

# Macroeconomic Effects of Debt Relief: Consumer Bankruptcy Protections in the Great Recession

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# Debt forgiveness in the Great Recession

Household debt widely viewed as having played role in U.S. employment after 2007

- ▶ Aggregate demand contraction at the ZLB

→ Household debt forgiveness could have helped (?)

- ▶ cf 2008 mortgage debt cram-down proposals

Substantial *aggregate* debt forgiveness during the Great Recession

- ▶ 1% of PCE written off by banks each year

We provide evidence on the *ex-post benefits* of debt relief policy

- ▶ Exploit cross-state variation in *debtor protections* to measure **debt forgiveness**
- ▶ Use GE model to interpret estimates and their aggregate implications

# What we do

1. Document the cross-state effects of bankruptcy exemptions:
  - ▶ Borrower response: more chargeoffs in states with larger exemptions
  - ▶ Macro effect: higher employment in local non-tradable, limited effect on tradable

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  - ▶ Key: difference out important GE effects

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2. Use these estimates to calculate “cross-state debt relief employment multipliers”:
  - ▶ Scale-free moments: summarize causal effect with model counterpart
  - ▶ Key: difference out important GE effects
3. Contrast empirical and model multiplier from a TANK<sup>3</sup> model:
  - ▶ Chargeoffs: wealth transfer from savers to borrowers
  - ▶ Match short-run cross-state multipliers for tradable and non-tradable employment
  - ▶ Recover the missing intercept: effect on employment in control states

# **1. Background and Data**

# Bankruptcy protections in the United States

## Bankruptcy asset exemption laws

- ▶ Protect debtors' assets from seizure by creditors
- ▶ Wide range of assets protected; canonical example is homestead:
  - ▶ Homeowners with positive equity benefit more in high exemption states

## Plausibly exogenous:

- ▶ Use laws set prior to recent crisis
  - ▶ Most changes were inflation adjustments (Mahoney 2015)
- ▶ No significant correlation with macro outcomes before the crisis

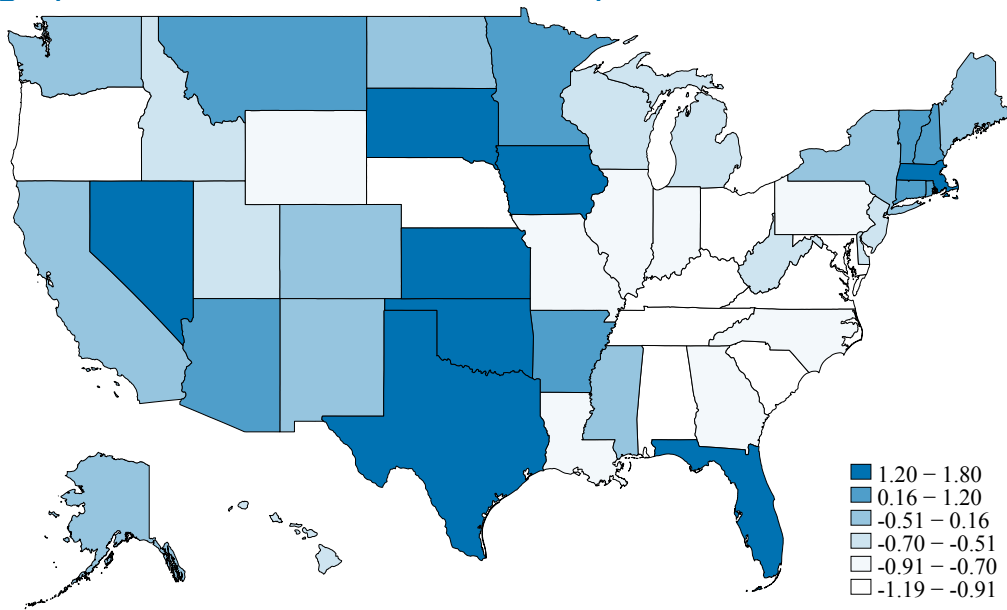
# Measuring protection

- ▶ Bankruptcy protection laws protect across a variety of asset classes
  - ▶ Largest asset protection is home equity, but includes auto [Homestead](#)
- ▶ Construct single “simulated” instrument of bankruptcy protection generosity
  - ▶ Currie and Gruber (1996), Mahoney (2015), Aronow–Goldsmith–Pinkham–Sorkin (2019)
- ▶ Measure combines asset protections in home equity, auto equity, savings and wildcard exemptions
- ▶ Standardize to s.d. = 1, mean zero measure



# Geographic distribution of simulated protection measure

Homestead



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## Equifax Consumer Credit Panel

- ▶ Credit scores, unsecured credit lines, auto loans, and mortgages
- ▶ 11m individual sample, collapsed to county × year-quarter

## Quarterly Census of Employment and Wages

- ▶ Derived from individual-level UI tax files sent to BLS
- ▶ We categorize industries as non-tradable following Mian and Sufi (2014)

## **2. Research Design**

# Empirical specification

We begin by documenting the responses of our outcomes to protections

Regress, in given location  $l$  (county)

$$Y_{lt} = \alpha_l + \lambda_t + \sum_{s \neq 2007q1} \beta_s \times 1(s = t) \times \text{Protection}_l + \epsilon_{lt}$$

where  $\text{Protection}_l$  is a function of the 2007 exemption level in location  $l$

**Borrower response:**  $Y_{lt} \equiv$  credit card chargeoffs in  $l$  at  $t$

**Macroeconomic response:**  $Y_{lt} \equiv$  log employment in  $l$  at  $t$

- Run separately for nontradable and tradable employment

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Assumption 2: divergence in trends after GR is only due to difference in protections

- ▶ Partial test: examine correlates with protection measure [Confounders](#)
- ▶ Partial test: control for potential alternative channels in regressions [Tables](#)

