The Economics of Financial Stress*

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Abstract

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, both financial stress itself and naivete about financial stress are important components of a psychology-based theory of the poverty trap. Sophisticated households, instead, save extra to escape high-stress states because they understand that doing so alleviates the economic consequences of financial stress. Second, the financial stress channel dampens or reverses the counterfactual large negative wealth effect on labor earnings because relieving stress frees up cognitive resources for productive work. Financial stress also has macroeconomic implications for wealth inequality and fiscal multipliers.

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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, 2022*a*), is not a key object for macroeconomics and household finance.[1] Although the traditional approach does focus 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).[2] 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 productive 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).[3]

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 negatively affects households close to financial constraints by draining cognitive resources and impacting economic behavior. This 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.

[1] According to a 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 (2022*a*) shows that 87 percent of Americans were stressed about their finances in March 2022, the highest number in the history of APA's Stress in America survey.

[2] Our paper uses the term "financial stress" to broadly capture the psychological costs of financial constraints. This includes but is not limited to, the narrow notion of stress, capturing the physiological stress response involving hormones such as cortisol (Mullainathan and Shafir, 2013).

[3] 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 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 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 (i.e., "bandwidth" in Mullainathan and Shafir, 2013). 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 ("sophisticates") 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 of this extra saving motive, under sophistication, financial stress leads to fewer households facing 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, resulting in more households at the financial constraint.

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 both financial stress itself and naivete

about financial stress are important components of a psychology-based theory of poverty traps (Mullainathan and Shafir, 2013).

The financial stress channel can attenuate or reverse the large negative wealth effect on labor earnings in benchmark models. This is because relieving financial stress frees up cognitive resources for productive work and increases productive labor and earnings. This channel helps bridge the gap between the prediction of benchmark models and the relatively small empirical estimates of the marginal propensity to earn (Cesarini et al., 2017; Auclert, Bardóczy and Rognlie, 2023). This channel is particularly strong for naive households close to financial constraints. It can help explain the finding in Banerjee et al. (2020) and Kaur et al. (2022) that poor households in developing countries exhibit a positive marginal propensity to earn and the finding in Golosov et al. (2024) that poor households exhibit a less negative marginal propensity to earn compared to rich households. By the same token, the financial stress channel introduces a new transmission mechanism for fiscal policy: lump-sum fiscal transfers can relieve financial stress, increase productive labor, 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.

Our paper builds upon and contributes to the literature that documents how psychological costs of financial constraints can adversely affect the lives of the poor (e.g., Shah, Mullainathan and Shafir, 2012; Mani et al., 2013; Mullainathan and Shafir, 2013; Haushofer and Fehr, 2014; Schilbach, Schofield and Mullainathan, 2016). In this literature, particularly relevant for us is the evidence on how financial stress negatively impacts productive labor and earnings. Directly related 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 attentive. Banerjee et al. (2020) and Fink, Jack and Masiye (2020) find similar evidence that relaxing financial constraints increases workers' productive labor supply and earnings.[4,5]

Our contributions to this literature are twofold. First, we argue that similar forces are relevant for US households, in addition to those in developing countries. Second, we build the first tractable intertemporal model of financial stress, which allows us to study implications for endogenous consumption, labor supply, saving decisions, and wealth distribution. This also enables us to unearth the important role of sophistication versus naivete in determining the economic impact of financial stress. Our modeling approach is inspired by the static model of Banerjee and Mullainathan (2008), in which households may be distracted at work because they worry about problems at home. However, the static nature of Banerjee and Mullainathan (2008) means that they do not address endogenous saving decisions, wealth distribution, or the important role of the sophistication-naivete dimension.

Our paper also contributes to the literature on poverty traps. The earlier theories focus on non-psychological forces: Galor and Zeira (1993) and Banerjee and Newman (1993) emphasize the role of credit market imperfections, lumpy technologies, and occupational choices. Dasgupta and Ray (1986, 1987) emphasize the role of nutrition. Most empirical evidence does not support these types of poverty traps (e.g., surveyed in Kraay and Raddatz, 2007 and Kraay and McKenzie, 2014). At the same time, Balboni et al. (2022) recently found support for the mechanism in Banerjee and Newman (1993).

Our paper is more closely related to the recent theories of poverty trap focusing on psychological forces. Our main contribution is to build the first model incorporating financial stress while featuring endogenous intertemporal decisions. This allows us to formalize the conditions for a poverty trap (e.g., the role of naivete) and to formally study a wide range of economic implications. Two other conceptually distinct types of psychology-based poverty traps have been studied: Banerjee and Mullainathan (2010), Bernheim, Ray and Yeltekin (2015), and Thakral and Tô (2020) focus on temptation and present bias, while Dalton, Ghosal and Mani (2016) and Genicot and Ray (2017) focus on reference dependence and aspirations. These theories build upon completely different

[4] 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).

[5] 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 during personal bankruptcy increases earnings. In Finland, Knupfer et al. (2023) find that the collapse of a Ponzi scheme leads to labor earning losses for investors. These losses are attributed to the financial stress caused by the collapse.

psychological foundations and empirical evidence. They do not focus on cognitive scarcity as the source of the poverty trap and are not designed to address relevant empirical evidence (e.g., Kaur et al., 2022). They also offer insights into the sophistication-naivete dimension that differ from those related to financial stress.[6] Another contribution of ours to the psychology-based poverty trap literature is to make the model tractable enough to directly connect to the large body of literature on intertemporal choices and wealth distribution, as well as to bridge with mainstream macroeconomic analysis.

Financial stress differs from present bias (e.g., Laibson, 1997). Present bias per se does not depend on proximity to financial constraints and does not generate any psychological costs of financial constraints. It is not related to how financial stress crowds out valuable cognitive resources. Moreover, present bias affects all households at any level of financial assets, while financial stress only impacts households close to constraints. This leads to different implications for household behavior and wealth distribution. Finally, the implications of the sophistication-naivete dimension for financial stress differ significantly from its implications for present bias. Under financial stress, sophisticates unambiguously save more and suffer smaller welfare costs compared to naifs, independent of the elasticity of intertemporal substitution (EIS). This arises from an income effect, as sophisticates understand that their future selves will be poorer due to stress and will benefit from additional savings. Under present bias, the implications of the sophistication-naivete dimension instead depend on the EIS. In particular, when the EIS is above one, the implications for present bias are the opposite of those for financial stress. Under present bias, sophisticates save less compared to naifs and suffer greater welfare costs (Maxted, 2023). This occurs because of a substitution effect that dominates the income effect when the EIS is above one. Sophisticates are discouraged from saving because they understand that their future selves will exhibit present bias and consume additional savings sub-optimally (O'Donoghue and Rabin, 1999). This substitution effect is absent in the context of financial stress, as stress itself will not lead to future suboptimal consumption smoothing.

Complementary to us, Caplin and Leahy (2001) study how to incorporate anticipatory feelings (e.g., anxiety) into expected utility theory and examine their impact on decision-making. They focus on how anxiety affects portfolio choice: households are anxious about unresolved uncertainty and derive negative anticipatory utility from it; as a result, households save less in risky assets and more in safe assets to alleviate their anxiety. Our paper complements but also differs from

[6] As discussed above, the temptation-based poverty trap requires sophistication rather than naivete. The aspiration-based poverty trap in Dalton, Ghosal and Mani (2016) does require naivete, but it is based on a mechanism completely different from the income effect under financial stress mentioned above: poor individuals do not exert enough effort because they do not understand that greater effort leads to higher aspirations. Moreover, we go one step further than Dalton, Ghosal and Mani (2016) and are able to deliver quantitative lessons regarding intertemporal choices and wealth distribution.

the wealth-in-utility literature in macroeconomics (e.g., Mian, Straub and Sufi, 2021; Michaillat and Saez, 2021). We focus on how financial stress crowds out the time and cognition available for productive labor. In that literature, the utility of wealth and the disutility of labor are instead treated as separable, with the wealth effect on labor supply and earnings remaining negative.

