The Economics of Financial Stress

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Beyond the Traditional 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 **first tractable intertemporal model** of financial stress/"scarcity" [literature: experiments]

Survey

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- A **first tractable intertemporal model** of financial stress/"scarcity" [literature: experiments]

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

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

- E.g., an average of 7 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: **first tractable intertemporal model** of financial stress/"scarcity"

- Financial stress crowds out time/cognition available for productive labor supply
- Financial stress decreases with distance to the financial constraint
- Disciplined based on our survey & [Kaur et al. (22)'s] experimental evidence

Finding 1: financial stress & naivete $\Longrightarrow$ 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

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

- **Counterfactual** model prediction: a higher wealth increases demand for leisure
- Relieving stress releases cognitive resources for productive work

Implication: wealth inequality & fiscal multipliers

Outline

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.

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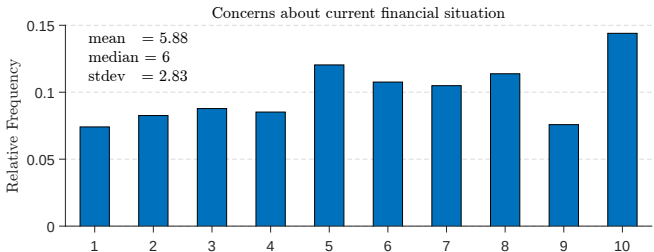
Q: On a scale from 1 to 10, how concerned are you about your current financial situation? 1 represents the lowest level of concern, and 10 represents the highest level of concern.



The Economic Consequences of Financial Stress table

Q: **Hours Worked** (mean: 39.6)

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

Q: **Hours Distracted** (mean: **6.4**)

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

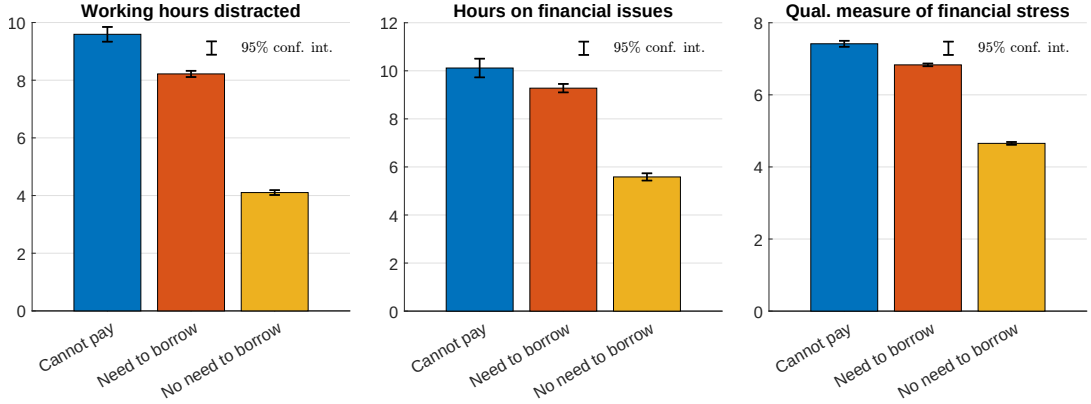
Q: **Hours Spent on Financial Issues** (mean: **7.7**, consistent with TIAA-GFLEC survey)

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** (mean: 211.2)

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**?

Financial Stress and Distance from Financial Constraints

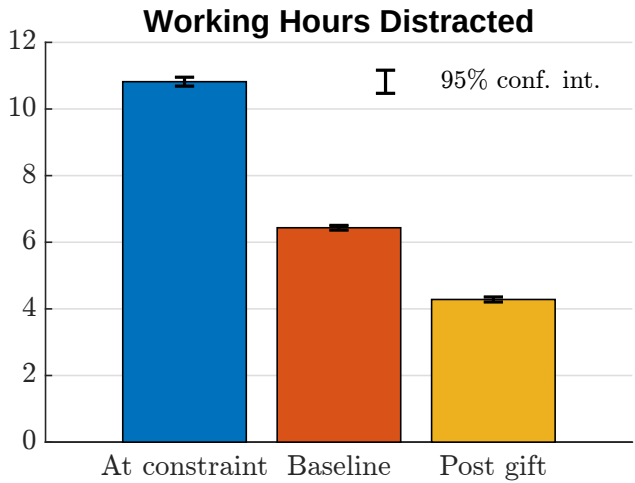
Q: **Financial Stress at Financial Constraints**

*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?*

Financial Stress and Distance from Financial Constraints



Outline

A First Intertemporal Model of Financial Stress

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

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

where a is net asset.

Financial stress $\Theta(a)$:

- **Crowds out time/cognition for productive labor** ℓ [main channel in devo]
  - 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
- Decreases in **distance from fin. constraints**
- Happens **involuntarily**, $\Theta(a)$ exogenous [but equiv. to endogenous $\Theta(a)$ choice]

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where a is net asset.

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

- Financial constraint

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

- Idiosyncratic productivity: a two-state Poisson process

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

The Sophistication Case

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

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

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

The Naivete Case

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

- **Naivete attenuates the extra saving motive**

$$-\frac{E_t\left[d\left(c_j^{-\frac{1}{\sigma}}(a)\right)\right]}{c_j^{-\frac{1}{\sigma}}(a)} = \left(r-\rho \underbrace{-\frac{1}{\sigma}\Theta(a)\frac{c_j^{'}(a)}{c_j(a)}}_{<0\text{, less net saving due to lower earning}}\right)dt$$

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

The Calibration Strategy

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

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

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

Find $\bar{\Theta}$ and α :

- Method 1: **Our Survey** (today)
  - Q: **financial stress at liquidity constraints & the slope of financial stress**