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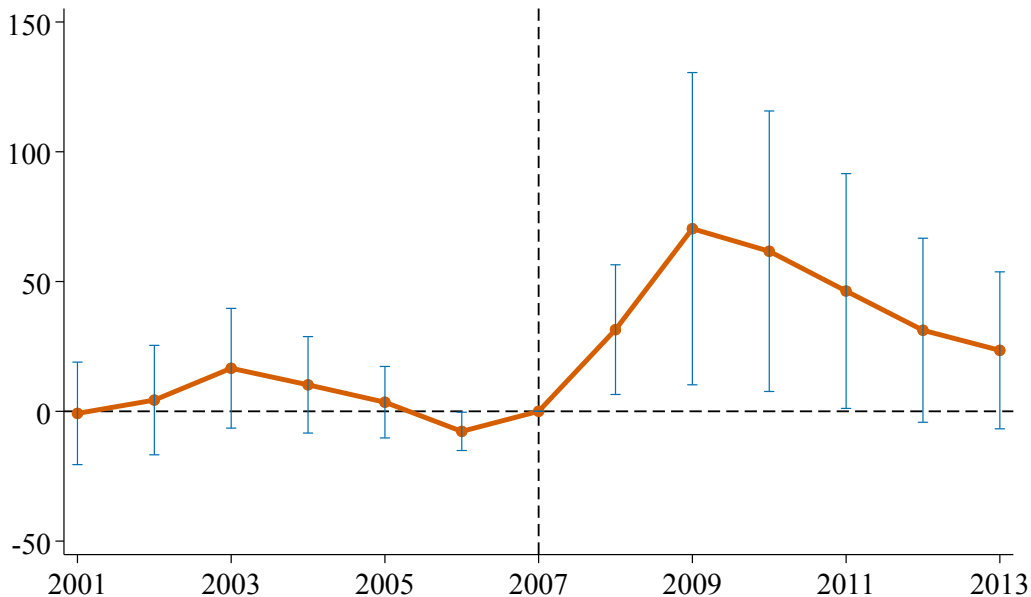
Key limitation: difference out key G.E. effects (missing intercept)

- ▶ How are low protection and high protection states separately affected?

