The Economics of Financial Stress

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Incorporating Psychological Costs of Financial Constraints

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2. Finances are the #1 stress in the US (APA, 22)

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3. Traditional take: financial constraints prevent consumption smoothing
4. Behavioral take: financial constraints drain scarce cognitive resources and worsen economic performance [scarcity by Mullainathan & Shafir; Haushofer & Fehr; etc.]

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Our paper links traditional and behavioral takes on financial constraints

What we do

1. Survey evidence about financial stress in the US [literature: developing countries]
2. 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.]

Findings: 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

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 & experimental evidence [Kaur et al. (22)]

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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

Finding 2: stress reverses the negative wealth effect on labor supply

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

Implications: wealth inequality & fiscal multipliers

Outline

Our Survey sample

- Survey company: Dynata
- 10,000 prime-age, US workers
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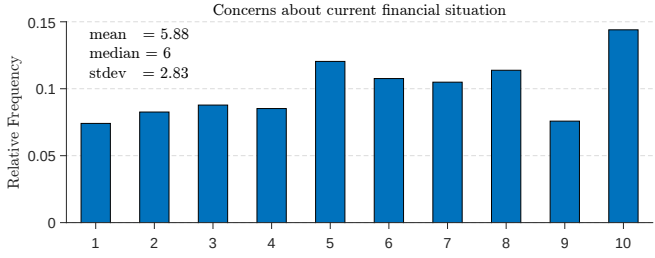
Q: *On a scale from 1 to 10, how concerned are you about your current financial situation? 1 represents the lowest level of concern, and 10 represents the highest level of concern.*



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, 22).

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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

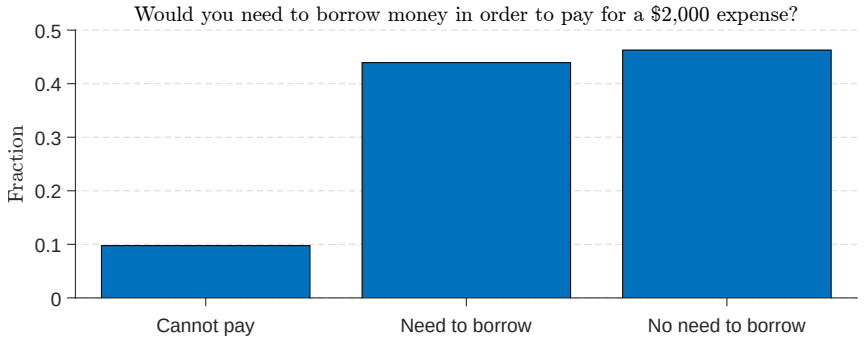
The Economic Consequences of Financial Stress table

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?

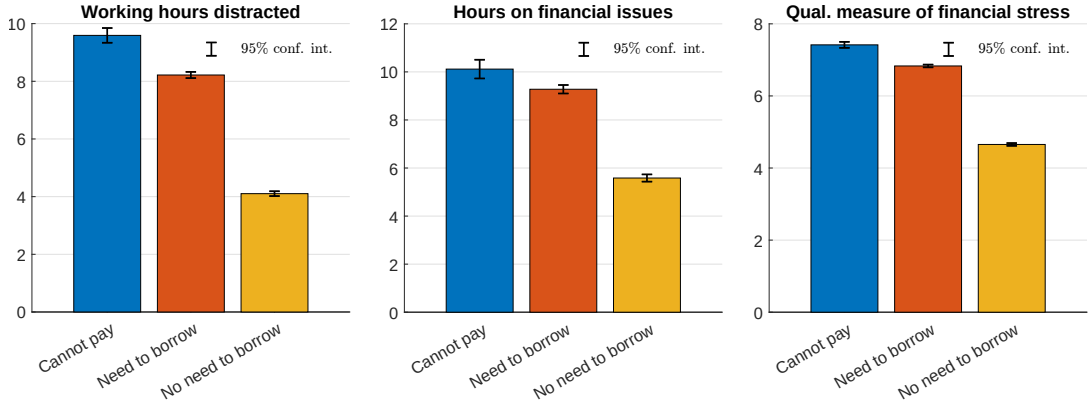
- Credit Karma/CNBC: 52% of respondents have impulsively shopped to help deal with feeling anxious or stressed out.

Financial Constraints



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

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

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

Calibration:

- Our survey & [Kaur et al. (22)'s] experimental evidence

A First Intertemporal Model of Financial Stress

Household problem [Achdou-Han-Lasry-Lions-Moll, 22]

$$\max_{\{c_t,\ell_t\}} \mathbb{E}_0 \left[\int_0^\infty e^{-\rho t} \left(\frac{c_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} - \theta \frac{[\ell_t + \Theta(a_t)]^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}} \right) dt \right], \quad s.t. \quad \begin{array}{c} \dot{a}_t = r a_t - c_t + w z_t \ell_t, \ a_t \geq \underline{a}, \\ z_t \in \{z_1, z_2\} \text{ with tr. inten. } \lambda \end{array}$$

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- Financial stress $\Theta(a)$ crowds out time/cognition available for productive labor ℓ
  - 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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- Most documented channel in development econ [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 extensions
  [e.g., impulse spending, prob. of being promoted and demoted (salaried worker), quality of decisions]

Calibration

- 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.

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Find $\bar{\Theta}$ and α:

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

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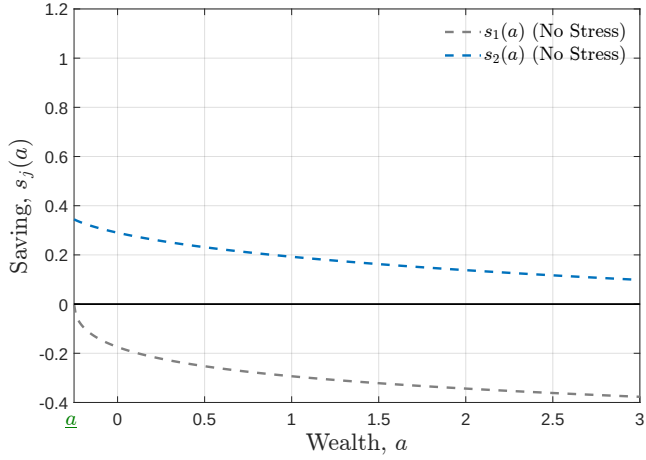
3. Kaur et al. (22) (in the paper) kaur

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)
$v = 1$	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