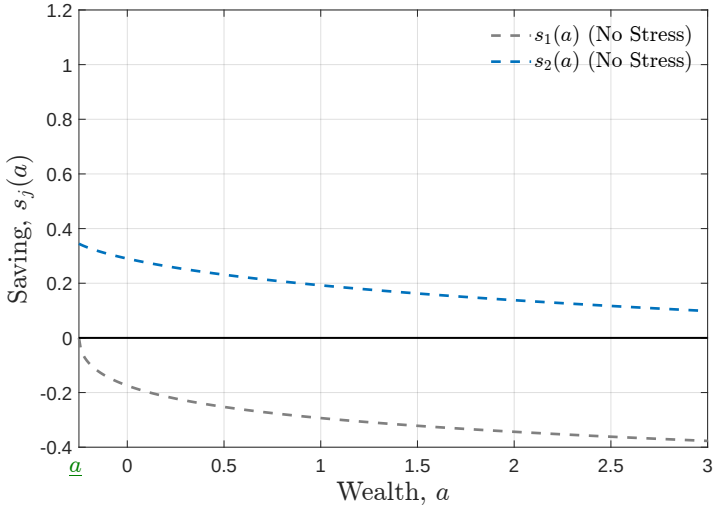
$$(\bar{\Theta}, \alpha) = (0.27, 11.9)$$

  - Net asset ($\approx$ 0.5 monthly income) halves financial stress

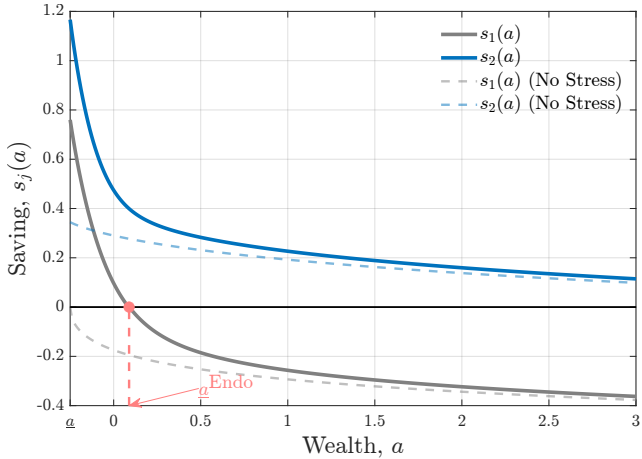
- Method 2: Kaur et al. (22) (in the paper) kaur parameters

Outline

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

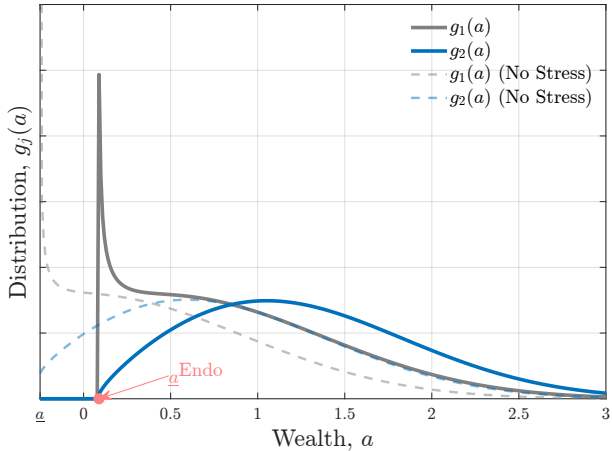


Sophistication: Extra Saving Motive (Net Flow Saving: $s = ra - c + wz\ell$)



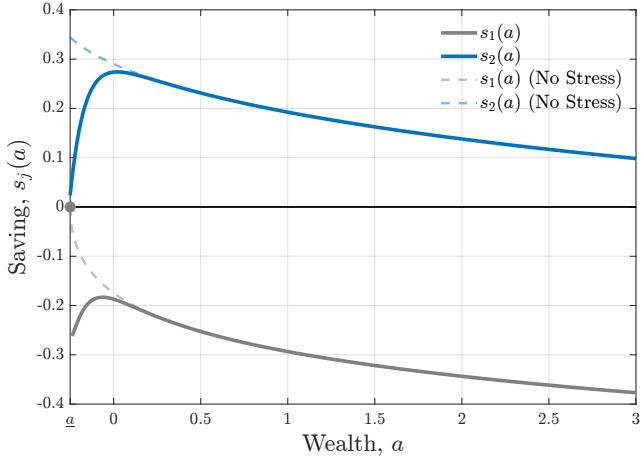
- Sophisticates have **higher net saving** despite lower earnings due to stress
- **No poverty trap:** positive net saving around the constraint $[s_j(a) > 0,\ \forall a \in [\underline{a}, \underline{a}^{\text{Endo}}]]$

Sophistication: Wealth Distribution (Exogenous r)



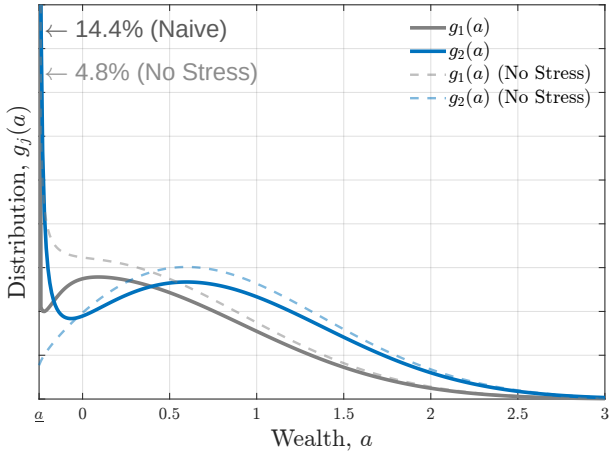
- **Sophisticates save out of financial stress**: $a \geq \underline{a}^{\text{Endo}}$ in the stationary distribution
- Inconsistent with the large number of constrained households ($\sim$10% in our data)

