The Economics of Financial Stress*

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Abstract

We study the psychological costs of financial constraints and their economic consequences. Using a US-based representative survey, we document the prevalence of financial stress among US households and that financial stress strongly correlates with measures of financial constraints. We incorporate financial stress into an otherwise standard dynamic model of consumption and labor supply. There are two main findings. First, sophistication versus naivete is critical in determining stressed households' behavior and welfare costs of financial stress. Sophisticates, who understand the economic consequences of financial stress, would save out of high-stress states. Naifs, instead, dis-save, fall into a poverty trap, and incur higher welfare losses. A psychology-based theory of poverty traps hence requires two equally important components: financial stress itself and naivete about financial stress. Second, the financial stress channel can reverse the counterfactual negative wealth effect of labor supply because relieving stress releases resources for productive work. Financial stress also has macroeconomic consequences on widening wealth inequality and increasing fiscal multipliers.

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1 Introduction

Many US households are financially constrained. According to a report by the Federal Reserve in 2021, 36 percent of US households have difficulty covering a mere $400 emergency expense. Economists have studied extensively one important consequence of financial constraints: imperfect consumption smoothing (Aiyagari, 1994; Gourinchas and Parker, 2002). In this paper, we investigate the psychological costs of financial constraints beyond this traditional channel. We term this channel financial stress.

The majority of Americans feel financially stressed: according to Capital One CreditWise survey, 73% of Americans rank finances as the No.1 stress in life. The post-COVID inflation makes things worse. American Psychological Association (2022) shows that 87% of Americans are stressed about their finance in March 2022, the highest number in the history of APA's Stress in America survey.

A growing behavioral development literature finds that financial stress has important economic consequences (e.g., Mani et al., 2013). As Mullainathan and Shafir (2013) summarize, the key channel is that financial stress drains scarce cognitive resources. Such a scarcity of cognitive resources can push people into a state of tunneling—neglecting activities outside the "financial stress" tunnel. Financially stressed people have difficulty in focusing, perform worse in economic tasks, and make poor decisions. Financial stress hence has important economic consequences on labor supply and earnings, time and risk preferences, and human capital investment (Haushofer and Fehr, 2014; Haushofer and Shapiro, 2016; Ong, Theseira and Ng, 2019; Lichand and Mani, 2020).

One well-documented economic consequence of financial stress is its impact on productive labor supply and earnings. Kaur et al. (2021) provide convincing recent evidence. They stagger when wages of Indian manufacturing workers are paid out: some workers are paid earlier while others are paid later and remain liquidity constrained. In other words, they vary the *timing* of wage payment without affecting the total. The early wage payment reduces workers' financial stress by immediately helping them pay off debts. Kaur et al. (2021) find that these less financially stressed workers become more productive at work and raise their earnings. Their output and earnings increase by 7% on average and by 13% for the most stressed households. The authors report additional evidence suggesting the increase comes from improved cognition: workers make fewer costly mistakes and become more attentively. Banerjee et al. (2020) and Fink, Jack and Masiye (2020) find similar evidence that reducing financial stress can increase Ghanaian workers' effective labor supply and earnings.

There are still many open economic questions regarding financial stress. Despite being an important explanation of poverty trap in development economics, financial stress receives little at-

tention in macroeconomics and household finance. The existing studies focus mostly on developing countries and there is a lack of evidence in the US context, despite its prevalence among US households. There is also no model of financial stress in the intertemporal context. Its implications for consumption, saving, and labor supply are not understood. Financial stress also has many natural but unexplored macroeconomic implications, such as for wealth distribution and fiscal stimulus.

This paper tackles these questions in two steps. We first conduct a representative survey of US households to gauge the degree of their financial stress and its economic consequences. We then build a tractable intertemporal model with financial stress. The model delivers empirically relevant predictions about how financial stress affects consumption and saving decisions, labor supply, and wealth distribution. We also uncover a novel and critical determinant of the economic impact of financial stress, the household's degree of sophistication about its own financial stress.

In our US-based survey targeting the representative primary or co-primary income earner, we document two key facts about financial stress and its economic consequences. First, the majority of survey participants feel financially stressed, based on a range of different measures of financial stress. For example, survey participants on average spend a median of 6 hours per week worrying about and dealing with issues related to household finances, distracting them from productive work. This finding also consistent with the finding of the TIAA Institute-GFLEC Personal Finance Index survey (Yakoboski, Lusardi and Hasler, 2020). Second, measures of financial stress are strongly correlated with measures of whether households are at financial constraints.

Next, we tractably incorporate financial stress into an otherwise standard dynamic model of consumption, labor supply, and weal distribution (Achdou et al., 2022). The model has two novel features consistent with our survey results and the evidence in Kaur et al. (2021). First, financial stress enters our model by crowds out valuable cognitive resources and time otherwise available for productive labor supply. Second, households closer to the financial constraints are more financially stressed. We calibrate our model based on our survey results and the evidence in Kaur et al. (2021).

We discover the important role of *sophistication* versus *naivete* in determining stressed households' behavior. The terms of sophistication and naivete are standard in behavioral economics (O'Donoghue and Rabin, 1999, 2001). In the context of financial stress, sophisticated households understand that future financial stress crowds out productive labor supply and lowers earnings. Naive households, on the other hand, do not understand the future impact of financial stress.

Sophisticates have a strong extra saving motive. Understanding that additional savings can alleviate future financial stress, sophisticates save out of high-stress states. With sophistication, financial stress surprisingly leads to fewer households at financial constraints despite stress's negative direct effect on earnings. There is no poverty trap for sophisticated households with financial stress.

On the other hand, naifs do not have this extra saving motive. They save less as a result of the negative effect of financial stress on earnings. With naivete, financial stress leads to a more dispersed wealth distribution and more households at financial constraints. Together, our results mean that a psychology-based theory of poverty trap (Mullainathan and Shafir, 2013) requires two equally important components: financial stress itself and naivete about financial stress.

Sophistication versus naivete has distinct implications for the welfare costs of financial stress. For this purpose, we first develop a money-metric measure of the welfare costs of financial stress. We compute the amount of money that fully compensates a household for the impact of financial stress. In our baseline calibration, the welfare costs of naifs' financial stress are ten times larger than sophisticates' financial stress.

Though differentiating sophistication from naivete is known to be hard, evidence points to the direction of naivete in the context of financial stress. The empirically large share of financially stressed households we document is consistent with the case of naivete but not with the case of sophistication through the lens of our model. Other evidence also points to the direction of naivete. Pew Charitable Trusts (2016) find that the share of Americans who feel financially insecure rises steadily over the course of the month (as cash-on-hand dwindles), and then drops sharply by 53% at the start of the next month when paychecks arrive. This is consistent with naivete but is hard to square with sophistication, since paychecks are anticipated. 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.

The financial stress channel can also reverse the counterfactual large negative wealth effect of labor supply in benchmark models (Auclert, Bardóczy and Rognlie, 2021). Relieving financial stress releases cognitive resources for productive work, increases productive labor supply and, hence, earnings. Financial stress thus provides a way to bring the wealth effect on labor supply in the model closer to its empirical counterpart in Cesarini et al. (2017), Banerjee et al. (2020), and Kaur et al. (2021). This channel is particularly strong for naifs and for households close to financial constraints.

A natural corollary of the positive wealth effect of labor supply for stressed households is a new transmission mechanism for fiscal policy: lump-sum fiscal transfers relieve financial stress, increase labor supply, and boost aggregate output. This channel breaks the Ricardian Equivalence and provides a new rationale for using fiscal transfers to stimulate the economy. In fact, in Biden (2021)'s speech about 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 for the stimulus check is to relieve the stress caused by the pandemic.

We explore alternative channels of financial stress. In the main analysis, we focus on how

financial stress crowds out valuable cognitive resources and time available for productive labor supply. This channel receives most attention and support in the existing behavioral development literature. It is also consistent with our survey evidence and easy to calibrate. But financial stress can matter through other channels: direct utility costs, impulsive spending to alleviate the stress (e.g., alcohol, cigarettes, etc.), transition probability across different individual income states, and quality of financial decisions (e.g., portfolio returns). We apply our modeling approach to these cases. The main insight on how sophistication versus naivete about financial stress affects household behavior remains.

Our paper builds upon and contributes to the literature on psychology of poverty and scarcity (e.g., Banerjee and Mullainathan, 2008; Mani et al., 2013; Mullainathan and Shafir, 2013; Haushofer and Fehr, 2014; Schilbach, Schofield and Mullainathan, 2016; Kaur et al., 2021). The main contribution is three-fold. First, we provide US-based evidence on the relevance of financial stress. Second, we build a tractable intertemporal model of financial stress that can be used to study consumption and saving decisions, labor supply, and wealth distribution. Third, we uncover the important role of sophistication versus naivete in determining the economic impact of financial stress.

Our paper also contributes to the theoretical literature on poverty traps. Galor and Zeira (1993) and Banerjee and Newman (1993) focus on the role of credit market imperfections and occupational choices.[1] Dasgupta and Ray (1986, 1987) focus on the role of nutrition. Banerjee and Mullainathan (2010) and Bernheim, Ray and Yeltekin (2015) focus on the role of present bias and temptation. Dalton, Ghosal and Mani (2016) focus on the role of reference dependence and aspirations. Our paper contributes in two ways. First, we provide a theory of poverty traps because of the scarcity of cognition. Second, we make the model tractable enough to extensively study the implications for intertemporal choices and wealth distribution.

A recent macroeconomic literature studies models with wealth in the utility function (Straub, 2019; Mian, Straub and Sufi, 2021; Michaillat and Saez, 2021). Financial stress provides a psychological foundation of why utility directly depends on wealth. However, our focus on how financial stress crowds out cognitive resources for productive labor supply differs from this literature. There, utility of wealth and disutility of labor are separable and the wealth effect of labor supply is still negative.

Financial stress differs significantly from present bias (e.g., Laibson, 1997 and Harris and Laibson, 2013). Present bias per se does not generate psychological costs of financial constraints: the costs of financial constraints still take the traditional form of imperfect consumption smoothing channel. By the same token, present bias cannot overturn the negative wealth effect of labor sup-

[1]Bandiera et al. (2017) and Balboni et al. (2022) provide empirical evidence supporting the role of occupational choices in generating poverty trap.

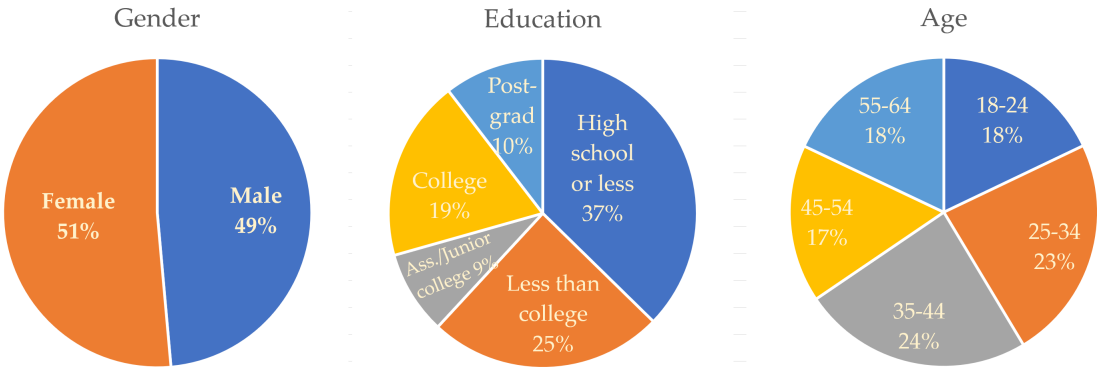


Figure 1: Demographics

Vars	Obs	Mean	Median	Std	Min	Max	q25	q75
Household size	10,000	2.3	2	1.7	0	12	1	3
Annual income	10,000	62,432	45,000	61,692	5,000	600,000	25,000	75,000
Net assets	9,959	66,791	5,000	219,362	-55,000	1,100,000	-45,000	45,000

Table 1: Demographics

ply. In terms of wealth distribution, present bias coupled with naivete can generate large number of financially constrained households. But present bias pushes all the people toward lower saving, while the effect of financial stress is asset-dependent: financial stress will not affect rich households.

2 Survey Design and Results

2.1 The Survey Sample and Structure

For our main online survey, we collect a sample of about 10,000 respondents who are prime-age, employed US workers. The sample is representative of the US population in terms of gender, age, region, total household income, and education. We collect the data in April and May 2022, in collaboration with Dynata, an online panel provider commonly used in economics (Andre et al., 2022). Our sample matches the demographics of the general population reasonably well (Figure 1 and Table 1). For instance, the median income in our sample is $55,000 and the median net assets in our sample is $5, 000.

Respondents start the survey by completing a series of demographic questions. Then, they answer key questions regarding financial stress and how it affects their economic lives. To ensure quality of the response, we make sure that the survey is relatively short. It has a total of 21 questions and can be finished in around 10 minutes. Appendix D contains the full survey questionnaire.

We also incorporate some attention checks in the survey. In the main text, we focus on the full

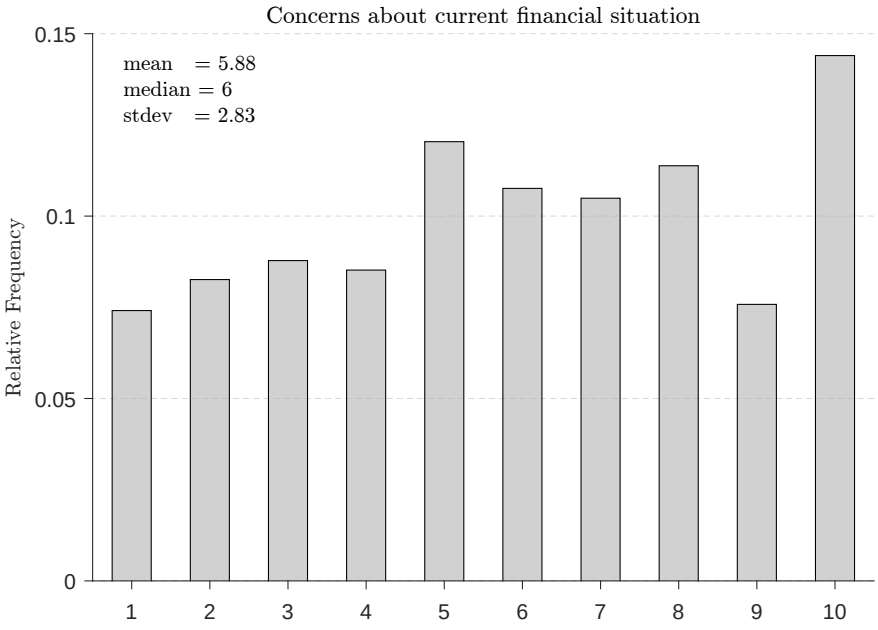


Figure 2: Qualitative Measure of Financial Stress

sample because our sampling procedure is designed so that the demographics of the full sample match the demographics of the general population. In Appendix B, we report all analysis for the restricted sample of participants who pass all attention checks. The analysis is very similar to the full sample.

