

The Economics of Financial Stress

Dmitriy Sergeyev^{2,4} (R) Chen Lian^{1,3} (R) Yuriy Gorodnichenko^{1,3,4}

¹UC Berkeley

²Bocconi University

³NBER

⁴CEPR

April 14, 2023

Incorporating Psychological Costs of Financial Constraints

“The harder it is to make it through to the next day financially – the harder you will find it to make careful and disciplined decisions.” — Olen and Pollack (13)

US households are **financially constrained** (36% can't cover \$400 emergency, Fed, 21)

Financial stress: No.1 stress in US (APA, 2022), **out of household finance & macro**

This paper: **link behavioral & traditional takes on financial constraints**

- Traditional: imperfect consumption smoothing, portfolio choices
- Behavioral: drain scarce cognitive resources & performance at economic tasks deteriorates
[**scarcity** by Mullainathan & Shafir]

Survey

Our contribution:

- Survey evidence about financial stress in US [literature: developing countries]
- A **tractable intertemporal model** of financial stress/“scarcity” [literature: experiments]

Survey

Our contribution:

- Survey evidence about financial stress in US [literature: developing countries]
- A **tractable intertemporal model** of financial stress/“scarcity” [literature: experiments]

Survey: a US survey with **10,000** households

[representative in terms of gender, age, region, total household income, and education.]

Finding: **US households are financially stressed** (multiple quantitative measures)

- E.g., a median of 6 hours per week **spent worrying and dealing with financial issues**
- Financial stress is strongly correlated with distance from financial constraints

A Tractable Intertemporal Model of Financial Stress

Model: A **tractable intertemporal model** of financial stress/“scarcity”

- Financial stress drains valuable time and cognitive resources
- Financial stress decreases with distance to the financial constraint
- Households' degrees of sophistication versus naivete can vary
- Disciplined based on our survey & [Kaur et al. (22)'s] experimental evidence

Finding 1: financial stress & naivete \implies a psychological theory of poverty trap

- **Sophisticates save out of stress**, understanding that saving relieves stress
- **Naifs** dis-save, fall into a **poverty trap**, and incur high welfare losses

A Tractable Intertemporal Model of Financial Stress

Model: A **tractable intertemporal model** of financial stress/“scarcity”

- Financial stress drains valuable time and cognitive resources
- Financial stress decreases with distance to the financial constraint
- Households' degrees of sophistication versus naivete can vary
- Disciplined based on our survey & [Kaur et al. (22)'s] experimental evidence

Finding 1: financial stress & naivete \implies a psychological theory of poverty trap

- **Sophisticates save out of stress**, understanding that saving relieves stress
- **Naifs** dis-save, fall into a **poverty trap**, and incur high welfare losses

Finding 2: stress **reverses** the **negative wealth effect of labor supply**

- **Counterfactual** model prediction: a higher wealth increases demand for leisure
- Relieving stress frees up time and cognitive resources for productive work

Implication: wealth inequality & fiscal multipliers

Outline

- 1 Our Survey
- 2 A Tractable Intertemporal Model of Financial Stress
- 3 The Impact of Financial Stress: Saving Behavior and Wealth Distribution
- 4 The Impact of Financial Stress: Labor Supply, Welfare, and Fiscal Stimulus

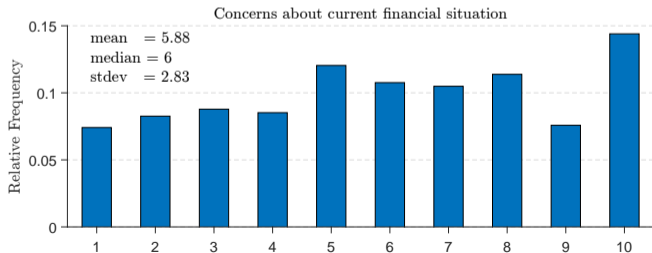
Our Survey sample

- Survey company: **Dynata**
- **10,000** prime-age, employed US workers
- **Representative** of the general population in terms of chosen **observable characteristics**
 - ▶ Gender, age, region, total household income, and education.

Our Survey sample

- Survey company: **Dynata**
- **10,000** prime-age, employed US workers
- **Representative** of the general population in terms of chosen **observable characteristics**
 - ▶ Gender, age, region, total household income, and education.

Q: 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 Economic Consequences of Financial Stress table

Q: **Hours Worked** (median: 40)

How many hours do you typically work in a week these days? If you are not sure, please estimate.

Q: **Hours Distracted** (median: 5)

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

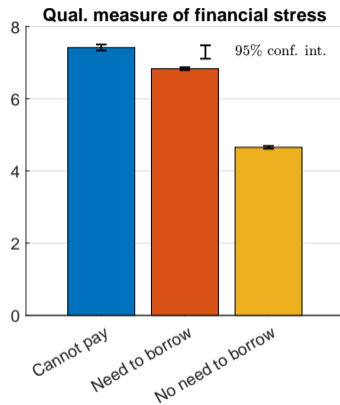
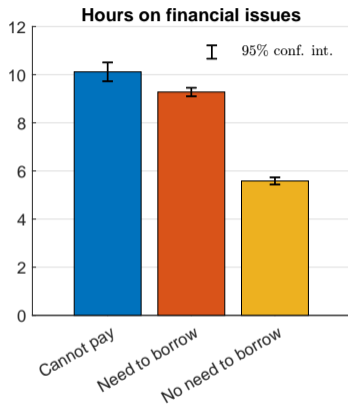
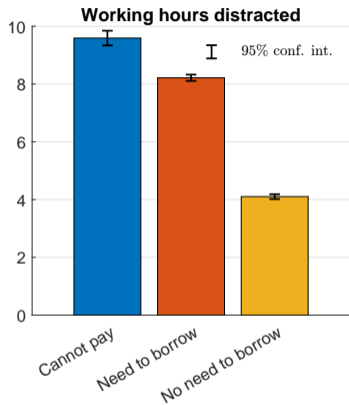
Q: **Hours Spent on Financial Issues** (median: 6, consistent with TIAA-GFLEC survey)

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

Q: **Dollar Spent to Relieve Financial Stress** (median: 100)

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

Average Financial Stress by Measures of Financial Constraints table



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

Outline

- 1 Our Survey
- 2 A Tractable Intertemporal Model of Financial Stress**
- 3 The Impact of Financial Stress: Saving Behavior and Wealth Distribution
- 4 The Impact of Financial Stress: Labor Supply, Welfare, and Fiscal Stimulus

A Tractable Intertemporal Model of Financial Stress

A tractable intertemporal model of financial stress/“scarcity”

Key elements:

- Financial stress **drains valuable time and cognitive resources**
- Financial stress decreases in **distance from fin. constraints**
- Households' degrees of sophistication versus naivete can vary
- Disciplined based on our survey & [Kaur et al. (22)'s] experimental evidence

A First Intertemporal Model of Financial Stress extensions

Utility: [infinite horizon, continuous time, discount rate ρ , $r < \rho$ is exogenous, and GE in the paper]

$$u(c, \ell; \Theta(a)) = \frac{c^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{(\ell + \Theta(a))^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}} \quad \text{s.t.} \quad \dot{a} = ra - c + wz\ell, \quad (1)$$

- The financial stress $\Theta(a)$ decreases in net asset a
 - ▶ **Crowds out time/cognition** available for productive labor supply ℓ
 - ▶ Happens **involuntarily**, $\Theta(a)$ exogenous [but equiv. to endogenous $\Theta(a)$ choice]

- Most documented channel in devo [Kaur et al., 22; Banerjee et al., 20]
 - ▶ Vary timing of wage payments: some paid earlier, others later
 - ▶ Productivity/earning loss of the later group due to financial stress
 - ▶ Consistent with our survey evidence
 - ▶ Functional form unimportant [e.g., multiplicative productivity loss]

- Allow multiple alternative channels of financial stress in extensions [e.g., impulse spending, direct utility costs, quality of portfolio allocations]

A First Intertemporal Model of Financial Stress extensions

Utility: [infinite horizon, continuous time, discount rate ρ , $r < \rho$ is exogenous, and GE in the paper]

$$u(c, l; \Theta(a)) = \frac{c^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{(\ell + \Theta(a))^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}} \quad \text{s.t.} \quad \dot{a} = ra - c + wz\ell, \quad (1)$$

Rest same as textbook continuous-time heterogeneous-agent model [Achdou et al., 22]

