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Using Factor Analysis to Assess Financial Vulnerability in the United States

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This paper examines the complex nature of financial vulnerability in the United States through the adoption of factor analysis to identify the underlying constructs of financial security. Using data from the FINRA Foundation's 2018 National Financial Capability Study (NFCS), we identify three underlying factors of financial vulnerability: (1) debt and cash flow management, (2) wealth building and planning, and (3) an understanding financial risks and financial literacy. A composite vulnerability index is created based on the three factors. Linear Probability Regression analyses are used to examine the association between sociodemographic characteristics (e.g., age, race/ethnicity, and income) and vulnerability scores.

FINRA Investor Education FOUNDATION

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All results, interpretations and conclusions expressed are those of the research team alone, and do not necessarily represent the views of the FINRA Foundation or any of its affiliated companies.

GW Business

Using Factor Analysis to Assess Financial Vulnerability in the United States[1]

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Abstract

This paper examines the complex nature of financial vulnerability in the United States through the adoption of factor analysis to identify the underlying constructs of financial security. Using data from the FINRA Foundation's 2018 National Financial Capability Study (NFCS), we identify three underlying factors of financial vulnerability: (1) debt and cash flow management, (2) wealth building and planning, and (3) an understanding financial risks and financial literacy. A composite vulnerability index is created based on the three factors. Linear Probability Regression analyses are used to examine the association between sociodemographic characteristics (e.g., age, race/ethnicity, and income) and vulnerability scores.

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1. Introduction

The ability of households to cope with unexpected life events (such as a job loss, health shock, or economic downturn) that disrupt economic activities or have an overall adverse impact on income and wealth is termed financial resilience (O'Neill and Xiao 2011). Financial resilience exists on a spectrum; households with high levels of resilience can "bounce back" from financial shocks more easily, whereas those with low levels of resilience are unable to do so. The latter are vulnerable to financial shocks and therefore often considered financially vulnerable. Because the capability of individuals and households to withstand economic shocks contributes to their long-term financial wellbeing, gaining insight to the factors that may place individuals at high-risk for vulnerability is critical.

The availability of financial assets, such as savings, has been examined in relation to financial resilience and wellbeing. Unrestricted precautionary savings are found to be crucial to the ability of households to weather financial shocks, especially among those with lower income. Low-income families often experience severe income volatility. For this population, putting aside emergency funds is essential in achieving financial security (J. Collins 2015; J. M. Collins 2016). The practical challenge remains that some bank accounts require minimum balances and can charge hefty fees on overdraft or when the balance falls below the minimum level. Data show that low-income families typically have less than two weeks' worth of income in checking and savings accounts and cash at home, and 55% of all American households can only replace less than one month of their income through liquid savings (Pew Charitable Trusts 2015).

A lack of assets and indebtedness can contribute to the inability to cope with a mid-sized financial shock (Hasler, Lusardi, and Oggero 2018). Morduch and Schneider (2017) provide

evidence that income and spending volatility are among the primary causes of financial vulnerability. Other studies have discussed sources of financial distress and vulnerability, including using alternative financial services such as pawnshops and payday loans (Skiba and Tobacman 2019; Melzer 2011) and high levels of indebtedness (Christelis et al. 2009; Jappelli, Pagano, and Maggio 2013).

Although financial resilience is highly correlated with factors such as income, debt, and wealth, it likely also depends on other crucial factors like money management skills and financial knowledge.

The economic importance of financial literacy, including its link to financial behavior and outcomes, is documented in a large and growing empirical literature (Hastings, Madrian, and Skimmyhorn 2013; Lusardi and Mitchell 2014; Lührmann, Serra-Garcia, and Winter 2018). Financial literacy rates are low among American adults (Yakoboski, Lusardi, and Hasler 2021; Angrisani et al. 2020; Lusardi, Hasler, and Yakoboski 2021). According to the data used for this paper, in 2018, only around one in three Americans had high levels of financially literacy. Greater financial literacy can reduce risks such as taking on too much debt, for example. Gerardi et al. (2013) found a robust relationship between numerical ability and mortgage default. They suggest that individuals with low numerical ability default on their mortgage due to behavior unrelated to the initial choice of their mortgage. Lusardi and Tufano (2015) show that debt literacy is low in America, with only one-third of the population understanding the basics of interest compounding. People lacking debt literacy are more likely to incur higher fees, use high-cost borrowing, and have excessive debt burdens. Moreover, those with overall low financial literacy levels are more likely

to struggle with making ends meet and less likely to save and plan for both the short- and long-term (Yakoboski, Lusardi, and Hasler 2021). Specifically, those who score higher on financial literacy assessments are more likely to plan and save for retirement and accumulate more retirement wealth, which is expected to contribute to financial resilience at old age and ultimately long-term financial wellbeing (Lusardi and Mitchell 2011; Lusardi, Michaud, and Mitchell 2017). Moreover, financial literacy has significant predictive power for future outcomes, including satisfaction with finances, ability to meet unexpected financial needs, and planning for retirement (Angrisani et al. 2020).

While various studies have identified distinct factors tied to financial vulnerability, few have taken a holistic approach to understanding its different dimensions. Valdes, Mottola, and Armeli (2021) used a latent class analysis to identify four subgroups of financial resilience, each distinct in their accumulation of wealth and assets, financial knowledge, and money management practices. While these findings provide evidence that financial resilience is indeed complex and multi-dimensional, no research exists, to our knowledge, that explains the underlying structure of financial resilience. This paper aims to fill this gap. We use data from the 2018 National Financial Capability Study (NFCS), a nationally representative survey of the financial capability of American adults commissioned every three years since 2009 by the FINRA Investor Education Foundation. We apply factor analysis to the responses to eleven NFCS questions on financial decision-making and outcomes to find the underlying constructs of financial vulnerability. Results show that we can assess financial vulnerability by (1) debt and cash flow management, (2) wealth building and planning, and (3) understanding risks and financial knowledge. This paper starts by examining each of these three contributing factors separately. Next, we create a composite

vulnerability index using the average of the three vulnerability scores in debt, wealth, and financial knowledge. Regression results for the three contributing factors separately show that while income strongly impacts wealth building and planning, its relationship with debt and cash flow management is relatively small. Other factors, such as age, may play a crucial role in debt and cash flow management. Racial and ethnic differences indicate that Black Americans are particularly vulnerable to low levels of financial literacy and risk knowledge, with findings persisting even when education and income are being controlled.

The regressions for the composite vulnerability index show that people under age 45 are more likely to be financially vulnerable than their older counterparts. As many in this age group are in a life stage that often coincides with high debt burdens (attributed primarily to student loans), childcare costs, and mortgages, they may experience tighter and more rigid household budgets than older respondents. Whereas education and especially a four-year college degree play a role, individuals with some college education but without a four-year degree are just as vulnerable as those with only a high school education. For these individuals, incurring student loan debt to finance some college education that subsequently may not result in a relatively higher pay leaves them in a particularly vulnerable situation. Our results confirm prior studies that show marriage provides people with more financial security. Financially, the widowed are not significantly different from those who are married; however, the divorced or separated are more vulnerable than those married. Not surprisingly, income and employment are strong predictors of overall vulnerability. However, a substantial share of the high-income people face challenges in debt and cashflow management. Lastly, financial knowledge is more strongly associated with age than educational attainment, possibly indicating that the current formal education system is not very

efficient in providing financial education. Moreover, acquiring financial knowledge may occur most effectively through learning-by-doing as people make financial decisions in life.

