14.7)	39.9 (14.8)
Gender				
Male	49.50%	48.53%	52.05%	49.35%
Female	50.50%	51.47%	47.95%	50.65%
Marital status				
Married	48.79%	54.13%	39.74%	27.07%
Single	33.42%	28.29%	42.70%	51.61%
Separated/divorce/widow	17.79%	17.58%	17.56%	21.32%
Having a dependent child	33.82%	27.56%	48.72%	40.01%
Race/ethnicity				
White	64.94%	68.57%	57.36%	56.71%
Black	10.91%	7.71%	17.35%	19.28%
Hispanic	15.62%	14.01%	19.09%	18.88%
AAPI	5.99%	7.42%	3.14%	2.09%
Others	2.54%	2.29%	3.07%	3.05%
Employment status				
Works full time	38.39%	37.34%	43.81%	26.40%
Self-employed	7.84%	6.75%	10.25%	9.73%
Works part-time	8.49%	7.91%	10.29%	7.16%
Homemaker	6.30%	6.07%	6.60%	7.72%
Student	2.88%	2.54%	3.27%	5.11%
Disabled	5.63%	4.32%	7.34%	13.26%
Unemployed	7.70%	5.54%	10.02%	22.60%
Retired	22.76%	29.53%	8.42%	8.02%
Education				
High school or lower	28.05%	23.12%	35.95%	50.07%
Some College	27.96%	27.02%	30.41%	27.96%
Associate degree	11.70%	12.27%	11.21%	7.27%

Variables	Full sample (N=23,068)	Fully banked (N=15,976)	Underbanked (N=5,824)	Unbanked (N=1,268)
Bachelor's degree	22.20%	25.66%	15.75%	10.79%
Post-bachelor's degree	10.09%	11.94%	6.68%	3.91%
Household income				
Less than \$15,000	11.33%	7.70%	15.31%	35.98%
15,000-\$24,999	10.60%	8.58%	14.15%	18.19%
\$25,000-\$34,999	10.96%	9.72%	13.69%	13.19%
\$35,000-\$49,999	14.42%	14.30%	15.41%	11.45%
\$50,000-\$74,999	18.76%	20.61%	16.18%	8.74%
\$75,000-\$99,999	13.16%	14.84%	10.52%	5.30%
\$100,000-\$149,999	13.13%	15.20%	9.64%	4.73%
\$150,000-\$199,999	4.57%	5.31%	3.30%	1.54%
\$200,000 or higher	3.07%	3.74%	1.81%	0.88%
Homeownership	60.14%	68.55%	44.75%	31.01%
Health insurance ownership	90.15%	93.21%	85.96%	73.31%

Weighted results.

Table 2. Logistic regression on financial fragility, full sample, 2021 NFCS

Variables	Model 1			Model 2		
	Coeff.	S.E.	Odds ratio	Coeff.	S.E.	Odds ratio
Financial capability index	-0.3426***	0.0083	0.7099	-	-	-
Financial capability components						
Objective financial knowledge	-	-	-	-0.0115	0.0134	0.9886
Subjective financial knowledge	-	-	-	-0.1529***	0.0162	0.8582
Perceived financial capability	-	-	-	-0.1471***	0.0142	0.8632
Desired financial behaviors	-	-	-	-0.6891***	0.0158	0.5020
Banking status (ref: fully banked)						
Underbanked	0.5860***	0.0427	1.7968	0.4664***	0.0446	1.5942
Unbanked	0.3619***	0.0750	1.4361	-0.1217	0.0771	0.8854
COVID-19 shocks						
Employment shock	0.1289***	0.0456	1.1376	0.1738***	0.0473	1.1898
Health shock	0.0329	0.0499	1.0334	0.0676	0.0517	1.0699
Age	0.0080***	0.0017	1.0080	0.0060***	0.0018	1.0060
Male (ref.: female)	-0.1898***	0.0388	0.8271	-0.2752***	0.0410	0.7594
Marital status (ref.: married)						
Single	0.0405	0.0519	1.0413	0.0736	0.0540	1.0764
Separated/divorce/ widow	0.1937***	0.0547	1.2137	0.1160*	0.0571	1.1230
Having a dependent child	0.1680***	0.0435	1.1829	0.1284**	0.0452	1.1370
Race/ethnicity (ref: White)						
Black	-0.1335*	0.0602	0.8750	-0.0018	0.0626	0.9982
Hispanic	-0.1180*	0.0556	0.8887	-0.0453	0.0574	0.9557
AAPI	-0.3008**	0.0982	0.7402	-0.2330*	0.1021	0.7922
Others	-0.1088	0.1146	0.8969	-0.0821	0.1181	0.9212
Employment status (ref: Full-time worker)						
Self-employed	-0.0552	0.0719	0.9463	-0.1576*	0.0749	0.8542
Part-time worker	0.0763	0.0659	1.0793	0.0288	0.0684	1.0292
Homemaker	0.0234	0.0774	1.0237	-0.1378	0.0804	0.8713
Student	0.1608	0.1015	1.1745	0.0329	0.1044	1.0334
Disabled	0.8381***	0.0827	2.3120	0.5435***	0.0853	1.7220
Unemployed	0.3961***	0.0702	1.4860	0.2215**	0.0727	1.2479
Retired	-0.2508***	0.0690	0.7782	-0.2629***	0.0725	0.7688
Education (ref: High school or lower)						
Some college	0.1535***	0.0454	1.1659	0.1057*	0.0473	1.1115
Associate degree	0.1325*	0.0619	1.1417	0.1130	0.0649	1.1196
Bachelor's degree	-0.0563	0.0577	0.9453	-0.0194	0.0606	0.9808
Post-bachelor's degree	-0.2720**	0.0915	0.7619	-0.2378*	0.0955	0.7884
Household income (ref: Less than \$15,000)						