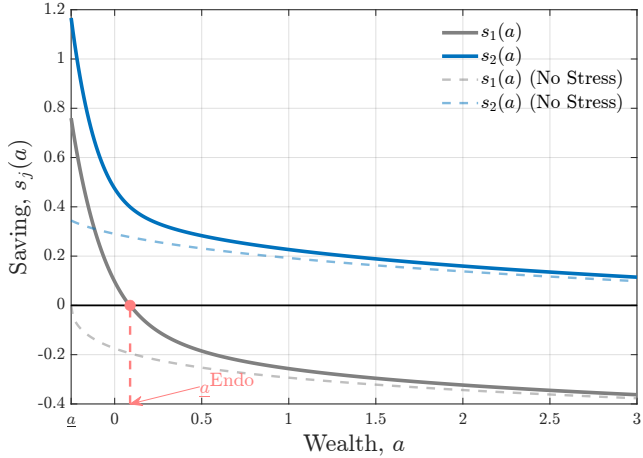
Outline

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



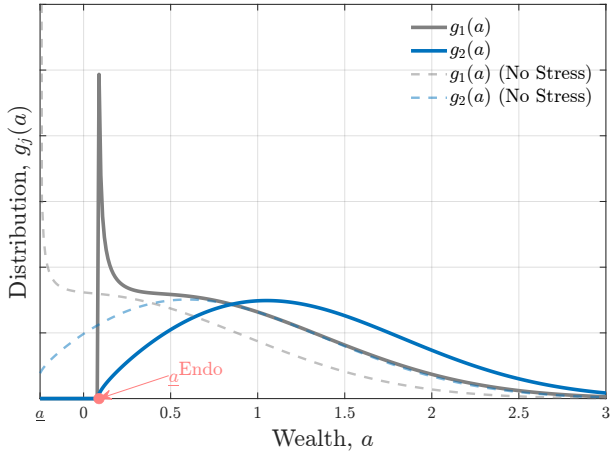
- **Permanent income hypothesis**:
  - temporarily high-income $\Longrightarrow$ save: $s_2(a) > 0$
  - temporarily low-income $\Longrightarrow$ dis-save: $s_1(a) < 0$

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



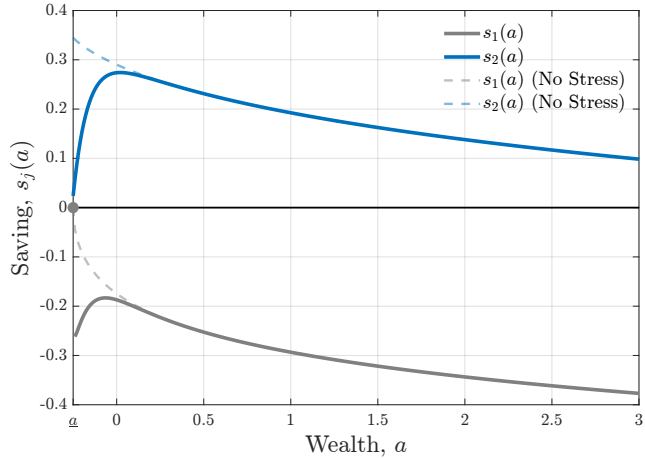
- Sophisticates have higher saving despite stress that increases working disutility
- No poverty trap: positive net saving around the constraint: $s_j(a) > 0, \forall a \in \left[\underline{a}, \underline{a}^{\text{Endo}}\right]$

Sophistication: Wealth Distribution (Exogenous r)



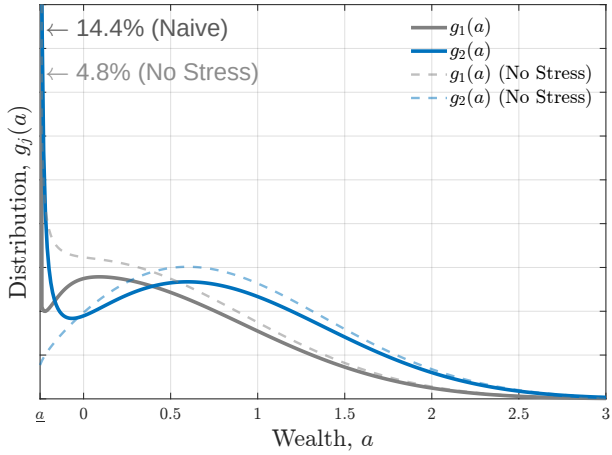
- Sophisticates save out of financial stress: $a \geq \underline{a}^{\text{Endo}}$ in the stationary distribution
- Inconsistent with the large number of constrained households ($\sim$10% in our data)

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



- 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 a large number of stressed households
- Help generate a large number of constrained households (∼10% in our data) mixture

Robustness Checks in the Paper: Sophistication vs Naivete

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

1. Alternative calibrations: cross-sectional, Kaur et al (22) — cross, kaur
2. Multiplicative productivity loss: $w\left(1-\Theta\left(a_t\right)\right)\ell$ — multiplicative
3. Partially productive during hours affected by financial stress — exchange
4. Alternative functional forms of $\Theta\left(a\right)$ — alternative
5. Non-convex $\Theta\left(a\right)$, harder to save out of the financial stress region — nonconvex
6. Different saving and borrowing rates — different
7. Alternative channels of financial stress
   - Stressed spending (impulsive shopping, alcohol, cigarettes, etc.) $C^{\Theta}\left(a\right)$ — consumption
   - Stress affects transition intensity $\lambda^{\Theta}\left(a\right)$ instead of earnings (salaried worker) — transition
   - Stress affects transition intensity $\mu^{\Theta}\left(a\right)$ between naivity and sophistication

Outline

Financial Stress and the Wealth Effect on Labor Supply

- Theory: negative wealth effect on labor supply with separable utility
  - a higher wealth increases demand for leisure

- Evidence: zero or positive wealth effect on labor supply, esp. close to fin. constraints
  [Cesarini et al. (17); Banerjee et al. (20)]

- Financial stress generates positive wealth effect on labor supply close to constraints

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

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

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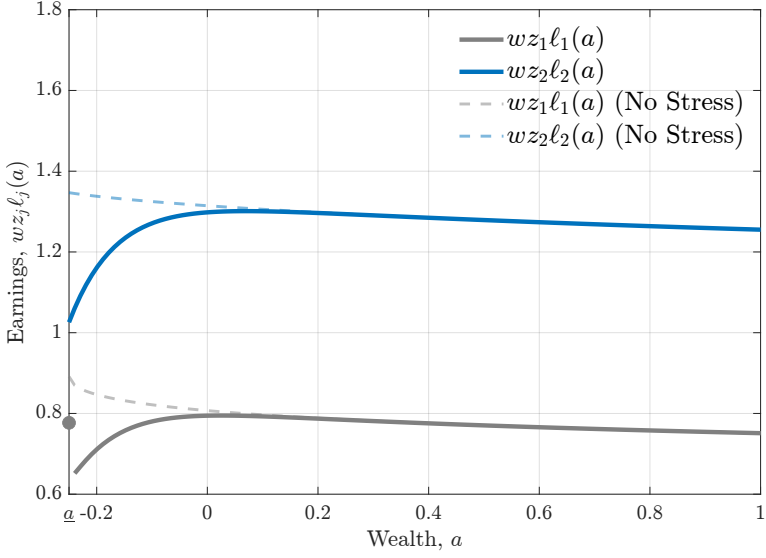
  - Relieving stress frees up time and cognitive resources for productive work

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

Positive Wealth effect on Labor Supply Close to $\underline{a}$ (Naivete) labor



Welfare Costs of Financial Stress

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

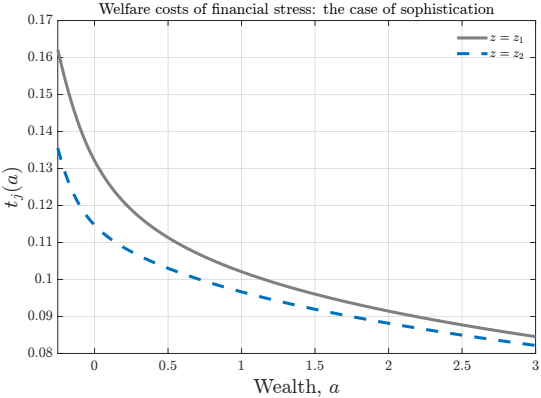
$$\omega_j\left(a + t_j(a)\right) = \omega_j^{\text{no-stress}}(a),$$

