Efficient Bailouts?

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Motivation

- Large interventions in credit markets during **financial crises**
- Fierce debate about desirability of **bailouts**
  - Supporters: salvation from a deeper credit crunch
  - Critics: sowing the seeds of future financial crises
- Frank-Dodd act attempts to end bailouts

Questions

- What are the implications of bailouts for the stability of the financial sector?
- Is it desirable to prohibit government bailouts?
- Quantitatively:
  - What are the effects over risk-taking and the severity of crises?
  - What is the optimal size of government intervention?
  - What are the features of policies to prevent excessive risk taking?

What I do

Propose a **quantitative** equilibrium model:

- Liquidity constraints generate "occasional credit crunches"
- This leads to **precautionary behavior** during normal times

Inefficiency and Policy Response:

- Collective transfer to firms increase dividend payments and wages
- But households do not internalize these GE effects

⇒ Ex-post: welfare improving bailouts

⇒ Ex-ante: insurance and moral hazard effects

Solve for optimal intervention

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What I find

- Bailouts are ex-ante welfare improving
- Optimal bailout: 2% points of GDP on average and increasing in leverage
- Severity of recession falls by 40% with the optimal intervention
- Role for macro-prudential policy to correct private cost of borrowing
- Size of optimal bailout is reduced by half when bailout is not anticipated

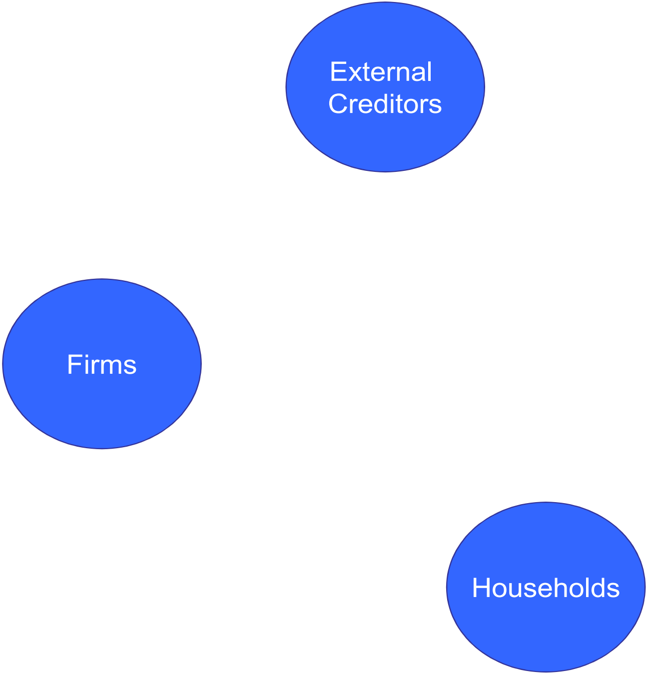
Relationship to the Literature

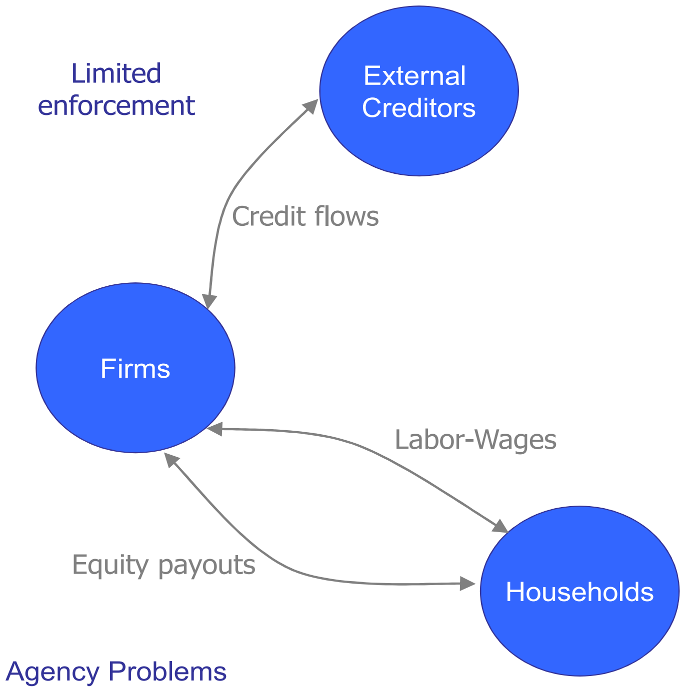
- Credit crunches and credit policy in DSGE models:

