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**Working Paper**

## The Economics of Financial Stress

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DISCUSSION PAPER SERIES

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JULY 2023

## DISCUSSION PAPER SERIES

IZA DP No. 16318

# The Economics of Financial Stress

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## ABSTRACT

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### The Economics of Financial Stress\*

We study the psychological costs of financial constraints and their economic consequences. Using a representative survey of U.S. households, we document the prevalence of financial stress in U.S. households and a strong relationship between financial stress and measures of financial constraints. We incorporate financial stress into an otherwise standard dynamic model of consumption and labor supply. We emphasize two key results. First, a psychology-based theory of poverty traps requires two equally important components: financial stress itself and naivete about financial stress. Specifically, sophisticates save enough to escape high-stress states, because they understand that doing so alleviates the economic consequences of financial stress. On the other hand, naifs dis-save, fall into a poverty trap, and incur high welfare losses. Second, the financial stress channel can reverse the counterfactual negative wealth effect on labor supply because relieving stress frees up cognitive resources for productive work. Financial stress also has macroeconomic implications on wealth inequality and fiscal multipliers.

**JEL Classification:** E7, G5

**Keywords:** household finance, survey, stress, behavioral economics

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# 1 Introduction

Financial constraints are a painful reminder that our wishes are limited by our means. Finding ways to reduce the pain from stressful tradeoffs is the bread and butter of economics. And yet, financial stress, the number one source of stress for Americans ([American Psychological Association, 2022a](#)), is not a key object for macroeconomics and household finance.<sup>1</sup> Although the traditional approach does concentrate on financial constraints as a pervasive limiting factor for consumption smoothing and portfolio allocations, stress itself is out of the picture. This status quo is striking, given that behavioral economics has underscored a wide spectrum of negative effects stemming from financial stress. For example, [Mani et al. \(2013\)](#) and [Mullainathan and Shafir \(2013\)](#) argue that financial stress leads to a “scarcity” of cognitive resources and pushes people into a state of tunneling (i.e., neglecting activities outside the “financial stress” tunnel). As a result, financially stressed individuals have difficulty focusing, perform poorly in economic tasks, and make poor decisions. These factors lead to significant economic consequences for labor supply and earnings, as well as consumption and saving decisions ([Haushofer and Fehr, 2014](#); [Ong, Theseira and Ng, 2019](#); [Lichand and Mani, 2020](#); [Banerjee et al., 2020](#); [Kaur et al., 2022](#)).<sup>2</sup>

To broaden the perspective and link behavioral and traditional takes on financial constraints, we develop a tractable theoretical model incorporating the psychological costs of financial constraints, i.e., financial stress. In this framework, financial stress not only has a direct effect on households’ utility but also influences their economic behavior. This behavioral impact is especially costly for those not sophisticated enough to make complex optimization decisions considering the impact of stress. Using our survey of U.S. households to discipline the model, we show that financial stress can significantly alter household consumption, saving, and labor supply decisions and lead to extra welfare costs. Together, our analysis sheds new light on the causes of wealth inequality and the impact of stimulus checks issued to households during the COVID-19 crisis and previous recessions.

In the first step, we conduct a large-scale survey targeting American prime-age workers to document a series of facts about financial stress. The survey is representative of the general population

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<sup>1</sup>According to Capital One CreditWise survey ([CNBC, 2021](#)), 73 percent of Americans rank finances as the No.1 stress in life. The post-COVID inflation makes things worse. [American Psychological Association \(2022a\)](#) shows that 87 percent of Americans are stressed about their finances in March 2022, the highest number in the history of APA’s Stress in America survey.

<sup>2</sup>Popular personal finance books also discuss financial stress and its impact extensively. For example, [Chilton \(1998, p.171\)](#) writes: “And, not only can excessive borrowing tap your cash flow, it can also cause stress.” [Olen and Pollack \(2016, p.21\)](#) add: “The harder it is to make it through to the next day financially – whatever the reason – the harder you will find it to make careful and disciplined decisions.” In a similar spirit, [The Washington Post \(2023\)](#) also emphasized the psychological toll of inflation: “US households are frustrated by how much more attention they must pay to these rising costs — attention that is itself costly.”

in terms of gender, age, region, total household income, and education. We introduce questions that help quantify the consequences of financial stress, a valuable contribution that provides a more direct mapping between data and theory. We find that the majority of survey respondents feel financially stressed (in line with [Yakoboski, Lusardi and Hasler, 2020](#) and [Hasler, Lusardi and Valdes, 2021](#)), and they suffer negative economic consequences from financial stress along a number of metrics. For example, survey respondents spend a median of 6 hours per week worrying about and dealing with issues related to household finances, draining valuable time and cognition from productive work. We also observe that measures of financial stress are strongly correlated with measures of whether households are at their financial constraints. Another innovation of our survey is to use hypothetical questions to elicit information about how respondents’ financial stress would change if they received additional money (e.g., a stimulus check).

Informed by the survey evidence and previous work (e.g., [Kaur et al., 2022](#)), we introduce financial stress into an otherwise standard dynamic model of consumption, labor supply, and wealth distribution ([Achdou et al., 2022](#)). The model has three novel features. First, financial stress enters our model by crowding out valuable cognitive resources and time. Second, financial stress decreases with the distance to financial constraints. Third, households’ degrees of sophistication versus naivete can vary ([O’Donoghue and Rabin, 1999, 2001](#)). We calibrate our model in different ways: based on our survey results and based on the evidence in [Kaur et al. \(2022\)](#).

We show that the sophistication-naivete dimension is a key determinant of how financial stress shapes household behavior. In our context, sophisticated households have a strong incentive to save to avoid future financial stress, because they understand that doing so alleviates future stress and its negative impact on productive labor and earnings. Because sophisticates save themselves out of high-stress states, financial stress leads to fewer households at financial constraints despite its negative direct effect on earnings. On the other hand, naive households (“naifs”) fail to internalize possible future financial stress and hence do not have this extra saving motive. Due to the negative direct effect of stress on productive labor and earnings, naifs save less and are pushed to financial constraints more often, resulting in a more dispersed wealth distribution.

The sophistication-naivete dimension is also crucial in determining the welfare costs of financial stress. For this purpose, we develop a money-metric measure of the welfare costs of financial stress. We find that the welfare costs of naifs’ financial stress are an order of magnitude larger than the costs of sophisticates’ financial stress, as naifs may become persistently trapped in the state of financial stress. Together, our results mean that a psychology-based theory of poverty traps ([Mullainathan and Shafir, 2013](#)) requires two key important ingredients: financial stress itself and naivete about financial stress.

The financial stress channel can also reverse the counterfactual large negative wealth effect on

labor supply in benchmark models (Cesarini et al., 2017; Auclert, Bardóczy and Rognlie, 2021). Relieving financial stress frees up cognitive resources for productive work, and increases labor supply and earnings. Financial stress thus brings the wealth effect on labor supply in the model closer to its empirical counterpart in Cesarini et al. (2017), Banerjee et al. (2020) and Kaur et al. (2022). This channel is particularly strong for naifs close to financial constraints. A corollary of the positive wealth effect on labor supply for stressed households is a new transmission mechanism for fiscal policy: lump-sum fiscal transfers can relieve financial stress, increase labor supply, and boost aggregate output. This channel breaks the Ricardian Equivalence and provides a new rationale for using fiscal transfers to stimulate the economy.

Our baseline approach focuses on the impact of financial stress on cognitive resources and time available for productive labor, since it is the most studied and documented channel in the behavioral literature (Banerjee et al., 2020; Kaur et al., 2022). But financial stress can matter through other channels: direct utility costs, quality of economic decisions (Mani et al., 2013; Haushofer and Fehr, 2014), impulsive spending to alleviate the stress (e.g., “stress spending” documented in Credit Karma, 2017), and a lower probability of promotion (and a higher probability of demotion) because stress impacts performance. In a series of extensions, we modify our model to accommodate these alternatives. We find that the main insight on how sophistication versus naivete about financial stress affects household behavior is robust to alternative channels of financial stress.

We contribute to several strands of research. First, our paper builds upon and contributes to the literature about the psychology of poverty and scarcity (e.g., Banerjee and Mullainathan, 2008; Mani et al., 2013; Mullainathan and Shafir, 2013; Haushofer and Fehr, 2014; Schilbach, Schofield and Mullainathan, 2016). Relative to the earlier work, we focus on the US rather than a developing country. In addition, we build a tractable intertemporal model of financial stress that can be used to study consumption and saving decisions, labor supply, and wealth distribution. We also emphasize the important role of sophistication versus naivete in determining the economic impact of financial stress.

In this literature, particularly relevant for us is the evidence on how financial stress negatively impacts productive labor and earnings. Directly relevant is Kaur et al. (2022), who stagger when wages of Indian manufacturing workers are paid out. Some workers are paid earlier, while others are paid later, remaining liquidity constrained. In other words, they vary the *timing* of wage payments without affecting the total. They find that early wage payment reduces workers’ financial stress, and these less stressed workers become more productive at work. The output and earnings of earlier-paid workers increase by an average of 7 percent, and by 13 percent for the most stressed households. The authors report additional evidence suggesting that the increase comes from improved cognition: earlier-paid workers make fewer costly mistakes and become more atten-

tive. Banerjee et al. (2020) and Fink, Jack and Masiye (2020) find similar evidence that relaxing financial constraints increases workers’ productive labor supply and earnings.<sup>3/4</sup>

Second, our paper also contributes to the theoretical literature on poverty traps. Galor and Zeira (1993) and Banerjee and Newman (1993) emphasize the role of credit market imperfections and occupational choices. Dasgupta and Ray (1986, 1987) emphasize the role of nutrition. Banerjee and Mullainathan (2010) and Bernheim, Ray and Yeltekin (2015) emphasize the role of present bias and temptation. Our paper advances this line of work in three ways. First, we provide a theory of poverty traps due to the scarcity of cognition. Second, we introduce the endogenous saving choice margin, which is absent in the classical theory of poverty traps (Dasgupta and Ray, 1986, 1987). We show that this margin is crucial in determining the conditions for poverty traps and reveals the important role of naivete in theories of poverty traps. Third, we make the model tractable enough to directly connect to the large literature on intertemporal choices and wealth distribution. Related and complementary to our work, Thakral and Tô (2020) provide an alternative psychology-based theory of poverty traps, demonstrating that consumers may lack the motivation to save because they are aware that their future selves will spend wastefully. Also related is Dalton, Ghosal and Mani (2016), who focus on the role of reference dependence and aspirations in a different psychology-based theory of poverty traps.

Financial stress differs from present bias (e.g., Laibson, 1997). Present bias per se does not generate psychological costs of financial constraints: the costs of financial constraints still take the traditional form of imperfect consumption smoothing. By the same token, present bias cannot overturn the negative wealth effect on labor supply. In terms of wealth distribution, present bias coupled with naivete can generate a large number of financially constrained households. But present bias pushes all households toward lower saving, while the effect of financial stress is wealth-dependent: financial stress has a smaller impact on wealthy households.

## 2 Survey Design and Results

We first introduce our large-scale survey of US households. We document that most survey respondents feel financially stressed, and measures of financial stress are strongly correlated with whether households are financially constrained.

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<sup>3</sup>Fehr, Fink and Jack (2022) provide empirical evidence that being financially constrained can improve household decision-making in certain areas, e.g., reducing exchange asymmetries. However, consistent with the channel we focus on, Fink, Jack and Masiye (2020) find that being financially constrained lowers households’ productive labor supply and earnings, using the same empirical setting conditions as in Fehr, Fink and Jack (2022).

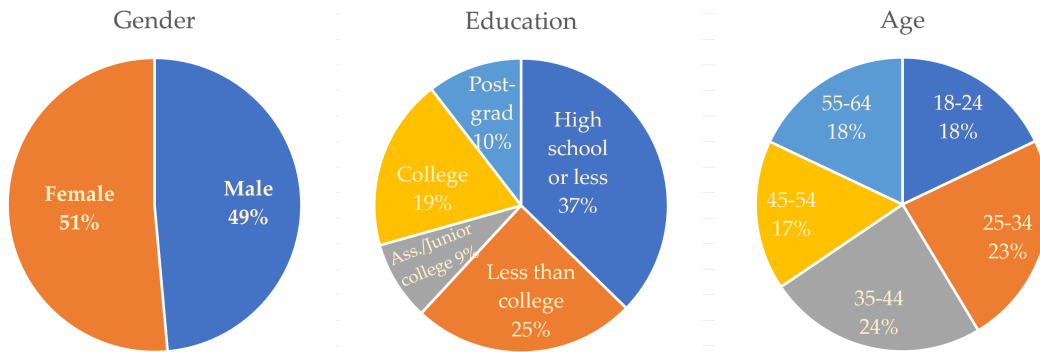
<sup>4</sup>In the United States, Maturana and Nickerson (2020) and Bernstein, McQuade and Townsend (2021) find that financial stress negatively affects workers’ productive labor supply. Dobbie and Song (2015) find that debt relief through personal bankruptcy increases earnings.



## 2.1 The Survey Sample and Structure

Our survey has a sample of 10,000 respondents who are prime-age, employed US workers.<sup>5</sup> The sample is representative of the US population in terms of gender, age, region, total household income, and education. We collected the data in April and May 2022 in collaboration with Dynata, an online panel provider commonly used in economics (Andre et al., 2022). Respondents start the survey by completing a series of demographic questions. Then, they answer our key questions regarding financial stress and how it affects their economic lives. To obtain high-quality responses, the survey is relatively short. It has 21 questions and can be finished under 10 minutes. Dynata pays respondents (roughly minimum wage) to complete the survey.

**Figure 1:** Sample Characteristics: Demographics



Notes: The pie charts represent the sample characteristics based on the full sample of our survey.

Figure 1 and Table 1 present the summary statistics of the respondents' characteristics and Table B.1 shows that the demographic characteristics in our sample are close to those in the 2019 American Community Survey. Appendix F contains the full survey questionnaire.<sup>6</sup>

## 2.2 The Prevalence of Financial Stress

We start with a qualitative measure of financial stress. We elicit the degree of financial stress on a 1 (not concerned) to 10 (extremely concerned) scale using the following question:

<sup>5</sup>This paper focuses on how financial stress affects employed workers. But financial stress could also affect the search behavior of unemployed workers. For example, it has the potential to reconcile the theoretical prediction that unemployment benefits should decrease job search efforts and the empirical evidence that the COVID-19 stimulus payments and unemployment benefits had small effects on job search efforts and sometimes made the unemployed search for jobs more intensively (Coibion, Gorodnichenko and Weber, 2020; Ganong et al., 2022).

<sup>6</sup>We also incorporate an attention check in the survey. In the main text, we focus on the full sample because our sampling procedure is designed so that the demographics of the full sample match the demographics of the general population. In Appendix C, we report all analyses for the restricted sample of respondents who pass the attention check. The results are similar to the full sample.

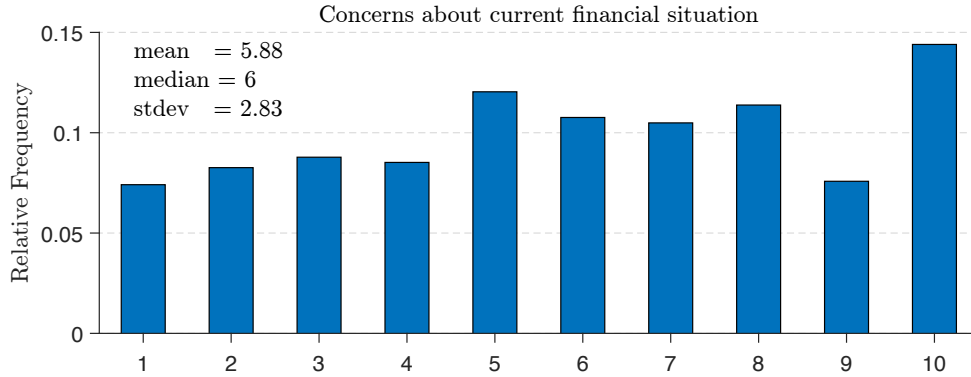
**Table 1:** Sample Characteristics: Household Size, Income, and Wealth

	Obs	Mean	Median	Std	Min	Max	q25	q75
Household size	9,992	3.42	3	1.78	1	14	2	4
Annual income	10,000	62,432	45,000	61,692	5,000	600,000	25,000	75,000
Net financial assets	9,959	66,791	5,000	219,362	-55,000	1,100,000	-45,000	45,000

Notes: The table shows the sample characteristics based on the full sample of our survey. The number of observations does not always equal to 10,000 because respondents can skip questions. To compute the statistics for the income and assets questions, we use the midpoints of the intervals chosen by the respondents (see questions Q4 and Q11 in Appendix F). For the open intervals “\$500,000 or more,” “-\$50,000 or less,” and “\$1,000,000 or more,” we use \$550,000, -\$55,000, and \$1,100,000, respectively, to compute summary statistics.

*Q12: On a scale from 1 to 10, how concerned are you about your current financial situation? 1 represents the lowest level of concern, and 10 represents the highest level of concern.*

The majority of survey respondents feel a nontrivial degree of financial stress. Figure 2 shows the distribution. Approximately 15 percent of respondents are extremely concerned, and only 7 percent are not concerned. The median answer is 6. These results suggest that most respondents are concerned about their finances.<sup>7</sup>

**Figure 2:** Qualitative Measure of Financial Stress

Notes: The figure shows the histogram of the answers to question Q12 of the survey.

To explore whether financial stress is correlated with financial constraints, we ask the respondents the following question:<sup>8</sup>

*Q9: If your household experienced an unexpected emergency, would you need to borrow money in order to pay for a \$2,000 expense?*

<sup>7</sup>This result is consistent with Hasler, Lusardi and Valdes (2021). Based on qualitative measures in a national representative survey conducted in 2018, they find that 53% of U.S. adults indicated that thinking about their finances makes them anxious and 44% indicated that discussing their finances is stressful.

<sup>8</sup>The question we use is based on Lusardi, Schneider and Tufano (2011) and Clark, Lusardi and Mitchell (2021), and it is shown to be a good indicator of whether households are financially constrained.

The respondents can choose from “no need to borrow,” “need to borrow,” and “cannot pay.” Approximately 9.8 percent of households in our sample are severely financially constrained (“cannot pay”). Approximately 44.0 percent of households are somewhat constrained (“need to borrow”). The rest, 46.2 percent of households, are unconstrained.

We find that financial stress is strongly correlated with being financially constrained. Specifically, we regress the qualitative measure of stress Q12 on the indicator variables corresponding to the three answers to question Q9 above. The results are in column (1) of Table 3. On average, the respondents who “cannot pay” the emergency expense have a stress level of 7.4, stress declines to 6.8 for those who “need to borrow,” and to 4.7 for those who “do not need to borrow.” These results suggest that financial stress is related to financial constraints.

To further explore factors associated with financial stress, we introduce several demographic controls (age, sex, educational attainment, etc.), as well as household income and net financial assets, into the regression of financial stress on measures of financial constraints (column (2) of Table 3). The coefficients on measures of financial constraints (Q9) remain roughly unchanged. In addition, we observe that financial stress declines with income and net financial assets. Financial stress has a clear inverted-U age profile with a peak at approximately 50 years. Women are more stressed than men. Financial stress exhibits a nonlinear relationship with educational attainment. Having children in the household and being married are associated with more stress.

## 2.3 Consequences of Financial Stress and the Role of Financial Constraints

As discussed in the introduction and documented in the behavioral-development literature, financial stress can drain valuable time and cognitive resources and incur negative economic consequences. For example, in a recent Stress in America Survey ([American Psychological Association, 2022b](#)), 37% of US adults reported that when they are stressed, they cannot bring themselves to do anything. To quantify this impact, we ask respondents two questions:

*Q17a-Q17b: Over the past week, how many working hours were you distracted by your financial concerns?*

*Q17c: Over the past week, how many hours did you spend thinking about and dealing with issues related to your household’s finances?*

The first question is motivated directly by the evidence from [Kaur et al. \(2022\)](#). The second question is a broader measure of the impact of financial stress and is motivated by [Yakoboski, Lusardi and Hasler \(2020\)](#). Note that the survey randomizes which of the two questions is given to a respondent. The first question is given to 75 percent of the sample, while the rest of the sample

answers the second question. We cap the possible responses at 20 hours to minimize measurement errors.

**Table 2:** Quantitative Measures of the Consequences of Financial Stress

	Obs	Mean	Median	Std	Min	Max	q25	q75
Hours worked	9,991	39.6	40	15.0	0	100	31	45
Working hours distracted	7,428	6.4	5	6.1	0	20	1	10
Hours on financial issues	2,517	7.7	6	5.9	0	20	3	11
Stress spending	9,979	211.2	100	265.3	0	1000	25	300

Notes: “Hours worked” represent the answers to the question Q16: “How many hours do you typically work in a week these days?”, “Working hours distracted” to the question Q17a, “Hours on financial issues” to the question Q17b, and “Stress spending” to question Q20.

Table 2 shows that the respondents spend a sizable number of hours being distracted by financial issues or dealing with them. Specifically, for the working-hours-distracted (Q17a-Q17b) question, the average distraction is 6.4 hours per week (median is 5 hours per week). For the question about hours spent on financial issues (Q17c), the average is higher and it equals 7.7 hours (median is 6 hours per week). This magnitude is consistent with the TIAA Institute-GFLEC Personal Finance Index survey. In their 2020 Report, [Yakoboski, Lusardi and Hasler \(2020\)](#) report that survey respondents spend an average of 6.7 hours per week thinking about and dealing with financial issues.<sup>9</sup>

Table 4 shows that distracted hours at work and hours spent on financial issues are strongly associated with the qualitative measure of financial stress (Q12). A one unit increase in the qualitative measure of stress predicts an increase in distracted hours at work and hours spent on financial issues by approximately one hour (columns (1) and (3) of the table). This magnitude does not change if we control for demographic characteristics (columns (2) and (4) of the table).

Similarly to the qualitative measure of financial stress, whether the household is financially constrained is a strong predictor of distracted hours at work and hours spent on financial issues (columns (3)-(6) of Table 3). The respondents who “cannot pay” the emergency expense report a weekly average of 9.6 hours distracted at work and 10.1 hours spent on financial issues. The respondents who “need to borrow” report a weekly average of 8.2 hours distracted at work and 9.3 hours spent on financial issues. The respondents who “do not need to borrow” report a weekly average of 4.1 hours distracted at work and 5.6 hours spent on financial issues. The magnitudes do not change much if we control for demographic characteristics (columns (4) and (6) of the table).

<sup>9</sup>To compute this average, we use Figure 3 (the distribution of the financial literacy index) and Figure 17 (average hours per week thinking about and dealing with issues by financial literacy index) in [Yakoboski, Lusardi and Hasler \(2020\)](#).

**Table 3:** Predictors of Financial Stress.

	Qual. measure of stress		Working hours distracted		Hours on fin. issues	
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Constraint (omitted: Intercept)						
Cannot pay	7.417*** (0.083)	7.323*** (0.106)	9.592*** (0.214)	8.934*** (0.272)	10.116*** (0.348)	9.839*** (0.451)
Need to borrow	6.831*** (0.039)	6.717*** (0.077)	8.218*** (0.1)	7.380*** (0.198)	9.278*** (0.167)	8.945*** (0.333)
No need to borrow	4.654*** (0.038)	4.794*** (0.079)	4.104*** (0.097)	3.902*** (0.202)	5.584*** (0.165)	5.890*** (0.345)
Controls						
Income		-0.075* (0.033)		-0.207 (0.087)		0.105 (0.141)
Net financial assets		-0.114*** (0.009)		-0.127*** (0.023)		-0.127** (0.039)
Non-primary earner		-0.497*** (0.082)		-0.687** (0.21)		-1.35*** (0.352)
Age		0.026*** (0.002)		-0.040*** (0.005)		-0.014 (0.009)
Age <sup>2</sup> /100		-0.111*** (0.017)		-0.235*** (0.044)		-0.339*** (0.075)
Female		0.212*** (0.052)		0.357** (0.134)		0.515* (0.225)
Education (omitted: Some college)						
High school or less		-0.170** (0.062)		-0.003 (0.158)		0.002 (0.265)
College		-0.067 (0.076)		-0.261 (0.193)		-1.038** (0.333)
Post-graduate		0.159 (0.097)		0.292 (0.247)		-0.345 (0.422)
Married		0.131* (0.056)		0.394** (0.144)		0.158 (0.243)
Have at least one child		0.203*** (0.056)		0.697*** (0.142)		0.738** (0.241)
Have at least one parent		0.064 (0.052)		0.632*** (0.134)		0.710** (0.227)
Observations	9962	9924	7428	7369	2517	2513
R <sup>2</sup>	0.167	0.209	0.131	0.168	0.108	0.149

Notes: Robust standard errors in parentheses. Each regression omits an intercept because the first three dummy variables sum up to one. The income control is demeaned and divided by the mean, the net financial assets control is demeaned and divided by the mean income, and the age variable is demeaned. \* indicates  $p < 0.05$ , \*\* –  $p < 0.01$ , \*\*\* –  $p < 0.001$ .

**Table 4:** Consequences of Financial Stress

	Working hours distracted		Hours on financial issues	
	(1)	(2)	(3)	(4)
Qual. measure of stress	1.08*** (0.022)	1.06*** (0.022)	1.052*** (0.036)	1.004*** (0.036)
Controls				
Non-primary earner		-0.196 (0.195)		-1.050*** (0.320)
Age		-0.07*** (.005)		-0.040** (0.008)
Age <sup>2</sup> /100		-0.194*** (0.041)		-0.236*** (0.068)
Female		0.264* (0.123)		0.285 (0.204)
Education (omitted: Some college)				
High school or less		0.260 (0.145)		0.448 (0.24)
College		-0.745*** (0.173)		-0.905** (0.295)
Post-graduate		-0.379 (0.215)		-0.681 (0.363)
Married		0.155 (0.130)		-0.140 (0.219)
Have at least one child		0.436*** (0.131)		0.825*** (0.219)
Have at least one parent		0.604*** (0.124)		0.615** (0.207)
Intercept	✓	✓	✓	✓
Observations	7408	7408	2511	2511
R <sup>2</sup>	0.250	0.289	0.254	0.290

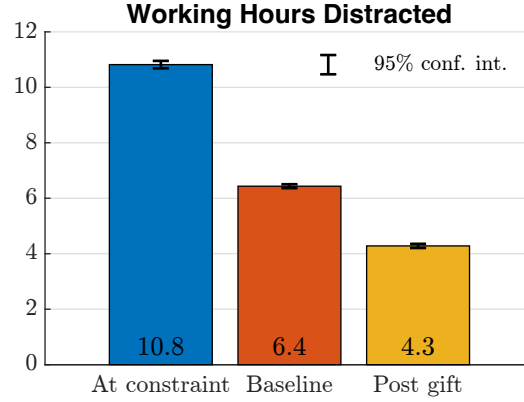
Notes: Robust standard errors in parentheses. The income control is demeaned and divided by the mean, the assets control is demeaned and divided by the mean income, and the age variable is demeaned. \* indicates  $p < 0.05$ , \*\* –  $p < 0.01$ , \*\*\* –  $p < 0.001$ .

