

Fiscal Multipliers and Financial Crises

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Modelling and Model Comparison

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This paper:

1. What were the effects of this fiscal policy response?
2. Which tools were the most important?

Approach and Results

1. Structural model of fiscal policy
 - ▶ Potential stabilization roles for each of the tools
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 - ▶ Study counterfactuals
 - ▶ Crisis and Great Recession without fiscal response

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3. Results:

- ▶ Aggregate consumption falls by **50% more** without policy response
- ▶ Transfers and equity injections most important
- ▶ Fiscal multipliers extremely state dependent
- ▶ New transmission channels for fiscal policy

Model

Nominal Rigidities \implies Government purchases

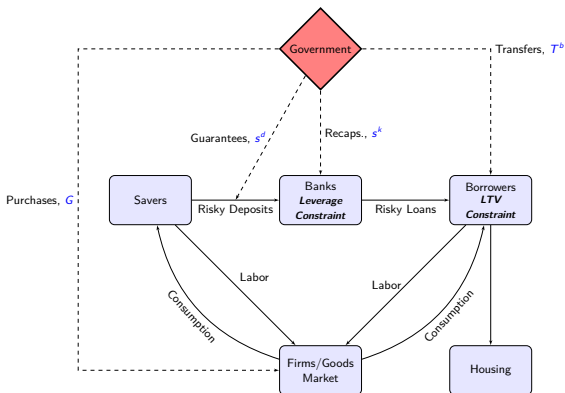
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1. TFP A_t
2. Financial shock σ_t

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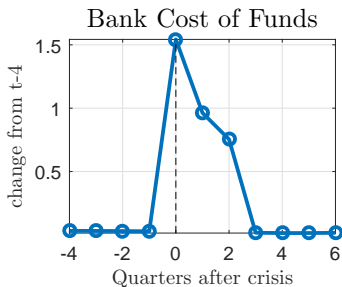
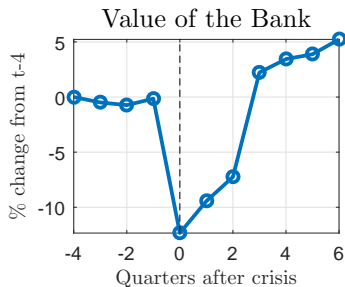
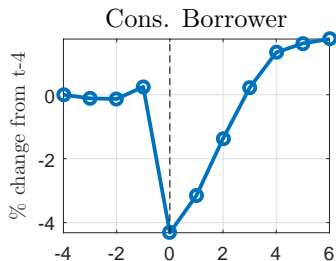
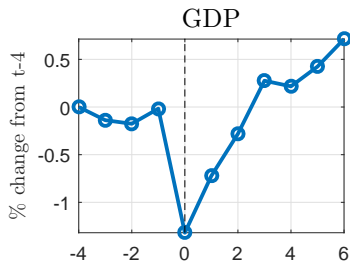
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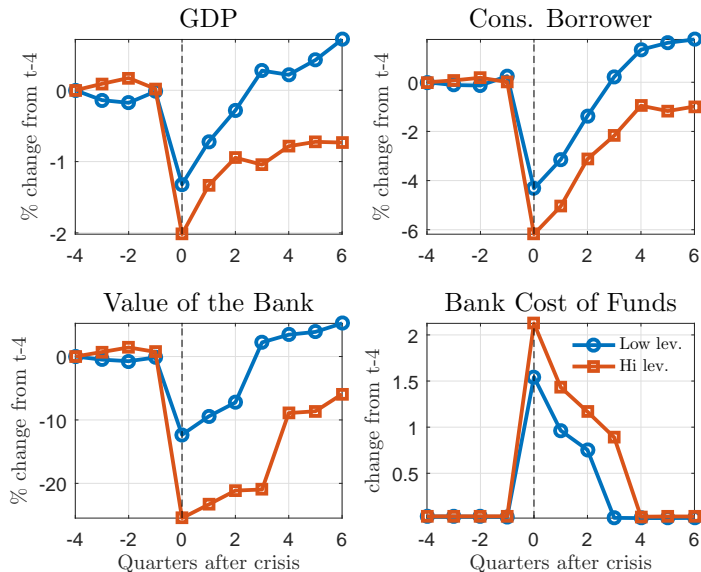
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Shock transmission depends on bank leverage and household leverage

