Consumer Bankruptcy as Aggregate Demand Management

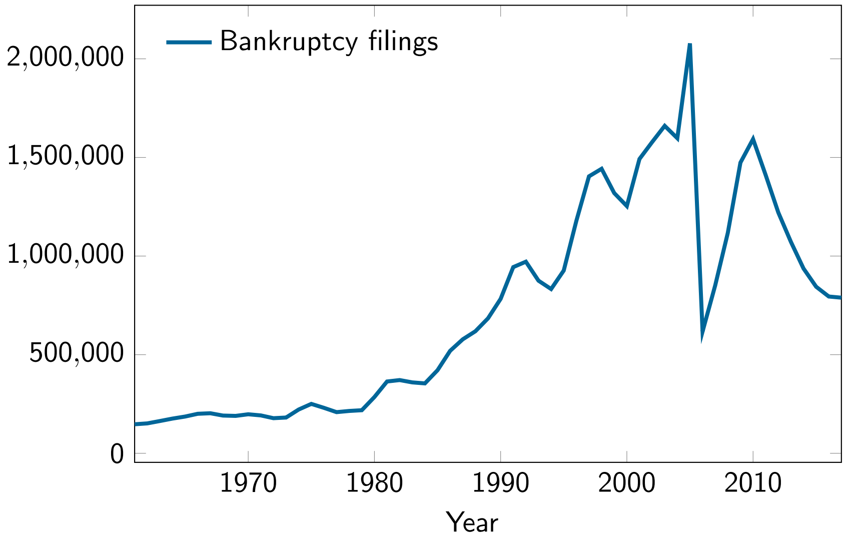
Adrien Auclert Kurt Mitman

Stanford IIES

December 2021

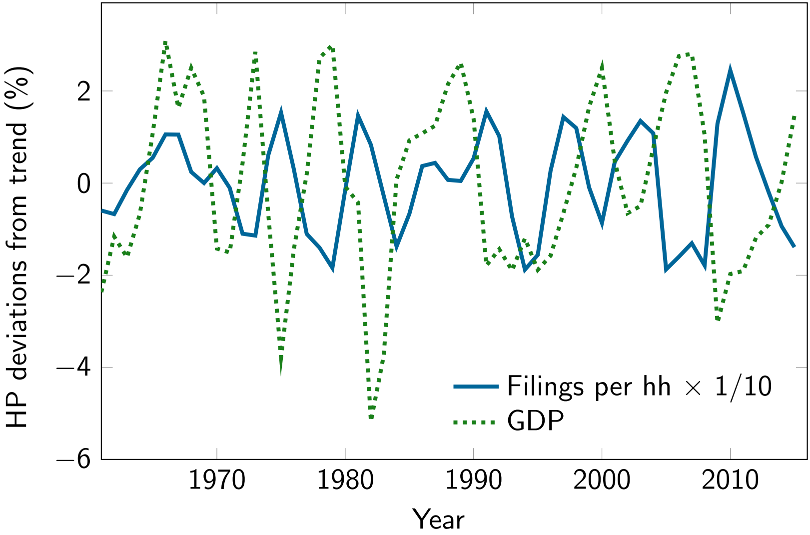
Consumer bankruptcy in the U.S.

- Common phenomenon...



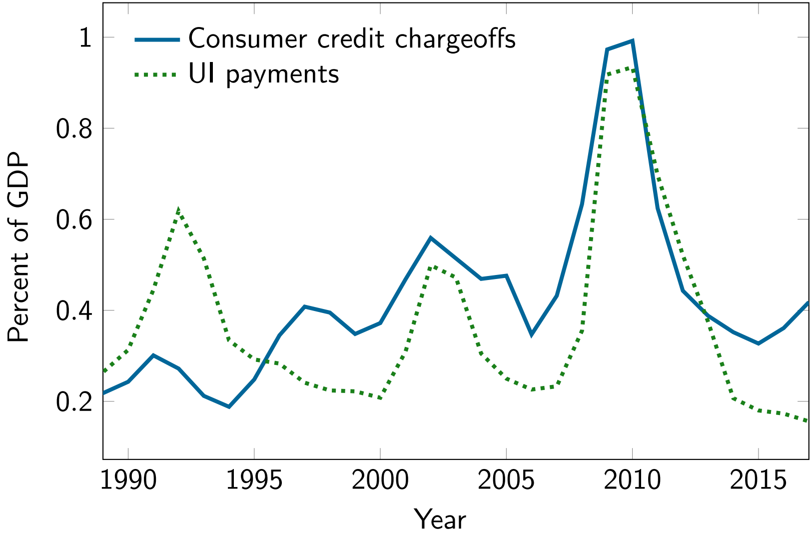
Consumer bankruptcy in the U.S.

