

Consumer Bankruptcy, Mortgage Default, and Labor Supply

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November 30, 2017

Introduction

- Consumers suffer from **shocks**.
Unemployment, medical expenses, house price crash, divorce, etc.
- Bankruptcy and Mortgage Default provide **insurance** against shocks.
 - In the US, Bankruptcy and default institutions vary greatly by state.
 - Bankruptcy provides different incentives depending on home equity and state law.
 - Must model **housing** to understand bankruptcy policy reforms.
- **Credit supply**, on the other hand, suffers from **moral hazard**.

Research Questions

- 1 How does Consumer Bankruptcy interact with Mortgage Default?
- 2 How do both interact with Labor Supply?
- 3 How to balance consumer protection against tightening credit supply?
- 4 What are the implications for welfare and labor supply of the 2005 *Bankruptcy Abuse Prevention and Consumer Protection Act*, **BAPCPA**, reform?

Contribution

- First life-cycle model with
 - ① Housing
 - ② Consumption and Saving/Borrowing
 - ③ Labor Supply
 - ④ Bankruptcy and Mortgage Default
- We model in great detail chapter 7 vs chapter 13 bankruptcies.
- We show the effects of BAPCPA on labor supply.

Related Literature

Bankruptcy:

- Mitman (2016)
- Livshits et al. (2007)
- Chatterjee et al. (2007)
- Pavan (2005)
- Li and White (2009)

Housing:

- Attanasio et al. (2012)
- Chambers et al. (2007)

Consumer Bankruptcy in the US

There are two relevant chapters in the US Bankruptcy Code for *personal* bankruptcy:

1 Chapter 7:

- Full debt discharge.
- Home equity protected from seizure up to **Homestead exemption** level.
- Exemption ranges from 0 in Maryland to ∞ in Texas.

2 Chapter 13:

- Debt restructuring plan with scheduled **repayments**.
- House and other assets are not seized.

Homestead Exemption Example

	Maryland	Texas
House Value	\$300,000	\$300,000
Mortgage	\$250,000	\$250,000
Equity	\$50,000	\$50,000
Homestead Exemption	0	∞
Unsecured Debt	\$25,000	\$25,000
Result of Bankruptcy	Forced Sale	Keep House

BAPCPA 2005

Bankruptcy Abuse Prevention and Consumer Protection Act 2005

- Based on banking sector's presumption of widespread fraud, BAPCPA aims at decreasing generosity of bankruptcy.
- Introduces a Means Test: Can only file for chapter 7 if income below state median.
- Increases chapter 7 financial filing costs.
- Homestead exemption cap: Regardless of state level, can exempt max. \$ 125k.
- The definition of abuse is extended.

The Link between Bankruptcy and Default

- Credit Bureau (Equifax) Data has LTV and bankruptcy indicator.
- (Rates are not nationally representative.)

Period	Annual Bankruptcy Rates, Equifax		
	All LTV	LTV > 95	LTV < 95
2004-2012	0.1164	0.21	0.1
Pre 2006	0.015	0.047	0.012
Post 2006	0.12	0.22	0.11