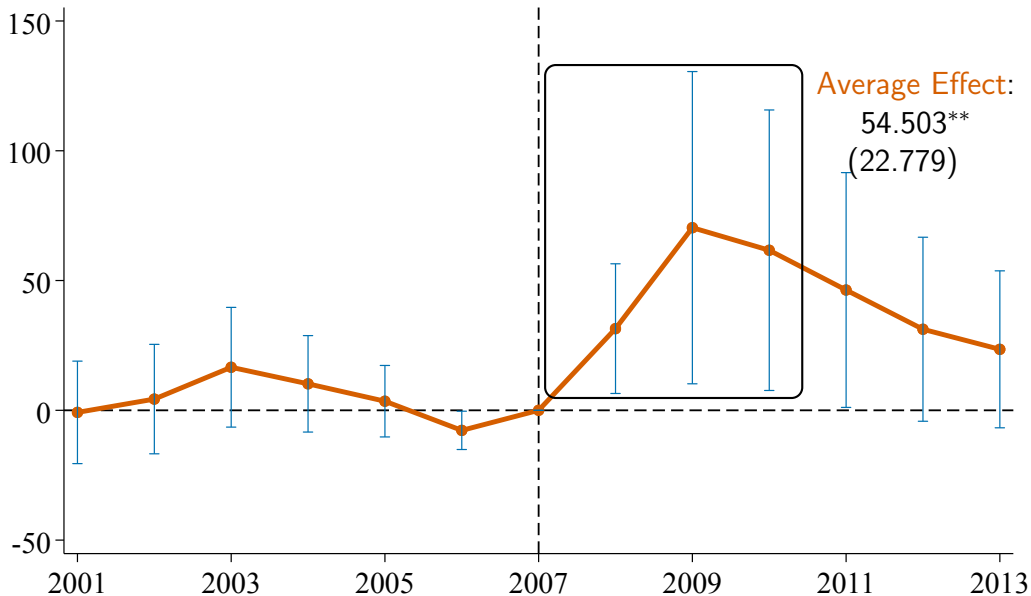


### **3. Empirical Results**

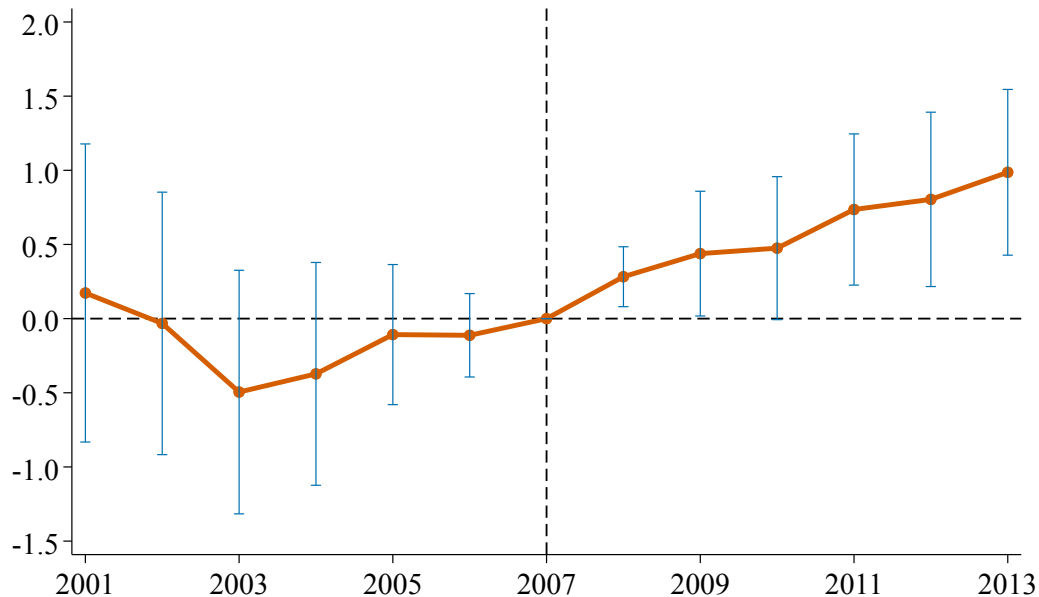
## Annual chargeoffs per capita



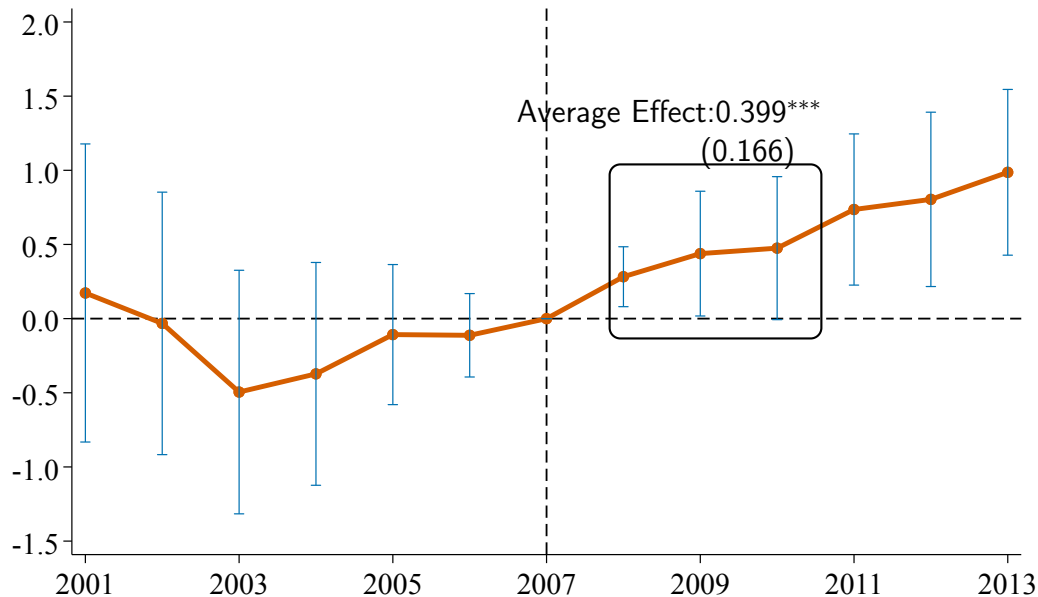
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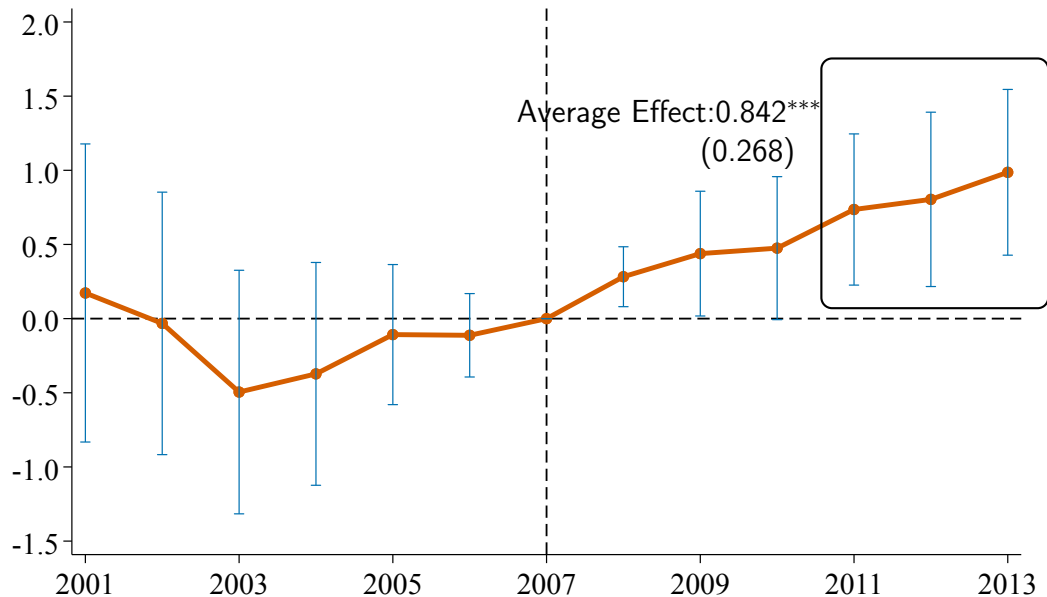
## Non-tradable employment



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## Non-tradable employment



## Tradable employment



# Calculating cross-state debt relief multipliers (1/2)

Estimates are causal impact of **bankruptcy protections**

- ▶ Positive increase in chargeoffs and employment

Object of interest is response of employment to **debt relief**

Proxy for debt relief using flow of charge-offs

- ▶ Missing: medical debt, payday credit, write-offs not captured by credit bureau data, renegotiation on terms of credit
- ▶ Adjust for this using estimates from bk. filings: scale measured debt relief by  $1/.77$



## Calculating cross-state debt relief multipliers (2/2)

$$\mathcal{M}_{s,rel} = \frac{\Delta \log(\text{Employment}_s)}{\text{Write-Downs} / \text{Consumption}}, \quad s \in \{\text{NT}, \text{T}\},$$

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	Nontradables ( $\mathcal{M}_{NT,rel}$ )	Tradables ( $\mathcal{M}_{T,rel}$ )
Short run (2008-2010)	1.81	0.39

- ▶ Next: structural model to interpret  $\mathcal{M}_{NT,rel}$ ,  $\mathcal{M}_{T,rel}$  and run counterfactuals

## 4. Structural model

# General Equilibrium model: overview

- ▶ '2×2×2' GE currency union model with incomplete markets
  - ▶ 2 regions: *High* exemptions (size  $\frac{1}{2}$ ), *Low* exemptions (other  $\frac{1}{2}$ )
  - ▶ 2 goods:  $T$  and  $NT$ , produced out of immobile labor
  - ▶ 2 agents: borrowers  $B$  (fraction  $\varphi^B$ ) and savers  $S$  ( $\varphi^S = 1 - \varphi^B$ )
- ▶ Agents
  - ▶ same period utility function over aggregate  $C$  and  $N$  (up to scale)
  - ▶ have different discount factors  $\beta^B < \beta^S$ , face borrowing limit
- ▶ Production
  - ▶ subject to diminishing returns:  $Y_T = A_T N_T^\gamma$ ;  $Y_{NT} = A_{NT} N_{NT}^\gamma$
  - ▶ sticky Calvo prices in each sector,  $p(\text{fixed price}) = \theta$  per quarter, flexible wages
- ▶ Home debt relief shocks:
  - ▶ **Lump-sum redistribution** from  $S$  to  $B$  in  $H$  region
  - ▶ Share  $f$  of total debt relief paid for by local  $S$  ( $f = \frac{1}{2}$ : equal incidence)
  - ▶ **Unexpected**, so do not affect interest rates or borrowing ex-ante
  - ▶ (Otherwise) no fiscal policy
  - ▶ Monetary policy is at the ZLB (with standard equilibrium selection)

