

# The Economics of Financial Stress

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# 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
- Behavioral: drain scarce cognitive resources & performance at economic tasks deteriorates [scarcity by Mullainathan & Shafir; Haushofer & Fehr; etc. ]

# Survey

## Our contribution:

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

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**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

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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 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

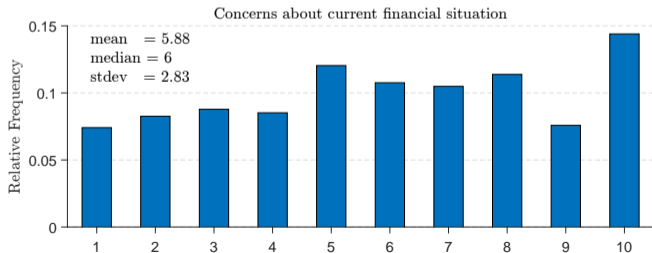
## Our Survey sample

- 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.

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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 Distracted** (75% of the sample, median: **5**)

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

- Scarcity literature: financial stress drains valuable time & cognition from productive work  
[Kaur et al., 22; Banerjee et al., 20]
- 37% of US adults reported that when they are stressed, they can't bring themselves to do anything (APA, 2022).

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Q: **Hours Spent on Financial Issues** (25% of the sample, median: **6**)

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

- Consistent with Lusardi's TIAA-GFLEC survey

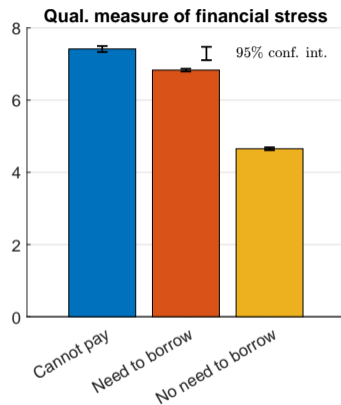
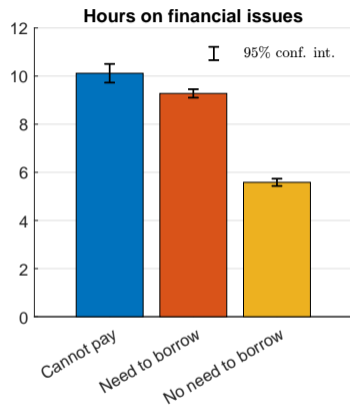
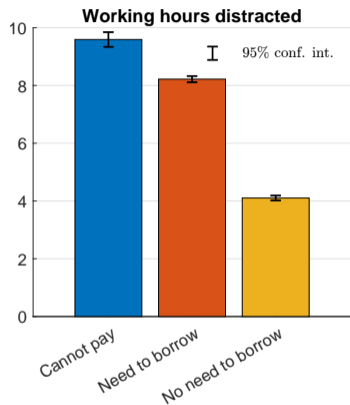
## The Economic Consequences of Financial Stress table

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?*

- Credit Karma/CNBC: 52% of respondents have impulsively shopped to help deal with feeling anxious or stressed out.

## 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?**

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# 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

Compared to classical theories of poverty trap (e.g., Dasgupta & Ray, 86, 87)

- Introduce **endogenous saving choice** & show that it's crucial

## A First Intertemporal Model of Financial Stress extensions

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

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

- Financial stress  $\Theta(a)$  **crowds out time/cognition** available for productive labor  $\ell$ 
  - ▶ Decreases in net asset  $a$
  - ▶ Happens **involuntarily**,  $\Theta(\cdot)$  exogenous [but equiv. to endogenous  $\Theta(a)$  choice]
  - ▶ Functional form unimportant [e.g., multiplicative productivity loss]

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  - ▶ Functional form unimportant [e.g., multiplicative productivity loss]
- 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
- Allow multiple alternative channels of financial stress in extensions  
[e.g., impulse spending, prob. of being promoted and demoted (salaried worker), quality of decisions]

## A First Intertemporal Model of Financial Stress extensions

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

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

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

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

## The Sophistication Case math

- **Sophisticates**: understand that future stress lowers future productive labor & earnings

$$c_j^{-\frac{1}{\sigma}}(a) = v_j'(a), \quad v_j(a) \text{ incorporates impact of future stress.}$$

- Sophisticates have strong incentives to **save out of financial stress**

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

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

# The Naivete Case

- **Naivete**: Consumption/saving as if no future **no-stress** [akin to present-bias naifs]

$$c_j^{-\frac{1}{\sigma}}(a) = (v_j^{\text{no-stress}})'(a)$$

- 1 do not understand that higher saving leads to lower future stress
- 2 do not understand that stress crowds out future productive labor & earning

- **Naifs do not have the extra saving motive**

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

- Financial stress + naivete  $\implies$  **lower net saving & poverty trap**
  - ▶ current stress crowds out current cognition/time, lowering current  $\ell_j(a)$  & earnings

## 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  $\alpha$  :

- 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 ( $\approx 0.5$  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

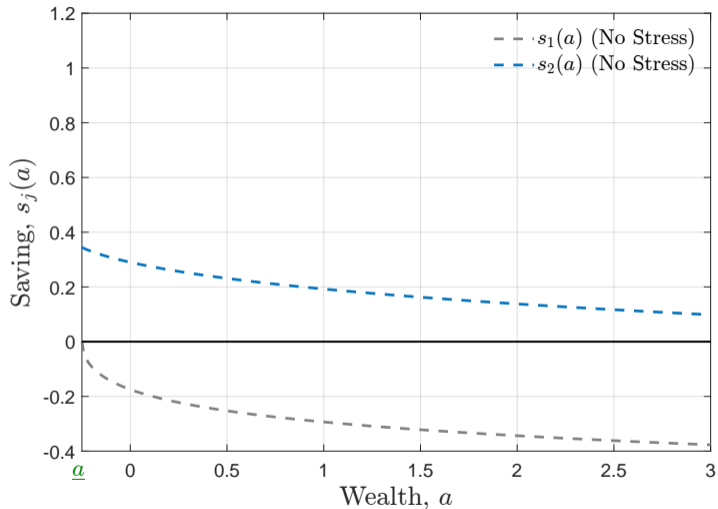
## Other Parameters

Parameters	Justifications
$\rho = 0.0131$	match avg $a/\text{avg } y = 0.56$ (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)
$w, \theta$	normalize average income and total labor hours to 1 in the naivete about financial stress case

# Outline

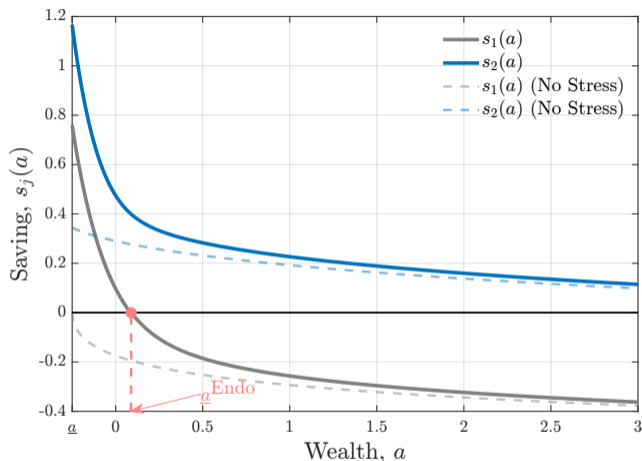
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## Frictionless Case (Net Flow Saving: $s = ra - c + wz\ell$ )