- Financial constraint

$$a \geq \underline{a}$$

- Idiosyncratic productivity: a two-state Poisson process

$$z \in \{z_1, z_2\} \quad \text{with transitional intensity } \lambda$$

The Sophistication Case

- **Sophisticates**: understand that stress crowds out productive labor & lowers earnings
- Strong incentives to **save out of financial stress**

$$\text{saving motive} \propto \underbrace{r - \rho}_{\text{standard intertemporal substitution}} + \underbrace{-wz_j \Theta'(a)}_{\text{extra saving motive, } >0}$$

- Financial stress + sophistication \implies save out of financial stress, **no poverty trap**

The Naivete Case

- **Naivete**: two equiv. interpretation
 - ① do not understand that lower saving leads to lower stress
 - ② do not understand that stress crowds out productive labor & earning
- **Naifs do not have the extra saving motive**

saving motive \propto

$\underbrace{r - \rho}$
standard intertemporal substitution

$$\underbrace{-\frac{1}{\sigma} w z_j \Theta(a) \frac{c'_j(a)}{c_j(a)}}_{\text{less net saving due to lower earning, } < 0}$$

- Financial stress + naivete \implies **lower net saving & poverty trap**

The Calibration Strategy

- The **financial stress function** (exact functional form unimportant)

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

where $a - \underline{a}$ is the distance from financial constraints.

- Normalize the model such that average income and productive labor is 1.

Find $\bar{\Theta}$ and α :

- Method 1: **Our survey** (within-subject variation based on hypothetical Qs) within

- ▶ Q: **financial stress at constraints & how gift check alleviates financial stress**

$$(\bar{\Theta}, \alpha) = (0.27, 11.9)$$

- ▶ Net asset (≈ 0.5 monthly income) halves financial stress

- Method 2: Our survey (across-subject relationship between stress & fin. constraints) cross

- Method 3: Kaur et al. (22) (in the paper) kaur

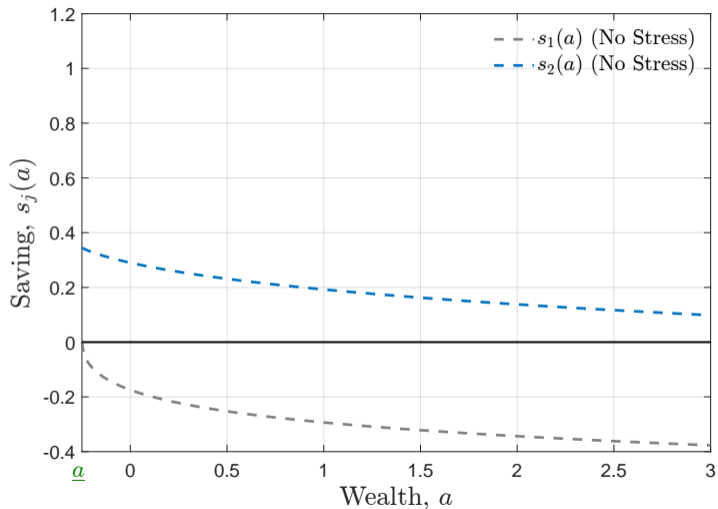
Other Parameters

Parameters	Justifications
$\rho = 0.0131$	match avg a /avg $y = 0.56$ (Kaplan-Violante, 22) in the naivete about financial stress case
$\sigma = 1$	Kaplan-Violante (22)
$\underline{a} = -1/4$	Kaplan-Violante-Moll (18)
$r = 0.01$	Kaplan-Violante (22)
$\nu = 1$	Guerrieri-Lorenzoni (17)
$(\lambda, z_1, z_2) = (0.57, 0.87, 1.13)$	Guerrieri-Lorenzoni (17)
w, θ	normalize average income and total labor hours to 1 in the naivete about financial stress case

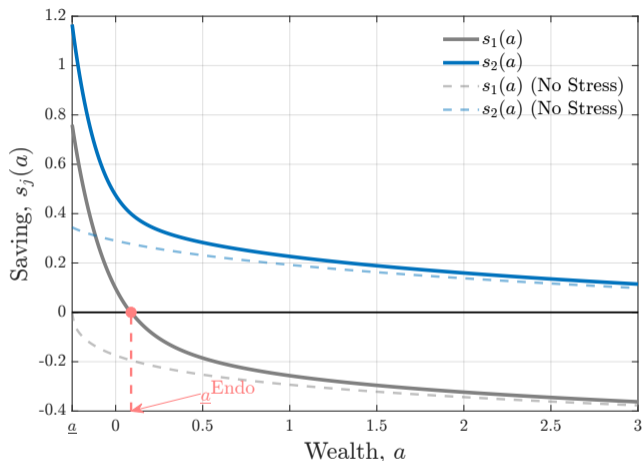
Outline

- 1 Our Survey
- 2 A Tractable Intertemporal Model of Financial Stress
- 3 The Impact of Financial Stress: Saving Behavior and Wealth Distribution**
- 4 The Impact of Financial Stress: Labor Supply, Welfare, and Fiscal Stimulus

Frictionless Case (Net Flow Saving: $s = ra - c + wz\ell$)

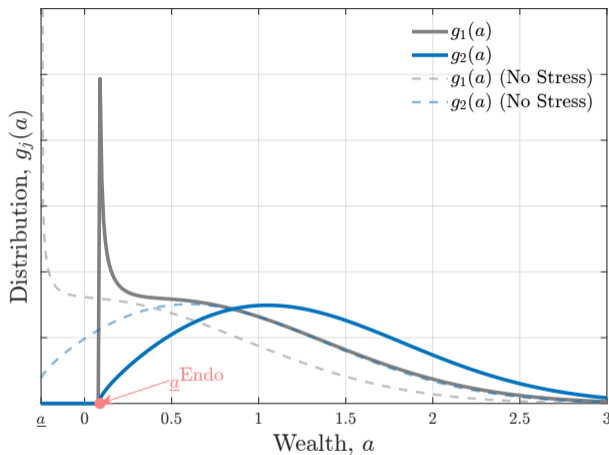


Sophistication: Extra Saving Motive (Net Flow Saving: $s = ra - c + wz\ell$)



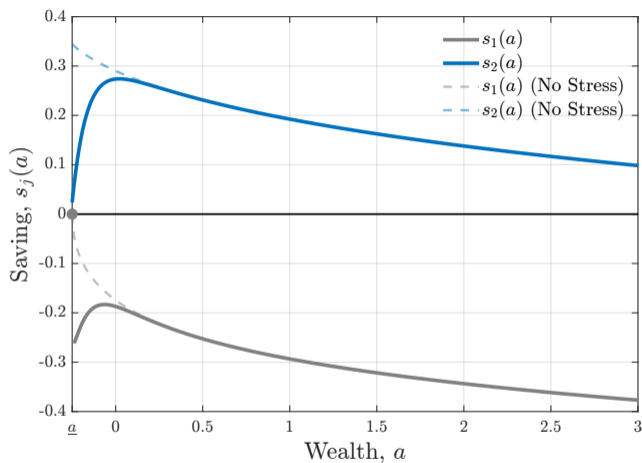
- Sophisticates have **higher net saving** despite lower earnings due to stress
- **No poverty trap**: positive net saving around the constraint $[s_j(a) > 0, \forall a \in [\underline{a}, \underline{a}^{\text{Endo}}]]$

Sophistication: Wealth Distribution (Exogenous r)



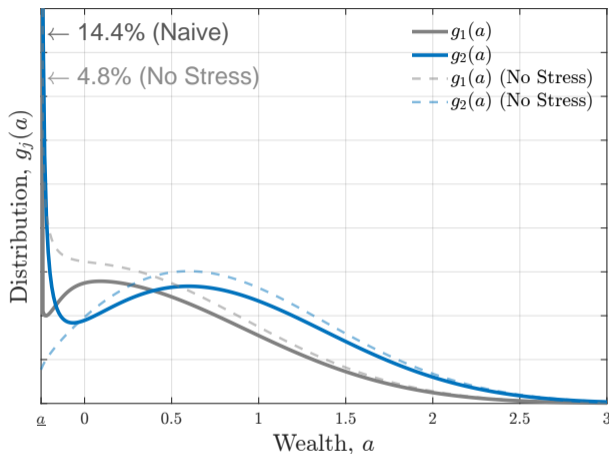
- **Sophisticates save out of financial stress:** $a \geq \underline{a}^{\text{Endo}}$ in the stationary distribution
- Inconsistent with the large number of constrained households ($\sim 10\%$ in our data)