- Common phenomenon, and highly countercyclical



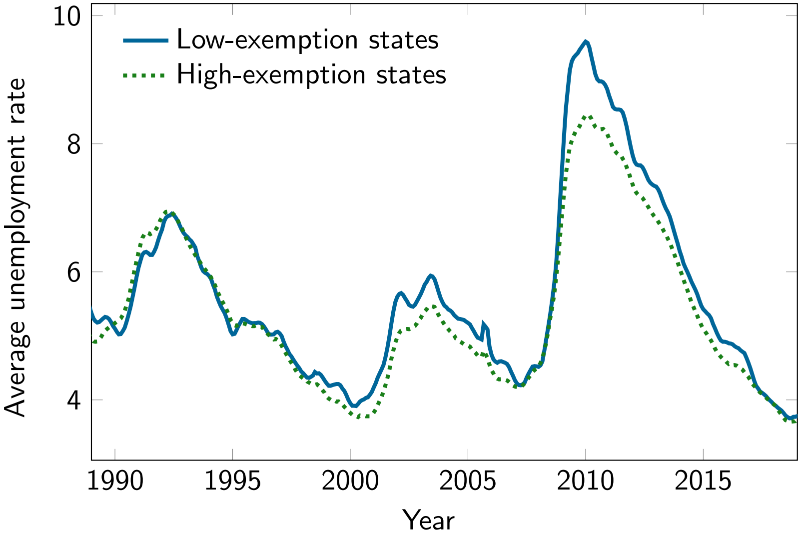
Consumer bankruptcy in the U.S.

- Credit relief comparable to unemployment insurance in magnitude



Consumer bankruptcy in the U.S.

- More generous states less sensitive to the cycle more



Consumer bankruptcy and aggregate stabilization

- In the data:
  a) Consumer bankruptcy is large and countercyclical
  b) Downturns tend to be less severe when there is more debt relief, at least across regions [Verner-Gyongyosi 2019, Auclert et al 2021]

- **Q**: To what extent does bankruptcy act as an *automatic stabilizer*?

- Our paper: a framework + quantitative theory to answer this Q
  1. Define what an automatic stabilizer *is*
  2. Show that consumer bankruptcy has the features of one
  3. Quantitatively evaluate the extent to which bankruptcy reduces the magnitude of output fluctuations, and effect of alternative policy rules

Related literatures

- Automatic stabilizers and the business cycle
  - IS-LM: income tax, govt spending [Musgrave-Miller 1948, Christiano 1984]
  - HANK: income tax [McKay-Reis 2016], UI [McKay-Reis 2020, Kekre 2021]
- Quantitative literature on consumer bankruptcy
  - Insurance vs credit access [Zame 93, Livshits et al 07, Chatterjee et al 07, ...]
  - Add business cycle fluctuations [Nakajima Rios-Rull 16, Fieldhouse et al 11]
  - Add nominal rigidities [new!]

Outline

1. Automatic stabilizers in a two period framework
2. Consumer default as an automatic stabilizer
3. Quantitative evaluation

Outline

1. Automatic stabilizers in a two period framework
2. Consumer default as an automatic stabilizer
3. Quantitative evaluation

Overview

- **Q:** What is an automatic stabilizer?

"I know it when I see it"

- A two period model offers the following practical definition:
  1. A form of transfer that systematically increases when GDP declines...

$$\epsilon_s = \frac{\partial s}{\partial y} < 0$$

  2. ...such that the induced redistribution mitigates the decline:

$$MPC_s^R - MPC_s^G > 0$$

- Examples of s: government spending, income tax revenue shortfall
- $\epsilon_s > 0$ is a destabilizer (e.g. Fisher debt deflation)

Model setup: households

- Two periods $t = 0, 1$ (short and long-run)
  - Production in period 0: $y_0 = A_0 n_0$, flex prices, partially rigid wages
  - Endowment in period 1: $y_1 = 1$
- I groups of heterogeneous agents, mass μ^i each
  - discount factor β^i, borrowing constraint $\overline{b_1^i}$, inequality e_0^i, risk $e_1^i \sim F^i$
  - taxed according to HSV retention function $z_{it} = \kappa_t (y_{it})^\lambda$; $z_t \equiv E[z_{it}]$
  - write $\Theta \equiv \left(\beta^i, \overline{b_1^i}, e_0^i, F^i\right)$
- **Consumption function** $c_0(z_0, z_1, \Theta) \equiv \sum_i \mu^i c_0^i(z_0, z_1, \Theta)$, with

$$c_0^i(z_0, z_1, \Theta) = \arg\max_{b_1^i \leq \overline{b_1^i}} u\left(c_0^i\right) + \beta^i \mathbb{E}\left[u\left(c_1^i\right)\right]$$

$$c_0^i = \frac{\left(e_0^i\right)^\lambda}{\mathbb{E}\left[\left(e_0^i\right)^\lambda\right]} z_0 + \frac{1}{R} b_1^i; \quad c_1^i = \frac{\left(e_1^i\right)^\lambda}{\mathbb{E}\left[\left(e_1^i\right)^\lambda\right]} z_1 - b_1^i$$