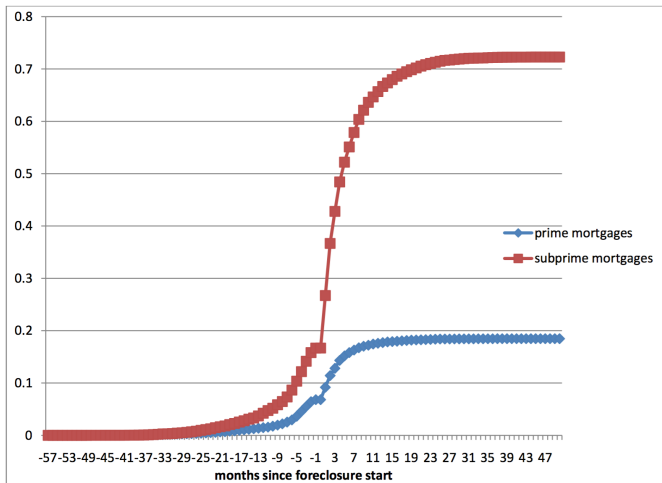
Homeowners with Mortgages only

The Link between Bankruptcy and Default

- Li and White (2009) measure the occurrence of bankruptcy after default (and vice versa).
- Both choices alleviate pressure on budget constraint.
- Legal provisions allow to convert undischarged mortgage debt into unsecured debt (precisely a lender's **recourse**).
- They find that the **correlation** between bankruptcy and mortgage default is **0.6** and **0.86** for **prime** and **subprimes**, respectively.
 - 77% (94%) of owners end up defaulting on their prime (subprime) mortgages after they file for bankruptcy

Li and White (2009)

Homeowners' Cumulative Bankruptcy Filing Rate Conditional on Foreclosure



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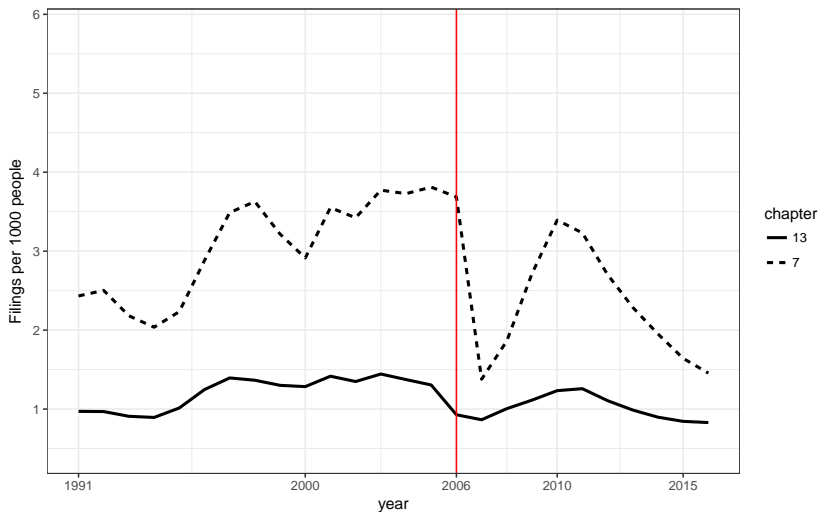
Bankruptcy Trend

Source: American Bankruptcy Institute, All Non-business Filings



Bankruptcy Trends by Chapter

Source: American Bankruptcy Institute

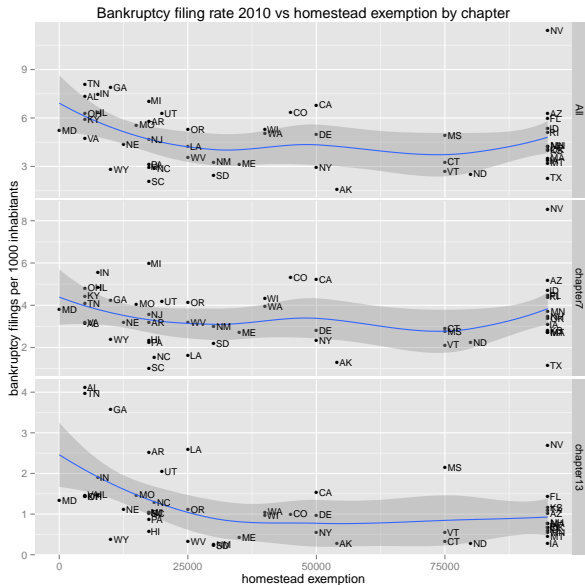


Homestead Exemption and Bankruptcy Rates

Why don't we see more bankruptcy with higher Homestead Exemption? Credit Rationing:

- Gropp et al. (1997)
- Pavan (2005)
- Li and Oswald (2017)
- Lenders react to institutions.

Homestead Exemption and Bankruptcy Rates



Why don't we see more bankruptcy with higher Homestead Exemption? Credit Rationing:

- Groppe et al. (1997)
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- **Lenders react to institutions.**

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Model Outline

- Lifecycle model with preferences over consumption, housing and leisure.
- Two assets: unsecured $a \in \mathbb{R}$ and secured $m \in \mathbb{R}_+$.
- Different set of discrete choices for renters and owners.
- Interest on $a < 0$ is endogenously priced.
- Interest on m is fixed.
- Exogenous wage process by education e - given wage w , choose hours worked.