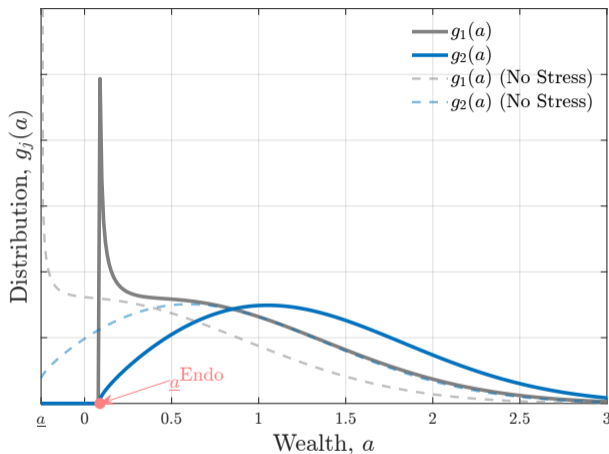
- **Permanent income hypothesis:** temporarily high-income  $\implies$  save ( $s_2 > 0$ )
  - ▶ temporarily low-income  $\implies$  dis-save ( $s_1 < 0$ )

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



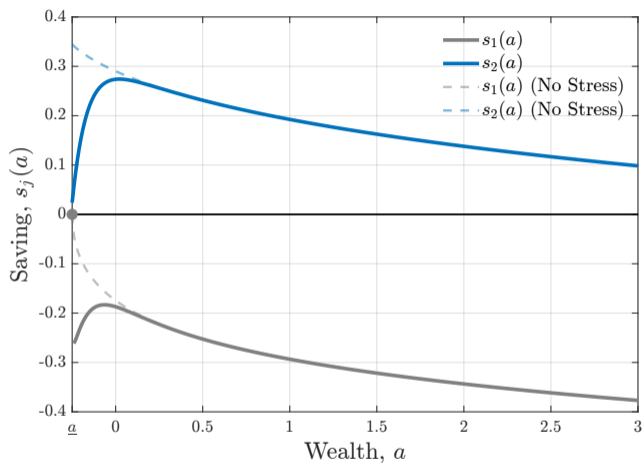
- Sophisticates have **higher net saving** despite lower earnings due to stress
- **No poverty trap**: positive net saving around the constraint  $[s_j(a) > 0, \forall a \in [\underline{a}, \underline{a}^{\text{Endo}}]]$

## Sophistication: Wealth Distribution (Exogenous $r$ )



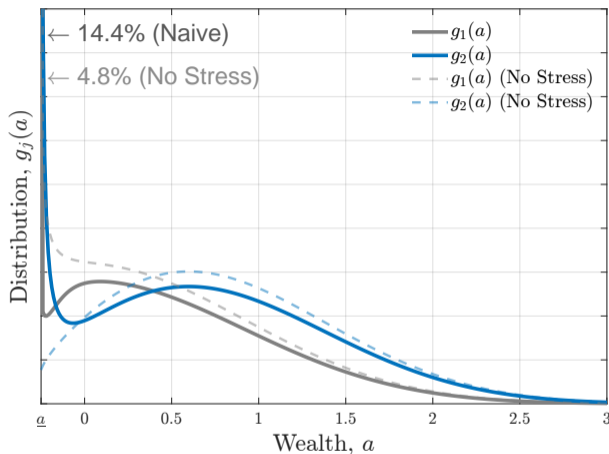
- **Sophisticates save out of financial stress:**  $a \geq \underline{a}^{\text{Endo}}$  in the stationary distribution
- Inconsistent with the large number of constrained households ( $\sim 10\%$  in our data)

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



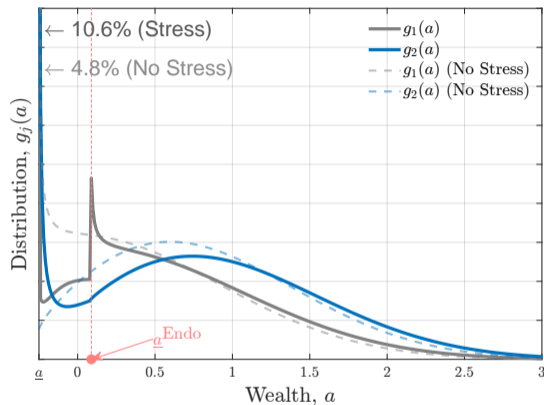
- Naifs have **lower net saving** because of lower earnings due to stress
- **Poverty trap**: negative net saving  $s_1(a) < 0$  for all  $a$

## 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**  $\varphi = 26\% \sim 32\%$  mixture
  - ▶ Still large number of constrained and stressed households (**naive** ones)

## Robustness Checks in the Paper: Sophistication vs Naivete

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

- Alternative calibrations **cross** **kaur**
- **Multiplicative** productivity loss:  $w(1 - \Theta(a_t))\ell$  **multiplicative**
- **Partially productive** during hours affected by financial stress **exchange**
- Alternative functional forms of  $\Theta(a)$  **alternative**
- Non-convex  $\Theta(a)$ , **more difficult to save out** of the financial stress region. **nonconvex**
- Different saving and borrowing rates **different**
- Alternative channels of financial stress
  - ▶ Stressed **spending** (impulsive shopping, alcohol, cigarettes, etc.)  $C^\Theta(a)$  **consumption**
  - ▶ Stress affects transitional intensity  $\lambda^\Theta(a)$  instead of current earnings (**salaried worker**) **transition**

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## 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

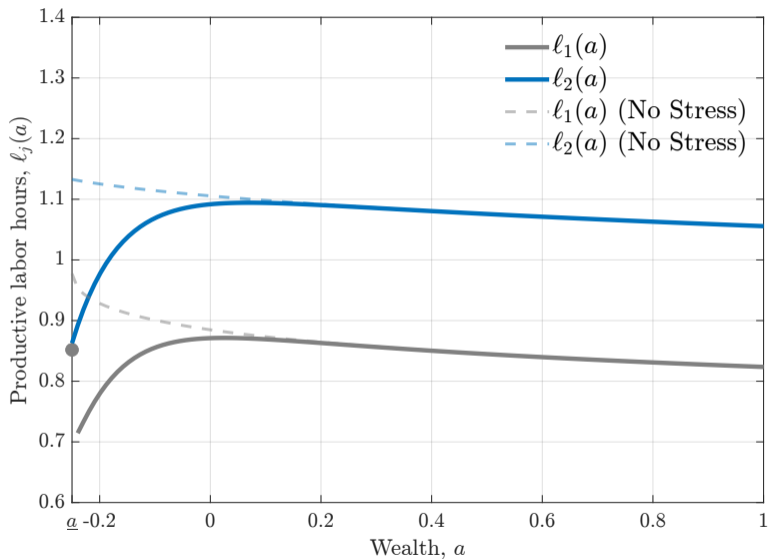
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- ▶ Relieving stress frees up time and cognitive resources for productive work
- Financial stress  $\implies$  A new **transmission mechanism for fiscal policy** fiscal
  - ▶ Fiscal transfers **relieve financial stress**, increase labor supply, and 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**