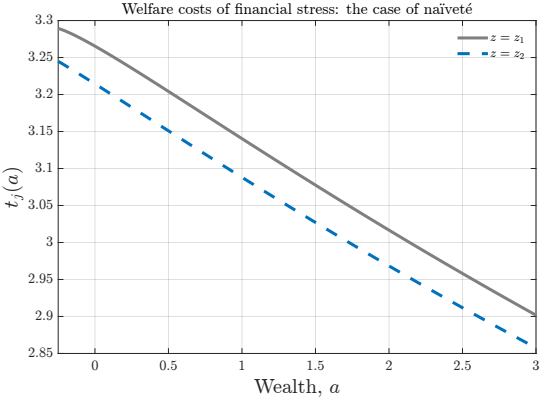
  - $t_j(a)$ is transfer needed to compensate the household for the impact of financial stress
  - $\omega_j(a)$ captures the stressed household's welfare from a paternalistic perspective

$$\omega_j(a) = \mathbb{E}_0\left[\int e^{-\rho t} u\left(c_j(a_t), \ell_j(a_t); \Theta(a_t)\right) dt | a_0 = a, z_j\right] \quad \text{s.t. budget}$$

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

Welfare Costs of Financial Stress: Sophistication vs Naivete





Conclusion

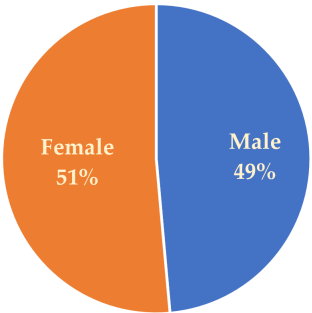
- **This paper** brings financial stress into household finance and macro
  - survey evidence on the prevalence of financial stress in US households
  - a tractable intertemporal model of financial stress/"scarcity"
  - link behavioral & traditional takes on financial constraints

- **Implications**
  - A psychology-based theory of poverty traps requires financial stress & naivete
  - Reverses the counterfactual negative wealth effect on labor supply
  - Financial stress increases the welfare cost of financial constraints (especially for naifs)
  - Macroeconomic consequences on wealth inequality & fiscal multipliers

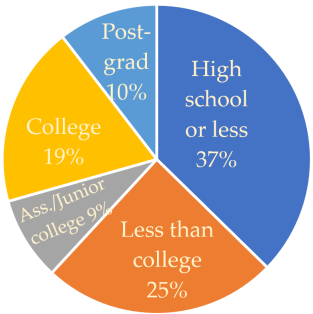
Outline

Demographics main

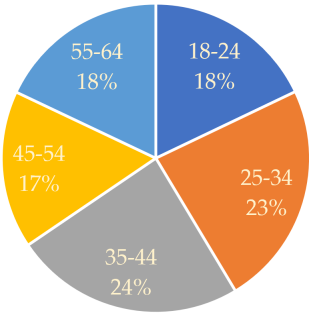
Gender



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	75,00
Net assets	9,959	66,791	5,000	219,362	-55,000	1,100,000	-45,000	45,00

Financial Stress and Measures of Financial Constraints main

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

The Sophistication Case more math back

- The household fully understands the future impact of financial stress

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

$$c_j^{-\frac{1}{\sigma}}(a) = dv_j(a)/da$$

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

$$-\frac{\mathbb{E}_t\left[d\left(c_j^{-\frac{1}{\sigma}}(a)\right)\right]}{c_j^{-\frac{1}{\sigma}}(a)} = \left(r - \rho \underbrace{-wz_j\Theta'(a)}_{\text{extra saving motive, >0}}\right) dt \quad \left[\text{vs. 1-year macro: } \tfrac{\dot{c}}{c} = \sigma(r-\rho)\right]$$

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

The Sophistication Case back

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

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

- Optimal consumption

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

- Optimal labor supply

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

The Naivete Case back

- Hh doesn't understand that its future self is subject to financial stress [akin to present-bias naifs]

$$\rho v_j^p(a) = \max_{c,\ell} \left\{ u(c,\ell;0) + \left(ra - c + wz_j\ell\right) dv_j^p(a)/da + \lambda \left(v_{-j}^p(a) - v_j^p(a) \right) \right\}$$

$$c_j^{-\frac{1}{\sigma}}(a) = dv_j^p(a)/da$$

  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

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

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

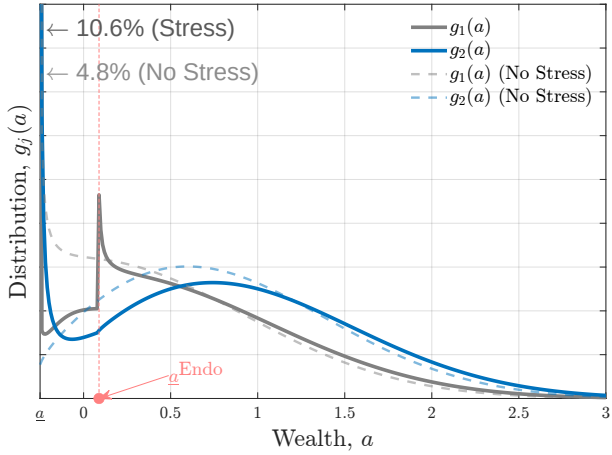
Extensions and Broader Interpretations main

Similar predictions with alternative channels of financial stress

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

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

A Mixture of Naifs and Sophisticates main



- Calibrate the proportion of sophisticated household $\varphi = 26\% \sim 32\%$ mixture
  - Still large number of constrained and stressed households (naive ones)

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.

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

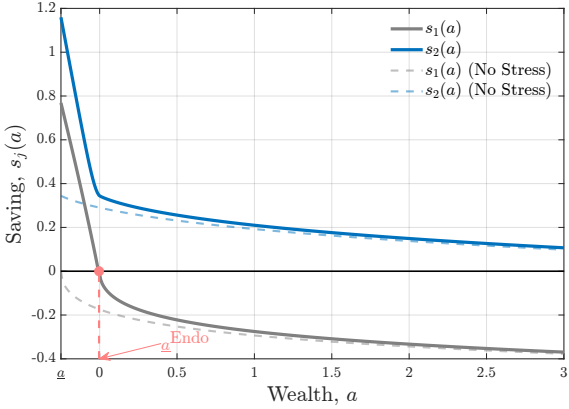
in the main analysis.