  (Gertler-Karadi (JME, 2011); Del Negro et al. (2010); Gertler-Kiyotaki-Queralto (2011))
  - They mostly focus on policy response to unanticipated credit crunches or log-linear dynamics. I analyze moral hazard effects.
- Moral hazard and incentive effects of bailouts:

  (Schneider-Tornell (RES, 2004); Farhi-Tirole (AER, 2012); Chari-Kehoe (2010), Keister (2010))
  - They study theoretically how bailouts increase risk-taking and moral hazard. I conduct a quantitative assessment.
- Externalities and macro-prudential regulation

  (Lorenzoni (RES, 2008); Bianchi (AER, 2011); Bianchi-Mendoza (2010); Jeanne-Korinek (2010))
  - They study prudential measures to address systemic risk. I study the role of bailouts and the implications for prudential regulation.


External Creditors
Firms
Households


Limited enforcement
External Creditors
Credit flows
Firms
Labor-Wages
Equity payouts
Households
Agency Problems

Households

Preferences:

$$E_0 \sum_{t=0}^{\infty} \beta^t u(c_t - G(n_t))$$

Budget constraint:

$$s_{t+1} p_t + c_t = w_t n_t + s_t(d_t + p_t)$$

d_t dividends, s_t equity shares, p_t price of shares

FOC:

$$w_t = G'(n_t)$$

$$p_t = \mathbb{E}_t m_{t+1}(d_{t+1} + p_{t+1})$$

where $m_{t+j} \equiv \beta^j u'(c_{t+j} - G'(n_{t+j}))/u'(c_t - G'(n_t))$

Firms

Continuum of firms with revenue given by

$$F(z, k, h) = zk^{\alpha}h^{1-\alpha}$$

z_t is an exogenous aggregate productivity shock

Flow-of-funds constraint:

$$b_t + d_t + k_{t+1} + \phi(k_t, k_{t+1}) \leq k_t(1-\delta) + F(z_t, k_t, h_t) - w_t h_t + \frac{b_{t+1}}{R}$$

$\phi(\cdot)$ capital adjustment costs

b_t non-state contingent one-period debt

<u>Remark:</u> stock of shares is fixed and normalized to 1

Financial constraints

- Collateral constraint on debt financing:

$$b_{t+1} \leq \kappa_t k_{t+1}$$

- Equity constraint:

$$d_t \geq \bar{d}$$

Investment is constrained by internal and external funds:

$$\underbrace{k_{t+1} - k_t(1-\delta) + \psi(k_t, k_{t+1})}_{Investment} = \underbrace{F(z_t, k_t, h_t) - w_t h_t}_{profits} - b_t + \underbrace{\frac{b_{t+1}}{R} - d_t}_{new\ ext.\ funds}$$

▸ FF data

$$i_t \leq F(z_t, k_t, h_t) - w_t h_t - b_t + \frac{\kappa_t k_{t+1}}{R} - \bar{d}$$

Recursive Problem

$$V(k, b, X) = \max_{d,h,k',b'} \left\{ d + \mathbb{E} m'(X, X') V(k', b', X') | X \right\}$$

$$s.t. \quad b + d + k' + \psi(k, k') \leq (1 - \delta)k + F(z, k, h) - w(X)h + \frac{b'}{R}$$

$$b' \leq \kappa k' \qquad (\mu)$$

$$d \geq \bar{d} \qquad (\eta)$$

$$X \equiv (K, B, \kappa, z)$$

Optimality conditions

$$(Labor\ demand) \qquad F_h(z_t, k_t, h_t) = w_t$$

$$(EE\ for\ bonds) \qquad 1 + \eta_t = R\mathbb{E}_t m_{t+1}(1 + \eta_{t+1}) + R\mu_t$$

$$(EE\ for\ capital) \qquad 1 + \eta_t = \mathbb{E}_t m_{t+1} R^k_{t+1}(1 + \eta_{t+1}) + \kappa_t \mu_t$$

$$R^k_{t+1} \equiv \frac{1 - \delta + F_k(z_{t+1}, k_{t+1}, h_{t+1}) - \psi_{1,t+1}}{1 + \psi_{2,t}}$$