Monetary and fiscal policy and equilibrium

- **Monetary policy**: set real rate R and $P_1 = P_0$
- **Fiscal policy**:
  - Period 0: govt spending rule $g_0(y_0)$, tax revenue rule $t_0(y_0)$
  - Period 1: constant g_1, t_1 is residual to ensure:

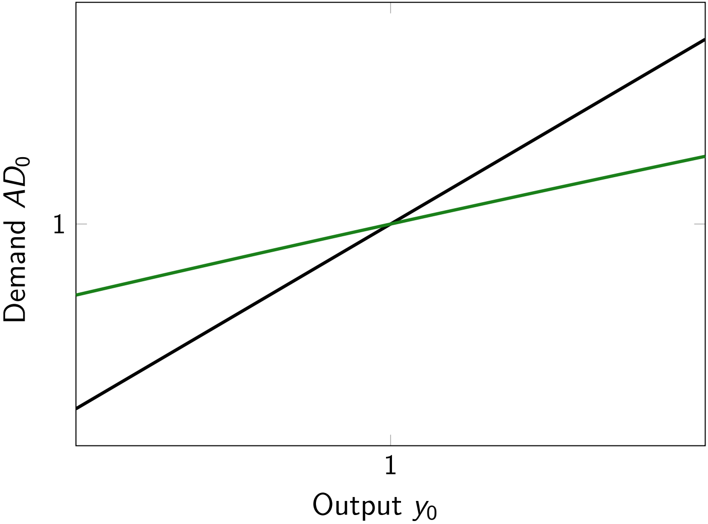
$$t_0(y_0) + \frac{t_1}{R} = g_0(y_0) + \frac{g_1}{R} \qquad \text{(GIBC)}$$

  - (t_0, t_1) levied by changing tax schedule intercepts κ_0, κ_1
  - Empirically relevant case: $g_0' < 0$, $t_0' > 0$ (e.g. from constant κ_0)
- Aggregate post-tax income in period t: $z_t = y_t - t_t$
- **Equilibrium** for given Θ is y_0 that solves:

$$AD_0(y_0, t_0(y_0), g_0(y_0), \Theta) = y_0$$

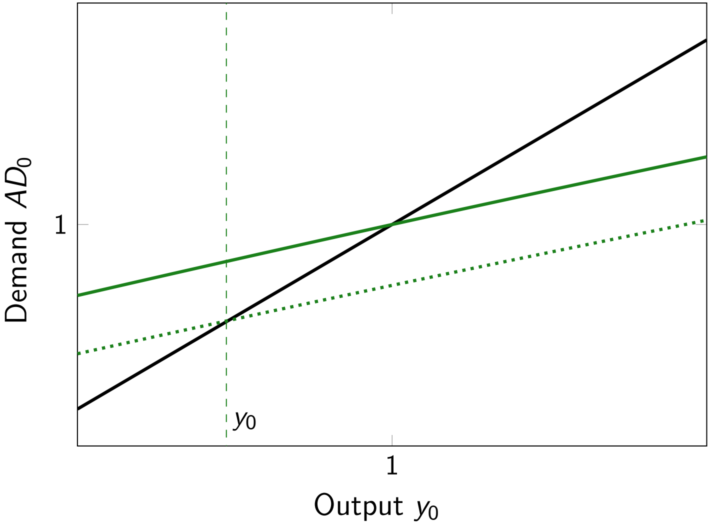
Taxes and spending as automatic stabilizers

- Initial equilibrium $\overline{y_0} = 1$: $AD_0\left(1, t_0\left(1\right), g_0\left(1\right), \overline{\Theta}\right) = 1$



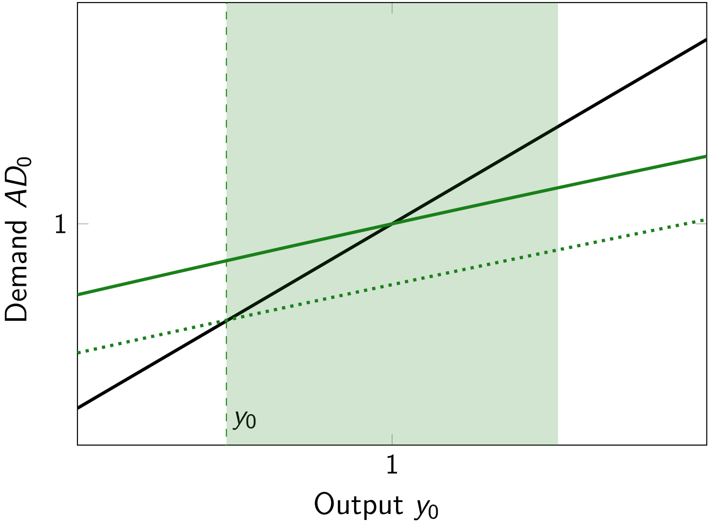
Taxes and spending as automatic stabilizers