Naivete: Poverty Trap (Net Flow Saving: $s = ra - c + wz\ell$)



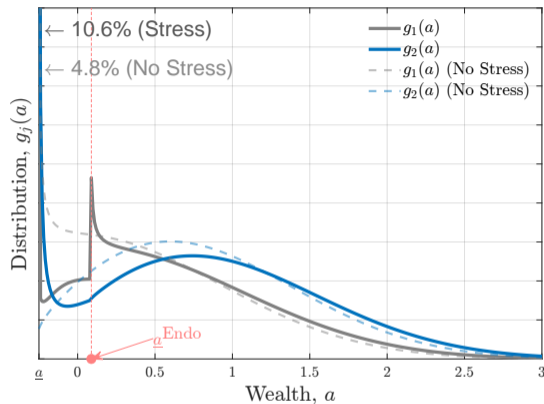
- Naifs have **lower net saving** because of lower earnings due to stress
- **Poverty trap**: negative net saving $s_1(a) < 0$ for all a

Naivete: Wealth Distribution (Exogenous r)



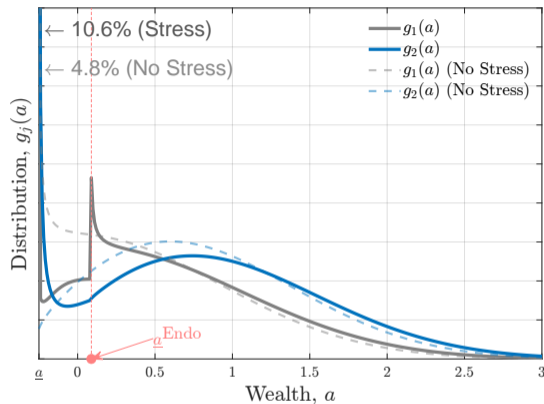
- **Naivete** generates **large number of stressed households**
- Help generate a large number of constrained households ($\sim 10\%$ in our data)

A Mixture of Naifs and Sophisticates



- Calibrate the **proportion of sophisticated household** $\varphi = 26\%$ mixture
 - ▶ If “relieve financial stress to maintain focus at work” is **a top 3 reasons for saving**
 - ▶ Still large number of constrained and stressed households (naive ones)

A Mixture of Naifs and Sophisticates



- Calibrate the **proportion of sophisticated household** $\varphi = 26\%$ mixture
 - ▶ If “relieve financial stress to maintain focus at work” is **a top 3 reasons for saving**
 - ▶ Still large number of constrained and stressed households (naive ones)
- Alternative: $\varphi = 32\%$, if matching % of households at constraints (“cannot pay”, 9.8%)

Robustness Checks in the Paper: Sophistication vs Naivete

Sophisticates save out of financial stress while naifs fall into the poverty trap

- Alternative functional forms of $\Theta(a)$ alternative
- Non-convex stress function $\Theta(a)$ nonconvex
- Multiplicative productivity loss: $wz^\Theta(a)\ell$ multiplicative
- Alternative calibrations cross kaur
- Different disutility from labor than from financial stress exchange
- Alternative channels of financial stress
 - ▶ Stressed spending (alcohol, cigarettes, etc.) $C^\Theta(a)$ consumption
 - ▶ Transitional intensity $\lambda^\Theta(a)$ instead of current earnings transition

Outline

- 1 Our Survey
- 2 A Tractable Intertemporal Model of Financial Stress
- 3 The Impact of Financial Stress: Saving Behavior and Wealth Distribution
- 4 The Impact of Financial Stress: Labor Supply, Welfare, and Fiscal Stimulus

Financial Stress and the Wealth Effect of Labor Supply

- Model: **negative** wealth effect of labor supply with separable utility
 - ▶ a higher wealth **increases** demand for **leisure**
- Evidence: **zero or positive** wealth effect of labor supply, esp. close to fin. constraints [Cesarini et al. (17); Kaur et al. (22); Banerjee et al. (20)]
- Financial stress generates **positive wealth effect of labor supply** close to constraints

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

- ▶ Relieving stress frees up time and cognitive resources for productive work

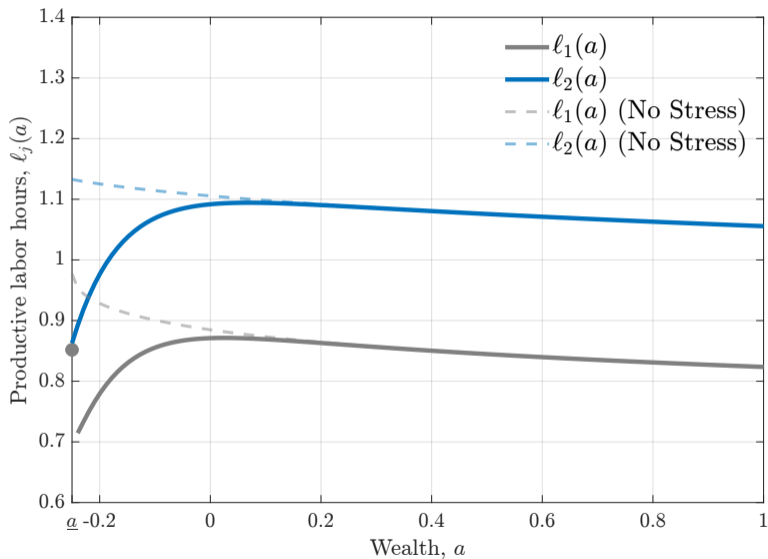
Financial Stress and the Wealth Effect of Labor Supply

- Model: **negative** wealth effect of labor supply with separable utility
 - ▶ a higher wealth **increases** demand for **leisure**
- Evidence: **zero or positive** wealth effect of labor supply, esp. close to fin. constraints [Cesarini et al. (17); Kaur et al. (22); Banerjee et al. (20)]
- Financial stress generates **positive wealth effect of labor supply** close to constraints

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

- ▶ Relieving stress frees up time and cognitive resources for productive work
- Financial stress \implies A new **transmission mechanism for fiscal policy** fiscal
 - ▶ Fiscal transfers **relieve financial stress**, increase labor supply, and boost aggregate output.
 - ▶ Popular debate about the stimulus check often centers around relieving financial stress

Positive Wealth Effect of Labor Supply Close to \underline{a} (Naivete) labor



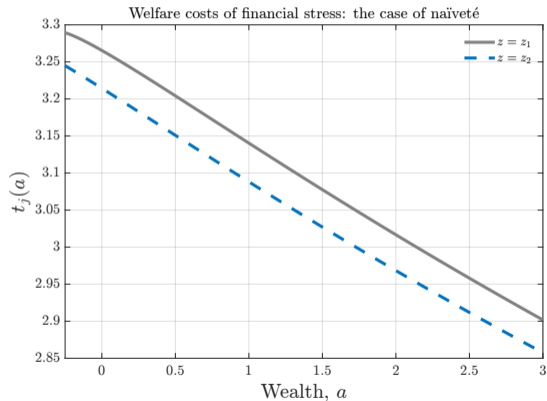
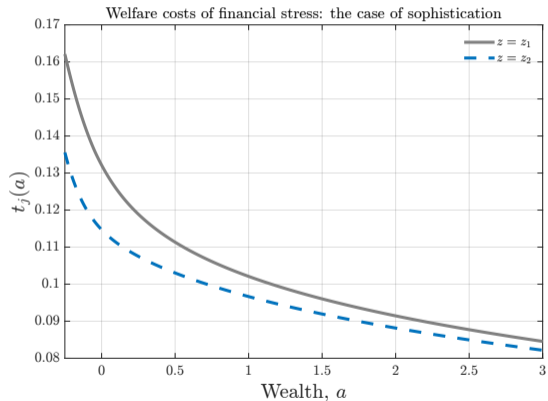
Welfare Costs of Financial Stress

- Financial stress increases the welfare costs of financial constraints (**especially for naifs**)
- A **money-centric** measure of the **welfare costs of financial stress**

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

- ▶ $t_j(a)$ is transfer needed to compensate the household for the impact of financial stress
- ▶ $\omega_j(a)$ captures the stressed household's welfare
- ▶ $\omega_j^{\text{no-stress}}(a)$ captures the no-stress household's welfare