To further gauge the relationship between financial stress and distance to financial constraints, we ask two hypothetical questions.

*Q19a: Now, I want you to imagine that your household's financial situation becomes worse, and you would struggle to quickly raise any additional money in the case of an emergency (for example, bank accounts have been depleted and credit cards are maxed out). In this alternate scenario, how many working hours would you have been distracted by your financial stress over the course of a week?*

*Q19b: Now, I want you to imagine that you were gifted \$2,000 at the start of last week. In this alternate scenario where you started the week with \$2,000 more money, how many working hours would you have been distracted by your financial stress?*

**Figure 3:** Financial Stress and Distance to Financial Constraints



Notes: The histogram presents averages of distracted hours at work in a hypothetical scenario where the household has no assets to cover an emergency (question Q19a of our survey), the baseline level of distracted hours at work (questions Q17a and Q17b of our survey), distracted hours at work in a hypothetical scenario where the household receives a gift of \$2,000 (question Q19b of our survey).

The first question aims to quantify the number of distracted hours at financial constraints. The second question aims to quantify how a \$2,000 transfer can alleviate the impact of financial stress on distracted hours. These two statistics will inform our model calibration later. The magnitude of the transfer (\$2,000) mimics the stimulus checks received by U.S. households during the COVID-19 crisis.

We summarize the results in Figure 3. On average, respondents report that they would be distracted for 10.8 hours (Q19a) per week at financial constraints. Reassuringly, this number based on hypothetical questions is consistent with the average distracted hours reported by the “cannot pay” group in Table 3. A \$2,000 gift check, on average, would reduce the distracted hours by 2.2 hours per week from 6.4 hours (Q17a-Q17b) to 4.3 hours (Q19b), with the difference being precisely estimated. These answers corroborate that financial stress decreases with the distance to financial constraints and help calibrate our model below.

To further assess the effects of stress, we elicit the impact of financial stress on spending:

*Q20: How much money do you typically spend per week in order to alleviate the stress driven by your financial concerns, which you would not spend if you were not financially stressed?*

As documented in [Credit Karma \(2017\)](#), impulsive spending can be a way to alleviate financial stress for some people. This question helps us to quantify the significance of this channel. Such stress spending is fairly significant in our sample (Table 2): on average, \$211 per week with a median of \$100 per week.<sup>10</sup> Like working hours distracted and hours spent on financial issues, impulse

<sup>10</sup>To put these magnitudes into perspective, we note that a pack of cigarettes (a common way to relieve stress) costs about \$10 in many states, and households in the two lowest income quintiles spend on average \$56 per month on lottery tickets in 2019 according to the [Consumer Expenditure Survey](#).

spending increases with the qualitative measure of financial stress. In our sample, an additional unit of financial stress (Q12) is associated with a \$7-\$8 increase in impulse spending. This pattern suggests that the negative economic consequences of financial stress go beyond draining cognition and time.

Together, the survey results suggest that the impact of financial stress is significant. Financial stress drains valuable time and cognition from productive work, and is strongly correlated with whether households are financially constrained. The findings are not sensitive to the exact wording of questions.

### 3 A Tractable Model of Financial Stress

In this section, we tractably incorporate financial stress into an otherwise standard model of intertemporal decision and wealth distribution. Motivated by our survey results, and the results in [Kaur et al. \(2022\)](#) and [Banerjee et al. \(2020\)](#), the model has three key features. First, financial stress enters our model by draining valuable cognitive resources and time from productive work. Second, financial stress decreases with the distance to financial constraints. Third, households' sophistication versus naivete about financial stress can vary. We calibrate our model based on the survey response and the evidence in [Kaur et al. \(2022\)](#). We also illustrate how our modeling approach can be easily applied to other channels of financial stress.

#### 3.1 Setup and Interpretations

Our model builds upon the standard continuous-time heterogenous-agent model in [Achdou et al. \(2022\)](#). Households are infinitely lived with the subjective discount rate  $\rho$ , and the flow utility function

$$u(c_t, \ell_t; \Theta(a_t)) = \frac{c_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{(\ell_t + \Theta(a_t))^{1+\frac{1}{v}}}{1+\frac{1}{v}}, \quad (1)$$

where  $c_t$  is consumption at instant  $t$ ,  $\ell_t$  is productive labor supply at  $t$ ,  $\sigma$  and  $v$  determine the intertemporal elasticity of substitution and the Frisch elasticity of labor supply, and the non-standard element  $\Theta(a_t) > 0$  captures the amount of cognition and/or time drained by finance-related issues at instant  $t$  (as a function of current net financial assets  $a_t$ ). Compared to classical theories of poverty traps (e.g., [Dasgupta and Ray, 1986, 1987](#)), we introduce an endogenous saving choice and show that it plays a crucial role in determining the conditions for poverty traps.

One interpretation of (1) is that the household's cognition/time budget can be allocated to three purposes: productive labor, leisure, and worrying about and dealing with financial issues. Financial stress  $\Theta(a_t)$  in (1) captures how finance-related issues crowd out cognition/time avail-



able for productive labor and leisure. It includes the psychological costs of financial constraints, our focus here. It could also encompass more broadly non-psychological time costs associated with being financially constrained, e.g., longer commutes due to reliance on public transportation and more time spent on childcare due to the inability to afford daycare. The cognition/time budget interpretation also explains why the impact of financial stress takes an additive form in (1). However, this is not crucial for the main economic lessons, as explained in Section 4.1 for the case where the impact of financial stress takes the form of a multiplicative productivity loss.

Consistent with our survey evidence and the evidence in Kaur et al. (2022), a household's financial stress  $\Theta(a_t)$  is assumed to be a decreasing function of net financial assets  $a_t$ . In addition, we assume that this function is continuously differentiable. When we calibrate the model, we use an exponential stress function (12). However, the exact functional form of financial stress is unimportant and alternative functional forms are explored in Section 4.1.

Here, we treat the financial stress function  $\Theta(\cdot)$  as exogenous. This maps to the *involuntary* capture of attention view in Mullainathan and Shafir (2013) and Kaur et al. (2022), the prevalent view in the scarcity literature. That is, financial stress captures cognitive resources automatically. Households close to financial constraints involuntarily worry about their finance and they cannot consciously control this worry. However, the benchmark model with exogenous  $\Theta(\cdot)$  is in fact equivalent to a model with *voluntary* capture of attention akin to rational inattention. That is, the amount of cognitive resources devoted to alleviate financial stress  $\Theta(\cdot)$  is chosen endogenously. Proposition 4 below formally states this result.

The household can borrow and save through a risk-free asset. Its budget constraint is given by

$$\dot{a}_t = ra_t - c_t + wz_t\ell_t \quad (2)$$

and is subject to the financial constraint

$$a_t \geq \underline{a}, \quad (3)$$

where  $w$  is the wage (treated as a constant),  $r$  is the interest rate,  $z_t$  is idiosyncratic productivity following a two-state Poisson process with support where  $z_1 < z_2$  and transition intensity  $\lambda$ , and  $\underline{a}$  represents the lower bound of net financial assets. Stochastic idiosyncratic productivity is introduced so there is a meaningful stationary wealth distribution.<sup>11</sup> We start from the partial equilibrium case with exogenous  $r$  but will report the results with endogenous  $r$  à la Huggett (1993) in Section 4.1. In our calibration, we focus on the case where  $r < \rho$  so that a stationary wealth distribution exists.

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<sup>11</sup>The two-state process follows Achdou et al. (2022) and is used for simplicity.

**Alternative channels of financial stress.** We model financial stress through its impact on time/cognition available for productive work, because this channel receives the most attention and support in the existing behavioral development literature. It is also consistent with our survey evidence and easy to calibrate.

But our modeling approach can be easily applied to alternative channels of financial stress, which we explore in depth in Section 4.1. First, financial stress can lead to direct utility costs. That is, the flow utility in (1) becomes

$$u(c_t, \ell_t) - U^\Theta(a_t),$$

where  $U^\Theta(a_t)$  captures the direct utility costs of financial stress, again decreasing in net financial assets. This channel is a psychological foundation of wealth in the utility function commonly used in macroeconomics (Straub, 2019; Mian, Straub and Sufi, 2021; Michaillat and Saez, 2021).<sup>12</sup>

Second, as our survey question Q20 suggested, to alleviate financial stress, the household may spend on items that it would not buy if it were not financially stressed. In this case, the budget (2) becomes

$$\dot{a}_t = ra_t - c_t - C^\Theta(a_t) + wz_t\ell_t,$$

where  $C^\Theta(a_t)$  captures this type of stressed spending, which does not directly enter the utility.

Third, instead of directly affecting labor earnings, financial stress can impact the transition intensity  $\lambda(a_t)$  between different idiosyncratic income states  $z_1$  and  $z_2$ . That is,  $\lambda(a_t)$  can depend on  $a_t$  in such a way that a financially stressed household is more likely to transition to the low-income state  $z_1$  and less likely to transition to the high-income state  $z_2$ . This case can capture salaried workers well. For example, because financial stress affects her performance, a stressed worker may face a lower chance of being promoted to a higher-salary job and a higher chance of being demoted to a lower-salary job.

Fourth, financial stress can also lead to worse economic decisions (Mani et al., 2013; Mullainathan and Shafir, 2013; Haushofer and Fehr, 2014; Kansikas, Mani and Niehaus, 2023). In the environment here and as further explained in Section 4.1, we can introduce this channel by allowing financial stress to impact households' probability of being sophisticated, which affects the quality of consumption and saving decisions.

The main insight on how sophistication versus naivete about financial stress affects household behavior remains. These additional channels are all temporarily shut down in the main analysis

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<sup>12</sup>Unlike the existing literature, our main specification examines how financial stress crowds out time and cognition available for productive labor. In the literature, the utility of wealth and the disutility of labor are instead treated as separable, with the wealth effect on labor supply remaining negative.

for clarity. One can hence view the impact of financial stress in our benchmark model as a lower bound of the total impact of financial stress.

### 3.2 Sophistication and the Extra Saving Motive

We start our analysis with the case of (full) sophistication.<sup>13</sup> The terms sophistication and its opposite, naivete, are standard in behavioral economics (O'Donoghue and Rabin, 1999, 2001). In the context of financial stress, sophisticates understand that financial stress crowds out future cognitive and time resources, which negatively impacts future productive labor supply and earnings. They understand that extra savings can alleviate future financial stress and its negative economic consequences.

Specifically, sophisticates choose consumption and labor to maximize the present value of (1)

$$\mathbb{E}_0 \left[ \int_0^{+\infty} e^{-\rho t} u(c_t, \ell_t; \Theta(a_t)) \right], \quad (4)$$

subject to the budget constraint (2), the financial constraint (3), and the process for  $z_t$ . We use  $v_j(a)$  to denote the optimal value of the objective (4) as a function of the initial asset  $a_0 = a$  and the initial productivity  $z_0 = z_j$  for  $j \in \{1, 2\}$ . The Hamilton-Jacobi-Bellman (HJB) equation of the problem is, for  $j \in \{1, 2\}$  and  $a \geq \underline{a}$ ,

$$\rho v_j(a) = \max_{c, \ell} \left\{ u(c, \ell; \Theta(a)) + (ra - c + wz_j \ell) v'_j(a) + \lambda(v_{-j}(a) - v_j(a)) \right\}, \quad (5)$$

where  $-j$  is the complement of  $j$ . That is, when  $j$  is 1, then  $-j$  is 2 and vice versa.

Sophisticates' consumption  $c_j(a)$  (and hence saving) solves (5) by trading off between the marginal utility of current consumption and the marginal value of saving. The latter takes into account its impact on stress. That is, additional saving alleviates future financial stress and its negative economic consequences. Formally,

$$c_j^{-\frac{1}{\sigma}}(a) = v'_j(a) \quad \text{for } j \in \{1, 2\} \quad \text{and } a > \underline{a} \quad (6)$$

The labor supply  $\ell_j(a)$  also solves (5). Financial stress  $\Theta(a)$  crowds out time and cognition from productive labor by increasing the marginal disutility of labor for each value of  $\ell_j(a)$ . Formally,

$$\varphi(\ell_j(a) + \Theta(a))^{\frac{1}{\psi}} = wz_j c_j^{-\frac{1}{\sigma}}(a) \quad \text{for } j \in \{1, 2\} \quad \text{and } a \geq \underline{a}. \quad (7)$$

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<sup>13</sup>In Appendix E.1, we also study the case of partial sophistication (O'Donoghue and Rabin, 2001), where households partially understand the impact of future financial stress.

The borrowing constraint (3) gives rise to the boundary condition:

$$v_j'(\underline{a}) \geq [wz_j(\ell_j(\underline{a}) - \Theta(\underline{a})) + r\underline{a}]^{-\frac{1}{\sigma}},$$

which guarantees that saving is non-negative at  $\underline{a}$  and the financial constraint is not violated (Achdou et al., 2022). Differentiating the HJB equation (5) with respect to  $a$  and using the consumption optimality (6), we obtain the modified Euler equation:

**Proposition 1.** *The optimal consumption under full sophistication satisfies*

$$\underbrace{-\frac{\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right]}{c_j^{-\frac{1}{\sigma}}(a)}}_{\text{saving motive}} = \left[ \underbrace{r - \rho}_{\text{intertemporal substitution}} \quad \underbrace{-wz_j\Theta'(a)}_{\text{extra saving motive, } >0} \right] dt \quad (8)$$

Compared to the standard Euler equation in Achdou et al. (2022), sophisticates' Euler equation (8) has one additional term  $-wz_j\Theta'(a)$ . This term is positive since financial stress  $\Theta(a)$  is decreasing in  $a$ . This term captures sophisticates' extra saving motive to save out of high financial stress states. Understanding that additional savings can alleviate financial stress and its negative economic consequences, sophisticates want to save more. This extra saving channel is so strong that, in the benchmark calibration below, sophisticates' net saving in the neighborhood of the financial constraint  $\underline{a}$  is positive. As a result, there are no sophisticates at the financial constraint in the stationary wealth distribution. In other words, with sophistication, financial stress surprisingly leads to fewer households at the financial constraint compared to the case without financial stress. This happens despite the negative direct effect of financial stress on productive labor and earnings. Sophisticated stressed households do not fall into the poverty trap.

### 3.3 Naivete and the Poverty Trap

Now we turn to the case of naivete. Naifs fail to internalize the negative consequences of future financial stress, making consumption and saving decisions as if financial stress will not crowd out cognitive and time resources in the future. This implies that naifs' consumption policy  $c_j(a)$  is determined by (9), trading off current consumption and the perceived future value  $v_j^p(a)$ :

$$c_j^{-\frac{1}{\sigma}}(a) = (v_j^p)'(a), \quad (9)$$

where the perceived future value is given by the frictionless, no-stress value function  $v_j^p(a) = v_j^{\text{no-stress}}(a)$ . That is, naifs perceive that the future impact of stress is zero, or  $\Theta(a) = 0$  for all  $a$ .

To find  $v_j^{\text{no-stress}}(a)$  for  $j \in \{1, 2\}$ , we solve

$$\rho v_j^{\text{no-stress}}(a) = \max_{c, \ell} \left\{ u(c, \ell; 0) + (ra - c + wz_j \ell) (v_j^{\text{no-stress}})'(a) + \lambda (v_{-j}^{\text{no-stress}}(a) - v_j^{\text{no-stress}}(a)) \right\}. \quad (10)$$

Naifs' current labor supply is still given by equation (7). Current financial stress still crowds out cognitive and time resources, reducing current productive labor supply and earnings. Together with (9), we establish:

**Proposition 2.** *The optimal consumption under naivete satisfies*

$$\underbrace{-\frac{\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right]}{c_j^{-\frac{1}{\sigma}}(a)}}_{\text{saving motive}} = \left[ \underbrace{r - \rho}_{\text{intemporal substitution}} \underbrace{-\frac{1}{\sigma} wz_j \Theta(a) \frac{c_j'(a)}{c_j(a)}}_{\text{less net saving, } < 0} \right] dt. \quad (11)$$

Compared to sophisticates' Euler equation in (8), naifs do not have the extra saving motive. This is intuitive: failing to understand the impact of future financial stress dispenses naifs' incentive to engage in extra saving to alleviate future financial stress. In fact, naifs' saving motive is even weaker than the no-stress case: the last term in the square bracket on the right-hand side of equation (11) is negative. This is because naifs' current earnings are lowered by current financial stress, resulting in lower net saving compared to no-stress households. In the benchmark calibration below, naifs' net saving in the neighborhood of the financial constraint  $\underline{a}$  is negative, and they fall into a poverty trap. The case of naivete can generate an empirically large number of financially constrained and stressed households.

It is worth noting that the specification here closely follows the present bias literature (e.g., [Harris and Laibson, 2013](#) and [Maxted, 2021](#)), where naifs' perceived future value function is given by the frictionless, no-present-bias value function.<sup>14</sup> However, the analysis also accommodates two broader interpretations of naivete about future financial stress. First, naifs do not understand that lower saving results in increased future financial stress. Second, even if naifs understand the aforementioned connection, they fail to understand that financial stress incurs negative economic consequences in the future (e.g., it reduces cognition and time available for productive labor).

**Analytical results on poverty traps.** Before turning to a numerical solution to the household's problem, we analytically evaluate whether a stressed household falls into a poverty trap in the deterministic case where idiosyncratic productivity  $z_t$  is a constant  $z$ . To be precise, we say that a household falls into a poverty trap when the household's net saving is negative in the neighborhood

<sup>14</sup>We also follow [Harris and Laibson \(2013\)](#) and [Maxted \(2021\)](#) and let the transition rate from the present to the future be  $\infty$ . This captures the economic essence in a simple way.

of the constraint  $\underline{a}$ . Formally, a household falls into a poverty trap if and only if  $\lim_{a \rightarrow (\underline{a})^+} s(a) < 0$ , where  $s(a) \equiv ra - c(a) + wz\ell(a)$  is net flow saving.

**Proposition 3.** *Let idiosyncratic productivity  $z$  be constant, the financial stress function  $\Theta(a)$  be continuously differentiable and increasing, and  $r < \rho$ . In this case:*

1. *Sophisticates do not fall into poverty traps, i.e.,  $\lim_{a \rightarrow (\underline{a})^+} s(a) > 0$ , if  $r - \rho - wz\Theta'(\underline{a}) > 0$ .*
2. *Naifs fall into poverty traps, i.e.,  $\lim_{a \rightarrow (\underline{a})^+} s(a) < 0$ .*
3. *Without financial stress, i.e.,  $\Theta(a) = 0$  for all  $a$ , net saving converges to 0 at  $\underline{a}$ , i.e.,  $\lim_{a \rightarrow (\underline{a})^+} s(a) = 0$ .*

Proposition 3 analytically summarizes the main insight in this section. It is worth noting that the condition  $r - \rho - wz\Theta'(\underline{a}) > 0$  (under which sophisticates do not fall into the poverty trap) is satisfied when  $\Theta(a)$  is sensitive to  $a$  in the neighborhood of  $\underline{a}$ . This is supported by [Kaur et al. \(2022\)](#). They find that earning losses driven by financial stress are pronounced for the most financially constrained group but decrease relatively quickly with respect to financial wealth. This condition is also satisfied in our benchmark calibration.

### 3.4 Calibration

We solve the model numerically based on the finite-difference method developed in [Achdou et al. \(2022\)](#). Table 1 displays the parameter values we use for the calibration, which are from standard references. Most non-stress parameters are from [Kaplan and Violante \(2022\)](#), with two exceptions. First, we switch to the more realistic borrowing constraints in [Kaplan, Moll and Violante \(2018\)](#) since [Kaplan and Violante \(2022\)](#) does not allow borrowing. Second, we use [Guerrieri and Lorenzoni \(2017\)](#) for productivity and labor supply parameters since [Kaplan and Violante \(2022\)](#) does not allow flexible labor supply. Following the standard practice for a one-asset model in the literature (e.g., [Kaplan and Violante, 2022](#)), we calibrate  $\rho$  such that the average wealth to average income ratio in the model is equal to the average liquid wealth to average income ratio in the data.<sup>15</sup> We normalize average income and labor hours in our model to be 1.

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<sup>15</sup>Specifically, we calibrate  $\rho$  such that the average wealth to average income ratio in the naive financial stress case of our model is equal to the average liquid wealth to average income ratio in the data. We then keep  $\rho$  constant across all other cases (e.g., sophisticated financial stress and no financial stress) to isolate the impact of financial stress. This calibration is justified because, as we argue further below, the naive financial stress case appears to be more empirically relevant than the sophisticated case, and the majority of households seem to be naive. In the baseline analysis, we also keep the interest rate  $r$  constant across all cases to isolate the impact of financial stress. In Figures 7 and E.21, we endogenize  $r$  such that the average wealth to average income ratio in the economy is fixed across cases. The main results are similar.

In the main analysis, we use our survey to calibrate the financial stress function:

$$\Theta(a) = \bar{\Theta} e^{-\alpha(a-\underline{a})}. \quad (12)$$

First, we set  $\bar{\Theta}$ —the maximum level of financial stress at the financial constraints—based on our survey question Q19a (hours distracted “at constraint”). Specifically, we let  $\bar{\Theta}$  be equal to 0.27 by dividing the average answer to this question in Figure 3 by the average working hours in Table 2. This is because we normalize the average total labor hours in our model to be one.

Second, we calibrate  $\alpha$ —the slope of the financial stress function—based on the difference between the survey question Q17ab and Q19b. That is, as shown in Figure 3, a \$2,000 gift check, on average, would reduce hours distracted by financial stress by 2.2 hours. Specifically, given the functional form in (12), we find<sup>16</sup>

$$\alpha = \frac{\overline{\log(Q17ab/Q19b)}}{2000/\text{income}} = 11.9 \quad (13)$$

In this calibration, financial stress decreases relatively quickly with net assets. Net asset at the level of 0.7 monthly income halves financial stress.

**Alternative calibration strategies.** We explore three alternative calibrations of the financial stress function  $\Theta(a)$ . First, we calibrate  $(\bar{\Theta}, \alpha) = (0.29, 15.5)$  based on the restricted sample of respondents who pass all attention checks (see Appendix C). Second, instead of using within-subject variation based on hypothetical questions Q19a and Q19b, we use between-subject variation based on how respondents’ hours distracted by financial stress (Q17ab) depend on their financial situations (Q9). This cross-sectional approach is explained in detail in Appendix E.2 and leads to  $(\bar{\Theta}, \alpha) = (0.26, 1.1)$ . Third, we use the estimates in Kaur et al. (2022) to calibrate  $(\bar{\Theta}, \alpha) = (0.26, 5.25)$ . As further explained in Section 4.2, Kaur et al. (2022) estimate the effect of an interim payment on Indian manufacturing workers’ hourly earnings by the status of financial constraints. We find  $(\bar{\Theta}, \alpha)$  by matching our model’s moments with estimates in that paper.

The main results about how sophistication versus naivete affects the impact of financial stress are not sensitive to these alternative calibrations. The maximum level of financial stress at the financial constraints,  $\bar{\Theta}$ , is remarkably consistent across different calibrations. Alternative calibra-

<sup>16</sup>To make the average in the numerator of (13) well defined, we drop anyone who reports zero in either question Q17ab or Q19b. Conceptually, this procedure means that we exclude respondents who are not affected by financial stress when estimating the additional \$2000’s impact on financial stress. The average income appears in the denominator in (13) because we normalize the average income in our model to be 1.

<sup>17</sup>The average income and average total labor hours are defined as  $\frac{1}{2}z_1 \int \ell_1(a)g_1(a)da + \frac{1}{2}z_2 \int \ell_2(a)g_2(a)da$  and  $\frac{1}{2} \int [\ell_1(a) + \Theta(a)]g_1(a)da + \frac{1}{2} \int [\ell_2(a) + \Theta(a)]g_2(a)da$ , where  $\{g_j(a)\}_{j=1}^2$  is the stationary probability density function of net wealth  $a$  for each productivity state  $j \in \{1, 2\}$ . We use the fact that, in the stationary distribution, exactly half of the household is at each idiosyncratic productivity state.

**Table 5:** Calibration Parameters

Parameters	Justifications
$\rho = 0.0131$	match avg $a/\text{avg } y = 0.56$ (Kaplan and Violante, 2022) in the naivete about financial stress case
$\sigma = 1$	Kaplan and Violante (2022)
$\underline{a} = -1/4$	Kaplan, Moll and Violante (2018)
$r = 0.01$	Kaplan and Violante (2022)
$v = 1$	Guerrieri and Lorenzoni (2017)
$(\lambda, z_1, z_2) = (0.57, 0.87, 1.13)$	Guerrieri and Lorenzoni (2017)
$w, \theta$	normalize average income and total labor hours to 1 <sup>17</sup> in the naivete about financial stress case
$(\bar{\Theta}, \alpha) = (0.27, 11.9)$	our survey

tions lead to lower  $\alpha$ , i.e., financial stress decreases slower with net financial assets. As explained in Appendix E.2, a lower  $\alpha$  in fact strengthens the main result that sophisticates exhibit strong extra saving motives while naifs fall into the poverty trap. Under sophistication, a lower  $\alpha$  further increases the extra saving motive, since it takes more to save out of high financial stress states. Under naivete, a lower  $\alpha$  leads to more constrained and stressed households in the stationary wealth distribution, since financial stress affects households over a wider range of net financial assets.

## 4 The Impact of Financial Stress: Saving Behavior and Wealth Distribution

In this section, we explain how financial stress affects a household’s saving behavior and wealth distribution. We uncover a novel and important determinant of the economic impact of financial stress: the household’s sophistication versus naivete about its financial stress.

**Sophistication.** The left panel of Figure 4 plots the net flow saving function, defined as  $s_j(a) \equiv ra - c_j(a) + wz_j\ell_j(a)$ , for each idiosyncratic income state,  $j \in \{1, 2\}$ . We compare a sophisticated stressed household with a no-stress household.