- Negative demand shock: $AD_0\left(y_0, t_0\left(y_0\right), g_0\left(y_0\right), \Theta\right) = y_0$



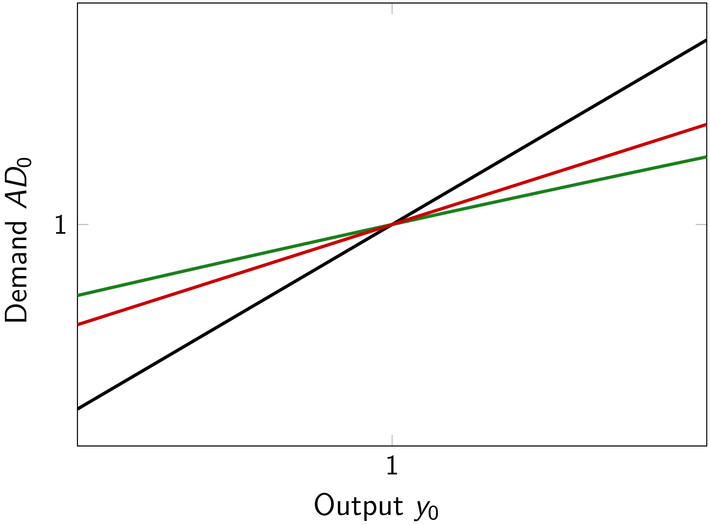
Taxes and spending as automatic stabilizers

- Output fluctuations under demand shocks



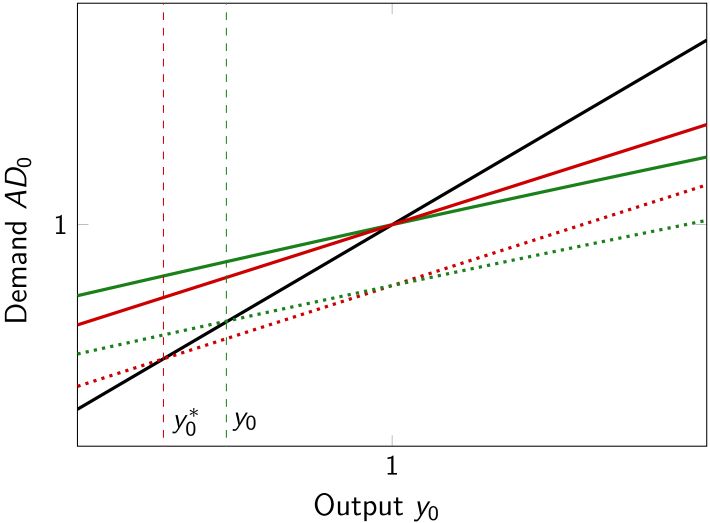
Taxes and spending as automatic stabilizers

- Counterfactual with fixed t_0, g_0: we'll show that $AD_0(y_0)$ *steepens*



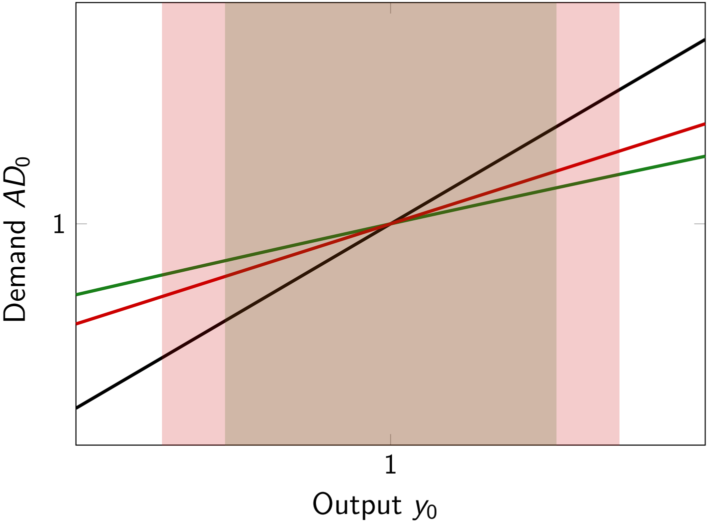
Taxes and spending as automatic stabilizers

- Same demand shock, larger change in y_0^* st $AD_0\left(y_0^*, t_0, g_0, \Theta\right) = y_0^*$