2. The Data and Summary Statistics

The data used in this study are drawn from the National Financial Capability Study (NFCS), a large-scale, nationally representative survey commissioned by the FINRA Investor Education Foundation to examine the financial capability of American adults (Mottola et al. 2019). The survey has been administered every three years since 2009. This paper uses data from the 2018 wave of the NFCS, which has 27,091 observations.

Our analyses exclude 5,427 observations that responded "don't know (DNK)" or "refuse to answer" to any of the eleven core questions included in the factor analysis. This leaves our final sample with 21,664 observations. Table (1) presents the summary statistics of the data. All statistics presented in this paper are weighted.

Table 1 : Summary Statistics of the Data

		Percentage
Age		
	18–29 years	17.4%
	30–44 years	26.1%
	45–59 years	24.8%
	60+ years	31.7%
Gender		
	Male	50.7%
	Female	49.3%
Race/Ethnicity		
	White, non-Hispanic	65.5%
	Black, non-Hispanic	10.2%
	Hispanic	15.5%
	Asian, non-Hispanic	6.6%
	Other, non-Hispanic	2.3%
Educational attainment		

	High school or less	27.0%
	Some college	38.9%
	Bachelor's degree	20.7%
	Post-graduate degree	13.4%
Marital status		
	Married/Living with partner	56.2%
	Single/Not married	28.5%
	Divorced/Separated	11.1%
	Widowed	4.3%
Financially dependent children		
	None	64.1%
	1 to 2	28.3%
	3 or more	7.6%
Household income		
	Less than $25K	15.6%
	$25K–49K	25.0%
	$50K–74K	21.2%
	$75K–99K	16.2%
	$100K+	22.1%
Work status		
	Employed	60.0%
	Unemployed	3.1%
	Not in labor force	13.1%
	Retired	23.8%
Total Observations		21,664

Notes: Data are from the 2018 NFCS. Weights are used. The table above shows the summary statistics of the raw data and the final sample used in this study, excluding all "don't know" and "refuse to answer" responses to the 11 core questions used in the factor analysis. The variable "household income" includes the total amount of a household's annual income, including wages, tips, investment income, public assistance, and income from retirement plans. The variable "educational attainment" includes the categories "high school or less," indicating that the highest degree received is a high school diploma or no diploma at all; "some college," indicating that respondents have attended a post-secondary institution and earned, at most, a two-year degree (i.e., an associate's degree); "bachelor's degree," indicating that respondents have earned a four-year degree; or "post-graduate degree," indicating that respondents have a degree beyond a bachelor's degree. An individual's work status is defined by four categories: "employed" for those who either have a full- or a part-time occupation; "unemployed" for those with no work at the time of the survey; "not in the labor force" for those who are full-time students, full-time homemakers, or permanently sick, disabled, or unable to work; and "retired" for those who classify themselves as being retired.

Dependent variables. The dependent variables are indices of financial vulnerability. The survey contains the following 11 questions that aim to assess people's financial decision making, situation, security, and financial knowledge:

- *How confident are you that you could come up with $2,000 if an unexpected need arose within the next month?*
- *Have you set aside emergency or rainy-day funds that would cover your expenses for 3 months in case of sickness, job loss, economic downturn, or other emergencies?*
- *In a typical month, how difficult is it for you to cover your expenses and pay all your bills?*
- *Would you say your (your household's) spending was less than, more than, or about equal to your (your household's) income?*
- *Do you currently own your home?*
- *Do you (or your spouse/partner) have any retirement plans through a current or previous employer, like a pension plan, a Thrift Savings Plan (TSP), or a 401(k), and/or do you (or your spouse/partner) have an IRA, Keogh, SEP, or any other type of retirement account that you have set up yourself?*
- *How strongly do you agree or disagree that you have too much debt?*
- *In the past 12 months, did you have certain experiences with credit cards, including paying the minimum payment only, being charged a late fee for late payment, being charged an over the limit fee for exceeding the credit line, or using the cards for a cash advance?*
- *In the past 5 years, how many times have you used alternative financial services, such as taking out an auto title loan, taking out a payday loan, using a pawn shop, or using a rent-to-own store?*
- *Answering the "Big Three" financial literacy questions on interest compounding, inflation, and risk diversification.*
- *Are you covered by health insurance?*

The original questionnaire is in Appendix (1). A factor analysis is used to identify the underlying constructs for these 11 items (see next section for detail).

Independent Variables. We include demographic variables such as age, gender, and race/ethnicity. The average age of respondents in the final sample was 48 years. As shown in Table 1, about 51%

of our survey respondents were male, 66% were non-Hispanic White, 10% were non-Hispanic Black, 16% were Hispanic, and 7% were non-Hispanic Asian. About 65% of respondents had no Bachelor's degree, 21% had a Bachelor's degree, and 13% had graduate degrees. Variables on family and children are also controlled for. More than half of respondents were married or living with a partner, and about one-third of respondents had at least one financially dependent child. Further, variables on income and employment are included. The median household income was between $50K and $74K, and about 60% of respondents were employed, with the rest either unemployed, not in the labor force, or retired.

3. Empirical Strategy and Results

(3.1) Factor analysis for financial vulnerability

Factor analysis is often used when there is a group of variables that can be interrelated. For example, the inability to come up with $2,000 tends to be closely tied to insufficient savings, whereas difficulty in covering all expenses and paying all bills is related with trouble making ends meet. In this paper, factor analysis is adopted to model such interrelationships and uncover the underlying constructs (also called "factors" or "components"), which in turn can help define financial vulnerability. More specifically, the goal is to find q factors that linearly reconstruct the 11 original survey items:

$$h_{ij} = z_{i1}b_{1j} + z_{i2}b_{2j} + \cdots + z_{iq}b_{qj} + e_{ij} \qquad (2)$$

where h_{ij} is the observed response of the ith person to the jth survey question ($1 \leq j \leq 11$), z_{ik} is the ith observation on the kth factor, b_{kj} is the set of factor loadings, and e_{ij} is similar to a residual. More details on the factor analysis are included in Appendix (2).

Results from the factor analysis show that the responses from the 11 questions on financial decision making, situation, security, and knowledge can be grouped into three factors:

Table 2: Original Variables and Underlying Factors

Underlying Factors	**Original Survey Questions/Variables**
Factor 1: Debt and Cashflow Management	• Difficulty covering all expenses and paying all bills • Trouble making ends meet • Too much debt
Factor 2: Wealth Building and Planning	• Cannot come up with $2,000 in 30 days • Savings < 3 months of expenses • Not owning a home • No retirement accounts • Not covered by health insurance
Factor 3: Understanding Risks and Financial Knowledge	• Expensive credit card uses • Use of alternative financial services • Low financial literacy

Table (3) presents the difference between the distribution of sociodemographic dimensions among the total population versus the most vulnerable groups for each factor separately. We defined the most vulnerable groups as those whose scores were among the bottom 25% in factors 1–3. To make the comparison more straightforward, we created the odds-ratio columns, which equal the percentage distribution of the most vulnerable group divided by the population distribution. If the odds ratio is greater than 1, a particular demographic segment has a higher concentration in the vulnerable group than in the general population. For example, because there are 17.4% of individuals aged 18–29 in the survey population, but 20.7% of those vulnerable for factor 1 are 18–29, the odds ratio here is 20.7%/17.4% = 1.19. This indicates that it is 19%more likely that an 18–29 year-old would be in the vulnerable group than in the overall population.