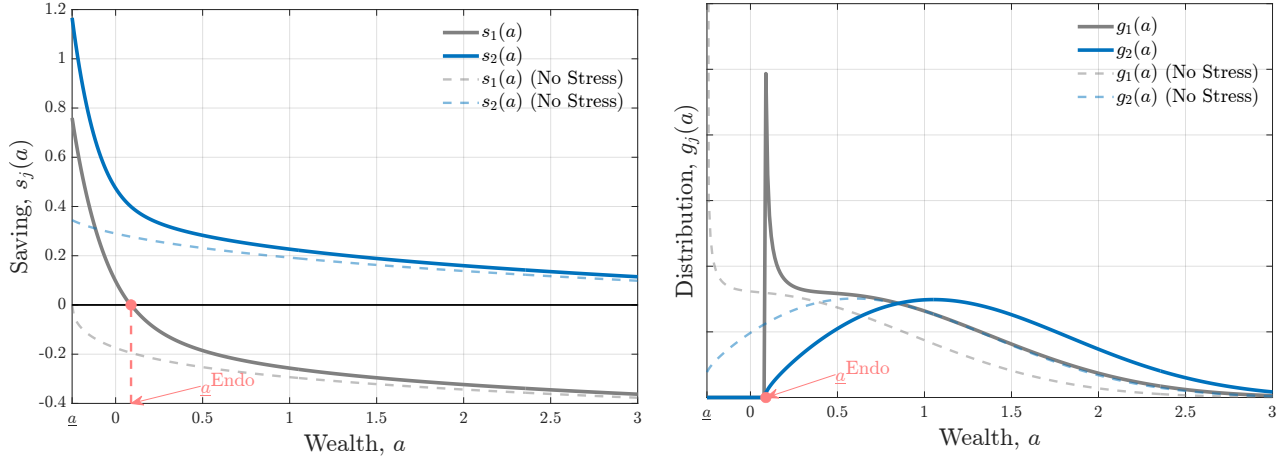
Two dashed lines in the left panel of Figure 4 capture the net flow saving of households without financial stress, i.e.,  $\Theta(a) = 0$  for all levels of net asset  $a$ . Consistent with the permanent income hypothesis, households in the low-income state  $z_1$  borrow,  $s_1(a) < 0$ , while households in the high-income state  $z_2$  save,  $s_2(a) > 0$ .<sup>18</sup>

Two solid lines in the left panel of Figure 4 capture the net flow saving of sophisticated stressed

<sup>18</sup>The net saving  $s_j(a)$  decreases with net asset  $a$  because the household is impatient ( $r < \rho$ ) and the precautionary saving motive (driven by the potential for binding financial constraints in the traditional sense, as in Carroll (1997) and Gourinchas and Parker (2002), rather than financial stress) decreases with net asset  $a$ .



**Figure 4:** Saving Behavior and Stationary Wealth Distribution (Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication.

households. They have a very strong extra saving motive to alleviate financial stress. Its net saving is *higher* than that of the no-stress household. This is despite the negative direct effect of financial stress on earnings.<sup>19</sup>

Moreover, because of this extra saving motive, even households in the low-income state  $z_1$  are net savers ( $s_1(a) > 0$ ) for all  $a < \underline{a}^{\text{Endo}}$ , where  $\underline{a}^{\text{Endo}}$  is the point at which the net saving of the sophisticated stressed household with low income is zero:

$$s_1(\underline{a}^{\text{Endo}}) = r\underline{a}^{\text{Endo}} - c_1(\underline{a}^{\text{Endo}}) + wz_1\ell_1(\underline{a}^{\text{Endo}}) = 0. \quad (14)$$

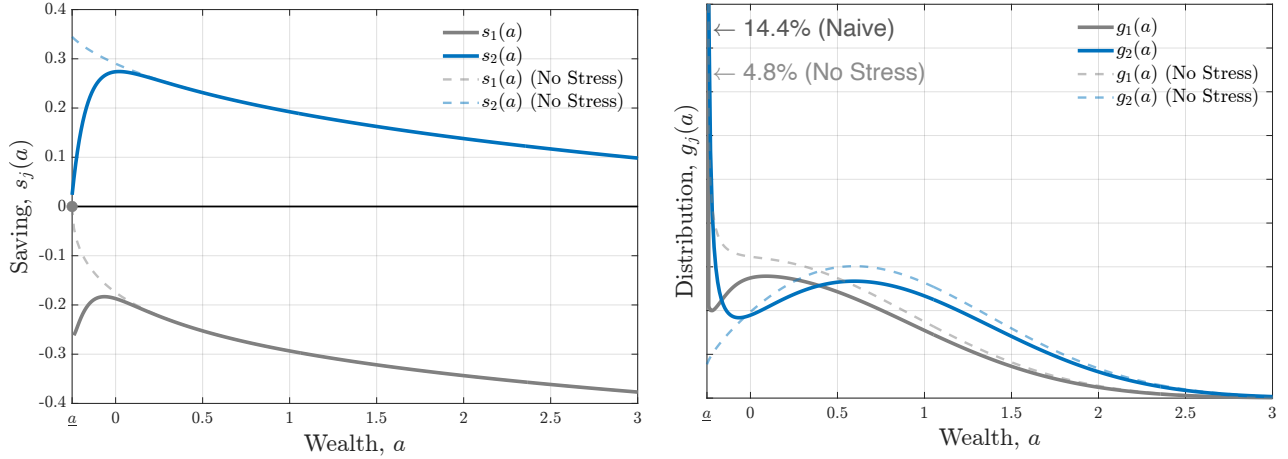
In other words, there is no poverty trap for sophisticates. No matter the idiosyncratic state, all sophisticated stressed households are net savers around the financial constraints. They all save out of the financial constraint in the stationary wealth distribution illustrated in the right panel of Figure 4.

Specifically, the right panel of Figure 4 plots the stationary probability density function of net wealth  $g_j(a)$  for each productivity state  $j \in \{1, 2\}$ .<sup>20</sup> We compare sophisticated stressed households with the no-stress benchmark. Consistent with the no-poverty-trap discussion above, the extra saving motive for sophisticated stressed households is so strong that *none* of them are close to the financial constraint  $\underline{a}$ . The wealth level  $\underline{a}^{\text{Endo}}$ , where the net saving  $s_1(\underline{a}^{\text{Endo}})$  in equation (14) is

<sup>19</sup>Specifically, there are two reasons why a sophisticated stressed household's net saving is higher than that of the no-stress household: the extra saving motive in (8); the extra labor supply motive in Figure 12.

<sup>20</sup>The stationary probability density function of net wealth  $\{g_j(a)\}_{j=1}^2$  can be found through the Kolmogorov forward equation as in Achdou et al. (2022):  $0 = -\frac{d[s_j(a)g_j(a)]}{da} - \lambda_j g_j(a) + \lambda_{-j} g_{-j}(a)$  for  $j \in \{1, 2\}$ .

**Figure 5:** Saving Behavior and Stationary Wealth Distribution (Naivete).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete.

zero, serves as an endogenous lower bound on wealth in the stationary wealth distribution for the sophisticated stressed households.

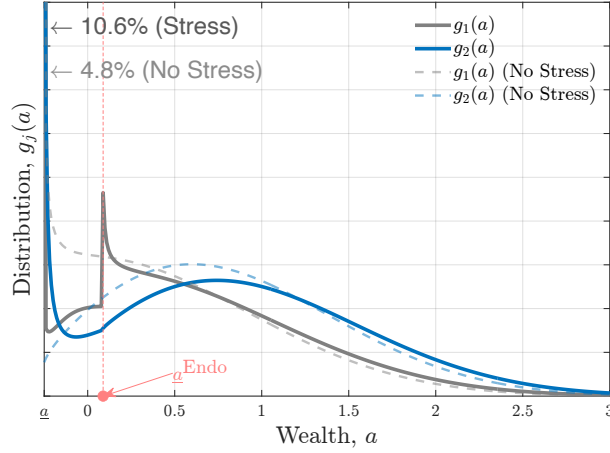
**Naivete.** Now we turn to the case of naivete. The left panel of Figure 5 plots the net flow saving function  $s_j(a)$  for each productivity state. We compare naive stressed households with no-stress households.

Two solid lines in the left panel of Figure 5 capture the net flow saving of naive stressed households. Naive stressed households do not have the extra saving motive. They have a *lower* net saving than no-stress households, because of the negative direct effect of financial stress on earnings. Naifs' lower net saving in the left panel of Figure 5 contrasts with sophisticates' higher net saving in Figure 4.<sup>21</sup>

The right panel of Figure 5 plots the stationary wealth distribution. We compare naive stressed households with the no-stress benchmark. Financial stress together with naivete significantly increases the proportion of financially constrained households. Even in the context of the one-asset model here, we are able to obtain a significant share of households at their financial constraints (14.4%). This resolves one shortcoming of one-asset models: too few financially constrained households (Krusell and Smith, 1998; Kaplan, Moll and Violante, 2018). In sum, financial stress and naivete together generate a psychology-based theory of poverty traps.

<sup>21</sup>The net saving  $s_1(\underline{a})$  is zero for a low-productivity household exactly at the constraint  $\underline{a}$ , which corresponds to the gray dot in the left panel of Figure 5. This makes sure that the financial constraint in (3) is not violated. A jump in the net saving function  $s_1(a)$  exactly at the constraint is standard for naive households (Harris and Laibson, 2013 and Maxted, 2021).

**Figure 6:** Stationary Wealth Distribution with a Mixture of Sophisticates and Naifs.



Notes: The figure plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states with a mixture of sophisticates and naifs.

**Stationary wealth distribution with a mixture of sophisticates and naifs.** We now analyze the stationary wealth distribution of our model with a mixture of naifs and sophisticates. It is well known that differentiating sophisticates from naifs is challenging (Heidhues and Strack, 2021; Carrera et al., 2022; Allcott et al., 2022). However, we offer two attempts to calibrate the proportion of sophisticates in our context, which lead to similar results.

In the first calibration, we leverage a standard survey question about reasons for saving and classify a household as a sophisticate if it mentions “Relieve financial stress to maintain focus at work” as one of the top three reasons for saving.<sup>22</sup> This results in a proportion of 26.4% of sophisticates.<sup>23</sup> Figure 6 plots the stationary wealth distribution given this mixture. There are two main lessons. First, we are still able to obtain a significant share of households at their financial constraints (10.6%), in fact, mimicking the 9.8% of households in our sample reporting that they are severely financially constrained and cannot pay the \$2,000 expenses. Second, all households at their financial constraints are naifs. Sophisticates instead save out of their financial constraints.

In the second calibration, we directly choose the proportion of sophisticates to match the share

<sup>22</sup>Specifically, we borrow this question from the Making Ends Meet Survey conducted by the Consumer Financial Protection Bureau. We retain the original survey’s options for reasons for savings but also introduce an additional option related to relieving financial stress. The survey is conducted on Prolific, targeting 1,001 employed US workers in April 2023, and we ensure that it is representative of the general population in terms of total household income. The details of the survey can be found in Appendix D.

<sup>23</sup>Specifically, 26.4% of respondents that are somewhat financially constrained (reporting “need to borrow” and “cannot pay” in response to Question Q9 about covering a \$2,000 emergency expense) mention “relieve financial stress to maintain focus at work” as one of the top three reasons for saving. The reason we calculate the proportion of sophisticated households based on this restricted sample is that households away from financial constraints may not choose “relieve financial stress” as a top three reason for saving, even if they are sophisticated. For the entire sample, the proportion of respondents who report “relieve financial stress” as a top three reason for saving is 20.7%.

of households at their financial constraints in the stationary wealth distribution with the share of households in our sample reporting that they are severely financially constrained and cannot pay the \$2,000 expenses (9.8%). This leads to a proportion of 32.2% of sophisticates, close to the first calibration. Figure E.20 plots the stationary wealth distribution, closely resembling Figure 6.

Together, we believe that the evidence indicates a significant proportion of households are naifs. Consistent with our findings, other evidence also suggests so in the context of financial stress. For example, [Pew Charitable Trusts \(2016\)](#) find that the share of Americans who feel financially stressed rises steadily over the course of the month (as cash-on-hand dwindles), and then drops sharply by 53 percent at the start of the next month when paychecks arrive. This is consistent with a significant proportion of naifs, since paychecks are anticipated regular payments and sophisticates would have smoothed out the impact of financial stress evenly over a month. [Bhargava and Conell-Price \(2021\)](#) find that most employees reported substantial financial stress about their current financial situation yet expressed optimism about achieving relief from such financial stress in the future.

## 4.1 Extensions

This section verifies that the main results about how sophistication versus naivete affects the impact of financial stress are robust to our modeling choices. We maintain the parameter values in Table 5, unless specifically mentioned.

**Endogenous  $r$ .** We follow [Huggett \(1993\)](#) and [Achdou et al. \(2022\)](#) and endogenize the interest rate  $r$  such that the average wealth in the economy is fixed at  $\int_{i \in [0,1]} a_{i,t} di = B = 0.56$ , the value we use for calibrating the subjective discount factor  $\rho$  in the benchmark model in Table 5.<sup>24</sup> Figure 7 updates Figure 4 under the endogenous  $r$ . The main lesson that sophisticates save out of the financial stress states remains true. Figure E.21 in Appendix E.12 updates the stationary wealth distribution with a mixture of sophisticates and naifs under endogenous  $r$ , which is similar to Figure 6.

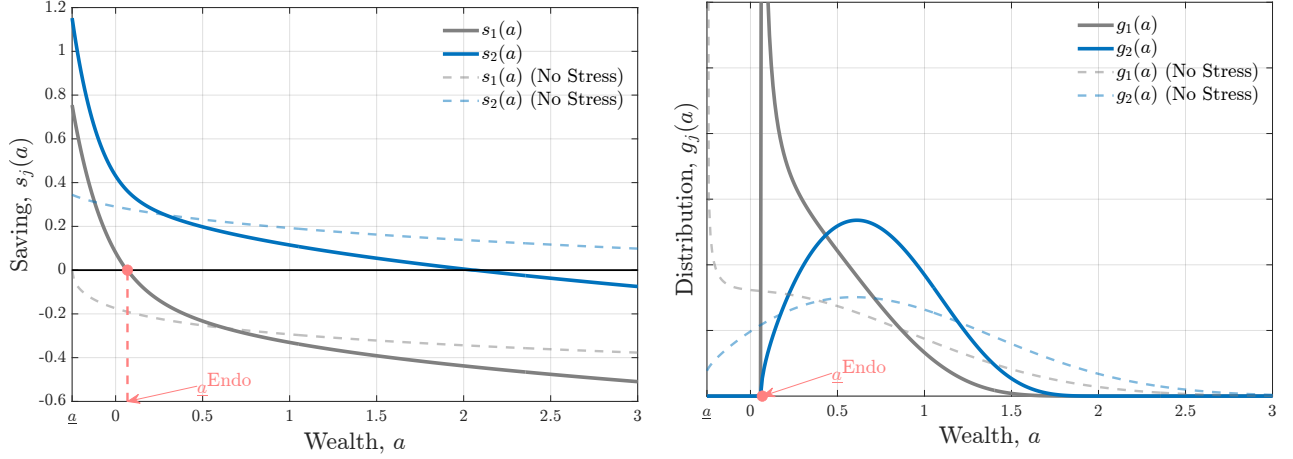
**Endogenizing the amount of time/cognition spent to alleviate financial stress** The benchmark model with exogenous  $\Theta(\cdot)$  and sophistication is equivalent to a model where  $\Theta(\cdot)$  is chosen endogenously. Specifically, consider an infinitely-lived household with discount rate  $\rho$  and flow utility:

$$\frac{c_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{(\ell_t + \Theta_t)^{1+\frac{1}{v}}}{1+\frac{1}{v}} - W_{j_t}(a_t, \Theta_t), \quad (15)$$

---

<sup>24</sup>For the naivete case, since the total wealth in the economy is already set to be 0.56 in the benchmark calibration, the endogenous interest rate  $r$  equals the exogenous interest rate  $r$  in Table 5.

**Figure 7:** Endogenous Interest Rate  $r$  (Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. The interest rate adjusts endogenously to satisfy asset market clearing condition.

where  $j_t$  in  $\{1, 2\}$  captures the idiosyncratic income state at  $t$ . The household endogenously chooses consumption  $c_t$ , labor supply  $\ell_t$ , and  $\Theta_t$  to maximize its expected discount utility, subject to the budget constraint (2), the financial constraint (3), and the transition intensity between idiosyncratic states. This specification is motivated by the static model in Banerjee and Mullainathan (2008), where the household can endogenously choose to spend time/cognition  $\Theta_t$  to alleviate disutility of financial stress  $\partial W_j(a, \Theta) / \partial \Theta < 0$ .<sup>25</sup> The next proposition summarizes the equivalence between this model of endogenous choice and our baseline model with exogenous  $\Theta(\cdot)$ .

**Proposition 4.** *There exists a disutility function  $\{W_j(a, \Theta)\}_{j=1}^2$  such that the household problem with endogenous  $\Theta$  choice, (15), leads to the same optimal consumption and labor supply  $\{c_j(a), \ell_j(a)\}_{j=1}^2$  as the household problem with exogenously decreasing stress function  $\Theta(\cdot)$  under sophistication.*

**Partially productive during hours affected by financial stress.** In the main analysis, households are unproductive during hours affected by financial stress. Here, we consider an extension where this assumption is relaxed and households are partially productive during hours affected by financial stress. That is, the household budget constraint (2) becomes

$$\dot{a}_t = ra_t - c_t + wz_t(\ell_t + \chi\Theta(a_t)), \quad (16)$$

<sup>25</sup>This model is also similar to Becker and Murphy (1988), where the decision maker can spend costly resources to alleviate addiction.

where  $\chi$  captures the productivity during hours affected by financial stress, and the baseline analysis is nested with  $\chi = 0$ . In Appendix E.3, we study the case with  $\chi = 0.5$ , i.e., households are half as productive during hours affected by financial stress. Other parts of the model are the same as in the main analysis. We also use the same calibration for  $\Theta(a_t)$  and other parameters. Figures E.3 and E.4 show the main results on sophistication versus naivete hold. The only difference from the main analysis is that the impact of financial stress is somewhat more limited. It is also worth noting that the calibration in Section 4.2 below, based on the estimates of Kaur et al. (2022) regarding the effect of financial stress on earnings, is agnostic about the value of  $\chi$ .

**Multiplicative productivity loss.** We consider a robustness check where the impact of financial stress takes the form of a multiplicative productivity loss. That is, the flow utility function in equation (1) takes the standard form of  $u(c_t, \ell_t) = c_t^{1-1/\sigma}/(1-1/\sigma) - \varphi \ell_t^{1+1/v}/(1+1/v)$  and the budget in equation (2) becomes

$$\dot{a}_t = ra_t - c_t + wz_t [1 - \Theta(a_t)] \ell_t, \quad (17)$$

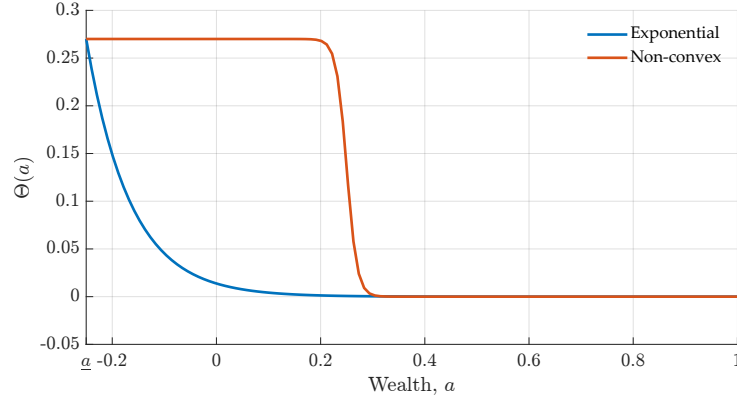
which features a multiplicative productivity loss driven by financial stress. Other parts of the model, including the calibration of parameters, are as in the main analysis. Figures E.5 and E.6 in Appendix E.4 modify Figures 4 and 5. Sophisticates' saving behavior and wealth distribution are similar to the main analysis. Naifs still fall into the poverty trap, but in an extreme fashion: all naive stressed households are at the financial constraint. This is because the multiplicative productivity loss significantly decreases incentives to work at the financial constraint. As a result, even households in the high-income state  $z_2$  have negative net saving in the neighborhood of the financial constraint.

**Alternative functional forms of stress: a weakly decreasing function.** We consider an alternative stress function  $\Theta(a)$ , which takes the form of:

$$\sqrt{\Theta(a)} = \max \left\{ \sqrt{\bar{\Theta}} - \alpha(a - \underline{a}), 0 \right\}. \quad (18)$$

This stress function decreases with net wealth  $a$  up to a point after which it equals zero. This contrasts with the exponential stress function in (12), which is positive for all  $a$ . Similar to Section 3.4, we calibrate the stress function parameters based on survey questions Q17ab, Q19a, and Q19b (see Appendix E.5 for a full explanation of the calibration procedure). Specifically, we set  $(\bar{\Theta}, \alpha)$  to (0.27, 2.06). Figures E.7 and E.8 in Appendix E.5 verify that sophisticates still save out of financial stress states while naifs still fall into the poverty trap.

**Figure 8: A Non-convex Stress Function**



Notes: The blue line shows the exponential stress function in our benchmark model. The orange line plots a non-convex stress function  $\Theta(a)$ . Equations (E.7) and (E.8) in Appendix E provide the exact functional form.

**Alternative functional forms of stress: more difficult to save out of the financial stress region.** One may wonder whether our result that sophisticates save out of the financial stress region continues to hold if it is more difficult for them to save out of the region. We consider a robustness check with a non-convex stress function  $\Theta(a)$  in Figure 8, where the stress  $\Theta(a)$  only starts to significantly decrease with  $a$  far away from the financial constraint  $\underline{a}$  (see Appendix E.6 for the exact functional form). Is it impossible for a sophisticated household close to the financial constraint  $\underline{a}$  to accumulate enough savings to be out of the financial stress region?

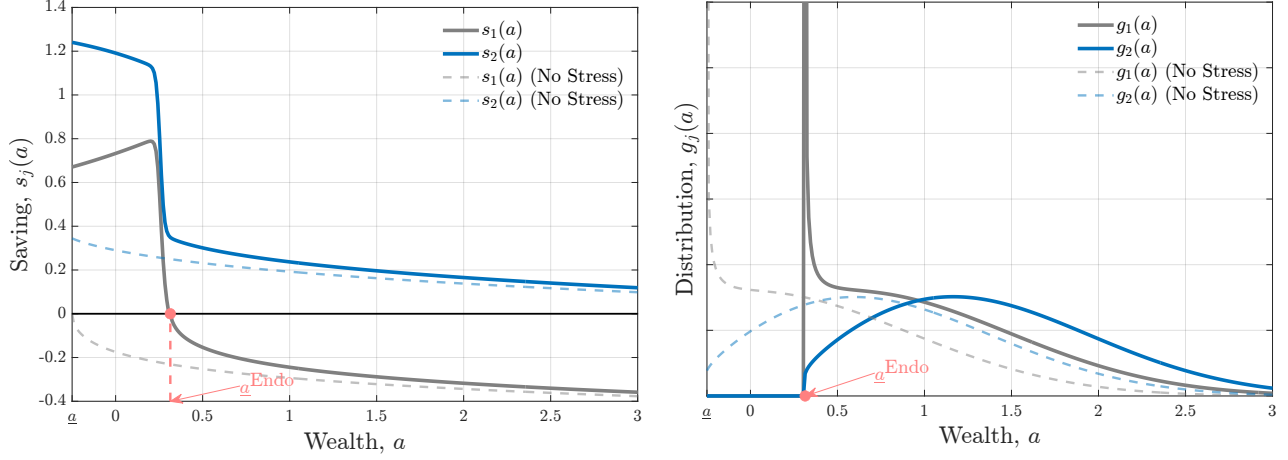
Figure 9 shows that sophisticates still save out of the financial stress region and that there are no sophisticates at the financial constraint in the stationary wealth distribution. To see this, the sophisticated household's Euler equation in (8) implies that their consumption only starts to increase at wealth levels with a high  $\Theta'(a)$ , away from the financial constraint. Close to the financial constraint  $\underline{a}$ , the sophisticated household's consumption is low and its net saving is high as in the left panel of Figure 9. This is why sophisticates still save out of the financial stress region.<sup>26'27</sup>

**Different saving and borrowing rates.** In the main analysis, we consider the standard case where the household faces the same borrowing and saving interest rates. In Appendix E.7, we also consider a case where the household faces different borrowing and saving interest rates (Kaplan, Moll and Violante, 2018). That is, if households are net borrowers ( $a_t < 0$ ), they face a higher rate  $r^b = r + \kappa$ , where  $\kappa$  is an exogenous wedge between borrowing and saving rates. A higher

<sup>26</sup>One way to generate a poverty trap under sophistication is to introduce indivisibility in saving technology. For example, this can be a discrete choice about whether to pay a fixed cost to invest in human capital as in Galor and Zeira (1993). However, such a poverty trap is not robust to income uncertainty, as explained in Acemoglu (2008) (Chapter 21.6).

<sup>27</sup>Naifs still fall into the poverty trap with the non-convex stress function  $\Theta(a)$ . See Appendix E.6.

**Figure 9:** Saving Behavior and Stationary Wealth Distribution (A Non-convex Stress Function under Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. The stress function  $\Theta(a)$  is non-convex as specified in equations (E.7) and (E.8) of Appendix E.

$\kappa$  increases the saving motive (regardless of whether households are financially stressed or not) because of the standard intertemporal substitution channel. Our main results that naifs save less and sophisticates save more than the no-stress households continue to hold.

**Alternative channels of financial stress: stress spending.** We study an alternative impact channel of financial stress through spending. As our survey question Q20 suggests, households may spend money on items that they would not buy if they were not financially stressed. This is called “stress spending” in [Credit Karma \(2017\)](#) and [CNBC \(2022\)](#), i.e., “impulsively shopping to help deal with feeling anxious or stressed out.”<sup>28</sup> In this case, the utility function in equation (1) is  $u(c_t, \ell_t) = c_t^{1-1/\sigma}/(1-1/\sigma) - \varphi \ell_t^{1+1/v}/(1+1/v)$  and the budget in equation (2) becomes

$$\dot{a}_t = ra_t - c_t - C^\Theta(a_t) + wz_t \ell_t, \quad (19)$$

where  $C^\Theta(a_t)$  captures this type of stressed spending, with the key property that it does not directly enter the utility. In Appendix E.8, we use the survey responses to Q20 to calibrate  $C^\Theta(a_t)$  and study the impact of financial stress through stressed spending. Figures E.14 and E.15 show that sophisticates still save out of financial stress states while naifs still fall into the poverty trap (“cycle of stress spending” in [Credit Karma, 2017](#)).

<sup>28</sup>[Credit Karma \(2017\)](#) find that more than half (52 percent) of respondents have impulsively shopped to deal with feelings of stress, anxiety or depression.



**Alternative channels of financial stress: transition intensity between idiosyncratic income states.** Instead of directly affecting labor earnings, financial stress can impact transition intensity between different idiosyncratic income states. That is, a stressed household is more likely to transition from the high-income state to the low-income state and is less likely to transition from the low-income state to the high-income state. This case better captures salaried workers: because financial stress affects her performance, a stressed worker may face a lower chance of being promoted to a higher-salary job and a higher chance of being demoted to a lower-salary job.