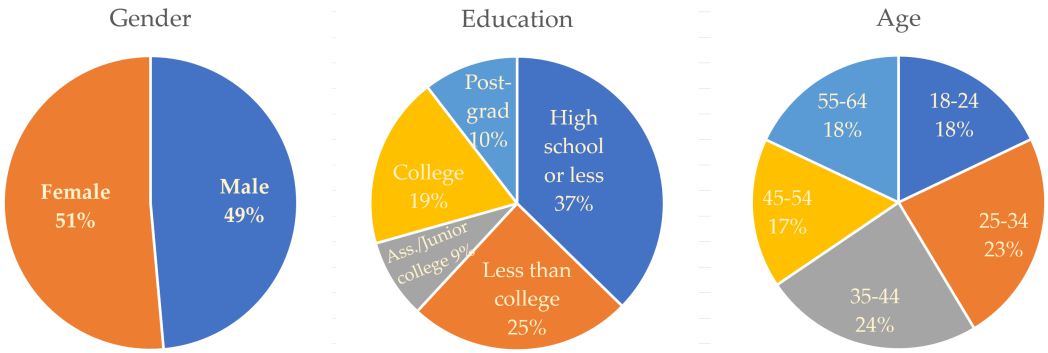
2 Survey Design and Results

We first introduce our large-scale survey of US households. We document that most survey respondents feel financially stressed, leading to negative economic consequences. Measures of financial stress are also strongly correlated with whether households are financially constrained.

2.1 The Survey Sample and Structure

Our survey has a sample of 10,000 respondents who are prime-age, employed US workers.[7] The sample is representative of the US population in terms of gender, age, region, total household income, and education. We collected the data between early April and late 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 in 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

[7] This paper focuses on how financial stress affects employed workers. However, 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).

Online Appendix Table B.1 shows that the demographic characteristics in our sample are close to those in the 2019 American Community Survey. Supplementary Appendix E contains the full survey questionnaire.[8]

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 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 Supplementary Appendix E). 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.

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:

> *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.[9]

To explore whether financial stress is correlated with financial constraints, we ask the respondents the following question:[10]

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

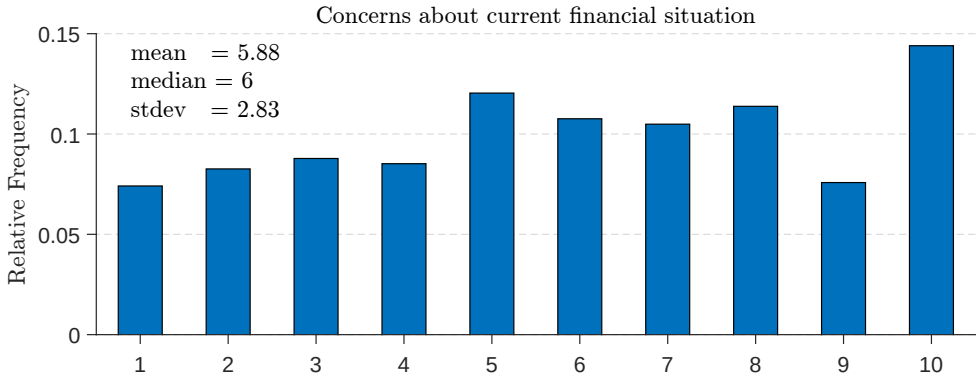
The respondents can choose from "no need to borrow," "need to borrow," and "cannot pay." Approximately 9.8 percent of households in our sample are severely financially constrained ("cannot

[8] 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 Supplementary Appendix D, we report all analyses for the restricted sample of respondents who pass the attention check. The results are similar to the full sample.

[9] 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.

[10] 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.

Figure 2: Qualitative Measure of Financial Stress



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

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.[11]

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, 2022*b*), 37% of US adults reported that when they are stressed, they cannot bring themselves to

[11] Table B.3 in Online Appendix B.3 presents results where measures of financial stress are normalized by their standard deviations.

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). Our survey randomizes which of the two questions is given to a respondent. The first question is given to 75 percent of the sample, and 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	15.1	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	265.0	0	1000	25	300

Notes: "Hours worked" represent the answers to question Q16: "How many hours do you typically work in a week these days?", "Working hours distracted" to question Q17a, "Hours on financial issues" to 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). This magnitude is consistent with the TIAA Institute-GFLEC Personal Finance Index survey. In their 2020 Report, Yakoboski, Lusardi and Hasler (2020) found that survey respondents spend an average of 6.7 hours per week thinking about and dealing with financial issues.[12]

[12]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). The emphasis of Yakoboski, Lusardi and Hasler (2020) is on financial literacy, not financial stress, following the tradition of Lusardi and Mitchell (2014, 2017).

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***	7.324***	9.592***	8.934***	10.116***	9.839***
	(0.083)	(0.107)	(0.255)	(0.308)	(0.388)	(0.477)
Need to borrow	6.831***	6.717***	8.218***	7.380***	9.278***	8.945***
	(0.038)	(0.078)	(0.108)	(0.207)	(0.176)	(0.341)
No need to borrow	4.654***	4.794***	4.104***	3.902***	5.584***	5.890***
	(0.038)	(0.080)	(0.084)	(0.200)	(0.150)	(0.349)
Controls						
Income		-0.075*		-0.207*		0.105
		(0.036)		(0.082)		(0.160)
Net financial assets		-0.114***		-0.127***		-0.127**
		(0.009)		(0.019)		(0.033)
Non-primary earner		-0.497***		-0.687**		-1.35***
		(0.082)		(0.210)		(0.334)
Age		0.026***		-0.040***		-0.014
		(0.002)		(0.005)		(0.009)
$Age^2/100$		-0.111***		-0.235***		-0.339***
		(0.017)		(0.044)		(0.075)
Female		0.212***		0.357**		0.515*
		(0.052)		(0.132)		(0.221)
Education (omitted: Some college)						
High school or less		-0.170**		-0.003		0.002
		(0.062)		(0.165)		(0.273)
College		-0.067		-0.261		-1.038**
		(0.074)		(0.177)		(0.299)
Post-graduate		0.159		0.292		-0.345
		(0.097)		(0.239)		(0.404)
Married		0.131*		0.394**		0.158
		(0.056)		(0.144)		(0.244)
Have at least one child		0.203***		0.697***		0.738**
		(0.055)		(0.143)		(0.242)
Have at least one parent		0.064		0.632***		0.710**
		(0.052)		(0.133)		(0.224)
Observations	9962	9924	7428	7369	2517	2513
R^2	0.167	0.209	0.131	0.168	0.108	0.149

Notes: Each column presents the results of a separate OLS regression. Robust standard errors are 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 $p < 0.05$, ** – $p < 0.01$, *** – $p < 0.001$. For each regression, the coefficients on the regressors "Cannot pay," "Need to borrow," and "No need to borrow" are statistically different from each other. Online Appendix Table B.2 provides details of the corresponding tests.

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).