2.2 The Prevalence of Financial Stress

We first document that the majority of survey participants feel financially stressed, based on a range of different measures of financial stress. We start with a qualitative measure of financial stress.

> 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 participants feel a nontrivial degree of financial stress. Figure 2 shows the histogram of the answers to this question. The median answer is 6, suggesting that most participants are quite concerned about their finances.

We then turn to quantitative measures of the economic consequences of financial stress. As a preparation, we first ask participants to report how many hours do you typically work in a week. Then, we randomize two different versions of questions gauging how financial stress drains valuable cognitive resources and time from productive work. The first version is motivated directly by the evidence in Kaur et al. (2021):

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

Table 2: The Impact of Financial Stress

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

The second version is a more broader measure of the impact of financial stress. This question is similar to a question used by the TIAA Institute-GFLEC Personal Finance Index survey (Yakoboski, Lusardi and Hasler, 2020).

> Q17b: Over the past week, how many hours did you spend thinking about and dealing with issues related to your household's finances?

Finally, we ask 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?

Table 2 shows the result. Not surprisingly, workers spent an average of forty hours per week at work, which is also the median of the distribution. For the hours distracted at work question Q17a, the average answer is 6.4 hours per week, and the median is 5 hours per week. For the hours spent thinking about and dealing with financial issues question Q17b, the average answer is 7.7 hours per week, and the median is 6 hours per week.[2] Our finding is also consistent with the TIAA Institute-GFLEC Personal Finance Index survey. In their 2020 Report (Yakoboski, Lusardi and Hasler, 2020), respondents report that they spend an average of 7 hours per week thinking about and dealing with issues. Together, the survey results suggest that the impact of financial stress is significant.

These numbers suggest that financial stress drains valuable time from productive work, and the finding is not sensitive to the exact wording of questions. Finally, for the dollars spent on alleviating financial stress question Q20 (e.g., alcohol, cigarette), the average answer is 211.2 dollars per week, and the median is 100 dollars per week. The impact of financial stress is again sizable, since the average weekly income in our sample is around 1200 dollars per week.

[2]The results based on the restricted sample of participants who pass all attention checks are similar. See Table 6 in Appendix B.

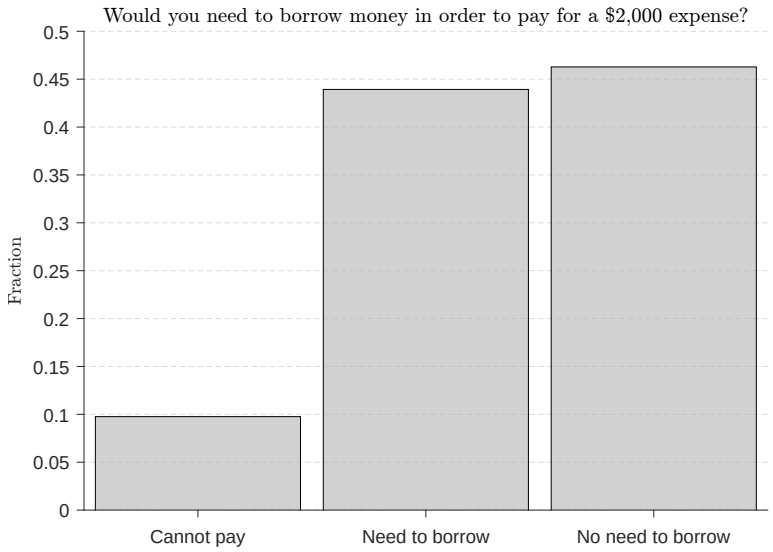


Figure 3: Measures of Financial Constraints

2.3 Financial Stress and Measures of Financial Constraints

We find that measures of financial stress are strongly correlated with measures of whether households are at financial constraints. We first collect a measure on whether the household is at borrowing constraints. This question is based on Lusardi, Schneider and Tufano (2011) and Clark, Lusardi and Mitchell (2021), and is shown to be a good indicator of whether households are financially constrained.

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

From Figure 3, around 10% of households in our sample is severely financially constrained ("cannot pay"). Around 44% of households are somewhat constrained ("need to borrow"). The rest 46% of households are unconstrained. Figure 4 shows that this measure of financial constraint is strongly correlated with all measures of financial stress. For example, households in "cannot pay" group report an average of 9.7 hours per week distracted at work. Households in "need to borrow" group report an average of 8.2 hours per week distracted at work. Households in "no need to borrow" group report an average of 4 hours per week distracted at work. The average in each group is very precisely estimated because of our large number size. For the hours spent on financial issues question, households in "cannot pay" group report an average of 10 hours per week, households in "need to borrow" group report an average of 9.5 hours per week, and households in "no need to borrow" group report an average of 5.8 hours per week.

In Appendix C, we regress measures of financial stress (in Q12, Q17a, Q17b) on measures of financial constraints (Q9), income, asset-income ratio, and other covariates. From Table 8, we

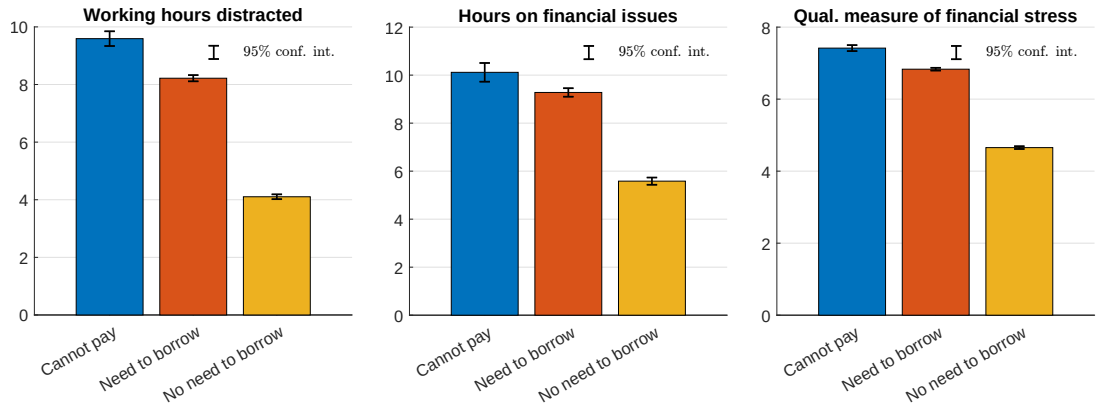


Figure 4: Average Financial Stress by Measures of Financial Constraints

Vars	Obs	Mean	Median	Std	Min	Max	q25	q75
Hours distracted at constraints	2,514	10.8	10	6.7	0	20	5	18
Δ(Hours distracted)	4,924	-2.2	0	4.4	-20	20	-3	0

Table 3: The Shape of Financial Stress

corroborate that measures of financial stress remain to be strongly correlated with measures of at financial constraints, no matter what measures of financial stress we use.

To further gauge the relationship between financial stress and distance to financial constraints and calibrate our model below, we ask the following two additional questions.

> Q19a: Now, I want you to imagine that your household's financial situation becomes worse, and you would struggle to quickly raise any additional money in the case of an emergency (for example, bank accounts have been depleted and credit cards are maxed out). In this alternate scenario, how many working hours would you have been distracted by your financial stress over the course of a week?
>
> Q19b: Now, I want you to imagine that you were gifted $2,000 at the start of last week. In this alternate scenario where you started the week with $2,000 more money, how many working hours would you have been distracted by your financial stress?

Table 2 shows the result. On average, participants report that they would be distracted for 10.8 hours per week at financial constraints. A $2,000 check on average would reduce the distraction at work by 2.2 hours per week.

3 A Tractable Model of Financial Stress

In this Section, we tractably incorporate financial stress into an otherwise standard standard model of intertemporal decision and wealth distribution (Achdou et al., 2022). Motivated by our

survey results and Kaur et al. (2021) and Banerjee et al. (2020), the model has has two key features. First, financial stress enters our model by draining valuable cognitive resources and time from productive work. Second, households closer to the financial constraints are more financially stressed. We calibrate our model based on the survey response and the evidence in Kaur et al. (2021). We also illustrate how our modeling approach can be easily applied to other channels of financial stress.

3.1 Set up and Interpretations

Set up. Our model is built upon the standard continuous-time heterogenous-agent model in Achdou et al. (2022). Households are infinitely lived with discount rate ρ. The flow utility is given by

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

where c_t is consumption at t, ℓ_t is productive labor supply at t, $\Theta\left(a_t\right) > 0$ captures the amount of cognition and/or time drained by financial stress (as a function of current net asset a_t), and σ and v parameterize the elasticity of intertemporal substitution and the Frisch elasticity.

Compared to the standard case in Achdou et al. (2022), the only difference in (1) is that the disutility now has two components: disutility driven by cognition/time spend on productive labor ℓ_t and cognition/time spent on worrying about and dealing with financial issues $\Theta\left(a_t\right)$.

One interpretation of (1) is that the household's cognition/time budget can be applied to three purposes: productive labor, worrying about and dealing with financial issues, and leisure. Financial stress $\Theta\left(a_t\right)$ crowds out cognition/time available for productive labor and leisure, captured by (1).

The household can borrow and save through a risk-less asset with interest rate r. Its budget constraint is given by

$$\dot{a}_t = r a_t - c_t + w z_t \ell_t \tag{2}$$

with borrowing constraints

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

where w is wage (treated as a constant), z_t is an idiosyncratic productivity following a two-state Poisson process $z_t \in \{z_1, z_2\}$ with transition intensity λ, and r is the interest rate. Stochastic idiosyncratic productivities are introduced so there is a meaningful stationary wealth distribution.

The two state process follows Achdou et al. (2022) and is used for simplicity. We start from the partial equilibrium case with exogenous r but will report the result with endogenous r a la Huggett in Section 4.1. In calibration, we focus the case in which $r < \rho$ so a stationary wealth distribution exists.

Consistent with our survey evidence and the evidence in Kaur et al. (2021), financial stress $\Theta(\cdot) \in \mathcal{C}^1(\mathbb{R}^+)$ is a function of and decreases in household's distance from financial constraints $a_t - \underline{a}$. As an example of the financial stress function, the main analysis below uses:

$$\Theta(a_t) = \bar{\Theta} \cdot e^{-\alpha(a_t - \underline{a})}, \tag{4}$$

where α parametrizes the slope of the financial stress function and $\bar{\Theta}$ parametrizes the maximum level of financial stress at the financial constraints. The exact functional form of financial stress in (4) is unimportant and alternative functional forms are explored in Section 4.1.

Here, we treat the financial stress function $\Theta(a_t)$ as exogenous. This maps to the involuntary capture of attention view in Mullainathan and Shafir (2013) and Kaur et al. (2021), the prevalent view in the scarcity literature. That is, financial stress captures cognitive resources automatically. Households close to financial constraints involuntarily worry about their finance and they cannot consciously control the worry.

However, the benchmark model with exogenous $\Theta(a_t)$ is in fact equivalent to a model with *voluntary* capture of attention akin to rational inattention. That is, the amount of cognitive resources devoted to alleviate financial stress $\Theta(a_t)$ is chosen endogenously. See Proposition 4 below.

Broader interpretations. We model financial stress through its impact on time/cognition available for productive work because this channel receives 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 other alternative channels of financial stress. As a first example, financial stress can lead to direct utility costs. That is, the flow utility in (1) becomes

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

where $U^{\Theta}(a_t)$ captures the direct utility costs of financial stress, again decreasing in distance from financial constraints. This channel prove a psychological foundation of wealth in utility model commonly used in macroeconomics (Straub, 2019; Mian, Straub and Sufi, 2021; Michaillat and Saez, 2021).

Second, as our survey question Q20 suggested, to alleviate financial stress, the household may

spend on items which they would not spend if they are not financially stressed (e.g., alcohol, cigarettes, etc.). In this case, the budget (2) becomes

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

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

Third, instead of directly affecting labor earnings, financial stress can impact transition intensity between different individual income states (z_1 and z_2). That is, λ depends on on a_t and a stressed household is more likely to transition to the low income state z_1. This approach captures salaried workers better. It leads to similar insights as in Sections 4.1.

Fourth, financial stress can lead to worse financial decisions (Haushofer and Fehr, 2014) and lower return on savings. This means the budget (2) becomes

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

where $r^{\Theta}(a_t)$ captures the return on savings, now increasing in distance from financial constraint. This specification is consistent with the empirical evidence that returns on savings increase with wealth (Fagereng et al., 2020; Hubmer, Krusell and Smith Jr, 2021).

We explore some of these alternatives in Sections 4.1. The main insight on how sophistication versus naivete about financial stress affects household behavior remains. These additional channels are all temporarily shut down for the main analysis for clarity. One can hence view the impact of financial stress in our benchmark model as a lower bound of the impact of financial stress.

3.2 Sophistication and the Extra Saving Motive

Now, we solve our benchmark model. We start from the case of full sophistication. The language of sophistication is standard in behavioral economics (O'Donoghue and Rabin, 1999, 2001). In the context of financial stress, sophisticates fully understand that their future selves are subject to financial stress $\Theta(\cdot)$. They understand that, if they do not save enough, financial stress will crowd out their future selves' productive labor supply and lowering their earnings.