Competitive Equilibrium Definition

Given an interest rate R and stochastic processes for z_t and κ_t, a competitive equilibrium is defined by a set of prices $\{w_t, p_t\}_{t\geq 0}$, allocations $\{c_t, k_{t+1}, b_{t+1}, d_t, h_t, n_t, s_t\}_{t\geq 0}$ and a SDF $\{m_t\}_{t\geq 0}$:

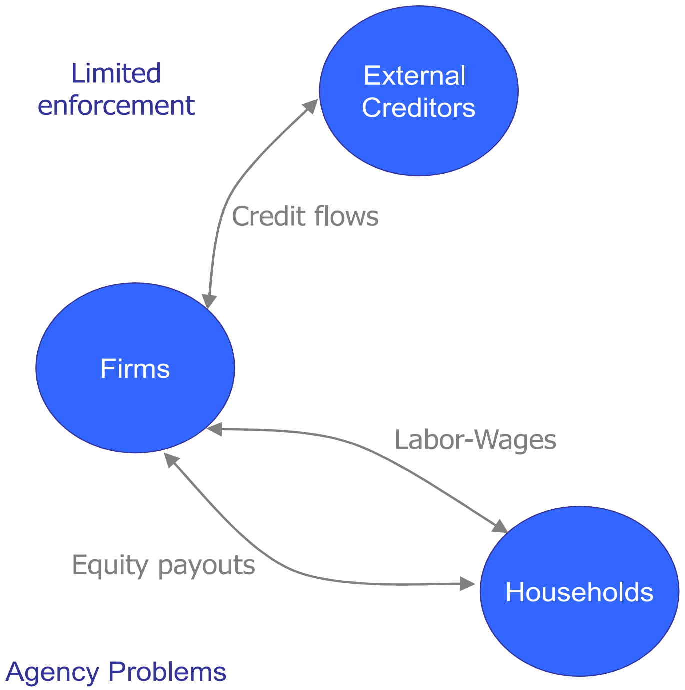
1. Households maximize utility
2. Firms optimize and discount dividends at $\beta^j u'(t+j))/(u'(t))$
3. All market clears:
   - Equity markets: $s_t = 1$
   - Labor markets: $h_t = n_t$
   - Resource constraint:

     $b_t + c_t + k_{t+1} + \psi(k_t, k_{t+1}) = k_t(1-\delta) + F(z_t, k_t, n_t) + \frac{b_{t+1}}{R}$