Table 4: Consequences of Financial Stress

	Working hours distracted		Hours on financial issues	
	(1)	(2)	(3)	(4)
Qual. measure of stress	1.08***	1.06***	1.052***	1.005***
	(0.023)	(0.023)	(0.038)	(0.037)
Controls				
Non-primary earner		-0.196		-1.050***
		(0.195)		(0.312)
Age		-0.070***		-0.040**
		(0.005)		(0.008)
$Age^2/100$		-0.194***		-0.236***
		(0.040)		(0.068)
Female		0.264*		0.285
		(0.123)		(0.201)
Education (omitted: Some college)				
High school or less		0.260		0.448
		(0.151)		(0.250)
College		-0.745***		-0.905**
		(0.161)		(0.270)
Post-graduate		-0.379		-0.681
		(0.206)		(0.347)
Married		0.155		-0.140
		(0.132)		(0.219)
Have at least one child		0.436***		0.825***
		(0.132)		(0.223)
Have at least one parent		0.604***		0.615**
		(0.122)		(0.205)
Intercept	✓	✓	✓	✓
Observations	7408	7408	2511	2511
R^2	0.250	0.289	0.254	0.290

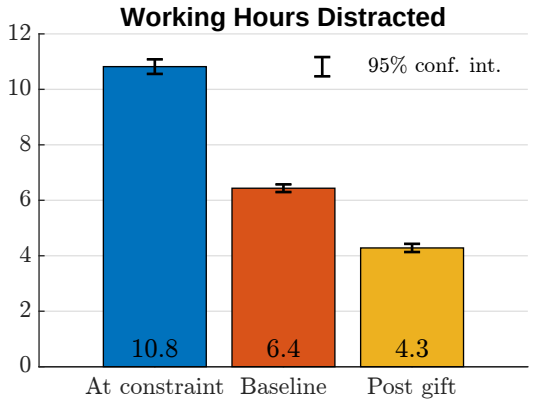
Notes: Robust standard errors in parentheses. The income control is demeaned and divided by the mean, the assets control is demeaned and divided by the mean income, and the age variable is demeaned. * indicates $p < 0.05$, ** – $p < 0.01$, *** – $p < 0.001$.

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).

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*

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), and distracted hours at work in a hypothetical scenario where the household receives a gift of $2,000 (question Q19b of our survey).

> *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?*

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.[13] 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 2.1 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?*

[13] Clustering standard errors at the respondent level changes the reported standard errors by less than 0.01%.

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.[14] Like working hours distracted and hours spent on financial issues, impulse 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.[15] 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.

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 ρ, and the flow utility function

$$u\left(c_t, \ell_t; \Theta\left(a_t\right)\right) = \frac{c_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{\left(\ell_t + \Theta\left(a_t\right)\right)^{1+\frac{1}{\psi}}}{1+\frac{1}{\psi}}, \tag{1}$$

where c_t is consumption at instant t, ℓ_t is productive labor supply at t, σ and ψ determine the intertemporal elasticity of substitution and the Frisch elasticity of labor supply, and the non-standard element $\Theta\left(a_t\right) > 0$ captures the amount of cognition and/or time drained by finance-

[14] 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.

[15] This range comes from regressing the amount of stress spending on the qualitative measure of financial stress, analogous to columns (1) and (3) of Table 4.

related issues at instant t (as a function of current net financial assets a_t). Compared to Dasgupta and Ray (1986, 1987), Banerjee and Mullainathan (2008), and Dalton, Ghosal and Mani (2016), we introduce an endogenous consumption and saving choice and show that it plays a crucial role in determining the conditions for poverty traps.

In equation (1), the household derives disutility from both productive labor supply and worrying about/dealing with financial issues, because both utilize scarce cognition and time (i.e., "bandwidth" in Mullainathan and Shafir, 2013).[16] The financial stress term $\Theta(a_t)$ can capture both the psychological costs of financial constraints, our focus here, and 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 bandwidth 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 4.2 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 4.2.

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 finances 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 alleviating financial stress $\Theta(\cdot)$ is chosen endogenously. This result is formally stated in Section 4.2.

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

$$\dot{a}_t = ra_t - c_t + wz_t\ell_t \tag{2}$$

[16] The specification in (1) is flexible enough to connect with both of our survey questions about the impact of financial stress. For Q17a-Q17b, one can interpret ℓ_t as productive working hours and $\Theta(a_t)$ as working hours distracted. The household derives disutility from total working hours $\ell_t + \Theta(a_t)$. For Q17c, one can again interpret ℓ_t as productive working hours, but $\Theta(a_t)$ as the total number of hours spent thinking about and dealing with financial issues. The household again derives disutility from $\ell_t + \Theta(a_t)$, which now includes hours spent on financial issues both during and outside of work. We use the first interpretation throughout the paper when mapping our model to our survey evidence.

and is subject to the financial constraint

$$a_t \geq \underline{a}, \tag{3}$$

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 λ, and $\underline{a}$ represents the lower bound of net financial assets. Stochastic idiosyncratic productivity is introduced so there is a meaningful stationary wealth distribution.[17] In the main analysis, we study a partial equilibrium setting with exogenous interest rate r. Online Appendix C.11 reports the results with endogenous r à la Huggett (1993). In our calibration, we focus on the case where $r < \rho$ so that a stationary wealth distribution exists.

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. We explore several such channels in Section 4.2 and Online Appendix C. First, financial stress can lead to direct utility costs independent of labor supply. Second, as our survey question Q20 suggests, to alleviate financial stress, the household may spend on items that it would not buy if it were not financially stressed. Third, instead of directly affecting labor earnings, financial stress can impact the transition intensity between different idiosyncratic income states, which can better capture salaried workers. 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). Section 4.2 shows that, even with these alternative channels, the main insight into how sophistication versus naivete about financial stress affects household behavior remains.

3.2 Sophistication and the Extra Saving Motive

The impact of financial stress on household behavior depends crucially on whether households understand the negative consequences of future financial stress and take this into consideration when making current decisions. The behavioral economics literature has developed two standard benchmarks regarding such understanding: sophistication and its opposite, naivete (O'Donoghue and Rabin, 1999, 2001). In the context of financial stress, sophisticates understand that future 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. On the other hand, naifs fail to internalize the negative consequences of future financial stress when making current consumption and saving

[17] The two-state process follows Achdou et al. (2022) and is used for simplicity.

decisions.

We start our analysis with the case of (full) sophistication.[18] Sophisticates choose consumption and labor to maximize the present value of (1)

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

subject to the budget constraint (2), the financial constraint (3), and the process for z_t. We use $v_j\left(a\right)$ 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 $a \geq \underline{a}$,

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

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

Sophisticates' consumption $c_j\left(a\right)$ (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,

$$c_j^{-\frac{1}{\sigma}}\left(a\right) = v_j^{'}\left(a\right) \quad \text{for} \quad j \in \{1, 2\} \quad \text{and} \quad a > \underline{a}. \tag{6}$$

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

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

The borrowing constraint in equation (3) gives rise to the boundary condition: $v_j^{'}\left(\underline{a}\right) \geq \left[wz_j\ell_j\left(\underline{a}\right) + r\underline{a}\right]^{-\frac{1}{\sigma}}$, 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:

[18] In Online Appendix C.1, we also study the case of partial sophistication (O'Donoghue and Rabin, 2001), where households partially understand the impact of future financial stress.

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

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

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 (full) naivete. Naifs fail to internalize the negative consequences of future financial stress, making current 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 $v_j^p(a)$:

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

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

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

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*

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

Compared to sophisticates' Euler equation in (8), naifs do not have the extra saving motive: 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, 2023), where naifs' perceived future value function is given by the frictionless, no-present-bias value function.[19] 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 to the right of the constraint $\underline{a}$. Formally, a household falls into a poverty trap if and only if $\lim_{a\to(\underline{a})^+} s(a) < 0$, where $s(a) \equiv ra - c(a) + wz\ell(a)$ is *net flow* saving. That is, the change in net financial asset a is negative for a household close to the financial constraint (i.e., $\dot{a} < 0$ in (2)). This definition is consistent with the standard definition of a poverty trap (Kraay and McKenzie, 2014).[20]

[19] We also follow Harris and Laibson (2013) and Maxted (2023) and let the transition rate from the present to the future be infinity. This captures the economic essence in a simple way.