In fact, this case corresponds to the textbook case of dynamic programming commonly used in macroeconomics. Sophisticates choose consumption and labor to maximize the present value of (1)

$$\mathbb{E}_0\left[\int_0^{+\infty} e^{-\rho t} u\left(c_t, \ell_t; \Theta(a_t)\right)\right], \tag{5}$$

subject to (4) – (3) and the process for z.

We use $v_j(a)$ to denote the optimal value of the objective (5) as a function of the initial asset

$a_0 = a$ and initial productivity $z_0 = z_j$ for $j \in \{1, 2\}$. We then use $c_j(a)$ and $l_j(a)$ to denote the optimal policy rule.

Similar to Achdou et al. (2022), the HJB equation of the problem can be written as

$$\rho v_j(a) = \max_{c,\ell} \left\{ u(c, \ell; \Theta(a)) + (ra - c + wz_j\ell) v_j'(a) + \lambda (v_{-j}(a) - v_j(a)) \right\}, \tag{6}$$

where $c_j(a)$ and $l_j(a)$ solve the above optimization problem and we adopt the convention that $-j = 2$ when $j = 1$ and vice versa.

The FOCs for optimal consumption and optimal labor supply are given by:

$$c_j^{-\frac{1}{\sigma}}(a) = v_j'(a) \tag{7}$$

$$\varphi (\ell_j(a) + \Theta(a))^{\frac{1}{v}} = wz_j c_j^{-\frac{1}{\sigma}}(a) \tag{8}$$

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

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

From (6), we can derive the modified Euler equation:

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

$$-\frac{E_t\left[d\left(c_j^{-\frac{1}{\sigma}}(a)\right)\right]}{c_j^{-\frac{1}{\sigma}}(a)} = \left(r - \rho \underbrace{-wz_j\Theta'(a)}_{>0,\ extra\ saving\ motive} \right) dt \tag{9}$$

Compared to the standard Euler equation in Achdou et al. (2022), sophisticates' Euler equation (9) 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 get 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 strong. In the benchmark calibration below, sophisticates' net saving in the neighborhood of financial constraints $\underline{a}$ is positive and there are no household at financial constraints in the stationary wealth distribution. With sophistication, financial stress surprisingly leads to a fewer households at the financial constraints. This is despite the negative direct effect of financial stress on earnings. Sophisticated stressed households do not fall into the poverty trap.

3.3 Naivete and the Poverty Trap

Now we turn to the case of naivete (O'Donoghue and Rabin, 1999, 2001). Naifs do not understand that their future selves are subject to financial stress $\Theta(a)$. They do not understand that financial stress crowds out their future selves' productive labor supply and lowers their earnings.

Formally, we consider the general case in O'Donoghue and Rabin (1999, 2001) and allow partial sophistication: the household partially understands the impact of future financial stress. We use $\mu \in [0,1]$ to capture the degree of sophistication. That is, the current self thinks that the future impact of financial stress is captured by $\mu\Theta(a)$ instead of $\Theta(a)$. The full naivete case is nested by $\mu = 0$.

In the continuous-time model here, we follow the recommendation in Harris and Laibson (2013) and Maxted (2021) and let the transition rate from the present self to the future self be ∞. This captures the economic essence in a simple way. In this case, the optimal consumption policy $c_j(a)$ is determined by (10), trading off between current consumption and the perceived future value function $v_j^p(a)$:

$$c_j^{-\frac{1}{\sigma}}(a) = \left(v_j^p\right)'(a). \tag{10}$$

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

$$\rho v_j^p(a) = \max_{c,\ell} u(c,\ell;\mu\Theta(a)) + (ra - c + wz_j\ell)\left(v_j^p\right)'(a) + \lambda\left(v_{-j}^p(a) - v_j^p(a)\right) \tag{11}$$

This is effectively the HJB of the value function for the full sophistication case in (6), but the impact of stress is captured by $\mu\Theta(a)$ instead of $\Theta(a)$. That is, the current self behaves as if her future selves are subject to financial stress $\mu\Theta(a)$ instead of $\Theta(a)$.

Proposition 2. *The optimal consumption under naivete and partial sophistication satisfies*

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

and the optimal labor supply is still given by (8).

Compared to the Euler equation in (9) with full sophistication, we find that naivete attenuates the extra saving motive. A smaller degree of sophistication μ means a smaller extra saving motive. This is intuitive: underestimating the future impact of financial stress undercuts the household's incentive to engage extra saving to alleviate financial stress. In the benchmark calibration below, naifs' net saving in the neighborhood of financial constraints $\underline{a}$ is negative and naifs fall into

poverty trap. The case of naivete can generate empirically large number of financially constrained and stressed households.

Analytical results on poverty trap. We can analytically characterize whether a stressed household falls into poverty trap for the deterministic case (z constant). To be precise, falling into a poverty trap means that the household has a negative net saving in the neighborhood of the constraint $\underline{a}$: $\lim_{a\to(\underline{a})^+} s(a) > 0$, where $s(a) \equiv ra - c(a) + wz\ell(a)$ captures the net saving.

Proposition 3. *Let idiosyncratic productivity z be a constant and fix any convex financial stress function $\Theta(a)$. Consider the case that $r < \rho$, which we always focus on. We have:*

1. *Sophisticates do not fall into poverty trap if $r - \rho - wz\Theta'(\underline{a}) > 0$: sophisticates have positive net saving in the neighborhood of $\underline{a}$: $\lim_{a\to(\underline{a})^+} s(a) > 0$.*

2. *Naifs fall into poverty trap: naifs have negative net saving in the neighborhood of $\underline{a}$: $\lim_{a\to(\underline{a})^+} s(a) < 0$.*

3. *Without financial stress, net saving converges to 0 at $\underline{a}$: when $\Theta(a) = 0$,$\lim_{a\to(\underline{a})^+} s(a) = 0$.*

Proposition 3 analytically summarizes the main insight in this section. It is worth noting that 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. (2021). 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). We use standard parameters. We normalize average income and labor hours in our model to be 1.

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 can calibrate $\bar{\Theta}$, the maximum level of financial stress at the borrowing constraints, based on the survey question Q19a.

> Q19a: Imagine that your financial situation becomes worse, and you would now struggle to quickly raise any additional money in the case of an emergency. How many working hours would you be distracted by your financial concerns over the course of a week?

Parameters	Justifications
ρ	avg a/avg $y = 0.59$ in the no-stress case, Kaplan-Violante (14)
$\sigma = 0.5$	standard
$v = 1$	Kaplan-Moll-Violante (18)
$\underline{a} = -1/4$	Kaplan-Moll-Violante (18)
$r = 0.03$	standard
$(\lambda, z_1, z_2) = (0.57, 0.87, 1.13)$	two state version of Guerrieri-Lorenzoni (18)
w,θ	Normalize average income and labor hours in the no-stress case to 1

Table 4: Calibration parameters

Specifically, we find $\bar{\Theta} = 0.27$ by letting the median answer to this question in Table 2 be normalized by the average working hours in Table 1 (recall that we normalize the average labor hours in our model to be 1).

Second, we can calibrate α, the slope of the financial stress function, based on the following two survey questions.

> Q17a: Over the past week, how many working hours were you distracted by your financial concerns?
>
> Q19b: Over the past week, how many working hours were you distracted by your financial concerns?

Specifically, given the functional form in (12), we find[3]

$$\alpha = \frac{\text{avg } \log\left(Q17a/Q19b\right)}{2000/\left(\text{avg income}\right)} = 11.9 \tag{13}$$

In this calibration, financial stress decreases with net asset relatively fast. Net asset at the level of 0.7 monthly income halves financial stress. This is consistent with the evidence in Kaur et al. (2021).

We explore alternative calibrations of the financial stress function $\Theta\left(a\right)$ in Section 4.1. The main results about how sophistication versus naivete affects the impact of financial stress is not sensitive to the calibration.

[3]To make the average in the numerator of (13) well define, we drop anyone who reports zero in either Q17a or Q19b. Conceptually, this procedure means that we exclude participants who are not affected by the financial stress. The average income appears in the denominator in (13) because we normalize the average income in our model to be 1.

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

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

Sophistication. The left panel of Figure 5 plots the net flow saving function $s_j(a) \equiv ra - c_j(a) + wz_j\ell_j(a)$ for each productivity state $j \in \{1,2\}$. We compare a sophisticated stressed household with a no-stress household.

Two dash lines in the left panel of Figure 5 capture the net flow saving of households without financial stress ($\Theta(a) = 0$ for all a). Consistent with the permanent income hypothesis, households in the low income state z_1 borrow ($s_1(a) < 0$) while households in the high income state z_2 save ($s_2(a) > 0$).

Two solid lines in the left panel of Figure 5 capture the net flow saving of sophisticated stressed households. A sophisticated stressed household has very a strong extra saving motive. Its net saving is *higher* than the non-stress household. This is despite the negative direct effect of financial stress on earnings.

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

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

In other words, there is no poverty trap for sophisticates. No matter the productivity state, all sophisticated stressed households are net savers around the financial constraints. They will save out of the financial constraints in the stationary distribution.

The right panel of Figure 5 plots the stationary wealth distribution for each productivity state $j \in \{1,2\}$. 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 are so strong that *none* of them is close to the $\underline{a} = -1/4$ constraint. The wealth level $\underline{a}^{\text{Endo}}$, where the net saving $s_1\left(\underline{a}^{\text{Endo}}\right)$ in (14) is zero, serves as an endogenous lower bound in the stationary wealth distribution for the sophisticated stressed households.

Naivete. Now we turn to the case of naivete. The left panel of Figure 6 plots the net flow saving function $s_j(a) = ra - c_j(a) + wz_j\ell_j(a)$ for each productivity state $j \in \{1,2\}$. We compare the naive stressed household ($\mu = 0$) with a no-stress household.

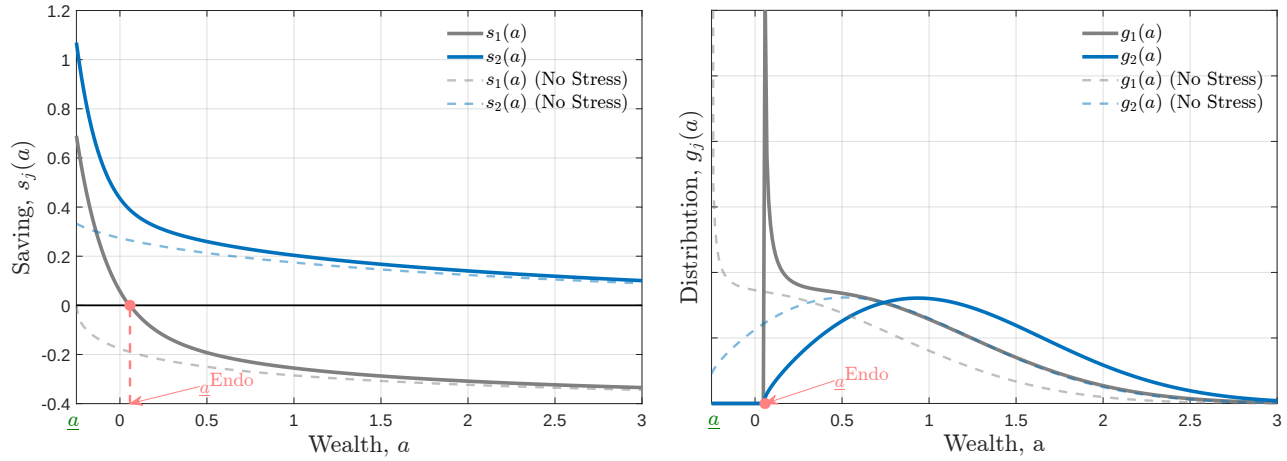


Figure 5: Saving Behavior and Stationary Wealth Distribution (Sophistication).

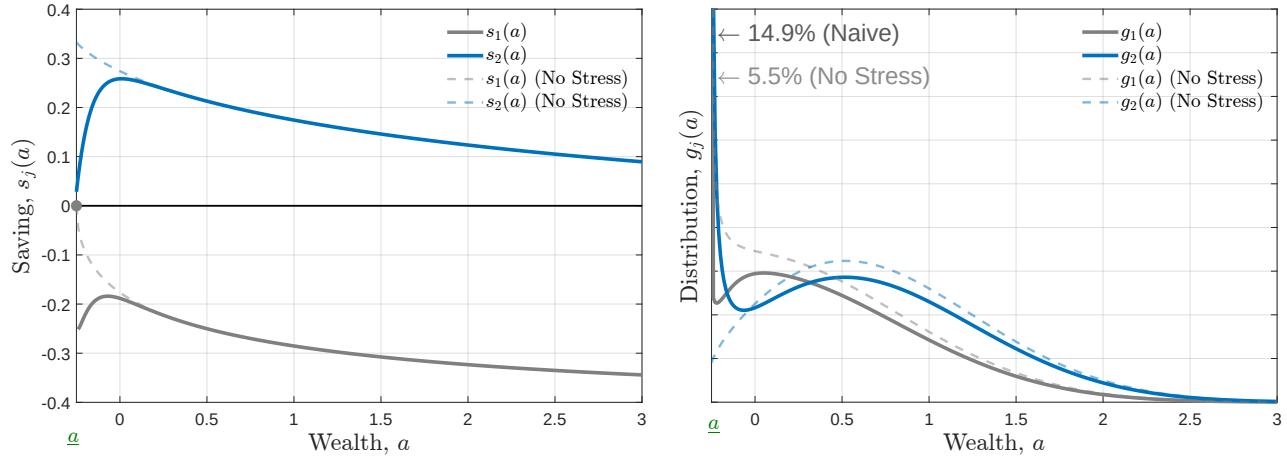


Figure 6: Saving Behavior and Stationary Wealth Distribution (Naivete).

Two solid lines in the left panel of Figure 6 capture the net flow saving of naive stressed households. A naive stressed household does not exert the extra saving motive. It has a *lower net saving* a non-stress household. This is because financial stress crowds out productive labor supply and lowers the labor earnings. The stressed household's lower net saving in the left panel of Figure 6 contrasts with the higher net saving in Figure 5 under sophistication.[4]

The right panel of Figure 6 plots the stationary wealth distribution for each productivity state $j \in \{1, 2\}$. 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 one-asset model here, we are able to obtain a large of share of financially constrained households (14.9%). This resolves one shortcoming of one-asset models: not enough

[4]The net saving $s_1(\underline{a})$ is zero for a low-productivity household exactly at the constraint $\underline{a}$. This makes sure that the financial constraint in (3) will not be violated. Such a jump in the net saving function $s_1(a)$ exactly at the constraint is standard for a naive household, such as in Harris and Laibson (2013) and Maxted (2021).