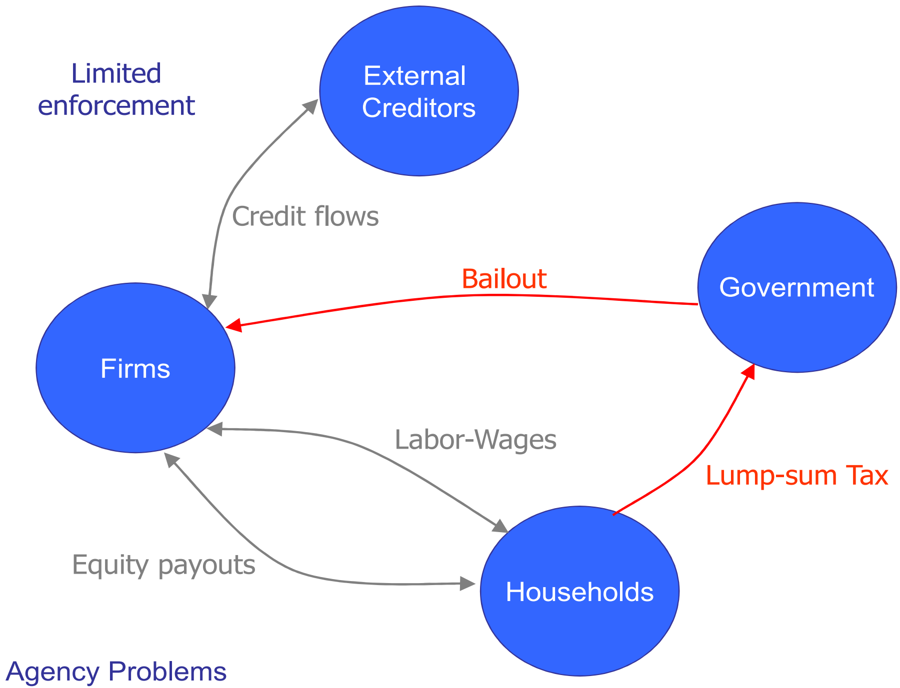
▸ RCE

Coordination Problem

- During a credit crunch, funds are more valuable inside firms
- Households do not internalize benefits of unilateral transfers to firms ⇒ **Free-rider problem** ⇒ inefficient level of investment
- Bailouts force households to transfer funds to firms ⇒ solve free-rider problem and improve welfare **ex-post**
- Bailouts reduce perceived cost of borrowing ⇒ Need for tax on debt **ex-ante**



Limited enforcement
External Creditors
Credit flows
Firms
Labor-Wages
Equity payouts
Households
Agency Problems


Limited enforcement
External Creditors
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Labor-Wages
Lump-sum Tax
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Normative Analysis

1. Set-up a constrained social planner's problem
2. Identify possible instruments that decentralize optimal allocations (debt-relief, equity injections, lump-sum transfers)
3. Quantitative analysis

Constrained Social Planner Problem

- Chooses investment, borrowing and dividends subject to liquidity constraints
- Choose transfers between firms and households subject to iceberg costs
- Lets labor markets, equity markets, and goods market clear competitively

Admissible Allocations

$$(Resource\ Const.)\quad b_t + c_t + k_{t+1} + \varphi\Upsilon_t = (1-\delta)k_t + F(z,k_t,h_t) + \frac{b_{t+1}}{R}$$

$$(Equity\ Const.)\quad (1-\delta)k_t + F(z_t,k_t,h_t) - w_t h_t + \frac{b_{t+1}}{R} + \Upsilon_t - b_t - k_{t+1} \geq \bar{d}$$

Υ_t are transfers from households to firms, φ is iceberg cost of transfers

$$(Collateral\ Constraint)\qquad b_{t+1} \leq \kappa_t k_{t+1}$$

$$(Stock\ market\ clearing)\qquad p_t = \mathbb{E}_t m_{t+1}(d_{t+1} + p_{t+1}),\ s_t = 1$$

$$(Labor\ Market\ clearing)\qquad w_t = G'(n_t) = F_h(k_t,h_t)$$

Some characterization

$$\eta_t - \varphi u'(t) \leq 0 \text{ with equality if } \Upsilon_t > 0$$

Remarks:

- If $\varphi = 0$, $d \geq \bar{d}$ does not bind.
- If $\bar{d} = -\infty$, the competitive equilibrium and the social planner's solution coincide

planner's problem

Decentralization I: Debt relief

Households finance bailout with lump-sum tax:

$$s_{t+1}p_t + c_t \leq w_t n_t + s_t(d_t + p_t) - T_t$$

Firms receive debt relief:

$$(1-\gamma_t)b_t + d_t + i_t \leq F(z_t, k_t, h_t) - w_t n_t + \frac{b_{t+1}}{R}(1-\tau_t) + T_t^f$$

Remark: Debt relief is executed only if equity constraint binds

Decentralization I: Debt relief, debt-tax

Households finance bailout with lump-sum tax:

$$s_{t+1}p_t + c_t \leq w_t n_t + s_t(d_t + p_t) - T_t$$

Firms receive debt relief and pay tax on debt:

$$(1 - \gamma_t)b_t + d_t + i_t \leq F(z_t, k_t, h_t) - w_t n_t + \frac{b_{t+1}}{R}(1 - \tau_t) + T_t^f$$