Compared to the total population, the vulnerable group for factor 1 (cash flow/debt) has a higher representation among the 30–44 age group (OR=1.5), non-Hispanic Black adults (OR=1.6),

people with three or more children (OR=1.6), people with lower income (less than $50K), and the unemployed (OR=1.5). The vulnerable group for factor 2 (wealth building) has a higher-than-population representation among people under 30 years old (OR=1.57), Hispanic adults, non-Hispanic Black adults (OR~=1.4), people with low educational attainment (less than a college degree), lower-income individuals (less than $50K), and those not working (unemployed and not in the labor force). Lastly, the vulnerable group for factor 3 (financial knowledge and risks) is more concentrated among people under age 45, non-Hispanic Black adults (OR=2.1), people with three or more children (OR=1.7), and those with lower income or who are not working.

Table 3: Sociodemographic Distribution of the Population vs. the Groups Vulnerable to Debt and Cash Flow Difficulties, Insufficient Wealth, and Low Financial Knowledge

	Total Population	**Vulnerable for Factor 1 (Debt & cash flow)**		**Vulnerable for Factor 2 (Wealth building)**		**Vulnerable for Factor 3 (Financial knowledge)**	
		Percent	**Odds ratio**	**Percent**	**Odds ratio**	**Percent**	**Odds ratio**
Age							
18–29 years	17.40%	20.70%	1.19	27.30%	1.57	33.40%	1.92
30–44 years	26.10%	39.10%	1.50	31.00%	1.19	40.00%	1.53
45–59 years	24.80%	24.10%	0.97	24.10%	0.97	17.60%	0.71
60+ years	31.70%	16.00%	0.50	17.60%	0.56	9.00%	0.28
Gender							
Male	50.70%	47.30%	0.93	42.10%	0.83	52.30%	1.03
Female	49.30%	52.70%	1.07	58.00%	1.18	47.70%	0.97
Race/Ethnicity							
White, non-Hispanic	65.50%	58.40%	0.89	54.90%	0.84	47.00%	0.72
Black, non-Hispanic	10.20%	16.50%	1.62	14.80%	1.45	21.50%	2.11
Hispanic	15.50%	17.70%	1.14	22.20%	1.43	23.20%	1.50
Asian, non-Hispanic	6.60%	4.60%	0.70	5.10%	0.77	5.60%	0.85
Other, non-Hispanic	2.30%	2.90%	1.26	3.00%	1.30	2.70%	1.17
Educational attainment							
High school or less	27.00%	27.80%	1.03	36.80%	1.36	34.20%	1.27
Some college	38.90%	46.90%	1.21	45.10%	1.16	45.90%	1.18

Bachelor's degree	20.70%	16.70%	0.81	13.40%	0.65	13.40%	0.65
Post-graduate degree	13.40%	8.60%	0.64	4.70%	0.35	6.40%	0.48
Marital status							
Married/Living with partner	56.20%	48.40%	0.86	36.90%	0.66	41.70%	0.74
Single/ Not married	28.50%	35.80%	1.26	42.50%	1.49	44.60%	1.56
Divorced/Separated	11.10%	12.70%	1.14	16.20%	1.46	11.40%	1.03
Widowed	4.30%	3.00%	0.70	4.40%	1.02	2.30%	0.53
Financially dependent children							
None	64.10%	49.60%	0.77	60.40%	0.94	47.80%	0.75
1 to 2	28.30%	38.00%	1.34	29.90%	1.06	39.00%	1.38
3 or more	7.60%	12.40%	1.63	9.70%	1.28	13.20%	1.74
Household income							
Less than $25K	15.60%	22.70%	1.46	35.00%	2.24	27.40%	1.76
$25K–49K	25.00%	30.50%	1.22	35.50%	1.42	31.50%	1.26
$50K–74K	21.20%	19.40%	0.92	17.80%	0.84	17.70%	0.83
$75K–99K	16.20%	16.00%	0.99	7.00%	0.43	14.50%	0.90
$100K+	22.10%	11.40%	0.52	4.80%	0.22	9.00%	0.41
Work status							
Employed	60.00%	67.90%	1.13	59.00%	0.98	68.90%	1.15
Unemployed	3.10%	4.60%	1.48	6.50%	2.10	5.40%	1.74
Not in labor force	13.10%	17.10%	1.31	22.00%	1.68	19.10%	1.46
Retired	23.80%	10.40%	0.44	12.60%	0.53	6.70%	0.28
Total Observations	21,664	5,295		5,038		4,838	

Notes: Data are from the 2018 NFCS. Nationally representative weights are used. The table above describes the sociodemographic background of the entire survey population and those vulnerable for factors 1–3. Being "Vulnerable for Factor 1" is an indicator variable that equals one if an individual's factor 1 score (which measures debt burden and a lack of cash flow) is among the top (worst) 25% of all factor 1 scores and zero otherwise. Being "Vulnerable for Factor 2" is an indicator variable that equals one if an individual's factor 2 score (which measures insufficient wealth accumulation and planning) is among the top (worst) 25% of all factor 2 scores and zero otherwise. Being "Vulnerable for Factor 3" is an indicator variable that equals one if an individual's factor 3 score (which measures the lack of financial knowledge and understanding of financial risks) is among the top (worst) 25% of all factor 3 scores and zero otherwise. The odds ratio is calculated by dividing the percentage distribution in a vulnerable group by the percentage distribution in the survey population. If an odds ratio is greater (less) than one, then it is more (less) likely we would see a specific characteristic among a vulnerable group than in the population. The variable "household income" includes the total amount of a household's annual income, including wages, tips, investment income, public assistance, and income from retirement plans. The education variable "educational attainment" includes the categories "high school or less," indicating that the highest degree received is a high school diploma or no diploma at all; "some college," indicating that respondents have attended a post-secondary institution and earned, at most, a two-year degree (i.e., an associate's degree); "bachelor's degree," indicating that respondents have earned a four-year degree; or "post-graduate degree," indicating that respondents have a degree beyond a bachelor's degree. An individual's work status is defined by four categories: "employed" for those who either have a full- or a part-time occupation; "unemployed" for those with no occupation at the time of the survey; "not in labor force" for those who are full-time students, full-time homemakers, or permanently sick, disabled, or unable to work; and "retired" for those who classify themselves as being retired.

(3.2) Regression analysis for the three vulnerability factors

A Linear Probability Model (LPM) is used to examine the associations between sociodemographic background with the three vulnerability factors. The results are shown in Table (4). Compared to adults under 30, those in the 30–44 age group appear to be more vulnerable to debt burden and cash flow difficulties (0.0893***), but less vulnerable to lacking financial knowledge (-0.0656***). Those in the 30–44 age group may be in a life stage that is tied to high debt obligations attributed to student debt repayments, mortgages, and other expenses due to childcare responsibilities. About half of people aged 35–44 have mortgage or home equity loans, with an outstanding debt level of around $222K in 2019. Close to one-third of people in the same age range have student loans, with the average debt level around $42K (Board of Governors of the Federal Reserve System 2019).