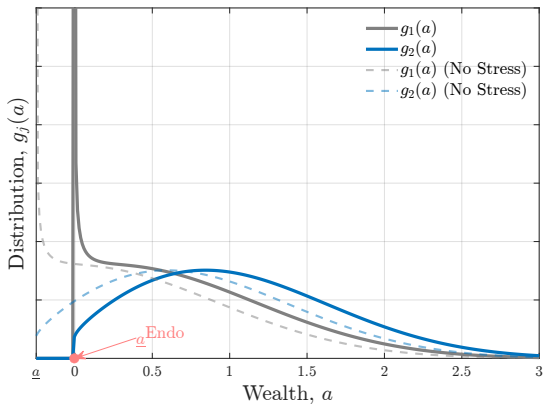
- **Our survey**, full sample
  - Q: **financial stress at liquidity constraints & the slope of financial stress**

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

Alternative Functional Forms of Stress Function: Sophistication

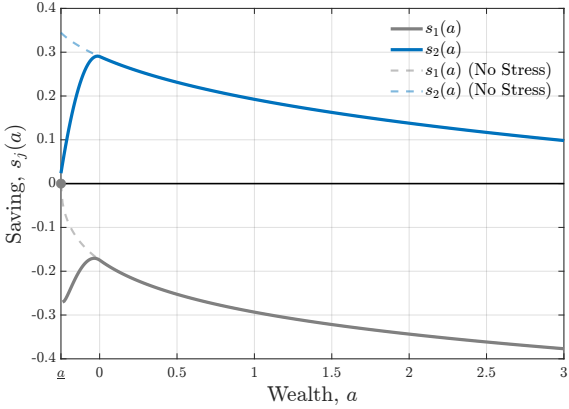
main

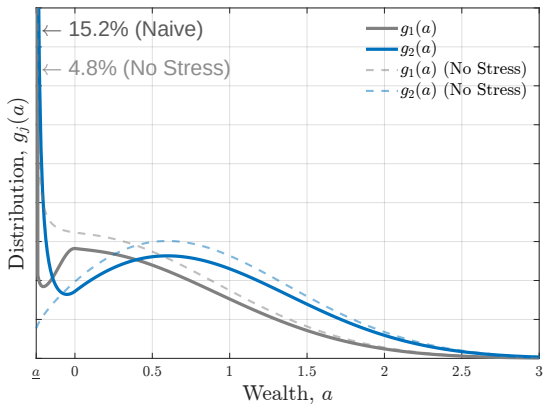




Alternative Functional Forms of Stress Function: Naivete

main





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

main

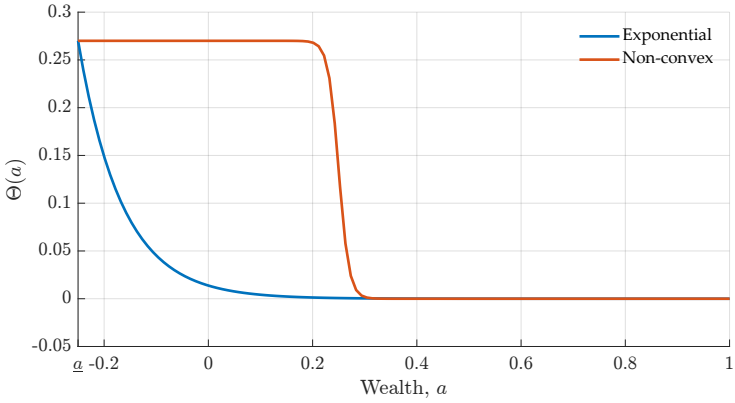


Figure: Non-convex Stress Function

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

main

The stress function

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

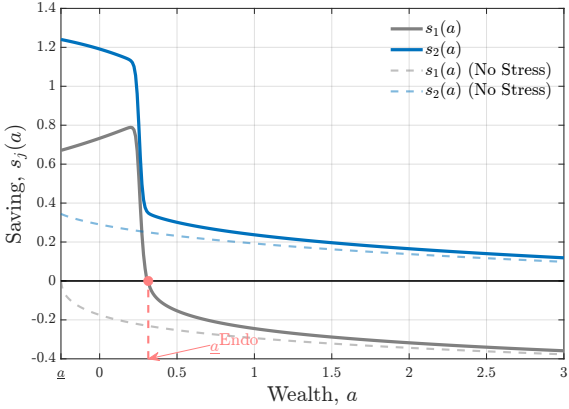
- $F(\cdot)$ is a normalized logistic function

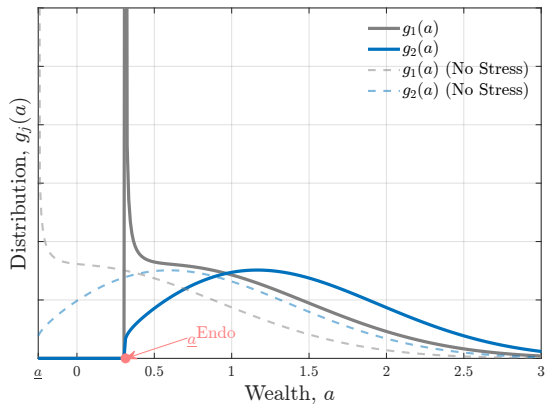
$$F(x) = \frac{\frac{1}{1+e^{-\beta\left(x-\frac{1}{2}\right)}} - \frac{1}{1+e^{-\beta\left(0-\frac{1}{2}\right)}}}{\frac{1}{1+e^{-\beta\left(1-\frac{1}{2}\right)}} - \frac{1}{1+e^{-\beta\left(0-\frac{1}{2}\right)}}},$$

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

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

main





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

main

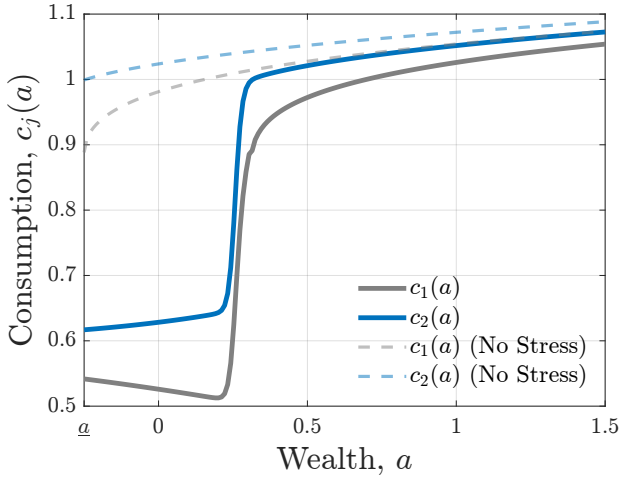
- Sophisticates still save out of stress region even with non-convex stress function

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

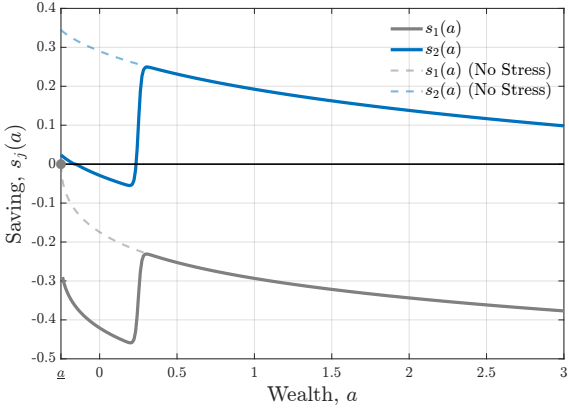
- Even if $\Theta'(a)$ is close to 0 around $\underline{a}$, $\Theta'(a)$ is large at the point where $\Theta(a)$ is steep (a^{steep})
  - $\Longrightarrow$ $c(a)$ increases a lot at a^{steep}
  - $\Longrightarrow$ $c(a)$ is very small at around $\underline{a}$ & strong extra saving motive