State Dependence: Financial Shock with Low Leverage



State Dependence: Financial Shock with High Leverage



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 - ▶ Match moments related to household and bank balance sheets
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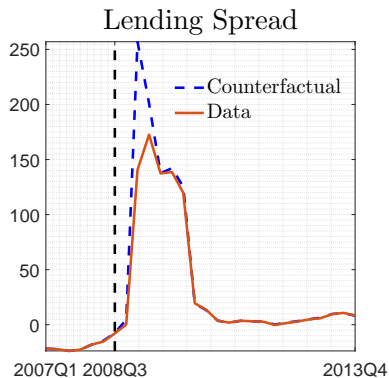
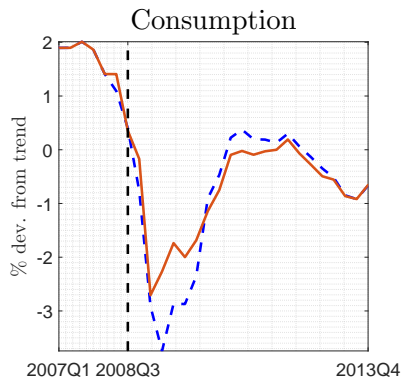
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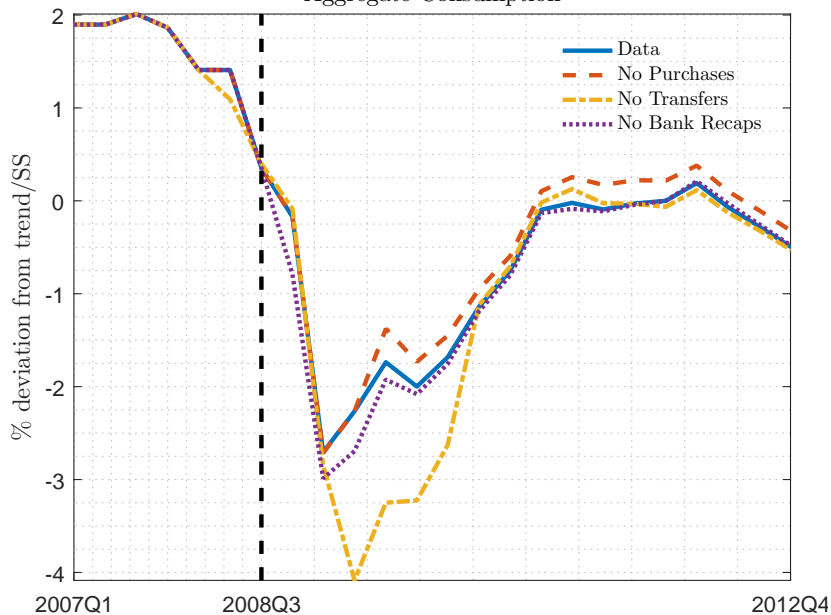
4. Use $\{\hat{A}_t, \hat{\sigma}_t\}_{t=2000Q1}^{T=2015Q4}$ to study counterfactual paths for Ω^T

Main Counterfactual: No Fiscal Policy

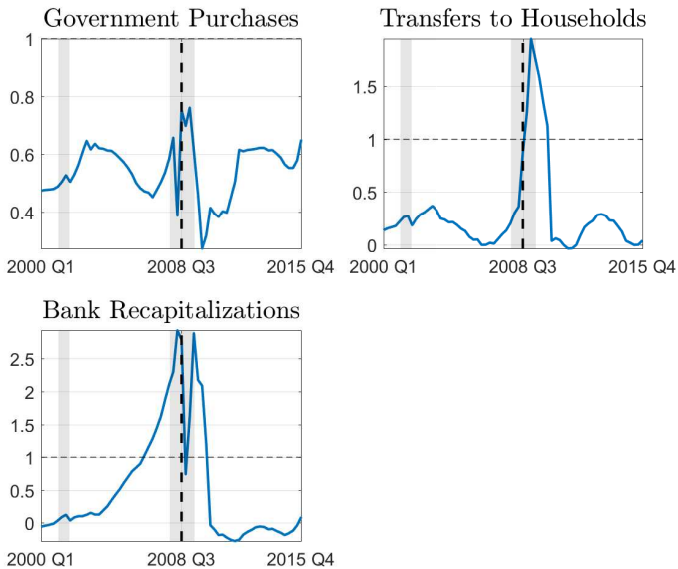


Policy Decomposition

Aggregate Consumption



Time Series for Fiscal Multipliers



State Dependent Multipliers: Mechanism

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New channel active when both constraints bind

Conclusion

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- ▶ Analysis of fiscal policy response to the Great Recession
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- ▶ New transmission channels for fiscal policy
 - ▶ Household-bank balance sheet interactions
 - ▶ State dependent effects

Appendix

Borrowers: Debt and Default

- ▶ Face value B_{t-1}^b ,
- ▶ Fraction γ matures every period
- ▶ Family construct (Landvoigt, 2015)