Variables	Model 1			Model 2		
	Coeff.	S.E.	Odds ratio	Coeff.	S.E.	Odds ratio
15,000-\$24,999	-0.1777**	0.0677	0.8372	-0.1984**	0.0697	0.8200
\$25,000-\$34,999	-0.3319***	0.0690	0.7176	-0.2741***	0.0713	0.7603
\$35,000-\$49,999	-0.5430***	0.0679	0.5810	-0.4664***	0.0703	0.6273
\$50,000-\$74,999	-0.8060***	0.0703	0.4466	-0.6214***	0.0730	0.5372
\$75,000-\$99,999	-1.0915***	0.0838	0.3357	-0.8342***	0.0870	0.4342
\$100,000-\$149,999	-1.5431***	0.0992	0.2137	-1.2696***	0.1025	0.2809
\$150,000-\$199,999	-1.6067***	0.1591	0.2005	-1.2400***	0.1640	0.2894
\$200,000 or higher	-1.9156***	0.2192	0.1473	-1.5185***	0.2273	0.2190
Homeownership	-0.5877***	0.0410	0.5556	-0.4597***	0.0426	0.6315
Covered by health insurance	-0.1624**	0.0570	0.8501	-0.0181***	0.0586	0.9821
Constant	-0.7098***	0.1603		2.9081***	0.1790	
State fixed effect (State of residence)	Included			Included		
Model fit						
Mean concordance rate	86.9%			88.9%		

Weighted results. Significance level: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 3. Logistic regression on financial fragility, subsample, 2021 NFCS