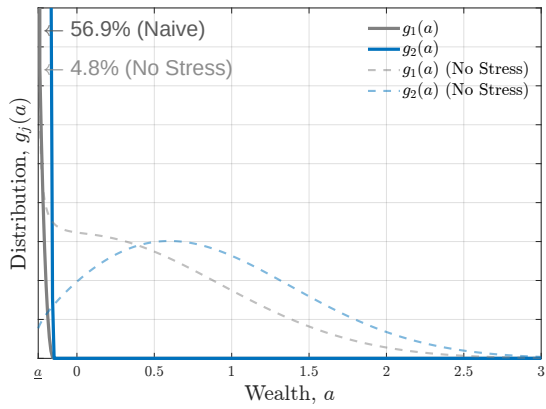
- Poverty trap with sophistication?
  - Galor-Zeira: indivisibility in saving technology (discrete human capital investment)
  - Acemoglu: not robust to income uncertainty

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



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





Multiplicative Productivity Loss main

- Utility (ℓ captures productive work)

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

- Budget and the borrowing constraint

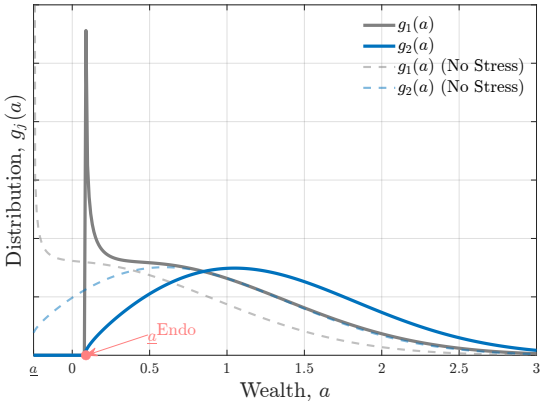
$$\dot{a} = ra - c + wz[1-\Theta(a)]\ell \quad \& \quad a \geq \underline{a},$$

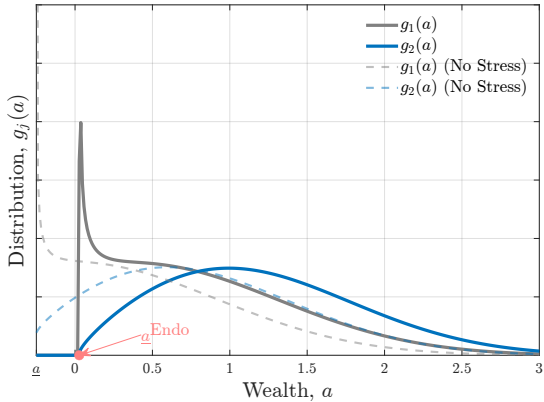
  where $\Theta(a) = \bar{\Theta}e^{-\alpha(a-\underline{a})}$ is the same as the main text

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

Multiplicative Productivity Loss: Sophistication

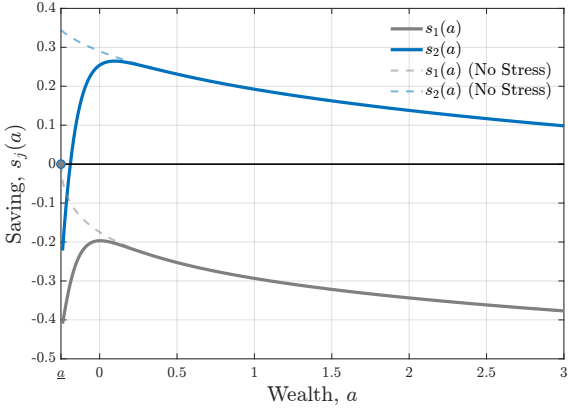
main

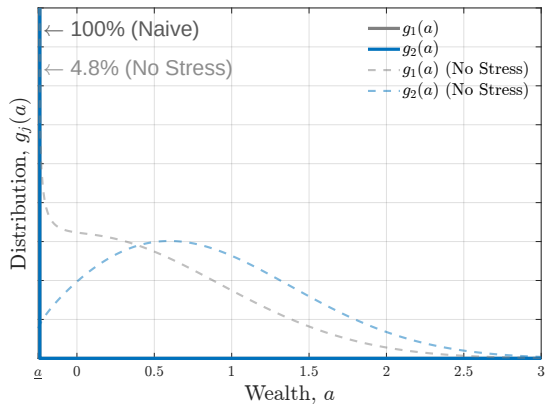




Multiplicative Productivity Loss: Naivete

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

Calibration: Financial Stress & Distance from Financial Constraints

main

Q: Financial Stress at Financial Constraints

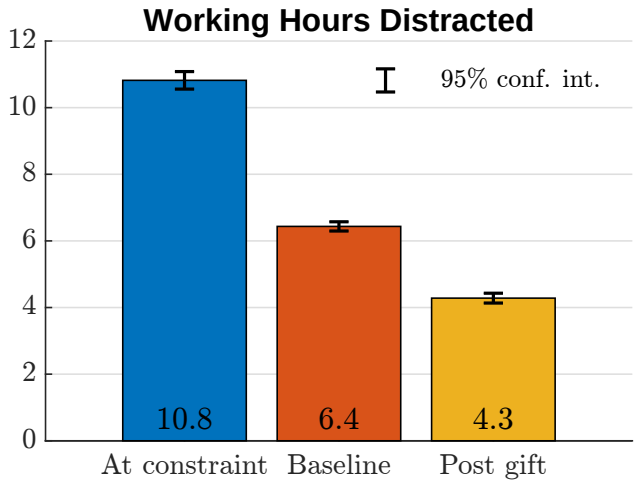
Imagine that your financial situation becomes worse, and you would now struggle to quickly raise any additional money in the case of an emergency. How many working hours would you be distracted by your financial concerns over the course of a week?

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?

Calibration: Financial Stress & Distance from Financial Constraints

main



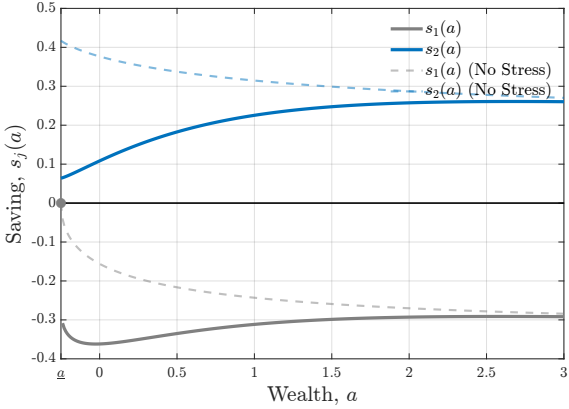
Alternative Calibration: Between-subject Variation

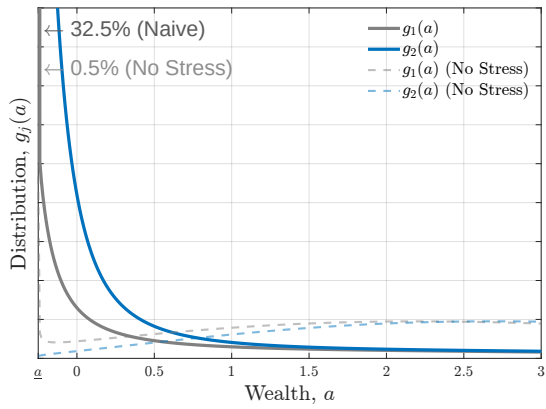
calibration robustness

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

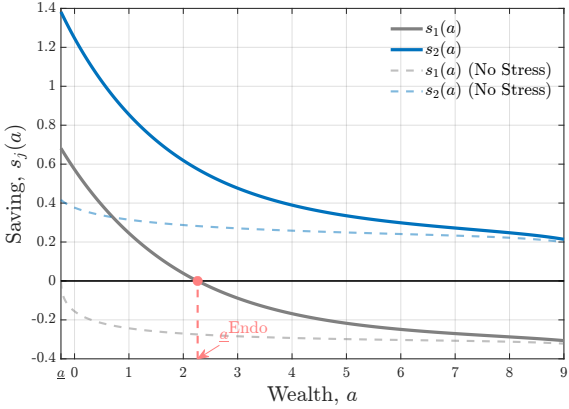
- Calibrate $\bar{\Theta} = 0.26$ based on the average hours distracted at work for those who "cannot pay" the emergency expense in Q9
- Calibrate $\alpha = 1.1$ based on the differences between those who "cannot pay" the emergency expense in Q9 and those who "need to borrow".