Compared to their younger counterparts, the 60+ age group is less likely to be vulnerable to the three factors measured. Individuals over 60 are 4% less likely to be burdened by debt, 10% less likely to lack sufficient wealth accumulation, and 27% less likely to have a poor understanding of financial risks and financial knowledge than those under age 30. The relative advantage of older people on the understanding of financial knowledge may indicate the importance of real-world experience on financial literacy (Frijns, Gilbert, and Tourani-Rad 2014).

Race and ethnicity play an important role in predicting financial vulnerability. Compared to non-Hispanic White individuals, non-Hispanic Black individuals are 9% more likely to be vulnerable to debt burdens and cash flow difficulties, 5% more likely to have insufficient wealth, and 22% more likely to score low on financial knowledge and risk assessments. Asian Americans

appear to be most secure when it comes to debt and cash flow management as they are 8% less likely than Whites to be burdened by debt and issues related to cash flow.

Marital status may also play a key role. Compared to their married peers, those who are single or divorced/separated are more likely to express being burdened by debt and cash flow difficulties, lack financial wealth, and score lower on financial literacy and risk assessments. This points to the conclusion that a household with two people potentially able to earn an income helps buffer against financial shocks and decrease financial vulnerability. By contrast, according to our findings, having financially dependent children has a significantly positive effect on financial vulnerability.

Education has a mixed association with financial vulnerability. Individuals who have completed some college are more likely than high school graduates to be burdened by debt and cash flow difficulties. This is consistent with prior findings that people with some college education but not a bachelor's degree usually face more challenges in repaying their student loans. Some students borrowed student loans but never finished college, leaving them unable to benefit from the greater earnings that come with a college degree (US Census Bureau 2021). Further, about 9% of community college students are enrolled in schools that don't participate in the federal student loan programs, which are the safest and most affordable option for borrowing money for college, and in some states the proportion is as high as 20% (Carrns 2014; Cochrane and Szabo-Kubitz 2016). Without this option, some students may rely on riskier and more expensive alternatives to pay for their education. However, we do find that individuals with a bachelor's

degree or more are better able to build wealth and exhibit better financial literacy and understanding of financial risks.

Income level has the strongest association with financial vulnerability. A higher income level is associated with a lower likelihood of having a debt burden or cash flow issues, insufficient wealth accumulation, and a lack of financial knowledge and understanding of financial risks. Moreover, the impact of higher income on mitigating vulnerability is incremental. For example, compared to people with less than $25K annual income, those earning $25K–49K are 5% less likely to incur debt problems, those earning $50K–99K are 12% less likely, and those making over $100K are 22% less likely.

Table 4: Regression Analysis on the Factors Associated with Being Vulnerable for Debt, Wealth, and Financial Risks and Knowledge

		Vulnerable for Factor 1 (Debt & cash flow)	**Vulnerable for Factor 2 (Wealth)**	**Vulnerable for Factor 3 (Financial risks and knowledge)**
Age (*Ref: 18–29 years)*				
	30–44 years	0.0893***	0.00180	-0.0656***
		(0.0128)	(0.0126)	(0.0132)
	45–59 years	-0.000753	-0.0323**	-0.225***
		(0.0130)	(0.0128)	(0.0130)
	60+ years	-0.0437***	-0.102***	-0.270***
		(0.0143)	(0.0140)	(0.0137)
Gender (Ref: Male)				
	Female	0.0282***	0.0505***	-0.0236***
		(0.00702)	(0.00680)	(0.00659)
Race/Ethnicity (Ref: White)				
	Black	0.0890***	0.0541***	0.220***
		(0.0133)	(0.0124)	(0.0130)
	Hispanic	-0.0247*	0.0482***	0.0623***
		(0.0127)	(0.0129)	(0.0128)
	Asian	-0.0773***	-0.0200	-0.00911
		(0.0135)	(0.0130)	(0.0134)
	Other	0.0292	0.0476**	0.0460**
		(0.0208)	(0.0195)	(0.0190)

Educational attainment (Ref: High school or less)			
Some college	0.0484***	-0.0143	-0.0235***
	(0.00922)	(0.00934)	(0.00889)
Bachelor's degree	-0.0182*	-0.0817***	-0.122***
	(0.00995)	(0.00971)	(0.00940)
Post-graduate degree	-0.0182*	-0.0858***	-0.107***
	(0.0109)	(0.00994)	(0.0102)
Marital status (Ref: Married/living with partner)			
Single/Not married	0.0286***	0.0500***	0.0434***
	(0.0103)	(0.0100)	(0.0101)
Divorced/Separated	0.0323***	0.0852***	0.0480***
	(0.0119)	(0.0118)	(0.0108)
Widowed	-0.0130	0.0156	-0.000254
	(0.0153)	(0.0164)	(0.0132)
Kids (Ref: None)			
1 to 2	0.103***	0.0196**	0.101***
	(0.00922)	(0.00867)	(0.00876)
3 or more	0.144***	0.0486***	0.145***
	(0.0162)	(0.0146)	(0.0151)
Household income (Ref: Less than $25K)			
$25K–49K	-0.0495***	-0.162***	-0.0708***
	(0.0131)	(0.0137)	(0.0128)
$50K–74K	-0.124***	-0.284***	-0.150***
	(0.0133)	(0.0139)	(0.0131)
$75K–99K	-0.118***	-0.373***	-0.139***
	(0.0144)	(0.0140)	(0.0139)
$100K+	-0.215***	-0.399***	-0.212***
	(0.0139)	(0.0138)	(0.0135)
Employment status (Ref: Unemployed)			
Employed	-0.0295	-0.0892***	-0.0437*
	(0.0236)	(0.0244)	(0.0240)
Retired	-0.110***	-0.147***	-0.0780***
	(0.0246)	(0.0252)	(0.0244)
Not in labor force	-0.0381	-0.0457*	-0.0425*
	(0.0253)	(0.0260)	(0.0255)
Constant	0.316***	0.595***	0.548***
	(0.0275)	(0.0279)	(0.0279)
Observations	21,664	21,664	21,664
R^2	0.113	0.213	0.236
Adjusted R^2	0.112	0.212	0.235