Variables	Fully banked (N=15,976)			Underbanked (N=5,824)			Unbanked (N=1,268)		
	Coeff.	S.E.	Odds ratio	Coeff.	S.E.	Odds ratio	Coeff.	S.E.	Odds ratio
Financial capability index	-0.3783***	0.0113	0.6850	-0.2938***	0.0144	0.7454	-0.2106***	0.0311	0.8101
COVID-19 shocks									
Employment shock	0.2405***	0.0664	1.2719	0.1399*	0.0701	1.1502	-0.1714	0.1696	0.8425
Health shock	0.2370***	0.0701	1.2674	-0.1353	0.0784	0.8735	0.0708	0.1871	1.0734
Age	0.0004	0.0023	1.0004	0.0237***	0.0031	1.0240	0.0058	0.0065	1.0058
Male (ref.: female)	-0.1233*	0.0523	0.8840	-0.2343***	0.0666	0.7911	-0.4252**	0.1517	0.6536
Marital status (ref.: married)									
Single	0.0803***	0.0718	1.0836	0.0371	0.0867	1.0378	-0.0119	0.2032	0.9882
Separated/divorce/ widow	0.3186***	0.0723	1.3752	-0.096	0.0977	0.9085	0.4903*	0.2332	1.6328
Having a dependent child	0.3777	0.0611	1.4589	-0.08	0.0694	0.9231	0.08	0.157	1.0833
Race/ethnicity (ref: White)									
Black	0.1154	0.0894	1.1223	-0.3056***	0.093	0.7367	-0.6868***	0.1984	0.5032
Hispanic	0.1170	0.0748	1.1241	-0.387***	0.0935	0.6791	-0.338	0.2119	0.7132
AAPI	-0.3739***	0.1227	0.6880	-0.2888	0.1967	0.7492	0.3801	0.5311	1.4624
Others	-0.0471	0.1622	0.9540	-0.3199	0.1805	0.7262	0.1529	0.4458	1.1652
Employment status (ref: Full-time worker)									
Self-employed	-0.0673	0.1064	0.9349	-0.0026	0.1104	0.9974	0.1633	0.249	1.1774
Part-time worker	0.1159	0.0896	1.1229	0.0853	0.1091	1.0890	-0.0336	0.2825	0.9670
Homemaker	-0.1339	0.1057	0.8747	0.2398	0.1333	1.2710	0.2735	0.2909	1.3146
Student	0.0835	0.1372	1.0871	0.2327	0.1787	1.2620	0.2061	0.3304	1.2289
Disabled	0.8805***	0.1097	2.4121	0.6859***	0.1475	1.9856	1.2859***	0.303	3.6179
Unemployed	0.4464***	0.0990	1.5627	0.2679*	0.1168	1.3072	0.9604***	0.227	2.6127
Retired	-0.1115	0.0879	0.8945	-0.2772	0.1418	0.7579	0.5018	0.3279	1.6517
Education (ref: High school or lower)									
Some college	0.0491	0.0622	1.0503	0.2277**	0.0765	1.2557	0.187	0.1677	1.2056
Associate degree	-0.0246	0.0820	0.9757	0.2433*	0.1092	1.2755	0.9076**	0.3008	2.4784
Bachelor's degree	-0.1152	0.0745	0.8912	-0.0337	0.1061	0.9669	0.0653	0.2477	1.0675
Post-bachelor's degree	-0.3394**	0.1165	0.7122	-0.1163	0.1701	0.8902	-0.5423	0.4406	0.5814

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Variables	Fully banked (N=15,976)			Underbanked (N=5,824)			Unbanked (N=1,268)		
	Coeff.	S.E.	Odds ratio	Coeff.	S.E.	Odds ratio	Coeff.	S.E.	Odds ratio
Household income (ref: Less than \$15,000)									
15,000-\$24,999	-0.4072***	0.0948	0.6655	0.1983	0.1159	1.2193	-0.5643**	0.2075	0.5688
\$25,000-\$34,999	-0.5021***	0.0964	0.6053	-0.119	0.1159	0.8878	-0.3953	0.2267	0.6735
\$35,000-\$49,999	-0.8096***	0.0947	0.4450	-0.2678*	0.1147	0.7651	-0.4895*	0.2436	0.6129
\$50,000-\$74,999	-1.0326***	0.0968	0.3561	-0.585***	0.1193	0.5571	-0.5997*	0.2659	0.5490
\$75,000-\$99,999	-1.2594***	0.1134	0.2838	-1.0201***	0.1445	0.3606	-0.5069	0.3371	0.6024
\$100,000-\$149,999	-1.7802***	0.1336	0.1686	-1.2659***	0.1686	0.2820	-1.5874***	0.4396	0.2045
\$150,000-\$199,999	-2.0086***	0.2274	0.1342	-1.2134***	0.2454	0.2972	-1.3583	0.8043	0.2571
\$200,000 or higher	-2.3653***	0.3225	0.0939	-1.4391***	0.343	0.2371	-1.1861	0.7909	0.3054
Homeownership	-0.4254***	0.0562	0.6535	-0.7439***	0.0697	0.4753	-0.5779***	0.1614	0.5611
Covered by health insurance	-0.3675***	0.0821	0.6925	-0.0246	0.0923	0.9757	0.043	0.1647	1.0439
Constant	-0.2531	0.2162		-0.761***	0.2796		-0.1193	0.5444	
State fixed effect (State of residence)	Included			Included			Included		
Model fit									
Mean concordance rate	86.8%			81.9%			81.4%		