Welfare Costs of Financial Stress: Sophistication vs Naivete



Conclusion

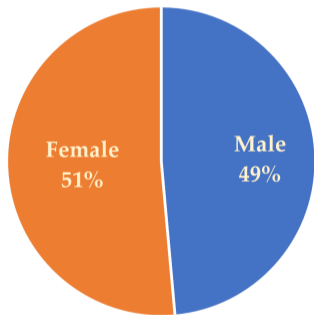
- **This paper:** bring **financial stress** into **household finance and macro**
 - ▶ survey evidence on the prevalence of financial stress in US households
 - ▶ a tractable intertemporal model of financial stress/“scarcity”
- **Implications:**
 - ▶ A psychology-based theory of poverty traps requires financial stress & **naivete**
 - ▶ **Reverses** the counterfactual **negative** wealth effect of labor supply
 - ▶ Financial stress increases the **welfare cost of financial constraints** (especially for naifs)
 - ▶ Macroeconomic consequences on wealth inequality & fiscal multipliers

Outline

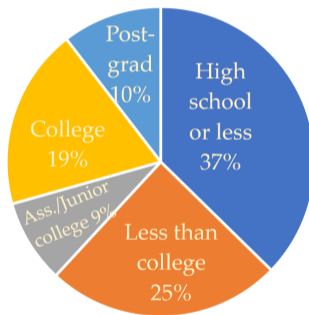
5 Extra Slides

Demographics main

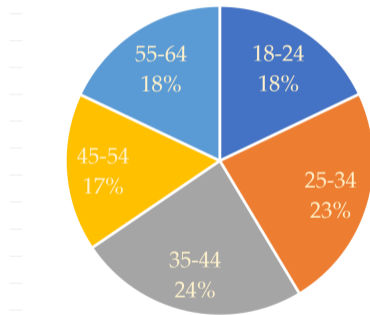
Gender



Education



Age



Summary Statistics

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

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

The Impact of Financial Stress main

Our result:

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

Cross-validation: 2021 TIAA Institute-GFLEC Personal Finance Index survey (Lusardi)

- Workers with low financial literacy spend **six hours per week** at work dealing with financial issues
- Consistent with our results

Extensions and Broader Interpretations main

Similar predictions with alternative channels of financial stress

$$u(c, \ell) - U^\ominus(a) \quad \text{s.t.} \quad \dot{a} = r(a)a - c - C^\ominus(a) + wz^\ominus(a)\ell \quad \& \quad a \geq \underline{a}$$

- Direct utility costs of financial stress: $U^\ominus(a)$
- Quality of financial decisions $r(a)$
- Stressed spending (alcohol, cigarettes, etc.) $C^\ominus(a)$
- Income transitional prob. $\lambda^\ominus(a)$ instead of current earnings
- Multiplicative productivity loss $z^\ominus(a)$
- All shut down for now, **lower bound** of the impact of financial stress

Alternative Functional Forms of Stress Function main

- Alternative functional forms of stress function

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

v.s.

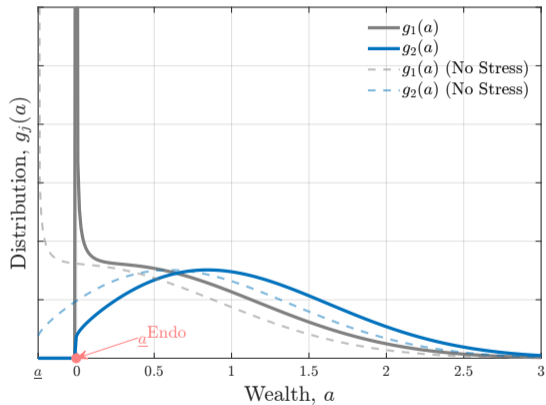
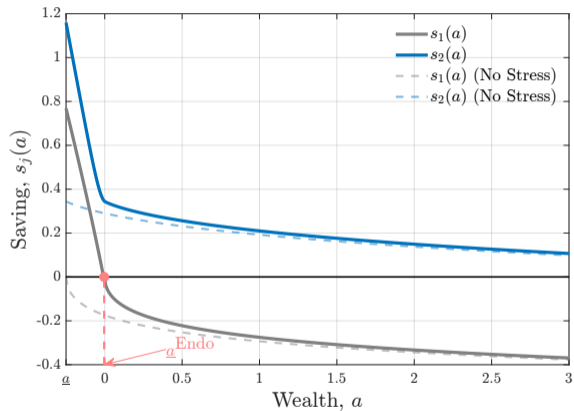
$$\log \Theta(a) = \log \bar{\Theta} - \alpha(a - \underline{a})$$

in the main analysis.

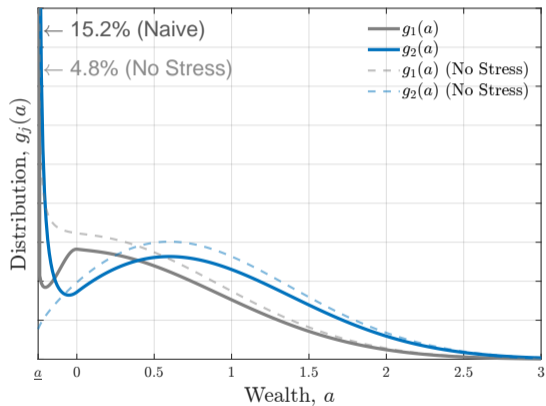
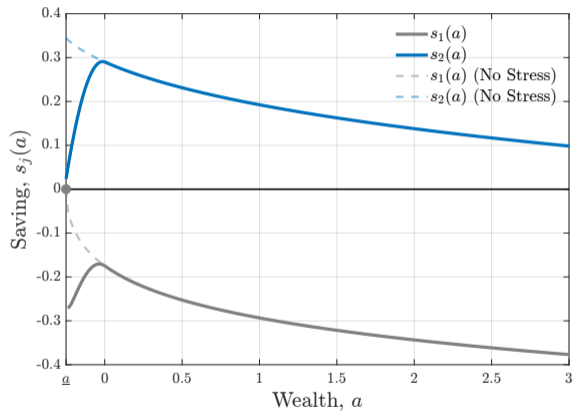
- **Our survey**, full sample
 - ▶ Q: **financial stress at liquidity constraints & the slope of financial stress**

$$(\bar{\Theta}, \alpha) = (0.27, 2.0574)$$

Alternative Functional Forms of Stress Function: Sophistication main



Alternative Functional Forms of Stress Function: Naivete main



Non-convex Stress Function main

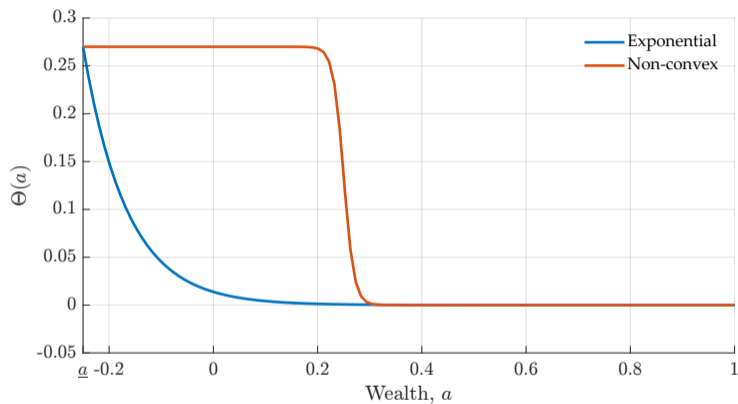


Figure: Non-convex Stress Function

Non-convex Stress Function main

The stress function

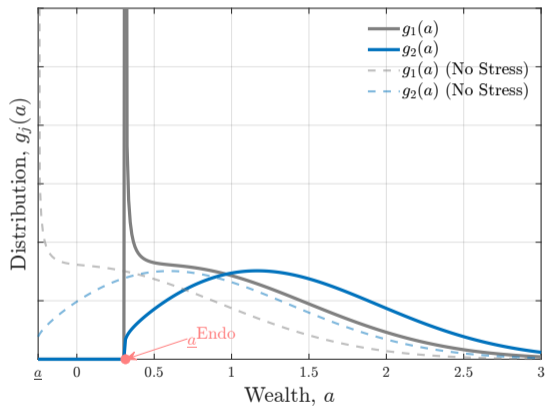
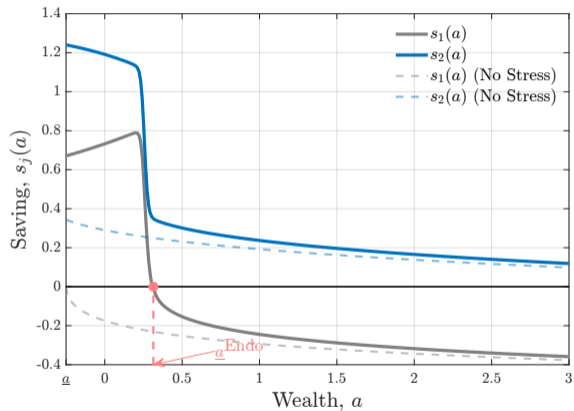
$$\Theta(a) = \begin{cases} \bar{\Theta} & \frac{a-(a+b)}{\delta} < 0, \\ F\left(1 - \frac{a-(a+b)}{\delta}\right), & \frac{a-(a+b)}{\delta} \in [0, 1), \\ 0 & \frac{a-(a+b)}{\delta} \geq 1. \end{cases}$$