Notes: Data are from the 2018 NFCS. Weights are used. The regressions are estimated by OLS in a Linear Probability Model. "Vulnerable for Factor 1" is an indicator variable that equals one if an individual's factor 1 score (which measures debt burden) is among the top (worst) 25% of all factor 1 scores and zero otherwise. "Vulnerable for Factor 2" is an indicator variable that equals one if an individual's factor 2 score (which measures insufficient wealth accumulation and planning) is among the top (worst) 25% of all factor 2 scores and zero otherwise. "Vulnerable for Factor 3" is an indicator variable that equals one if an individual's factor 3 score (which measures the lack of financial knowledge and understanding of financial risks) is among the top (worst) 25% of all factor 3 scores and zero otherwise. The variable "household income" includes the total amount of a household's annual income, including wages, tips, investment income, public assistance, and income from retirement plans. The variable "educational attainment" includes the categories "high school or less," indicating that the highest degree received is a high school diploma or no diploma at all; "some college," indicating that respondents have attended a post-secondary institution and earned, at most, a two-year degree (i.e., an associate's degree); "bachelor's degree," indicating that respondents have earned a four-year degree; and "post-graduate degree," indicating that respondents have a degree beyond a bachelor's degree. An individual's work status is defined by four categories: "employed" for

those who either have a full- or a part-time occupation; "unemployed" for those with no occupation at the time of the survey; "not in labor force" for those who are full-time students, full-time homemakers, or permanently sick, disabled, or unable to work; and "retired" for those who classify themselves as being retired. Ref indicates the reference value of categorical variables. Robust standard errors in parentheses. * *p < 0.10,* ** *p < 0.05,* *** *p < 0.01.*

(3.3) Regression analysis for the composite vulnerability index

In the previous section, we examined the three vulnerability factors separately. These three factors are highly correlated. The Pearson's correlation coefficients between being vulnerable for debt and cash flow management, wealth planning, and financial risks/knowledge range between 0.35 and 0.44, all statistically significant. While 57% of surveyed respondents are not vulnerable for any of the three factors, close to 19.6% are vulnerable for at least one factor, 14.8% for two factors, and 8.6% for all three factors.

In the following, we create a composite vulnerability index, which equals the arithmetic mean of the three vulnerability factors on debt, wealth, and financial risks and knowledge. Next, we create an indicator variable that equals one if a person's composite vulnerability index is among the top (worst) 25% of all. Finally, in Table (5) below, we compare the distribution of the survey population with the most vulnerable group. Results show that the following segments of the population are particularly overrepresented in the vulnerable group: 18–29 year-olds (OR= 1.61), non-Hispanic Black adults (OR=1.64), Hispanic adults (OR=1.44), singles/not married (OR=1.45), people with 3+ financial dependents (OR=1.54), those in the lowest income group (OR=2), and those unemployed (OR=1.97) or not in the labor force (OR=1.6).

Next, we use an OLS regression in a Linear Probability Model to examine what variables can help predict a person being among the top (worst) 25% in the composite vulnerability index

(Table 6). Ceteris paribus, people over 45 are less likely to be among the most vulnerable. In particular, those over 60 years old are 13% less likely than those under 30 to be the most financially vulnerable. This is in line with the life-cycle model that those close to retirement should be at the peak of their wealth accumulation.

Compared to non-Hispanic Whites, non-Hispanic Black adults are 10% more likely to fall into the most vulnerable group. Having a bachelor's degree or more is shown to reduce the likelihood of financial vulnerability significantly. Marriage appears to strengthen economic security. Compared to the married, singles and the divorced are 3% and 6% more likely to be financially vulnerable, respectively. In contrast, a higher number of financially dependent children decreases financial security. Income is the strongest predictor of financial security. Compared to people earning less than $25K, those earning $100K or more are 34% less likely to be financially vulnerable.

Table 5: Sociodemographic Distribution of the Survey Population Versus the Most Vulnerable (the Composite Vulnerability Index)

	Total Population	People Scoring the Worst in Composite Vulnerability Index	Odds-Ratio
Age			
18–29 years	17.40%	28.00%	1.61
30–44 years	26.10%	35.40%	1.36
45–59 years	24.80%	22.70%	0.92
60+ years	31.70%	13.90%	0.44
Gender			
Male	50.70%	43.20%	0.85
Female	49.30%	56.80%	1.15
Race/Ethnicity			
White, non-Hispanic	65.50%	53.10%	0.81
Black, non-Hispanic	10.20%	16.70%	1.64
Hispanic	15.50%	22.30%	1.44

Asian, non-Hispanic	6.60%	5.10%	0.77
Other, non-Hispanic	2.30%	2.90%	1.26
Educational attainment			
High school or less	27.00%	34.60%	1.28
Some college	38.90%	45.60%	1.17
Bachelor's degree	20.70%	14.30%	0.69
Post-graduate degree	13.40%	5.50%	0.41
Marital status			
Married/Living with partner	56.20%	40.60%	0.72
Single/ Not married	28.50%	41.40%	1.45
Divorced/Separated	11.10%	14.60%	1.32
Widowed	4.30%	3.50%	0.81
Financially dependent children			
None	64.10%	53.60%	0.84
1 to 2	28.30%	34.70%	1.23
3 or more	7.60%	11.70%	1.54
Household income			
Less than $25K	15.60%	31.30%	2.01
$25K–49K	25.00%	34.90%	1.40
$50K–74K	21.20%	18.50%	0.87
$75K–99K	16.20%	9.20%	0.57
$100K+	22.10%	6.20%	0.28
Work status			
Employed	60.00%	63.70%	1.06
Unemployed	3.10%	6.10%	1.97
Not in labor force	13.10%	20.90%	1.60
Retired	23.80%	9.40%	0.39
Total Observations	21,664	4,899	

Note: Data are from the 2018 NFCS. Weights are used. The column "people scoring the worst in composite vulnerability index" includes people whose composite vulnerability index (i.e., the average of three factor scores) is among the top (worst) 25% of all. The odds ratio is calculated by dividing the percentage distribution in the vulnerable group by the percentage distribution in the survey population. If an odds ratio is greater (less) than one, then it is more (less) likely we would see a certain characteristic among the vulnerable group than in the population. The variable "household income" includes the total amount of a household's annual income, including wages, tips, investment income, public assistance, and income from retirement plans. The variable "Educational attainment" includes the categories "high school or less," indicating that the highest degree received is a high school diploma or no diploma at all; "some college," indicating that respondents have attended a post-secondary institution and earned, at most, a two-year degree (i.e., an associate's degree); "bachelor's degree," indicating that respondents have earned a four-year degree; and "post-graduate degree," indicating that respondents have a degree beyond a bachelor's degree. An individual's work status is defined by four categories: "employed" for those who either have a full- or a part-time occupation; "unemployed" for those with no occupation at the time of the survey; "not in the labor force" for those who are full-time students, full-time homemakers, or permanently sick, disabled, or unable to work; and "retired" for those who classify themselves as being retired.