## GE model: details

- ▶ Agents period utility is  $u(C, N)$ 
  - ▶  $C$  aggregates of  $C_T$  and  $C_{NT}$  with elasticity  $\eta$
  - ▶  $C_T$  and  $C_{NT}$  aggregate intermediates with elasticity  $\epsilon$
  - ▶ Fraction  $\frac{1}{2}$  of tradable intermediates made at  $H$  (no home bias)
  - ▶ Budget constraint of agent  $h$  in region  $i$  at  $t$

$$P_{i,t}C_{i,t}^h + \left(B_{i,t-1}^h - \Delta_{i,t}^h\right) = \frac{1}{1 + I_t}B_{i,t}^h + W_{i,t}N_{i,t}^h + v^h D_{i,t}$$
$$B_{i,t}^h \leq \bar{b}P_{T,t}$$

- ▶ Markets clear:

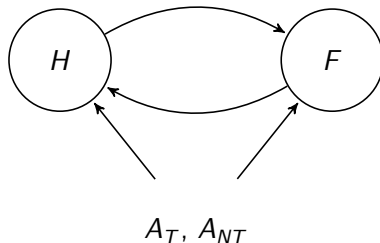
$$N_{i,t} = N_{T,i,t} + N_{NT,i,t}, \quad C_{NT,i,t} = Y_{NT,i,t}$$

$$\varphi^B \left( B_{H,t}^B + B_{F,t}^B \right) + \varphi^S \left( B_{H,t}^S + B_{F,t}^S \right) = 0$$

$$\underbrace{\varphi^S \left( -\Delta_{H,t}^S \right)}_{fDR_t} + \underbrace{\varphi^S \left( -\Delta_{F,t}^S \right)}_{(1-f)DR_t} = \varphi^B (\Delta_{H,t}^B + \Delta_{F,t}^B) \equiv DR_t$$

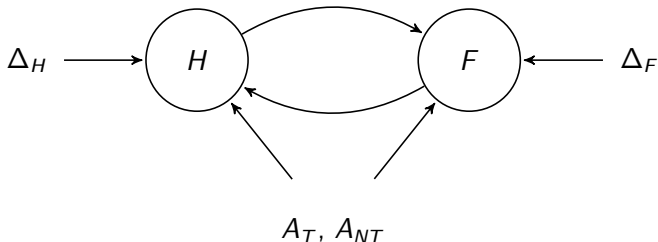
## Connecting model and data 1/2

- Both regions  $H$  and  $F$  subject to common TFP shocks  $A_T, A_{NT}$



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- ▶ Both regions  $H$  and  $F$  subject to common TFP shocks  $A_T, A_{NT}$ 
  - ▶  $H$  region receives treatment  $\Delta_H$  at  $t = 0$ ,  $F$  receives  $\Delta_F$



- ▶ Model symmetric and approx. linear  $\implies$  can write outcome (eg log employment)  $Y_{r,t}$  in region  $r$  as

$$Y_{r,t} = \gamma_r + \lambda_t + \mathcal{M}_H \Delta_{H,t} + \mathcal{M}_F \Delta_{F,t} \quad (1)$$

- ▶  $\mathcal{M}_{r,t} = 0$  for  $t \neq 0$  assuming no anticipation or persistence

## Connecting model and data 2/2

- ▶ Our “true” model puts structure on what DiD estimate gives us
- ▶ Our DiD estimator only identifies *relative* multiplier

$$\frac{(Y_{H,t} - Y_{H,0}) - (Y_{F,t} - Y_{F,0})}{(\Delta_{H,t} - \Delta_{H,0}) - (\Delta_{F,t} - \Delta_{F,0})} = \mathcal{M}_{rel} = \mathcal{M}_H - \mathcal{M}_F$$

- ▶ What issues come up in interpreting this as causal effect of treatment of size  $\Delta$ ?



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- ▶ What issues come up in interpreting this as causal effect of treatment of size  $\Delta$ ?
  - ▶ The “missing intercept problem”
  - ▶ Our policy goal is the **aggregate** multiplier: the causal effect of the aggregate treatment on the aggregate outcome.

$$\mathcal{M}_{agg} = \mathcal{M}_H + \mathcal{M}_F$$

# The missing intercept problem

$$\mathcal{M}_{rel} = \frac{(Y_{H,t} - Y_{H,-1}) - (Y_{F,t} - Y_{F,-1})}{\Delta_H - \Delta_F} = \mathcal{M}_H - \mathcal{M}_F$$

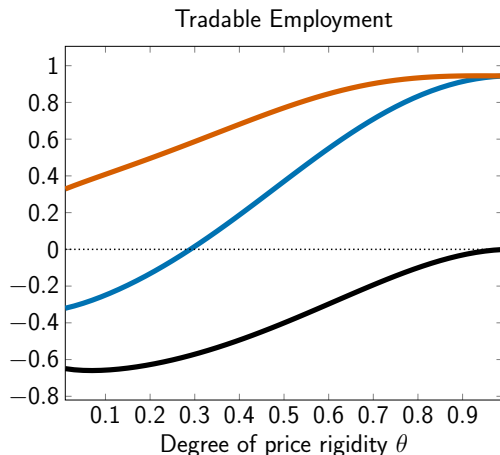
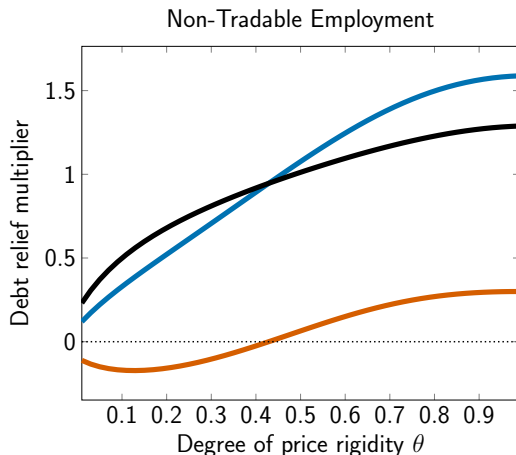
- ▶ Missing intercept problem 1: Baseline treatment
  - ▶ Debt relief in both regions, but only pick up effect of  $\Delta_H - \Delta_F$
- ▶ Missing intercept problem 2: Effect of treatment on control group
  - ▶ Connected regions  $\Rightarrow$  general equilibrium spillovers ( $\mathcal{M}_F \neq 0$ )
- ▶ **Solution:** study impulse response to  $\Delta_H$ , assuming  $\Delta_F = 0$ 
  1. Compare  $\mathcal{M}_{rel}$  to data
  2. Recover  $\mathcal{M}_H$  and  $\mathcal{M}_F$  separately using model
  3. Scale up shock using what we know about  $\Delta_F$