Utility

Agents choose:

- consumption c
- hours supplied to labor market $l \in \{l_1, \dots, l_L\} \equiv \mathcal{L}$, and
- housing floorspace $h \in \{\underline{h}, h_1, \dots, \bar{h}\} \equiv \mathcal{H}$ with $\mathbf{H} \equiv \mathbf{1}[h > \underline{h}]$:

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- housing floorspace $h \in \{\underline{h}, h_1, \dots, \bar{h}\} \equiv \mathcal{H}$ with $\mathbf{H} \equiv \mathbf{1}[h > \underline{h}]$:

$$u(c, l, h) = \frac{\left(c^\omega (L - l - \mathbf{1}[l > 0]\theta_P)^{1-\omega} \right)^{1-\gamma}}{1 - \gamma} \exp(\theta_H h) + \mathbf{H}\mu h$$

where

- Leisure is $L - l - \mathbf{1}[l > 0]\theta_P$, and L is the leisure endowment
- θ_P is a fixed cost of participation
- θ_H strength of housing preference
- μ warm glow ownership utility

House Prices and Wages

- Prices are similar to Mitman (2016): no aggregate shocks.
- Every individual i 's house value varies *idiosyncratically*.

$$p_{i0} = 1$$

$$p_{it} = \rho_p p_{it-1} + \epsilon_{it-1}$$

$$\epsilon_{it} \sim N(0, \sigma_p^2)$$

- Wages as in De Nardi et al. (2016):

$$\ln w_{itj} = d_j + e_i + f(t)^e + \eta_{itj}^e$$

$$i = 1, \dots, N; t = 25, \dots, 60; j = 1968, \dots, 2013$$

Financial Markets

1 Unsecured Debt: $a' < 0$

- Unsecured credit institutions extend one-period discount bonds $a' < 0$ to consumers
- They know bankruptcy is an option, hence take that into account when pricing **each individual** loan.
- We assume free entry, hence zero expected profit on each loan.

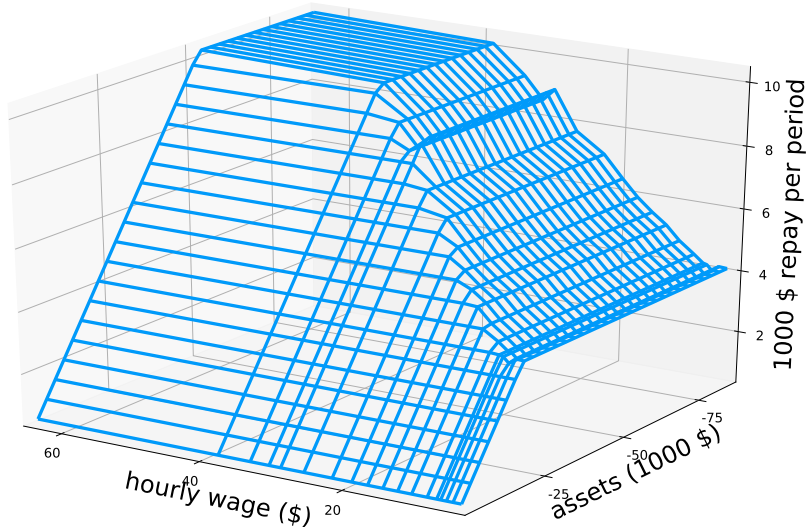
2 Mortgage Lenders: m

- Offer a **unique** fixed rate mortgage (FRM). Mortgage vintage is state variable.
- They charge a fixed rate $r^m = r + \hat{r}$, r the risk-free rate, \hat{r} an exogenous default premium.