To capture this intuition in the context of our model, in Appendix E.9, we assume that the transition intensity from the low-income state  $z_1$  to the high-income  $z_2$  is given by  $\lambda - \bar{\lambda}e^{-\alpha(a_t - \underline{a})}$ , while the transition intensity from  $z_2$  to  $z_1$  is given by  $\lambda + \bar{\lambda}e^{-\alpha(a_t - \underline{a})}$ . Other parts of the model are identical to those in the main analysis. We calibrate  $\bar{\lambda}$  by setting it to  $\lambda\bar{\Theta}$ , where  $\bar{\Theta}$  is the same as in the main analysis in Section 3.4. This means that, at the financial constraint, the maximum impact of financial stress on the transition intensity is proportional to the maximum impact of financial stress on time and cognition available for productive work in the benchmark model. The calibration of  $\alpha$  and other parameters are identical to those in the main analysis.

Figure E.16 in Appendix E.9 shows that sophisticates' saving behavior and wealth distribution are very similar to those in the main analysis. For naifs in Figure E.17, financial stress does not directly affect their saving behavior anymore because financial stress does not directly affect their current labor earnings and does not prompt any extra saving motive. However, financial stress makes naifs more likely to be in the low-income state and eventually lowers their wealth. In fact, the stationary wealth distribution for naive stressed households is very similar to the main analysis in Figure 5. In other words, even if financial stress only affects the transition intensity between different idiosyncratic income states, naive stressed households still fall into the poverty trap.

**Alternative channels of financial stress: quality of decisions and degree of sophistication.** A key theme of the scarcity literature is that financial stress can lead to worse economic decisions by crowding out valuable cognitive resources (Mani et al., 2013; Mullainathan and Shafir, 2013; Haushofer and Fehr, 2014; Kansikas, Mani and Niehaus, 2023). In the environment discussed here, we can capture this channel by allowing financial stress to impact households' probability of being sophisticated, which in turn affects the quality of consumption and saving decisions. Specifically, in Appendix E.10, we expand upon our baseline environment by letting households stochastically transition between states of sophistication and naivete. The intensity of these transitions is influenced by financial stress. That is, a stressed household is more likely to transition from being sophisticated to being naive, and is less likely to transition from being naive to being sophisticated. Details on the model specification and calibration can be found in Appendix E.10.

Figure E.18 in Appendix E.10 plots the net flow saving of sophisticates and naifs and demon-

strates that the main results regarding how sophistication versus naivete impacts the effect of financial stress continue to hold. Sophisticates still save out of financial stress states, now also because they understand that higher saving reduces their likelihood of becoming naive, thereby improving the quality of their future consumption and saving decisions. Naive households, on the other hand, lack this additional saving motive, have lower net savings compared to no-stress households, and can fall into poverty traps. The stationary wealth distribution in Figure E.19 is similar to the case with a mixture of sophisticated and naifs in Figure 6. A significant share of households are at their financial constraints (14.4%), and all households at their financial constraints are naifs.

## 4.2 Calibration based on Kaur et al. (2022)

Here, we explore an alternative calibration of our baseline model based on Kaur et al. (2022)’s estimates. They vary the *timing* of wage payment without affecting the total: some workers are paid earlier while others are paid later and remain liquidity constrained. They then estimate the effect of the interim payment on Indian manufacturing workers’ hourly earnings by measures of financial constraints. This calibration based on measured effect of financial stress in a real-life situation is conceptually distinct from calibration based on our survey measures.

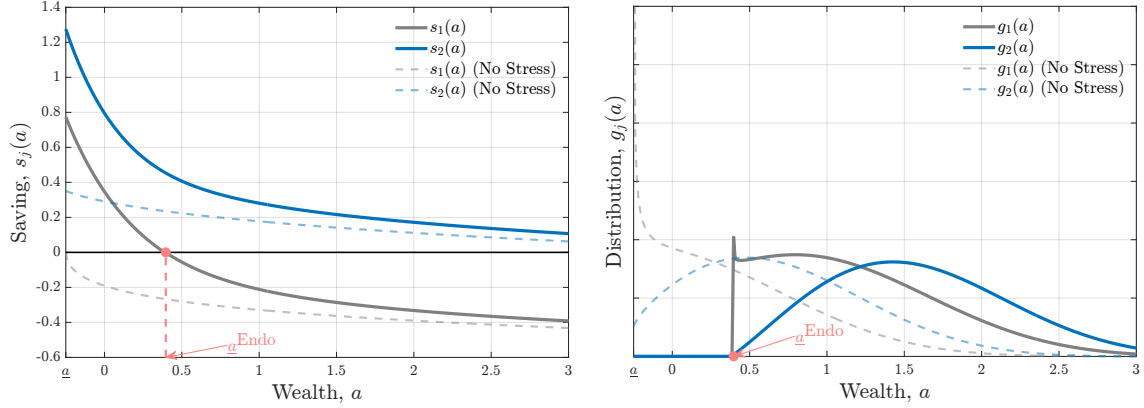
We re-calibrate  $(\rho, \bar{\Theta}, \alpha)$  to match Kaur et al. (2022)’s estimates with the model predictions of the naive financial stress case. We keep the rest of the parameters the same as Table 5 for consistency. For  $\rho$ , we match Kaur et al. (2022)’s estimates that 64.5% of households in their sample cannot come up with 1000 Rs. of emergency fund (Table I) and find  $\rho = 0.0145$ . For  $(\bar{\Theta}, \alpha)$ , we match the two estimates in Table A.X of Kaur et al. (2022). First, the effect of an interim payment (1,400 Rs.) on a worker’s hourly earnings for households that cannot come up with an emergency fund of 1,000 Rs. is a 9.18 percent increase (0.145 standard deviations). Second, the effect of an interim payment on a worker’s hourly earnings for households that can come up with an emergency fund of 1,000 Rs. is a 1.46 percent increase (0.023 standard deviations). This calibration, based on the effect on earnings, is also agnostic regarding several modeling choices, such as whether the impact of stress takes an additive or multiplicative form and whether households are unproductive or partially productive during hours affected by stress.<sup>29</sup>

Since the average income in our model is normalized to 1, we normalize the data accordingly. We calculate the average household income of workers with characteristics similar to those in Kaur et al. (2022) based on Indian Sample Survey (77th round): (1) rural; (2) in the state of Odisha; (3) who are scheduled caste or scheduled tribe members; (4) whose primary occupation is casual

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<sup>29</sup>Kaur et al. (2022) study piece-rate workers, so hourly earnings are proportional to hourly production. The counterpart of hourly earnings in our model is  $wz_j \ell_j(a) / [\ell_j(a) + \Theta(a)]$ . The effect of an interim payment on workers’ hourly earnings in the model is then given by  $wz_j \ell_j(a + \Delta) / [\ell_j(a + \Delta) + \Theta(a + \Delta)] - wz_j \ell_j(a) / [\ell_j(a) + \Theta(a)]$ , where  $\Delta$  is the size of the interim payment.

**Figure 10:** Calibration based on Kaur et al. (2022) (Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. The calibration is based on Kaur et al. (2022).

labor in agriculture; (5) who own less than one acre of land. We find that the average household income for the restricted sample is 16871.6 Rs.<sup>30</sup> We then normalize all Rupee values by 16871.6 Rs., e.g., the size of the interim payment is  $\Delta = 1400/16871.6 \approx 0.083$ .

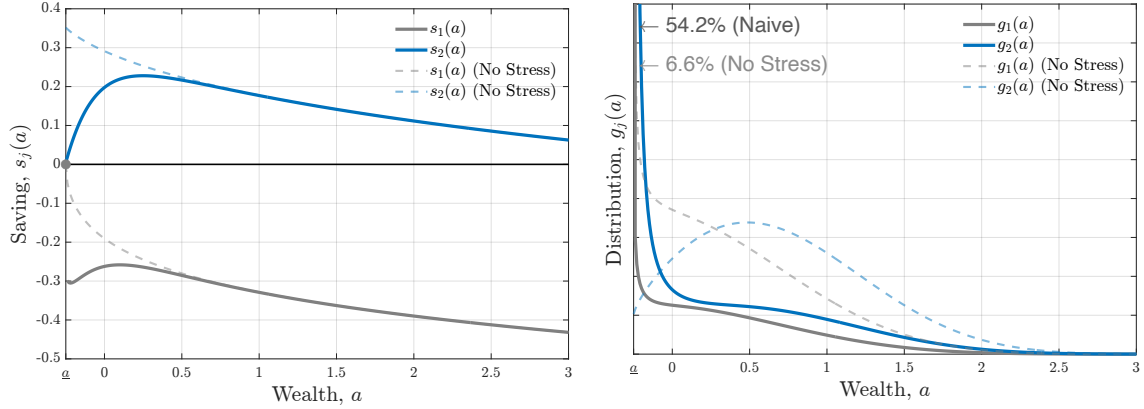
Given this calibration strategy, we find  $(\bar{\Theta}, \alpha) = (0.26, 5.25)$ . Compared to the main calibration in Table 5, the maximum level of financial stress  $\bar{\Theta}$  is similar. Financial stress decreases with net assets somewhat slower here ( $\alpha = 5.25$  v.s.  $\alpha = 11.9$  in the main analysis). From Figures 10 and 11, we can see that the main lessons that sophisticates save out of financial stress states and naifs fall into the poverty trap remain to be true. There are more households at financial constraints for the naive case here. This is because we match Kaur et al. (2022)'s estimates that 64.5% of households in their sample cannot come up with 1,000 Rs. of emergency fund, a number significantly higher than its US counterpart (e.g., ten percent based on our survey question Q9).

## 5 The Impact of Financial Stress: Labor Supply, Welfare, and Fiscal Stimulus

This section presents three additional implications of the model with financial stress. First, financial stress reduces the counterfactually large negative wealth effect on labor supply. Second, financial stress generates non-trivial welfare costs, especially for naifs. Finally, financial stress can make lump-sum fiscal transfers expansionary even without nominal rigidities.

<sup>30</sup>Results are winsorized at the top and bottom 1 percent.

**Figure 11:** Calibration based on Kaur et al. (2022) (Naivete).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. The calibration is based on Kaur et al. (2022).

## 5.1 Financial Stress and the Wealth Effect on Labor Supply

The financial stress channel can attenuate or reverse a counterfactually large negative wealth effect on labor supply. The sign and size of the wealth effect on labor supply are a longstanding puzzle (see Auclert, Bardóczy and Rognlie, 2021 for a recent treatment). Benchmark models with separable utility functions of consumption and labor predict a large negative wealth effect on labor supply. That is, since leisure is a normal good, higher wealth increases the demand for leisure. Nevertheless, the empirical estimates of wealth effect on labor supply are often close to zero or even positive (Cesarini et al., 2017; Banerjee et al., 2020; Kaur et al., 2022).

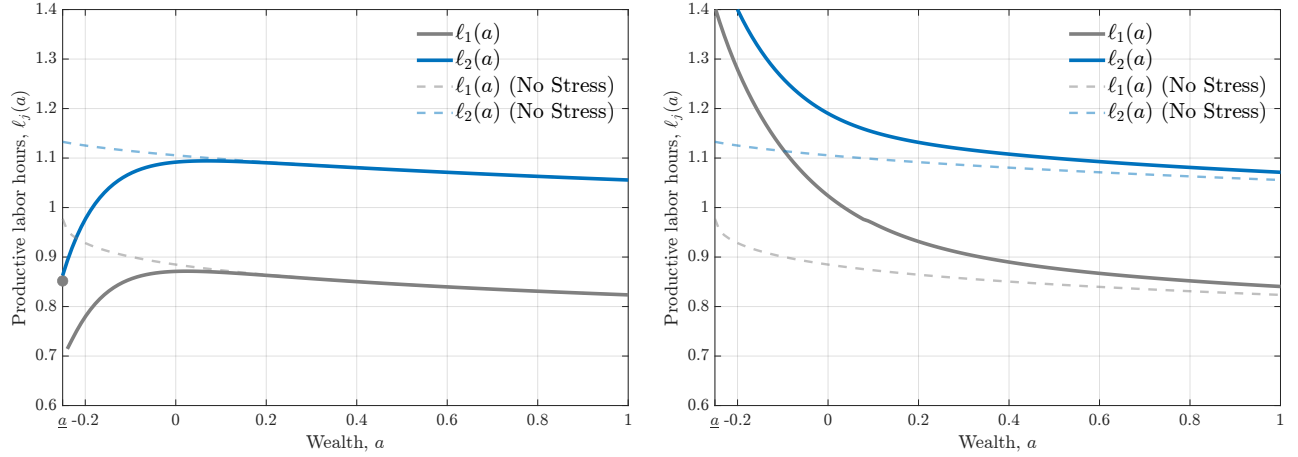
The intuition for why financial stress helps resolve the puzzle is simple. Relieving financial stress frees up cognitive capacity and time for productive work and increases productive labor supply and earnings. To see this, we take a derivative with respect to wealth  $a$  of the optimal labor supply in equation (7), which holds both for naifs and sophisticates:

$$\frac{d\ell_j(a)}{da} = \underbrace{-\frac{\ell_j(a) + \Theta(a)}{c_j(a)} \cdot \frac{v}{\sigma} \cdot \frac{dc_j(a)}{da}}_{<0, \text{ wealth effect}} \underbrace{- \frac{d\Theta(a)}{da}}_{>0, \text{ alleviating financial stress}}. \quad (20)$$

The first term captures the standard negative wealth effect on labor supply. The second term captures the positive wealth effect on productive labor supply from alleviating financial stress.

The left panel of Figure 12 plots the labor supply  $\ell_j(a)$  as a function of net wealth  $a$  for each productivity state  $j \in \{1, 2\}$ . We compare a naive stressed household with a no-stress household. For a naive stressed household, the second channel in (20) dominates around financial constraints: the wealth effect on labor supply is positive in the neighborhood of  $\underline{a}$ . Relieving financial stress

**Figure 12:** Labor Supply (Naivete vs Sophistication).



Notes: The left panel plots the labor supply function  $\ell_j(a)$  at each idiosyncratic income state for the naive stressed households (solid lines) and no-stress households (dashed lines). The right panel plots the labor supply function  $\ell_j(a)$  at each idiosyncratic income state for the sophisticated stressed households (solid lines) and no-stress households (dashed lines).

frees up cognitive capacity and time for productive work. This positive wealth effect on labor supply around financial constraints is consistent with the empirical evidence in [Kaur et al. \(2022\)](#) and [Banerjee et al. \(2020\)](#). Away from financial constraints, the canonical negative first term in equation (20) dominates, and the wealth effect on labor supply turns negative.

The right panel of Figure 12 compares a sophisticated stressed household's labor supply with a no-stress household's. For a sophisticated stressed household, the first term in equation (20) dominates. The wealth effect on labor supply is always negative, even more so than the no-stress case. Akin to the extra saving motive in Figure 7, the sophisticated stressed household has an extra incentive to work because it wants to save more to alleviate future selves' financial stress. This channel contributes to the counterfactually large and negative wealth effect on labor supply.<sup>31</sup> Together, these observations further strengthen our belief that the evidence ([Cesarini et al., 2017](#); [Banerjee et al., 2020](#); [Kaur et al., 2022](#)) points in the direction that a significant portion of households are naive in the context of financial stress.

## 5.2 Welfare Costs of Financial Stress

Financial stress generates non-trivial welfare costs, especially for naifs. To show this formally, we evaluate the welfare of a stressed household based on the expected discounted value of its utility in equation (1) given its consumption  $c_j(a)$ , labor supply  $\ell_j(a)$ , and the initial state  $a_0 = a$  and

<sup>31</sup>Based on the left panel of Figure 4, we can infer that the sophisticated stressed household's consumption  $c_j(a)$  is very sensitive to  $a$  in the neighborhood of  $\underline{a}$ . The first term in (20) is then large and dominant.

$z_0 = z_j$  for  $j \in \{1, 2\}$  :

$$\omega_j(a) \equiv \mathbb{E} \left[ \int e^{-\rho t} u(c_j(a_t), \ell_j(a_t); \Theta(a_t)) dt \middle| a_0 = a, z_0 = z_j \right]. \quad (21)$$

subject to the law of motion of assets (2) and the transition of idiosyncratic states. The HJB equation for  $\{\omega_j(a)\}_{j=1}^2$  is

$$\rho \omega_j(a) = u(c_j(a), \ell_j(a); \Theta(a)) + [ra - c_j(a) + wz_j \ell_j(a)] \omega'_j(a) + \lambda [\omega_{-j}(a) - \omega_j(a)]. \quad (22)$$

Two points are worth clarifying. First, (21) and (22) hold under both sophistication and naivete. The differences between sophistication and naivete are summarized by decision rules  $\{c_j(a), \ell_j(a)\}_{j=1}^2$ . Second, under naivete, the welfare function  $\{\omega_j(a)\}_{j=1}^2$  in (21) differs from the perceived value function in (10). The welfare function in (21) is evaluated from a paternalistic viewpoint based on the correct understanding of the impact of future financial stress. The perceived value function in (10) is, instead, based on the naive household's neglect of the impact of future financial stress.

We then develop a money-metric measure of the welfare costs of financial stress. Given the initial state  $a_0 = a$  and  $z_0 = z_j$  for  $j \in \{1, 2\}$ ,  $t_j(a)$  captures the transfer needed to fully compensate the household for the impact of financial stress:

$$\omega_j(a + t_j(a)) = \omega_j^{\text{no-stress}}(a), \quad (23)$$

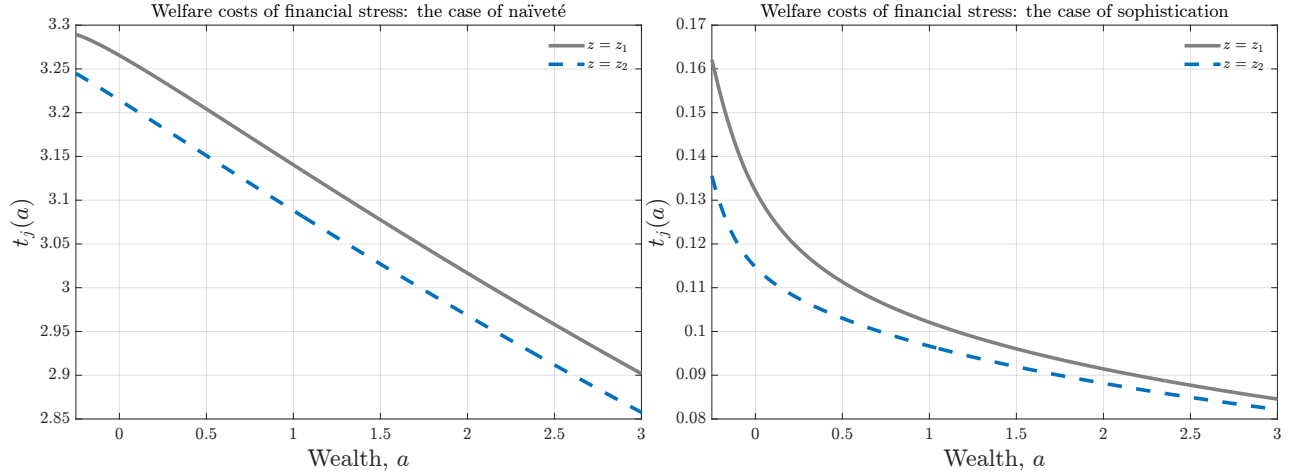
where  $\omega_j^{\text{no-stress}}(a)$  captures the welfare in equation (21) without financial stress, i.e.,  $\Theta(a) = 0$ .

Figure 13 plots the welfare costs of financial stress  $\{t_j(a)\}_{j=1}^2$  under naivete and sophistication. The welfare costs of naifs' financial stress are much larger, roughly twenty times larger than sophisticates. Naivete significantly worsens the welfare costs of financial stress because naifs' consumption and labor decisions are suboptimal, leading them to fall into poverty traps and to incur negative effects from financial stress persistently. On the other hand, sophisticates, who save themselves from poverty traps, only incur negative effects temporarily, and only in the proximity to the financial constraint.

### 5.3 The Financial Stress Channel of Fiscal Stimulus

A natural implication of the positive wealth effect on labor supply for stressed households in Section 5.1 is a new transmission mechanism for fiscal policy: a lump-sum fiscal stimulus relieves financial stress, increases productive labor supply, and boosts aggregate output. In fact, in Biden's speech about the American Rescue Plan Act of 2021, he mentioned that "so many people need

**Figure 13:** Welfare Costs of Financial Stress (Naivete vs Sophistication).



Notes: The left panel plots the welfare cost of stress  $t_j(a)$  at each idiosyncratic income state for the naive stressed households. The right panel does so for the sophisticated stressed households.

help, because (the pandemic) caused an enormous *stress*,” and a key role of the stimulus check is to relieve the stress caused by the pandemic.

To motivate this exercise, we ask in our survey the following question.

*Q21b: On a scale from 1 to 10, how much did those checks alleviate your financial concerns?*

The respondents answer that these stimulus checks significantly alleviated their financial stress. Figure B.1 shows that the median answer is 5.

To illustrate how financial stress introduces a new transmission mechanism for fiscal stimulus, we first consider a general equilibrium model with a representative financially stressed agent. That is, we consider the model in Section 3 but temporarily shut down the idiosyncratic productivity shock and treat  $z$  as a constant that equals one. We introduce a lump sum fiscal transfer  $T_t$  financed by public debt  $b_t$ .<sup>32</sup>

The household’s budget constraint (2) becomes  $\dot{a}_t = r_t a_t - c_t + T_t + w \ell_t$ , while the government budget constraint and asset market clearing are given by  $\dot{b}_t = r_t b_t + T_t$  and  $b_t = a_t$ . On the production side, we make things simple and consider a competitive representative firm with linear production technology:  $y_t = \ell_t$ . Finally, good market clearing implies  $c_t = y_t$ .

We first revisit the no-stress benchmark.

**Proposition 5.** *Without financial stress, i.e.,  $\Theta(a) = 0$  for all  $a$ , equilibrium aggregate spending, labor supply, and output paths  $\{c_t, \ell_t, y_t\}_{t=0}^{+\infty}$  are independent of the paths of fiscal stimulus and aggregate debt  $\{b_t, T_t\}_{t=0}^{+\infty}$*

<sup>32</sup>A positive  $T_t$  means a lump sum transfer and a negative  $T_t$  means a lump sum tax.

Proposition 5 is the famed Ricardian Equivalence result in Barro (1974). Fiscal transfers financed by public debt do not change the household's present value of its lifetime post-tax income, because an increase in public debt leads to increases in future taxes. As a result, these fiscal transfers do not affect the household's consumption and labor supply. Equilibrium aggregate spending, labor supply, and output are hence unchanged.

Now, we show how the financial stress channel breaks the Ricardian Equivalence and provides a new rationale for using fiscal transfers to stimulate the economy.

**Proposition 6.** *Fiscal stimulus financed by public debt stimulates aggregate spending and output:*

$$\frac{dy_t}{db_t} = -\frac{\varphi^v}{\varphi^v + \frac{v}{\sigma}y_t^{-\frac{v}{\sigma}-1}}\Theta'(b_t) > 0.$$

To understand this result, note that asset market clearing  $a_t = b_t$  means that the equilibrium stress level  $\Theta(a_t) = \Theta(b_t)$  decreases with the level of public debt  $b_t$ . Public debt-financed stimulus checks boost private assets and alleviate financial stress. This increases effective labor supply and boosts aggregate output. Consistent with this prediction, Coibion, Gorodnichenko and Weber (2020) find that the unemployed searched harder for jobs in response to stimulus checks during the COVID-19 crisis.

We now turn to the heterogeneous-agent version of our model with idiosyncratic risk, as in the main analysis. Taking into account the taxes, the budget constraint of a household  $i \in [0, 1]$  becomes

$$\dot{a}_{i,t} = ra_{i,t} - c_{i,t} + wz_{i,t}\ell_{i,t} - T_t.$$

The production side of the economy is similar to above: the competitive representative firm produces given the linear technology:  $y_t = \int z_{i,t}\ell_{i,t}di$ . In equilibrium, the goods and asset market clear:  $y_t = c_t$ ,  $\int a_{i,t}di = b_t$ , and the interest rate  $r_t$  adjusts to ensure market clearing.

To assess the effect of public debt increase, we compare the aggregate output level in two stationary equilibria where the only exogenous variable that differs is the level of outstanding public debt  $B$ . In one case, public debt level  $b_t = B = 0.56$ , the same as the aggregate asset level in Table 5 in the main analysis. In another case, public debt rises to the new steady level of  $b_t = B + \Delta B$ , where  $\Delta B = 0.25$  (e.g., similar to the expansion of public debt to GDP during the COVID-19 pandemic). In each case, the government keeps the level of government debt at a constant level by collecting taxes  $T_t = r_t b_t$  in every instant  $t$ . These taxes are levied uniformly across all agents in the economy.

The economy is populated by a mixture of sophisticates and naifs, as in Figure 6. All the calibration parameters (except the endogenous real interest rate) are identical to our benchmark



calibration in Table 5. We find that

$$\frac{y(B + \Delta B) - y(B)}{y(B)} = 0.67\%,$$

where  $y(B)$  is the level of aggregate output in a stationary equilibrium with outstanding public debt  $B$ . In other words, an increase in public debt similar to the expansion of public debt during the COVID-19 pandemic can boost aggregate output by 0.67 percent. To be clear, this calculation isolates *one* channel: the supply-side channel of financial stress on labor supply. Introducing a demand-side channel through nominal rigidities can make the effect larger.

## 6 Conclusion

Although financial stress is a feature of life for many people in developed and developing countries, it remains understudied in economics. To shed more light on this matter, we investigate the psychological costs of being financially constrained and their economic consequences. We document that the majority of US households experience financial stress, and financial stress is strongly correlated with measures of financial constraints. A key innovation of our survey is to introduce questions that allow us to quantify the consequences of financial stress and map them into theory. The main bulk of our contribution is to develop a tractable model of intertemporal decisions and wealth distribution incorporating financial stress. We show that a psychology-based theory of poverty traps requires not only financial stress itself but also naivete. The financial stress channel can reverse the counterfactual negative wealth effect on labor supply. Financial stress also has macroeconomic consequences on wealth inequality and fiscal multipliers.

Our findings suggest several avenues for future research and potential policy recommendations. For example, we focus on how financial stress crowds out valuable time and cognition from productive work, but we also lay out alternative channels for the impact of financial stress. Further exploring these channels empirically and theoretically appears to be a fertile area for future work. The key role of naivete suggests that policies such as default choices that encourage saving and the promotion of financial literacy could be powerful antidotes to the negative consequences of financial stress. By highlighting the increasing welfare costs experienced by naive financially stressed households, our results may also diverge from standard business cycle models which imply small, if not trivial, welfare costs of business cycles (Lucas, 2003). As a result, there could be more scope for targeted countercyclical policies to ensure that recessions do not push vulnerable households into poverty traps.

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## A Proofs

This section collects the proofs omitted from the main text of the paper.