## Four lessons from model

1. Both nontradable *and* tradable multiplier  $\rightarrow$  high aggregate price stickiness
2. Zero tradable multiplier masks large positive responses of both regions
3. At ZLB, nontradable employment response in low-exemption regions is positive
4. Large nontradable debt relief multiplier in model *because* shock is small

# Model multipliers and price rigidity

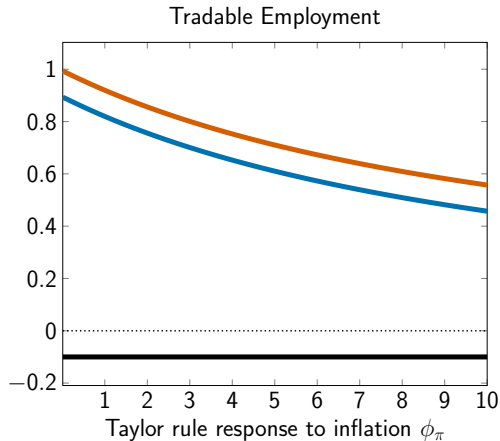
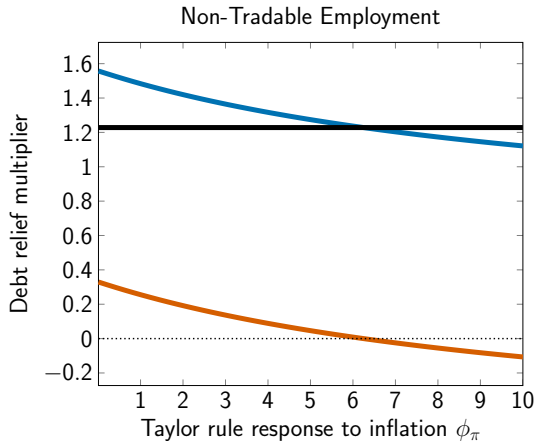
- ▶ Muted relative response of  $T$  requires substantial degree of price rigidity



— Home multiplier ( $\mathcal{M}_H$ ) — Foreign multiplier ( $\mathcal{M}_F$ ) — Relative multiplier ( $\mathcal{M}_{rel}$ )

# Role of monetary policy

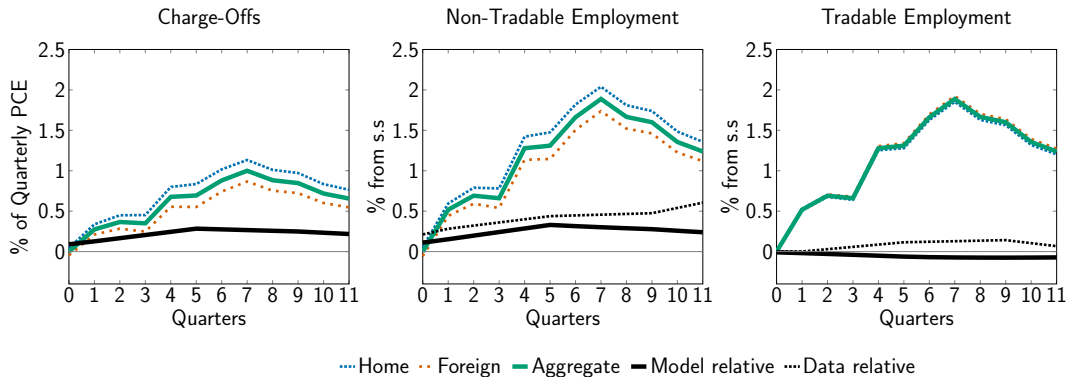
- ▶ Response of monetary policy is important to recover the levels
- ▶ Limited response/ZLB is natural for this period



— Home multiplier ( $\mathcal{M}_H$ ) — Foreign multiplier ( $\mathcal{M}_F$ ) — Relative multiplier ( $\mathcal{M}_{rel}$ )

# Counterfactual employment effect of debt relief

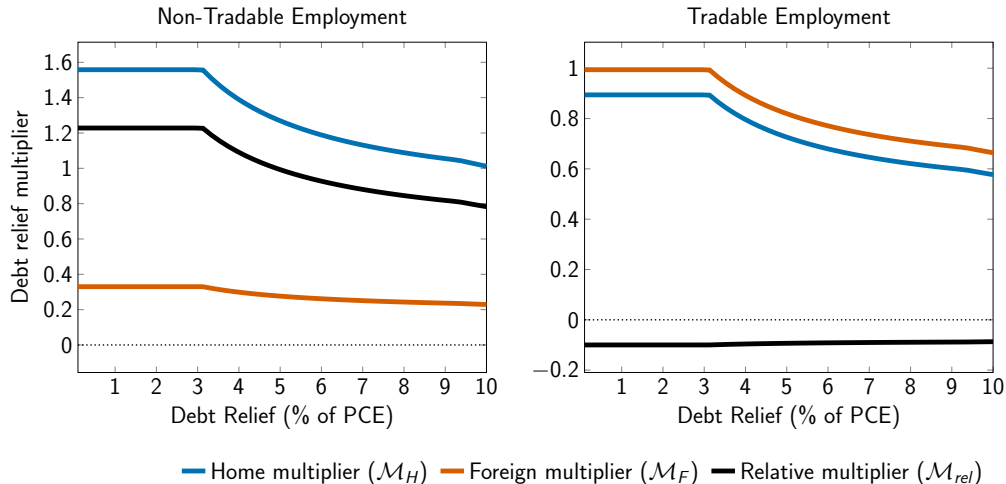
- ▶ Experiment: feed in *sequence* of unanticipated  $\Delta_{H,t}$  and  $\Delta_{F,t}$ 
  - ▶  $\Delta_H - \Delta_F$  is  $1\sigma$  shock and average = data



- ▶ Debt forgiveness increased both  $T$  and  $NT$  employment by  $\simeq 1.5$  percent

# Size counterfactual

- How do debt relief multipliers vary with size of  $DR$ ?