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**
- Consistent with the large number of constrained households ($\sim$10% in our data)

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: Kaur et al. (21) 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

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 **attenuates** counterfactual large **negative wealth effect of labor supply**

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

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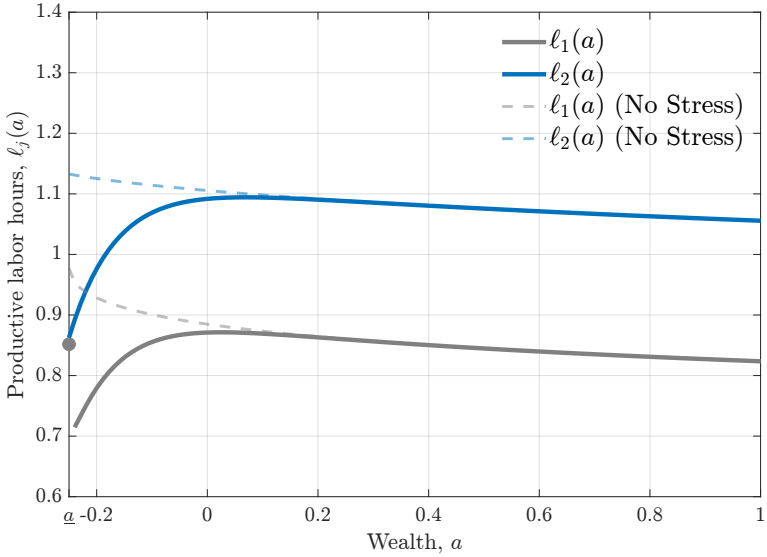
- Financial stress $\Longrightarrow$ A new **transmission mechanism for fiscal policy** fiscal
  - Fiscal transfers **relieve financial stress**, increase labor supply, and boost aggregate output.
  - Popular debate about the stimulus check often centers around reliving financial stress

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**

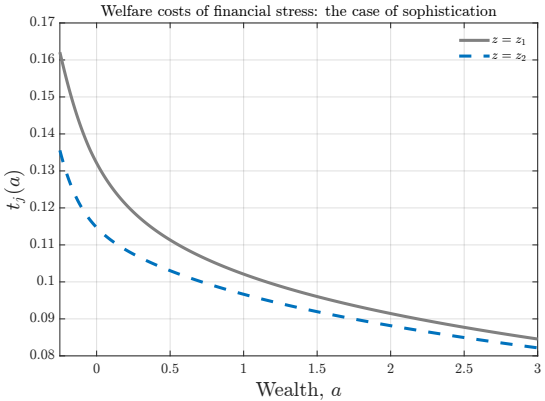
$$\omega_j(a + t_j(a)) = \omega_j^{\text{no-stress}}(a),$$

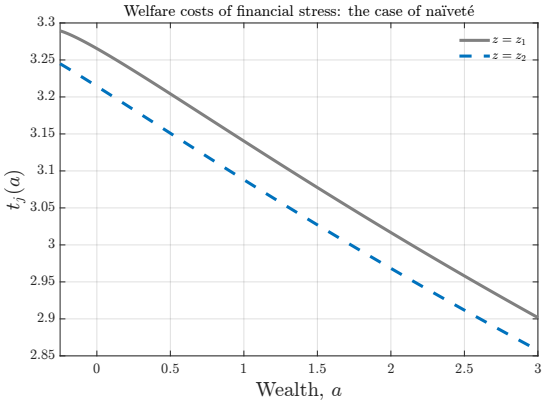
  - $t_j(a)$ is transfer needed to compensate the household for the impact of financial stress
  - $\omega_j(a)$ captures the stressed household's welfare

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

  - $\omega_j^{\text{no-stress}}(a)$ captures the no-stress household's welfare

Welfare Costs of Financial Stress: Sophistication vs Naivete





Conclusion

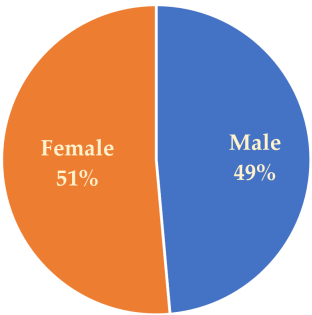
- **This paper**: bring **financial stress** into **household finance and macro**
  - survey evidence on the prevalence of financial stress in US households
  - a first tractable intertemporal model of financial stress/"scarcity"

- **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

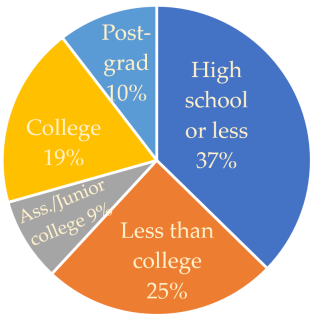
Outline

Demographics main

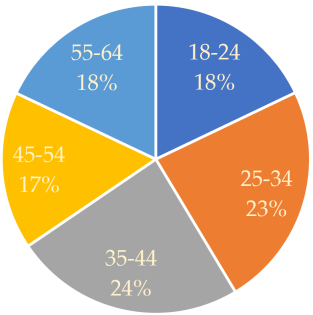
Gender



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

Financial Stress and Measures of Financial Constraints main

	(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 owner	✓	✓	✓
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.

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

Other Parameters main

Parameters	Justifications
ρ	avg a/avg $y = 0.56$, Kaplan-Violante (22) in the naive financial stress case
$\sigma = 1$	Kaplan-Violante (22)
$\underline{a} = -1/4$	Kaplan-Moll-Violante (18)
$r = 0.01$	Kaplan-Violante (22)
$v = 1$	Guerrieri-Lorenzoni (17)
$(\lambda, z_1, z_2) = (0.57, 0.87, 1.13)$	two state version of Guerrieri-Lorenzoni (17)
w, φ	Normalize average income & labor hours to 1 in the naive financial stress case

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.