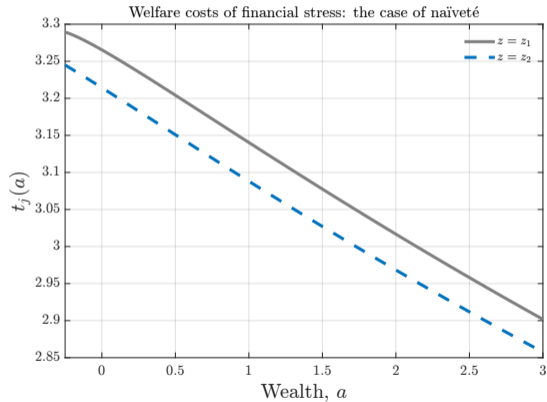
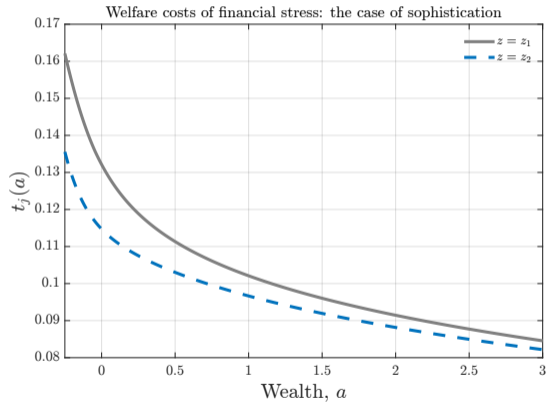
$$\omega_j(a + t_j(a)) = \omega_j^{\text{no-stress}}(a),$$

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

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

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

# Welfare Costs of Financial Stress: Sophistication vs Naivete



# Conclusion

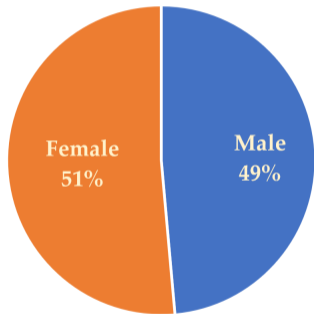
- **This paper:** bring **financial stress** into **household finance and macro**
  - ▶ survey evidence on the prevalence of financial stress in US households
  - ▶ a tractable intertemporal model of financial stress/“scarcity”
  - ▶ **link behavioral & traditional takes on financial constraints**
- **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

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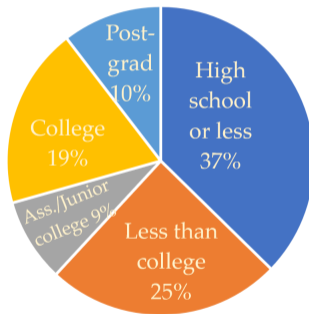
## 5 Extra Slides

# Demographics main

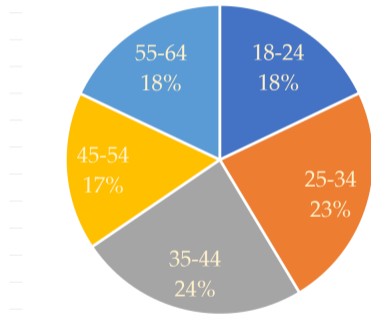
## Gender



## 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 <sup>2</sup> /100		-0.111*** (0.017)		-0.235*** (0.044)		-0.339*** (0.075)
Female		0.212*** (0.052)		0.357** (0.134)		0.515* (0.225)
Education (omitted: Some college)						
High school or less		-0.170** (0.062)		-0.003 (0.158)		0.002 (0.265)
College		-0.067 (0.076)		-0.261 (0.193)		-1.038** (0.333)
Post-graduate		0.159 (0.097)		0.292 (0.247)		-0.345 (0.422)
Married		0.131* (0.056)		0.394** (0.144)		0.158 (0.243)
Have at least one child		0.203*** (0.056)		0.697*** (0.142)		0.738** (0.241)
Have at least one parent		0.064 (0.052)		0.632*** (0.134)		0.710** (0.227)
Observations	9962	9924	7428	7369	2517	2513
R <sup>2</sup>	0.167	0.209	0.131	0.168	0.108	0.149

# 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

## The Sophistication Case main

- **Sophisticates:** understand that stress lowers future productive labor & earnings
- Standard HJB for the continuation value function  $v_j(a)$

$$\rho v_j(a) = \max_{c, \ell} \{ u(c, \ell; \Theta(a)) + (ra - c + wz_j \ell) v_j'(a) + \lambda (v_{-j}(a) - v_j(a)) \} \quad \forall j \in \{1, 2\}$$

- Optimal consumption

$$c_j^{-\frac{1}{\sigma}}(a) = (v_j)'(a) \quad \forall j \in \{1, 2\}$$

- Optimal labor supply

$$\varphi(\ell_j(a) + \Theta(a))^{\frac{1}{\nu}} = wz_j c_j^{-\frac{1}{\sigma}}(a) \quad \text{for } j \in \{1, 2\}$$

## 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.

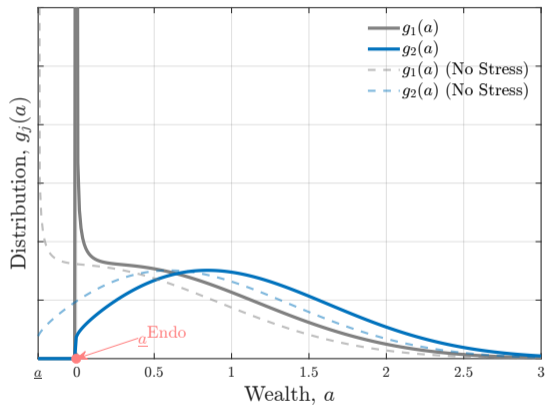
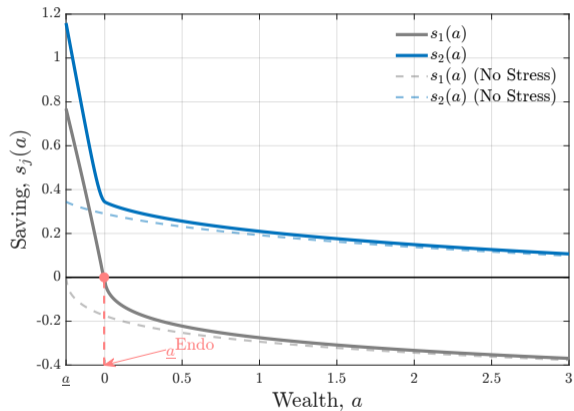
$$\log \Theta(a) = \log \bar{\Theta} - \alpha(a - \underline{a})$$

in the main analysis.