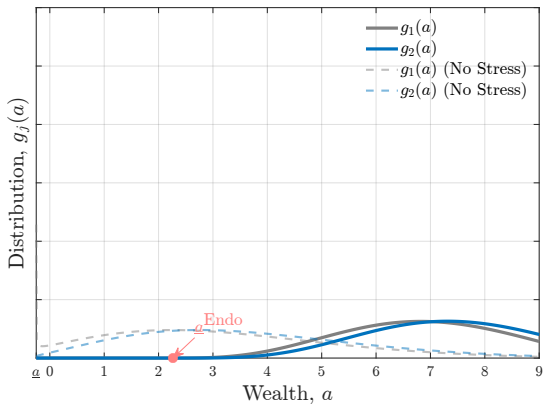
Alternative Calibration: Between-subject Variation main





Alternative Calibration: Between-subject Variation main





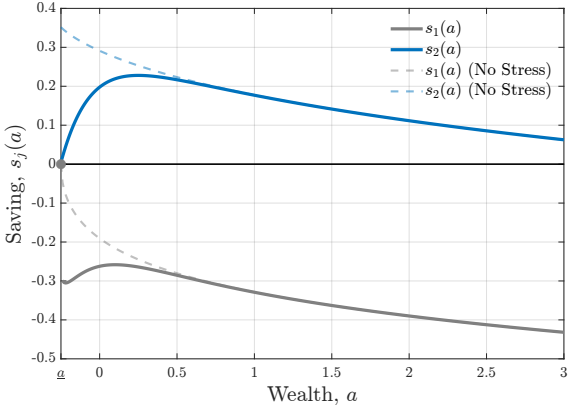
Alternative Calibration: Kaur et al. (21) main

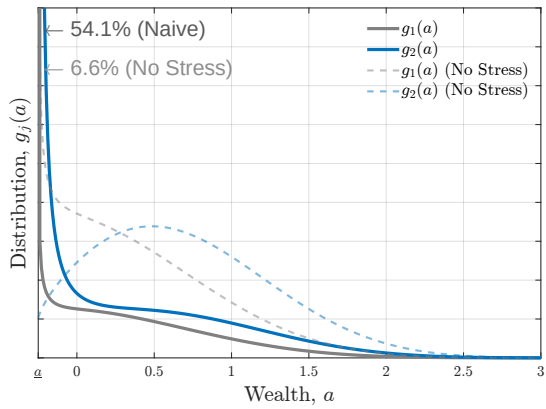
- Calibrate ρ (in the naive financial stress case) to match
  - fraction of households (64.5%) who can't come up with 1000 Rs. of emergency fund (Kaur et al., 22)

- Calibrate $(\bar{\Theta}, \alpha) = (0.2575, 5.25)$ in the naive financial stress case) to match
  - the effect on 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%

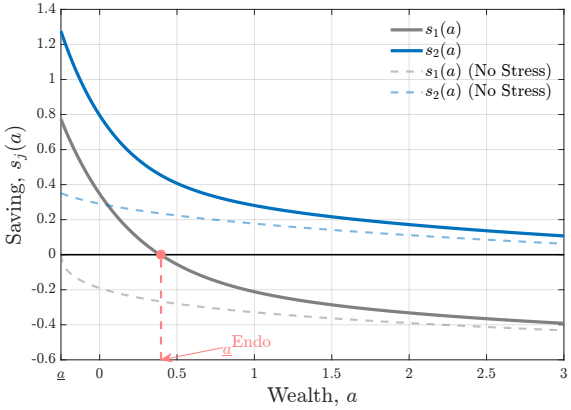
- Normalize by the average household income (16871.6 Rs.) of workers with characteristics similar to those in Kaur et al. (22) in Indian Sample Survey (77th round)

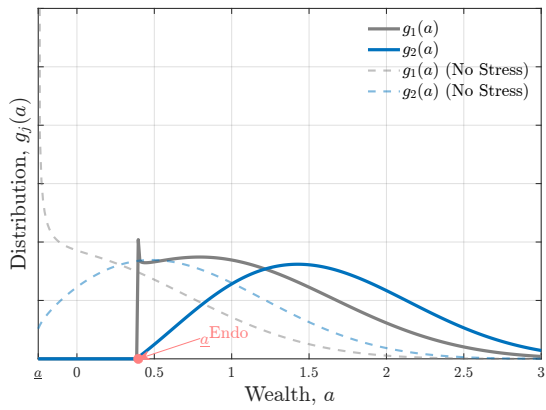
Alternative Calibration: Kaur et al. (21) main





Alternative Calibration: Kaur et al. (21) main





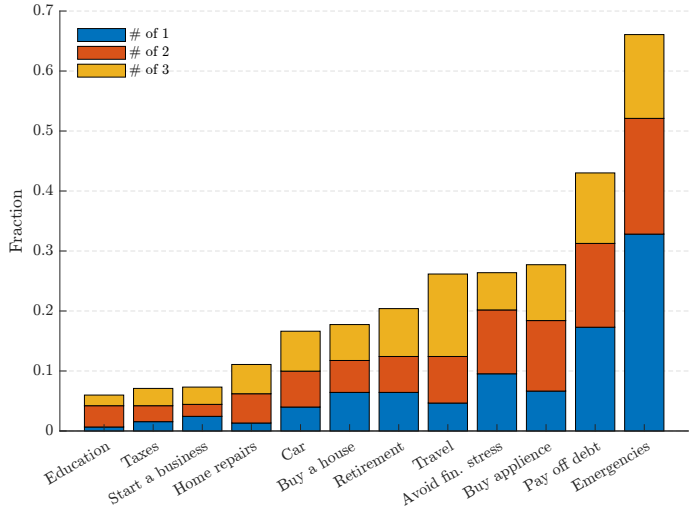
Calibrate the Proportion of Sophisticated Households main

- A follow up survey run in April 2023 on Prolific
  - targeting 1,001 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, $\varphi = 26\%$ main



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

Partially Productive during Hours affected by Financial Stress

main

- Utility (ℓ captures productive work)

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

- Budget and the borrowing constraint

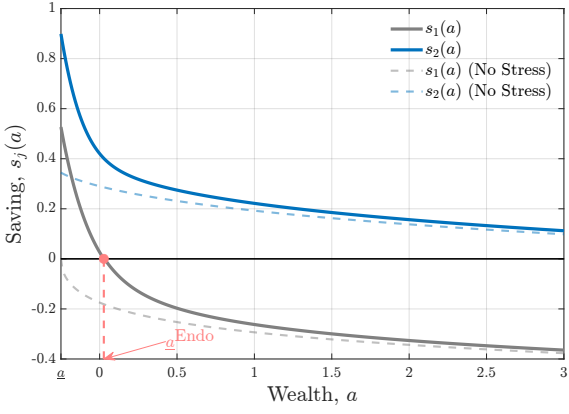
$$\dot{a} = ra - c + wz(\ell + \chi\Theta(a)) \quad \& \quad a \geq \underline{a},$$