- Borrower consumption concave in  $DR \Rightarrow$  effectiveness falls with size

# Conclusion

- ▶ We find reduced form evidence that more generous debt relief policies increased chargeoffs and  $NT$  employment over the Great Recession
- ▶ The implied short-run cross-state debt relief multiplier is  $\simeq 2$  for  $NT$ ,  $\simeq 0$  for  $T$ 
  - ▶ Substantial nominal rigidities required to rationalize this
- ▶ Model suggests low exemption regions also benefited at the ZLB
  - ▶ Aggregate demand effects are important in evaluating debt relief policy
  - ▶ Suggests recession-contingent debt relief may be optimal
  - ▶ cf Auclert and Mitman (coming soon!)



# Appendix

# Mian-Sufi T/NT categories

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TABLE I  
INDUSTRY CATEGORIZATION<sup>a</sup>

Non-Tradable Industries			Tradable Industries		
NAICS	Industry Name	NT?	NAICS	Industry Name	T?
<i>Panel A: Industry classification based on retail, restaurants, and US—world trade</i>					
7221	Full-service restaurants	1	3261	Plastics product manufacturing	0
7222	Limited-service eating places	1	3231	Printing and related support activities	0
4451	Grocery stores	1	3363	Motor vehicle parts manufacturing	0
4521	Department stores	1	3116	Animal slaughtering and processing	0
4529	Other general merchandise stores	1	3364	Aerospace product & parts manufacturing	1
4481	Clothing stores	0	3327	Machine shops; screw nut & bolt manuf.	0
4461	Health and personal care stores	1	3345	Navigational & control instruments manuf.	0
4471	Gasoline stations	1	3344	Semiconductor and other electronic manuf.	1
7223	Special food services	0	3399	Other miscellaneous manufacturing	0
4511	Sporting goods hobby and music stores	1	5112	Software publishers	1
7224	Drinking places (alcoholic beverages)	0	3391	Medical equipment and supplies manuf.	0
4532	Office supplies stationery and gift stores	1	3222	Converted paper product manufacturing	0
4539	Other miscellaneous store retailers	1	3118	Bakeries and tortilla manufacturing	0
4482	Shoe stores	0	3339	Other general purpose machinery manuf.	0
4512	Book, periodical, and music stores	0	3329	Other fabricated metal product manuf.	0
4452	Specialty food stores	0	3254	Pharmaceutical and medicine manuf.	0
4483	Jewelry luggage and leather goods stores	1	3331	Agriculture and mining machinery manuf.	0
4453	Beer wine and liquor stores	1	3361	Motor vehicle manufacturing	1
4533	Used merchandise stores	1	3251	Basic chemical manufacturing	1
4531	Florists	1	3114	Fruit & vegetable preserving & manuf.	0

(Continues)

A. MIAN AND A. SUFI

## Defining the instrument

For our base year (2007), define the benefit of filing for bankruptcy for individual  $i$  living in state  $s$  as

$$b_i(s) = \text{Dischargeable Debt}_i - (\text{Housing Equity}_i - \text{Exemption}_s)^+ - \text{Filing Cost}$$

and similarly for other exemptions (auto, etc.)

Predictor of household bankruptcy decision [Fay, Hurst and White]

Our instrument is defined (following Mahoney 2015) as

$$\text{Protection}_s \equiv \frac{1}{|I_{-s}|} \sum_{j \in I_{-s}} b_j(s)$$

# Effects of complementarities

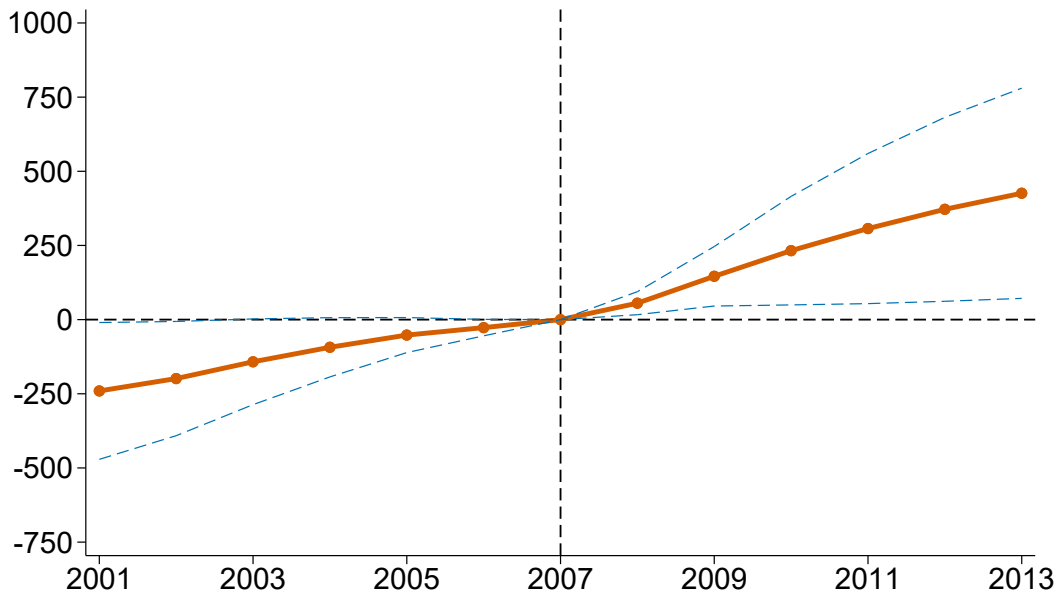
- ▶ In principle, level effects could be much larger
- ▶  $C/N$  complementarities + sticky prices  $\Rightarrow$  large multipliers