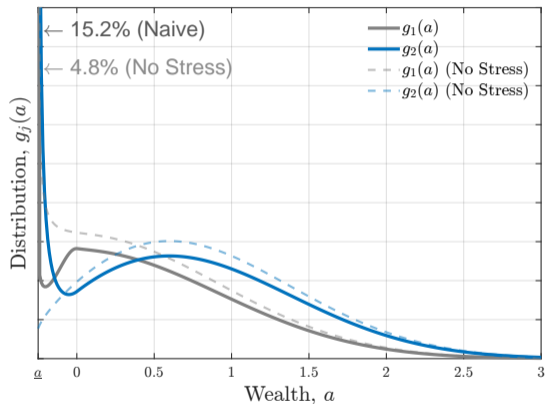
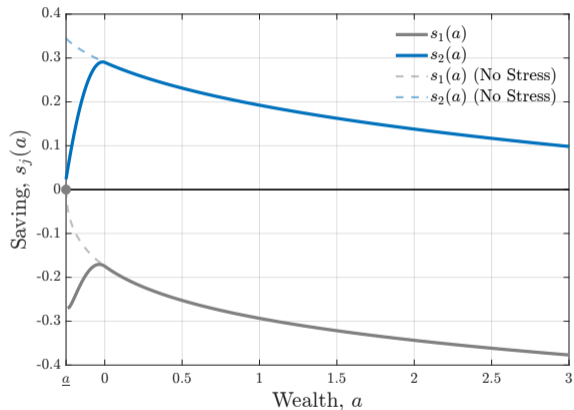
- **Our survey**, full sample
  - ▶ Q: **financial stress at liquidity constraints & the slope of financial stress**

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

# Alternative Functional Forms of Stress Function: Sophistication main



# Alternative Functional Forms of Stress Function: Naivete main



# Non-convex $\Theta(a)$ : More Difficult to Save out of Stress Region main

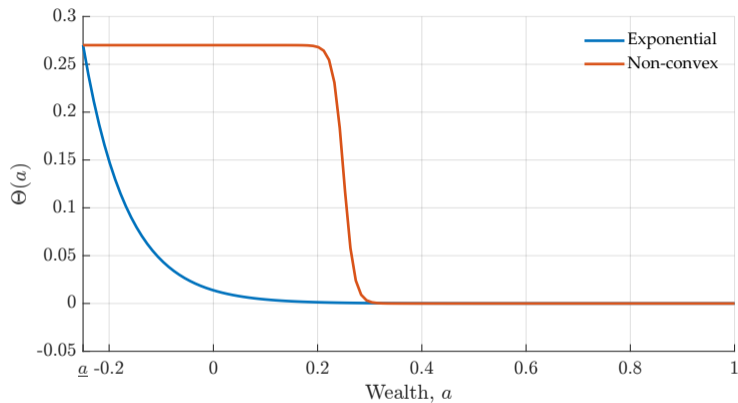


Figure: Non-convex Stress Function

## Non-convex $\Theta(a)$ : More Difficult to Save out of Stress Region main

The stress function

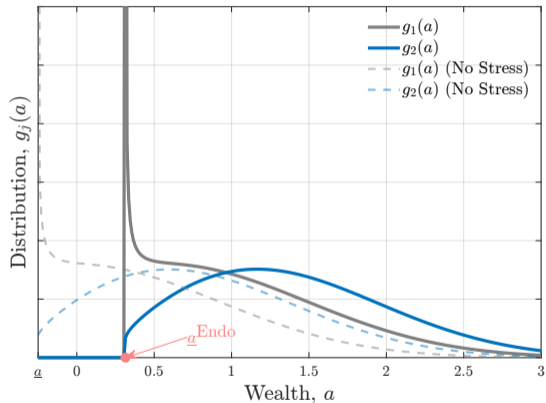
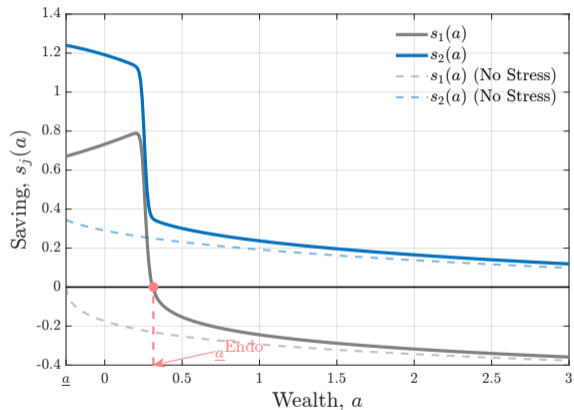
$$\Theta(a) = \begin{cases} \bar{\Theta} & \frac{a-(a+b)}{\delta} < 0, \\ F\left(1 - \frac{a-(a+b)}{\delta}\right), & \frac{a-(a+b)}{\delta} \in [0, 1), \\ 0 & \frac{a-(a+b)}{\delta} \geq 1. \end{cases}$$

- $F(\cdot)$  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 $\Theta(a)$ : Sophistication main



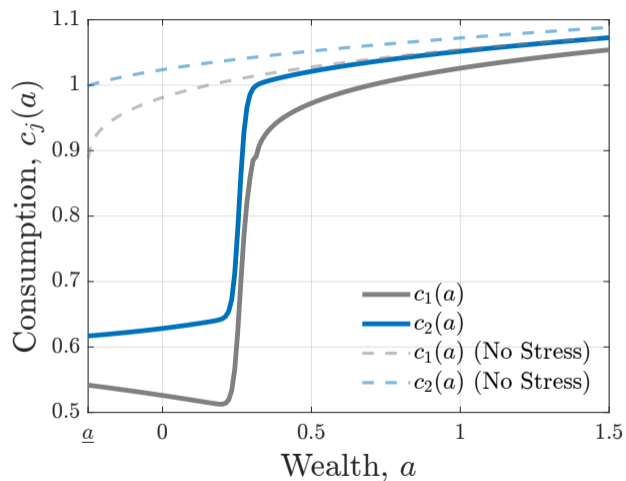
## Non-convex $\Theta(a)$ : Sophistication main

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

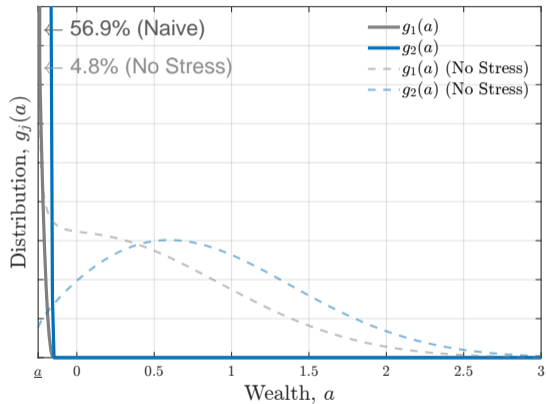
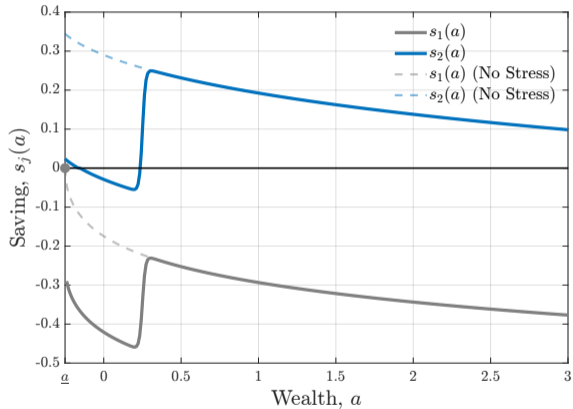
$$-\frac{E_t \left[ d \left( c_j^{-\frac{1}{\sigma}}(a) \right) \right]}{c_j^{-\frac{1}{\sigma}}(a)} = \left( r - \rho \quad \underbrace{-wz_j \Theta'(a)}_{>0, \text{ extra saving motive}} \right) dt$$