Remark: Debt relief is executed only if equity constraint binds

Remark: Tax on debt is set when debt releaf only if equity constraint **is expected** to bind

policies

Decentralization II: Equity injections

Government purchases equity and transfer them to households:

$$s_{t+1}p_t + c_t \leq w_t n_t + (s_t + s_t^g)(d_t + p_t) - T_t$$

Firms's problem is:

$$\mathbb{E}_t \sum_{j=0}^{\infty} m_{t+j}(d_{t+j} - e_t b_t)$$

$$\text{s.t.} \quad b_t + d_t + i_t \leq F(z_t, k_t, h_t) - w_t n_t + e_t b_t + \frac{b_{t+1}}{R}(1 - \tau_t) + T_t^f$$

$$d_t \leq \bar{d}, \quad b_{t+1} \leq \kappa_t k_{t+1}$$

where number of shares are re-normalized to one and equity injections are set to a fraction of debt

Decentralization II: Equity injections, debt-tax

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Remark: Prudential tax on debt is strictly smaller than debt relief

▸ policies2

Decentralization III: Helicopter Drop

Bailout implemented through lump sum transfers **conditional on aggregate variables**

First-order conditions remain unaffected

→ No tax on debt is required to implement planner's allocations

Best case to prevent moral hazard as individual outcomes are independent of individual choices

Quantitative Analysis

Numerical Method

- Challenges
  - Financial constraints impose significant non-linearities
  - State variables are not confined to a small region
  - Changes in consumption lead to large changes in firms's choices
- Approach:
  - Iterates jointly on equilibrium policy functions on entire state space
  - Allows for occasionally binding liquidity constraints
  - Full-equilibrium dynamics

Functional Forms and Distribution Assumptions

$$u(c - G(n)) = \frac{\left[c - \chi \frac{n^{1+\frac{1}{\omega}}}{1+\frac{1}{\omega}}\right]^{1-\sigma} - 1}{1-\sigma}, \qquad F(z,k,h) = zk^{\alpha}h^{1-\alpha}$$

$$\psi(k_t, k_{t+1}) = \frac{\phi_k}{2}\left(\frac{k_{t+1} - k_t}{k_t}\right)^2 k_t$$

TFP shocks and financial shocks are independent processes:

$$log(z_t) = \rho \; log(z_{t-1}) + \epsilon_t, \qquad \epsilon_t \sim N(0, \sigma_\epsilon)$$

Financial shocks follow a two-state Markov chain with values given by $\{\kappa^L, \kappa^H\}$ and transition matrix:

$$P = \begin{bmatrix} P_{L,L} & 1 - P_{L,L} \\ 1 - P_{H,H} & P_{H,H} \end{bmatrix}$$

Calibration

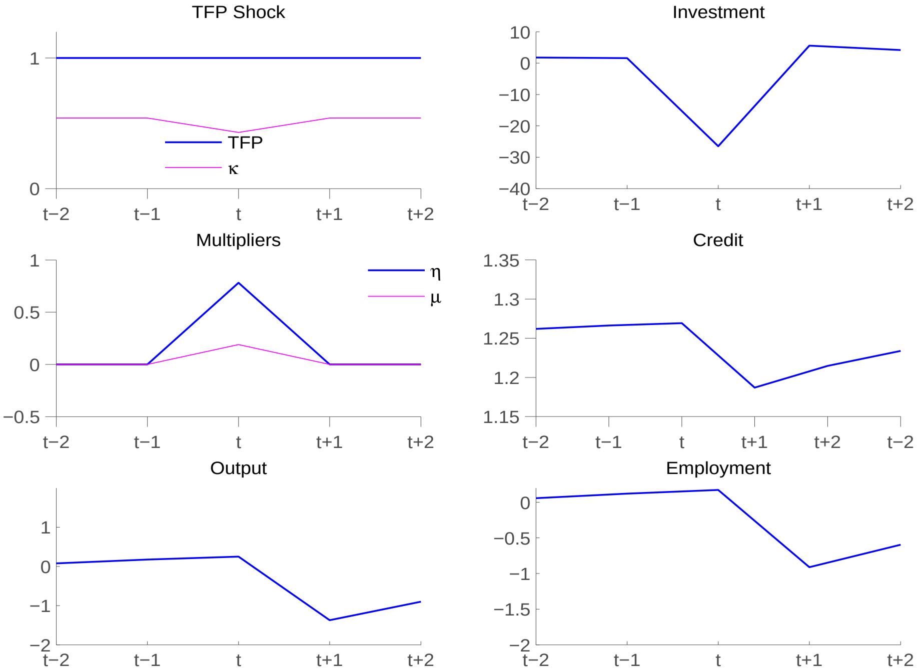
Parameters set independently	Value	Source/Target
Interest rate	$R-1=0.02$	Interest rate mid 2000
Discount factor	$\beta=0.97$	Capital-output$=2.5$
Share of capital	$\alpha_K=0.33$	Average Labor Share
Depreciation rate	$\delta=0.1$	Standard value
Labor disutility coefficient	$\chi=0.67$	Normalization
Risk aversion	$\sigma=1.5$	Benchmark value
Frisch elasticity parameter	$\omega=2.0$	Benchmark value
Efficiency cost	$\varphi=10bps$	Benchmark value