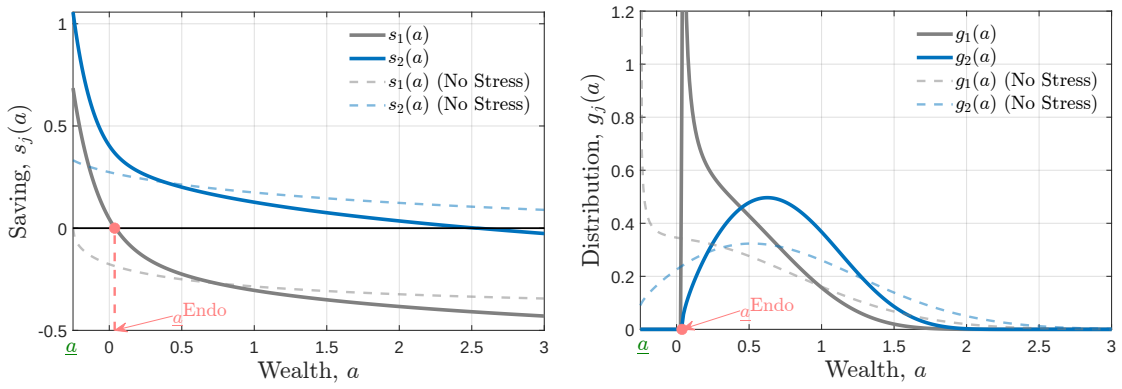


Figure 7: Endogeneize r (Sophistication).

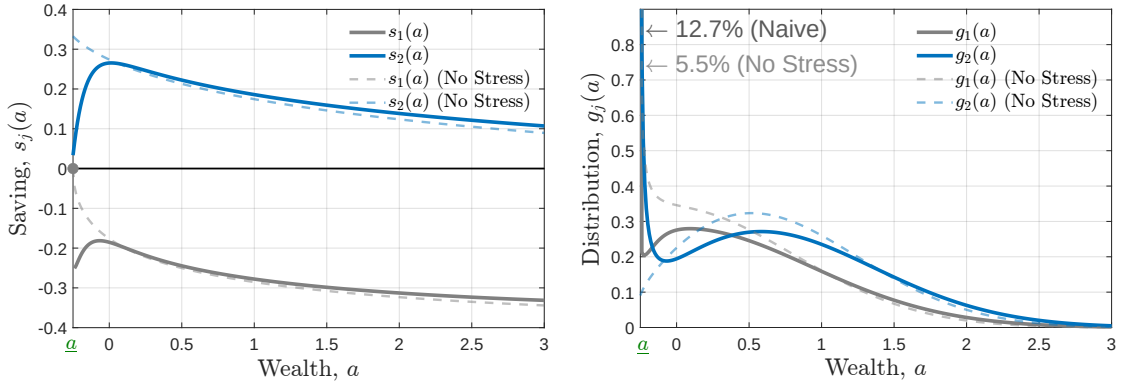


Figure 8: Endogeneize r (Naivete).

financially constrained households (Krusell and Smith, 1998; Kaplan, Moll and Violante, 2018). In sum, financial stress and naivete together generate a psychology-based theory poverty trap.

Though differentiating sophistication from naivete is known to be hard, we do feel that the evidence points to the direction of naivete in the context of financial stress. Based on our calibration, the empirically large share of financially constrained households we document (e.g., 10% from Figure 3) is consistent with the case of naivete but not with the case of sophistication.

4.1 Extensions

We verify that the main results about how sophistication versus naivete affects the impact of financial stress is not sensitive to our modeling choices.

Endogenous r. First, we follow Huggett (1993) and Achdou et al. (2022) and endogeneize the interest rate r such that the total wealth in the economy is fixed at $\int_{i\in[0,1]} a_{i,t}di = B = 0.59$, as the no-stress case in Table 2. Figures 7 and 8 re-plot Figures 5 and 6 with endogenous r. The main lesson that sophisticates save out of the financial stress states while naifs fall into the poverty trap remain to be true.

Alternative calibration. We explore two 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 participants who pass all attention checks. The analysis is essentially same (see Appendix B). Second, we use the estimates in Kaur et al. (2021) to calibrate. [To be completed]

Endogenous stress choice. The benchmark model with exogenous $\Theta(a_t)$ under sophistication is equivalent to a model in which the stress $\Theta(a_t)$ is chosen endogenously. Specifically, consider the case in which the flow utility is given by

$$\frac{c_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi\frac{(\ell_t+\Theta_t)^{1+\frac{1}{v}}}{1+\frac{1}{v}} - W_{j_t}(a_t,\Theta_t) \quad \text{s.t.} \quad (2),\ (3) \text{ and the idiosyncratic productivity transition,} \tag{15}$$

where c_t,ℓ_t, and Θ_t are all chosen endogenously and $j_t \in \{1,2\}$ capture the income idiosyncratic productivity state at t. 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 $\frac{\partial W_j(a,\Theta)}{\partial\Theta} < 0$. [5]

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

Alternative functional forms of $\Theta(a)$. We consider an alternative functional form of the stress function $\Theta(a)$.

$$\sqrt{\Theta(a)} = \max\left\{\sqrt{\bar{\Theta}} - \alpha(a-\underline{a}), 0\right\}. \tag{16}$$

Similar to Section 3.4, we calibrate $\left(\bar{\Theta}, \alpha\right) = (0.27, 2.0574)$ based on survey questions Q17a, Q19a, and Q19b (see Appendix C for a full explanation of the calibration procedure). From Figures 22 and 23 in Appendix C, sophisticates still save out of financial stress states while naifs still fall into the poverty trap.

Non-convex stress function $\Theta(a)$. One may wonder whether our result that sophisticates save out of the financial stress region depends on the convexity of the financial stress function $\Theta(a)$. We consider a robustness check with a non-convex stress function $\Theta(a)$ in Figure 9 (see Appendix C for the exact functional form). In Figure 9, financial stress $\Theta(a)$ only starts to significantly decrease with a far away from the financial constraint $\underline{a}$. For a sophisticated household close to the constraint $\underline{a}$, is that too daunting for her to accumulate enough savings to be out of the financial stress region?

From Figure 10, we find that sophisticates still save out of the financial stress region and that

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

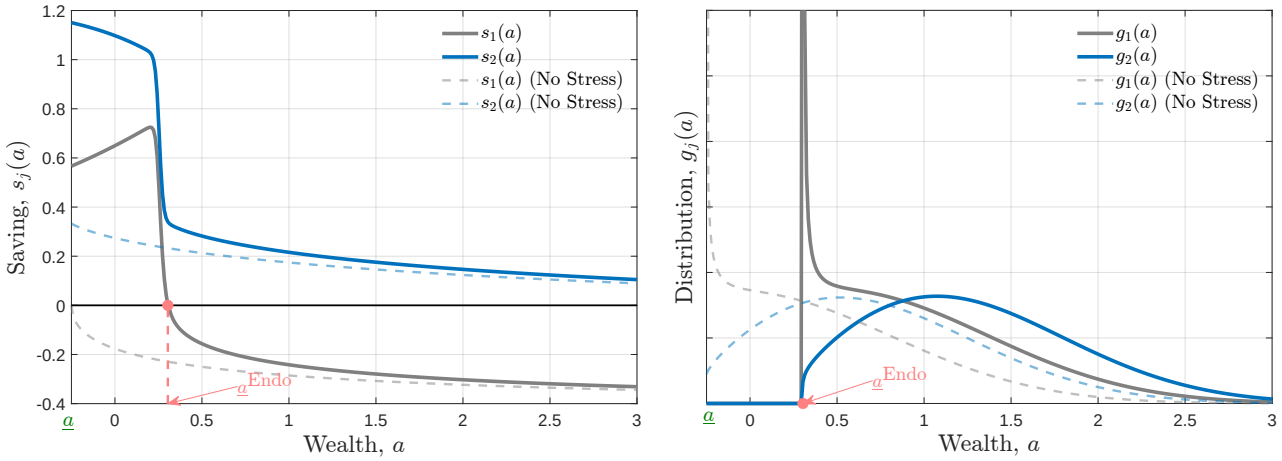


Figure 10: Saving Behavior and Stationary Wealth Distribution (Non-convex Stress Function under Sophistication).

there are no sophisticated at their financial constraints in the stationary wealth distribution. From the sophisticated household's Euler equation in (1), we know that the sophisticated household's consumption only starts to increase at the point where $\Theta'(a)$ is high. In other words, close to the constraint $\underline{a}$, the sophisticated household's consumption is very low and her net saving is very high (as in the left panel of Figure 10). This is why sophisticates still save out of the financial stress region.[6,7]

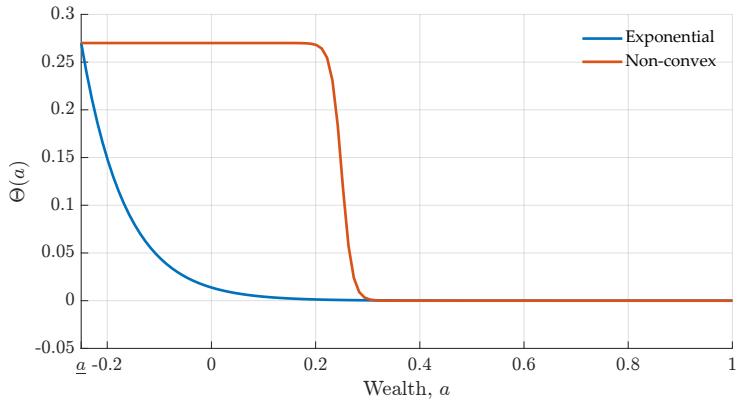


Figure 9: Non-convex Stress Function

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 utility in (1)

[6]For a sophisticated household to be trapped in a poverty trap, it seems that a non-continuous saving technology is needed, such as the discrete human capital investment technology in Galor and Zeira (1993). But such a poverty trap is in fact not robust to income uncertainty. See Chapter 21.6 in Acemoglu (2008).

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

becomes $u(c_t, \ell_t) = \frac{c_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{\ell_t^{1+\kappa}}{1+\frac{1}{v}}$ and the budget in (2) becomes

$$\dot{a}_t = ra_t - c_t + wz_t (1 - \Theta(a_t)) \ell_t.$$

Other parts of the model are the same as the main analysis and we use the same calibration for $\Theta(a_t)$ and other parameters. Figures 25 and 26 in Appendix C re-plot Figures 5 and 6. Sophisticates' saving behavior and wealth distribution are very similar to the main analysis. Naifs still fall into the poverty trap, but in an extreme fashion. In the stationary distribution, all naive stressed households are at the financial constraints. This is because the multiplicative productivity loss significantly decreases incentives to work and even households in the high income state z_2 have negative net saving $s_2(a) < 0$ in the neighborhood of $\underline{a}$.

Different disutility from labor than from financial stress. In the main analysis, an increase in productive labor and an increase in cognition/time spent on finance lead to the same increase in disutility in (4). We consider a robustness check where this assumption is relaxed. That is, the utility in (1) becomes:

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

where now an one unit increase in productive labor and an χ unit increase in cognition/time spent on finance lead to the same increase in disutility. In Appendix C, we study the case with $\chi = 0.5$. Other parts of the model is the same as the main analysis and we use the same calibration for $\Theta(a_t)$ and other parameters. Figures 27 and 28 show the main results on sophistication versus naivete remain to hold.

Alternative channels of financial stress: stressed spending. We study an alternative channel of the impact of financial stress through spending. As our survey question Q20 suggests, the household may spend on items which they would not spend if they are not financially stressed (e.g., alcohol, cigarettes, etc.). In this case, the utility in (1) becomes $u(c_t, \ell_t) = \frac{c_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{\ell_t^{1+\kappa}}{1+\frac{1}{v}}$ where the budget in (2) becomes

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

where $C^{\Theta}(a_t)$ captures this type of stressed consumption. In Appendix C, we use the survey responses to Q20 to calibrate $C^{\Theta}(a_t)$ and study the impact of financial stress through stressed consumption. Figures 9 and 6 show that sophisticates still save out of financial stress states while naifs still fall into the poverty trap.

Alternative channels of financial stress: transition intensity between income states. Instead of directly affecting labor earnings, financial stress can impact transition intensity between different individual income states (z_1 and z_2). That is, a stressed household is more likely to transition from high income states to low income states and is less likely to transition from low income states to high income states. Such a channel of financial stress captures salaried workers better.

Specifically, in Appendix C, we consider the following case. The transition intensity from z_1 to z_2 is given by $\lambda - \bar{\lambda} e^{-\alpha(a_t - \underline{a})}$, while the transition intensity from z_2 to z_1 is given by $\lambda + \bar{\lambda} e^{-\alpha(a_t - \underline{a})}$. Other parts of the model are the same as the main analysis and we use the same calibration for $\Theta(a_t)$ and other parameters. In terms of calibration, α, λ, and other parameters are the same as the main calibration. We find $\bar{\lambda}$ by letting $\frac{\bar{\lambda}}{\lambda} = \bar{\Theta}$, where $\bar{\Theta}$ is from Section 3.4. This means that, at financial constraints, the maximum impact of financial stress on the transition intensity is proportional to the maximum impact of financial stress on hours available for productive work (recall that we normalize the average labor hours in our model to be 1).

Figures 31 and 32 in Appendix C re-plot Figures 5 and 6. Sophisticates' saving behavior and wealth distribution are very similar to the main analysis. For naifs, financial stress does not directly affect their saving behavior any more, because financial stress does not directly affect their current labor earnings and they think that their future selves will not be subject to financial stress. But, financial stress makes them more likely to be at 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 6. In other words, even if financial stress only affects the transition intensity between different individual income states, naive stressed households still fall into the poverty trap.