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

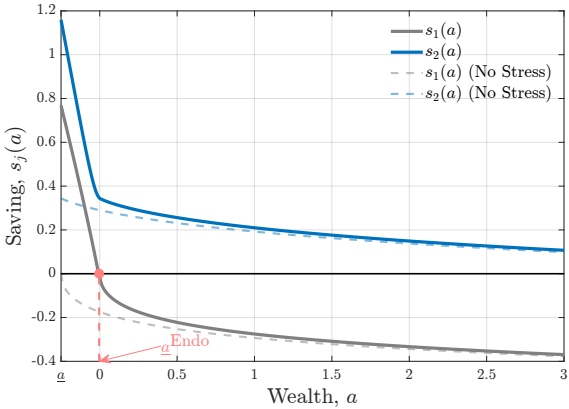
in the main analysis.

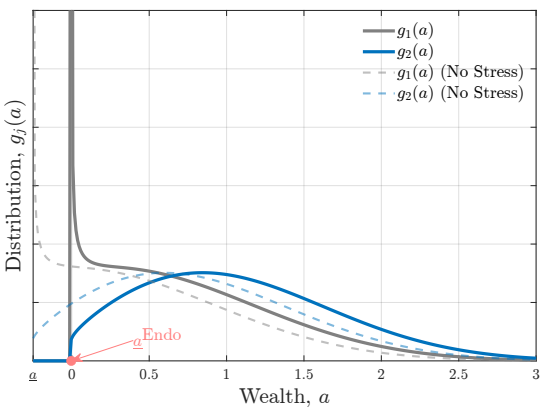
- **Our survey**, full sample
  - Q: **financial stress at liquidity constraints & the slope of financial stress**

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

Alternative Functional Forms of Stress Function: Sophistication

main





Alternative Functional Forms of Stress Function: Naivete

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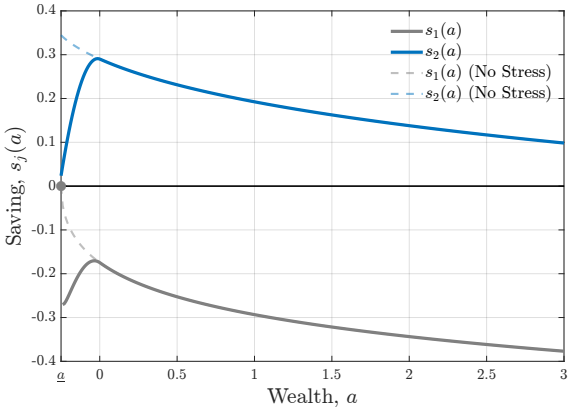
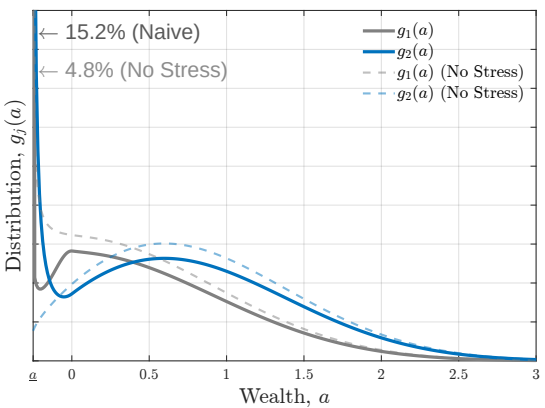




Non-convex Stress Function

main

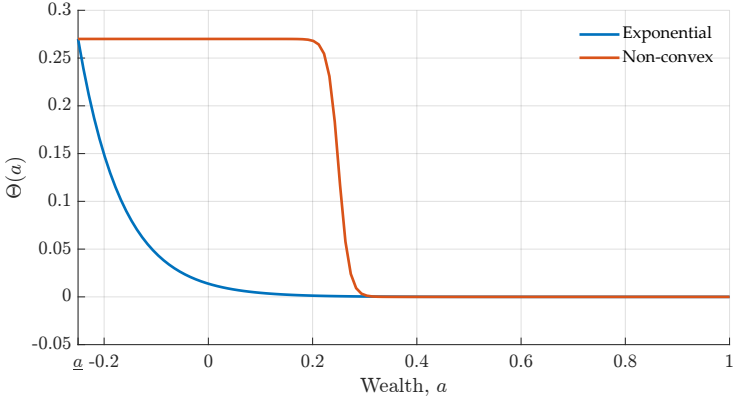


Figure: Non-convex Stress Function

Non-convex Stress Function

main

The stress function

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

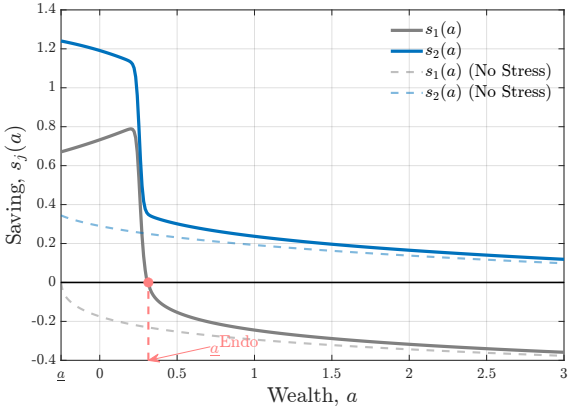
- $F(\cdot)$ is a normalized logistic function