Unsecured Debt: Eaton and Gersovitz (1981)

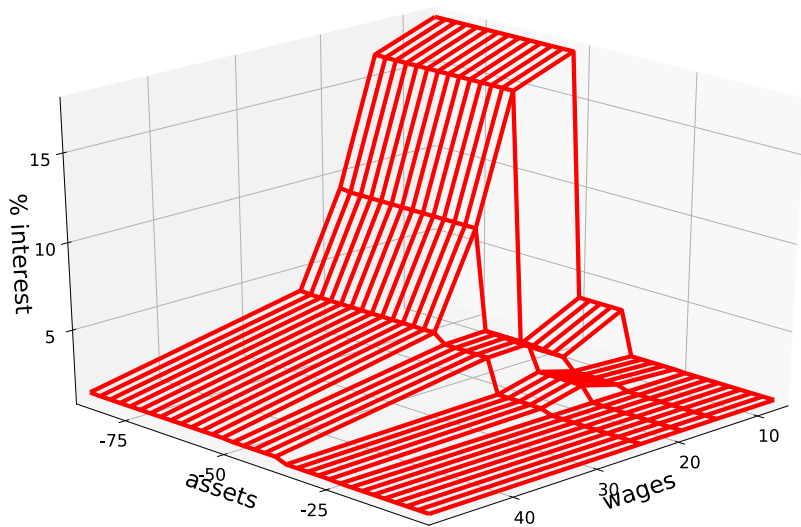
- We follow Eaton and Gersovitz (1981).
- A negative asset choice $a' < 0$ implies unsecured borrowing.
- For a consumer with state vector X , the interest rate for loan $a' < 0$ depends on the **probability of bankruptcy** $\pi(a'|X)$
- There is **no unobserved** state variable, i.e. full information, and bank can compute π .
- Consumer promises to return $-a' > 0$ units of consumption good to the bank tomorrow . . .
- . . . in exchange for $\frac{q(a'|X)}{1+r}$ units of consumption today.

Chapter 13 Repayment function at age 1: $\bar{y}_1(a, w)$



Implied Interest Rate

$$\frac{q(a'|X)}{1+r} = \frac{a'}{1+r} \implies \frac{1+r}{q(a'|X)} a' = \text{interest}$$



Bankruptcy and Mortgage Default for Consumers

- Consumers enter **bankruptcy punishment state** upon filing for bankruptcy:
 - 1 Exclusion from credit market: $a' \geq 0$, no new mortgage.
 - 2 Suffer a non-monetary utility loss λ .
 - 3 Lasts T_{bk} periods on average. Exit with prob δ .
- If not in that state, they have the option to file every period.
- **Filing** means that $a = 0$, and that the future value comes from the punishment state.
- **Defaulting** on the mortgage means that $m = 0$, $\mathbf{H} = 0$. There may follow a deficiency judgment if **recourse** is allowed. (Any Remaining negative equity would be forwarded to next period as unsecured debt.)

Discrete Choices in Non-punishment State

Renters: Value function W

- 1 Rent,
- 2 Buy,
- 3 File chapter 7, and
- 4 File chapter 13 bankruptcy.

Owners: Value function V

- 1 Stay,
- 2 Sell,
- 3 Default,
- 4 File chapter 7,
- 5 File chapter 13,
- 6 File chapter 7 *and* Default.

Discrete Choices in Non-punishment State

Renters: Value function W

- 1 Rent,
- 2 Buy,
- 3 file chapter 7, (if $a < 0$)
- 4 file chapter 13 bankruptcy. (if $a < 0$)

Owners: Value function V

- 1 Stay,
- 2 Sell,
- 3 Default, (if equity < 0)
- 4 file chapter 7, (if $a < 0$)
- 5 file chapter 13 bankruptcy. (if $a < 0$)
- 6 File chapter 7 *and* Default. (if $a < 0$ and equity < 0)

Discrete Choices in Non-punishment State

Renters: Value function W

- 1 Rent,
- 2 Buy,
- 3 ~~file chapter 7, (if $a < 0$)~~
- 4 ~~file chapter 13 bankruptcy. (if $a < 0$)~~

Owners: Value function V

- 1 Stay,
- 2 Sell,
- 3 Default, (if equity < 0)
- 4 ~~file chapter 7, (if $a < 0$)~~
- 5 ~~file chapter 13 bankruptcy. (if $a < 0$)~~
- 6 ~~File chapter 7 and Default. (if $a < 0$ and equity < 0)~~