[20] There, they define a poverty trap as gross flow saving, in poverty, falling below the depreciation of capital, which means negative net flow saving.

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

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

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 5 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 ρ 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.[21] We normalize average income and labor hours in our model to be 1.

[21] Specifically, we calibrate ρ 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 ρ 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 Online Appendix C.11, we endogenize r such that the average wealth to average income ratio in the economy is fixed across cases. The main results are similar.

Table 5: Calibration Parameters

Parameters	Justifications
$\sigma = 1$	Kaplan and Violante (2022)
$\underline{a} = -1/4$	Kaplan, Moll and Violante (2018)
$r = 0.01$	Kaplan and Violante (2022)
$\psi = 1$	Guerrieri and Lorenzoni (2017)
$(\lambda, z_1, z_2) = (0.57, 0.87, 1.13)$ [22]	Guerrieri and Lorenzoni (2017)
$\left(\bar{\Theta}, \alpha\right) = (0.27, 11.9)$	Our survey
$\rho = 0.0131$	Match avg a/avg $y = 0.56$ (Kaplan and Violante, 2022) in the naivete about financial stress case.
$w = 1.05$, $\varphi = 1.05$	Normalize average income and total labor hours to 1 in the naivete about financial stress case.[23]

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

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

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 α—the slope of the financial stress function—based on the log 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[24]

$$\alpha = \frac{\overline{\log\left(Q17ab/Q19b\right)}}{2000/\overline{\text{income}}} = 11.9, \tag{13}$$

[22] These parameters reflect a two-state discretization of the labor productivity process employed in Guerrieri and Lorenzoni (2017), who assume that the log of productivity follows an AR(1) process with normal disturbances, the persistence ρ of 0.967, volatility σ^2 of 0.017 at quarterly frequency, and the average level of productivity of one. Following Maxted (2023), we transform this discrete-time process into a continuous-time Ornstein-Uhlenbeck (OU) process with the rate of mean reversion ρ^{OU} such that $\rho = \exp(-\rho_{\text{OU}}\Delta)$ and the volatility σ^2_{OU} such that $\sigma^2 = \sigma^2_{\text{OU}}(1 - \exp(-2\rho_{\text{OU}}\Delta))/(2\rho_{\text{OU}})$, where $\Delta = 0.25$ is the duration of one quarter in continuous time. Then we discretize the OU process into two states using finite-difference methods. The mean of the productivity z is normalized to one.

[23] The average income and average total labor hours are defined as $\frac{1}{2}wz_1\int \ell_1(a)g_1(a)da + \frac{1}{2}wz_2\int \ell_2(a)g_2(a)da$ and $\frac{1}{2}\int\left[\ell_1(a) + \Theta(a)\right]g_1(a)da + \frac{1}{2}\int\left[\ell_2(a) + \Theta(a)\right]g_2(a)da$, 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.

[24] 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.

which means that net assets at the level of 0.7 monthly income halves financial stress. In Section 4.3, we explored three alternative calibrations and show that the main results about how sophistication versus naivete affects the impact of financial stress are not sensitive to these alternative calibrations.

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 show that the household's sophistication versus naivete about its financial stress is an important determinant of the economic impact of financial stress. Moreover, the impact of the sophistication-naivete dimension is robust to various extensions and alternative calibration strategies. Finally, we contrast the impact of financial stress with the impact of present bias.

4.1 The Impact of Financial Stress: Sophistication versus Naivete

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, $j \in \{1, 2\}$. That is, the time derivative of a (i.e., $\dot{a}$ in (2)). We compare a sophisticated stressed household with a no-stress household (by no-stress, we mean the household that does not suffer from the psychological cost of financial constraints, i.e., $\Theta(a) = 0$ for all levels of net asset a.)

Two dashed lines in the left panel of Figure 4 capture the net flow saving of the no-stress household. Consistent with the permanent income hypothesis, households in the low-income state z_1 dis-save/borrow, $s_1(a) < 0$, while households in the high-income state z_2 save, $s_2(a) > 0$.[25]

Two solid lines in the left panel of Figure 4 capture the net flow saving of sophisticated stressed 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.[26]

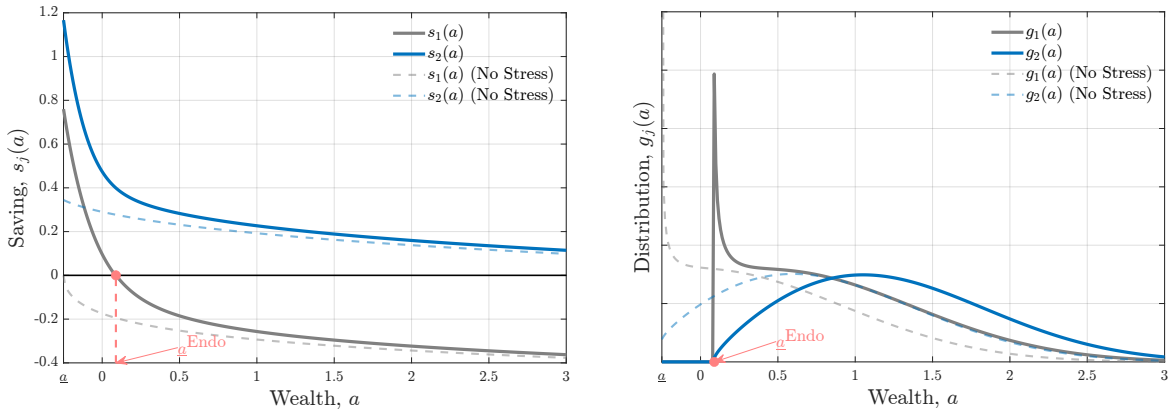
Moreover, because of this extra saving motive, even households in the low-income state z_1 are net savers ($s_1(a) > 0$) for all $a < \underline{a}^{\text{Endo}}$, where $\underline{a}^{\text{Endo}}$ is the point at which the net saving of the sophisticated stressed household with low income is zero

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

[25] 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.

[26] Specifically, there are two reasons why a sophisticated stressed household's net saving is higher than that of a no-stress household: the extra saving motive in (8), and the extra labor supply motive in Figure 11.

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.