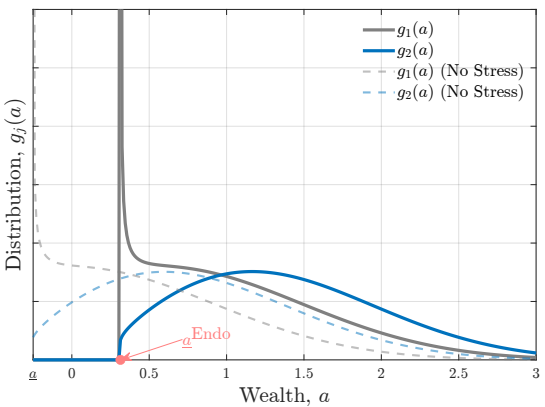
$$F(x) = \frac{\frac{1}{1+e^{-\beta\left(x-\frac{1}{2}\right)}} - \frac{1}{1+e^{-\beta\left(0-\frac{1}{2}\right)}}}{\frac{1}{1+e^{-\beta\left(1-\frac{1}{2}\right)}} - \frac{1}{1+e^{-\beta\left(0-\frac{1}{2}\right)}}},$$

- $\overline{\Theta} = 0.27$ (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

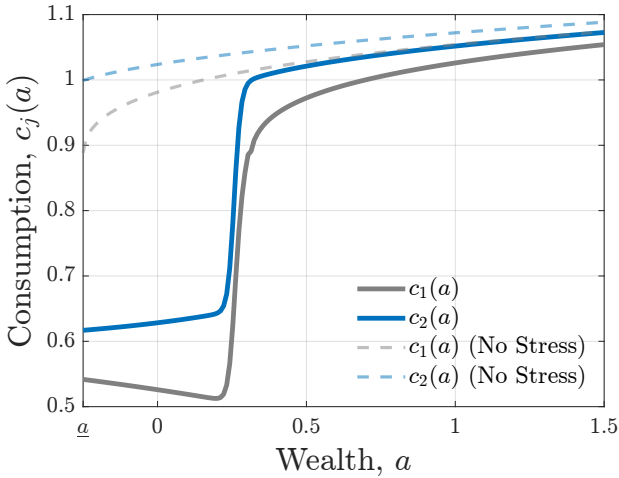
- Sophisticates **still save out of stress region even with non-convex stress function**

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

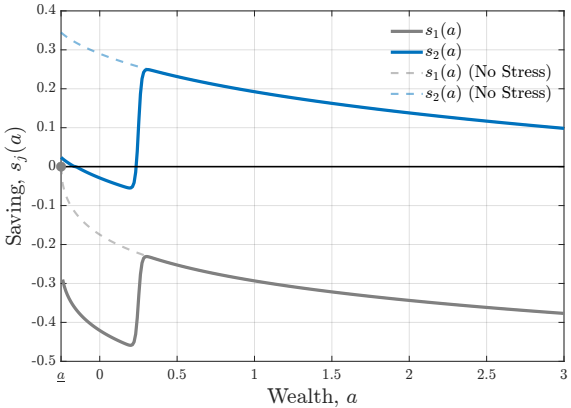
- Even if $\Theta'(a)$ is close to 0 around $\underline{a}$, $\Theta'(a)$ is large at the point $\Theta(a)$ is steep (a^{sleep})
  $\Longrightarrow$ $c(a)$ increases a lot at a^{sleep}
  $\Longrightarrow$ $c(a)$ is very small at around $\underline{a}$ & strong extra saving motive

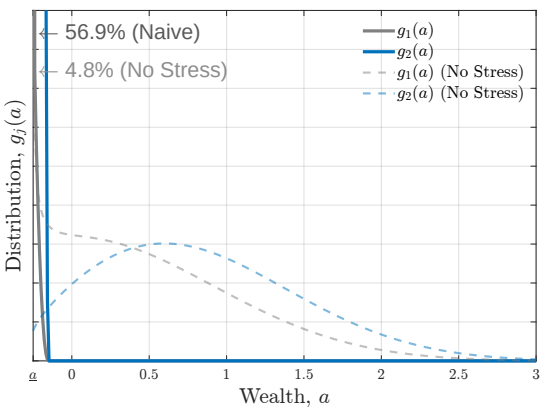
- Poverty trap with sophistication?
  - Galor-Zeira: non-continuous saving technology (human capital investment)
  - Stress affects quality of financial decisions $r(a)$ (may dominate the extra saving motive)

Non-convex Stress Function: Sophistication main



Non-convex Stress Function: Naivete main





Multiplicative Productivity Loss main

- Utility (ℓ captures productive work)

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

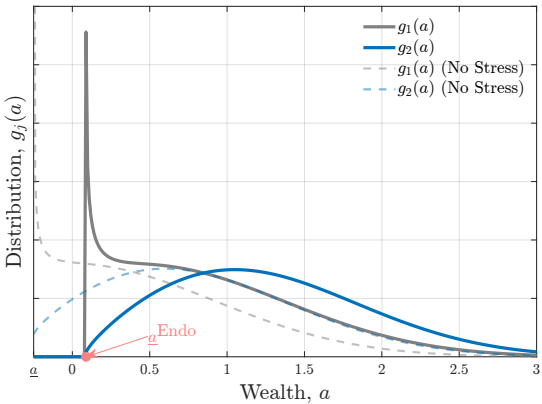
- Budget and the borrowing constraint

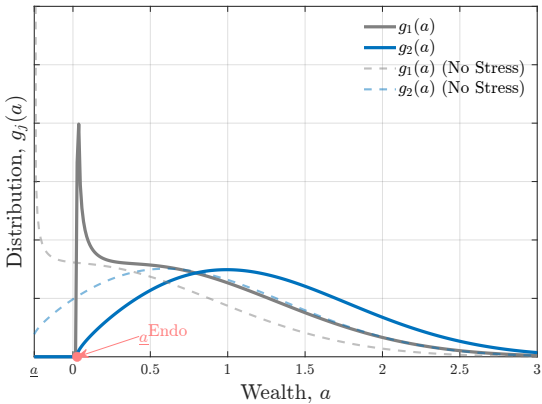
$$\dot{a}=ra-c+wz[1-\Theta(a)]\ell \quad \& \quad a\geq\underline{a},$$