Renter Conditional Value Function

Discrete Choice: Rent

- Today's interest rate depends on tomorrow's likelihood of bankruptcy.
- Stay on as renter, pay rent x , and tomorrow's value is W_{t+1}
- $q_t(a'|w)$ takes into account expected chapter 13 repayments given (a', w) .

$$W_t^{\text{rent}}(a, w) = \max_{\substack{a' \in \mathbb{R} \\ l \in \mathcal{L}}} u(c, l, \underline{h}) + \beta E_{w'|w, t} [W_{t+1}(a', w')]$$

s.t.

$$c + \frac{q_t(a'|w)}{1+r} = wl + a - x$$

$$\pi^7(a'|w) = E_{w'|w, t} [I_{t+1}^7(a', w')]$$

$$\pi^{13}(a'|w) = E_{w'|w, t} [I_{t+1}^{13}(a', w')]$$

Renter Conditional Value Function

Discrete Choice: *File 13*

- Tomorrow's value is W_{t+1}^{13} , which depends on **repayment \bar{y}**
- no savings choice in period of filing: $a = a' = 0$.
- Utility penalty $\lambda \in [0, 1]$

$$W_t^{\text{file } 13}(a, w) = \max_{l \in \mathcal{L}} u(c\lambda, l, \underline{h}) + \beta E_{w'|w, t} \left[W_{t+1}^{13}(\bar{y}(a, w), 0, w') \right]$$

s.t.

$$c - 0 = wl + 0$$

Datasets Used

We want to match a series of aggregate moments by age and education for the period 2000–2006, i.e. pre-BAPCPA (and housing crash).

- Wage, Ownership Rate and Hours worked age profiles from PSID.
- Aggregate Bankruptcy rates from ABI.
- Default Rates: EquiFax 90+ days in default.
- Variation in legal environment: choose a baseline set of states.

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Estimation

- We do standard SMM.
- Parameters λ^e and θ_H^e vary by education groups high/low education.
- **high** education: 14+ years.
- The moment function contains all aggregate moments.
- Age profiles of ownership and hours not in the objective function for now, but out of sample test.
- **Will report only low education results here!**
Please refer to my website for long presentation/paper.

Parameter Estimates

		Estimate	Std. error
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Utility: c, l and h

Weight of consumption	ω	0.61	-
CRRA	γ	2.1	-
Fixed Cost of Participation	θ_P	800	-
Housing utility parameter (high)	θ_H^h	-0.136	-
Housing utility parameter (low)	θ_H^l	-0.138	-
Warm glow utility of housing	μ	0.01	-

Utility: Bankruptcy

Ch. 13 Consumption penalty (high)	λ_{13}^h	1	-
Ch. 13 Consumption penalty (low)	λ_{13}^l	0.842	-
Ch. 7 Consumption penalty (high)	λ_7^h	0.829	-
Ch. 7 Consumption penalty (low)	λ_7^l	0.7	-
Bequest penalty if BK	θ_{BK}	12.1	-

Exogenously Set Parameters

Prob of exit from bankruptcy state	δ	0.2
2003 Median household income 1000 USD		43
Risk free gross interest rate	$1 + r$	1.02
Discount factor	β	0.95
Rental price of housing	p_r	0.02
fixed cost of selling	ϕ	0.06
Probability of deficiency	ψ	0.1
Homestead exemption modulo median income	ζ	1
Downpayment ratio	χ	0.1
Mortgage interest rate	r_m	0.06
Annual hours worked full time	l_L	2277
Annual leisure endowment (hours)	L	4000
House price shock persistence	ρ_p	0.96
House price shocks SD	σ_p	0.15