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

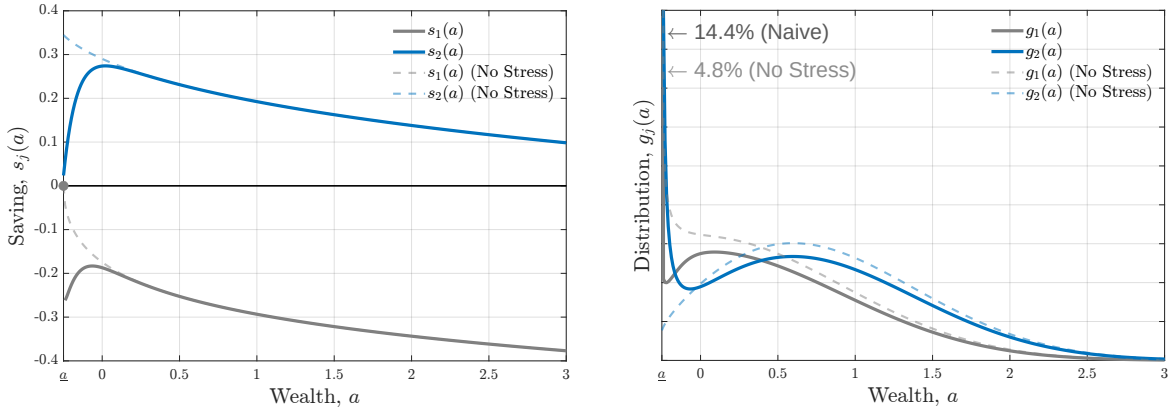
Specifically, the right panel of Figure 4 plots the stationary probability density function of net wealth $g_j(a)$ for each productivity state $j \in \{1, 2\}$.[27] We compare sophisticated stressed households with the no-stress benchmark. Consistent with the no-poverty-trap discussion above, the extra 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 $s_1\left(\underline{a}^{\text{Endo}}\right)$ in equation (14) is 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. Finally, it is worth noting that the gray dot in the left panel of Figure 5 (and similar figures in the rest of the paper) captures that the net saving $s_1(\underline{a})$ is zero for a low-productivity naif exactly at the constraint $\underline{a}$. This ensures that the financial constraint in (3)

[27] 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.

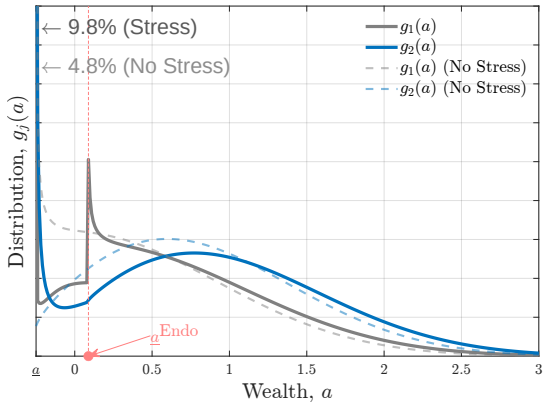
is not violated. Such a jump in the net saving function $s_1(a)$ exactly at the constraint is standard for naive households (Harris and Laibson, 2013; Maxted, 2023).

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.

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 directly differentiating sophisticates from naifs is challenging (Heidhues and Strack, 2021; Carrera et al., 2022; Allcott et al., 2022). We henceforth resort to a more indirect approach to calibrate the proportion of sophisticates. That is, we 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 expenses (9.8%). This leads to a proportion of 32.2% of sophisticates. Figure 6 plots the stationary wealth distribution. The main lesson is that all households at their financial constraints are naifs. Sophisticates, instead, save out of their financial constraints.

In Supplementary Appendix F, we also consider an alternative calibration strategy, leveraging a supplementary survey question about the top reasons for saving, to calibrate the proportion of sophisticates, which leads to similar results as in Figure 6 (a proportion of 26.4% of sophisticates).

Figure 6: 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 sophiscates and naifs.

Again, all households at their financial constraints are naifs. Sophisticates, instead, save out of their financial constraints.

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.

4.2 Robustness and 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.

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 ρ and flow utility:

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

where j_t in $\{1,2\}$ captures the idiosyncratic income state at t and $W_{j_t}(a_t, \Theta_t)$ captures the disutility of financial stress. The household endogenously chooses consumption c_t, labor supply ℓ_t, and Θ_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 Θ_t to alleviate disutility of financial stress $W_{j_t}(a_t, \Theta_t)$.[28] Proposition 2 in Online Appendix C.2 shows the equivalence between this model of endogenous choice and our baseline model with exogenous $\Theta(\cdot)$. That is, there exists a disutility function $\{W_j(a, \Theta)\}_{j=1}^2$ such that the household problem with endogenously chosen Θ, (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

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

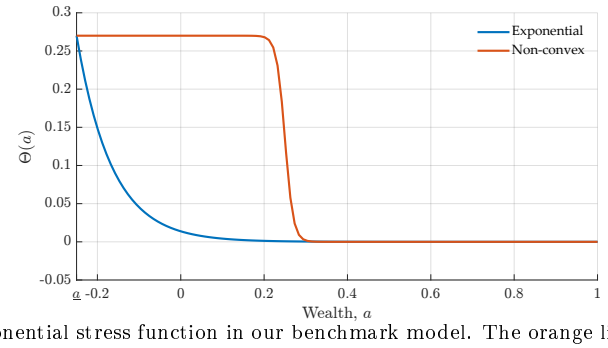
where χ captures the productivity during hours affected by financial stress, and the baseline analysis is nested with $\chi = 0$. In Online Appendix C.3, we study the case with $\chi = 0.5$, i.e., households are half as productive during hours affected by financial stress. Other parts of the model are the same as in the main analysis. Figures C.1 and C.2 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 Online Appendix C.14, based on the estimates of Kaur et al. (2022) regarding the effect of financial stress on earnings, is agnostic about the value of χ.

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 $u(c_t, \ell_t) = c_t^{1-1/\sigma}/(1-1/\sigma) - \varphi\ell_t^{1+1/\psi}/(1+1/\psi)$ and the budget in equation (2) becomes

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

[28] This model is also similar to Becker and Murphy (1988), where the decision maker can spend costly resources to alleviate addiction.

Figure 7: 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 (C.4) and (C.5) in Online Appendix C.5 provide the exact functional form.

which features a multiplicative productivity loss driven by financial stress. Other parts of the model are as in the main analysis. Figures C.3 and C.4 in Online Appendix C.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 and hence earnings at the financial constraint. As a result, even households in the high-income state z_2 have negative net savings in the neighborhood of the financial constraint.

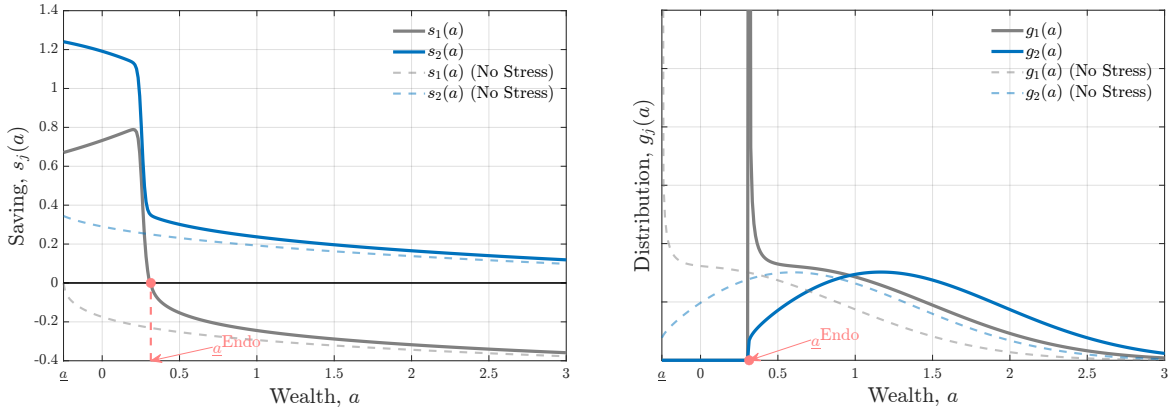
Alternative functional forms of stress: more difficult to save out of the financial stress region. One may wonder whether our result that sophisticates save out of the financial stress region continues to hold if it is more difficult for them to save out of the region. We consider a robustness check with a non-convex stress function $\Theta(a)$ in Figure 7, where the stress $\Theta(a)$ only starts to significantly decrease with a far away from the financial constraint $\underline{a}$ (see Online Appendix C.5 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 8 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 $\left|\Theta'(a)\right|$, 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 8. This is why sophisticates still save out of the financial stress region.[29,30]

[29] One way to generate a poverty trap under sophistication is to introduce indivisibility in technology choice. 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).