5 The Impact of Financial Stress: Labor Supply, Welfare, and Other Applications

5.1 Financial Stress and the Wealth Effect of Labor Supply

The financial stress channel can also attenuate or reverse the counterfactual large negative wealth effect of labor supply. The sign and size of the wealth effect of labor supply are a longstanding puzzle (see Auclert, Bardóczy and Rognlie, 2021 for a recent treatment). Benchmark models with separate utilities predict a large negative wealth effect of labor supply. Nevertheless, its empirical estimates are often close to zero or even positive (Cesarini et al., 2017; Banerjee et al., 2020; Kaur

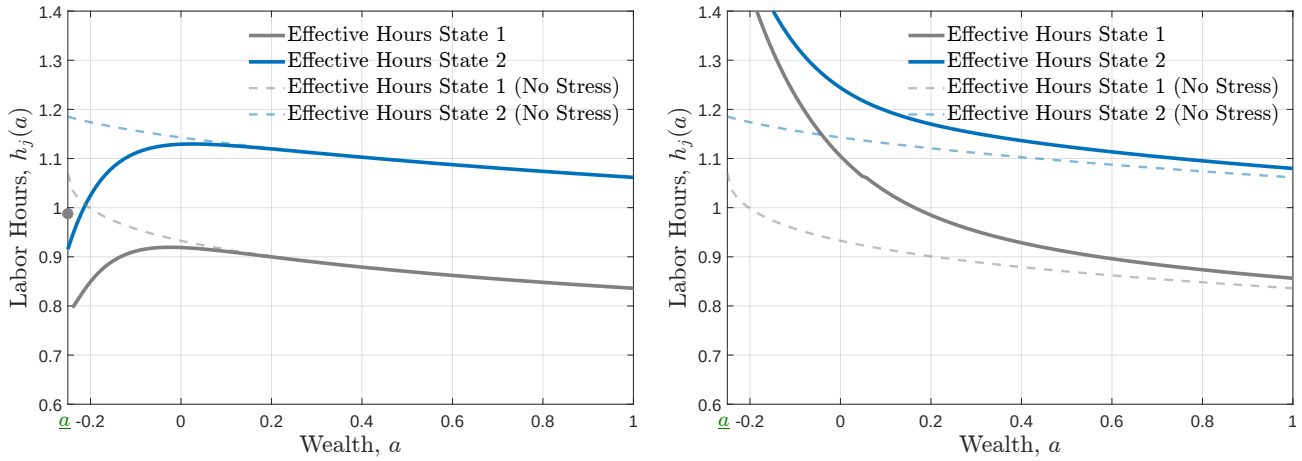


Figure 11: Labor Supply (Naivete vs Sophistication).

et al., 2021).

The intuition why financial stress helps is simple. Relieving financial stress releases cognitive resources available for productive work and increases productive labor supply and earnings.

To see this, we take a derivative with respect a in the optimal labor supply (8), which holds both for the naivete case and for the sophistication case:

$$\frac{\partial \ell_j(a)}{\partial a} = \underbrace{-\frac{(\ell_j(a) + \Theta(a))}{c_j(a)} \frac{v}{\sigma} \cdot \frac{\partial c_j(a)}{\partial a}}_{<0,\ \text{wealth effect}} \underbrace{-\frac{\partial \Theta(a)}{\partial a}}_{>0,\ \text{alleviating financial stress}} . \tag{17}$$

The first term captures the standard negative wealth effect of labor supply emphasized in Auclert, Bardóczy and Rognlie (2021). The second term captures the positive wealth effect effect of labor supply from alleviating financial stress.

The left panel of Figure 11 plots the labor supply $\ell_j(a)$ 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 (17) dominates around financial constraints: the wealth effect of labor supply is positive in the neighborhood of $\underline{a}$. Relieving financial stress releases cognitive and time available from productive work. This positive wealth effect of labor supply around financial constraints is consistent with the empirical evidence in Kaur et al. (2021) and Banerjee et al. (2020). Away from financial constraints, however, the canonical first channel in (17) dominates and the wealth effect of labor supply turns negative.

The right panel of Figure 11 compares a sophisticated stressed household's labor supply with a no-stress household's. For a sophisticated stressed household, the first channel in (17) dominates. The wealth effect of labor supply is negative, even more so than the no-stress case. Akin to the extra saving motive in Figure 7, the sophisticated stressed household has an extra incentive to work

because it wants to saves more to alleviate future selves' financials stress. This channel contributes to the counterfactual negative wealth effect of labor supply.[8] Together, this further strengthens our belief that the evidence (Cesarini et al., 2017; Banerjee et al., 2020; Kaur et al., 2021) points to the direction of naivete in the context of financial stress.

5.2 Welfare Costs of Financial Stress

Sophistication versus naivete also has distinct implications for the welfare costs of financial stress. We evaluate the welfare of a stressed household based on the expected discounted value of her utility in (1) given her decision rules $\{c_j(a), \ell_j(a)\}_{j=1}^2$ and the initial state $a_0 = a$ and $z_0 = z_j$ for $j \in \{1, 2\}$:

$$\omega_j(a) \equiv E\left[\int e^{-\rho t} u\left(c_j(a_t), \ell_j(a_t); \Theta(a_t)\right) dt | a_0 = a, z_j\right] \tag{18}$$

subject to (2), (3), and the transition of individual productivity states. The HJB equations of $\omega_j(a)$ for $j \in \{1, 2\}$ are given by:

$$\rho\omega_j(a) = u\left(c_j(a), \ell_j(a); \Theta(a)\right) + \left(ra - c_j(a) + wz_j\ell_j(a)\right)\omega_j'(a) + \lambda\left(\omega_{-j}(a) - \omega_j(a)\right). \tag{19}$$

Two points are worth clarifying. First, (18) and (19) hold under both sophistication and naivete. The differences between sophistication and naivete are summarized by decision rules$\{c_j(a), \ell_j(a)\}_{j=1}^2$. Second, under naivete, the welfare $\omega_j(a)$ in (6) differs from the perceived value function in (11). The welfare in (6) is evaluated from a paternalistic view based on correct understanding of the impact financial stress $\Theta(a)$. The perceived value function in (11) is instead based on the naive household's imperfect understanding of the impact financial stress: $\mu\Theta(a)$.

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

$$\omega_j(a + t_j(a)) = \omega_j^{\text{no-stress}}(a), \tag{20}$$

where $\omega_j^{\text{no-stress}}(a)$ captures the welfare in (18) without financial stress ($\Theta(a) = 0$).

Figure 12 plot the welfare costs of financial stress $t_j(a)$ for each productivity state $j \in \{1, 2\}$ both under naivete and under sophistication. The welfare costs of naifs' financial stress are much larger, roughly ten times larger than sophisticates. Naivete significantly worsens the welfare costs of financial stress because naifs' consumption and labor decisions are suboptimal from a paternalistic

[8] Based on the left panel of Figure 5, 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 (17) is then large and dominates.

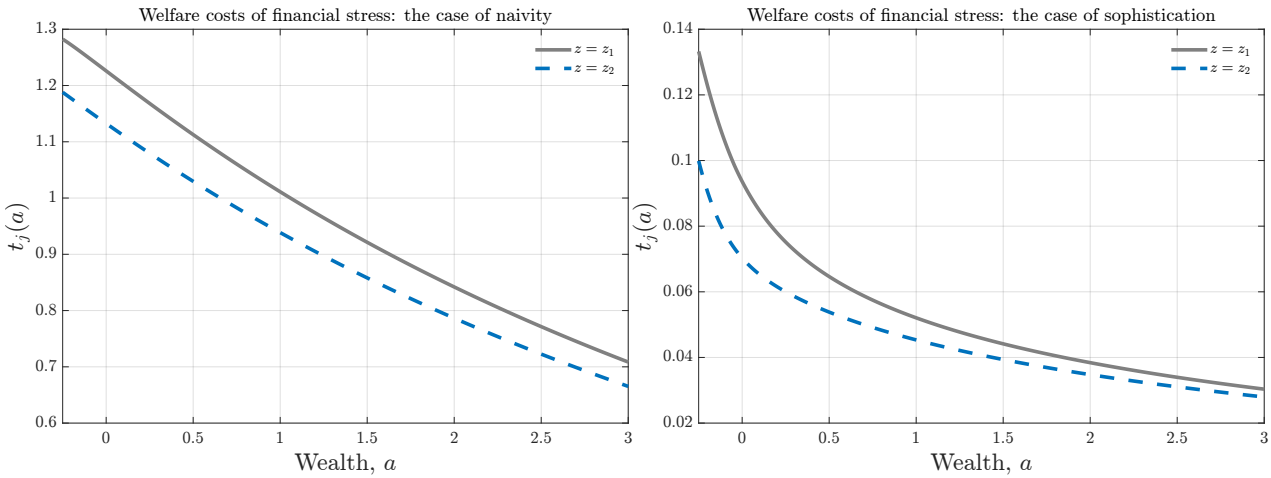


Figure 12: Welfare Costs of Financial Stress (Naivete vs Sophistication).

viewpoint taking account into financial stress.

5.3 The Financial Stress Channel of Fiscal Stimulus

A natural corollary of the positive wealth effect of labor supply for stressed households in Section 5.1 is a new transmission mechanism for fiscal policy: lump-sum fiscal stimulus relieves financial stress, increases productive labor supply, and boosts aggregate output. In fact, in Biden's speech about 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 for the stimulus check is to relieve the stress caused by the pandemic.

To motivate, in our survey, we ask:

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

Participants answer that these stimulus checks significantly alleviate there financial stress. Figure 13 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 $z = 1$ as a constant. We introduce a lump sum fiscal transfer T_t financed by public debt b_t.[9]

The household's budget constraint (2) becomes

$$\dot{a}_t = r_t a_t - c_t + T_t + w\ell_t,$$

[9]A positive T_t means a lump sum transfer and a negative T_t means a lump sum tax.

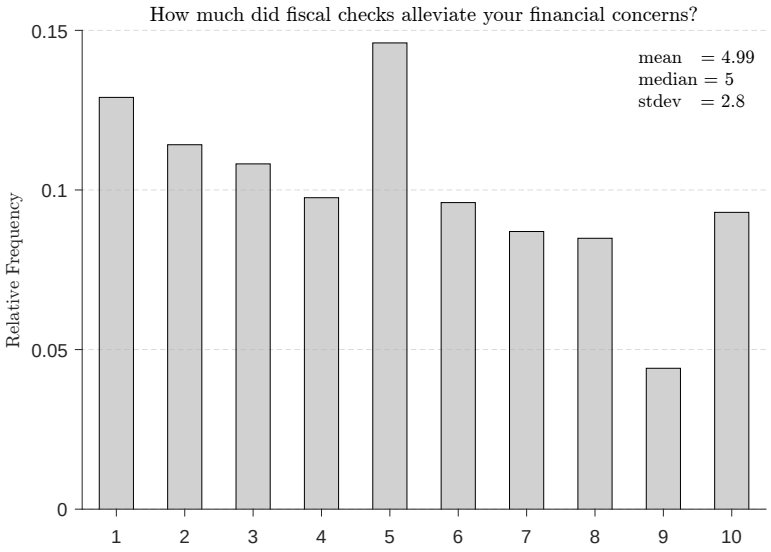


Figure 13: Stimulus Checks and Financial Stress.

while the government budget constraint and asset market clearing are given by

$$\dot{b}_t = r_t b_t + T_t \quad \text{and} \quad b_t = a_t.$$

On the production supply side, we make things simple. We consider the follow linear technology with a competitive representative firm.

$$y_t = \ell_t. \tag{21}$$

Finally, good market clearing implies

$$c_t = y_t. \tag{22}$$

We first revisit the no-stress benchmark.

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

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

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

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

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

To understand this result, note that asset market clearing $b_t = a_t$ means that the equilibrium stress level $\Theta(a_t) = \Theta(b_t)$ decreases in the level of public debt b_t. In other words, fiscal stimulus financed by public debt provides private liquidity to help alleviate financial stress.[10] This increases effective labor supply and boost aggregate output.

This financial stress channel of fiscal stimulus provides a new psychological rationale for the famed Friedman rule (Friedman, 2005). The government would like to use public debt to satiate private liquidity to alleviating financial stress.

In Appendix C, we study the heterogeneous agent case with idiosyncratic productivity $z \in \{z_1, z_2\}$ in the main analysis. We find that a increase of public debt by 40% of GDP (e.g., similar to the expansion of public debt during covid) can boost aggregate output by 40%. Note that this calculation isolates the supply side channel of financial stress on labor supply. Introducing demand side channel through sticky price can potentially make the effect larger.

6 Conclusion

In this paper, we investigate the psychological costs of financial constraints, financial stress. We document that the majority of US households experience financial stress and financial stress is strongly correlated with measures of financial constraints. We develop a tractable way to incorporate financial stress into an otherwise standard model of intertemporal decision and wealth distribution. We show that a psychology-based theory of poverty trap requires not only financial stress itself and but also naivete about financial stress. The financial stress channel can also reverse the counterfactual negative wealth effect of labor supply. We hope our paper can draw macroeconomists' and financial economists' attention about the importance of financial stress.

[10] The key is that financial stress depends on current net wealth instead of permanent income

Appendix A: Proofs

Proof of Proposition 4.