Weighted results. Significance level: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 4. Logistic regression on financial fragility, financial capability components, subsample, 2021 NFCS

Variables	Fully banked (N=15,976)			Underbanked (N=5,824)			Unbanked (N=1,268)		
	Coeff.	S.E.	Odds ratio	Coeff.	S.E.	Odds ratio	Coeff.	S.E.	Odds ratio
Financial capability components									
Objective financial knowledge	-0.0349	0.0178	0.9657	0.0512*	0.0238	1.0525	0.0155	0.051	1.0156
Subjective financial knowledge	-0.1345***	0.0226	0.8742	-0.1827***	0.027	0.8330	-0.1846***	0.0561	0.8314
Perceived financial capability	-0.167***	0.0199	0.8462	-0.1379***	0.023	0.8712	-0.0742	0.0504	0.9285
Desired financial behaviors	-0.7661***	0.0215	0.4648	-0.5385***	0.0262	0.5836	-0.5797***	0.072	0.5601
COVID-19 shocks									
Employment shock	0.2625***	0.0691	1.3002	0.1801*	0.0725	1.1973	-0.1215	0.1758	0.8856
Health shock	0.1878*	0.073	1.2066	-0.0456	0.0813	0.9554	0.1723	0.1944	1.1880
Constant	3.5143***	0.2434		2.4413***	0.3103		2.5155***	0.596	
Control variables	Included			Included			Included		
State fixed effect (State of residence)	Included			Included			Included		
Model fit									
Mean concordance rate	89.1%			84.1%			83.1%		

Weighted results. Control variables are the same as Table 3. Significance level: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

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**IJBM-07-2023-0373.R1: "Financial inclusion, financial capability, and financial fragility during the COVID-19 pandemic"**

Thank you for the comments. We edited the manuscript in response to the comments. Our responses to specific suggestions and comments are shown below.

#	Comment	Author Response
	<b>Reviewer #1</b>	
1	<p>1. Originality: Does the paper contain new and significant information adequate to justify publication?: The article titled “Financial inclusion, financial capability, and financial fragility during the COVID-19 pandemic” focuses on an interesting topic and addresses the issue by analyzing secondary data.</p> <p>The manuscript has improved in terms of content and clarity in the second round. However, the following points need further consideration.</p>	<p>We have revised our manuscript by incorporating your comments/suggestions. Please find our detailed responses below.</p>
2	<p>2. Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?: The Introduction section still needs to emphasize the originality of the study better.</p> <p>The authors have changed “bank status” to “banking status” to ensure coherence in terminology. On page 3, line 14, “bank status” can also be revised as “banking status.”</p> <p>The ongoing COVID-19 pandemic: “The ongoing” must be deleted.</p> <p>The paragraph beginning with “The ongoing COVID-19 pandemic...” reveals the data set used in the study and the details of the analysis. However, the purpose of the study is mentioned in the following paragraph. These two paragraphs must be revised to organize the idea flow and provide a smooth transition to the literature review.</p>	<p>The introduction is revised to emphasize the originality of this study. Also, editorial issues raised by you are addressed in this version.</p>

#	Comment	Author Response
	The contribution to the existing literature is better emphasized. However, the following sentence can be moved from the introduction section to be used after the presentation of the findings, “the findings reveal that...”	
3	<p>Literature Review</p> <p>Page 5, Lines 8-20: The authors have written, “Research on financial fragility can be categorized into three main types..” however, this sentence and the following sentences are not supported with academic references.</p> <p>Page 6, Lines 18-37: Can authors support this paragraph with additional and more recent resources from the literature?</p> <p>On page 6, lines 33-50: The authors use financial literacy and financial knowledge interchangeably in the study. Considering the reader profile, this could be acceptable. However, they write “financial behavior” and also “desirable financial behavior” on Page 6 but list “Desired financial behaviors” on Table 1. The variable names must be consistent throughout the study.</p>	Sources have been added in the two places pointed out by you. On page 6, when the components of financial capability are mentioned, “financial behavior” is changed to “the number of desirable financial behavior.”
4	3. Methodology: Is the paper's argument built on an appropriate base of theory, concepts or other ideas? Has the research or equivalent intellectual work on which the paper is based been well designed? Are the methods employed appropriate?: The methodology is clear.	Thanks.
5	4. Results: Are results presented clearly and analysed appropriately? Do the conclusions adequately tie together the other elements of the paper?: The discussion on Page 18 is clear and has a good idea flow, however, the discussion with previous literature is insufficient. The discussion and the relevance of findings with previous studies conducted about crises, health shocks, COVID-19, CSR topics, or financial capability components is lacking.	Four more relevant citations have been added to the Conclusions section. These citations cover topics mentioned by the reviewer such as CSR and COVID-19
6	5. Implications for research, practice and/or society: Does the paper identify	Thanks.