[30] Naifs still fall into the poverty trap with the non-convex stress function $\Theta(a)$. See Online Appendix C.5.

Figure 8: 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 (C.4) and (C.5) of Online Appendix C.5.

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."[31] In this case, the utility function in equation (1) is $u(c_t, \ell_t) = c_t^{1-1/\sigma}/(1-1/\sigma) - \varphi \ell_t^{1+1/\psi}/(1+1/\psi)$ and the budget in equation (2) becomes

$$\dot{a}_t = ra_t - c_t - C^{\Theta}(a_t) + wz_t\ell_t, \tag{18}$$

where $C^{\Theta}(a_t)$ captures this type of stress spending, with the key property that it does not directly enter the utility. In Online Appendix C.6, we use the survey responses to Q20 to calibrate $C^{\Theta}(a_t)$ and study the impact of financial stress through stress spending. Figures C.6 and C.7 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).

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 their performance, a stressed worker may face a lower chance of

[31] Credit Karma (2017) find that more than half (52 percent) of respondents have impulsively shopped to deal with feelings of stress, anxiety, or depression.

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 Online Appendix C.7, 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 α and other parameters are identical to those in the main analysis.

Figure C.8 in Online Appendix C.7 shows that sophisticates' saving behavior and wealth distribution are very similar to those in the main analysis. For naifs in Figure C.9, 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 Online Appendix C.8, 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 Online Appendix C.8.

Figure C.10 in Online Appendix C.8 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 Figure C.11 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 (14.7%), and almost all households at their financial constraints are naifs.

Other extensions and robustness checks. We verify that the main lessons—that sophisticates save out of financial stress states while naifs may fall into poverty traps—remain true in the following extensions: i) under different elasticities of intertemporal substitution ($\sigma = 0.5$ or $\sigma = 2$ instead of $\sigma = 1$) in Online Appendix C.9; ii) under different borrowing and saving interest rates as in Kaplan, Moll and Violante (2018) in Online Appendix C.10; iii) under an endogenous interest rate r as in Huggett (1993) and Achdou et al. (2022) in Online Appendix C.11; iv) under an alternative stress function $\Theta(a)$, which decreases with net wealth a up to a point, after which it equals zero, in Online Appendix C.12.

4.3 Alternative Calibration Strategies

We explore three alternative calibrations of the financial stress function $\Theta(a)$. First, we calibrate $\left(\bar{\Theta}, \alpha\right) = (0.29, 15.5)$ based on the restricted sample of respondents who pass all attention checks (see Supplementary Appendix D). 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 (question Q17ab) depend on their financial situations (question Q9). This cross-sectional approach is explained in detail in Online Appendix C.13 and leads to $\left(\bar{\Theta}, \alpha\right) = (0.26, 1.1)$. Third, we use the estimates in Kaur et al. (2022) to calibrate $\left(\bar{\Theta}, \alpha\right) = (0.26, 5.25)$. As further explained in Online Appendix C.14, Kaur et al. (2022) estimate the effect of an interim payment on Indian manufacturing workers' hourly earnings by the status of financial constraints. This calibration based on the measured effect of financial stress in a real-life situation is conceptually distinct from calibration based on our survey measures.

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 calibrations lead to lower α, i.e., financial stress decreases slower with net financial assets. As explained in Online Appendix C.13, a lower α strengthens the main result that sophisticates exhibit strong extra saving motives while naifs fall into the poverty trap. Under sophistication, a lower α further increases the extra saving motive, since it takes more to save out of high financial stress states. Under naivete, a lower α 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.

4.4 Financial Stress vs Present Bias

Does financial stress have implications similar to present bias (e.g., Strotz, 1955, and Laibson, 1997), which may also result in more households facing financial constraints? It turns out that it does not. This section highlights the key differences between the two behavioral frictions.

As noted in the introduction, the first key difference is that present bias does not depend on proximity to financial constraints and affects households at all levels of financial assets, whereas financial stress impacts only households close to constraints. By the same token, present bias does not address empirical evidence about the psychological effects of financial constraints on cognition and productive labor supply (e.g. Kaur et al., 2022).

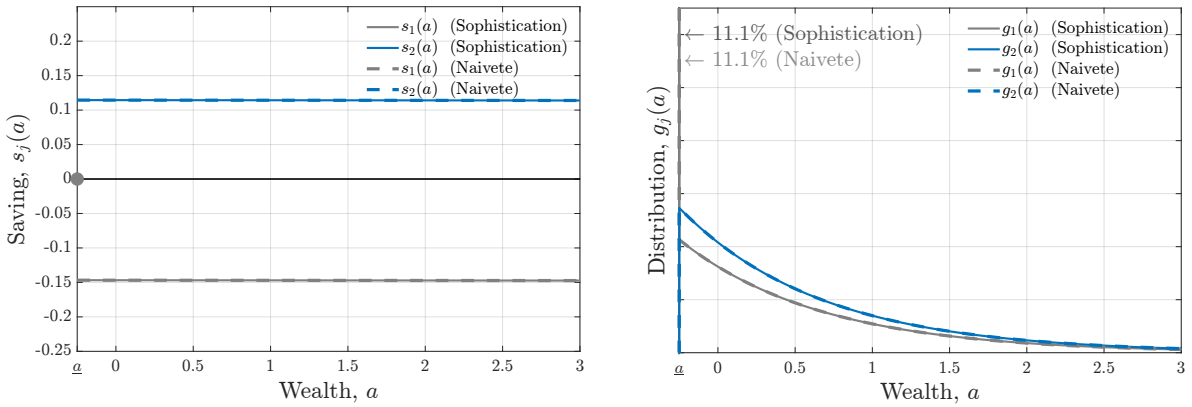
Crucially, the implications of the sophistication-naivete dimension for present bias differ significantly from its implications for financial stress. For financial stress, as illustrated above and in Online Appendix C.9, sophisticates unambiguously save more than naifs, independent of the elasticity of intertemporal substitution (EIS). Intuitively, this arises from an income effect: sophisticates understand that their future selves will be poorer due to stress and will benefit from additional savings. For present bias, the impact of the sophistication-naivete dimension instead depends on the EIS. When the EIS is above one, sophisticates save less than naifs, opposite to how the sophistication-naivete dimension impacts financially stressed households. This occurs because of the presence of a substitution effect that dominates the aforementioned income effect when the EIS is above one. According to this substitution effect, sophisticates are discouraged from saving because they understand that their future selves will exhibit present bias and consume additional savings sub-optimally (O'Donoghue and Rabin, 1999). In the case when the EIS equals one, the income and substitution effects cancel each other out, resulting in identical saving functions for sophisticates and naifs (Maxted, 2023). When the EIS is below one, the income effect dominates the substitution effect, and sophisticates save more than naifs, similar to how the sophistication-naivete dimension impacts financially stressed households.

To further illustrate, we present the model from Section 3 extended with present bias. We follow the state-of-the-art treatment in Harris and Laibson (2013) and Maxted (2023) and consider a continuous-time formulation of present bias, known as instant gratification.[32] To maintain minimal deviation from Harris and Laibson (2013) and Maxted (2023), the model introduces financial stress but excludes endogenous labor supply. Consequently, we can employ the $\widehat{u}$-agent solution method for the intra-personal game as used in the aforementioned papers.[33] The details of the model and solution are explained in Online Appendix C.15.

[32] That is, the transition rate from the present to the future equals infinity.