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

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

$$W_{1,j}(a) = wz_j\left(c_j^{\text{benchmark}}(a)\right)^{-\frac{1}{\sigma}} = \varphi\left(\ell_j^{\text{benchmark}}(a) + \Theta^{\text{benchmark}}(a)\right)^{\frac{1}{v}} = wz_j\left(v_j^{\text{benchmark}}\right)'(a), \tag{23}$$

and

$$W_{0,j}(a) = \Theta_j(a)\, wz_j\left(v_j^{\text{benchmark}}\right)'(a)$$

so

$$W_{0,j}'(a) = wz_j\left(c_j^{\text{benchmark}}(a)\right)^{-\frac{1}{\sigma}}\left(\Theta^{\text{benchmark}}\right)'(a) + \Theta_j(a)\, wz_j\left(v_j^{\text{benchmark}}\right)''(a) \tag{24}$$

Now, consider the household problem with endogenous stress choice (15) with (23) and (24). Let me use $\{c_j(a), \ell_j(a), \Theta_j(a)\}_{j=1}^2$ to denote the optimal consumption, labor supply, and stress choices and $\{v_j(a)\}_{j=1}^2$ to denote the optimal value function. Optimal choices imply

$$wz_j v_j'(a) = wz_j\left(c_j(a)\right)^{-\frac{1}{\sigma}} = \varphi\left(\ell_j(a) + \Theta_j(a)\right)^{\frac{1}{v}} = W_{1,j}(a). \tag{25}$$

Using (25) and (23), we know that

$$c_j(a) = c_j^{\text{benchmark}}(a), \;\; v_j'(a) = \left(v_j^{\text{benchmark}}\right)'(a), \;\text{ and }\; \ell_j^{\text{benchmark}}(a) + \Theta^{\text{benchmark}}(a) = \ell_j(a) + \Theta_j(a). \tag{26}$$

The HJB equation of the endogenous stress choice problem implies

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

The envelope theorem implies

$$\rho v_j'(a) = -W_{0,j}'(a) + \Theta_j(a)\, W_{1,j}'(a) + rv_j'(a) + \left(ra - c_j(a) + wz_j\ell_j(a)\right)v_j''(a) + \lambda\left(v_{-j}'(a) - v_j'(a)\right).$$

Together with (23), (24), and (26), we have

$$\rho\left(v_j^{\text{benchmark}}\right)'(a) = -\varphi\left(\ell_j^{\text{benchmark}}(a) + \Theta^{\text{benchmark}}(a)\right)^{\frac{1}{v}}\left(\Theta^{\text{benchmark}}\right)'(a) + r\left(v_j^{\text{benchmark}}\right)'(a),$$
$$+\left(ra - c_j^{\text{benchmark}}(a) + wz_j\ell_j(a)\right)\left(v_j^{\text{benchmark}}\right)''(a) + \lambda\left(\left(v_{-j}^{\text{benchmark}}\right)'(a) - \left(v_j^{\text{benchmark}}\right)'(a)\right)$$

Compare to (27) below, we know

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

and Proposition 4 is proved.

Proof of Proposition 1.

Using the HJB in (6) and the envelope theorem,

$$\rho v_j'(a) = -\varphi\left(\ell(a) + \Theta(a)\right)^{\frac{1}{v}}\Theta'(a) + rv_j'(a) + \left(ra - c_j(a) + wz_j\ell_j(a)\right)v_j''(a) + \lambda\left(v_{-j}'(a) - v_j'(a)\right). \tag{27}$$

Together with optimal consumption in (7) and the optimal labor supply in (8), we have:

$$\rho c_j^{-\frac{1}{\sigma}}(a) = \left(r - wz_j\Theta'(a)\right)c_j^{-\frac{1}{\sigma}}(a) - \frac{1}{\sigma}\left(ra - c_j(a) + wz_j\ell_j(a)\right)c_j^{-\frac{1}{\sigma}-1}(a)\,c_j'(a) + \lambda\left(c_{-j}^{-\frac{1}{\sigma}}(a) - c_j^{-\frac{1}{\sigma}}(a)\right)$$

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

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

Together, we have

$$-\frac{E_t\left[d\left(c_j^{-\frac{1}{\sigma}}(a)\right)\right]}{c_j^{-\frac{1}{\sigma}}(a)} = \left(r - \rho\underbrace{-wz_j\Theta'(a)}_{>0,\text{ extra saving motive}}\right)dt.$$

Proof of Proposition 2.

Using the HJB in (11) and the envelope theorem

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

where $c_j^p(a)$ and $\ell_j^p(a)$ solve (11) and are given by

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

From (10) and (8), we know that

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

Together, we have

$$\rho c_j^{-\frac{1}{\sigma}}(a) = \left(r-\mu w z_j \Theta'(a)\right) c_j^{-\frac{1}{\sigma}}(a) - \frac{1}{\sigma}\left(ra - c_j(a) + wz_j\ell_j(a)\right) c_j^{-\frac{1}{\sigma}-1}(a)\, c_j'(a) + \lambda\left(c_{-j}^{-\frac{1}{\sigma}}(a) - c_j^{-\frac{1}{\sigma}}(a)\right) - \frac{1}{}$$

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

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

Together, we have

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

As a result,

$$-\frac{E_t\left[d\left(c_j^{-\frac{1}{\sigma}}(a)\right)\right]}{c_j^{-\frac{1}{\sigma}}(a)} = \left(r-\rho-\mu w z_j \Theta'(a) - \frac{1-\mu}{\sigma} w z_j \Theta(a)\frac{c_j'(a)}{c_j(a)}\right) dt.$$

Proof of Proposition 3.

To prove Part 1 of Proposition 3, note that, with a deterministic z and Proposition 1

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

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

To prove Part 2 of Proposition 3, note that, with a deterministic z and Proposition 2

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

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

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

Proof of Proposition 5.

Optimal labor supply implies

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

Technology (21) and market clearing (22) imply

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

Together, we have

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

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

Proof of Proposition 6. Optimal labor supply and asset market clearing imply

$$\varphi\left(\ell_t+\Theta(b_t)\right)^{\frac{1}{v}}=wc_t^{-\frac{1}{\sigma}}.$$

Technology (21) and market clearing (22) imply

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

Together, we have

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

and

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

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

and

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

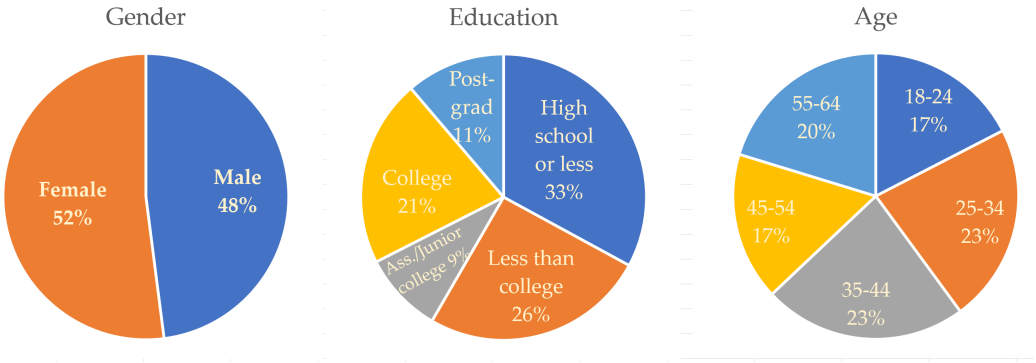


Figure 14: Demographics, the Restricted Sample

Vars	Obs	Mean	Median	Std	Min	Max	q25	q75
Household size	6,686	2.3	0	1.6	0	11	1	3
Annual income	6,686	66,649	55,000	63,332	5,000	600,000	25,000	85,000
Net assets	6,667	83,092	5,000	236,668	-55,000	1,100,000	-25,000	55,000

Table 5: Demographics, the Restricted Sample

Appendix B: Analysis based on the Restricted Sample of Participants who Pass All Attention Checks

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

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

We then ask what your favorite color is. In this Appendix, we report all analysis for the restricted sample of participants who pass all attention checks. The analysis is very similar to the full sample reported in the main text.

Demographics

In Figure 14 and Table 5, we report the demographics of the restricted sample of participants who pass all attention checks. Compared to Figure 1 and Table 1 based on the full sample, this sample is slightly more educated. It also has a somewhat higher average annual income ($66,649 vs $62,432) and average net asset ($83,092 vs $66,791).

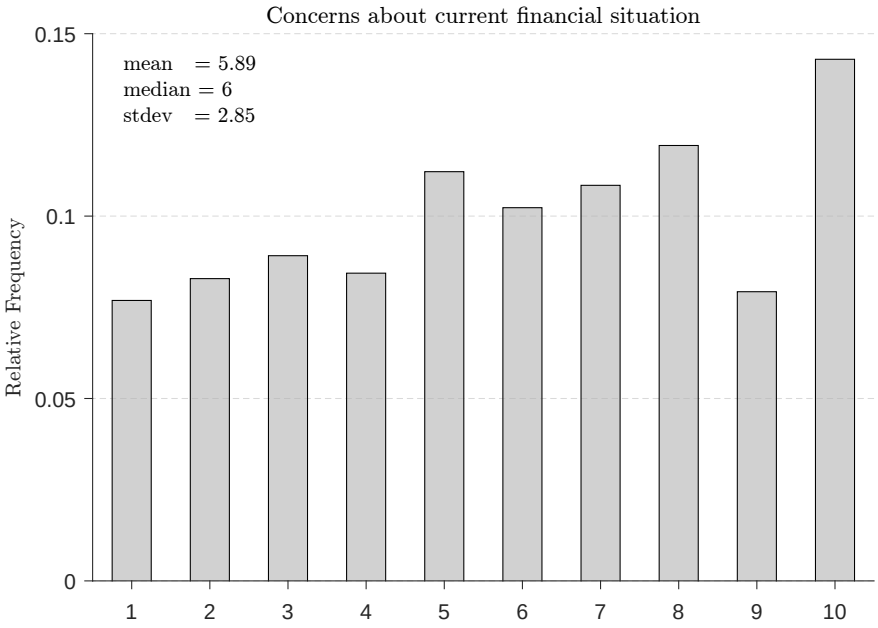


Figure 15: Qualitative Measure of Financial Stress, the Restricted Sample

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

Table 6: The Impact of Financial Stress, the Restricted Sample

The Prevalence of Financial Stress

In Figure 15 and Table 6, we report the prevalence of financial stress in the restricted sample of participants who pass all attention checks. The qualitative measure of financial stress based on this sample is very similar to Figure 2 based on the full sample. For the quantitative measures (compared to Table 2), the restricted sample is slightly less affected by financial stress: the average hours distracted at work is 6.0 hours (v.s. 6.4 hours) per week, the average hours hours spent thinking about and dealing with financial issues is 7.3 hours (v.s. 7.7 hours) per week, and the average amount of dollars spent on alleviating financial stress is 198.4 dollars (v.s. 211.2 dollars) per week.

Financial Stress and Measures of Financial Constraints

In Figures 16 and 17 and Table 7, we report the relationship between financial stress and measures of financial constraints in the restricted sample of participants who pass all attention checks. The distribution of the measures of financial constraints in Figure 16 is very similar to Figure 3 based

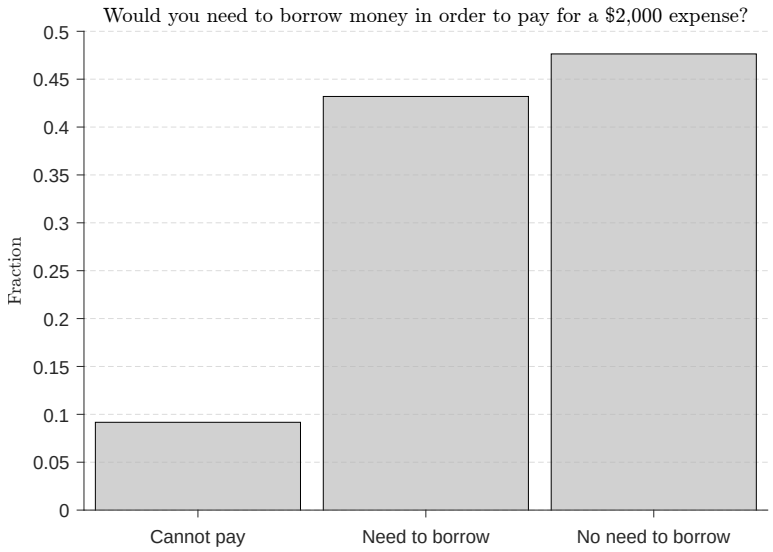


Figure 16: Measures of Financial Constraints, the Restricted Sample

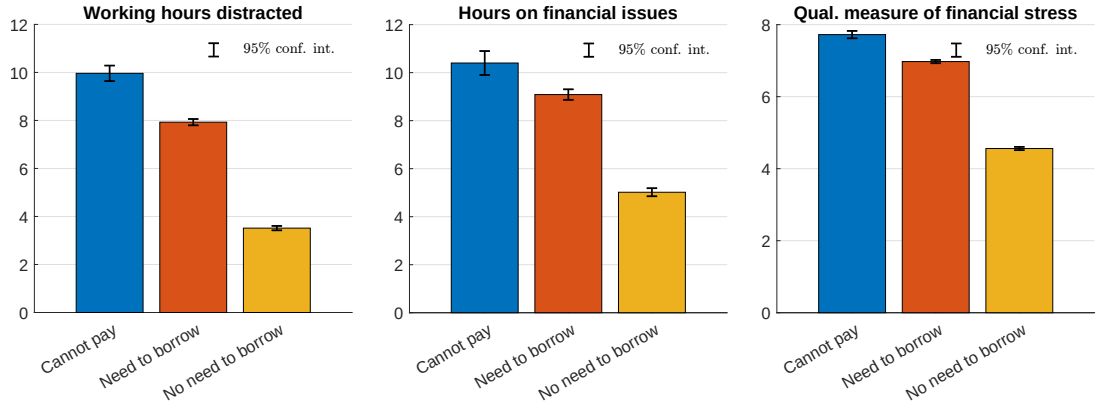


Figure 17: Average Financial Stress by Measures of Financial Constraints, the Restricted Sample

on the full sample. Figure 17 shows that this measure of financial constraint is again strongly correlated with all measures of financial stress, similar to Figure 4 based on the full sample. Table 7 summarizes the responses to Q19a and Q19b. Compared to Table 3, respondents in the restricted sample report that they would be distracted for 11.2 hours (v.s. 10.8 hours) per week at financial constraints. A $2,000 check on average would reduce the distraction at work by 2.6 hours (v.s. 2.2 hours) per week.