Taxes and spending as automatic stabilizers

- Same demand shocks, larger output fluctuations



Taxes and spending as automatic stabilizers

- By how much does slope of AD schedule *steepen* in absence of s?

$$\frac{\partial AD_0}{\partial s}\left(-\frac{\partial s}{\partial y_0}\right) = \left(MPC_s^R - MPC_s^G\right)\left(-\epsilon_s\right)$$

  - For taxes, $MPC_\tau^R = \frac{\partial c_0}{\partial z_0}$, $MPC_\tau^G = R \cdot \frac{\partial c_0}{\partial z_1}$, and $\epsilon_\tau = (-t_0')$
  - For spending, $MPC_g^R = 1$, $MPC_g^G = R \cdot \frac{\partial c_0}{\partial z_1}$, and $\epsilon_g = g_0'$

Proposition (Contribution of automatic stabilizers to fluctuations)

Let y_0^* denote output in counterfactual with cst t_0, g_0. For small shocks:

$$\frac{\mathrm{std}\left(dy_0^*\right)}{\mathrm{std}\left(dy_0\right)} = 1 + M \cdot \sum_{s\in S}\left(-\epsilon_s\right)\cdot\left(MPC_s^R - MPC_s^G\right)$$

where $M = \frac{1}{1-\frac{\partial c_0}{\partial z_0}}$ is benchmark multiplier.

Takeaway: defining features of stabilizers: ϵ_s, MPC_s^R, and MPC_s^G

Outline

1. Automatic stabilizers in a two period framework
2. Consumer default as an automatic stabilizer
3. Quantitative evaluation

Updated environment

- Two types $I = 2$ (borrowers and savers)
  - Mass $1 - \mu$ of savers S
  - Mass μ of borrowers B, with option to default in first period
  - For simplicity: equal endowments and no taxes/spending, $z_t = y_t$
- Borrowers now have defaultable legacy debt $b_0 > 0$ owed to savers
  - Default involves utility cost K_0 and financial market exclusion
  - We think of K_0 as an **instrument of policy** (more instruments later)
  - Decision perturbed by type-1 extreme value shocks $\left(\epsilon^R, \epsilon^D\right)$

Borrower problem and cyclicality of default

- At $t = 0$, borrowers either:
  - repay and choose b_1 to achieve

$$\max_{b_1} U^{B,R}(b_1) \equiv u(\underbrace{y_0 - b_0 + \frac{1}{R}b_1}_{c_0^{B,R}}) + \beta^B V^{cont}(b_1)$$

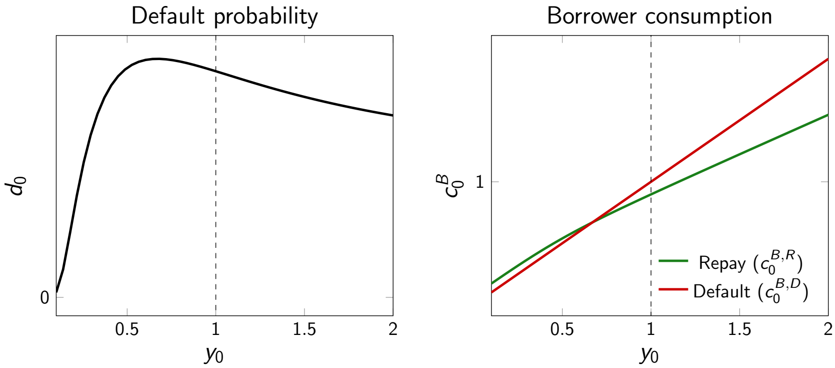
  - default and get

$$U^{B,D} = u(\underbrace{y_0}_{c_0^{B,D}}) + \beta^B V^{aut} - K_0$$

- EV1 shocks → fraction of borrowers that default:

$$d_0(y_0) = \frac{1}{1 + \exp\{-\alpha(U^{B,D}(y_0) - U^{B,R}(y_0))\}}$$

Countercyclical default and $c_0^{B,D} - c_0^{B,R}$



Savers, policy, equilibrium

- Savers maximize $U^S \equiv u\left(c_0^S\right) + \beta^S \mathbb{E}\left[u\left(c_1^S\right)\right]$, without constraints; are claimants to borrower debts, so intertemporal budget:

$$c_0^S + \frac{c_1^S}{R} = y_0 + \frac{1}{R} + (1 - d_0)\frac{\mu}{1-\mu} b_0$$

- Now aggregate demand at date 0 is:

$$AD_0(y_0, d_0) \equiv \mu(1 - d_0)\, c_0^{B,R}(y_0) + \mu d_0 c_0^{B,D}(y_0) + (1-\mu)\, c_0^S(y_0, d_0)$$