Calibration

Parameters set by simulation	Value	Target
TFP shock		
	$\sigma_\epsilon = 0.01$	SD of GDP=2.0
	$\rho = 0.24$	Autocorrelation of GDP=0.45
Financial shock		
	$\kappa_L = 0.43$	Average leverage =45 percent
	$\kappa_H = 0.54$	Non-binding collateral constraint
	$P_{HH} = 0.9$	Probability of credit crunch=4 percent
	$P_{LL} = 0.1$	Duration of credit crunch=3 years
Adjustment cost	$\phi_k = 2.0$	SD of investment =9 percent
Dividend threshold	$\bar{d} = 0.05$	Equalize prob. binding constraints

Definition of credit crunch: Fall in credit of more than 2SD

How does a typical crisis look like in the decentralized equilibrium without intervention?



TFP Shock
TFP
κ
Investment
Multipliers
η
μ
Credit
Output
Employment
t−2
t−1
t
t+1
t+2

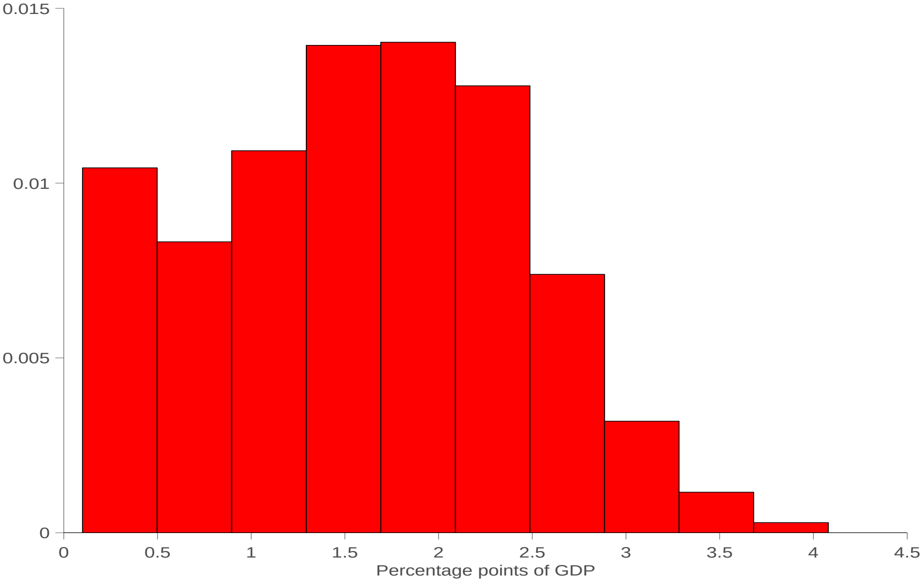
Comparison with Data

	Model	Data 2008-2009
Output	−1.5%	−2.6%
Consumption	−1.1%	−1.2%
Investment	−27.0%	−22.6%
Debt-repurchase/GDP	6.6%	8.1%
Hours	−1.0%	−6.7%

Note: Data corresponds to US data 2008-2009. Model corresponds to average crisis in decentralized equilibrium.