[33] Following Maxted (2023), we allow the borrowing limit to be flexible, meaning that the household can potentially reduce its assets below $\underline{a}$. However, this comes at such a prohibitively high cost that the household will never opt to do so. Consequently, $\underline{a}$ remains the lower bound of the stationary wealth distribution.

Figure 9: Saving Behavior and Stationary Wealth Distribution (Present Bias Only).



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 in the case of present bias only. The dashed lines capture the case when the household is fully naive. The solid lines show the case when the household is fully sophisticated. The present bias parameter β is set to 0.75, the subjective discount factor ρ is set to 0.0076 to match the average liquid wealth to income ratio of 0.56 in the case of full naivete, and the productive labor supply is set to 1. All the other parameters are similar to those in Table 5.

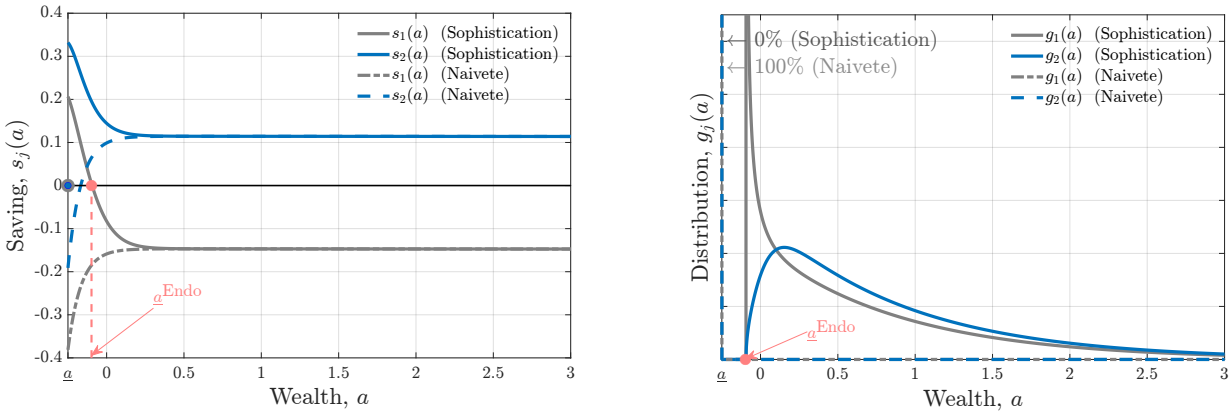
We first consider the case of present bias only, without financial stress. Figure 9 plots the net flow of savings and stationary wealth distribution for present-biased households, given the parameter values in Table 5 and the degree of present bias β of 0.75, as in Maxted (2023).[34] As in our main analysis, the EIS σ is equal to one. Figure 9 illustrates that sophisticates and naifs share *identical* saving functions and stationary wealth distributions.[35] Online Appendix C.16 study the case of present bias only with alternative elasticities of intertemporal substitution. Figure C.28 shows that when the EIS is above one, specifically $\sigma = 2$, sophisticated present-biased households save less than naive present-biased households. Figure C.27 shows that when the EIS is below one, specifically $\sigma = 0.5$, sophisticated present-biased households save more than naive present-biased households. In sum, the implication of the sophistication-naivete dimension differs from the case of financial stress.

We next present the joint implications of present bias and financial stress. Figure 10 plots the net flow saving and stationary wealth distribution for the present bias parameter β of 0.75, the subjective discount factor ρ of 0.0076, and the productive labor supply of $1 - \Theta(a_t)$, with the rest of the parameters identical to those in Table 5 (in particular, the EIS σ is equal to one.). We assume that sophisticates here are sophisticated about both financial stress and present bias, and naifs here are naive about both financial stress and present bias. With both present bias and financial stress, the implications of the sophistication-naivete dimension now resemble those of the

[34] Similar to the main analysis, we recalibrate ρ to match avg a/avg $y = 0.56$ for the naive present-bias case and keep this level of ρ, which equals 0.0076, constant across all other cases in this section. Compared to Table 5, there is no labor supply elasticity because we exclude endogenous labor supply here. We normalize the productive labor supply and w to 1.

[35] Although the saving functions appear flat, they are slightly negatively sloped. It is straightforward to show, following the analysis in Maxted (2023), that the derivative of the saving function with respect to wealth a is $ds_j(a)/da = (r\beta - \rho)/\beta$. Under our calibration, it approximately equals -0.00013.

Figure 10: Saving Behavior and Stationary Wealth Distribution (Present Bias and Financial Stress).



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 in the presence of financial stress and present bias. The dashed and dashed-dotted lines capture the case when the household is fully naive. The solid lines show the case when the household is fully sophisticated. The present bias parameter β is set to 0.75, the subjective discount factor ρ is set to 0.0076 to match the average liquid wealth to income ratio of 0.56 in the case of full naivete and only present bias, and the productive labor supply is set to $1-\Theta(a)$. All the other parameters are similar to those in Table 5.

main analysis. Sophisticates save out of the financial constraint, while naifs fall into the poverty trap in an extreme fashion: all naive, stressed-and-present-biased households are at the financial constraint. With both present bias and financial stress, under naivete, even households in the high-income state z_2 have negative net savings near the financial constraint, contributing to the degenerate stationary distribution.

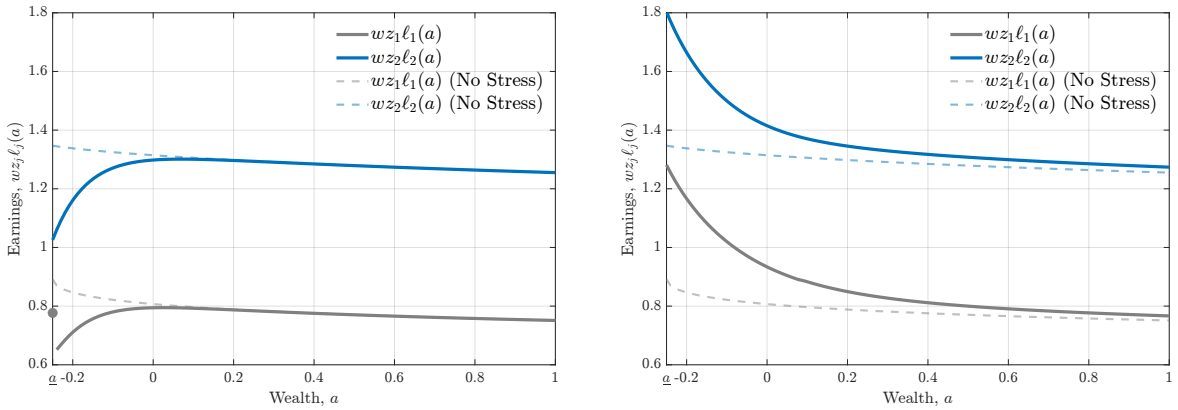
5 The Impact of Financial Stress: Labor Earnings, Welfare, and Fiscal Stimulus

This section presents three additional implications of financial stress. First, the financial stress channel dampens or reverses the counterfactual large negative wealth effect on labor earnings. 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.

5.1 Financial Stress and the Wealth Effect on Labor Earnings

Benchmark models with separable utility functions of consumption and labor predict a large negative wealth effect on labor supply and earnings. That is, since leisure is a normal good, higher wealth increases the demand for leisure, crowding out labor supply and earnings. Nevertheless, the empirical estimates of the wealth effect on labor earnings (i.e., the marginal propensity to earn) are often close to zero or even positive (Cesarini et al., 2017; Auclert, Bardóczy and Rognlie, 2023;

Figure 11: Labor Earnings: Naivete (left) vs Sophistication (right).