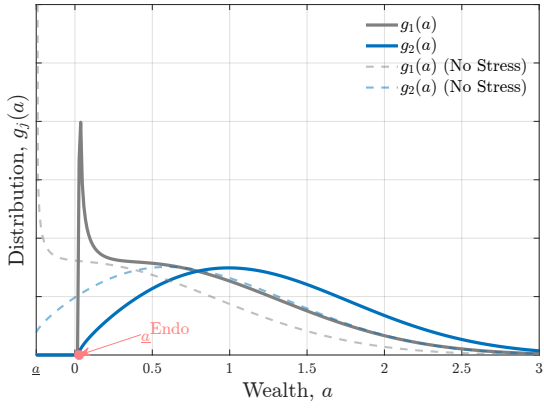
where χ is the productivity during stressed hours, with the baseline $\chi = 0$.

- Here: $\chi = 0.5$

Partially Productive during Hours affected by Financial Stress: Sophistication

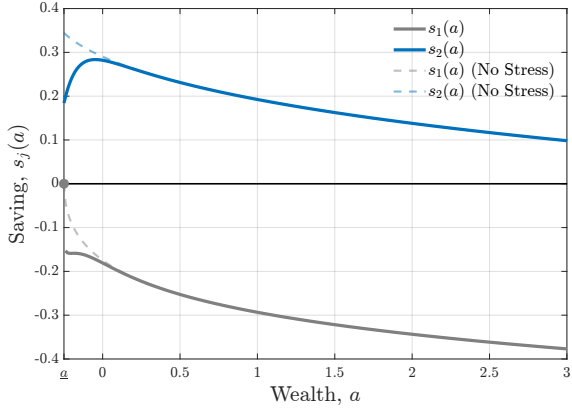
main

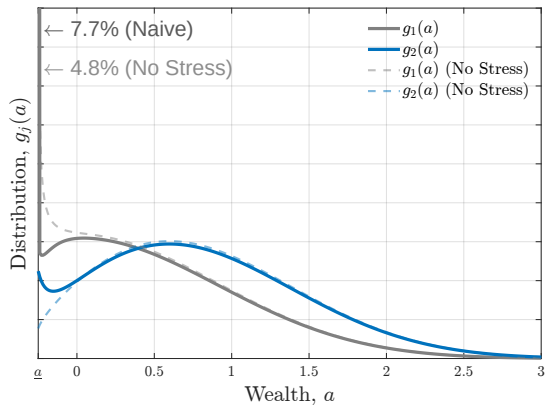




Partially Productive during Hours affected by Financial Stress: Naivete

main





Stressed Spending main

- Utility

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

- Budget

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

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

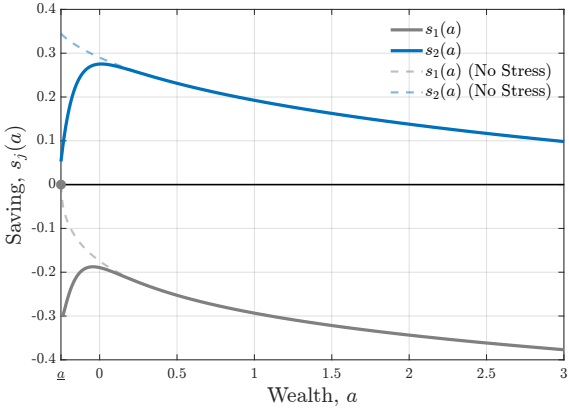
- Calibration

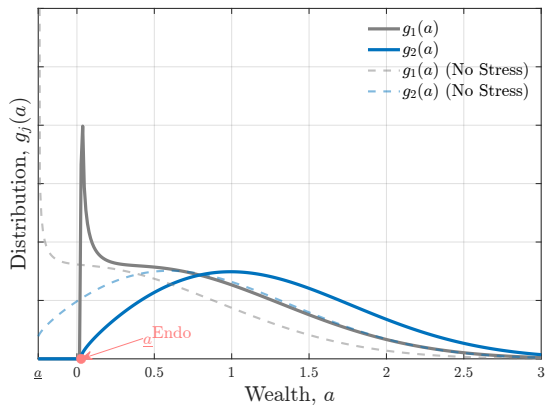
$$C^{\Theta}(a) = \bar{C}e^{-\alpha(a-\underline{a})}$$

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

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

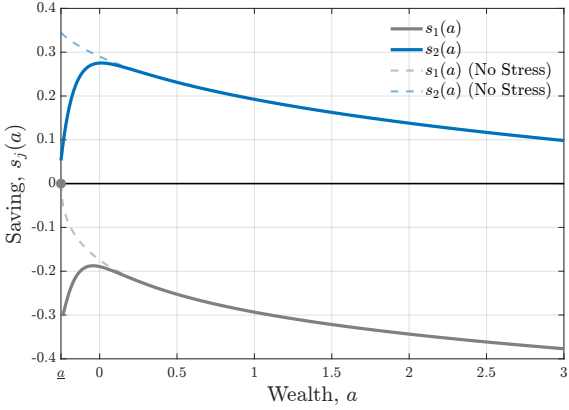
Stressed Spending : Sophistication main

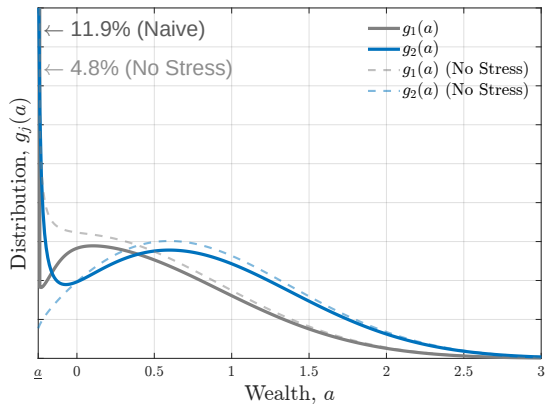




Stressed Spending : Naivete

main





Different Saving and Borrowing Rates main

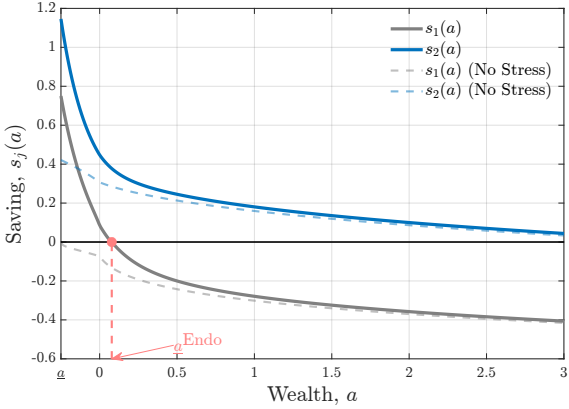
- Household faces **different borrowing & saving interest rates** (Kaplan-Violante-Moll)
- If households are net borrowers ($a_t < 0$), they face a higher rate