### A.1 Proof of Proposition 1

Differentiating the HJB equation (5) and using the envelope theorem, we obtain

$$\begin{aligned} \rho v_j'(a) = & -\varphi[\ell_j(a) + \Theta(a)]^{\frac{1}{\sigma}} \Theta'(a) + r v_j'(a) + [ra - c_j(a) + wz_j \ell_j(a)] v_j''(a) \\ & + \lambda (v_{-j}'(a) - v_j'(a)). \end{aligned} \quad (\text{A.1})$$

Together with optimal consumption in (6) and the optimal labor supply in (7), we have:

$$\begin{aligned} \rho c_j^{-\frac{1}{\sigma}}(a) = & \left[ r - wz_j \Theta'(a) \right] c_j^{-\frac{1}{\sigma}}(a) - \frac{1}{\sigma} [ra - c_j(a) + wz_j \ell_j(a)] c_j^{-\frac{1}{\sigma}-1}(a) c_j'(a) \\ & + \lambda \left[ c_{-j}^{-\frac{1}{\sigma}}(a) - c_j^{-\frac{1}{\sigma}}(a) \right]. \end{aligned}$$

From the budget (2) and the transition intensity of the idiosyncratic productivity, we know

$$\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right] = \left[ -\frac{1}{\sigma} (ra - c_j(a) + wz_j \ell_j(a)) c_j^{-\frac{1}{\sigma}-1}(a) c_j'(a) + \lambda \left( c_{-j}^{-\frac{1}{\sigma}}(a) - c_j^{-\frac{1}{\sigma}}(a) \right) \right] dt.$$

Together, we have

$$-\frac{\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right]}{c_j^{-\frac{1}{\sigma}}(a)} = [r - \rho - wz_j \Theta'(a)] dt.$$

### A.2 Proof of Proposition 2

Differentiating the HJB equation (10) and using  $v_j^p(a) = v_j^{\text{no-stress}}(a)$  and the envelope theorem, we get

$$\begin{aligned} \rho \left( v_j^p \right)'(a) = & r \left( v_j^p \right)'(a) + [ra - c_j^p(a) + wz_j \ell_j^p(a)] \left( v_j^p \right)''(a) \\ & + \lambda \left[ \left( v_{-j}^p \right)'(a) - \left( v_j^p \right)'(a) \right], \end{aligned}$$

where  $c_j^p(a)$  and  $\ell_j^p(a)$  solve the HJB equation (10) and are given by the following first order optimality conditions

$$\begin{aligned}\varphi\left(\ell_j^p(a)\right)^{\frac{1}{v}} &= wz_j\left(c_j^p(a)\right)^{-\frac{1}{\sigma}} \\ \left(c_j^p(a)\right)^{-\frac{1}{\sigma}} &= \left(v_j^p\right)'(a).\end{aligned}$$

From equations (7) and (9), we know that

$$c_j^p(a) = c_j(a) \quad \text{and} \quad \ell_j^p(a) = \ell_j(a) + \Theta(a).$$

Combining these insights, we obtain

$$\rho c_j^{-\frac{1}{\sigma}}(a) = r c_j^{-\frac{1}{\sigma}}(a) - \frac{1}{\sigma} [ra - c_j(a) + wz_j(\ell_j(a) + \Theta(a))] c_j^{-\frac{1}{\sigma}-1}(a) c_j'(a) + \lambda \left[ c_{-j}^{-\frac{1}{\sigma}}(a) - c_j^{-\frac{1}{\sigma}}(a) \right]. \quad (\text{A.2})$$

From the budget (2), the transition intensity of the idiosyncratic productivity, and Ito's lemma for jump processes, we know

$$\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right] = \left[ -\frac{1}{\sigma} (ra - c_j(a) + wz_j \ell_j(a)) c_j^{-\frac{1}{\sigma}-1}(a) c_j'(a) + \lambda \left( c_{-j}^{-\frac{1}{\sigma}}(a) - c_j^{-\frac{1}{\sigma}}(a) \right) \right] dt. \quad (\text{A.3})$$

Using equation (A.3), we can rewrite equation (A.2) in a more compact form

$$\rho c_j^{-\frac{1}{\sigma}}(a) = r c_j^{-\frac{1}{\sigma}}(a) + E_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right] - \frac{1}{\sigma} wz_j \Theta(a) c_j^{-\frac{1}{\sigma}-1}(a) c_j'(a),$$

which simplifies to

$$-\frac{\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right]}{c_j^{-\frac{1}{\sigma}}(a)} = \left[ r - \rho - \frac{1}{\sigma} wz_j \Theta(a) \frac{c_j'(a)}{c_j(a)} \right] dt.$$

### A.3 Proof of Proposition 3

**Part 1.** Note that with a deterministic  $z$ , Proposition 1 implies

$$-\frac{dc_j^{-\frac{1}{\sigma}}(a)}{c_j^{-\frac{1}{\sigma}}(a)} = \frac{1}{\sigma} \cdot \frac{dc_j(a)}{c_j(a)} = \frac{1}{\sigma} \cdot \frac{c_j'(a) s(a) dt}{c_j(a)} = (r - \rho - wz_j \Theta'(a)) dt.$$



Because  $c_j'(a) > 0$ ,  $s(a)$  has the same sign as  $r - \rho - wz_j\Theta'(a)$ . Part 1 of Proposition 3 then follows from the fact  $\Theta(\cdot) \in \mathcal{C}^1(\mathbb{R}^+)$ .

**Part 2.** Note that, with a deterministic  $z$  and Proposition 2

$$-\frac{dc_j^{-\frac{1}{\sigma}}(a)}{c_j^{-\frac{1}{\sigma}}(a)} = \frac{1}{\sigma} \cdot \frac{dc_j(a)}{c_j(a)} = \frac{1}{\sigma} \cdot \frac{c_j'(a)s(a)dt}{c_j(a)} = \left[ r - \rho - \frac{1}{\sigma} wz_j\Theta(a) \frac{c_j'(a)}{c_j(a)} \right] dt.$$

Because  $r < \rho$  and  $c_j'(a) > 0$ ,  $s(a)$  has the same sign as  $r - \rho - \sigma^{-1}wz_j\Theta(a)c_j'(a)/c_j(a) < 0$ . This proves part 2 of Proposition 3.

**Part 3.** See Part 1 of Proposition 1 in Achdou et al. (2022).

## A.4 Proof of Proposition 4

Consider our benchmark problem with an exogenously decreasing stress function  $\Theta^{\text{benchmark}}(a)$  under sophistication studied in Section 3. Let  $\{c_j^{\text{benchmark}}(a), \ell_j^{\text{benchmark}}(a)\}_{j=1}^2$  be the optimal consumption and labor supply and  $\{v_j^{\text{benchmark}}(a)\}_{j=1}^2$  be the optimal value function. We can find  $\{W_j(a, \Theta)\}_{j=1}^2$  such that

$$W_j(a, \Theta) = W_{0,j}(a) - \Theta W_{1,j}(a),$$

where  $\Theta$  is a real number and

$$W_{1,j}(a) \equiv wz_j(c_j^{\text{benchmark}}(a))^{-\frac{1}{\sigma}} = \varphi(\ell_j^{\text{benchmark}}(a) + \Theta^{\text{benchmark}}(a))^{\frac{1}{v}} = wz_j(v_j^{\text{benchmark}})'(a), \quad (\text{A.4})$$

and

$$W_{0,j}(a) \equiv \Theta^{\text{benchmark}}(a) wz_j(v_j^{\text{benchmark}})'(a),$$

so that

$$W_{0,j}'(a) = wz_j(c_j^{\text{benchmark}}(a))^{-\frac{1}{\sigma}} (\Theta^{\text{benchmark}})'(a) + \Theta_j(a) wz_j(v_j^{\text{benchmark}})''(a). \quad (\text{A.5})$$

Now, consider the household problem with endogenous stress choice (15) with (A.4) and (A.5). The corresponding HJB equation of the household problem is

$$\rho v_j(a) = \max_{c, \ell, \Theta} \left\{ \frac{c^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{(\ell + \Theta)^{1+\frac{1}{v}}}{1+\frac{1}{v}} - [W_{0,j}(a) - \Theta W_{1,j}(a)] + (ra - c + wz_j\ell) v_j'(a) + \lambda [v_{-j}(a) - v_j(a)] \right\}.$$

Let us use  $\{c_j(a), \ell_j(a), \Theta_j(a)\}_{j=1}^2$  to denote the optimal consumption, labor supply, and stress choices and  $\{v_j(a)\}_{j=1}^2$  to denote the value function evaluated at optimum. Optimal choices imply

$$wz_j v_j'(a) = wz_j (c_j(a))^{-\frac{1}{\sigma}} = \varphi(\ell_j(a) + \Theta_j(a))^{\frac{1}{v}} = W_{1,j}(a). \quad (\text{A.6})$$

Using the definition (A.4) and the optimality condition (A.6), we deduce that

$$\begin{aligned} c_j(a) &= c_j^{\text{benchmark}}(a), \quad v_j'(a) = (v_j^{\text{benchmark}})'(a), \\ \text{and } \ell_j^{\text{benchmark}}(a) + \Theta^{\text{benchmark}}(a) &= \ell_j(a) + \Theta_j(a). \end{aligned} \quad (\text{A.7})$$

The envelope theorem implies

$$\rho v_j'(a) = -W'_{0,j}(a) + \Theta_j(a) W'_{1,j}(a) + r v_j'(a) + [ra - c_j(a) + wz_j \ell_j(a)] v_j''(a) + \lambda [v_{-j}'(a) - v_j'(a)].$$

Together with (A.4), (A.5), and (A.7), we have

$$\begin{aligned} \rho (v_j^{\text{benchmark}})'(a) &= -\varphi [\ell_j^{\text{benchmark}}(a) + \Theta^{\text{benchmark}}(a)]^{\frac{1}{v}} (\Theta^{\text{benchmark}})'(a) + r (v_j^{\text{benchmark}})'(a) \\ &\quad + [ra - c_j^{\text{benchmark}}(a) + wz_j \ell_j(a)] (v_j^{\text{benchmark}})''(a) \\ &\quad + \lambda [(v_{-j}^{\text{benchmark}})'(a) - (v_j^{\text{benchmark}})'(a)]. \end{aligned}$$

Comparing the last equation to equation (A.1) above, we get

$$\ell_j(a) = \ell_j^{\text{benchmark}}(a) \quad \text{and} \quad \Theta_j(a) = \Theta^{\text{benchmark}}(a),$$

and Proposition 4 is proved.

## A.5 Proof of Proposition 5

Optimal labor supply implies

$$\varphi \ell_t^{\frac{1}{v}} = w c_t^{-\frac{1}{\sigma}}.$$

Technology  $y_t = \ell_t$  and market clearing  $c_t = y_t$  imply

$$w = 1 \quad \text{and} \quad c_t = \ell_t = y_t.$$

Together, we have

$$\varphi y_t^{\frac{1}{v}} = y_t^{-\frac{1}{\sigma}} \implies y_t = \varphi^{-1/(\frac{1}{\sigma} + \frac{1}{v})}.$$

As a result,  $\{c_t, \ell_t, y_t\}_{t=0}^{+\infty}$  are independent of the path of fiscal stimulus and aggregate debt  $\{b_t, T_t\}_{t=0}^{+\infty}$ .

## A.6 Proof of Proposition 6

Optimal labor supply and asset market clearing imply

$$\varphi[\ell_t + \Theta(b_t)]^{\frac{1}{v}} = w c_t^{-\frac{1}{\sigma}}.$$

Technology  $y_t = \ell_t$  and market clearing  $c_t = y_t$  imply

$$w = 1 \quad \text{and} \quad c_t = \ell_t = y_t.$$

Together, we have

$$\varphi(y_t + \Theta(b_t))^{\frac{1}{v}} = y_t^{-\frac{1}{\sigma}}.$$

After taking a derivative of both sides of the last equation with respect to the level of debt  $b_t$ , we obtain

$$\frac{dy_t}{db_t} = -\frac{\varphi^v \Theta'(b_t)}{\varphi^v + \frac{v}{\sigma} y_t^{-\frac{v}{\sigma}-1}}.$$

## B Additional Survey Analysis

### B.1 Our Surveys Compared to the 2019 American Community Survey

As designed, we want to highlight that the individual characteristics in our full sample are close to those of the general US population as seen in the 2019 American Community Survey (ACS) along five key dimensions: gender, age, household’s income, education, and region. These results are presented in Table B.1. For example, the median income in the ACS is \$41,600, while the median in our sample is \$40,000-49,999, which we code using the midpoint of \$45,000.

**Table B.1:** Summary Statistics

	(1) ACS	(2) Survey: full sample	(3) Survey: restricted sample	(4) Supp. survey
<b>Gender</b>				
Female	0.51	0.51	0.52	0.46
<b>Age</b>				
18-34	0.38	0.41	0.40	0.49
35-54	0.41	0.41	0.40	0.40
55-64	0.21	0.18	0.20	0.11
<b>Household’s income</b>				
Median income, USD	41,600	45,000	55,000	45,000
<b>Education</b>				
College or more	0.26	0.29	0.32	0.46
<b>Region</b>				
Northeast	0.18	0.17	0.17	0.16
Midwest	0.21	0.23	0.24	0.21
South	0.38	0.43	0.42	0.41
West	0.23	0.16	0.17	0.22
Observations	3,239,553	10,000	6,686	1,001

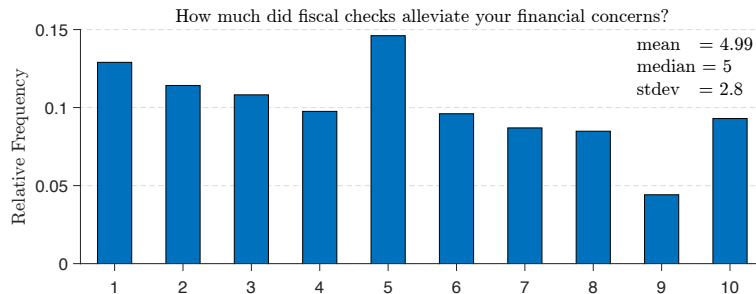
Notes: The table compares the individual characteristics of Americans in the 2019 American Community Survey (ACS) in column (1) to the characteristics in the full (column (2)) and restricted (column (3)) samples in our main survey, and the supplementary survey (column (4)). The ACS statistics were computed using the full sample of unique individuals. Household income sums up the gross earnings of all (non-institutionalized) members within households, resulting in 1,276,643 household-level observations. The shares across the age groups were normalized by the mass of people in these groups so that they sum up to one (e.g.,  $0.38 + 0.41 + 0.21 = 1$ ).

## B.2 Stimulus Check and Financial Stress

Figure B.1 shows the histogram of answers to the following question in the full sample of our main survey.

*Q21b: On a scale from 1 to 10, how much did those checks alleviate your financial concerns?*

**Figure B.1:** Stimulus Checks and Financial Stress.



Notes: The figure shows the histogram of the answers to question Q21b of our survey.

## C Analysis based on the Restricted Sample

We incorporate an attention check in the survey. We first say:

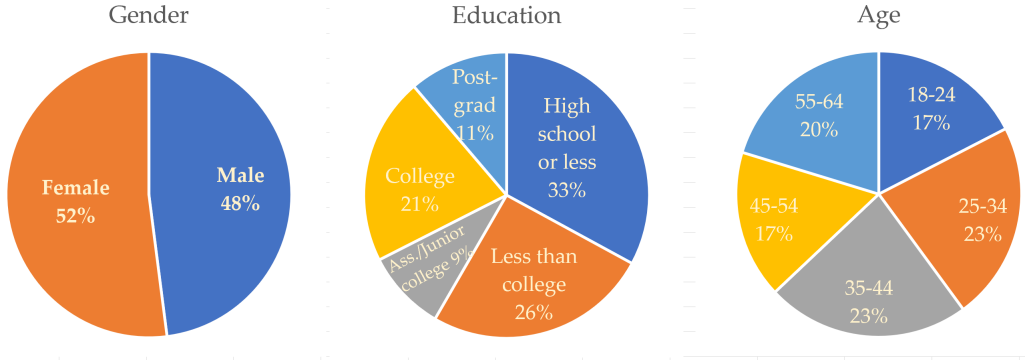
*Q14. The next question is about the following problem. In questionnaires like ours, sometimes there are participants who do not carefully read the questions and just quickly click through the survey. This means that there are a lot of random answers which compromise the results of research studies. To show that you read our questions carefully, please enter turquoise as your answer to the next question.*

We then ask what respondent's favorite color is. In this Appendix C, we report all analysis for the restricted sample of respondents who pass the attention check. The analysis is very similar to the full sample reported in the main text.

### C.1 Demographics

In Figure C.1 and Table C.1, we report the demographics of the restricted sample. Compared to Figure 1 and Table 1 based on the full sample, this sample is slightly more educated. It also has a somewhat higher average annual income (\$66,649 vs \$62,432) and average net asset (\$83,092 vs \$66,791).

**Figure C.1:** Restricted Sample Characteristics: Demographics



Notes: These pie charts represent the sample characteristics based on the subsample of respondents who answered the screener question Q14 (see above and Appendix F) correctly.

**Table C.1:** Restricted Sample Characteristics: Household Size, Income, and Wealth

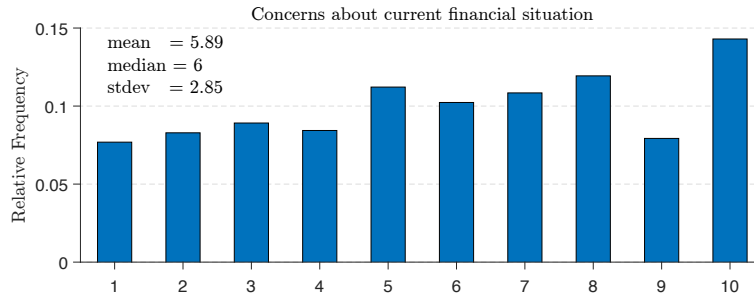
Vars	Obs	Mean	Median	Std	Min	Max	q25	q75
Household size	6,686	3.3	3	1.6	1	12	2	4
Annual income	6,686	66,649	55,000	63,332	5,000	600,000	25,000	85,000
Net assets	6,667	83,092	5,000	236,668	-55,000	1,100,000	-25,000	55,000

Notes: This table shows the sample characteristics based on the subsample of respondents who answered the screener question Q14 (see above and Appendix F) correctly. The number of observations does not always equal to 10,000 because respondents can skip questions. To compute the statistics for the income and assets questions, we use the midpoints of the intervals chosen by the respondents (see questions Q4 and Q11 in Appendix F). For the open intervals "\$500,000 or more," "- \$50,000 or less," and "\$1,000,000 or more," we set \$550,000, -\$55,000, and \$1,100,000, respectively.

## C.2 The Prevalence of Financial Stress

In Figure C.2 and Table C.3, we report the prevalence of financial stress in the restricted sample of respondents who pass all attention checks. The qualitative measure of financial stress based on this sample is very similar to Figure 2 based on the full sample.

**Figure C.2:** Qualitative Measure of Financial Stress, the Restricted Sample



Notes: The figure shows the histogram of the answers to question Q12 of the survey based on the subsample of respondents who answered the screener question Q14 (see above and Appendix F) correctly.

**Table C.2:** Predictors of Financial Stress, the Restricted Sample

	Qual. measure of stress		Working hours distracted		Hours on fin. issues	
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Constraint (omitted: Intercept)						
Cannot pay	7.723*** (0.103)	7.578*** (0.129)	9.963*** (0.258)	9.417*** (0.326)	10.401*** (0.434)	10.27*** (0.555)
Need to borrow	6.974*** (0.047)	6.870*** (0.093)	7.928*** (0.119)	7.335*** (0.233)	9.086*** (0.200)	8.964*** (0.401)
No need to borrow	4.560*** (0.045)	4.796*** (0.095)	3.515*** (0.112)	3.632*** (0.238)	5.018*** (0.195)	5.534*** (0.413)
Controls						
Income		-0.111** (0.041)		-0.207 (0.105)		0.188 (0.173)
Net financial asset		-0.121*** (0.011)		-0.098*** (0.027)		-0.104* (0.047)
Non-primary earner		-0.415*** (0.105)		-0.699** (0.261)		-1.922*** (0.464)
Age		0.025*** (0.002)		-0.042*** (0.006)		-0.018 (0.012)
Age <sup>2</sup> /100		-0.120*** (0.021)		-0.255*** (0.052)		-0.347*** (0.090)
Female		0.251*** (0.062)		0.521*** (0.158)		0.581* (0.269)
Education (omitted: Some college)						
High school or less		-0.158* (0.075)		0.060 (0.190)		0.001 (0.322)
College		-0.099 (0.087)		-0.328 (0.219)		-0.885* (0.382)
Post-graduate		-0.050 (0.113)		-0.213 (0.284)		-0.759 (0.485)
Married		0.058 (0.067)		0.289 (0.169)		0.091 (0.289)
Have at least one child		0.190** (0.066)		0.638*** (0.167)		0.611* (0.287)
Have at least one parent		0.072 (0.062)		0.303 (0.157)		0.634** (0.270)
Observations	6671	6654	4982	4966	1678	1678
R <sup>2</sup>	0.205	0.248	0.166	0.200	0.138	0.178

Notes: Robust standard errors in parentheses. Each regression omits an intercept because the first three dummy variables sum up to one. The income control is demeaned and divided by the mean, the assets control is demeaned and divided by the mean income, and the age variable is demeaned. \* indicates  $p < 0.05$ , \*\* –  $p < 0.01$ , \*\*\* –  $p < 0.001$ .

For question Q9 about whether respondents are financially constrained, 9 percent of households in our restricted sample are severely financially constrained (“cannot pay”). 43 percent of households are somewhat constrained (“need to borrow”). The rest, 48 percent of households, are unconstrained. This is similar to the full sample reported in the main text.

Similarly to Table 3, we find that measures of financial stress are strongly correlated with being financially constrained (columns (1) and (2) of Table C.2). On average, the people who “cannot

pay” the emergency expense have the stress level of 7.7 (in contrast to 7.4 in the full sample). This number drops to 7.0 for those who “need to borrow” (in contrast to 6.8 in the full sample), and 4.6 for the respondents “who do not need to borrow” (as opposed to 4.7 in the full sample). Similar to the full sample, adding individual characteristics as controls does not change these magnitudes much.

### C.3 Consequences of Financial Stress

For quantitative measures of the consequences of financial stress, the restricted sample is slightly less affected by financial stress (Table C.3 compared to Table 2): the average working hours distracted is 6.0 hours (v.s. 6.4 hours) per week, the average hours spent on financial issues is 7.3 hours (vs. 7.7 hours) per week, and the average amount of dollars spent on alleviating financial stress is 198.4 dollars (vs. 211.2 dollars) per week.

**Table C.3:** Quantitative Measures of the Consequences of Financial Stress, the Restricted Sample

	Obs	Mean	Median	Std	Min	Max	q25	q75
Hours worked	6,681	39.0	40	13.3	0	100	32	45
Working hours distracted	4,982	6.0	5	6.0	0	20	1	10
Hours on financial issues	1,648	7.3	5	5.9	0	20	3	10
Stress spending	6,679	198.4	100	257.1	0	1000	25	250

Notes: “Hours worked” represent the answers to the question Q16: “How many hours do you typically work in a week these days?”, “Working hours distracted” to the question Q17a, “Hours on financial issues” to the question Q17b, and “Stress spending” to question Q20. The restricted sample is a subsample of respondents who answered the screener question Q14 (see above and Appendix F) correctly.

Similarly to Table 4, we find that distracted hours at work and hours spent on financial issues strongly increase with the qualitative measure of financial stress (Q12) in the restricted sample. These results are in Table C.4. The magnitudes are quite close to the full sample ones: a one unit increase in the qualitative measure of stress increases distracted hours at work and hours spent on financial issues by approximately one hour.

Columns (3)-(6) of Table C.2 demonstrate that whether the household is financially constrained is a strong predictor of distracted hours at work and hours spent on financial issues, similar to the full sample.

### C.4 Financial Stress and Distance to Financial Constraints

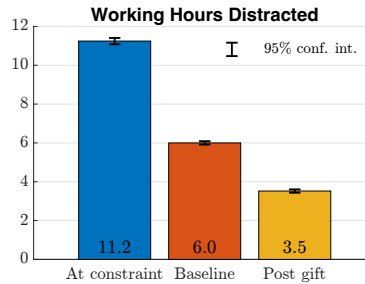
Figure C.3 summarizes the responses to Q19a and Q19b. Compared to Figure 3, respondents in the restricted sample report that they would be distracted for 11.2 hours (vs. 10.8 hours) per week at financial constraints. A \$2,000 check on average would reduce the distracted hours by 2.6 hours (vs. 2.2 hours) per week.



**Table C.4:** Consequences of Financial Stress, the Restricted Sample

	Working hours distracted (1)	(2)	Hours on financial issues (3)	(4)
Qual. measure of stress	1.117*** (0.025)	1.077*** (0.026)	1.068*** (0.043)	1.410*** (0.439)
Controls				
Non-primary earner		-0.308 (0.241)		-1.730*** (0.423)
Age		-0.070*** (0.006)		-0.039*** (0.010)
Age <sup>2</sup> /100		-0.191*** (0.048)		-0.264** (0.082)
Female		0.373* (0.144)		0.394 (0.244)
Education (omitted: Some college)				
High school or less		0.362* (0.174)		0.471 (0.292)
College		-0.721*** (0.195)		-0.777* (0.340)
Post-graduate		-0.638** (0.247)		-0.839* (0.420)
Married		0.117 (0.153)		-0.056 (0.261)
Have at least one child		0.348* (0.153)		0.740** (0.261)
Have at least one parent		0.304* (0.145)		0.451 (0.247)
Intercept	✓	✓	✓	✓
Observations	4976	4976	1675	1675
R <sup>2</sup>	0.278	0.318	0.273	0.310

Notes: Robust standard errors in parentheses. The income control is demeaned and divided by the mean, the assets control is demeaned and divided by the mean income, and the age variable is demeaned. \* indicates  $p < 0.05$ , \*\* –  $p < 0.01$ , \*\*\* –  $p < 0.001$ .