# Does it matter who pays?

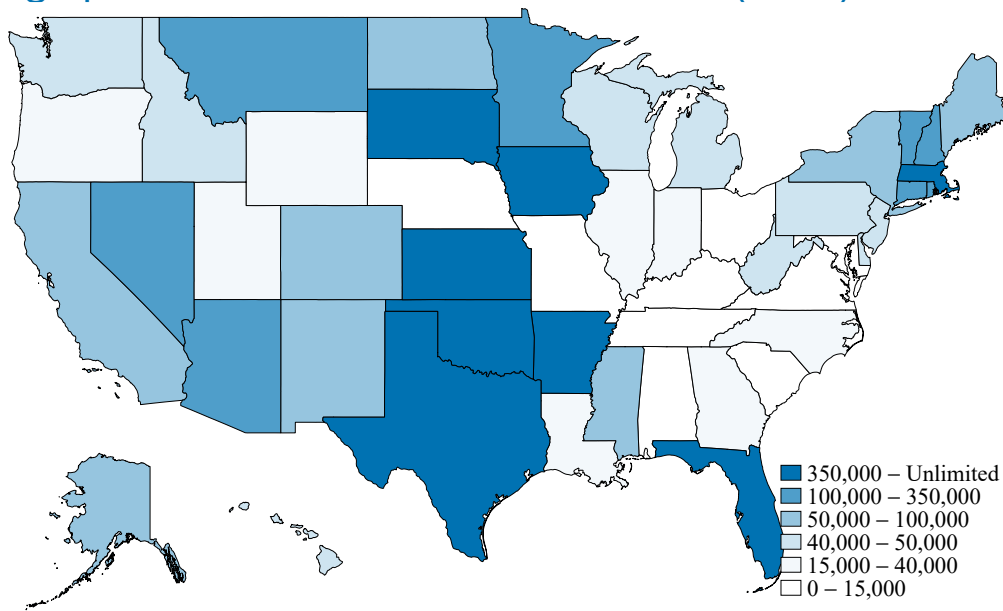
- ▶ Less than you would imagine

[Back](#)

## Cumulative chargeoffs per capita ( $\beta_s$ )



## Geographic distribution of homestead laws (2007)



# Potential Confounders [Back](#)

<i>Panel A: Employment Outcomes</i>	Levels in 2001	Levels in 2007
Non-Tradable Employment	0.014 (0.012)	0.013 (0.009)
Tradable + Other Employment	-0.006 (0.019)	-0.010 (0.020)
Total Employment	-0.002 (0.016)	-0.005 (0.016)



## Potential Confounders [Back](#)

<i>Panel B: Credit Outcomes</i>	Levels in 2001	Levels in 2007
Bankruptcy Rate (p.p.)	−0.020 (0.016)	−0.041** (0.016)
Credit Card Limits (\$)	−2.281 (351.177)	−82.992 (489.225)
Credit Card Debt (\$)	52.226 (49.649)	49.320 (45.253)
Mortgage Debt (\$000)	−0.891 (1.774)	0.130 (4.141)
Foreclosure Rate (p.p.)	0.033 (0.039)	−0.075 (0.060)
Debt-to-Income Ratio	0.005 (0.049)	0.058 (0.138)

## Potential Confounders [Back](#)

<i>Panel C: State Characteristics</i>	Levels in 2001	Levels in 2007
Democratic Vote Share (p.p.)	-0.638 (1.522)	-0.694 (1.944)
Max. Unemp. Benefit (\$)	219.405 (501.763)	133.546 (727.673)
Population < 45 (p.p.)	0.102 (0.890)	0.386 (0.887)
College Educated (p.p.)	0.271 (0.625)	0.124 (0.701)
Market Beta	-0.055 (0.046)	-0.033 (0.042)

<i>Panel C: State Characteristics</i>	Levels in 2001	Levels in 2007
Annual Income per Capita (\$)	221.372 (635.750)	576.162 (887.380)
Log Average House Price	1.258 (0.948)	4.943 (4.973)
Homeowner Share	-1.283** (0.556)	-1.410** (0.584)
Elasticity of Housing Supply		0.042 (0.140)
Recourse Indicator		0.029 (0.063)
Shift-share Shock		0.628*** (0.211)

# Employment Results [Back](#)

	Avg Change	Effect of Bankruptcy Protections			
<i>Panel A: 2008-2010</i>	(1)	(2)	(3)	(4)	(5)
Log Non-Tradable Emp.	-5.178 (6.737)	0.499*** (0.183)	0.399** (0.166)	0.422*** (0.100)	0.433*** (0.100)
Log Tradable + Other Emp.	-7.988 (8.263)	0.162 (0.366)	0.086 (0.330)	-0.125 (0.221)	-0.044 (0.211)
Log Total Emp.	-7.406 (6.919)	0.231 (0.311)	0.156 (0.272)	-0.005 (0.176)	0.061 (0.170)
Number of Observations		161,720	161,720	161,720	155,300
County F.E.		Y	Y	Y	Y
Year-Quarter F.E.		Y	Y	Y	Y
Housing Controls $\times$ YQ F.E.		N	Y	Y	Y
Additional Controls $\times$ YQ F.E.		N	N	Y	Y
Exclude Sand States		N	N	N	Y

# Employment Results [Back](#)

	Avg Change	Effect of Bankruptcy Protections			
<i>Panel B: 2011-2013</i>	(1)	(2)	(3)	(4)	(5)
Log Non-Tradable Emp.	5.300 (5.896)	1.096*** (0.228)	0.842*** (0.268)	0.941*** (0.241)	0.941*** (0.241)
Log Tradable + Other Emp.	3.740 (8.224)	-0.103 (0.455)	-0.075 (0.404)	-0.249 (0.275)	-0.249 (0.275)
Log Total Emp.	4.056 (6.712)	0.139 (0.337)	0.130 (0.308)	0.018 (0.212)	0.018 (0.212)
Number of Observations		161,720	161,720	161,720	155,000
County F.E.		Y	Y	Y	Y
Year-Quarter F.E.		Y	Y	Y	Y
Housing Controls $\times$ YQ F.E.		N	Y	Y	Y
Additional Controls $\times$ YQ F.E.		N	N	Y	Y
Exclude Sand States		N	N	N	N