- New equation characterizing equilibrium:

$$AD_0(y_0, d_0(y_0)) = y_0$$

How consumer default affects the Keynesian cross

- Effect on slope of AD schedule if we fix d_0 :

$$\frac{\partial AD_0}{\partial d_0}\left(-\frac{\partial d_0}{\partial y_0}\right) = \left(\underbrace{\frac{c_0^{B,D} - c_0^{B,R}}{b_0}}_{ACED} - MPC^S\right) \cdot \mu b_0 \cdot \left(-\frac{\partial d_0}{\partial y_0}\right)$$

$ACED \equiv \frac{c_0^{B,D} - c_0^{B,R}}{b_0}$ is the average consumption effect of default

so, provided that:

$$ACED > MPC^S > 0$$

consumer default fits our definition of a stabilizer, with:

- $MPC_s^R = ACED$
- $MPC_s^G = MPC^S$
- $\epsilon_s = \mu b_0 \frac{\partial d_0}{\partial y_0}$ [$s \equiv \mu b_0 d_0$ is total amount of defaulted debt]

Bankruptcy as an automatic stabilizer

Corollary (Automatic stabilizer role of bankruptcy)

Let y_0^* denote output in counterfactual with cst d_0. For small shocks:

$$\frac{\mathrm{std}\left(dy_0^*\right)}{\mathrm{std}\left(dy_0\right)} = 1 + M \cdot \left(ACED - MPC^S\right) \frac{\mu b_0}{y_0} \left(-\frac{\partial d_0}{\partial \log y_0}\right)$$

- Simple sufficient statistic formula to answer original **Q**
  - *ACED*: important empirical object, no good measure so far
  - Back of envelope calculation with plausibly large *ACED*:

$$\underbrace{M \cdot \left(ACED - MPC^S\right)}_{\sim 0.6} \cdot \underbrace{\frac{\mu b_0}{y_0}}_{\sim 10\%} \cdot \underbrace{\left(-\frac{\partial d_0}{\partial \log y_0}\right)}_{\sim 0.5} \sim 0.03$$

Outline

1. Automatic stabilizers in a two period framework

2. Consumer default as an automatic stabilizer

3. Quantitative evaluation

Quantitative model overview

- "HANK" w/ household default
  - similar to Livshits, MacGee, Tertilt (2007)
  - but general equilibrium + nominal rigidities
- Household model:
  - OLG, ages $j = 1 \ldots J$
  - Idiosyncratic income risk and expenditure risk
- Production:
  - Linear production in labor (for today)
  - Sticky prices and wages $\rightarrow$ standard NKPC and WPC
- Government policy:
  - Bankruptcy code: filing fee, exclusion from credit, Chapter 7 & 13
  - Fiscal: progressive taxation, PAYGO pensions, $g'(y) < 0$
  - Monetary: standard Taylor rule

Calibration / Estimation

- Calibrate steady state parameters to match
  - life-cycle profiles: income, wealth, consumption, debt and default
  - cross-section: debt, chargeoffs, default, income
- Calibrate slopes of NKPC/WPC and monetary and fiscal rules
- Estimate shock processes for β, g, mp via SMM to match
  - standard deviations and covariances of standard aggregate
  - cyclicality of bankruptcy, chargeoffs and debt

Cyclical Properties of Data & Model

	Model			Data		
Var	Std Dev	Corr(y, x)	Corr(x, x_{-1})	Std Dev	Corr(y, x)	Corr(x, x_{-1})
Y	0.021	1	0.55	0.020	1	0.58
C	0.026	0.938	0.59	0.018	0.90	0.66
G	0.045	0.056	0.55	0.028	0.27	0.80
BK	0.095	−0.489	0.95	0.109	−0.38	0.53
CO	0.128	−0.329	0.89	0.225	−0.45	0.58
d	0.191	0.218	0.96	0.046	0.710	0.90
n	0.021	1	0.55	0.018	0.83	0.63
w	0.017	0.832	0.89	0.019	−0.26	0.77
π	0.024	0.591	0.81	0.022	0.04	0.87
i	0.057	−0.446	0.81	0.036	0.14	0.87

Param. Estimates   Variance decomp.   IRFs

Model counterfactuals

Counterfactuals

1. Baseline: turn off benchmark automatic stabilizers
   - Countercyclical government spending
   - Countercyclical deficits
2. Eliminate countercyclical bankruptcy
   - Penalties increase in recessions to ensure acyclical default rate
3. Active use of bankruptcy policy for demand magement
   - Penalties reduced in recession, triples bankruptcy rate cyclicality

Automatic stabilizers quantified

	Benchmark Model	
	$\mathrm{std}(Y)$	Relative to benchmark
Benchmark	0.021	1
Acyclical G	0.023	1.09
Acyclical deficits	0.023	1.10
Acyclical bankuptcy	0.021	1.02
All three acyclical	0.025	1.22
Active bankruptcy policy	0.020	0.93