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

$$F(x) = \frac{\frac{1}{1+e^{-\beta(x-\frac{1}{2})}} - \frac{1}{1+e^{-\beta(0-\frac{1}{2})}}}{\frac{1}{1+e^{-\beta(1-\frac{1}{2})}} - \frac{1}{1+e^{-\beta(0-\frac{1}{2})}}},$$

- $\bar{\Theta} = 0.27$ (benchmark)
- $b = 0.5$ (location of the decline)
- $\delta = 0.5$ and $\beta = 50$ (speed of the decline)

Non-convex Stress Function: Sophistication main



Non-convex Stress Function: Sophistication

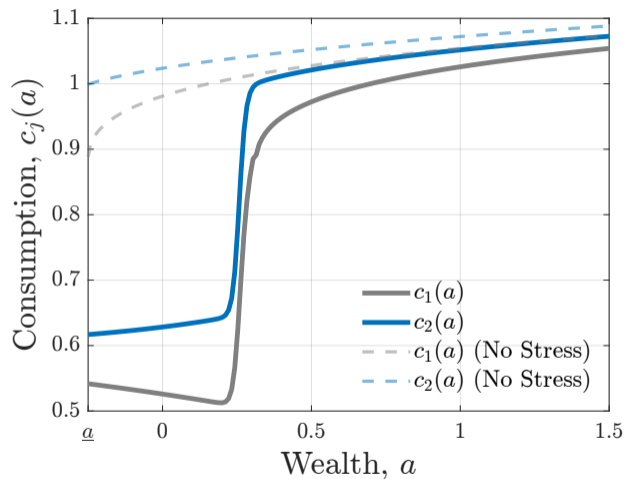
- Sophisticates **still save out of stress region even with non-convex stress function**

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

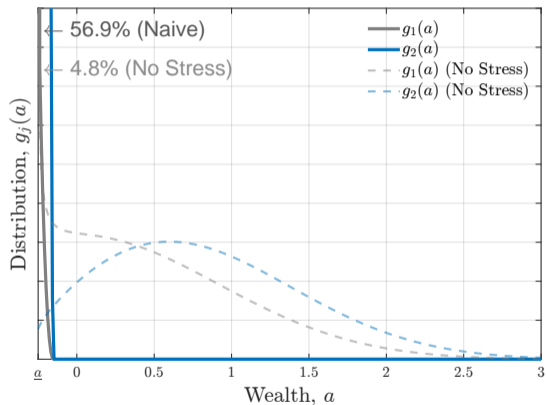
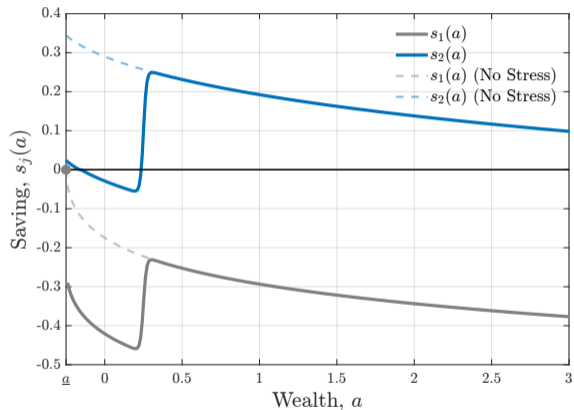
- Even if $\Theta'(a)$ is close to 0 around \underline{a} , $\Theta'(a)$ is large at the point $\Theta(a)$ is steep (a^{sleep})
 - $\implies c(a)$ increases a lot at a^{sleep}
 - $\implies c(a)$ is very small at around \underline{a} & strong extra saving motive
- Poverty trap with sophistication?
 - ▶ Galor-Zeira: non-continuous saving technology (human capital investment)
 - ▶ Stress affects quality of financial decisions $r(a)$ (may dominate the extra saving motive)

Non-convex Stress Function: Sophistication

main



Non-convex Stress Function: Naivete main



Multiplicative Productivity Loss main

- Utility (ℓ captures productive work)

$$u(c, \ell) = \frac{c^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{\ell^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}}$$

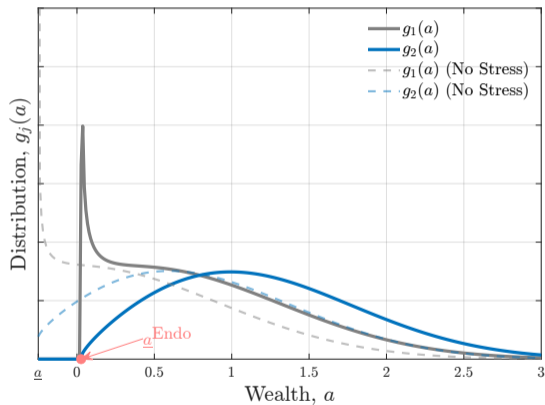
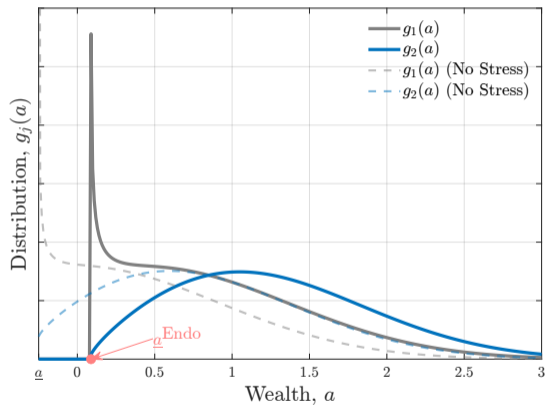
- Budget and the borrowing constraint

$$\dot{a} = ra - c + wz[1 - \Theta(a)]\ell \quad \& \quad a \geq \underline{a},$$

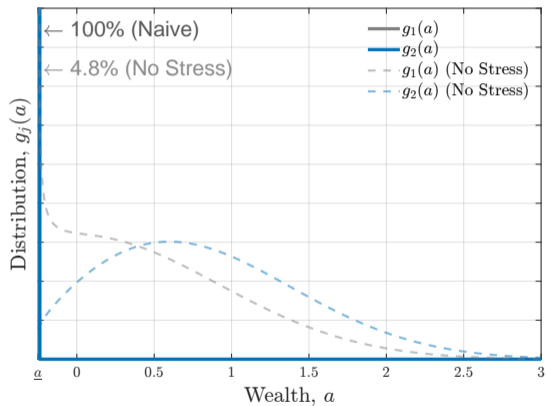
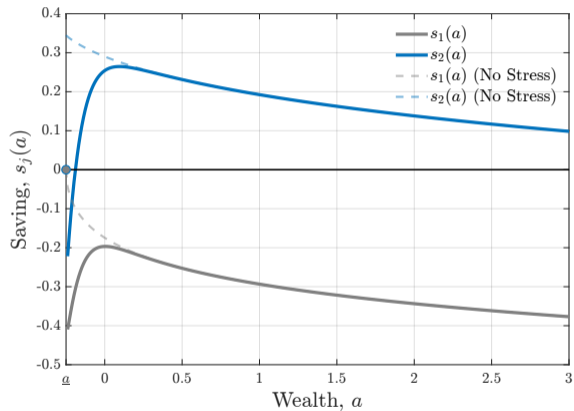
where $\Theta(a) = \bar{\Theta}e^{-\alpha(a-\underline{a})}$ is the same as the main text

- Impact of financial stress takes the form of a multiplicative productivity loss