#	Comment	Author Response
	clearly any implications for research, practice and/or society? Does the paper bridge the gap between theory and practice? How can the research be used in practice (economic and commercial impact), in teaching, to influence public policy, in research (contributing to the body of knowledge)? What is the impact upon society (influencing public attitudes, affecting quality of life)? Are these implications consistent with the findings and conclusions of the paper?: The managerial implications are well-explained.	
7	6. Quality of Communication: Does the paper clearly express its case, measured against the technical language of the fields and the expected knowledge of the journal's readership? Has attention been paid to the clarity of expression and readability, such as sentence structure, jargon use, acronyms, etc.: In general, the manuscript is clear.	Thanks.
8	The last paragraph can also be separated from the discussion and implication section. Limitations and future research directions can be separated into a different section.	We have reorganized the last section accordingly.
9	The newly added sections or sentences in the manuscript are not highlighted and are difficult to follow in the review process. Can authors show the revised sections in another color in the revision process?	We will try to submit two versions; (a) clean version and (b) track-change version (if allowed).
	<b>Reviewer #2</b>	
1	Comments: I would like to commend the authors for their successful efforts in addressing nearly all of the comments and suggestions.	We have revised our manuscript by incorporating your comments/suggestions. Please find our detailed responses below.
2	Additional Questions: 1. Originality: Does the paper contain new and significant information adequate to justify publication?: The paper now contains new and significant information that is adequate to justify its publication. The research presented in the paper offers fresh insights related to financial inclusion, financial capability, and financial fragility. However, the introduction section would	In the introduction, we have added studies using the US data to discuss specific issues associated with financial inclusion, financial capability, and financial fragility particularly in the US market. In this version, the introduction is revised to emphasize the unique contribution of this study to the literature.



#	Comment	Author Response
	gain more significance if the authors were able to identify specific issues associated with financial inclusion, financial capability, and financial fragility particularly in the US market.	
3	2. Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?: The paper demonstrates a clear understanding of the relevant literature in the field. The author(s) have cited an appropriate range of literature sources, encompassing key works and recent developments. Their use of references is covering seminal works as well as current research, which underscores a grasp of the existing body of knowledge.	Thanks.
4	3. Methodology: Is the paper's argument built on an appropriate base of theory, concepts or other ideas? Has the research or equivalent intellectual work on which the paper is based been well designed? Are the methods employed appropriate?: The use of relevant theories is still lacking a thorough elaboration to the extent of contribution to theoretical perspectives. Yet the paper is based exhibits a well-designed approach and the methods employed in the study are deemed appropriate.	Thanks.
5	4. Results: Are results presented clearly and analysed appropriately? Do the conclusions adequately tie together the other elements of the paper?: The results in the paper are presented with clarity, and the analysis is conducted appropriately. After the revision, the authors have effectively interpreted the findings and linked them to the research objectives and relevant literature.	Thanks.
6	5. Implications for research, practice and/or society: Does the paper identify clearly any implications for research, practice and/or society? Does the paper bridge the gap between theory and practice? How can the research be used in practice (economic and commercial	Thanks.

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#	Comment	Author Response
	impact), in teaching, to influence public policy, in research (contributing to the body of knowledge)? What is the impact upon society (influencing public attitudes, affecting quality of life)? Are these implications consistent with the findings and conclusions of the paper?: The research implications consistently emphasise the importance of considering different banking statuses, particularly for underbanked and unbanked consumers is now explained in a practical sense.	
7	6. Quality of Communication: Does the paper clearly express its case, measured against the technical language of the fields and the expected knowledge of the journal's readership? Has attention been paid to the clarity of expression and readability, such as sentence structure, jargon use, acronyms, etc.: Overall, the paper effectively conveys its arguments, considering the technical language commonly used in the relevant fields, while also taking into account the anticipated knowledge level of the journal's readership.	Thanks.