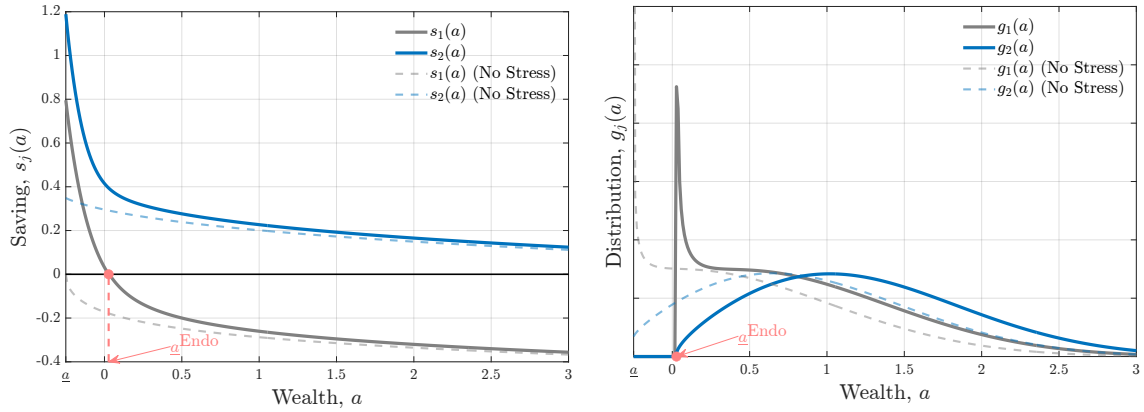
**Figure C.3:** Financial Stress and Distance to Financial Constraints

Notes: The histogram presents averages of distracted hours at work in a hypothetical scenario where the household has no assets to cover an emergency (question Q19a of our survey), the baseline level of distracted hours at work (questions Q17ab of our survey), distracted hours at work in a hypothetical scenario where the household receives a gift of \$2,000 (question Q19b of our survey). The averages are based on the subsample of respondents who answered the screener question Q14 (see above and Appendix F) correctly.

## C.5 The Impact of Financial Stress: Household Behavior, Wealth Distribution, and Welfare Costs

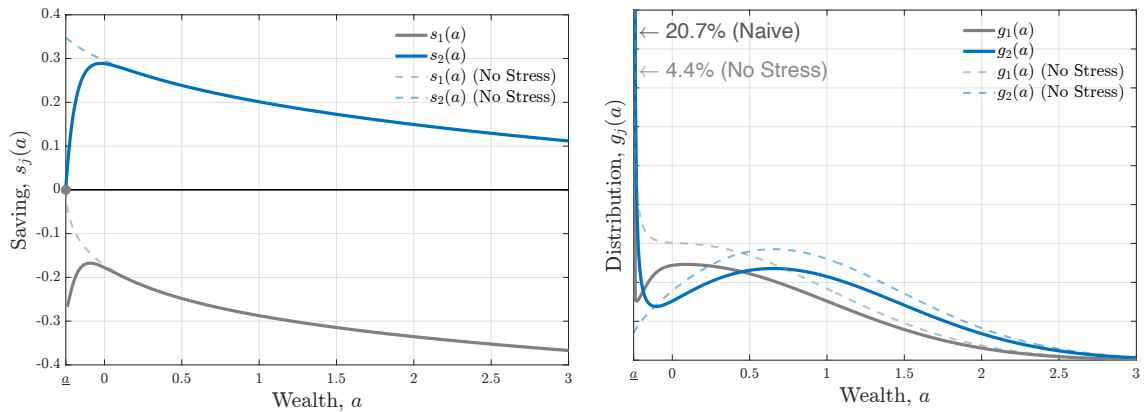
Here, we use the same parameters as in 3.4 with the exception of  $(\bar{\Theta}, \alpha)$  which we calibrate to  $(0.29, 15.5)$  based on the restricted sample of respondents. Other parameters are the same as in Table 5. From Figures C.4 and C.5, the main lessons that sophisticates save out of the financial stress states while naifs fall into the poverty trap remain to be true.

**Figure C.4:** Calibration based on the Restricted Sample (Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. The calibration is based on the sample restricted to those who answered the screener question Q14 correctly. The details are in Appendix C.5.

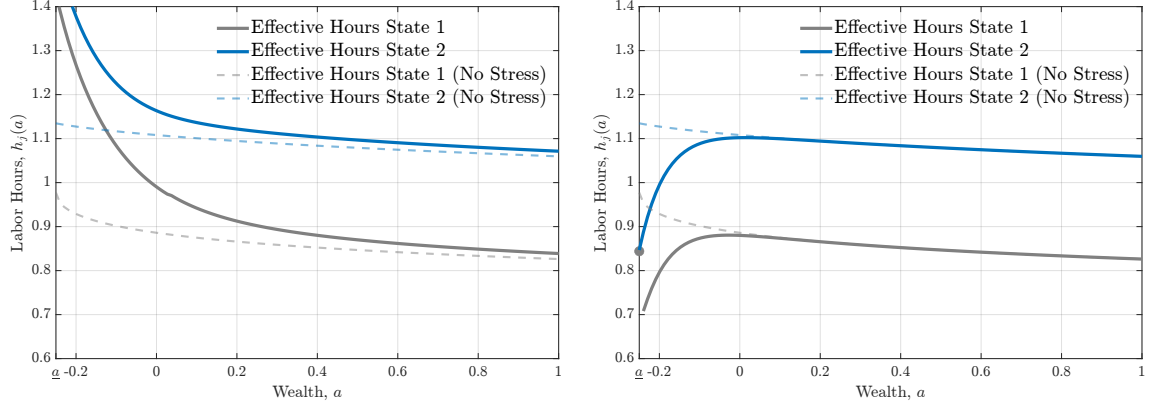
**Figure C.5:** Calibration based on the Restricted Sample (Naivete).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states of a naive household. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress. The calibration is based on the sample restricted to those who answered the screener question Q14 correctly. The details are in Appendix C.5.

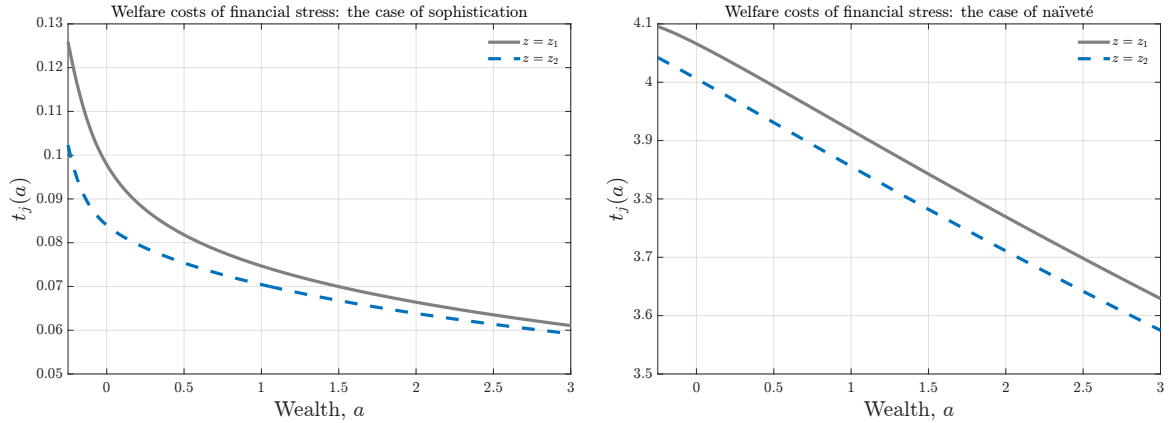
Comparing Figure C.6 to Figure 12, we observe that the financial stress channel still reverses the counterfactual large negative wealth effect on labor supply for naifs (but not for sophisticated). Comparing Figure C.7 to Figure 13, we observe that the welfare costs of naifs' financial stress are still much larger than the welfare costs of sophisticates' financial stress.

**Figure C.6:** Calibration based on the Restricted Sample (Labor Supply: Sophistication vs Naivete)



Notes: The left panel plots the labor supply function  $\ell_j(a)$  at each idiosyncratic income state for the naive stressed households (solid lines) and no-stress households (dashed lines). The right panel plots the labor supply function  $\ell_j(a)$  at each idiosyncratic income state for the sophisticated stressed households (solid lines) and no-stress households (dashed lines). The calibration is based on the sample restricted to those who answered the screener question Q14 correctly. The details are in Appendix C.5.

**Figure C.7:** Calibration based on the Restricted Sample (Welfare Costs: Sophistication vs Naivete)



Notes: The left panel plots the welfare cost of stress  $t_j(a)$  at each idiosyncratic income state for the naive stressed households. The right panel does so for the sophisticated stressed households. The calibration is based on the sample restricted to those who answered the screener question Q14 correctly. The details are in Appendix C.5.

## D The Supplementary Survey

Our supplementary survey consists of a sample of 1,001 respondents who are employed US workers. The sample is representative of the US population in terms of gross household income.<sup>33</sup> Table B.1 compares the respondents’ characteristics across our surveys and the 2019 American Community survey. We collected the data in April 2023 in collaboration with Prolific, a standard online survey provider. The novel question in the supplementary survey pertains to reasons for saving. We have adapted this question from the Making Ends Meet Survey conducted by the Consumer Financial Protection Bureau, adding an extra option related to targeted financial stress: “Relieve financial stress to maintain focus at work.” The remainder of the survey is similar to the main survey, as described in Section 2.

Specifically, the new question is:<sup>34</sup>

**Q.** People have different reasons for saving, even though they may not be saving all the time. What are your most important reasons for saving? Please pick **up to three reasons** and rank them. [RANDOMIZE THE ORDER]

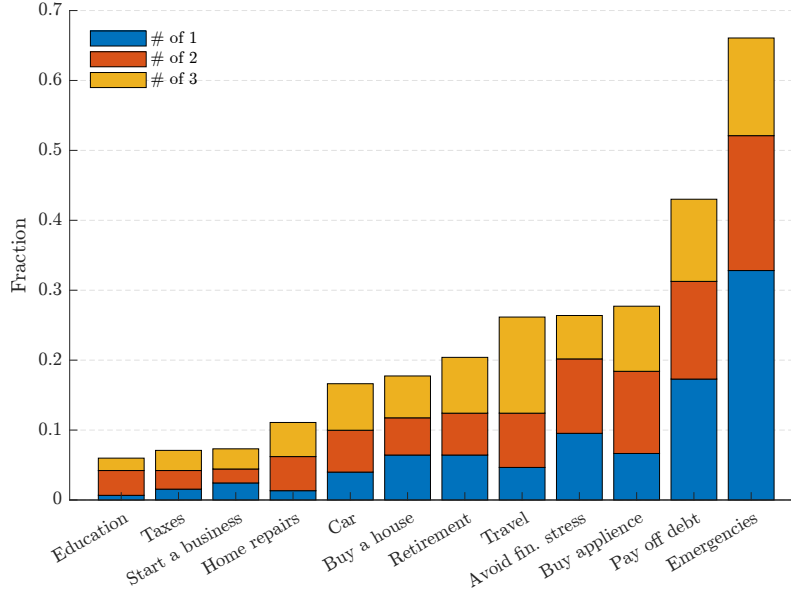
- Education (for yourself, child, grandchild, or another family member);
- Buy a car or other vehicle;
- Emergencies or unexpected needs;
- Buy a home;
- Home improvements/repairs;
- Buy household goods, appliances, home furnishings;
- Travel/take a vacation;
- Taxes;
- Retirement;
- Start a business;
- Relieve financial stress to maintain focus at work;
- Pay off debt;
- Other (please specify)

---

<sup>33</sup>For Prolific, an online survey platform that we use, ensuring representativeness is practical for a single characteristic; thus, we have opted to focus on household income. The supplementary survey statistics broadly track those of the main survey with the exception of a larger share of young and educated respondents.

<sup>34</sup>Note that on Qualtrics, our respondents first choose up to three options and on the next screen rank these three options. All options except for the “other” option are presented in random order.

**Figure D.1:** Most Important Reasons for Saving.



Notes: The figure plots the proportion of survey participants who choose each option as the most important reasons for saving, among households reporting "need to borrow" and "cannot pay" in response to Question Q9 about covering a \$2,000 emergency expense.

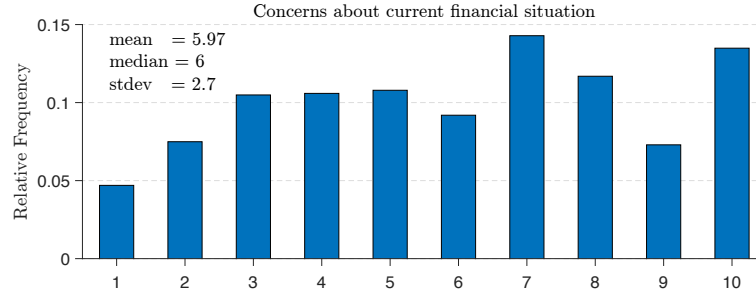
**Calibrate the proportion of sophisticates.** We classify a household as a sophisticate if it mentions "Relieve financial stress to maintain focus at work" as one of the top three reasons for saving. This results in a proportion of 26.4% of sophisticates. Specifically, in Figure D.1, 26.4% of households that are somewhat financially constrained (i.e., reporting "need to borrow" and "cannot pay" in response to Question Q9 about covering a \$2,000 emergency expense) mention "relieve financial stress to maintain focus at work" as one of the top three reasons for saving. The reason we calculate the proportion of sophisticated households based on this restricted sample is that households away from financial constraints may not choose "relieve financial stress" as a top three reason for saving, even if they are sophisticated. For the entire sample, the proportion of sophisticates (report "relieve financial stress" as a top three reason for saving) is 20.7%.

**Other survey results.** Figure D.2 replicates Figure 2, which plots the histogram of the qualitative measure of financial stress, based on the supplementary survey sample. The mean, median, and standard deviation are approximately the same across the two surveys.

Table D.1 presents the same statistics as Table 2 but for the supplementary survey. The comparison of these two tables reveals that financial stress still negatively affects supplementary survey respondents' cognitive capacity, which leads to negative economic consequences. For the working-hours-distracted (Q17a-Q17b) question, the average distraction is 4.5 hours per week. For the question about hours spent on financial issues (Q17c), the average is 5.7 hours. The magnitude is within the ballpark, though somewhat smaller than that of the main survey, partly due to the

supplementary survey participants working fewer hours on average (35.6 hours per week) compared to the main survey participants (39.6 hours per week).

**Figure D.2:** Qualitative Measure of Financial Stress



Notes: The figure shows the histogram of the answers to question Q12 of the supplementary survey.

**Table D.1:** Quantitative Measures of the Consequences of Financial Stress

	Obs	Mean	Median	Std	Min	Max	q25	q75
Hours worked	1,001	35.6	40	12.3	0	100	29	40
Working hours distracted	505	4.5	3	5.2	0	20	1	6
Hours on financial issues	496	5.7	4	5.1	0	20	2	8
Stress spending	998	96.7	30	165.6	0	1000	0	100

Notes: “Hours worked” represent the answers to the question Q16: “How many hours do you typically work in a week these days?”, “Working hours distracted” to the question Q17a (only half of the respondents were asked this question), “Hours on financial issues” to the question Q17b (only half of the respondents were asked this question), and “Stress spending” to question Q20.

**Table D.2:** Predictors of Financial Stress.

	Qual. measure of stress (1)	Working hours distracted (2)	Hours on fin. issues (2)
Financial Constraint (omitted: Intercept)			
Cannot pay	8.189*** (0.252)	7.738*** (0.760)	10.042*** (0.682)
Need to borrow	7.108*** (0.126)	6.182*** (0.360)	7.098*** (0.358)
No need to borrow	4.853*** (0.102)	2.913*** (0.296)	4.044*** (0.286)
Observations	1,001	505	496
$R^2$	0.219	0.120	0.15338

Notes: Robust standard errors in parentheses. Each regression omits an intercept because the three dummy variables sum up to one. \* indicates  $p < 0.05$ , \*\* –  $p < 0.01$ , \*\*\* –  $p < 0.001$ .

Table D.2 confirms that whether the household is financially constrained, represented by the answers to the question Q9 in the main survey, is still a good predictor of the three measures of financial stress in the supplementary survey. This is similar to Table 3 in the main survey.

## E Additional Model Analysis

### E.1 Partial Sophistication

Here we extend the naive case in Section 3.3 and allow for partial sophistication, similar to O'Donoghue and Rabin (1999, 2001). That is, the household partially understands the impact of future financial stress. We use parameter  $\mu \in [0, 1]$  to capture the degree of sophistication. That is, the current self thinks that the future impact of financial stress is captured by  $\mu\Theta(a)$  instead of  $\Theta(a)$ . The naive case is nested by imposing  $\mu = 0$ .

In the continuous-time model here, we follow Harris and Laibson (2013) and Maxted (2021) and let the transition rate from the present to the future be  $\infty$ . This captures the economic essence in a simple way. In this case, the optimal consumption policy  $c_j(a)$  is determined by (E.1), trading off between current consumption and the perceived future value function  $v_j^p(a)$ :

$$c_j^{-\frac{1}{\sigma}}(a) = (v_j^p)'(a). \quad (\text{E.1})$$

The HJB for the perceived value function  $v_j^p(a)$  is given by

$$\rho v_j^p(a) = \max_{c, \ell} \left\{ u(c, \ell; \mu\Theta(a)) + (ra - c + wz_j\ell) (v_j^p)'(a) + \lambda (v_{-j}^p(a) - v_j^p(a)) \right\}, \text{ for } j \in \{1, 2\}. \quad (\text{E.2})$$

This is effectively the same HJB as the full sophistication case in (5), but the impact of stress is given by  $\mu\Theta(a)$  instead of  $\Theta(a)$ . Together with (E.1), we establish:

**Proposition 7.** *The optimal consumption under partial sophistication satisfies*

$$-\frac{\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right]}{c_j^{-\frac{1}{\sigma}}(a)} = \left[ r - \rho - wz_j\Theta'(a) + \underbrace{(1 - \mu) \left( wz_j\Theta'(a) - \frac{1}{\sigma}\Theta(a) \frac{c_j'(a)}{c_j(a)} \right)}_{<0, \text{ less extra saving motive}} \right] dt, \quad (\text{E.3})$$

and the optimal labor supply is still given by equation (7).

Compared to the Euler equation in (8), we find that partial sophistication attenuates the extra saving motive. A smaller degree of sophistication  $\mu$  means a smaller extra saving motive. This is intuitive: underestimating the impact of future financial stress undercuts the household's incentive to engage in extra saving to alleviate financial stress. In the case of full naivete, i.e.,  $\mu = 0$ , (8) becomes (11) in Proposition 2.

**Proof of Proposition 7.** Differentiating the HJB equation (E.2) and using the envelope theorem, we get

$$\begin{aligned} \rho \left( v_j^p \right)' (a) = & -\varphi \mu \left[ \ell_j^p (a) + \mu \Theta (a) \right]^{\frac{1}{v}} \Theta' (a) + r \left( v_j^p \right)' (a) + \left[ ra - c_j^p (a) + wz_j \ell_j^p (a) \right] \left( v_j^p \right)'' (a) \\ & + \lambda \left[ \left( v_{-j}^p \right)' (a) - \left( v_j^p \right)' (a) \right], \end{aligned}$$

where  $c_j^p (a)$  and  $\ell_j^p (a)$  solve the HJB equation (E.2) and are given by the following first order optimality conditions

$$\begin{aligned} \varphi \left[ \ell_j^p (a) + \mu \Theta (a) \right]^{\frac{1}{v}} &= wz_j \left( c_j^p (a) \right)^{-\frac{1}{\sigma}} \\ \left( c_j^p (a) \right)^{-\frac{1}{\sigma}} &= \left( v_j^p \right)' (a). \end{aligned}$$

From equations (7) and (E.1), we know that

$$c_j^p (a) = c_j (a) \quad \text{and} \quad \ell_j^p (a) = \ell_j (a) + (1 - \mu) \Theta (a).$$

Combining these insights, we obtain

$$\begin{aligned} \rho c_j^{-\frac{1}{\sigma}} (a) = & \left[ r - \mu wz_j \Theta' (a) \right] c_j^{-\frac{1}{\sigma}} (a) - \frac{1}{\sigma} \left[ ra - c_j (a) + wz_j (\ell_j (a) + (1 - \mu) \Theta (a)) \right] c_j^{-\frac{1}{\sigma}-1} (a) c_j' (a) \\ & + \lambda \left[ c_{-j}^{-\frac{1}{\sigma}} (a) - c_j^{-\frac{1}{\sigma}} (a) \right]. \end{aligned} \tag{E.4}$$

From the budget (2), the transition intensity of the idiosyncratic productivity, and Ito's lemma for jump processes, we know

$$\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}} (a) \right) \right] = \left[ -\frac{1}{\sigma} (ra - c_j (a) + wz_j \ell_j (a)) c_j^{-\frac{1}{\sigma}-1} (a) c_j' (a) + \lambda \left( c_{-j}^{-\frac{1}{\sigma}} (a) - c_j^{-\frac{1}{\sigma}} (a) \right) \right] dt. \tag{E.5}$$

Using equation (E.5), we can rewrite equation (E.4) in a more compact form

$$\rho c_j^{-\frac{1}{\sigma}} (a) = \left( r - \mu wz_j \Theta' (a) \right) c_j^{-\frac{1}{\sigma}} (a) + E_t \left[ d \left( c_j^{-\frac{1}{\sigma}} (a) \right) \right] - \frac{1 - \mu}{\sigma} wz_j \Theta (a) c_j^{-\frac{1}{\sigma}-1} (a) c_j' (a),$$

which simplifies to

$$-\frac{\mathbb{E}_t \left[ d \left( c_j^{-\frac{1}{\sigma}} (a) \right) \right]}{c_j^{-\frac{1}{\sigma}} (a)} = \left[ r - \rho - \mu wz_j \Theta' (a) - \frac{1 - \mu}{\sigma} wz_j \Theta (a) \frac{c_j' (a)}{c_j (a)} \right] dt.$$



## E.2 Cross-sectional Calibration

Here, we consider an alternative calibration strategy based on cross-sectional variations in our survey. This approach differs from the baseline calibration in Section 3.4, which uses within-subject variations based on hypothetical questions Q19a and b. Here, we use between-subject variations based on how different respondents’ reported consequences of financial stress depend on their status of financial constraints, similar to Table 3

Specifically, we leverage the finding in Table 3 that whether the household is financially constrained is a strong predictor of financial stress. First, we calibrate  $\bar{\Theta}$ —the maximum level of financial stress at the financial constraint—based on the average hours distracted at work for those who “cannot pay” the emergency expense in Q9. That is, we find  $\bar{\Theta} = 0.26$  by letting the first row in column (3) of Table 3 be normalized by the average working hours in Table 1. Reassuringly, this is very similar to  $\bar{\Theta} = 0.27$  in the main analysis, calibrated based on hypothetical questions Q19a.

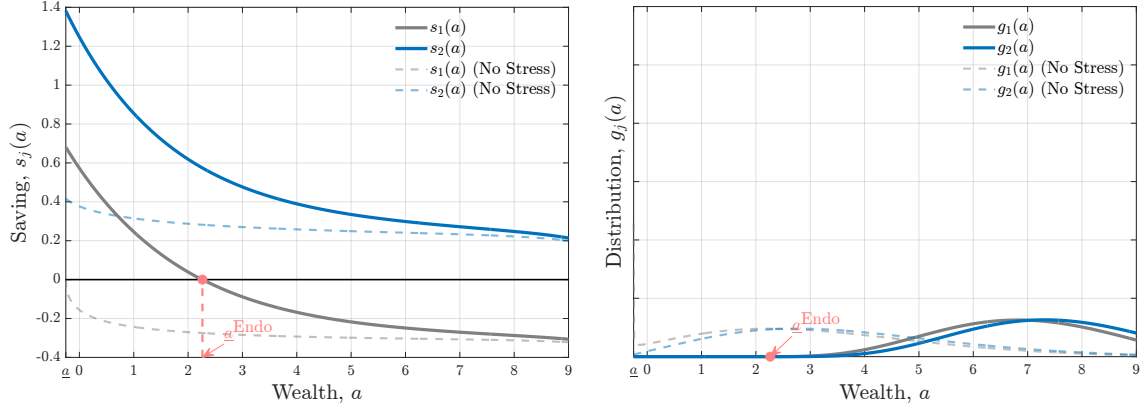
Second, we calibrate  $\alpha$ —the slope of the financial stress function—based on the differences between those who “cannot pay” the emergency expense in Q9 and those who “need to borrow”. Given the functional form in (12), we find the log difference of the average hours distracted at work between two groups,  $\log(9.592) - \log(8.218)$ , from the two rows in column (3) of Table 3.<sup>35</sup> We also need to find the difference of net assets of two groups. For those who “cannot pay” the \$2,000 expense even by borrowing, their net assets should be within \$2,000 from their borrowing constraints, or within 0.032 units of average income in Table 1 (which we use for normalization). We approximate the net liquid assets of this group by the mid-point between  $\underline{a} = -0.25$  and  $-0.25 + 0.032$ , which is  $-0.234$ . For those who “need to borrow” to pay the \$2,000 expense, their net liquid assets are larger than  $-0.25 + 0.032$  but lower than 0.032 (in units of average income). We approximate the net assets of this group by the mid-point of these two numbers, which is  $-0.093$ . Together, we find  $\alpha = [\log(9.592) - \log(8.218)]/(-0.093 - (-0.234)) = 1.1$ . This is lower than the  $\alpha$  in the main analysis. That is, financial stress decreases slower with net financial assets.

We keep the rest of the parameters the same as in Table 5 for consistency.<sup>36</sup> From Figures E.1 and E.2, we can see that a lower  $\alpha$  strengthens the main result: sophisticates exhibit strong extra saving motives while naifs fall into the poverty trap. Under sophistication, a lower  $\alpha$  further increases the extra saving motive, since it takes more to save out of high financial stress states. Under naivete, a lower  $\alpha$  leads to more constrained and stressed households in the stationary wealth distribution, since financial stress affects households with a wider range of net financial assets.

<sup>35</sup>For the log difference, normalizing the average working hours is irrelevant.

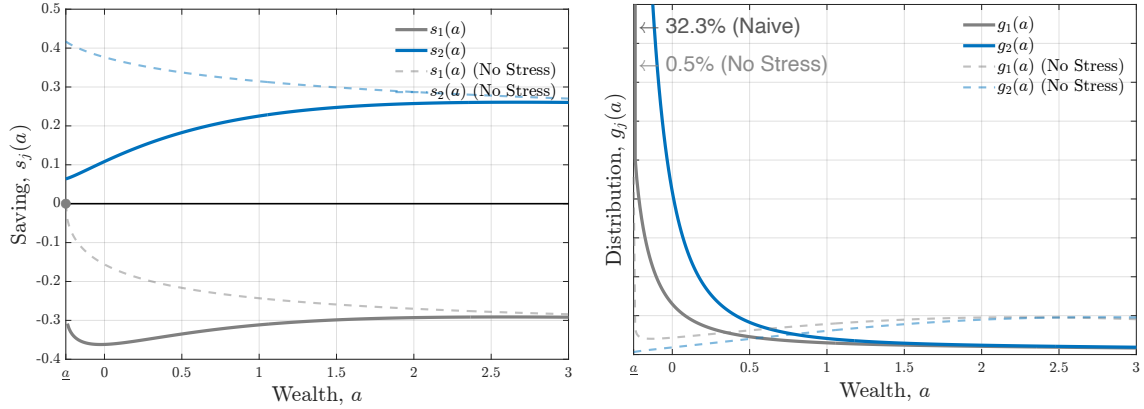
<sup>36</sup>For  $\rho$ , similar to Table 5, we match avg  $a/\text{avg } y = 0.56$  in the naivete about financial stress case.