1. Borrower enters period with states

$$h_{t-1}, B_{t-1}^b$$

2. Continuum of members $i \in [0, 1]$, each with

$$h_{t-1}, B_{t-1}^b, \nu_t(i)$$

where $\nu_t(i) \sim F_t^b \in [0, \infty)$

3. Each member i can:

3.1 Repay maturing debt γB_{t-1}^b , and keep houses worth $\nu_t(i) p_t h_{t-1}$

or

3.2 Default on maturing debt, lose collateral

Borrower Family Problem

$$V_t^b(B_{t-1}^b, h_{t-1}) = \max_{c_t^b, n_t^b, h_t, B_t^b, \iota(\nu)} \left\{ \log(c_t) - v(n_t) + \xi^b \log(h_t) + \beta \left[\mathbb{E}_t(V_{t+1}^b)^{1-\alpha^b} \right]^{\frac{1}{1-\alpha^b}} \right\}$$

subject to budget constraint

$$c_t^b + \underbrace{\gamma \frac{B_{t-1}^b}{\Pi_t} \int [1 - \iota(\nu)] dF_t^b(\nu)}_{\text{debt repayment}} + \underbrace{p_t h_t}_{\text{house purchase}} \leq$$

$$(1 - \tau) w_t n_t^b + \underbrace{Q_t^b B_t^{b, \text{new}}}_{\text{new debt}} + \underbrace{p_t h_{t-1} \int \nu [1 - \gamma \iota(\nu)] dF_t^b(\nu)}_{\text{sale of non-forecl. houses}} - T_t + \underbrace{T_t^b}_{\text{Transfers}}$$

and borrowing constraint

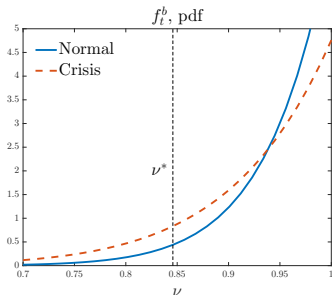
$$B_t^{b, \text{new}} \leq \underline{m} p_t h_t$$

Borrower Default

Default iff $\nu \leq \nu_t^*$,

$$\nu_t^* = \frac{B_{t-1}^b}{\Pi_t p_t h_{t-1}} \simeq \text{Loan-to-Value}$$

- ▶ $F_t^b = \text{Beta}(1, \sigma_t^b)$
- ▶ $\sigma_t^b \sim$ two-state Markov
- ▶ Mean preserving spread



Lenders earn (per unit of debt)

$$Z_t^{\text{loans}} = \underbrace{(1 - \gamma) Q_t^b}_{\text{not matured}} + \gamma \left\{ \underbrace{1 - F_t^b(\nu_t^*)}_{\text{repaid}} + \underbrace{\overbrace{(1 - \lambda^b)}^{\text{Resource Cost}} \int_0^{\nu_t^*} \nu \frac{p_t h_{t-1}}{B_{t-1}^b / \Pi_t} dF_t^b}_{\text{foreclosed}} \right\}$$

Financial Intermediaries

- ▶ Fixed income portfolios, maturity transformation, risky deposits
- ▶ Fraction $1 - \theta$ of earnings paid out as dividends every period
- ▶ Invest in loan securities b_t , raise deposits d_t

Problem for intermediary $j \in [0, 1]$ with current earnings $e_{j,t}$

$$\underbrace{V_t^k(e_{j,t})}_{\text{current mkt value}} = \max_{b_{j,t}, d_{j,t}} \left\{ \underbrace{(1 - \theta)e_{j,t}}_{\text{dividend}} + \underbrace{\mathbb{E}_t \left[\frac{\Lambda_{t,t+1}^s}{\Pi_{t+1}} \max \{0, V_{t+1}^k(e_{j,t+1})\} \right]}_{\text{ex-dividend value}} \right\}$$

subject to

$$\text{flow of funds : } Q_t^b b_{j,t} = \theta e_{j,t} (1 + s_t^k) + Q_t^d d_{j,t}$$

$$\text{capital req. : } \kappa Q_t^b b_{j,t} \leq \mathbb{E}_t \left[\frac{\Lambda_{t,t+1}^s}{\Pi_{t+1}} \max \{0, V_{t+1}^k(e_{j,t+1})\} \right]$$

$$\text{LoM earnings : } e_{j,t+1} = u_{j,t+1} Z_{t+1}^{\text{loans}} b_{j,t} - d_{j,t}$$

Financial Intermediaries

- ▶ $u_{j,t} \sim F^d \subseteq [\underline{u}, \bar{u}]$
- ▶ Default iff

$$u_{j,t} < u_t^* \equiv \frac{d_{j,t-1}}{Z_t^{\text{loans}} b_{j,t-1}} \simeq \text{Leverage}$$

- ▶ Aggregation \Rightarrow **representative bank**

$$\int_{[0,1]} \mathbb{E}_t \left[\frac{\Lambda_{t,t+1}^s}{\Pi_{t+1}} \max \{0, V_{t+1}^k(e_{j,t+1})\} \right] dj \equiv \Phi_t \theta E_t$$