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

Banerjee et al., 2020; Kaur et al., 2022).[36]

The financial stress channel can attenuate or reverse the large negative wealth effect on labor earnings in benchmark models, helping to reconcile it with the relatively small empirical estimates. 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 the wealth a in the optimality condition (7) for the productive labor supply $\ell_j(a)$, which holds both for naifs and sophisticates. We arrive at the following expression for the marginal propensity to earn:

$$\frac{d\left(wz_j\ell_j\left(a\right)\right)}{da} = \underbrace{-wz_j \cdot \frac{\ell_j\left(a\right)+\Theta\left(a\right)}{c_j\left(a\right)} \cdot \frac{\psi}{\sigma} \cdot \frac{dc_j\left(a\right)}{da}}_{<0,\ \text{wealth effect}} \quad \underbrace{-wz_j \cdot \frac{d\Theta\left(a\right)}{da}}_{>0,\ \text{alleviating financial stress}} . \tag{19}$$

The first term captures the standard negative wealth effect on labor supply and earnings. The second term captures the positive wealth effect of alleviating financial stress.

The left panel of Figure 11 plots labor earnings $wz_j\ell_j\left(a\right)$ 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 (19) dominates around financial constraints: the wealth effect on labor earnings is positive in the neighborhood of $\underline{a}$. Relieving financial stress frees up cognitive capacity and time for productive work. This positive wealth effect on labor earnings 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 (19) dominates, and the wealth effect on labor earnings turns negative. Interestingly,

[36]Labor earnings are often more clearly defined and reliably measured than labor supply, hence they are the focal point of the empirical literature.

Golosov et al. (2024) also find that, contrary to benchmark models,[37] poor households exhibit a less negative marginal propensity to earn compared to rich households.[38]

The right panel of Figure 11 compares a sophisticated stressed household's labor earnings with a no-stress household's. For a sophisticated stressed household, the first term in equation (19) dominates. The wealth effect on labor earnings is always negative, even more so than the no-stress case. Akin to the extra saving motive in Figure 4, 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 earnings.[39] 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 $z_0 = z_j$ for $j \in \{1, 2\}$:

$$\omega_j(a) \equiv \mathbb{E}\left[\int_0^{+\infty} e^{-\rho t} u\left(c_j(a_t), \ell_j(a_t); \Theta(a_t)\right) dt \middle| a_0 = a, z_0 = z_j\right]. \tag{20}$$

subject to the law of motion of assets (2) and the transition of idiosyncratic states. Two points are worth clarifying. First, (20) holds 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 (20) differs from the perceived value function in (10). The welfare function in (20) 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.

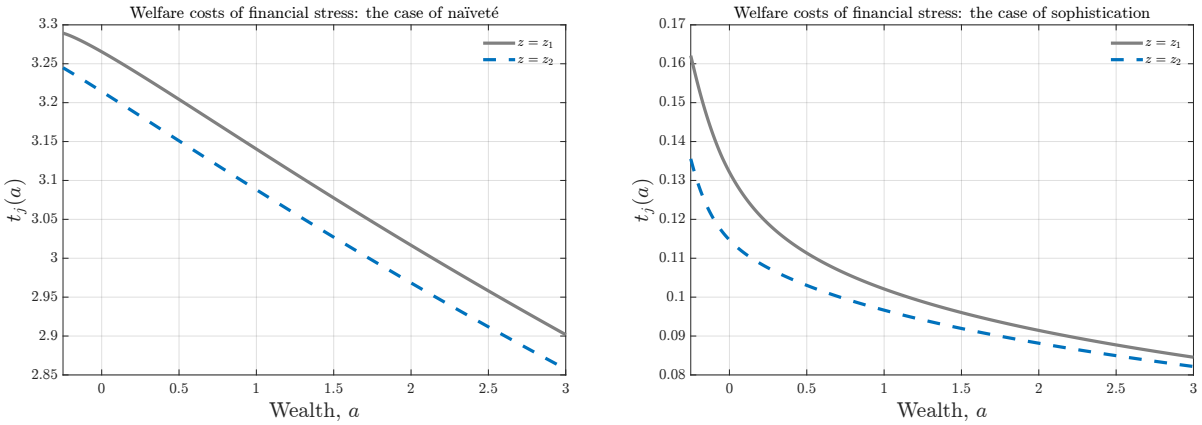
We then develop a money-metric measure of the welfare costs of financial stress. Given the

[37] Benchmark models predict that poor households exhibit a more negative marginal propensity to earn compared to rich households. This can be seen from the no-stress version of (19), $\frac{d(wz_j\ell_j(a))}{da} = -wz_j \cdot \frac{\ell_j'(a)}{c_j'(a)} \cdot \frac{\psi}{\sigma} \cdot \frac{dc_j(a)}{da}$, and the fact that poor households have a higher MPC $\frac{dc_j(a)}{da}$.

[38] In Table 3.1 of Golosov et al. (2024), the authors provide estimates for the marginal propensity to earn (out of \$100 lottery earnings) in different pre-win income quartiles. The estimate for the first quartile is half as negative as the estimate for the fourth quartile. It is worth noting that the estimates of marginal propensity for the first quartile remain negative, pointing to the direction that, in this context, the financial stress channel attenuates but does not reverse the large negative wealth effect on labor earnings.

[39] 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 (19) is then large and dominant.

Figure 12: 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 sophiscated stressed households.

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:

$$\omega_j\left(a + t_j\left(a\right)\right) = \omega_j^{\text{no-stress}}\left(a\right), \tag{21}$$

where $\omega_j^{\text{no-stress}}(a)$ captures the welfare in equation (20) without financial stress, i.e., $\Theta(a) = 0$.

Figure 12 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.

Related to Section 4.4, the welfare implications of the sophistication-naivete dimension for financial stress differ significantly from those for present bias. For present bias, the welfare impact of the sophistication-naivete dimension depends on the EIS (see the state-of-the-art treatment in Maxted, 2023). When the EIS is above one, sophisticates suffer a larger welfare cost from present bias than naifs do (O'Donoghue and Rabin, 1999), because they are discouraged from saving, as discussed in Section 4.4. When the EIS equals one, sophisticates and naifs suffer the same welfare cost from present bias. When the EIS is below one, sophisticates suffer a smaller welfare cost from present bias. For financial stress, sophisticates always suffer a smaller welfare cost than naifs, independent of the EIS.

5.3 The Financial Stress Channel of Fiscal Stimulus

A natural implication of the positive wealth effect on productive labor supply and earnings 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 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 answered 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, where a positive T_t means a lump sum transfer and a negative T_t means a lump sum tax.

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 4. *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 $\{b_t, T_t\}_{t=0}^{+\infty}$.*

Proposition 4 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 5. *With a continuously differentiable and increasing financial stress function* $\Theta(a)$*, fiscal stimulus financed by public debt stimulates aggregate spending and output:*

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

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 productive labor supply and boosts aggregate output. Consistent with this prediction, Coibion, Gorodnichenko and Weber (2020) found 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 the above: the competitive representative firm produces given the linear technology: $y_t = A\int z_{i,t}\ell_{i,t}di$, where A is the productivity, which equals the wage w 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 as in Online Appendix C.11.

To assess the effect of an increase in public debt, 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 households 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

$$\frac{y(B+\Delta B) - y(B)}{y(B)} = 0.98\%,$$

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 0.98 percent. It is worth noting that this

calculation isolates *one* channel: the supply-side channel of financial stress on productive 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 that 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 earnings. 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 (Lusardi and Mitchell, 2014, 2017) 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.

Data Availability Statement

The data and code underlying this article is available on Zenodo at https://dx.doi.org/10.5281/zenodo.13869710.

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