Multiplicative Productivity Loss: Sophistication



Multiplicative Productivity Loss: Naivete



Multiplicative Productivity Loss: Naivete

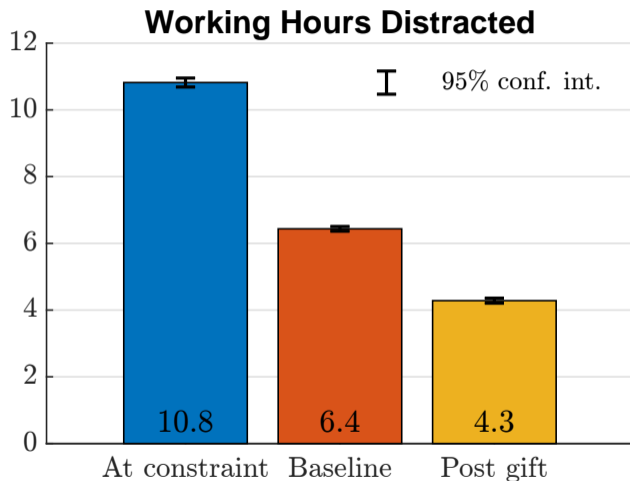
- Why 100% at constraints for the naivete case?
- Multiplicative productivity loss further decreases incentives to work
 - ▶ even **net saving for the high income** $s_2(a) < 0$ in the neighborhood of \underline{a}
- Full poverty trap

Q: Financial Stress at Financial Constraints

*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?*

Q: The Slope of Financial Stress

*Imagine that you were given \$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 concerns?*

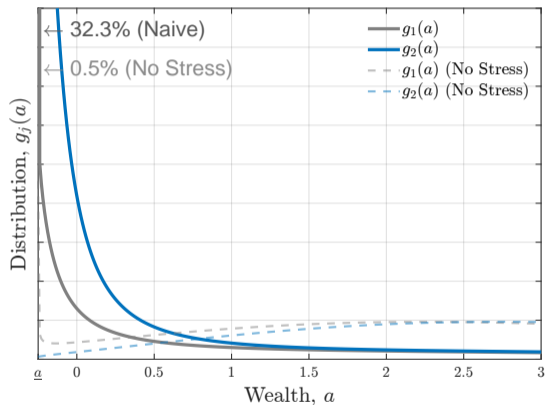
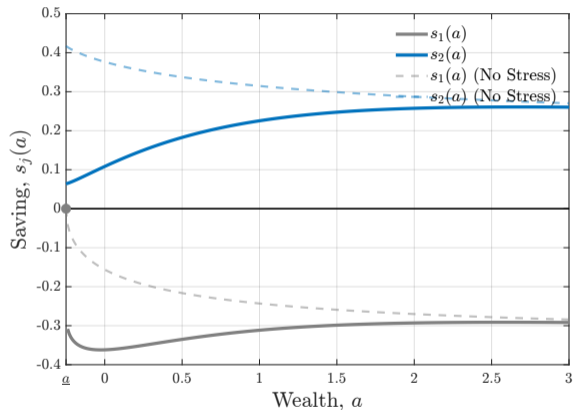


Alternative Calibration: Between-subject Variation main

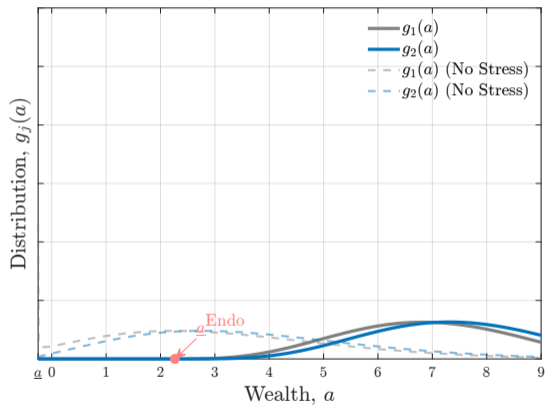
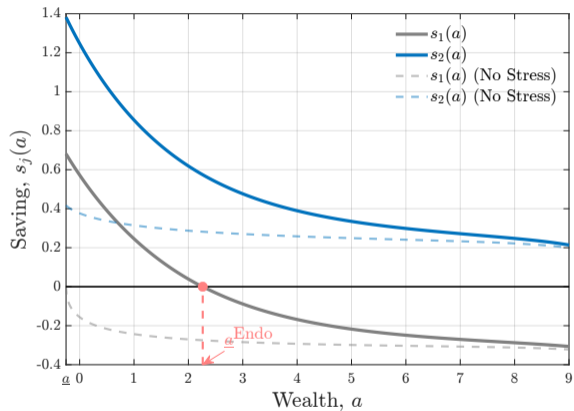
$$\Theta(a) = \bar{\Theta} e^{-\alpha(a-\underline{a})}$$

- Calibrate $\bar{\Theta} = 0.26$ based on the **average hours distracted at work** for those who “**cannot pay**” the emergency expense in Q9
- Calibrate $\alpha = 1.1$ based on the differences between those who “**cannot pay**” the emergency expense in Q9 and those who “**need to borrow**”.

Alternative Calibration: Between-subject Variation main



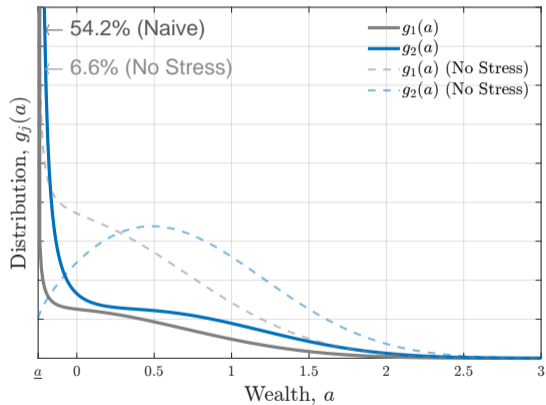
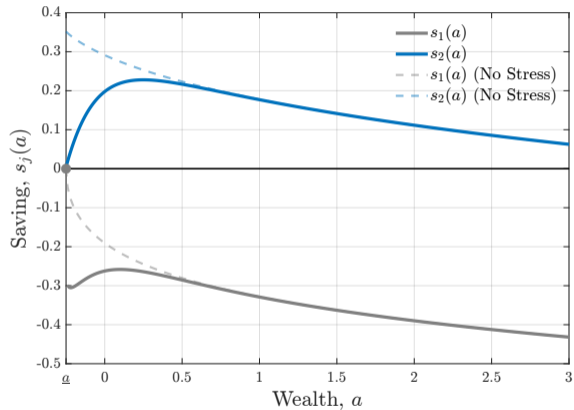
Alternative Calibration: Between-subject Variation main



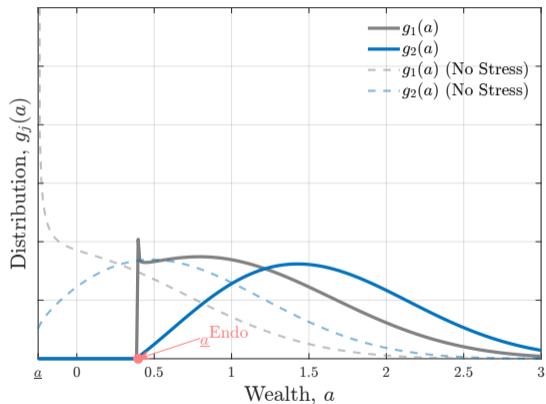
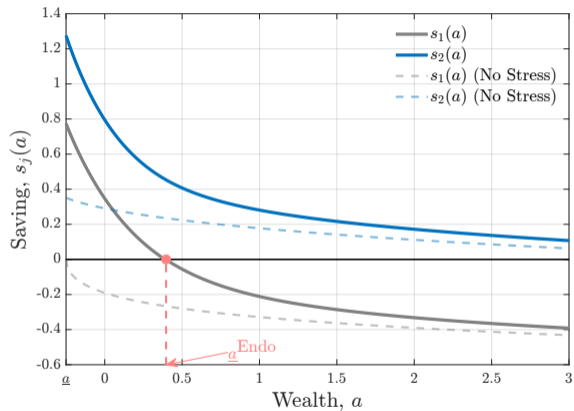
Alternative Calibration: Kaur et al. (21) main