- Even if  $\Theta'(a)$  is close to 0 around  $\underline{a}$ ,  $\Theta'(a)$  is large at the point  $\Theta(a)$  is steep ( $a^{sleep}$ )
  - $\Rightarrow c(a)$  increases a lot at  $a^{sleep}$
  - $\Rightarrow c(a)$  is very small at around  $\underline{a}$  & strong extra saving motive
- Poverty trap with sophistication?
  - ▶ Galor-Zeira: **indivisibility** in saving technology (discrete human capital investment)
  - ▶ Acemoglu: not robust to income uncertainty

## Non-convex $\Theta(a)$ : Sophistication main



# Non-convex $\Theta(a)$ : Naivete main



## Multiplicative Productivity Loss main

- Utility ( $\ell$  captures productive work)

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

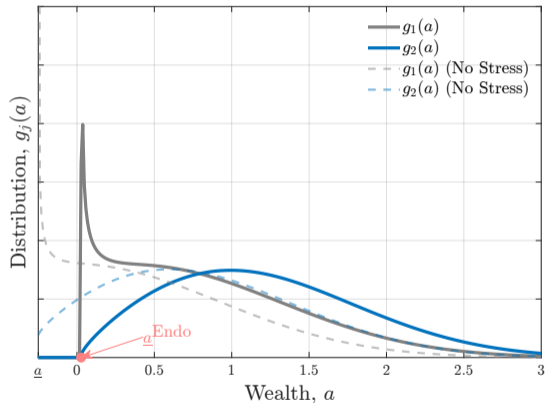
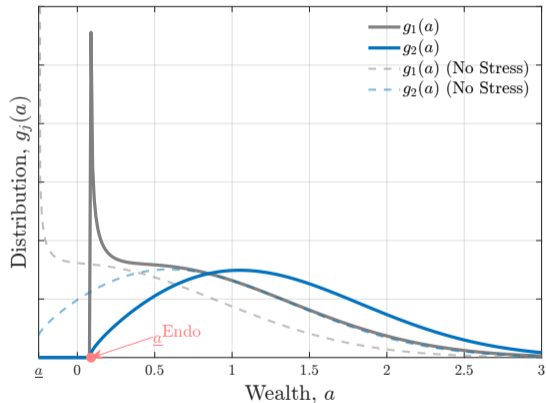
- Budget and the borrowing constraint

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

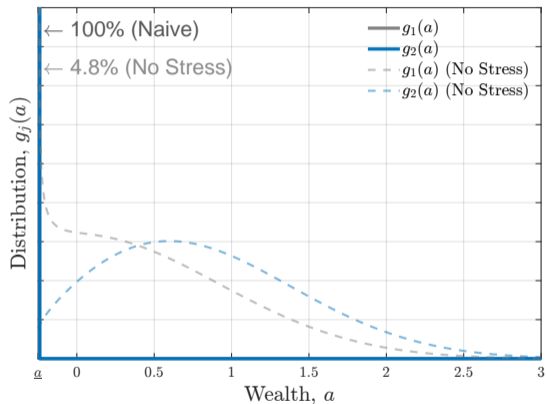
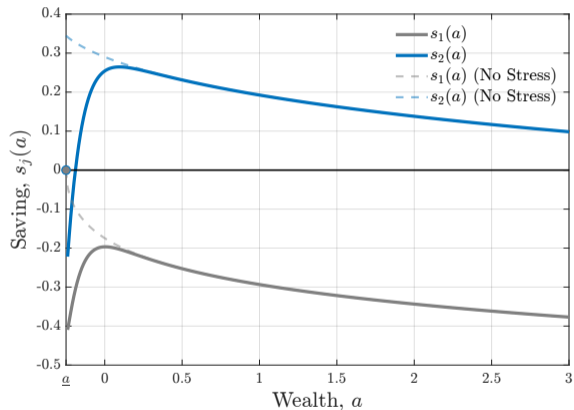
where  $\Theta(a) = \bar{\Theta}e^{-\alpha(a-\underline{a})}$  is the same as the main text

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

# Multiplicative Productivity Loss: Sophistication main



# Multiplicative Productivity Loss: Naivete main



## Multiplicative Productivity Loss: Naivete main

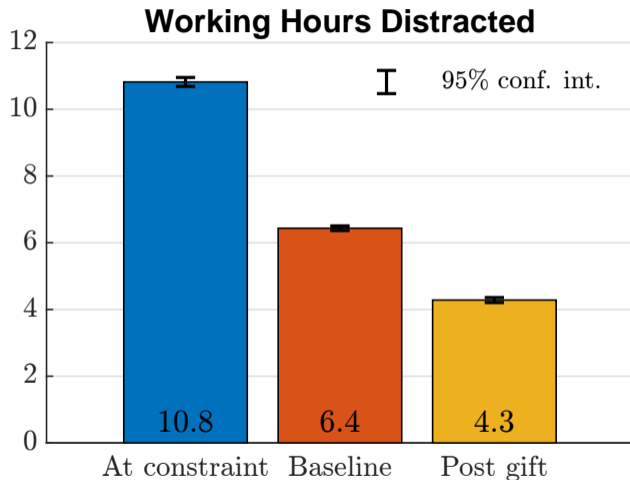
- Why 100% at constraints for the naivete case?
- Multiplicative productivity loss further decreases incentives to work
  - ▶ even **net saving for the high income**  $s_2(a) < 0$  in the neighborhood of  $\underline{a}$
- Full poverty trap

### 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?*

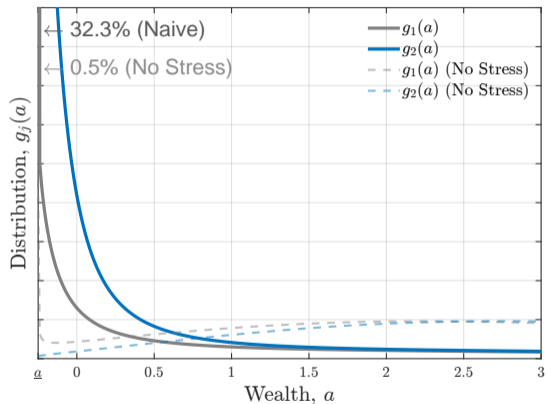
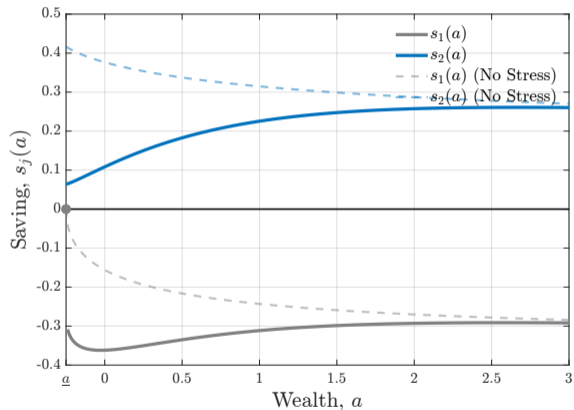