Vars	Obs	Mean	Median	Std	Min	Max	q25	q75
Hours distracted at constraints	1,698	11.2	10	6.7	0	20	5	20
Δ(Hours distracted)	3,293	-2.6	0	4.5	-20	20	-4	0

Table 7: The Shape of Financial Stress, the Restricted Sample

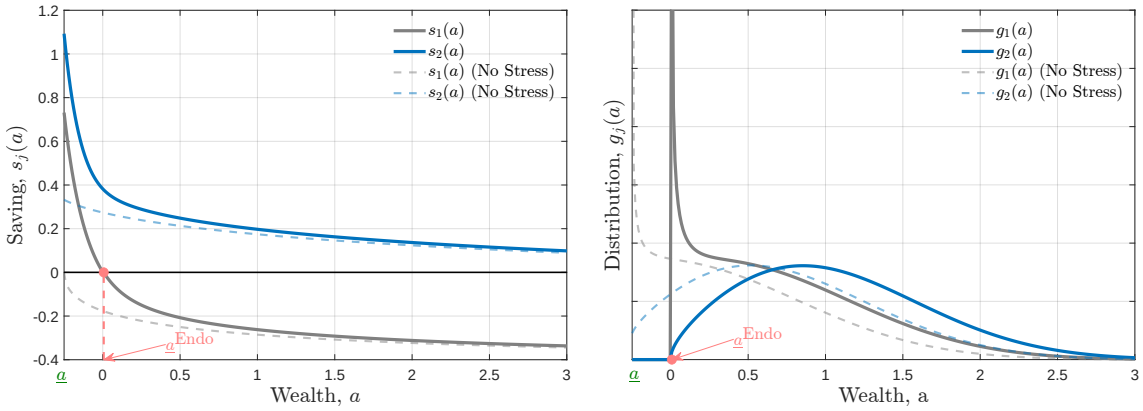


Figure 18: Calibration based on the Restricted Sample (Sophistication).

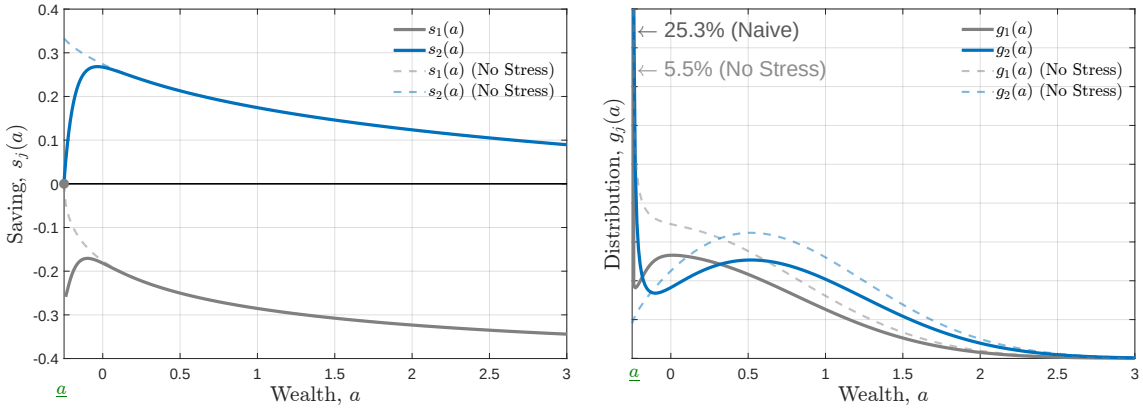


Figure 19: Calibration based on the Restricted Sample (Naivete).

The Impact of Financial Stress: Household Behavior, Wealth Distribution, and Welfare Costs

Here, we use the same produced in 3.4 but calibrate $\left(\bar{\Theta}, \alpha\right) = (0.29, 15.5)$ based on the restricted sample of participants who pass all attention checks. Other parameters are the same as in Table 4. From Figures 18 and 19, the main lesson that sophisticates save out of the financial stress states while naifs fall into the poverty trap remain to be true. Compare Figure 20 with Figure 11, the financial stress channel still reverses the counterfactual large negative wealth effect of labor supply for naifs (but not for sophisticated). Compare Figure 21 with Figure 12, the welfare costs of naifs' financial stress are much larger than the the welfare costs of sophisticates' financial stress.

Appendix C: Additional Analysis

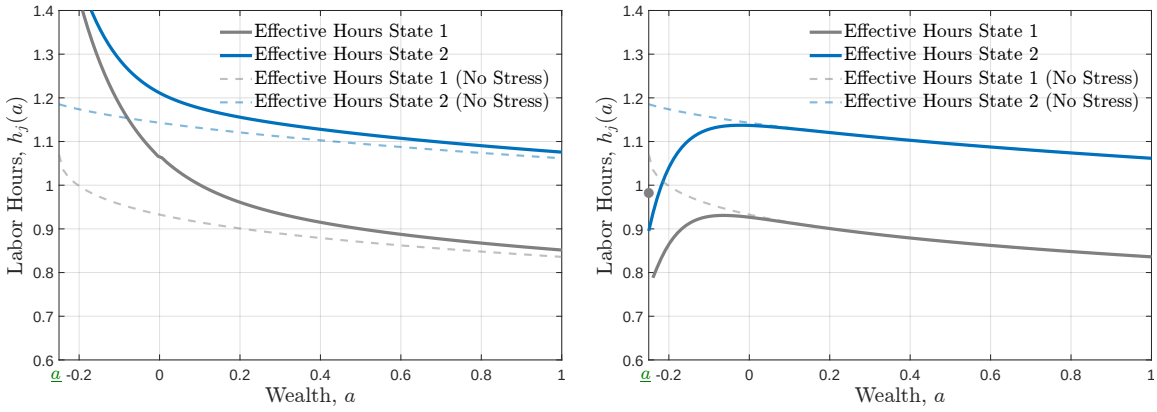


Figure 20: Calibration based on the Restricted Sample (Labor Supply: Sophistication vs Naivete)

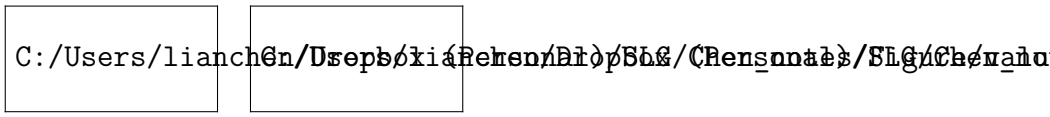


Figure 21: Calibration based on the Restricted Sample (Welfare Costs: Sophistication vs Naivete)

Financial Stress and Measures of Financial Constraints

Here, we regress measures of financial stress (in Q12, Q17a, Q17b) on measures of financial constraints (Q9), income, asset-income ratio, and other covariates based on the full sample. From Table 8, we corroborate that measures of financial stress remain to be strongly correlated with measures of at financial constraints after controlling for income, asset-income ratio, and demographics. This is true no matter what measures of financial stress we use.[11]

Calibration Based on Kaur et al. (2021)

An Alternative Functional Form of $\Theta(a)$

	(1) Working hours distracted	(2) Hours on financial issues	(3) Qual. measure of stress
Financial Constraint			
Cannot pay	10.12***	9.138***	6.097***
	(0.460)	(0.703)	(0.176)
Need to borrow	8.178***	7.895***	5.467***
	(0.374)	(0.593)	(0.157)
No need to borrow	4.728***	4.535***	3.521***
	(0.381)	(0.600)	(0.155)
Income	-0.271***	0.0408	-0.275***
	(0.0774)	(0.185)	(0.0414)
Asset-income ratio	-0.597***	-0.137	-0.234**
	(0.0940)	(0.0909)	(0.0785)
Observations	4965	1678	6653
R^2	0.605	0.680	0.862
Covariates			
Demographics	✓	✓	✓
Primary earner	✓	✓	✓
Household size	✓	✓	✓

Notes: Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Income and asset-income ratio are normalized by their standard deviations.

Table 8: Financial Stress and Measures of Financial Constraints

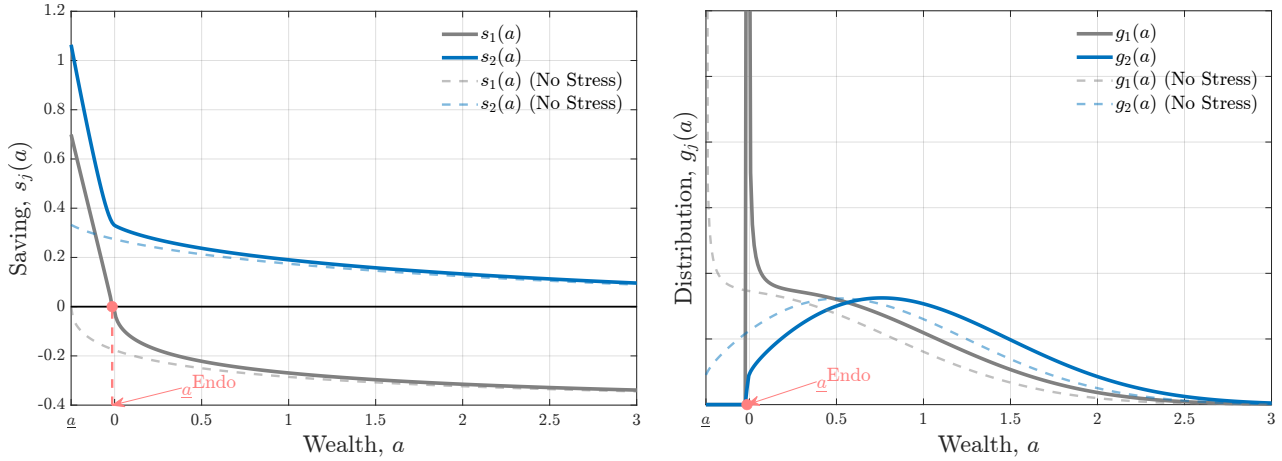


Figure 22: Alternative Functional Form of $\Theta(a)$ (Sophistication).

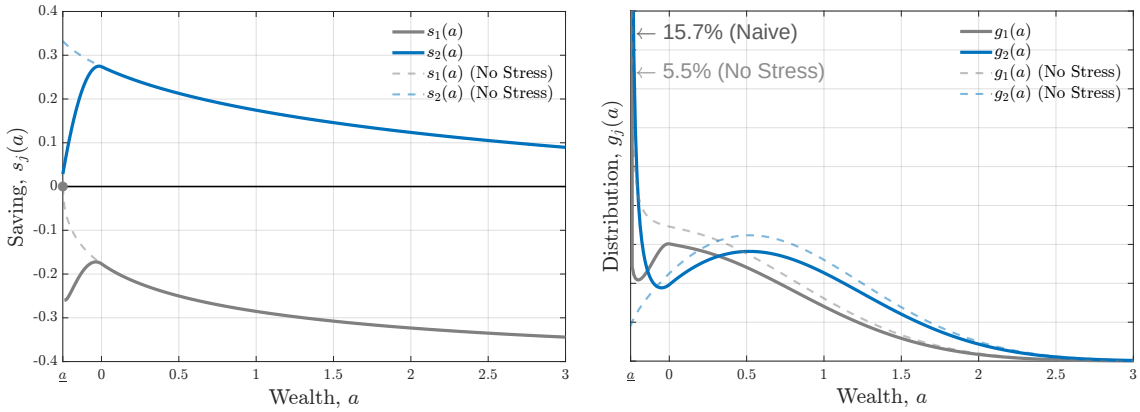


Figure 23: Alternative Functional Form of $\Theta(a)$ (Naivete).

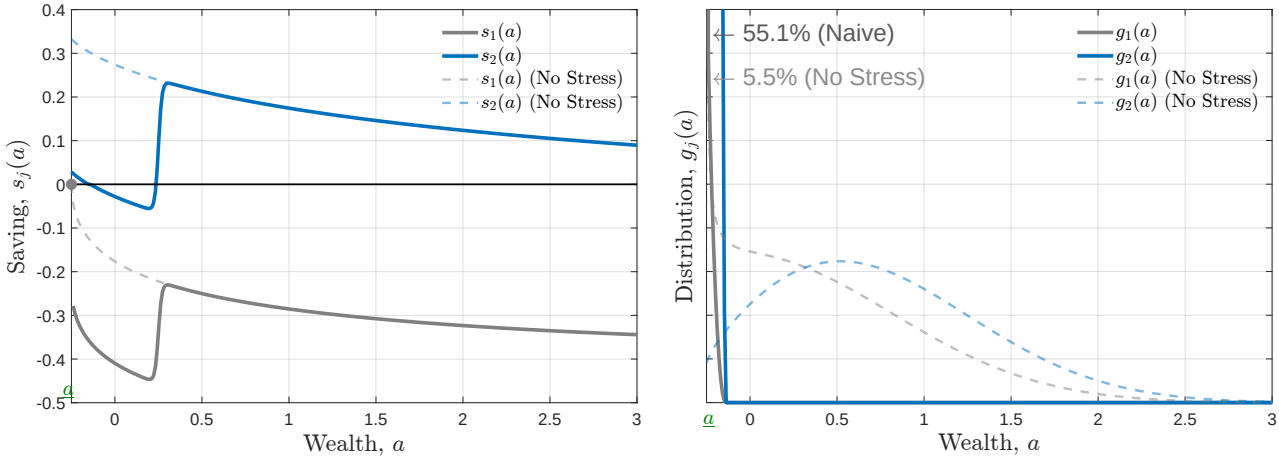


Figure 24: Saving Behavior and Stationary Wealth Distribution (Non-convex Stress Function under Naivete).

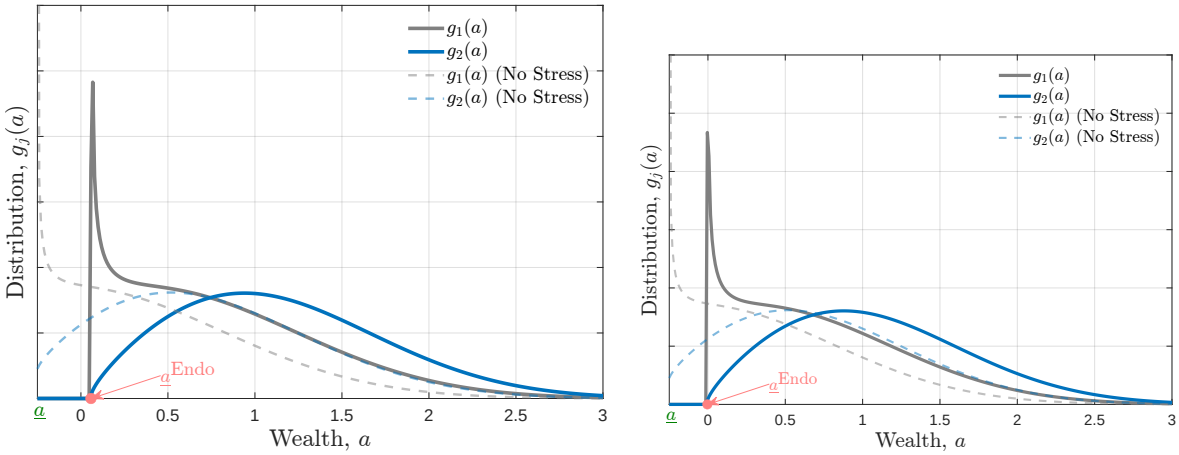


Figure 25: Multiplicative Productivity Loss (Sophistication).