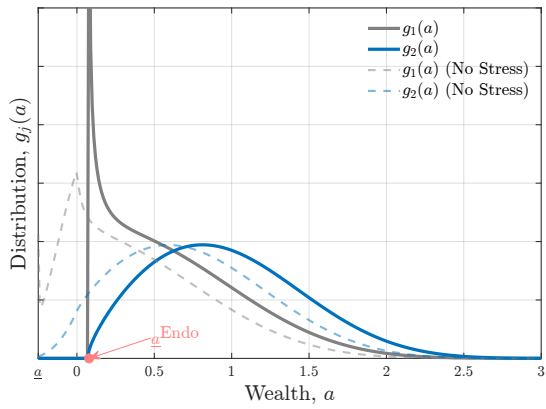
$$r^b = r + \kappa$$

- A higher κ 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

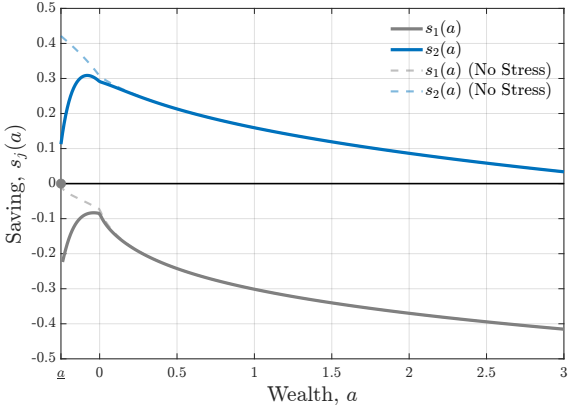
main

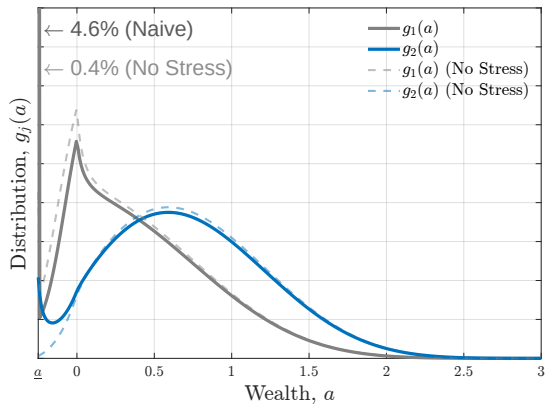




Different Saving and Borrowing Rates: Naivete

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

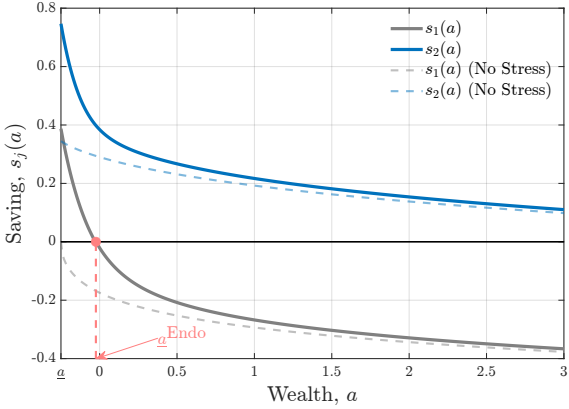
- Transition intensity:

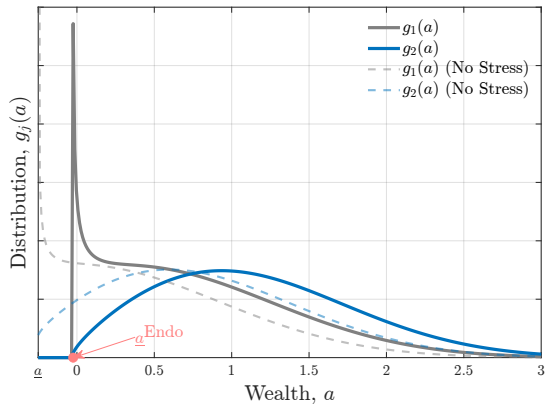
$$z_1 \to z_2 : \lambda - \bar{\lambda} e^{-\alpha(a-\underline{a})} \quad \text{and} \quad z_2 \to z_1 : \lambda + \bar{\lambda} e^{-\alpha(a-\underline{a})}$$

- 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)

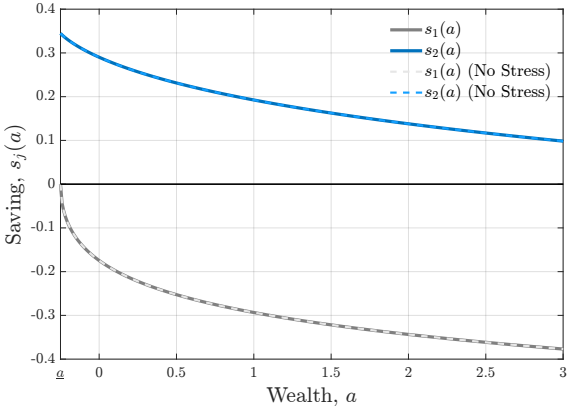
Stress Affects Transition Intensity: Sophistication

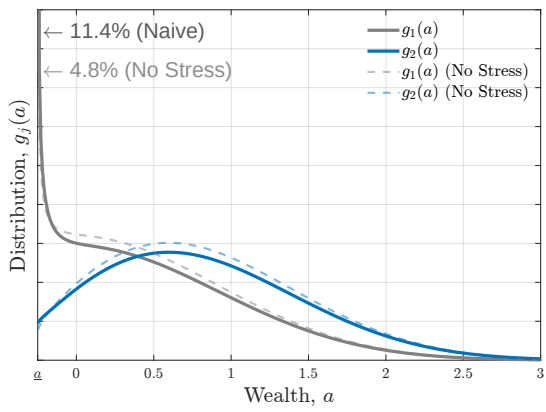
main





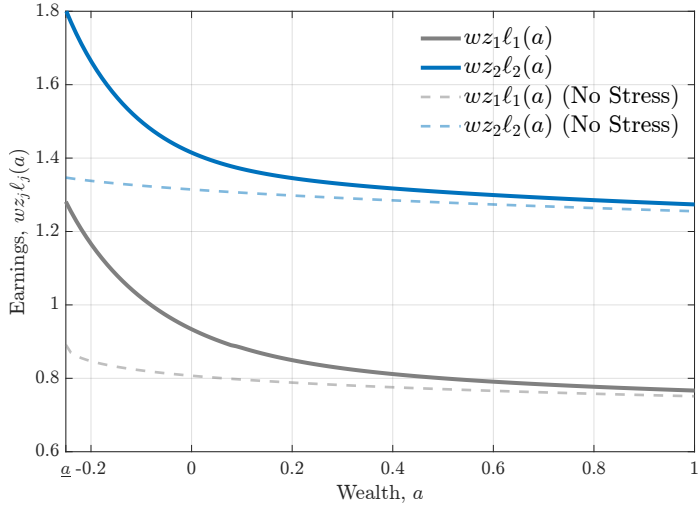
Stress Affects Transition Intensity: Naivete main





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

Wealth Effect on Labor Supply (Sophistication) main



The Financial Stress Channel of Fiscal Stimulus main

Positive effect on labor supply $\Longrightarrow$ 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:

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

- 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)
  $\Longrightarrow$ boost aggregate output by 0.67%
- This is purely from the supply side (adding AD further increases multipliers)