Table 6: Regression Analysis on the Factors Associated with Being Most Vulnerable Using the Composite Financial Vulnerability Index

	(YES/NO) Scoring the Worst in Composite Vulnerability Index
Age (Ref: 18–29 years)	
30–44 years	0.000830
	(0.0128)
45–59 years	-0.0722***
	(0.0129)
60+ years	-0.131***
	(0.0140)
Gender (Ref: Male)	
Female	0.0486***
	(0.00679)
Race/Ethnicity (Ref: White)	
Black	0.0953***
	(0.0129)
Hispanic	0.0420***
	(0.0128)
Asian	-0.0307**
	(0.0128)
Other	0.0410**
	(0.0195)
Educational attainment (Ref: High School or less)	
Some college	-0.00164
	(0.00920)
Bachelor's degree	-0.0664***
	(0.00969)
Post-graduate degree	-0.0691***
	(0.0101)
Marital status (Ref: Married/Living with partner)	
Single/Not married	0.0297***
	(0.0100)
Divorced/Separated	0.0571***
	(0.0114)
Widowed	-0.00999
	(0.0157)
Kids (Ref: None)	
1 to 2	0.0642***
	(0.00879)
3 or more	0.110***
	(0.0152)
Household income (Ref: Less than $25K)	
$25K–49K	-0.114***
	(0.0134)
$50K–74K	-0.223***
	(0.0136)

$75K–99K	-0.293***
	(0.0141)
$100K+	-0.335***
	(0.0137)
Employment status (Ref: Unemployed)	
Employed	-0.0735***
	(0.0241)
Retired	-0.143***
	(0.0248)
Not in labor force	-0.0558**
	(0.0257)
Constant	0.527***
	(0.0279)
Observations	21664
R^2	0.190
Adjusted R^2	0.189

*Notes: Data are from the 2018 NFCS. Weights are used. The regression is estimated by OLS in a Linear Probability Model. The column "(Yes/No) scoring the worst in composite vulnerability index" includes people whose composite vulnerability index (i.e., the average of three factor scores) is among the top (worst) 25% of all. The variable "household income" includes the total amount of a household's annual income, including wages, tips, investment income, public assistance, and income from retirement plans. The variable "Educational attainment" includes the categories "high school or less," indicating that the highest degree received is a high school diploma or no diploma at all; "some college," indicating that respondents have attended a post-secondary institution and earned, at most, a two-year degree (i.e., an associate's degree); "bachelor's degree," indicating that respondents have earned a four-year degree; and "post-graduate degree," indicating that respondents have a degree beyond a bachelor's degree. An individual's work status is defined by four categories: "employed" for those who either have a full- or a part-time occupation; "unemployed" for those with no occupation at the time of the survey; "not in the labor force" for those who are full-time students, full-time homemakers, or permanently sick, disabled, or unable to work; and "retired" for those who classify themselves as being retired. Ref indicates the reference value of categorical variables. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

4. Conclusions

While several studies have examined financial resilience and vulnerability, most of the existing literature tends to focus on one single dimension, such as wealth, debt, or income, failing to take into consideration the complex and multivariate nature of financial vulnerability. In the present paper, we take a holistic approach to assessing financial vulnerability. Using data from the FINRA Foundation's 2018 National Financial Capability Study (NFCS), we apply factor analysis to a set of survey questions on financial decision-making and outcomes to find the underlying constructs of financial vulnerability. Results from the factor analysis show that the set of questions can be grouped into three factors: (1) cash flow and debt management, (2) wealth building and

planning, and (3) understanding financial risks and financial knowledge. The three factors are analyzed separately and combined to create a composite vulnerability index.

We examine the sociodemographic characteristics that are most strongly associated with financial vulnerability. Results show that age is a strong predictor of economic vulnerability. Most noticeably, being in the 30–44 age range is significantly associated with high levels of debt and cash flow management vulnerability, all else being equal. Many families in this age group are well-educated with regular income but are most burdened by mortgage debt and student loans. Discussions exist on proposed policies that directly reduce outstanding student loans ("student loan forgiveness"), although critics are concerned over unintended consequences such as incentivizing future students to borrow even more loans (Epstein 2020). Curbing the cost of higher education has also been proposed.

Second, we find that financial literacy is more strongly associated with age than formal education. This indicates that a deep understanding of financial risks and knowledge may happen more through real-life experiences, such as buying a home or selling a vehicle, than through a formal classroom education. While financial education in school is key for many young people to lay the foundation of financial literacy, the value of alternative and continued forms of education, including those administered through the workplace, should not be underestimated. As employees experience important life milestones when crucial financial decisions must be made, the workplace can provide extremely useful "just-in-time" training that is effective and convenient.

Third, we find that Black individuals are among the most financially vulnerable. Black adults were most likely to lack wealth and struggle with high debt burdens and cash flow issues, and many scored low on financial literacy assessments, even when education and income are controlled. These findings are in line with existing evidence indicating that Black Americans are economically vulnerable and face significant money management challenges. Black Americans are also more likely to engage with alternative financial services such as payday lenders and pawnshops, with around 42% of Black Americans reporting that they used at least one type of alternative financial service in the five years before completing the survey, compared to 22% of their White counterparts. One possible way to address this problematic trend is financial education that is tailored to the needs of Black Americans and that is tied to financial access and inclusion. Given that financial education may occur more organically through the use of financial products, incorporating educational components into the products themselves may be worth further exploration and innovation.

Lastly, household income is perhaps the most important predictor of financial vulnerability. Not surprisingly, a higher income level is associated with a lower likelihood of being financially vulnerable. However, income alone explains more wealth planning variations than debt management. All else being equal, people earning $100K or more are nearly 40% less likely than those earning less than $25K to experience vulnerability in managing and planning for wealth accumulation. In comparison, the highest-earning group is only 21% less likely than the lowest-earning group to be vulnerable in debt management. This suggests that an adequate income level is not sufficient for achieving financial resilience. Even high-income individuals can face challenges with significant debt burdens and debt management.

References

Angrisani, Marco, Jeremy Burke, Annamaria Lusardi, and Gary Mottola. 2020. "The Stability and Predictive Power of Financial Literacy: Evidence from Longitudinal Data." Working Paper 28125. Working Paper Series. National Bureau of Economic Research. https://doi.org/10.3386/w28125.

Board of Governors of the Federal Reserve System. 2019. "Survey of Consumer Finances, 1989 – 2019." https://www.federalreserve.gov/econres/scf/dataviz/scf/chart/.

Carrns, Ann. 2014. "Not All Community Colleges Offer Federal Student Loans." *The New York Times*, July 15, 2014, sec. Your Money. https://www.nytimes.com/2014/07/16/your-money/not-all-community-colleges-offer-federal-student-loans.html.

Christelis, Dimitrios, Tullio Jappelli, Omar Paccagnella, and Guglielmo Weber. 2009. "Income, Wealth and Financial Fragility in Europe." *Journal of European Social Policy* 19 (4): 359–76. https://doi.org/10.1177/1350506809341516.

Cochrane, Debbie, and Laura Szabo-Kubitz. 2016. "States of Denial: Where Community College Students Lack Access to Federal Student Loans." https://eric.ed.gov/?id=ED571625.

Collins, J., ed. 2015. *A Fragile Balance: Emergency Savings and Liquid Resources for Low-Income Consumers*. Palgrave Macmillan US. https://doi.org/10.1057/9781137482372.

Collins, J. Michael. 2016. "One Paycheck Away from Poverty." Text. The Hill. March 4, 2016. https://thehill.com/blogs/congress-blog/economy-budget/271680-one-paycheck-away-from-poverty.

Epstein, Richard. 2020. "Avoid the Pitfalls Of Student Loan Forgiveness." Text. Hoover Institution. 2020. https://www.hoover.org/research/avoid-pitfalls-student-loan-forgiveness.

Frijns, Bart, Aaron Gilbert, and Alireza Tourani-Rad. 2014. "Learning by Doing: The Role of Financial Experience in Financial Literacy." *Journal of Public Policy* 34 (1): 123–54. https://doi.org/10.1017/S0143814X13000275.