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

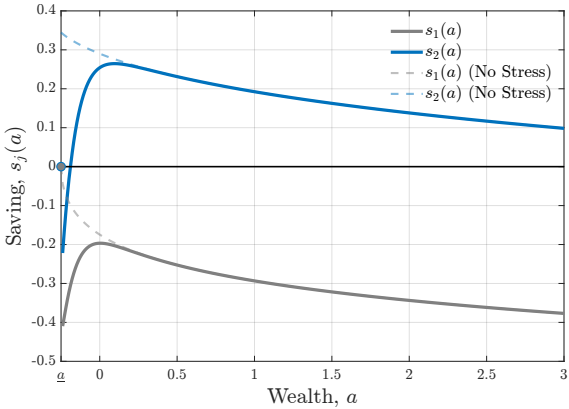
- Impact of financial stress takes the form of a multiplicative productivity loss

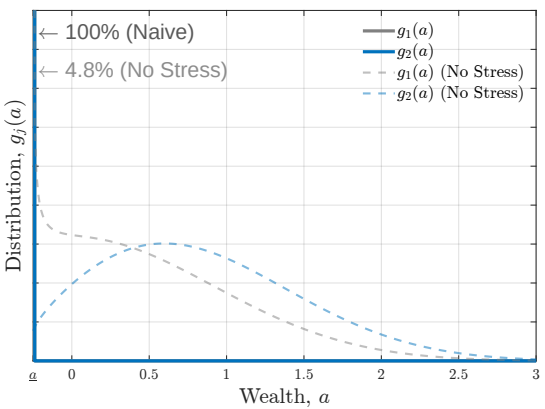
Multiplicative Productivity Loss: Sophistication





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

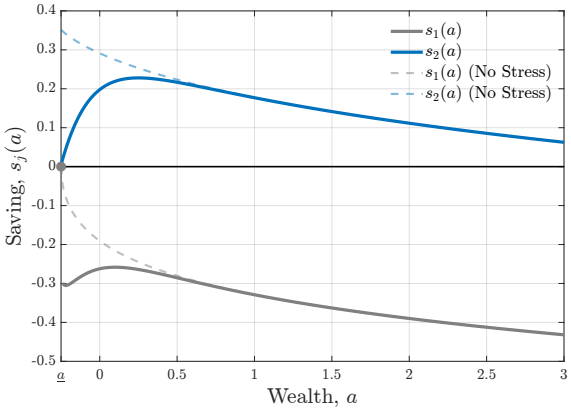
Alternative Calibration: Kaur et al. (21) main

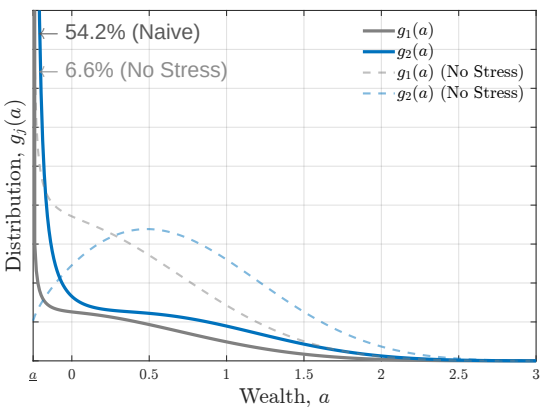
- Calibrate ρ (in the naive financial stress case) to match
  - **fraction** of households (64.5%) **who can't come up with 1000 Rs.** of emergency fund (Kaur et al., 22)

- 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%

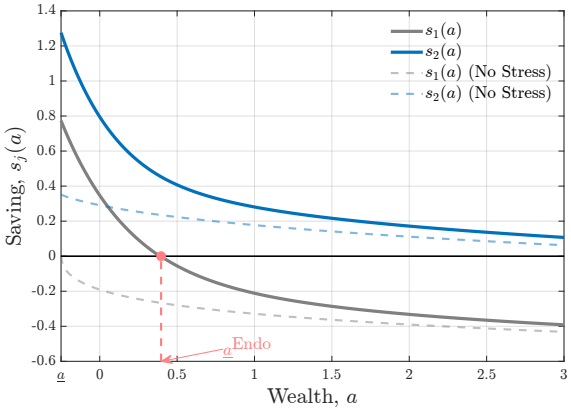
- Normalize by the average household income (16871.6 Rs.) of workers with characteristics similar to those in Kaur et al. (22) in Indian Sample Survey (77th round)

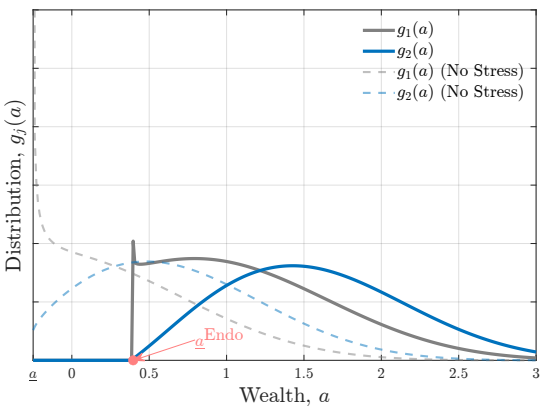
Alternative Calibration: Kaur et al. (21) main





Alternative Calibration: Kaur et al. (21) main





Different Disutility from Labor than from Financial Stress main

- Utility (ℓ captures productive work)