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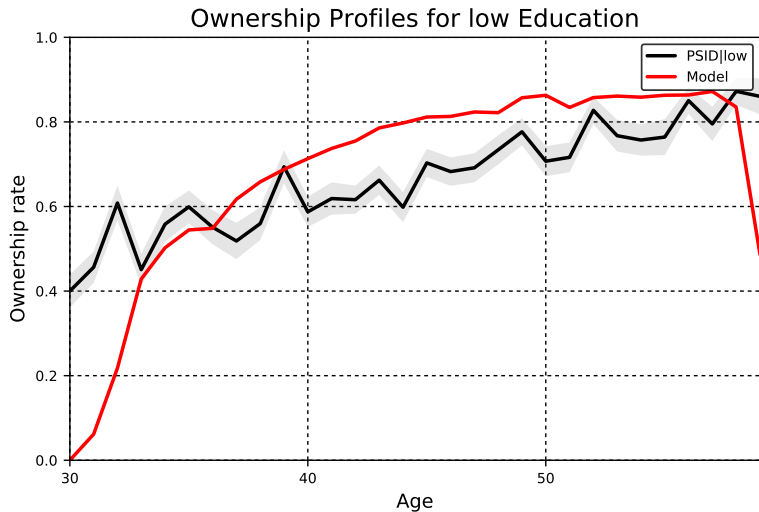
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Aggregate Moments for Low Education

Aggregate Moments for low Education		
Moment	Model	Data
Bankruptcy	4.931	4.978
Bankruptcy 7	3.618	3.533
Bankruptcy 13	1.313	1.362
Default	0.84	0.847
Homeownership	67.589	67.81
Hours	2176.7	2072.05

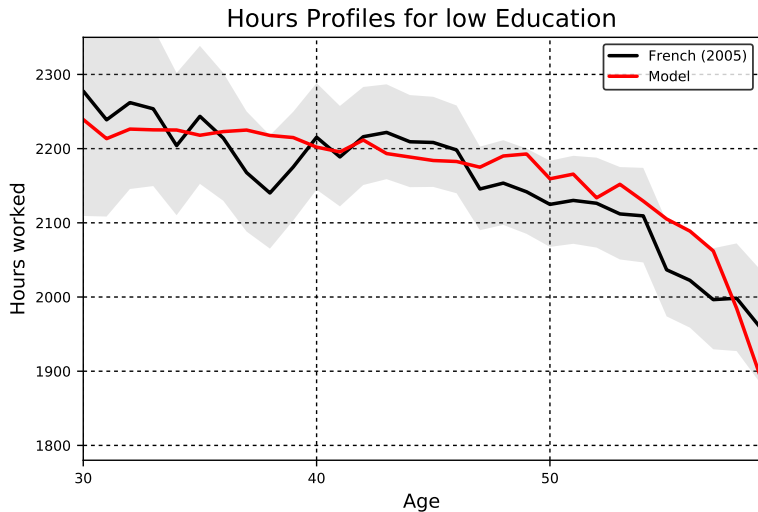
Ownership Profiles

Low Education



Hours Profiles

Low Education



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Implementation

- Meanstest: only people below state median income can file chapter 7.
- Homestead cap: Homestead exemption cannot exceed \$125,000
- Filing for chapter 7 now incurs greater filing costs: set to 2% of median income (as in Mitman (2016))
- Compare two steady states: **Baseline** vs **BAPCPA**, keeping shock sequences fixed.