- Calibrate ρ (in the naive financial stress case) to match
 - ▶ **fraction** of households (64.5%) **who can't come up with 1000 Rs.** of emergency fund (Kaur et al., 22)
- Calibrate $(\bar{\Theta}, \alpha) = (0.2575, 5.25)$ in the naive financial stress case) to match
 - ▶ **the effect of interim payment** (around 1400 Rs) on worker's **productivity** (Kaur et al., 22)
 - ▶ households who can't come up with 1000 Rs. of emergency fund: 9.18%
 - ▶ households who can come up with 1000 Rs. of emergency fund: 1.46%
- Normalize by the average household income (16871.6 Rs.) of workers with characteristics similar to those in Kaur et al. (22) in Indian Sample Survey (77th round)

Alternative Calibration: Kaur et al. (21) main



Alternative Calibration: Kaur et al. (21) main



Calibrate the Proportion of Sophisticated Households main

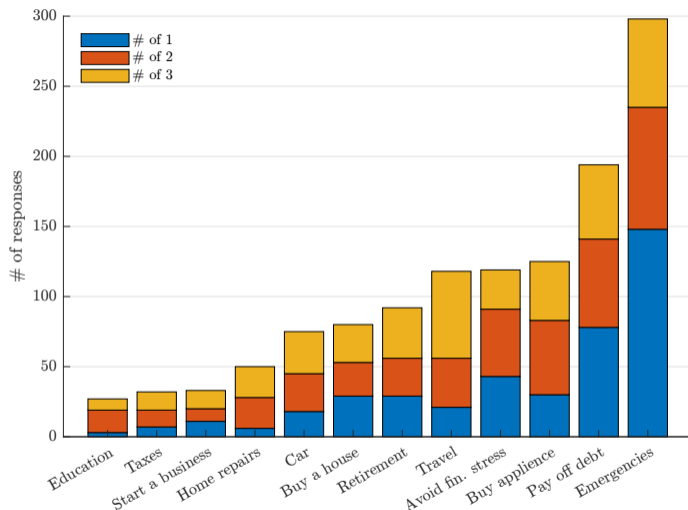
- A follow up survey run in April 2023 on Prolific
 - ▶ targeting **1,000** prime-age, employed US workers
- **Representative** of the general population in terms of total household income
- Borrow the “reasons” for saving question from the Making Ends Meet Survey from CFPB
 - ▶ introduce a financial stress option
 - ▶ sophisticates if “relieve financial stress to maintain focus at work” is **a top 3 reasons for saving**

People have different reasons for saving, even though they may not be saving all the time.

What are **your most important reasons for saving**? Pick your top three reasons.

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

Calibrate the Proportion of Sophisticated Households, $\phi = 26\%$ main



- 26.4% of sophisticates

[% of "relieve financial stress" as top3 saving reasons among "need to borrow" & "cannot pay"]

Different Disutility from Labor than from Financial Stress main

- Utility (ℓ captures productive work)

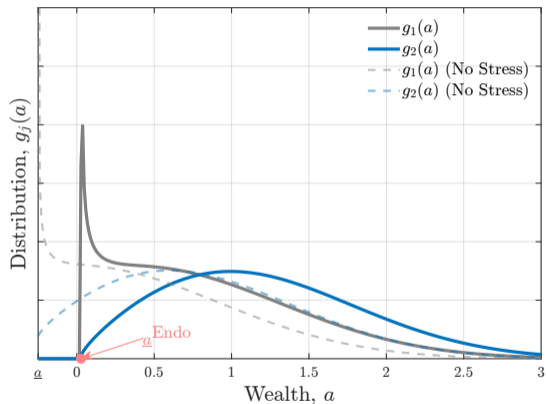
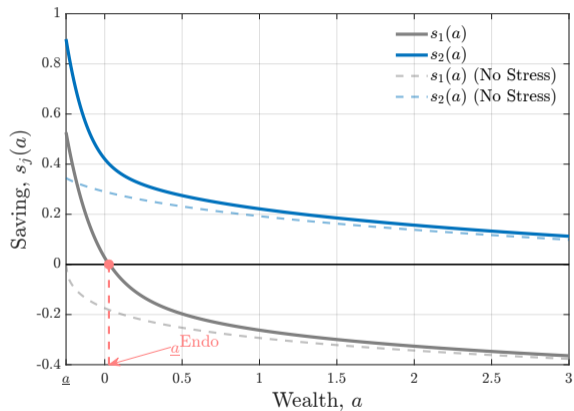
$$u(c, \ell; \Theta(a)) = \frac{c^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{(\ell + \chi \cdot \Theta(a))^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}}$$

- Budget and the borrowing constraint

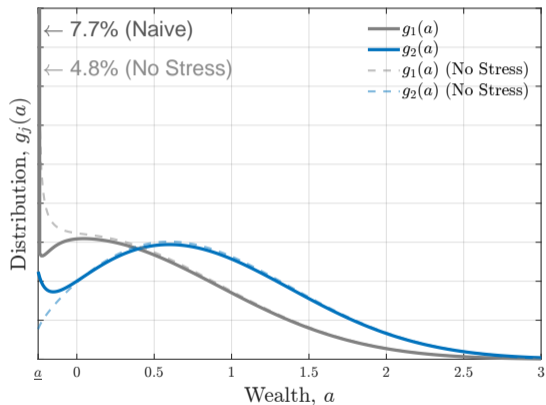
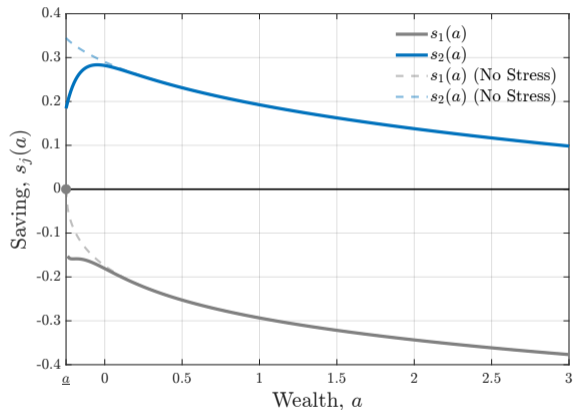
$$\dot{a} = ra - c + wz\ell \quad \& \quad a \geq \underline{a},$$

- As an illustration: $\chi = 0.5$

Different Disutility from Labor than from Financial Stress: Sophistication



Different Disutility from Labor than from Financial Stress: Naivete



Stressed Spending main

- Utility

$$u(c, \ell) = \frac{c^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{\ell^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}}$$

- Budget

$$\dot{a} = ra - c - C^{\ominus}(a) + wz\ell$$

- ▶ $C^{\ominus}(a)$: spending to alleviate financial stress (e.g., cigarette, alcohol)

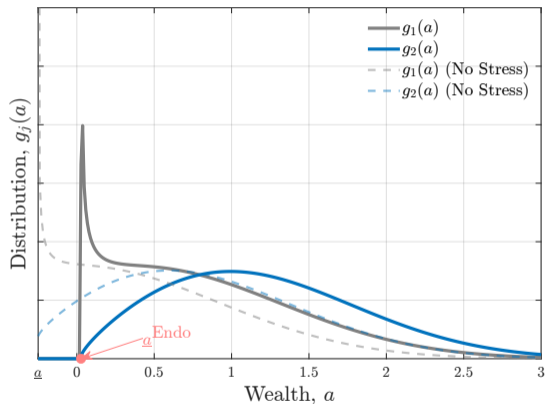
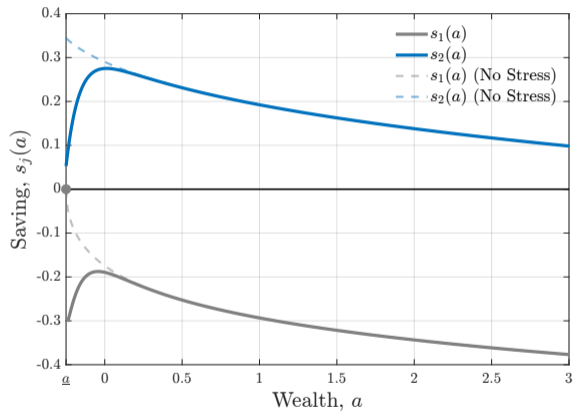
- Calibration