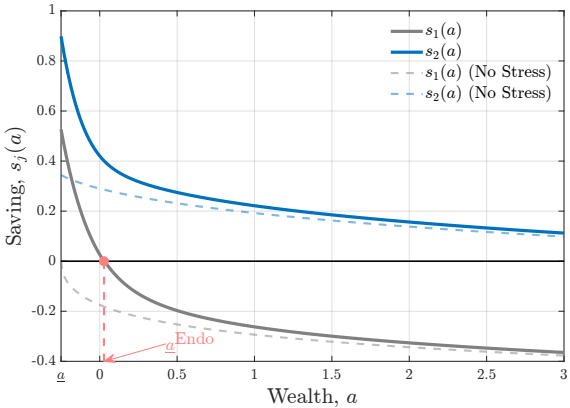
$$u(c,\ell;\Theta(a)) = \frac{c^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \varphi\frac{(\ell+\chi\cdot\Theta(a))^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}}$$

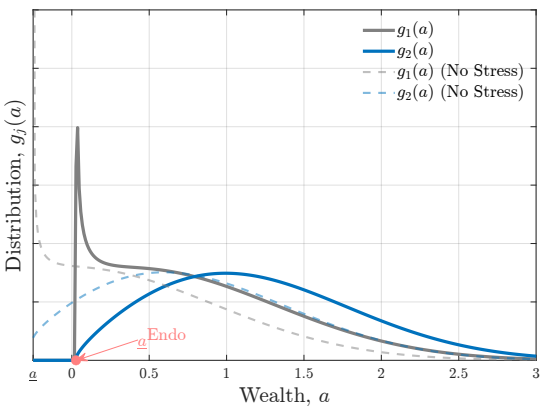
- Budget and the borrowing constraint

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

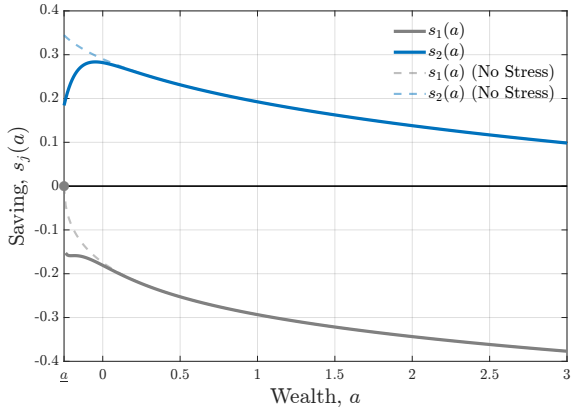
- As an illustration: $\chi = 0.5$

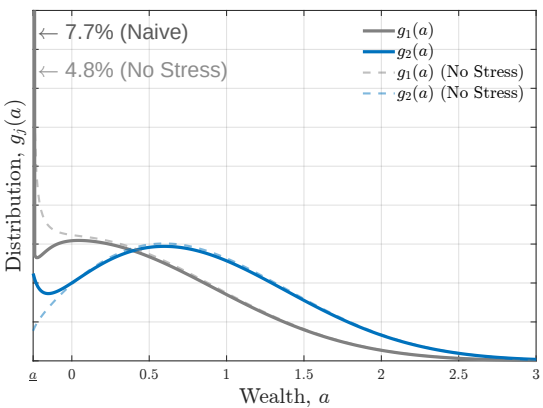
Different Disutility from Labor than from Financial Stress: Sophistication





Different Disutility from Labor than from Financial Stress: Naivete





Stressed Spending main

- Utility

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

- Budget

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

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

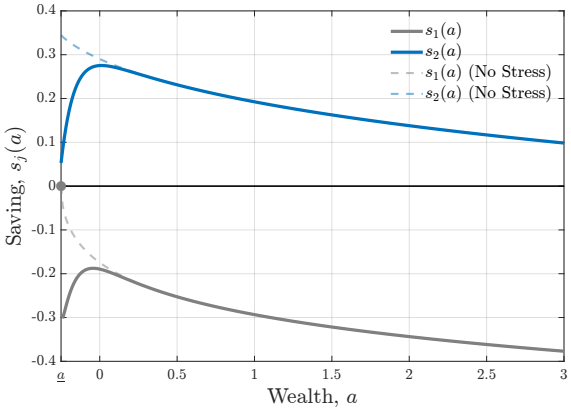
- Calibration

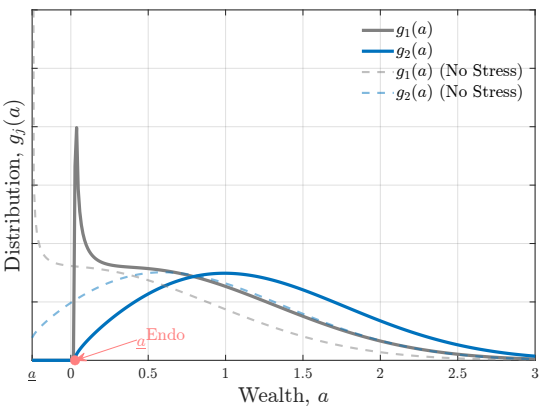
$$C^{\Theta}(a) = \bar{C}e^{-\alpha(a-\underline{a})}$$

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

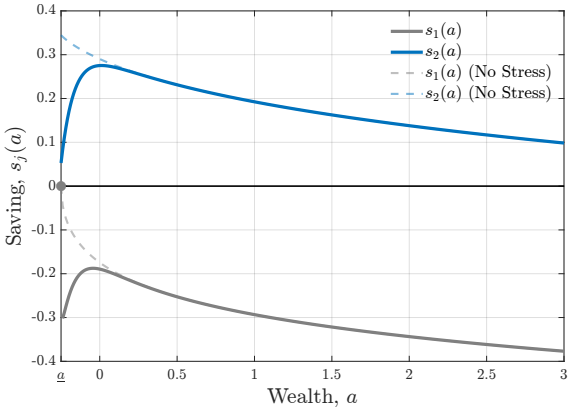
$$\frac{\bar{C}}{avg(C)|_{data}} = \frac{\bar{\Theta}}{avg(\Theta)|_{data}}$$