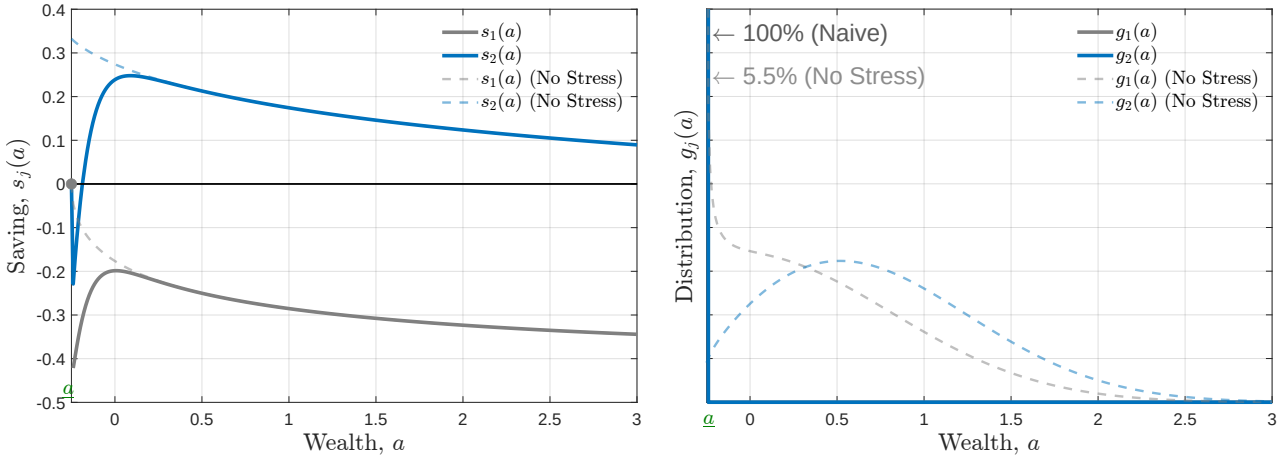


Figure 26: Alternative Functional Form of $\Theta(a)$ (Naivete).

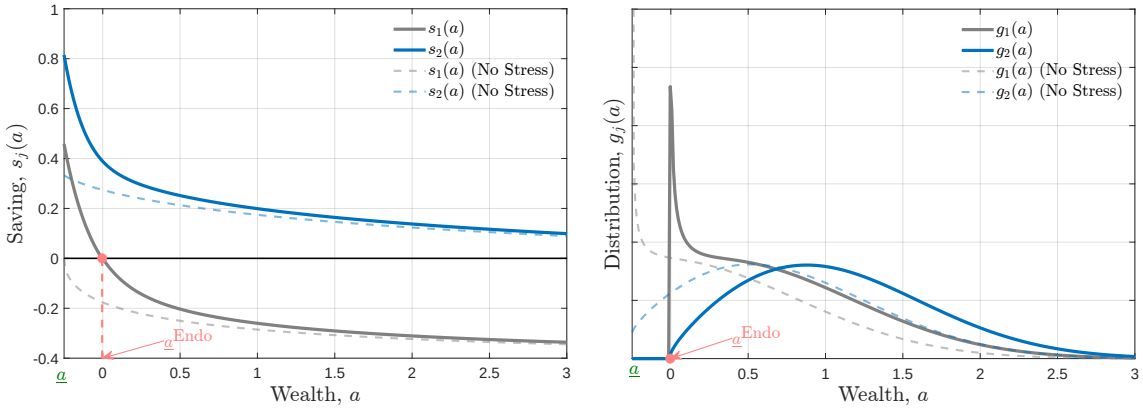


Figure 27: Different Disutility from Labor than from Financial Stress (Sophistication).

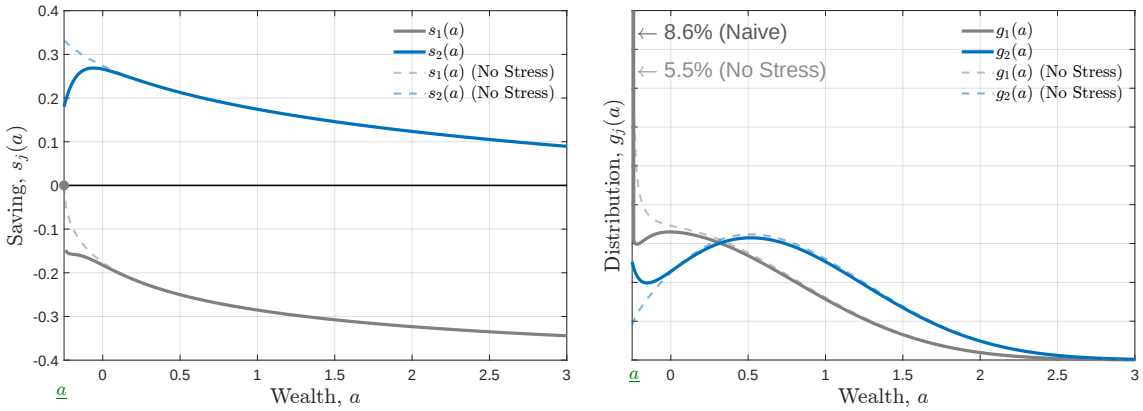


Figure 28: Different Disutility from Labor than from Financial Stress (Naivete).

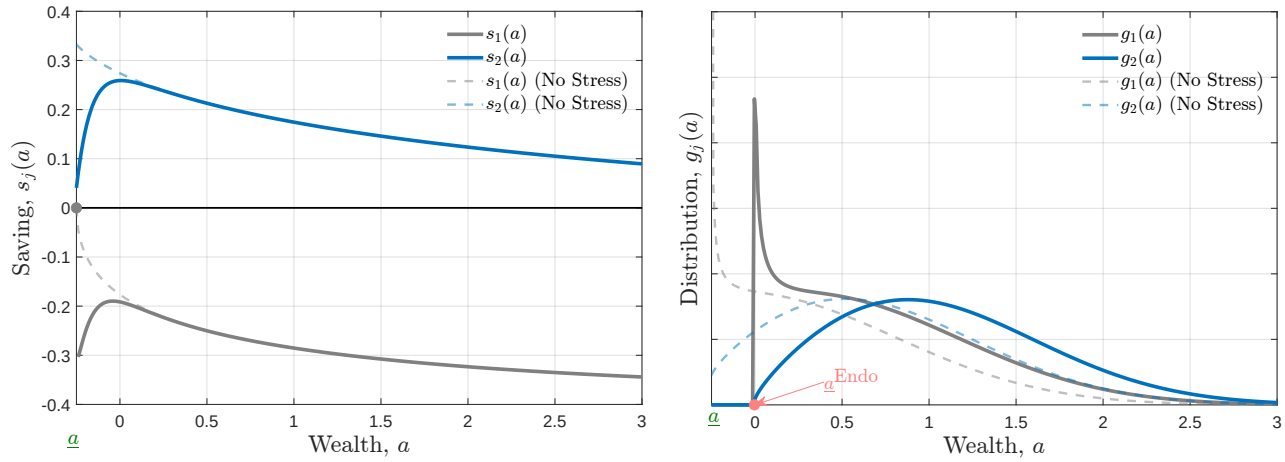


Figure 29: Stressed Consumption (Sophistication).

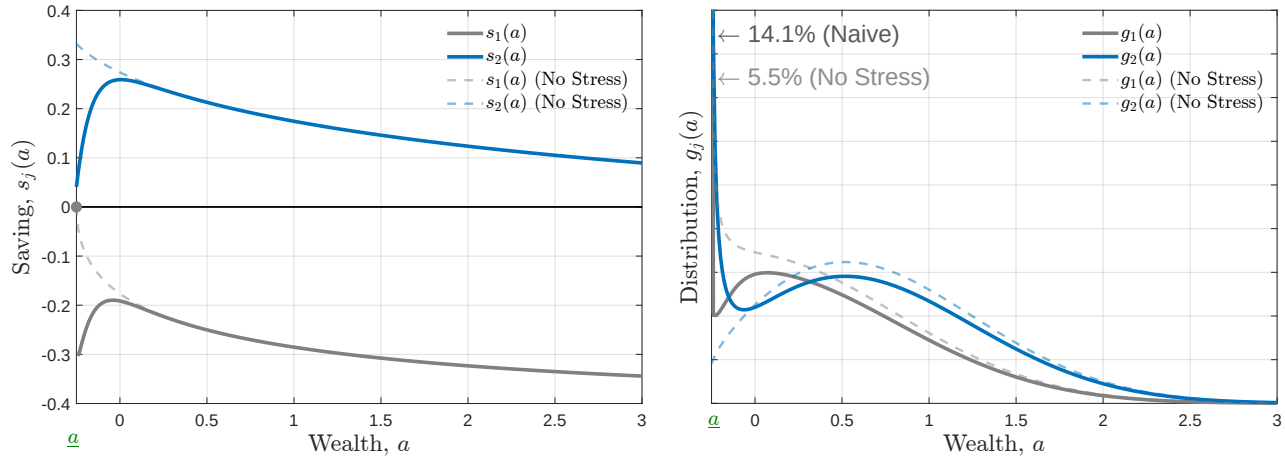


Figure 30: Stressed Consumption (Naivete).

A Non-convex Stress function $\Theta(a)$

Multiplicative Productivity Loss

Different Disutility from Labor than from Financial Stress

Alternative Channels of Financial Stress: Stressed Spending

Alternative Channels of Financial Stress: Transition Intensity between Individual Productivity States

Fiscal Stimulus with Heterogenous Agents

[11]Since we have three dummies corresponding to each potential answer to Q9 about the financial constraint status, we do not have constants in the regression in Table 8.

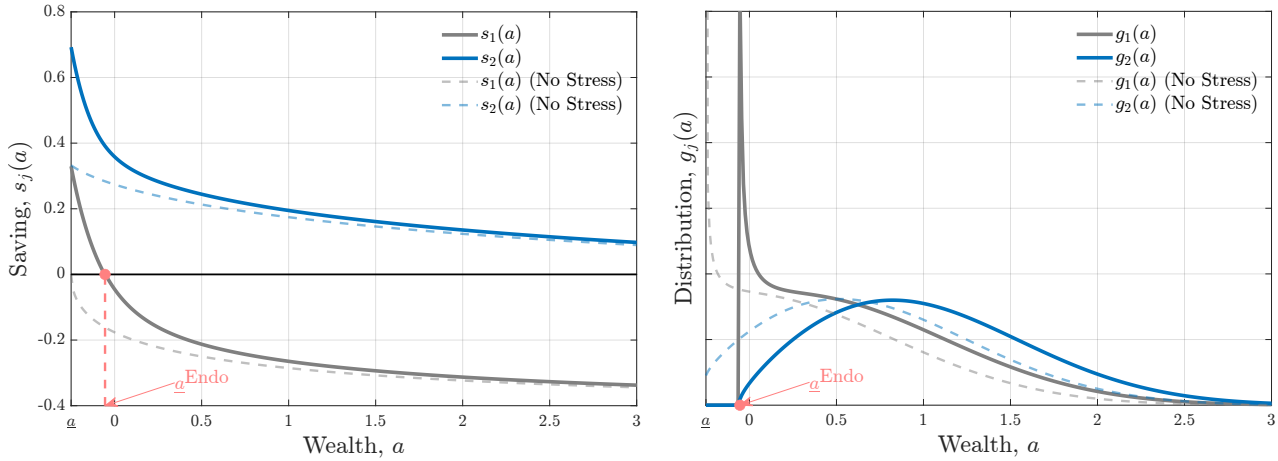


Figure 31: Stress Affects Transition Intensity (Sophistication).

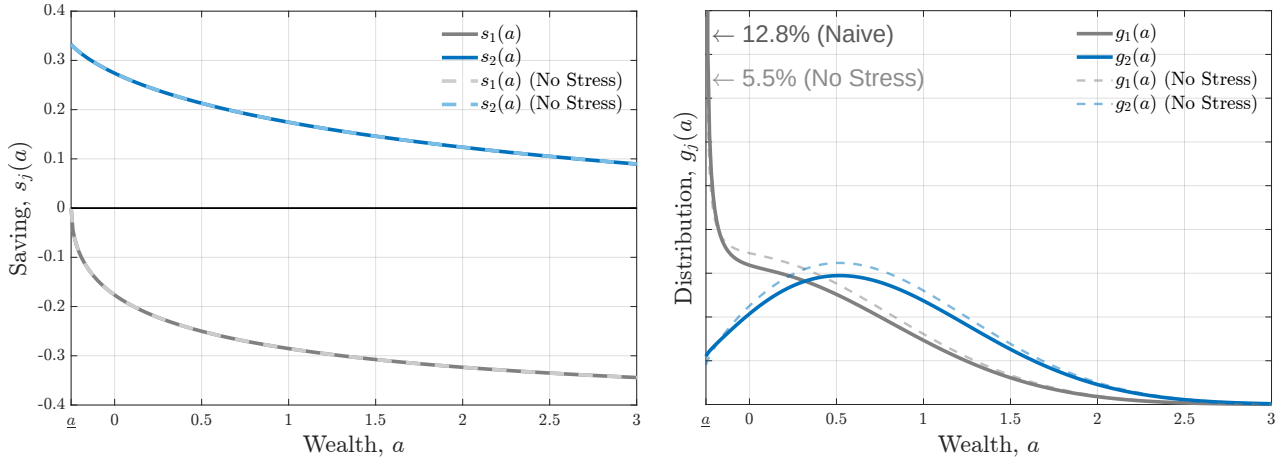


Figure 32: Stress Affects Transition Intensity (Sophistication).

Appendix D: Survey Questionnaire

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