$$C^{\ominus}(a) = \bar{C} e^{-\alpha(a-\underline{a})}$$

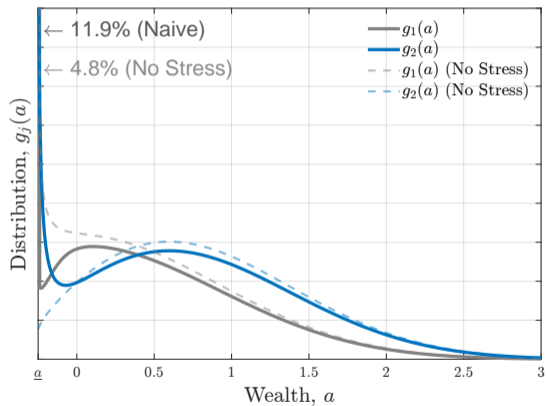
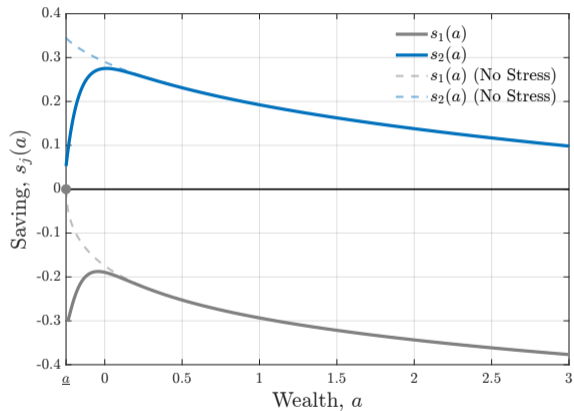
- ▶ α : same as main analysis
- ▶ \bar{C} :

$$\frac{\bar{C}}{\text{avg}(C)|_{data}} = \frac{\bar{\Theta}}{\text{avg}(\Theta)|_{data}}$$

Stressed Spending : Sophistication



Stressed Spending : Naivete



Stress Affects Transition Intensity between Income States main

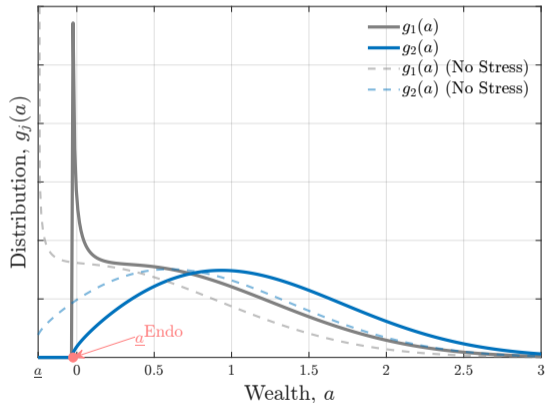
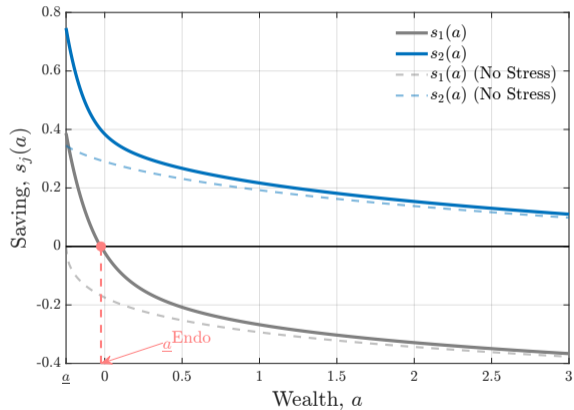
- Financial stress affects transition intensity between z_1 and z_2
 - ▶ no direct effect on earnings
 - ▶ better capture salaried workers

- Transition intensity:

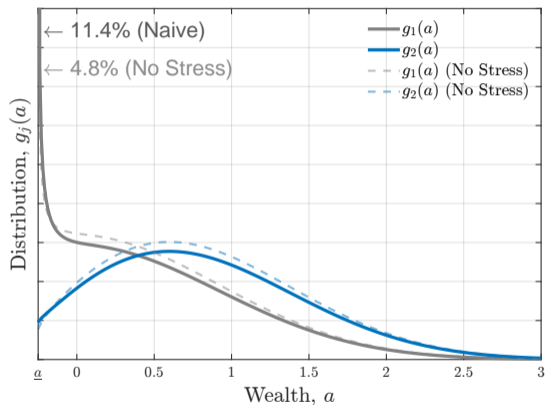
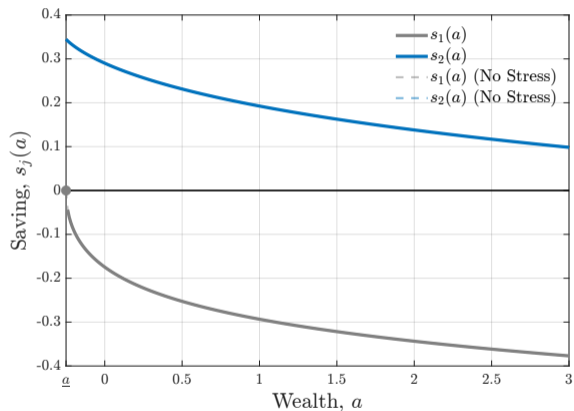
$$z_1 \rightarrow z_2 : \lambda - \bar{\lambda} e^{-\alpha(a-\underline{a})} \quad \text{and} \quad z_2 \rightarrow z_1 : \lambda + \bar{\lambda} e^{-\alpha(a-\underline{a})}$$

- Calibration
 - ▶ α and λ are the same as the main calibration
 - ▶ $\frac{\bar{\lambda}}{\lambda} = \bar{\Theta}$ (max impact on transition intensity similar to max impact on productive labor supply)

Stress Affects Transition Intensity: Sophistication main

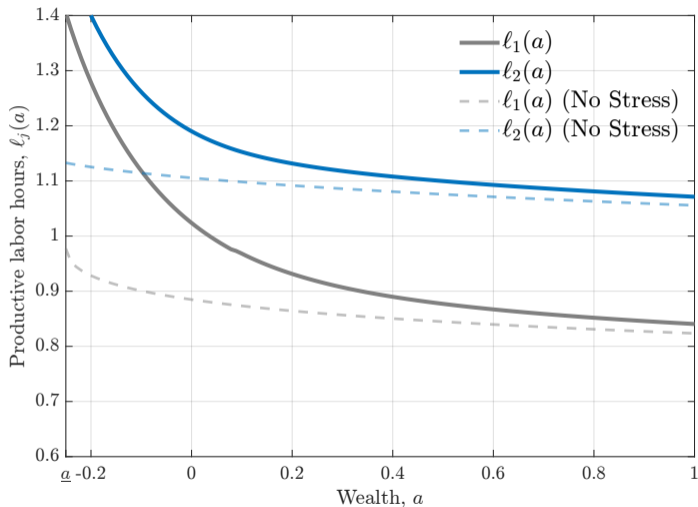


Stress Affects Transition Intensity: Naivete main



- No direct effect on labor earnings/saving, but similar stationary wealth distribution

Wealth Effect of Labor Supply (Sophistication) main



The Financial Stress Channel of Fiscal Stimulus main

Positive effect on labor supply \implies A new **transmission mechanism for fiscal policy**

- **Lump-sum transfers are expansionary**
 - ▶ Relieves financial stress & **increases labor supply** & boosts aggregate output

Biden on the stimulus check in the “American Rescue Plan Act of 2021”

- So many people need help, because (the pandemic) caused an **enormous stress**.

Popular debate about the stimulus check often centers around **relieving financial stress**.

Public Debt Reduces Financial Stress main

- Household:

$$\int_{t=0}^{+\infty} e^{-\rho t} \left[\frac{c_{i,t}^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi \frac{(\Theta(a_{i,t}) + \ell_{i,t})^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}} \right] dt \quad \text{s.t.} \quad \dot{a}_{i,t} = r_t a_{i,t} - c_{i,t} + T_t + w z_{i,t} \ell_{i,t} \quad \text{and} \quad a_{i,t} \geq \underline{a}$$

- Government & production, market clearing:

$$\dot{b}_t = r_t b_t + T_t, \quad \int c_{i,t} di = y_t = \int \ell_{i,t} di, \quad b_t = \int a_{i,t}.$$

- Fiscal stimulus/public debt b_t provides liquidity and reduces financial stress**

The Financial Stress Channel of Fiscal Stimulus main

- Same calibration as above
- A increase of steady state public debt by 40% of GDP (similar to COVID)
⇒ **boost aggregate output by 1.14%**
- Note that this is purely from the supply side (shut down AD to isolate)