Comparison to earlier papers on automatic stabilizers

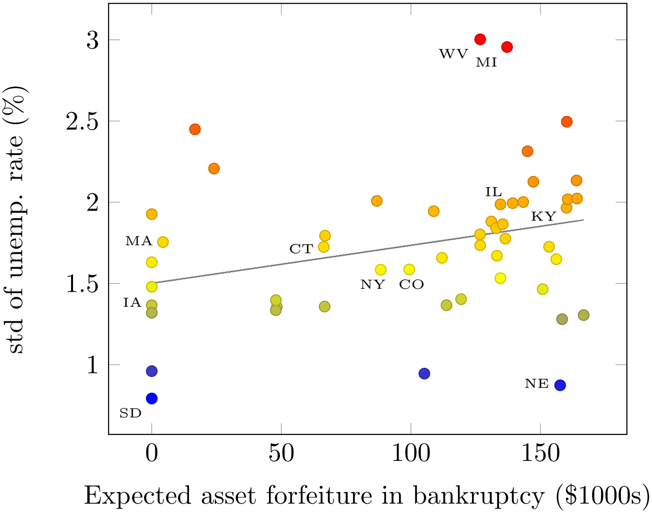
- McKay-Reis (2016)
  - Remove income tax stabilizers $\rightarrow$ *reduce* $\mathrm{std}(Y)$ by 0.5%
  - Our model $\rightarrow$ increase $\mathrm{std}(Y)$ by 10%
- Kekre (2021)
  - Increase generosity of UI by $4\times \rightarrow$ reduce $\mathrm{std}(Y)$ by 8%
  - Our active policy: increase $\frac{\partial d}{\partial \log y}$ by $3\times \rightarrow$ reduce $\mathrm{std}(Y)$ by 7%

Conclusion

- Bankruptcy serves as an automatic stabilizer in response to shocks
  - Transfer that rises in bad times, reduces magnitude of fluctuations
  - Quantitatively, dampens output fluctuations by around 2%
- Active bankruptcy policy can help aggregate demand management
  - Simple “lean against wind” policy further dampens by 7%
- Feasible alternative to ad-hoc policy changes that
  - achieves ex-post redistribution to constrained households
  - avoids credit supply contraction

Thank you!

Bankruptcy generosity and unemployment cyclicality



Back

Model setup: household problem

- Write S for aggregate state
- Consider interim state after shocks z, κ have realized
- Household with option to default solves:

$$W_j(b, z, \kappa; S) = \mathbb{E}_{\epsilon^R, \epsilon^D}\left[\max_{d\in\{0,1\}}(1-d)\left(V_j^R(b, z, \kappa; S) + \epsilon^R\right) + d\left(V_j^D(z; S) + \epsilon^D\right)\right]$$

where ϵ^R, ϵ^D are type-I EV distributed with parameter $\frac{1}{\alpha}$.

- Value of repaying is:

$$\begin{aligned} V_j^R(b, z, \kappa; S) &= \max_{c, beq \geq 0, b'} u(c) - v(n) + 1_{\{j=J\}} w\left(beq\right) \\ &\quad + \beta 1_{\{j \neq J\}} \mathbb{E}\left[W_{j+1}(b', z', \kappa'; S')\right] \\ & s.t. \\ c + \frac{beq}{1+r} + Q_j^R(b', z; S) &= b - \kappa + y_j\left(z, n\right) \end{aligned}$$

- Value of defaulting is:

$$V_j^D\left(z; S\right) = \begin{cases} X_j\left(-F - \gamma y_j(z, n), z; S\right) - K & y_j\left(z, n\right) \leq \overline{y_j} \\ X_j\left(\overline{b}_j\left(z\right) - F, z; S\right) - K & \text{otherwise} \end{cases}$$

Model setup: exclusion value

- Value function in exclusion given by:

$$
\begin{aligned}
X_j(b,z,\kappa;S) \quad = \quad & \max_{c,beq\geq 0,b'>b^{max}} u(c) - v(n) + 1_{\{j=J\}} w\left(b'\right) \\
& +\beta 1_{\{j\neq J\}} \Big\{ \nu \mathbb{E}\left[V_{j+1}(b',z',\kappa';S')\right] \\
& +(1-\nu)\mathbb{E}\left[X_{j+1}(b',z',\kappa';S')\right] \Big\}
\end{aligned}
$$

subject to

$$
\begin{aligned}
c + \frac{beq}{1+r} + Q_j^X(b',z;S) \quad &= \quad b + y_j\left(z,n\right) + T_j(b,z,\kappa) \\
b^{max} \quad &\equiv \quad \min\left\{0, Q_j^X(b',z;S) - b = \bar{\zeta} y_j\left(z,n\right)\right\}
\end{aligned}
$$

where $T_j(b,z,\kappa)$ is a transfer to guarantee households a consumption floor $\underline{c}$ in exclusion.