BAPCPA Aggregate Results: Low Education

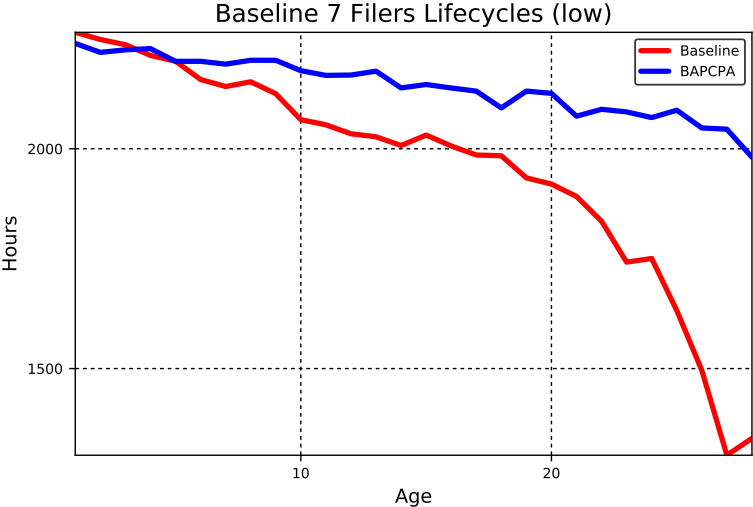
Experiment: BAPCPA

Moment	Baseline	BAPCPA
Bankruptcy	4.931	3.828
Bankruptcy 7	3.618	3.286
Bankruptcy 13	1.313	0.542
Default	0.84	0.828
Homeownership	67.589	67.768
Hours	2176.7	2175.33
Interest	1.107	1.095
median($a file$)	-1.091	-1.152
$\mathbb{E}[V t = 1]$	-28.515	-28.372

Results for low Education

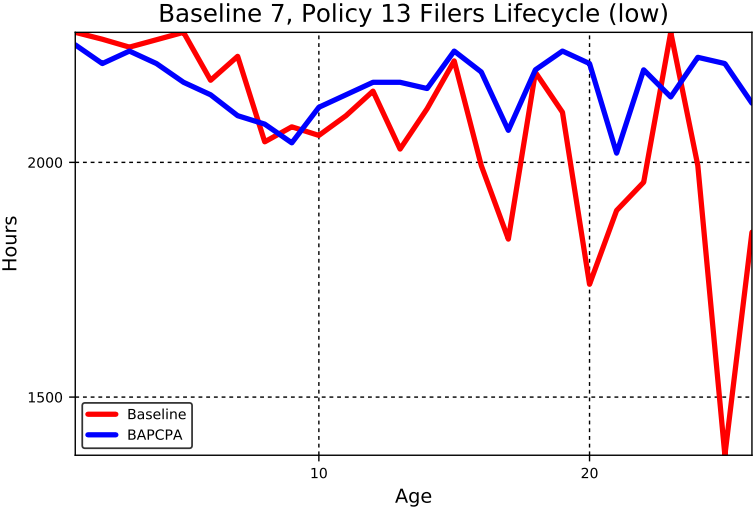
BAPCPA – Labor Supply

Lifecycle profile for people who filed 7 in baseline (Low)



BAPCPA – Labor Supply

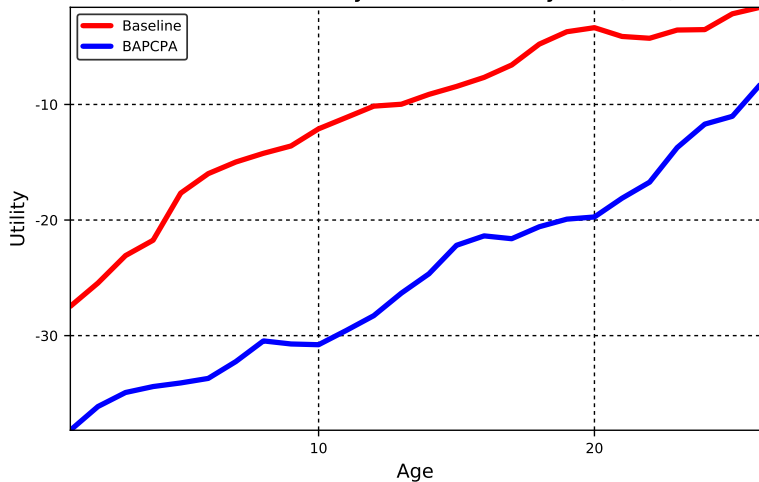
filed 7 in baseline, 13 in policy (Low)