## Alternative Calibration: Between-subject Variation main

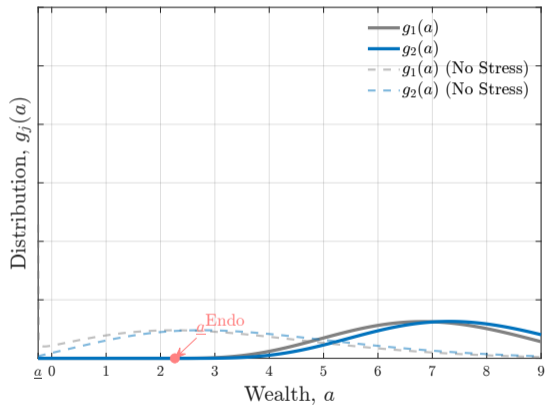
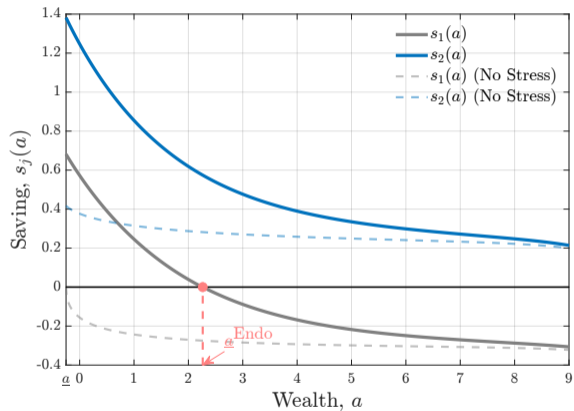
$$\Theta(a) = \bar{\Theta} e^{-\alpha(a-\underline{a})}$$

- 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



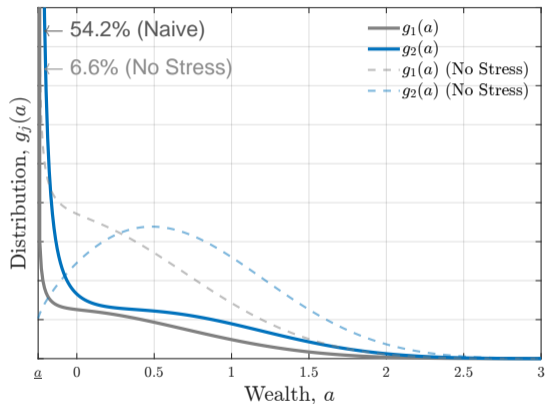
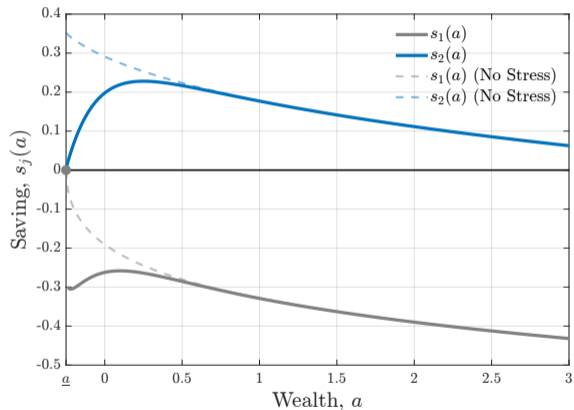
# Alternative Calibration: Between-subject Variation main



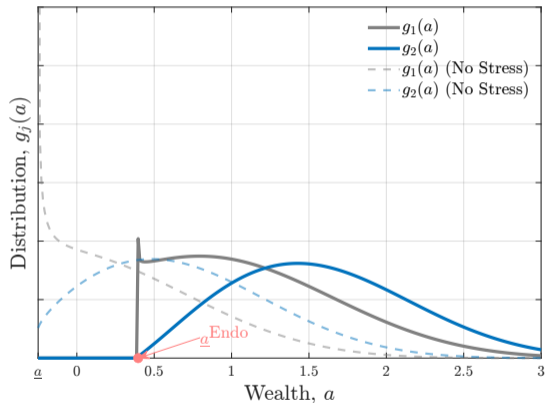
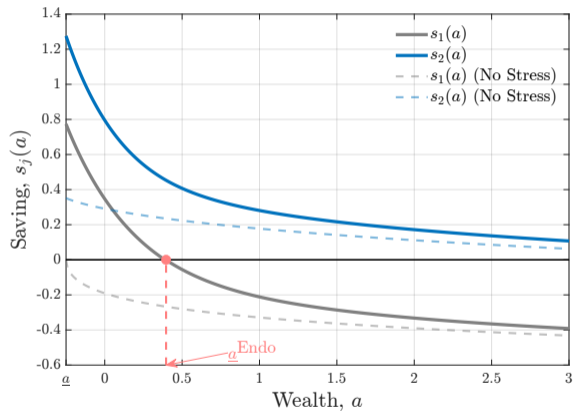
## Alternative Calibration: Kaur et al. (21) main

- Calibrate  $\rho$  (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

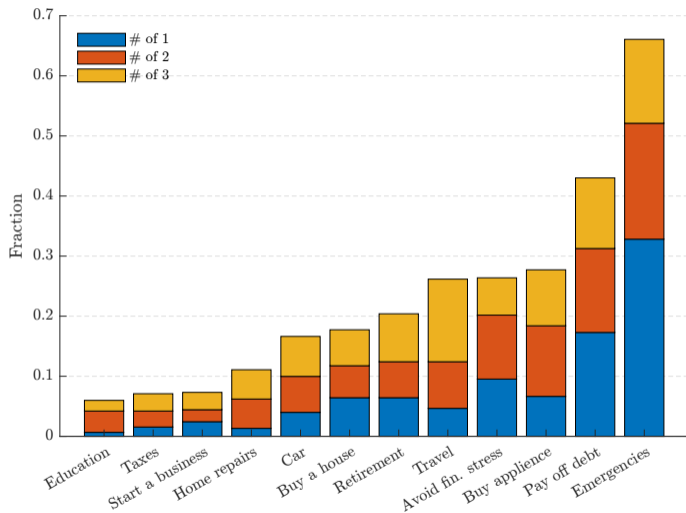
- A follow up survey run in April 2023 on Prolific
  - ▶ targeting **1,000** prime-age, employed US workers
- **Representative** of the general population in terms of total household income
- Borrow the “reasons” for saving question from the Making Ends Meet Survey from CFPB
  - ▶ introduce a financial stress option
  - ▶ sophisticates: relieve financial stress to maintain focus at work is **a top 3 saving reasons**
  - ▶ **proportion of sophisticated household**  $\varphi = 26\%$
- Alternative:  $\varphi = 32\%$ , if matching % of households at constraints (“cannot pay”, 9.8%)

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



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

- Utility ( $l$  captures productive work)

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

- Budget and the borrowing constraint

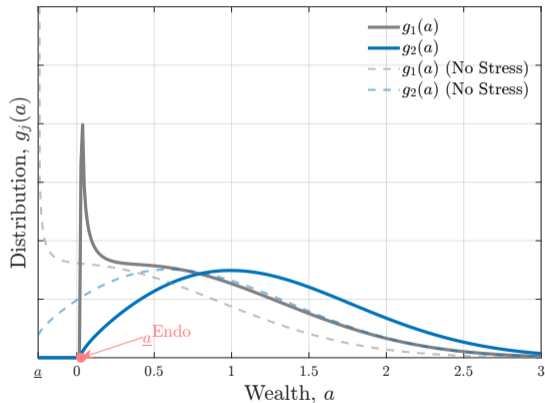
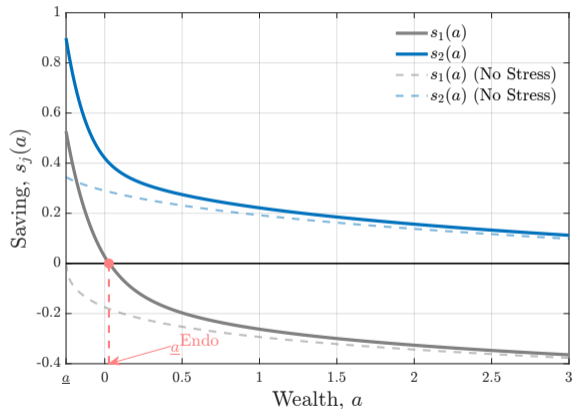
$$\dot{a} = ra - c + wz(l + \chi\Theta(a)) \quad \& \quad a \geq \underline{a},$$

where  $\chi$  is the productivity during **stressed hours**, with the baseline  $\chi = 0$ .