Gerardi, Kristopher, Lorenz Goette, and Stephan Meier. 2013. "Numerical Ability Predicts Mortgage Default." *Proceedings of the National Academy of Sciences* 110 (28): 11267–71. https://doi.org/10.1073/pnas.1220568110.

Hasler, Andrea, Annamaria Lusardi, and Noemi Oggero. 2018. "Financial Fragility in the US: Evidence and Implications." *GFLEC Working Paper*. https://gflec.org/wp-content/uploads/2018/04/Financial-Fragility-Research-Paper-04-16-2018-Final.pdf.

Hastings, Justine S., Brigitte C. Madrian, and William L. Skimmyhorn. 2013. "Financial Literacy, Financial Education, and Economic Outcomes." *Annual Review of Economics* 5 (1): 347–73. https://doi.org/10.1146/annurev-economics-082312-125807.

Jappelli, Tullio, Marco Pagano, and Marco Di Maggio. 2013. "Households' Indebtedness and Financial Fragility." *Journal of Financial Management, Markets and Institutions*, no. 1/2013. https://doi.org/10.12831/73631.

Lührmann, Melanie, Marta Serra-Garcia, and Joachim Winter. 2018. "The Impact of Financial Education on Adolescents' Intertemporal Choices." *American Economic Journal: Economic Policy* 10 (3): 309–32. https://doi.org/10.1257/pol.20170012.

Lusardi, Annamaria, Andrea Hasler, and Paul J. Yakoboski. 2021. "Building up Financial Literacy and Financial Resilience." *Mind & Society* 20 (2): 181–87. https://doi.org/10.1007/s11299-020-00246-0.

Lusardi, Annamaria, Pierre-Carl Michaud, and Olivia S. Mitchell. 2017. "Optimal Financial Knowledge and Wealth Inequality." *Journal of Political Economy* 125 (2): 431–77. https://doi.org/10.1086/690950.

Lusardi, Annamaria, and Olivia S. Mitchell. 2011. "Financial Literacy and Retirement Planning in the United States*." *Journal of Pension Economics & Finance* 10 (4): 509–25. https://doi.org/10.1017/S147474721100045X.

———. 2014. "The Economic Importance of Financial Literacy: Theory and Evidence." *Journal of Economic Literature* 52 (1): 5–44. https://doi.org/10.1257/jel.52.1.5.

Lusardi, Annamaria, and Peter Tufano. 2015. "Debt Literacy, Financial Experiences, and Overindebtedness*." *Journal of Pension Economics & Finance* 14 (4): 332–68. https://doi.org/10.1017/S1474747215000232.

Melzer, Brian T. 2011. "The Real Costs of Credit Access: Evidence from the Payday Lending Market*." *The Quarterly Journal of Economics* 126 (1): 517–55. https://doi.org/10.1093/qje/qjq009.

Morduch, Jonathan, and Rachel Schneider. 2017. *The Financial Diaries: How American Families Cope in a World of Uncertainty*. Princeton University Press. https://nyuscholars.nyu.edu/en/publications/the-financial-diaries-how-american-families-cope-in-a-world-of-un.

Mottola, Gary, Gerri Walsh, Robert Ganem, Christine Kieffer, Annamaria Lusardi, James Gatz, Jeff Larrimore, Genevieve Melford, and Phillip Zepp. 2019. "The State of US Financial Capability: The 2018 National Financial Capability Study." *FINRA Investor Education Foundation*. https://www.usfinancialcapability.org/downloads/NFCS_2018_Report_Natl_Findings.pdf.

O'Neill, Barbara, and Jing Jian Xiao. 2011. "Financial Resiliency Before, During, and After the Great Recession: Results of an Online Study." *Journal of Consumer Education* 28. http://www.cefe.illinois.edu/JCE/archives/2011_vol_28/2011_vol_28_pg34-43_O'Neill%20and%20Xiao.pdf.

Pew Charitable Trusts. 2015. "The Precarious State of Family Balance Sheets." https://www.pewtrusts.org/~/media/Assets/2015/01/FSM_Balance_Sheet_Report.pdf.

Skiba, Paige Marta, and Jeremy Tobacman. 2019. "Do Payday Loans Cause Bankruptcy?" *The Journal of Law and Economics* 62 (3): 485–519. https://doi.org/10.1086/706201.

US Census Bureau. 2021. "COVID-19 Adds to Economic Hardship of Those Most Likely to Have Student Loans." Census.Gov. 2021. https://www.census.gov/library/stories/2021/08/student-debt-weighed-heavily-on-millions-even-before-pandemic.html.

Valdes, Olivia, Gary Mottola, and Stephen Armeli. 2021. "Bouncing Back? The Financial Resilience of Americans," 7.

Watkins, Marley W. 2018. "Exploratory Factor Analysis: A Guide to Best Practice." *Journal of Black Psychology* 44 (3): 219–46. https://doi.org/10.1177/0095798418771807.

Yakoboski, Paul, Annamaria Lusardi, and Andrea Hasler. 2021. "Financial Well-Being and Literacy in the Midst of a Pandemic: The 2021 TIAA Institute-GFLEC Personal Finance Index." GFLEC- George Washington University. https://gflec.org/wp-content/uploads/2021/04/2021-P-Fin-Index-report-TIAA-Institute-GFLEC-April-2021.pdf?x95812.

Appendix 1

National Financial Capability Survey (NFCS) items for the **11 variables** included in the factor analysis. Dummy variables were created for each question. Bolded letters indicate the responses coded as "1" in analyses. All observations indicating "Don't know" or "Prefer not to say" were omitted from the analyses.

1. Cannot come up with $2,000 in 30 days

How confident are you that you could come up with $2,000 if an unexpected need arose within the next month?

I am certain I could come up with the full $2,000 1

I could probably come up with $2,000.....2

I could probably not come up with $2,000 3

I am certain I could not come up with $2,000 4

Don't know 98

Prefer not to say.....99

2. Savings < 3 months of expenses

Have you set aside emergency or rainy day funds that would cover your expenses for 3 months, in case of sickness, job loss, economic downturn, or other emergencies?

Yes 1

No.....2

Don't know 98

Prefer not to say.....*99*

3. Difficulty covering all expenses and paying all bills

In a typical month, how difficult is it for you to cover your expenses and pay all your bills?

Very difficult*.....*1

Somewhat difficult*.....*2

Not at all difficult.....*3*

Don't know.....*98*

Prefer not to say.....*99*

4. Trouble making ends meet

Over the past year, would you say your [IF Q.A7a = 1 OR 2 INSERT: household's] spending was less than, more than, or about equal to your [IF Q.A7a = 1 OR 2 INSERT: household's] income? Please do not include the purchase of a new house or car, or other big investments you may have made.

*Spending **less** than income*.....*1*

Spending more than income*.....*2

*Spending about **equal** to income*.....*3*

Don't know.....*98*

Prefer not to say.....*99*

5. Not owning a home

Do you [IF Q.A7a = 1 OR 2 INSERT: or your [spouse/partner]] currently own your home?

Yes 1

No.....2

Don't know 98

Prefer not to say.....99

6. No retirement account

Do you [IF Q.A7a = 1 OR 2 INSERT: or your [spouse/partner]] have any retirement plans through a current or previous employer, like a pension plan [IF Q.X3 = 2 INSERT: , a Thrift Savings Plan (TSP),] or a 401(k)?