**Figure E.1:** Cross-sectional calibration (Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. The calibration is based on the cross-sectional distribution of answers to Q9 and Q17a-Q17b in our survey.

**Figure E.2:** Cross-sectional calibration (Naivete).



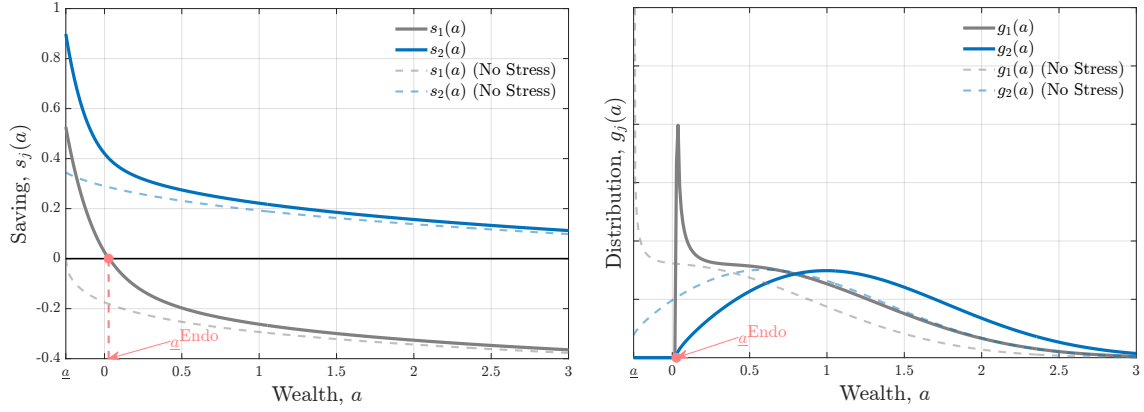
Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. The calibration is based on the cross-sectional distribution of answers to Q9 and Q17a-Q17b in our survey.

### E.3 Partially Productive during Hours Affected by Financial Stress

In the main analysis, households are unproductive during hours affected by financial stress. Here, we consider an extension where this assumption is relaxed and households are partially productive during hours affected by financial stress. Specifically, we study the case with  $\chi = 0.5$  in (16), i.e., households are half as productive during hours affected by financial stress. As explained in the main text, Figures E.3 and E.4 re-plot Figures 4 and 5. The main lessons that sophisticates save out of financial stress states and naifs fall into the poverty trap remain to be true. The only

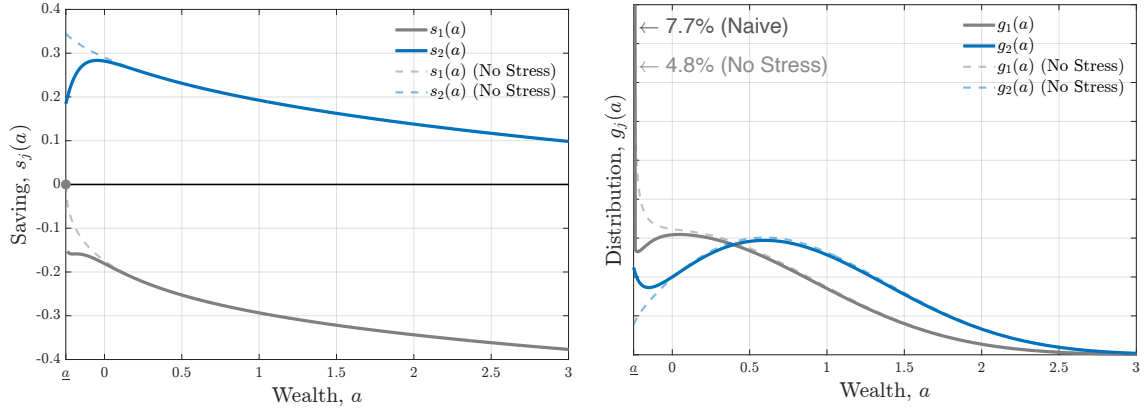
difference from the main analysis is that the impact of financial stress is somewhat more limited.

**Figure E.3:** Partially Productive during Hours Affected by Financial Stress (Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. Households are partially productive during hours affected by financial stress (16).

**Figure E.4:** Partially Productive during Hours Affected by Financial Stress (Naivete).



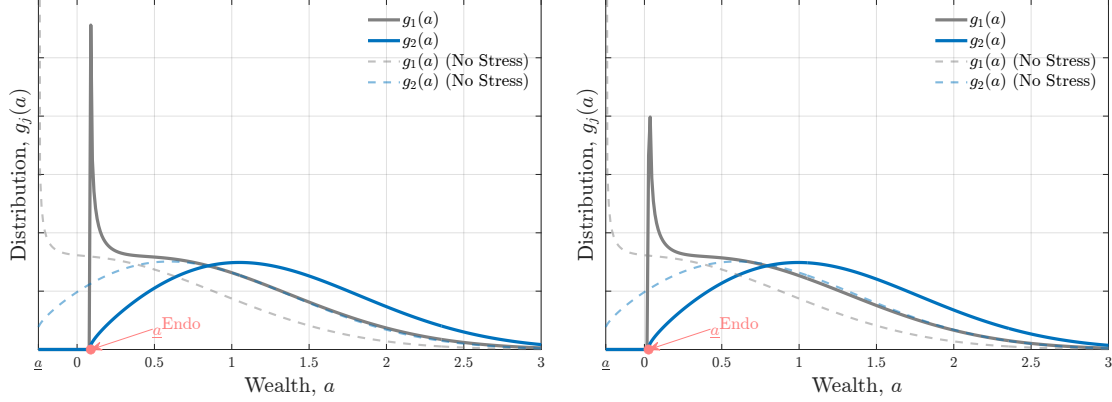
Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. Households are partially productive during hours affected by financial stress (16).

## E.4 Multiplicative Productivity Loss

As explained in the main text, we consider a robustness check where the impact of financial stress takes the form of a multiplicative productivity loss. Figures E.5 and E.6 re-plot Figures 4 and 5. The main lessons that sophisticates save out of financial stress states and naifs fall into the poverty trap remain to be true. Naifs fall into the poverty trap in an extreme fashion: all naive stressed households are at the financial constraint. This is because the multiplicative productivity loss

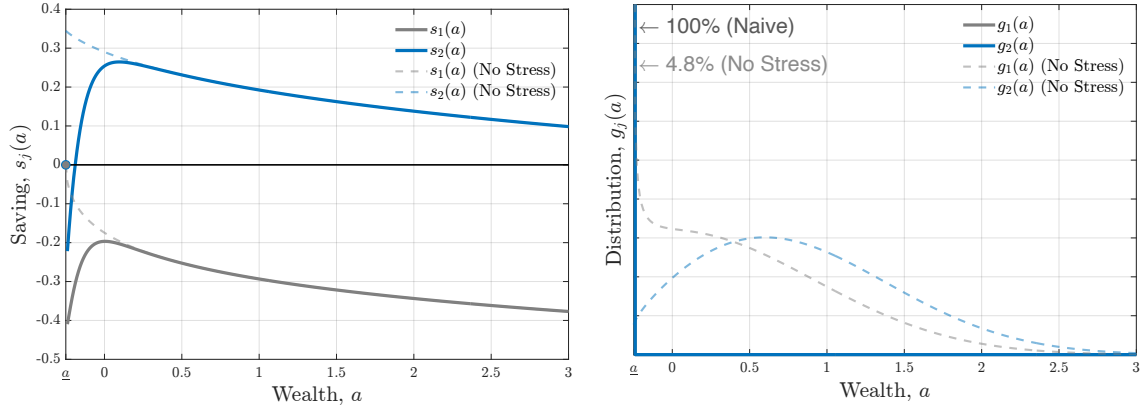
significantly decreases incentives to work at the financial constraint. As a result, even households in the high-income state  $z_2$  have negative net saving in the neighborhood of the financial constraint.

**Figure E.5:** Multiplicative Productivity Loss (Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. The impact of financial stress takes the form of a multiplicative productivity loss as in (17).

**Figure E.6:** Multiplicative Productivity Loss (Naivete).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. The impact of financial stress takes the form of a multiplicative productivity loss as in (17).

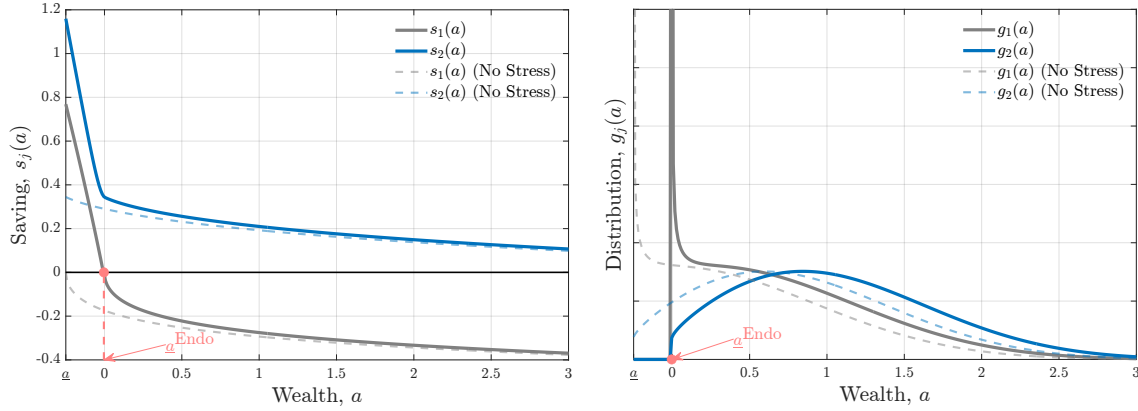
## E.5 Alternative Functional Forms of Stress: a Weakly Decreasing Function

We consider an alternative functional form of the stress function  $\Theta(a)$  in (18). For the calibration,  $\bar{\Theta} = 0.27$  is the same as the main analysis in Table 5. To calibrate  $\alpha$ , we use survey questions

Q19a and Q19b, similar to Section 3.4. Similar to (13), we find

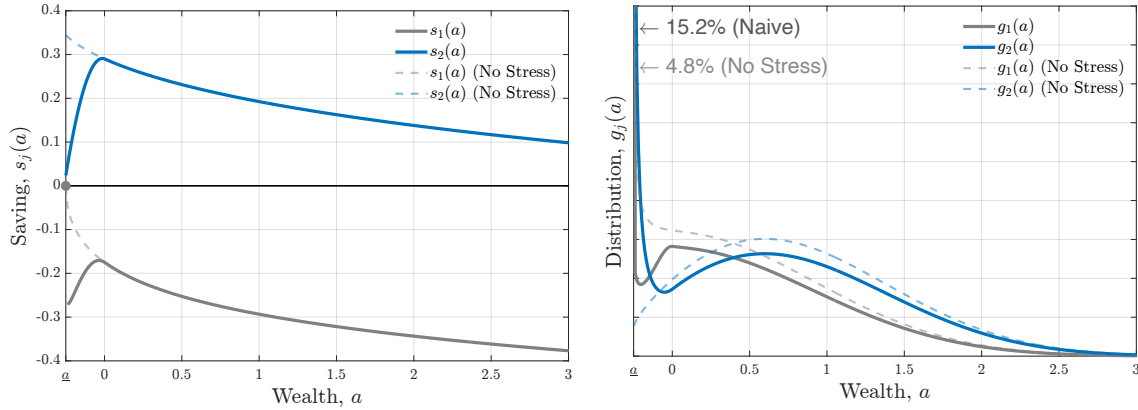
$$\alpha = \frac{\text{avg} (\sqrt{Q17a} - \sqrt{Q19b})}{2000 / (\text{avg income})} = 0.206. \quad (\text{E.6})$$

**Figure E.7:** Alternative Functional Forms of Stress: a Weakly Decreasing Function. (Sophistication).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. The stress function takes the weakly-decreasing form as in equation (18).

**Figure E.8:** Alternative Functional Forms of Stress: a Weakly Decreasing Function (Naivete).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. The stress function takes the weakly-decreasing form as in equation (18).

Similarly to Section 3.4, we drop anyone who reports zero in either Q17ab or Q19b. Conceptually, this procedure means that we exclude respondents who are not affected by the financial stress. From (18), this means we estimate  $\alpha$  using households with positive  $\sqrt{\Theta} - \alpha(a - \underline{a})$ .

From Figures E.7 and E.8, the main lessons that sophisticates save out of financial stress states and naifs fall into the poverty trap remain to be true.

## E.6 Alternative Functional Forms: More Difficult to Save out of the Financial Stress Region

The non-convex stress function  $\Theta(a)$  in Figure 8 takes the following functional form:

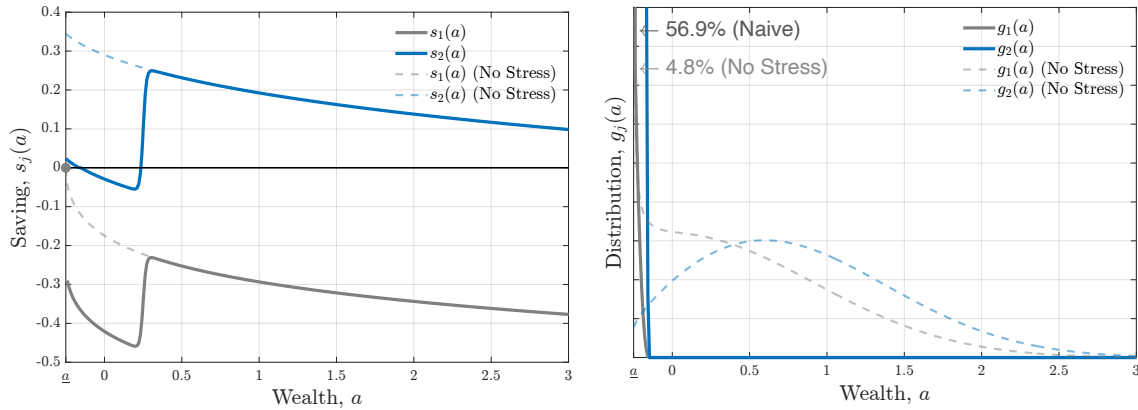
$$\Theta(a) = \begin{cases} \bar{\Theta} & \frac{a-(a+b)}{\delta} < 0, \\ F\left(1 - \frac{a-(a+b)}{\delta}\right), & \frac{a-(a+b)}{\delta} \in [0, 1), \\ 0 & \frac{a-(a+b)}{\delta} \geq 1. \end{cases} \quad (\text{E.7})$$

where  $F(\cdot)$  is a normalized logistic function

$$F(x) = \left[ \frac{1}{1 + e^{-\beta(x-\frac{1}{2})}} - \frac{1}{1 + e^{-\beta(0-\frac{1}{2})}} \right] \left[ \frac{1}{1 + e^{-\beta(1-\frac{1}{2})}} - \frac{1}{1 + e^{-\beta(0-\frac{1}{2})}} \right]^{-1}, \quad (\text{E.8})$$

and  $b$  is a shift parameter,  $\delta$  is the width of the support of the function on which the function value  $\Theta(a)$  changes, and  $\beta$  is the speed of change of the function. In Figure 8, we consider the case with  $\bar{\Theta} = 0.27$ ,  $b = 0.5$ ,  $\beta = 50$ , and  $\delta = 0.5$ . Figure 9 in the main text shows that sophisticates still save out of the financial stress region. Figure E.9 here shows that naifs still fall into poverty traps.

**Figure E.9:** Saving Behavior and Stationary Wealth Distribution (Non-convex Stress Function under Naivete).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. The stress function takes the non-convex form as in equations (E.7)-(E.8).

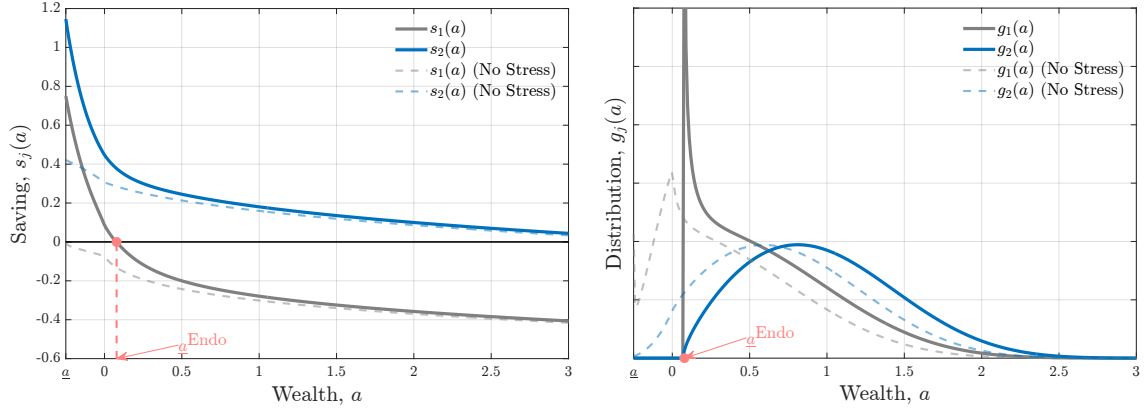
## E.7 Different Saving and Borrowing Rates

Here, we consider a case where the household faces different borrowing and saving interest rates (Kaplan, Moll and Violante, 2018). That is, if households are net borrowers ( $a_t < 0$ ), they face a higher rate  $r^b = r + \kappa$ , where  $\kappa$  is an exogenous wedge between borrowing and saving rates. A

higher  $\kappa$  increases the saving motive (regardless of whether households are financially stressed or not) because of the standard intertemporal substitution channel.

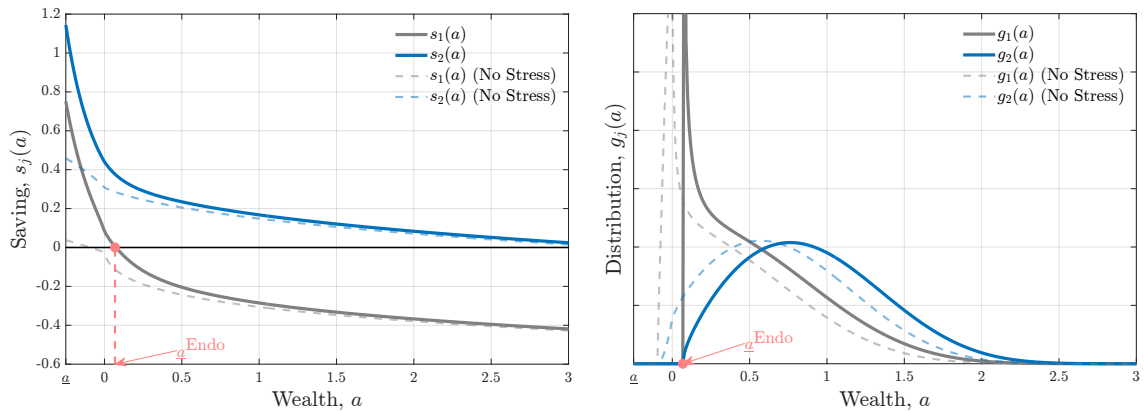
Figures E.10 ( $\kappa = 4\%$ ) and E.11 ( $\kappa = 6\%$ , as in Kaplan, Moll and Violante, 2018) re-plot Figure 4 under sophistication. Our main results that sophisticates save more than the no-stress households and out of financial stress states in the stationary wealth distribution continue to hold.

**Figure E.10:** Different Saving and Borrowing Rates (Sophistication,  $\kappa = 4\%$ ).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. Households face a borrowing rate 4% higher than the saving rate.

**Figure E.11:** Different Saving and Borrowing Rates (Sophistication,  $\kappa = 6\%$ ).

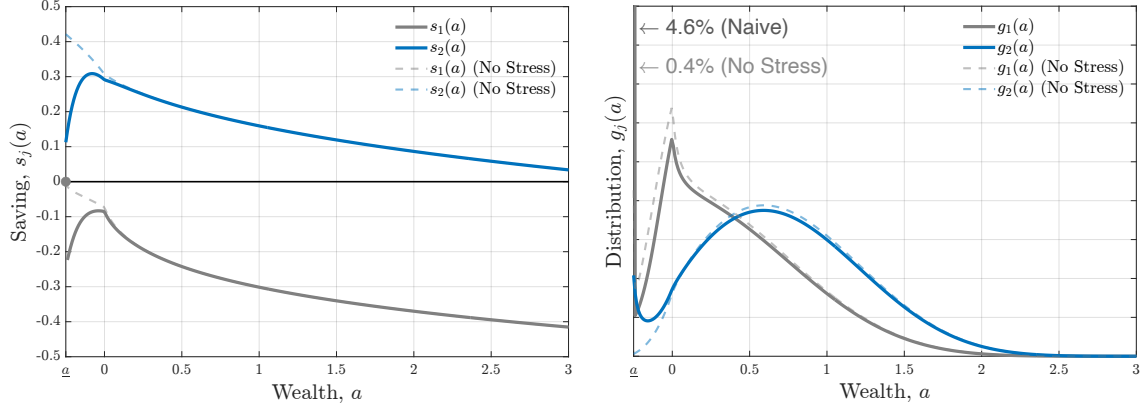


Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. Households face a borrowing rate 6% higher than the saving rate.

Figures E.12 ( $\kappa = 4\%$ ) and E.13 ( $\kappa = 6\%$ , as in Kaplan, Moll and Violante, 2018) re-plot Figure 5 under naivete. Our main results that naifs have lower net saving compared to the no-stress households continue to hold. However, since a higher  $\kappa$  increases the saving motive due to the standard intertemporal substitution channel, there are fewer households at financial constraints.

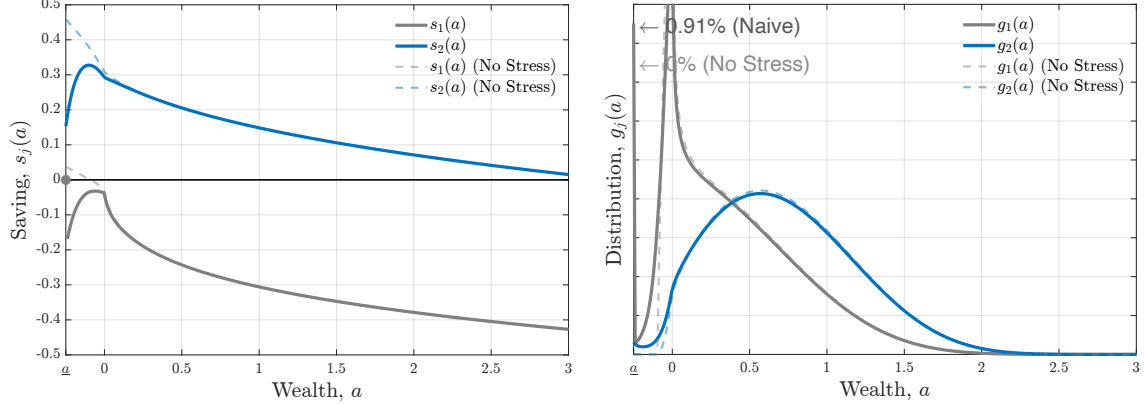
Nonetheless, financial stress combined with naivete still significantly increases the proportion of financially constrained households compared to the no-stress case.

**Figure E.12:** Different Saving and Borrowing Rates (Naivete,  $\kappa = 4\%$ ).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. Households face a borrowing rate 4% higher than the saving rate.

**Figure E.13:** Different Saving and Borrowing Rates (Naivete,  $\kappa = 6\%$ ).



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. Households face a borrowing rate 6% higher than the saving rate.

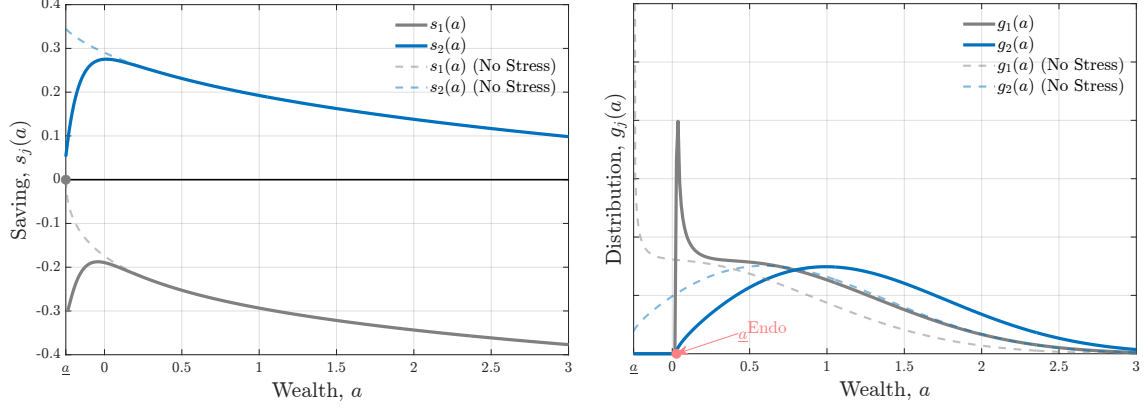
## E.8 Alternative Channels of Financial Stress: Stress Spending

As explained in the main text, we study an alternative channel of the impact of financial stress through spending. For the calibration, we assume that  $C^\Theta(a) = \bar{C}e^{-\alpha(a-\underline{a})}$ , where  $\alpha$  is the same as the main analysis in Table 5. We find the amount of stress spending at financial constraints  $\bar{C}$  based on  $\bar{C}/\text{avg } C^\Theta$  in Q20 =  $\bar{\Theta}/\text{avg } \Theta$  in Q17a and  $\bar{\Theta}$  stressed hours at financial constraints from the main analysis in Table 5. As explained in the main text, Figures E.14 and E.15 re-plot



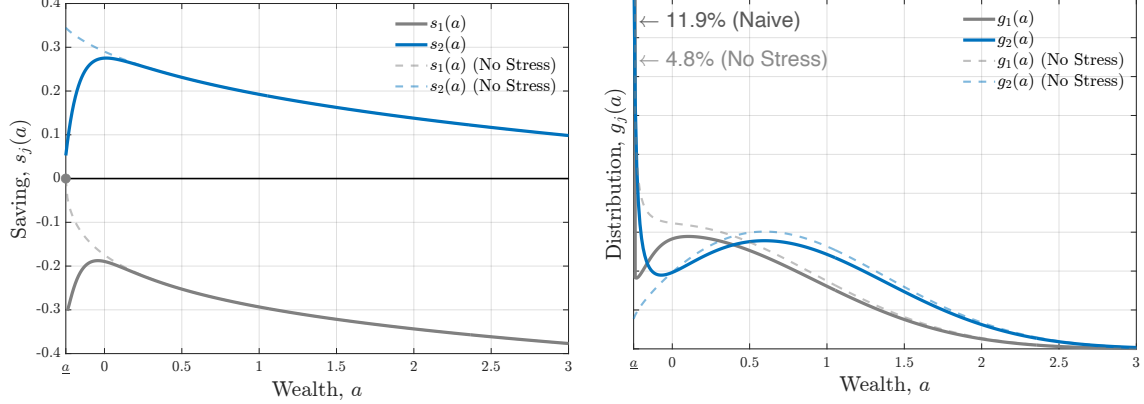
Figures 4 and 5. The main lessons that sophisticates save out of financial stress states and naifs fall into the poverty trap remain to be true.