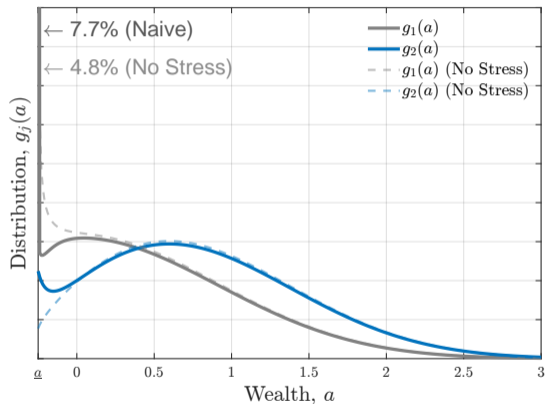
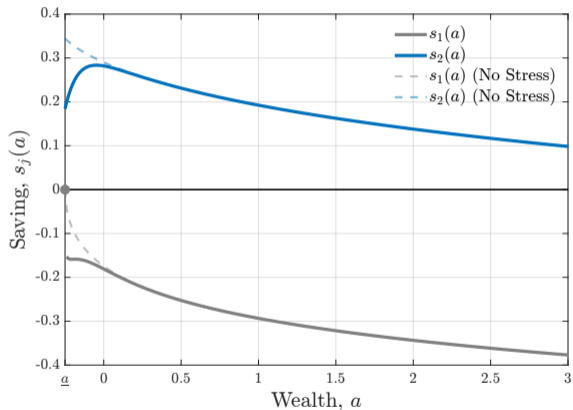
- Here:  $\chi = 0.5$

# Partially Productive during Hours affected by Financial Stress: Sophistication

main



# Partially Productive during Hours affected by Financial Stress: Naivete main



# 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., impulsive shopping, alcohol)

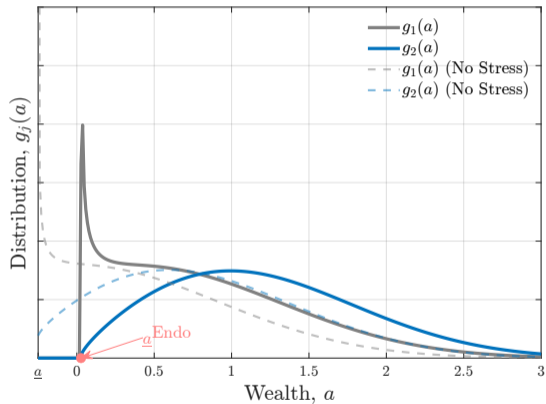
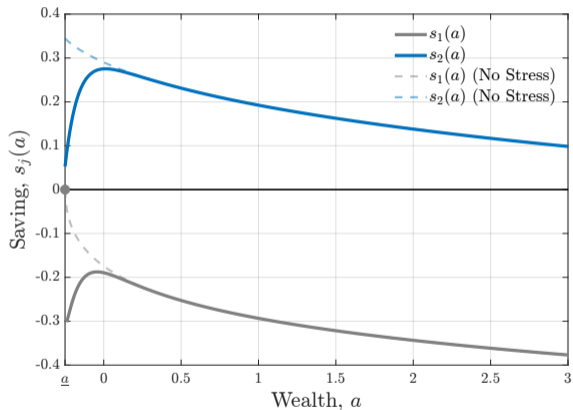
- Calibration

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

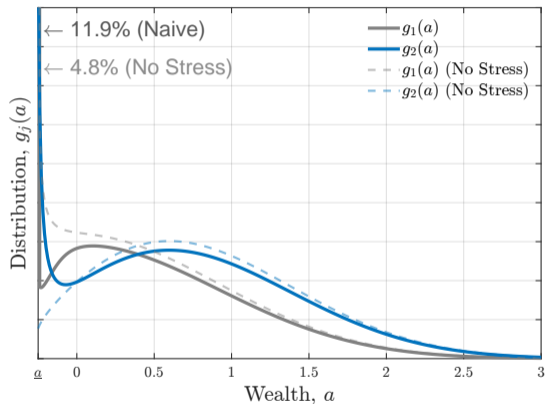
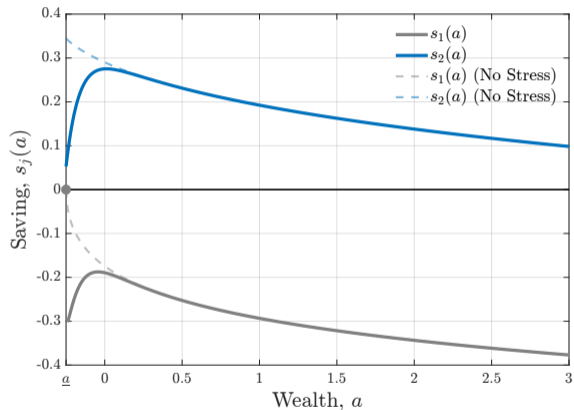
- ▶  $\alpha$ : same as main analysis
- ▶  $\bar{C}$ :

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

# Stressed Spending : Sophistication main



# Stressed Spending : Naivete main



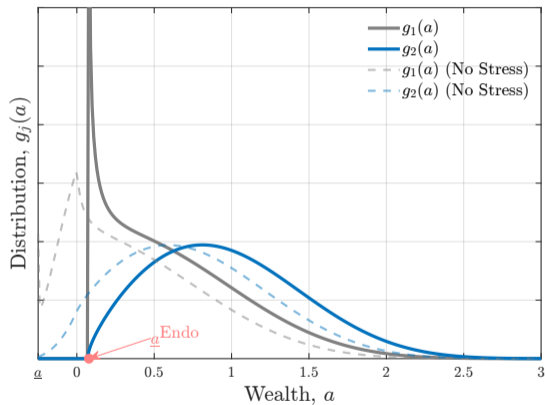
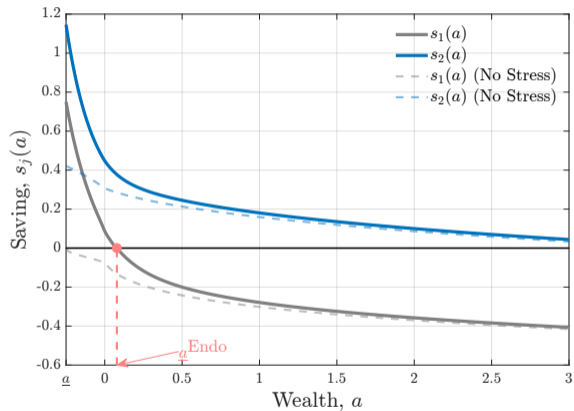
## Different Saving and Borrowing Rates main