BAPCPA - Utility

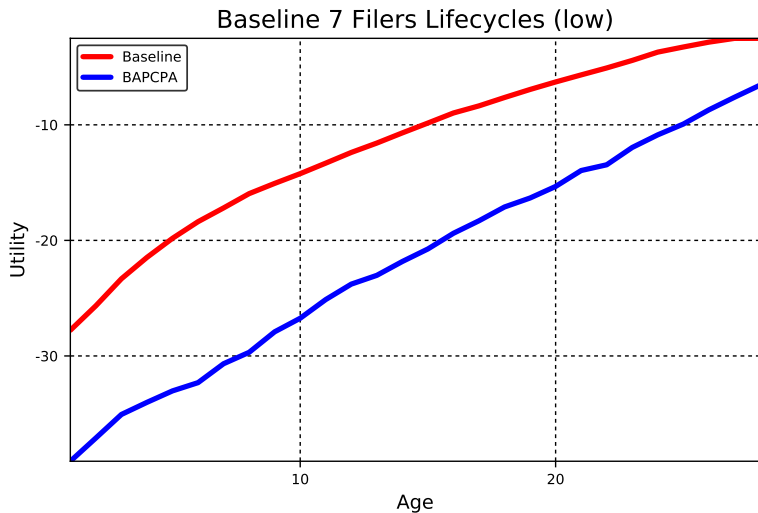
filed 7 in baseline, 13 in policy (Low)

Baseline 7, Policy 13 Filers Lifecycles (low)



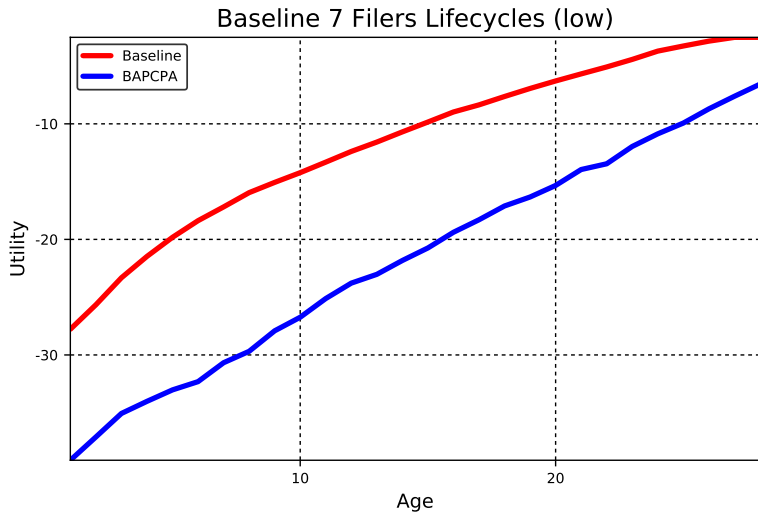
BAPCPA - Utility

Lifecycle profile for people who filed 7 in baseline (Low)



BAPCPA - Utility

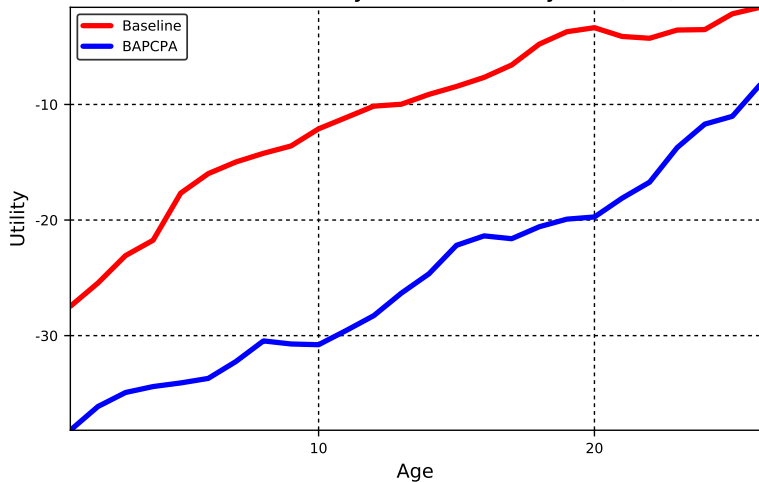
Lifecycle profile for people who filed 7 in baseline (Low)



BAPCPA - Utility

filed 7 in baseline, 13 in policy (Low)

Baseline 7, Policy 13 Filers Lifecycles (low)



Conclusion

- We constructed a model to analyse the BAPCPA reform.
- We are able to fit the main data moments.
- The policy has negligible impact on aggregate welfare.
- The affected population of filers, however, has greatly reduced utility.
- Their labor supply strongly increases.

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