**Figure E.14: Stressed Spending (Sophistication).**



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. Financial stress enters the budget constraint in the form of stressed spending as in equation (19).

**Figure E.15: Stressed Spending (Naivete).**



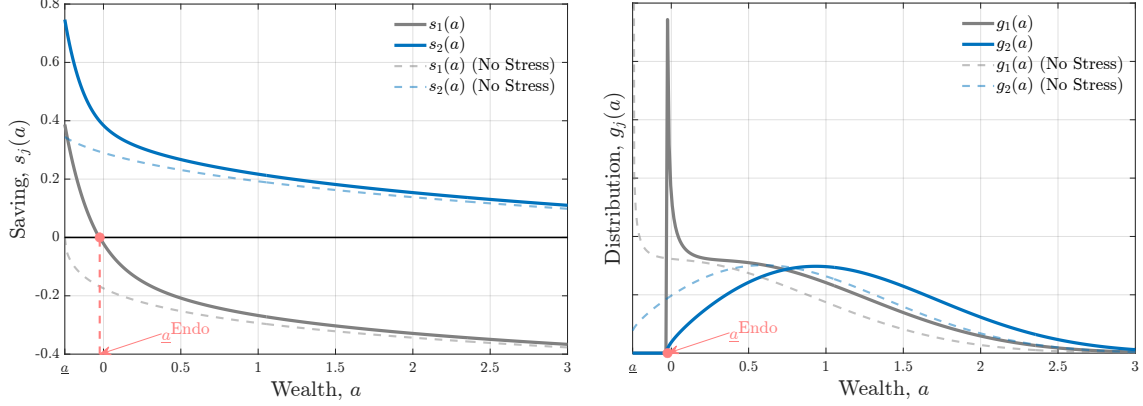
Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. Financial stress enters the budget constraint in the form of stressed spending as in equation (19).

## E.9 Alternative Channels of Financial Stress: Transition Intensity between Individual Productivity States

As explained in the main text, we study an alternative channel of the impact of financial stress through the impact on the transition intensity between different individual income states ( $z_1$  and

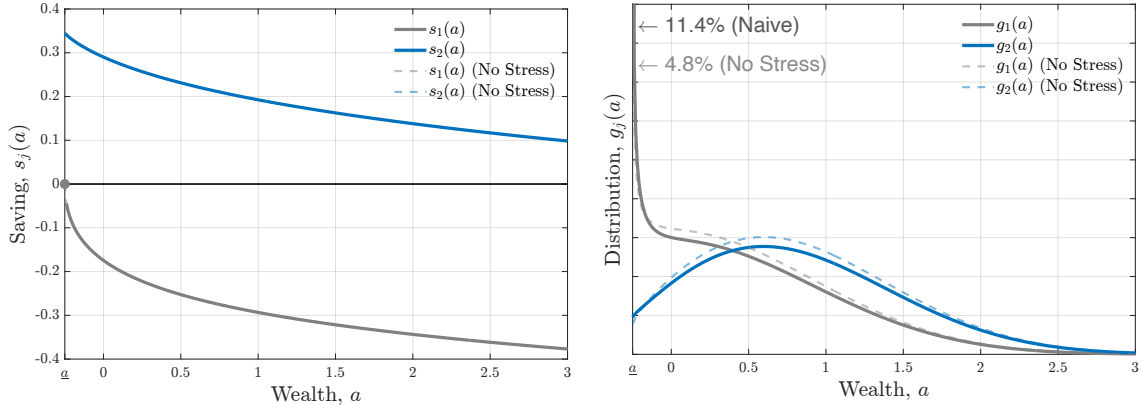
$z_2$ ). Figures E.16 and E.17 re-plot Figures 4 and 5. The main lessons that sophisticates save out of financial stress states and naifs fall into the poverty trap remain to be true.

**Figure E.16: Stress Affects Transition Intensity (Sophistication).**



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under sophistication. In this scenario, the transition probability between income states  $\lambda$  depends on stress and, hence, net assets. Specifically, we assume that the transition intensity from  $z_1$  to  $z_2$  is given by  $\lambda - \bar{\lambda}e^{-\alpha(a_t - \underline{a})}$ , while the transition intensity from  $z_2$  to  $z_1$  is given by  $\lambda + \bar{\lambda}e^{-\alpha(a_t - \underline{a})}$ .

**Figure E.17: Stress Affects Transition Intensity (Naivete).**



Notes: The left panel plots the net saving function  $s_j(a)$  and the right panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress under naivete. In this scenario, the transition probability between income states  $\lambda$  depends on stress and, hence, net assets. Specifically, we assume that the transition intensity from  $z_1$  to  $z_2$  is given by  $\lambda - \bar{\lambda}e^{-\alpha(a_t - \underline{a})}$ , while the transition intensity from  $z_2$  to  $z_1$  is given by  $\lambda + \bar{\lambda}e^{-\alpha(a_t - \underline{a})}$ .

## E.10 Alternative Channels of Financial Stress: Quality of Decisions and Degree of Sophistication

Here, we expand upon our baseline environment by allowing households to stochastically transition between states of sophistication and naivete. The intensity of these transitions is influenced by

financial stress. That is, a stressed household is more likely to transition from being sophisticated to being naive, and is less likely to transition from being naive to being sophisticated.

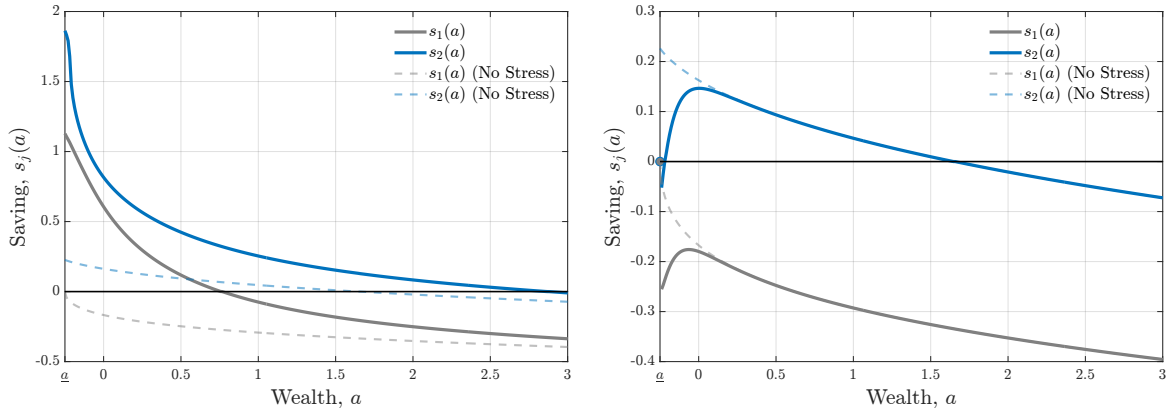
Specifically, the transition intensity between being sophisticated (s) and being naive (n) is given by

$$\mu_{sn}(a) = \mu_0 + \bar{\mu}e^{-\alpha_\mu(a-\underline{a})} \quad \text{and} \quad \mu_{ns}(a) = 1 - \mu_0 - \bar{\mu}e^{-\alpha_\mu(a-\underline{a})}, \quad (\text{E.9})$$

as functions of current net financial assets  $a$ . Similar to Appendix E.9, we calibrate  $\bar{\mu}$  by setting it to  $\bar{\Theta}\mu_0$ , where  $\bar{\Theta}$  is the same as in the main analysis in Section 3.4. We calibrate  $\mu_0$  to match the share of sophisticates of 26.4% as in Figure 6. The calibration of  $\alpha$  and other parameters are identical to those in the main analysis.<sup>37</sup> The right panel of Figure E.19 visualizes (E.19).

As in the main analysis, sophisticates understand the negative economic consequences of future financial stress, both in terms of crowding out future cognitive and time resources and in terms of being more likely to transition to naivety. Naifs, on the other hand, fail to internalize the negative consequences of future financial stress, making consumption and saving decisions as if there will be no financial stress in the future, similar to (9).

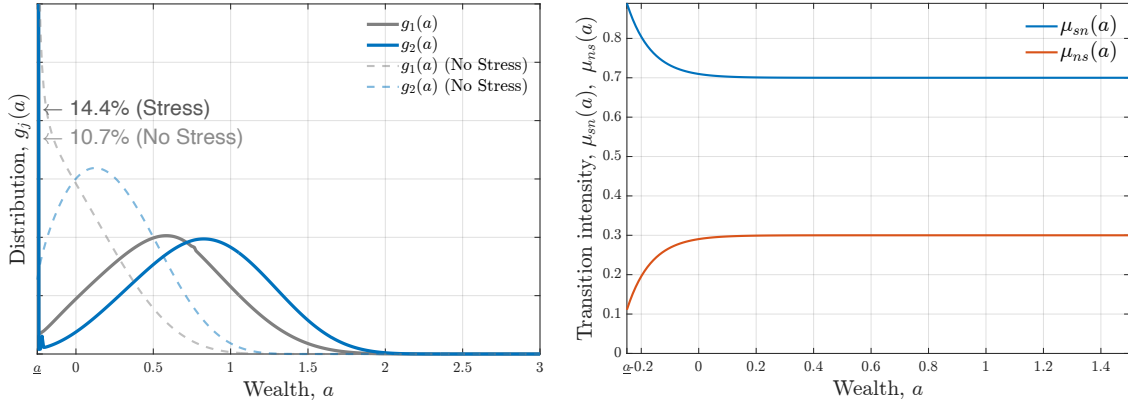
**Figure E.18:** Quality of Decisions and Degree of Sophistication (Saving Behavior).



Notes: Both panels plot the net saving function  $s_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress (under sophistication in the left panel and under naivete in the right panel). Financial stress affects the transition intensity between sophisticates and naifs.

<sup>37</sup> $\rho$  is recalibrated to make sure that the average wealth to average income ratio is equal to the average liquid wealth to average income ratio in the data, 0.56, as in the main analysis.  $w$  and  $\varphi$  are recalibrated so that average income and labor hours in our model to be 1, as in the main analysis.

**Figure E.19:** Quality of Decisions and Degree of Sophistication (Stationary Wealth Distribution and Transition Intensity between Sophisticates and Naifs).



Notes: The left panel plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states. The dashed lines capture the case without financial stress and the solid lines capture the case with financial stress with a mixture of sophisticates and naifs. The right panel plots the transition intensity between sophisticates and naifs. Financial stress affects the transition intensity between sophisticates and naifs.

Specifically, Figure E.18 plots the net flow saving of sophisticates and naifs and demonstrates that the main results regarding how sophistication versus naivete impacts the effect of financial stress continue to hold. Sophisticates still save out of financial stress states, now also because they understand that higher saving reduces their likelihood of becoming naive, thereby improving the quality of their future consumption and saving decisions. Naive households, on the other hand, lack this additional saving motive, have lower net savings compared to no-stress households, and can fall into poverty traps. The stationary wealth distribution in the left panel of Figure E.19 is similar to the case with a mixture of sophisticated and naifs in Figure 6.<sup>38</sup> A significant share of households at their financial constraints (14.4%), and all households at their financial constraints are naifs.

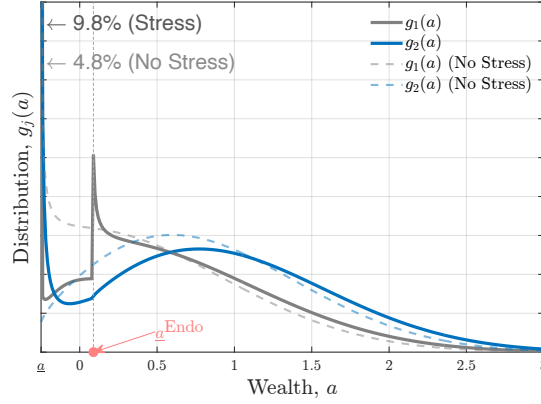
## E.11 An Alternative Calibration: the Proportion of Sophisticates

In this calibration, we directly choose the proportion of sophisticates to match the share of households at their financial constraints in the stationary wealth distribution with the share of households in our sample reporting that they are severely financially constrained and cannot pay the \$2,000 (9.8%).<sup>39</sup> This leads to a proportion of 32.2% of sophisticates, which is close to the first calibration. Figure E.20 plots the stationary wealth distribution, which closely resembles Figure 6.

<sup>38</sup>There is a small spike in the stationary wealth distribution for households in the high-income state  $z_2$  near the financial constraint  $\underline{a}$  (solid blue line in the left panel of Figure E.19). This is the point where their net saving is zero, which leads to the jump in the probability density function.

<sup>39</sup>The 9.8% share is from the main survey in Section 2. The share in the Prolific sample is similar, at 9.0%.

**Figure E.20:** Stationary Wealth Distributions with a Mixture of Sophisticates and Naifs.



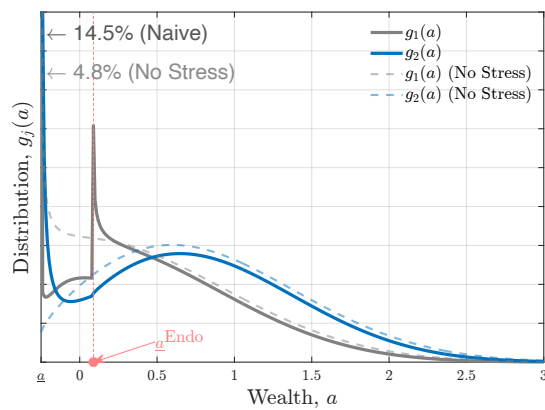
Notes: The figure plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states with a mixture of sophisticates and naifs.

## E.12 Endogenous $r$ with a Mixture of Sophisticates and Naifs

Figure E.21 updates the stationary wealth distribution with a mixture of sophisticates and naifs under endogenous  $r$ . Compared to Figure 6, we keep the proportion of sophisticates in 26.4% but endogenize the interest rate  $r$  such that the total wealth in the economy is fixed at  $\int_{i \in [0,1]} a_{i,t} di = B = 0.56$ . The key lesson that all households at their financial constraints are naifs and sophisticates instead save out of their financial constraints remains. In fact, compared to Figure 6, there are more households at their financial constraints. This is because endogeneizing  $r$  lowers the interest rate compared to Figure 6.<sup>40</sup>

<sup>40</sup>The baseline calibration makes sure that, if all households are naives, the total wealth in the economy is at  $\int_{i \in [0,1]} a_{i,t} di = B = 0.56$ . With a mixture of sophisticates and naifs and an exogenous interest rate, the total wealth in the economy in Figure 6 is then smaller than 0.56. As a result, endogeneizing  $r$  lowers the interest rate compared to Figure 6.

**Figure E.21:** Stationary Wealth Distributions with a Mixture of Sophisticates and Naifs, Endogenous  $r$ .



Notes: The figure plots the probability density function of stationary wealth distribution  $g_j(a)$  for both idiosyncratic income states with a mixture of sophisticates and naifs. The interest rate adjusts endogenously to satisfy asset market clearing condition.

# F Survey Questionnaire

The text in ALL CAPS, square brackets, and section titles contains technical information that was not shown to respondents.

[RANDOMLY SPLIT ALL PARTICIPANTS INTO THREE GROUPS AND DENOTE THEM: GROUP1 (MAX STRESS QUESTION), GROUP2 (GIFT QUESTION), GROUP3 (TOTAL HOURS QUESTION)]

## University of California at Berkeley

### Consent to Participate in Research

*The Economics of Financial Stress*

CPHS #2021-11-14868

### Key Information

- You are being invited to participate in a research study. Participation in research is completely voluntary.
- The purpose of the study is to investigate how financial concerns affect work performance.
- The study will take a total of 6-12 minutes, and you will be asked a series of questions regarding your financial situation, the extent to which it worries you, and how your worries may change depending on hypothetical scenarios.
- Risks and/or discomforts may include thinking about imaginary scenarios that change your financial situation.

**Introduction and Purpose** My name is Chen Lian, and my research colleagues are Yuriy Gorodnichenko and Dmitriy Sergeyev. Yuriy Gorodnichenko and I are faculty members at the University of California, Berkeley in the Department of Economics, and Dmitriy Sergeyev is a faculty member at Bocconi University in the Department of Economics. We would like to invite you to participate in our research study, which concerns the effects of financial stress on work performance.

**Procedures** If you agree to participate in our research, we will ask you to complete the attached online survey. The survey will involve questions about individual characteristics (e.g., year of birth, household size, and marital status), financial situation (e.g., typical income, financial holdings), work performance (employment status, hours worked, hours distracted by financial concerns), as well as several hypothetical questions (e.g., whether and how additional liquid assets reduce hours distracted by financial stress), and should take about 6-12 minutes to complete.

**Risks/Discomforts** Some of the research questions may make you think about your concerns. You are free to decline to answer any questions you don't wish to, or to stop participating at any time.

As with all research, there is a chance that confidentiality could be compromised; however, we are taking precautions to minimize this risk.

**Confidentiality** Your study data will be handled as confidentially as possible. If the results of this study are published or presented, individual names and other personally identifiable information will not be used.

To minimize the risks to the confidentiality, the data that we collect will not contain individual identifiers. Upon receiving the answers to our survey, the data will only be shared amongst the project's authors using password-protected computers until the project is completed. Upon completion, de-identified data will be retained for possible use in future research done by ourselves or others. Upon completion, de-identified data will be retained indefinitely for possible use in future research done by ourselves or others.

Your personal information may be released if required by law. Authorized representatives from the following organizations may review your research data for purposes such as monitoring or managing the conduct of this study:

- Sponsor: Chen Lian
- University of California

**Rights** *Participation in research is completely voluntary.* You are free to decline to take part in the project. You can decline to answer any questions and are free to stop taking part in the project at any time. Whether or not you choose to participate, answer any particular question, or continue participating in the project, there will be no penalty to you or loss of benefits to which you are otherwise entitled.

**Questions** If you have any questions about this research, please contact us. You can reach me, Chen Lian, at chenlianyy@gmail.com.

If you have any questions about your rights or treatment as a research participant in this study, please contact the University of California at Berkeley's Committee for Protection of Human Subjects at 510-642-7461 or by e-mail at subjects@berkeley.edu.

**If you agree to participate in the research, please save a copy of this page** for future reference, then click on the "Yes" button below. [ADD Yes/No BUTTONS]



Please tell us about yourself.

**S1.** What is your current age? [ADD A DROP-DOWN MENU]

- Years old: 16,17,...,100.

**S2.** What best describes your current employment situation?

- Working full-time (for someone or self-employed)
- Working part-time (for someone or self-employed)
- Not working

**Q1.** In which state is your primary residence?

- AL Alabama (1)
- AK Alaska (2)
- ...
- WI Wisconsin (50)
- WY Wyoming (51)
- I live outside the US (99)

**Q2.** What is the highest level of school you have completed, or the highest degree you have received? [RESPONDENTS CHOOSE ONE OF THE FOLLOWING OPTIONS]

- Some high school or less
- High school diploma (or equivalent)
- Some college but no degree (including academic, vocational, or occupational programs)
- Associate/Junior College degree (including academic, vocational, or occupational programs)
- Bachelor's degree (For example: BA, BS)
- Post-graduate degree (For example: MA, MS, PhD, MD, JD)

**Q3.** What is your gender?

- Male
- Female

**Q4.** How much income does your household **normally** earn **in a year** (before tax)? If you do not know, please estimate and choose an appropriate range. [ADD A DROPDOWN MENU WITH THE FOLLOWING INTERVALS]

- [\$0;\$9,999]
- [\$10,000;\$19,999]
- ...
- [\$90,000;\$99,999]
- [\$100,000;\$124,999]
- [\$125,000;\$149,999]
- [\$150,000;\$174,999]
- [\$175,000;\$199,999]
- [\$200,000;\$299,999]
- [\$300,000;\$499,999]
- \$500,000 or more

**Q5.** Over the past few months, was your household's income different from what your household normally earns?

- My household's income was **about normal**.
- My household's income was **higher than normal**.
- My household's income was **lower than normal**.

**Q6.** Are you currently married or living as a partner with someone?

- Yes
- No

**Q7.** Please tell us how many of the following people usually live in your current primary residence, other than yourself (including those who are temporarily away)?

- Children \_\_\_\_\_
- Your or your spouse/partner's parents \_\_\_\_\_
- Others \_\_\_\_\_

**Q8.** Does your household have debt?

- Yes
- No

**Q8b.** [ASK IF Q7 = Yes] What types of debt does your household owe? (select all that apply)

- mortgage
- student loan
- car loan
- credit card debt (that you do not expect to repay by the due date)
- loan from a friend or a family member
- other (please specify) [ADD A TEXTBOX]

**Q9.** If your household experienced an unexpected emergency, would you need to borrow money in order to pay for a \$2,000 expense?

- No, I would not need to borrow money to cover a \$2,000 expense
- Yes, I would need to borrow money to cover a \$2,000 expense
- I could not pay for this expense, even by borrowing

**Q10.** [ASK IF Q9 != “I simply cannot pay for this expense, even by borrowing”] If your household had to borrow \$2,000 in the case of an emergency, what interest rate do you expect to be charged?

[ADD A SLIDER WITH THE RANGE [0%;30%]]

**Q11.** What is the value of your household's **total financial investments** (checking and savings accounts, stocks, bonds, 401(k), real estate, etc.) minus **total financial liabilities** (credit card debt, mortgages, student loans, consumer loans, etc.)? If you are not sure, please estimate.

You should choose a negative range if the the value of your liabilities is greater than the value of your investments.

[ADD A DROPDOWN MENU]

- - \$50,000 or less
- - (\$49,999;\$39,999)
- ...
- - (\$9,999;\$0)
- [\$0;\$9,999]
- [\$10,000;\$19,999]
- ...
- [\$90,000;\$99,999]
- [\$100,000;\$124,999]
- ...
- [\$175,000;\$199,999]
- [\$200,000;\$299,999]
- [\$300,000;\$499,999]
- [\$500,000;\$999,999]
- \$1,000,000 or more

**Q12.** On a scale from 1 to 10, how concerned are you about your household's current financial situation? 1 represents the lowest level of concern (or no concerns), and 10 represents the highest level of concern.

[ADD A SLIDER WITH THE VALUES (1,2,..., 10)]

**Q14.** The next question is about the following problem. In questionnaires like ours, sometimes there are participants who do not carefully read the questions and just quickly click through the survey. This means that there are a lot of random answers which compromise the results of research studies. To show that you read our questions carefully, please enter turquoise as your answer to the next question.

What is your favorite color? [ADD A TEXTBOX]

**Q15.** Are you the primary or co-primary earner in your household?

- Yes
- No

**Q16.** How many hours do you typically work in a week these days? If you are not sure, please estimate. [ADD A SLIDER WITH THE RANGE [0;100] HOURS]

**Q17a.** [ASK IF GROUP1 = 1] Over the past week, how many working hours were you distracted by your financial stress?

[ADD A SLIDER WITH VALUES BETWEEN 0 AND 20 HOURS]

**Q19a.** [ASK IF GROUP1 = 1] You reported that you were distracted for [ANSWER TO Q17a] hours by your financial stress last week.

**Now, I want you to imagine that your household's financial situation becomes worse, and you would struggle to quickly raise any additional money in the case of an emergency (for example, bank accounts have been depleted and credit cards are maxed out).**

In this alternate scenario, how many working hours would you have been distracted by your financial stress over the course of a week?

[ADD A SLIDER WITH VALUES BETWEEN 0 AND 20 HOURS]

**Q17b.** [ASK IF GROUP2 = 1] Over the past week, how many working hours were you distracted by your financial stress?

[ADD A SLIDER WITH VALUES BETWEEN 0 AND 20 HOURS]

**Q18b.** [ASK IF GROUP2 = 1] You reported that you were distracted for [ANSWER TO Q17b] hours by your financial stress last week. **Now, I want you to imagine that you were gifted \$2,000 at the start of last week.**

In this alternate scenario where you started the week with \$2,000 **more money**, would you have been

- **less distracted** by your financial stress?
- **distracted by the same amount** by your financial stress?
- **more distracted by** your financial stress?

**Q19b\_\_1.** [ASK IF GROUP2 = 1 AND Q18b = “less stressed”] In this alternate scenario where you started the week with \$2,000 **more money**, how many working hours would you have been distracted by your financial stress? [ADD A SLIDER WITH VALUES BETWEEN 0 AND Q17b HOURS]

(Note that the slider allows you to choose a number between 0 and [ANSWER TO Q17b], highlighted in green, because you answered that you would have been less distracted with extra money compared to your current financial situation.)

**Q19b\_\_2.** [ASK IF GROUP2 = 1 AND Q18b = “more stressed”] In this alternate scenario where you started the week with \$2,000 **more money**, how many working hours would you have been distracted by your financial stress? [ADD A SLIDER WITH VALUES BETWEEN Q17B AND 20 HOURS]

(Note that the slider allows you to choose a number between [ANSWER TO Q17b] and 20, highlighted in green, because you answered that you would have been more distracted with extra money compared to your actual financial situation.)

**Q19b\_\_3.** [ASK IF GROUP2 = 1 AND Q18b is not answered] In the same alternate scenario where you started the week with \$2,000 **more money**, how many working hours would you have been distracted by your financial stress? [ADD A SLIDER WITH VALUES BETWEEN 0 AND 20 HOURS]

**Q17c.** [ASK IF GROUP3 = 1] Over the past week, how many hours did you spend thinking about and dealing with issues related to your household’s finances? If you are not sure, please estimate. [ADD A SLIDER WITH VALUES BETWEEN 0 AND 20 HOURS]

**Q20.** How much money do you typically spend per week in order to alleviate the stress driven by your financial concerns, which you would not spend if you were not financially stressed? [RESTRICT ANSWERS TO \$0-\$1,000]

**Q21.** Over the last few years, your household may have received stimulus checks from the U.S. government.

Please let us know if your household has received any of those checks.

- Yes, my household has received at least one of those checks.
- No, my household has not received any of those checks.

**Q21b.** [ASK IF Q23 = YES] On a scale from 1 to 10, how much did those checks alleviate your financial concerns? 1 represents that they had very little effect on your financial concerns, and 10 represents that they fully alleviated your financial concerns. [ADD A SLIDER WITH THE VALUES (1,2,..., 10)]