- Household faces **different borrowing & saving interest rates** (Kaplan-Violante-Moll)
- If households are net borrowers ( $a_t < 0$ ), they face a higher rate

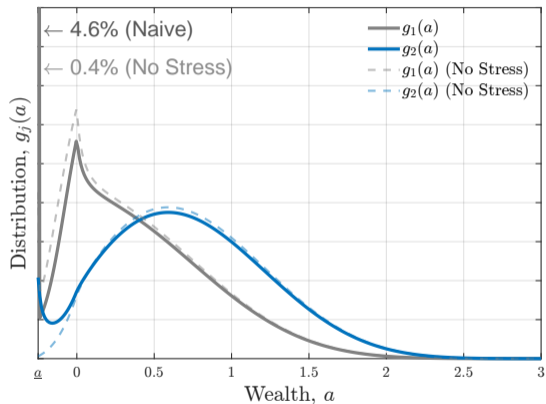
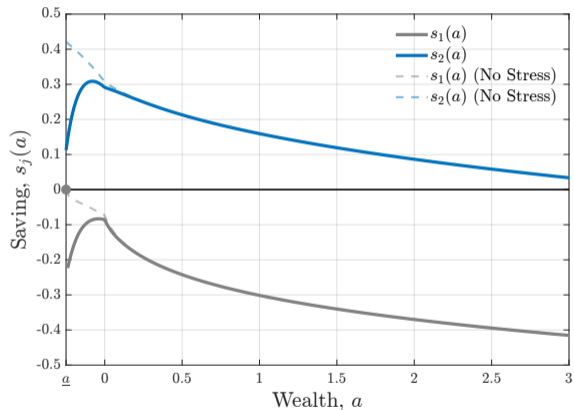
$$r^b = r + \kappa$$

- A higher  $\kappa$  increases the saving motive because of intertemporal substitution channel
- Still, naifs save less than the no-stress households
  - ▶ sophisticates save more than the no-stress households
- Here,  $\kappa = 4\%$ ; Paper,  $\kappa = 6\%$

# Different Saving and Borrowing Rates: Sophistication main



# Different Saving and Borrowing Rates: Naivete main



## 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

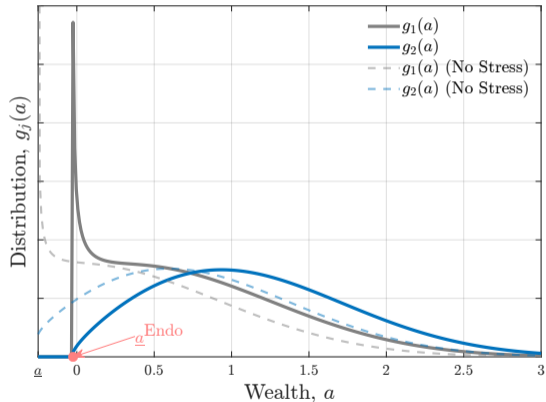
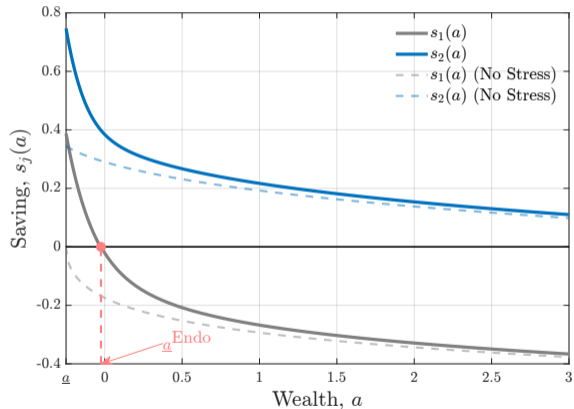
- Transition intensity:

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

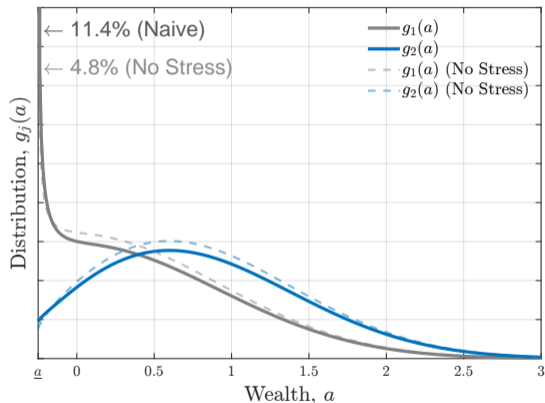
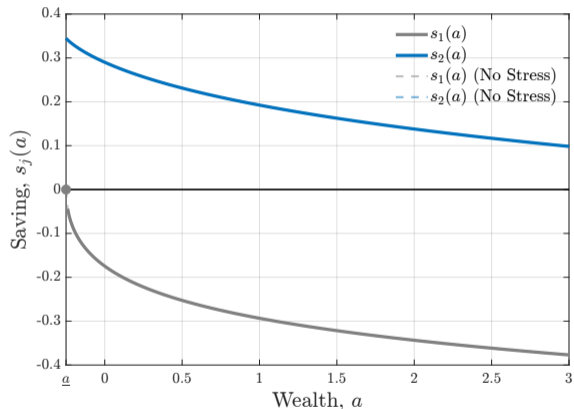
- Calibration

- ▶  $\alpha$  and  $\lambda$  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

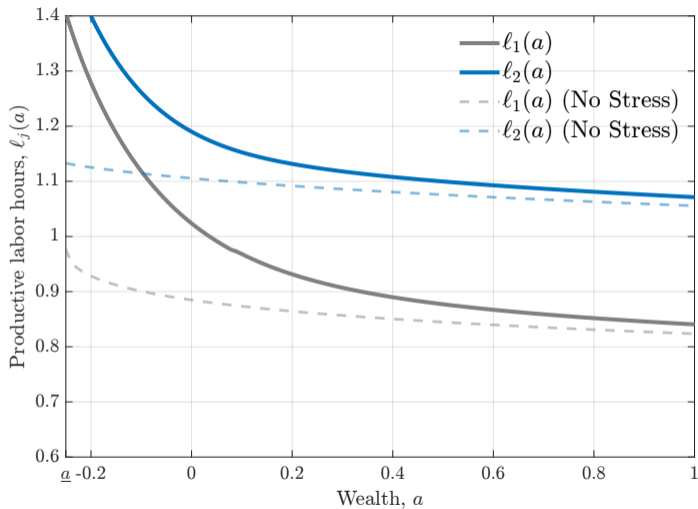


# Stress Affects Transition Intensity: Naivete main



- 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 private liquidity and reduces financial stress**

## The Financial Stress Channel of Fiscal Stimulus main

- Same calibration as above with a mixture of naifs and sophisticates
- A increase of steady state public debt by 25% of GDP (similar to COVID)  
⇒ **boost aggregate output by 0.67%**
- This is purely from the supply side (adding AD further increases multipliers)