Yes 1

No.....2

Don't know 98

Prefer not to say.....99

AND

Do you [IF Q.A7a = 1 OR 2 INSERT: or your [spouse/partner]] have any other retirement accounts NOT through an employer, like an IRA, Keogh, SEP, or any other type of retirement account that you have set up yourself?

Yes 1

No.....2

Don't know 98

Prefer not to say.....99

7. Too much debt

How strongly do you agree or disagree with the following statement?

Please give your answer on a scale of 1 to 7, where 1 = "Strongly Disagree," 7 = "Strongly Agree," and 4 = "Neither Agree Nor Disagree". You can use any number from 1 to 7.

	Strongly Disagree	2	3	Neither Agree nor Disagree	5	6	Strongly Agree	Don't Know	Prefer not to Say
I have too much debt right now	1	2	3	4	**5**	**6**	**7**	98	99

8. Expensive credit card uses

In the <u>past 12 months</u>, which of the following describes your experience with credit cards? (Select an answer for each)

	Yes	No	Don't Know	Prefer not to Say
In some months, I paid the minimum payment only	**1**	2	98	99
In some months, I was charged a late fee for late payment	**1**	2	98	99
In some months, I was charged an over the limit fee for exceeding my credit line	**1**	2	98	99
In some months, I used the cards for a cash advance	**1**	2	98	99

Composite dummy variable that shows a 1 if at least one expensive credit card behavior (as shown above in the list) has been used in the past 12 months.

9. Use of alternative financial services

In the <u>past 5 years</u>, how many times have you… (Select an answer for each)

	Never	1 time	2 times	3 times	4 or more times	Don't Know	Prefer not to Say
Taken out an auto title loan? Auto title loans are loans where a car title is used to borrow money for a short period of time. They are NOT loans used to purchase an automobile.	1	**2**	**3**	**4**	**5**	98	99
Taken out a short term "payday" loan?	1	**2**	**3**	**4**	**5**	98	99
Used a pawn shop?	1	**2**	**3**	**4**	**5**	98	99
Used a rent-to-own store?	1	**2**	**3**	**4**	**5**	98	99

Composite dummy variable that takes on the value of 1 if at least one form of AFS was used in the past 5 years.

10. Low financial literacy – "Big Three" not answered correctly

Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

More than $102.....1

Exactly $102.....2

Less than $102.....3

Don't know.....98

Prefer not to say.....99

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

More than today ***.....1***

Exactly the same ***.....2***

Less than today 3

Don't know 98

Prefer not to say 99

Buying a single company's stock usually provides a safer return than a stock mutual fund.

True ***.....1***

False 2

Don't know 98

Prefer not to say 99

Coded as "yes" if all Big Three financial literacy questions not answered correctly (indicated by bolded text).

11. Not covered by health insurance

Are you covered by health insurance?

Yes 1

No ***.....2***

Don't know 98

Prefer not to say 99

Appendix 2. Technical Notes for the Factor Analysis

We apply an exploratory factor analysis (EFA) on the responses to 11 questions on financial decision making, outcomes, and knowledge using STATA. Several of these questions may share the same underlying latent or unobserved factors. Thus, factor analysis is used to conceptualize the relationships of multiple indicators of latent variables in a causal modeling framework in which a factor model is assumed for the relationships between latent variables and their indicators. Specifically, each observed variable is a linear function of a set of latent factors and a residual variable, which contains variation specific to that particular variable and a random measurement error.

The first step is to calculate eigenvalues. The eigenvalue measures the amount of variance that a factor explains in the observed variables. A factor with an eigenvalue greater than one explains more variance than a single observed variable. Thus, this common factor is thought to be responsible for covariation among the variables. Covariation among the variables is greater when the different variables measure the same factor and lower when the unique part of the variables dominates. A factor must have an eigenvalue greater than zero to be retained. In practice, researchers use both eigenvalue and their domain knowledge and intuition to decide on the most appropriate number of factors that they will retain. In the present study, the first three factors have significantly higher eigenvalues. Moreover, each of the first three factors represents a specific dimension in financial resilience/vulnerability. Factor 1 represents cash flow and debt management, factor 2 represents wealth building and planning, and factor 3 represents the

understanding of financial risks and financial knowledge. Thus, we retain the first three factors in the paper.

Next, factor loadings express the relationship of each variable to the underlying factor. Factor loadings can be interpreted like standardized regression coefficients (in the case of uncorrelated factors these loadings equal the correlations of the variables with the factors). The loadings provide a basis for interpreting the factors in the model, because factors obtain their meaning from the variables to which they are linked and vice versa.

Additionally, the uniqueness measures the percentage of a variable's variance that is not explained by the common factors. Uniqueness can be a result of pure measurement error or it can represent something that is measured reliably in that variable, but not by any of the others. The greater the uniqueness, the more likely that it is due to more than just measurement error (values greater than 0.6 are usually considered high). If the uniqueness is high, then the variable is not well explained by the factors.

For this analysis, we used oblique rotation, which assumes that factors are not independent and are correlated, as well as Kaiser normalization, which is a method to obtain stability of solutions across samples. For more detail on factor analysis, please see Watkins (2018).

Table A2.1: Eigenvalues for Financial Vulnerability Factors

Factors	**Eigenvalue**
Factor 1	4.5716
Factor 2	0.6936
Factor 3	0.5293
Factor 4	0.0953
Factor 5	0.0368
Factor 6	-0.0474
Factor 7	-0.0851
Factor 8	-0.1265

Factor 9	-0.1435
Factor 10	-0.1473
Factor 11	-0.1988

Notes: Data are from the 2018 NFCS. National weights are used.

Table A2.2.: Rotated Factors

Factors	**Variance**
Factor 1	3.6147
Factor 2	3.0951
Factor 3	3.0003
Factor 4	2.0524
Factor 5	0.8808

Notes: Data are from the 2018 NFCS. National weights are used.

Table A2.3.: Rotated Factor Loadings

Variables	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Uniqueness**
Cannot come up with $2,000 in 30 days	0.2681	0.3005	0.1994	0.0804	0.3423	0.2979
Savings < 3 months of expenses	0.2380	0.4899	-0.0524	0.2414	0.2148	0.2810
Difficulty covering all expenses and paying all bills	0.6578	0.0935	0.1156	0.0328	0.1328	0.2965
Trouble making ends meet	0.6747	-0.0214	-0.0214	-0.0062	-0.0394	0.5849
Not owning a home	-0.0264	0.5107	0.1362	0.0062	0.0527	0.6280
No retirement account	0.0007	0.6855	-0.0843	0.0386	0.0737	0.5359
Too much debt	0.4257	0.0244	0.1174	0.3645	0.0112	0.3499
Expensive credit card use	0.1612	0.0430	0.5115	0.3404	-0.0175	0.3010
Use of alternative financial services	0.1042	-0.0395	0.6685	0.0533	-0.1150	0.4501
Low financial literacy – Big Three not answered correctly	-0.0284	0.1071	0.5507	-0.0498	0.0948	0.6375
Not covered by health insurance	0.0593	0.4418	0.1410	-0.0762	-0.1578	0.7106

Notes: Data are from the 2018 NFCS. National weights are used.

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