Back

Estimated shock processes

Z	σ^Z	ρ^z
mp	0.054	0.04
β	0.011	0.83
G	0.040	0.52

Parameter	Interpretation	Value
κ^w	Slope of WPC	0.35
κ^p	Slope of NKPC	0.35
ϕ^π	Taylor rule coef	1.5
$\phi_{g,B}$	Spending fiscal rule	0.3
$\phi_{\tau,B}$	Tax fiscal rule	-1

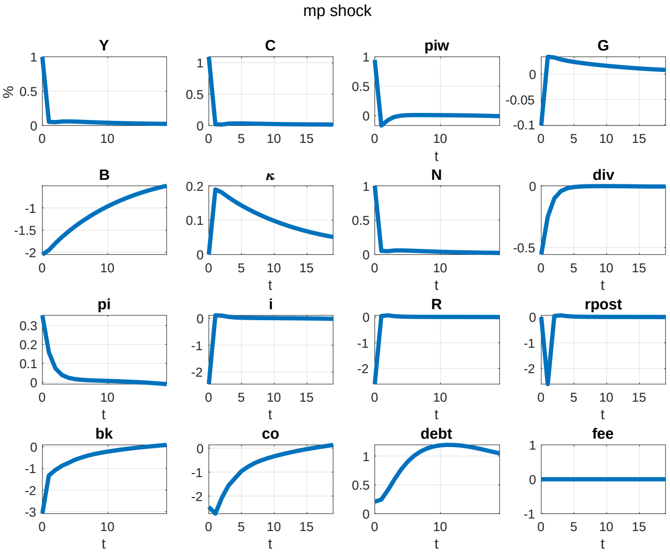
Back

Variance decomposition

		Variance Decomposition		
Variable	Std Dev	β shock	mp shock	G shock
Y	0.021	13%	78%	9%
C	0.026	15%	85%	0%
G	0.045	1%	11%	88%
BK	0.095	38%	59%	3%
CO	0.128	38%	57%	5%
$Debt$	0.191	48%	49%	3%
w	0.017	49%	50%	1%
π	0.024	88%	11%	1%
i	0.057	37%	63%	0%

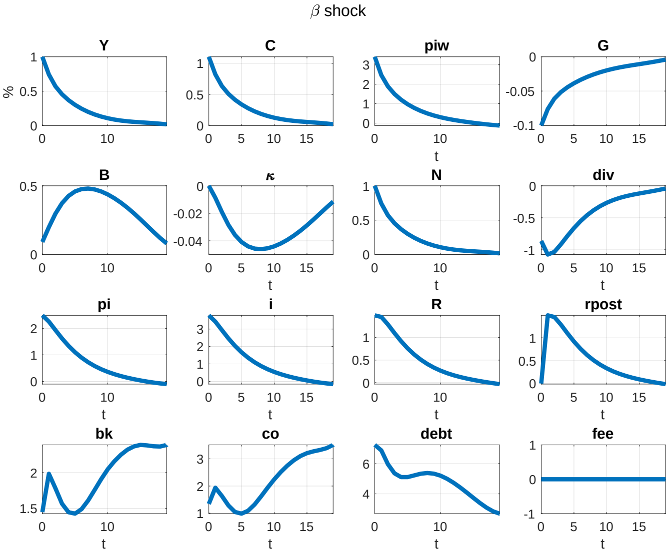
Back

IRFs to Estimated Shocks



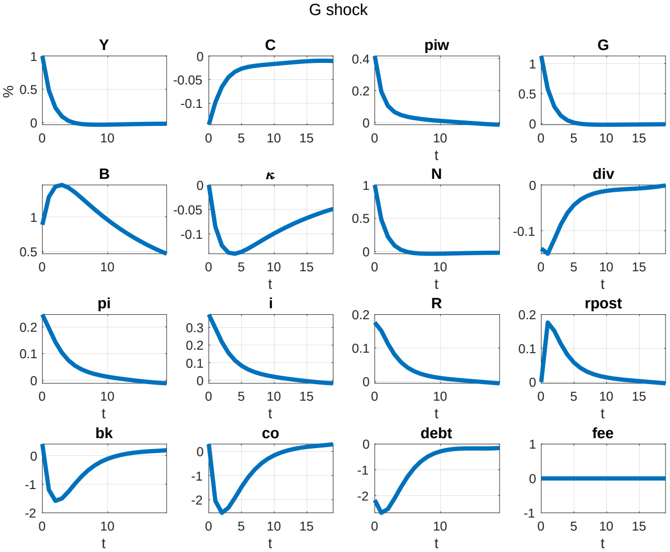
Back

IRFs to Estimated Shocks



Back

IRFs to Estimated Shocks



Back