## Charge-offs Results

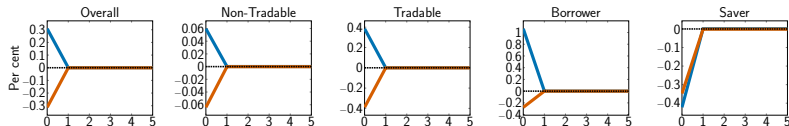
	Avg Change	Effect of Bankruptcy Protections			
<i>Panel A: 2008-2010</i>	(1)	(2)	(3)	(4)	
Charge-Offs in Full Sample	124.775 (199.676)	50.385 (35.896)	54.503** (22.779)	38.177*** (9.016)	33 (9)
Charge-Offs for Homeowners	242.352 (360.046)	77.499 (61.751)	80.459** (39.185)	55.587*** (13.294)	53 (16)
Charge-Offs for Renters	-11.849 (104.352)	24.626* (14.019)	22.579** (10.733)	15.272* (8.916)	10 (3)
Number of Observations		161,720	161,720	161,720	15
County F.E.		Y	Y	Y	
Year-Quarter F.E.		Y	Y	Y	
Housing Controls $\times$ YQ F.E.		N	Y	Y	
Additional Controls $\times$ YQ F.E.		N	N	Y	
Exclude Sand States		N	N	N	

## Charge-offs Results

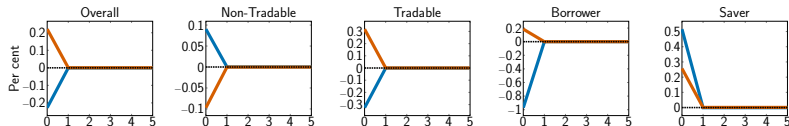
	Avg Change	Effect of Bankruptcy Protections			
<i>Panel B: 2011-2013</i>	(1)	(2)	(3)	(4)	
Charge-Offs in Full Sample	-241.672 (174.642)	31.714 (27.598)	33.691* (18.338)	22.861*** (6.916)	22 (7)
Charge-Offs for Homeowners	-400.601 (290.675)	47.585 (51.431)	49.411 (32.105)	29.151*** (10.418)	29 (11)
Charge-Offs for Renters	-91.944 (139.866)	9.889 (7.273)	9.325 (6.480)	8.088* (4.157)	7 (3)
Number of Observations		161,720	161,720	161,720	15
County F.E.		Y	Y	Y	
Year-Quarter F.E.		Y	Y	Y	
Housing Controls $\times$ YQ F.E.		N	Y	Y	
Additional Controls $\times$ YQ F.E.		N	N	Y	
Exclude Sand States		N	N	N	

# Impulse response with flexible prices ( $\Delta_{H,0} = 1\% \times Y$ )

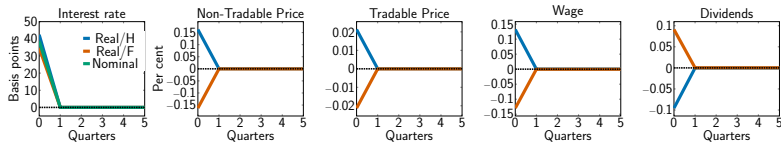
Panel A: Consumption



Panel B: Employment



Panel C: Other Outcomes

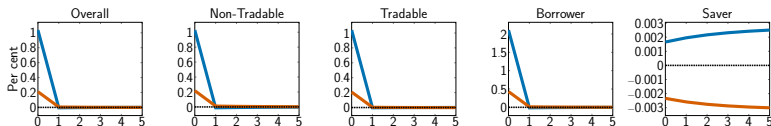


— Home — Foreign

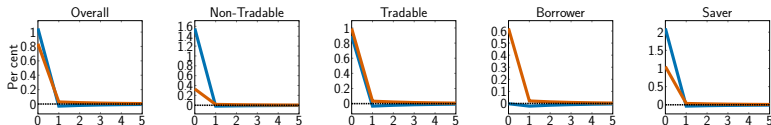


# Impulse response with sticky prices ( $\Delta_{H,0} = 1\% \times Y$ , $\theta = 0.8$ )

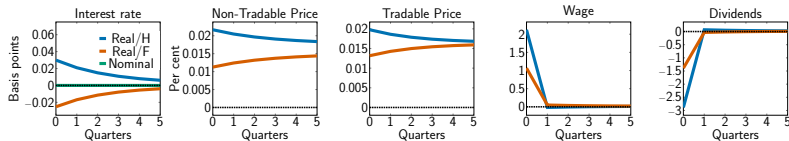
Panel A: Consumption



Panel B: Employment



Panel C: Other Outcomes



— Home — Foreign

# Model: benchmark calibration

	Parameter (Quarterly frequency)	Value	Target
$\varphi^B$	Frac. of borrowers in each region	0.5	Symmetry
$\beta^S$	Saver discount factor	0.983	7% (yoy) interest rate
$\beta^B$	Borrower discount factor	0.95	
$u(C, N)$	Utility function	$\log C - \chi_h N^2$	Standard calibration
		$\log(C - \chi_h N^2)$	GHH calibration
$1 - \alpha$	Tradable share	0.236	Data
$\eta$	Subst. between $T$ and $NT$	2	Standard value
$\epsilon$	Subst. within $T$ and within $NT$	10	Standard value
$\gamma$	Labor sh. in prod. of $T$ and $NT$	0.66	Standard value
$\theta$	Fraction of firms with fixed price	$[0, 1]$	
$v^B$	Shares owned by borrowers	1	
$\bar{b}/C$	Debt limit (% of annual GDP)	16.67%	avg debt/GDP=8.33%
$f$	Incidence of debt relief	0.5	Symmetry
$I_t$	Monetary policy rule	0	ZLB