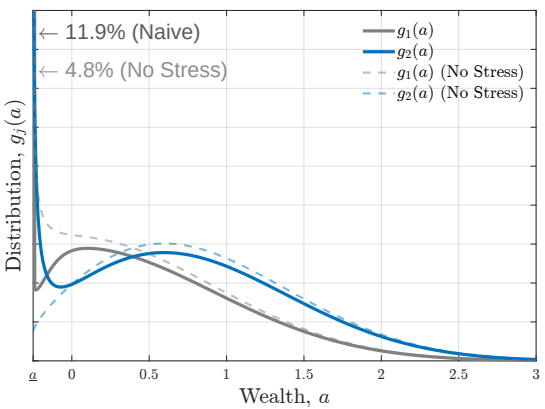
Stressed Spending : Sophistication





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

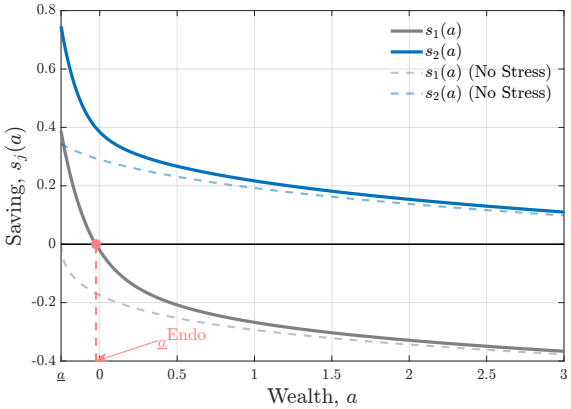
- Transition intensity:

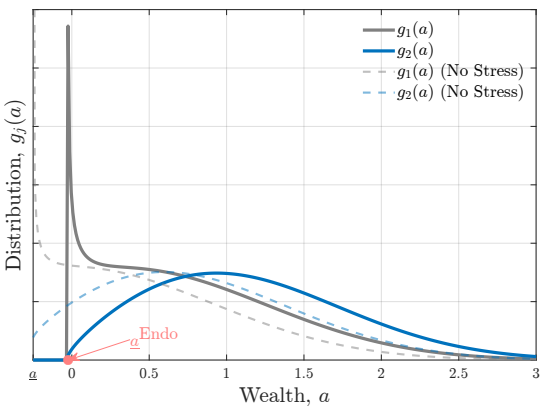
$$z_1 \to z_2 : \lambda - \bar{\lambda} e^{-\alpha(a-\underline{a})} \quad \text{and} \quad z_2 \to z_1 : \lambda + \bar{\lambda} e^{-\alpha(a-\underline{a})}$$

- 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

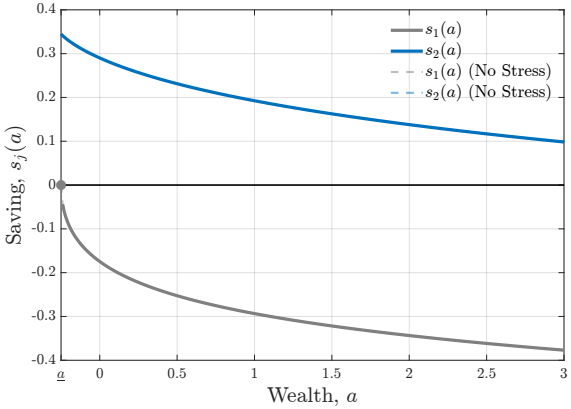
main

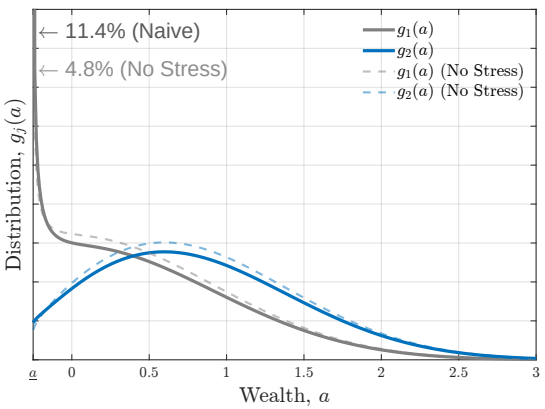




Stress Affects Transition Intensity: Naivete

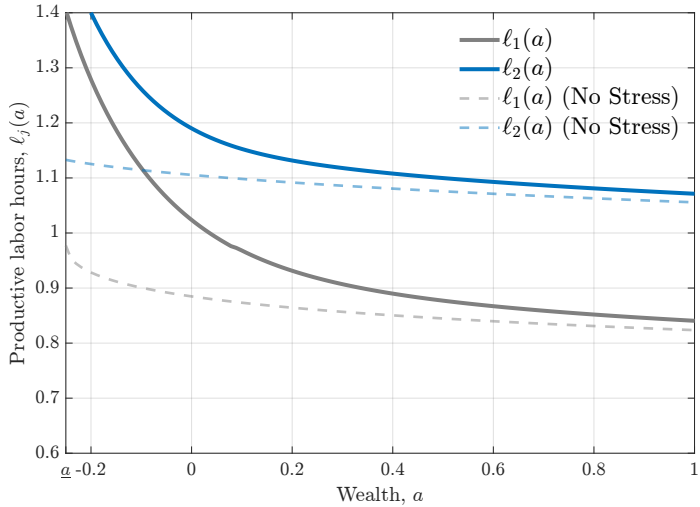
main





- 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

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**.

Positive effect on labor supply $\Longrightarrow$ **lump-sum transfers are expansionary**

- Relieves financial stress & **increases labor supply** & boosts aggregate output
- Breaks the Ricardian Equivalence, because **public debt provides private liquidity**
  - financial stress depends on liquid asset instead of permanent income