- ▶ Spreads reflect **Credit Risk** + **Current** + **Future** binding constraints
- ▶ Long-term debt \Rightarrow Pecuniary Externalities \Rightarrow Financial Accelerator
- ▶ Payoff per unit of deposits,

$$Z_t^{\text{deposits}} = \underbrace{s_t^d}_{\text{guaranteed}} + (1-s_t^d) \left\{ \underbrace{1 - F^d(u_t^*)}_{\text{repaid}} + \underbrace{(1 - \lambda^d) \int_0^{u_t^*} u \frac{Z_t^{\text{loans}} B_{t-1}^b}{D_{t-1}} dF^d}_{\text{liquidated}} \right\}$$

Closing the Model

Standard DSGE model w/ nominal rigidities

▶ Producers → Phillips Curve [▶ producers](#)

▶ Savers → Euler Equation (IS) [▶ savers](#)

▶ Housing in fixed supply,

$$h_t = 1$$

▶ Central Bank → Taylor Rule

$$\frac{1}{Q_t} = \frac{1}{\bar{Q}} \left[\frac{\Pi_t}{\bar{\Pi}} \right]^{\phi_\pi} \left[\frac{Y_t}{\bar{Y}} \right]^{\phi_y}$$

▶ Aggregate resource constraint,

$$C_t + G_t + \text{DWL Bank Default}_t + \text{DWL Household Default}_t = \underbrace{A_t N_t}_{= Y_t} \underbrace{[1 - d(\Pi_t)]}_{\text{Menu Costs}}$$

[▶ Back](#)

Fiscal Authority

Budget constraint,

$$\underbrace{\tau Y_t + T_t + Q_t B_t^g - \bar{G} - \frac{B_{t-1}^g}{\Pi_t}}_{\text{Standard Surplus}} = \text{Net Cost from Discretionary Measures}_t$$

Fiscal rule for taxes,

$$T_t = \phi_\tau \log \left(\frac{B_{t-1}^g}{\bar{B}^g} \right)$$

Net Cost from Discretionary Measures,

$$(G_t - \bar{G}) + \chi T_t^b + s_t^k \theta E_t + s_t^d \frac{D_{t-1}}{\Pi_t} \times (1 - \text{Recovery Rate}_t)$$

Calibration

1. Crises

$$\sigma_t^b = [\sigma_t^{b,\text{normal}}, \sigma_t^{b,\text{crisis}}]^T \quad \text{and} \quad \mathbf{P}^\sigma = \begin{bmatrix} .995 & .005 \\ .2 & .8 \end{bmatrix}$$

2. Households

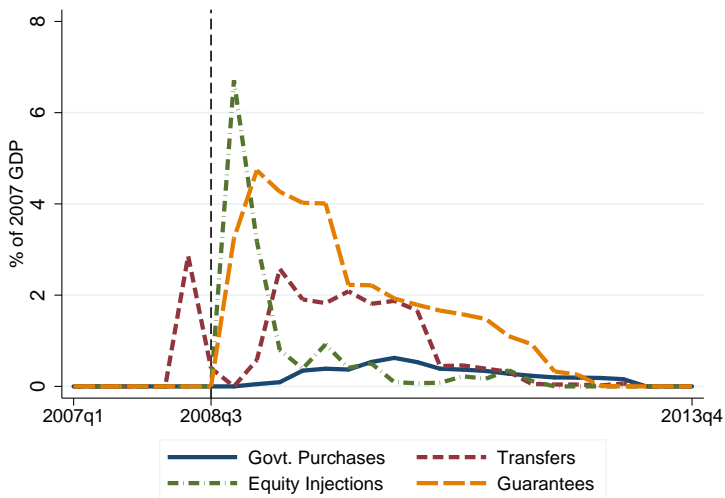
Target	Target	Parameter
Fraction Borrowers	Parker et al. (2013)	$\chi = 0.45$
Avg. Maturity	20 quarters	$\gamma = 0.05$
Max LTV Ratio	80%	$\underline{m} = 0.203$
Debt/GDP	80%	$\xi = 0.0347$
Avg. Delinquency Rate	2%	$\sigma^{b,\text{normal}} = 12.93$

3. Banks

$$F^d(u) = \frac{u^\sigma - \underline{u}^\sigma}{\bar{u}^\sigma - \underline{u}^\sigma}$$

Target	Target	Parameter
Book Leverage	10	$\kappa = 0.1$
Payout Rate	20%	$\theta = 0.8$
Avg. Lending Spread	2%	$\varpi = 0.0105$
CDS-Implied Prob. Def.	2% in recessions	$\underline{u} = 0.91, \sigma^d = 1$

Fiscal Policy Response to the Great Recession



Smoothed Shocks