second moments

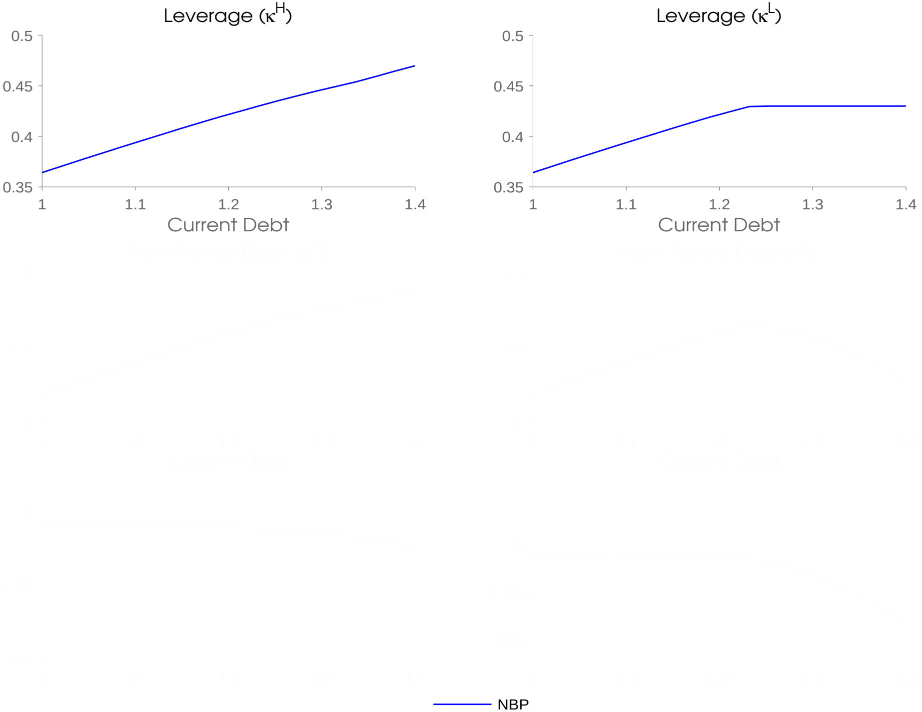
Ergodic Distribution of Bailouts



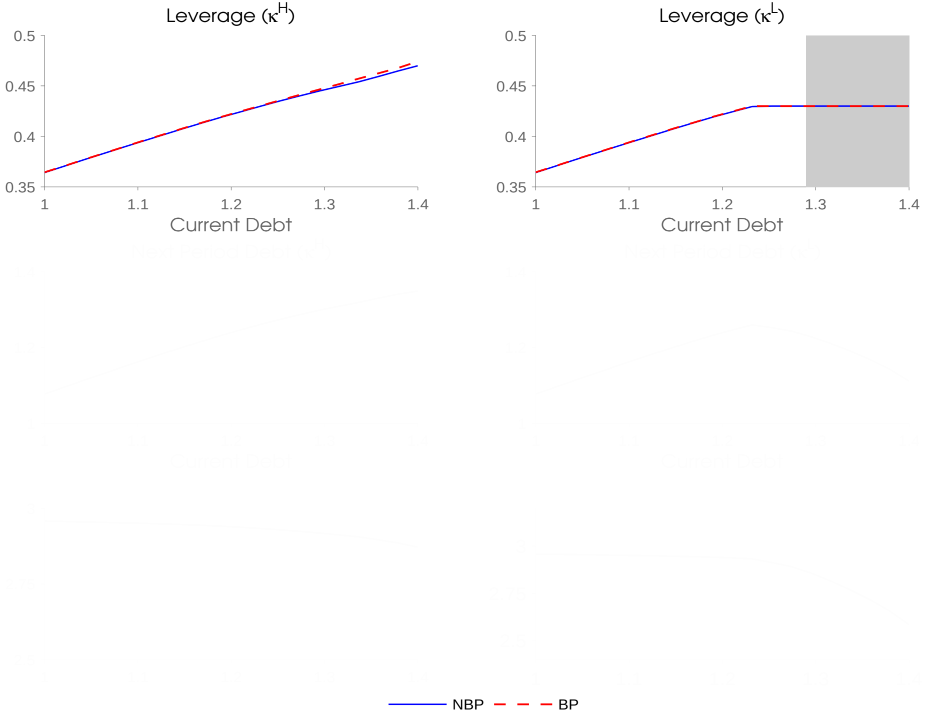
Laws of motion for leverage $\left(\frac{B_{t+1}}{K_{t+1}}\right)$, borrowing and capital as a function of current debt, for mean values of productivity and mean value of capital

OBP denote optimal bailout policy

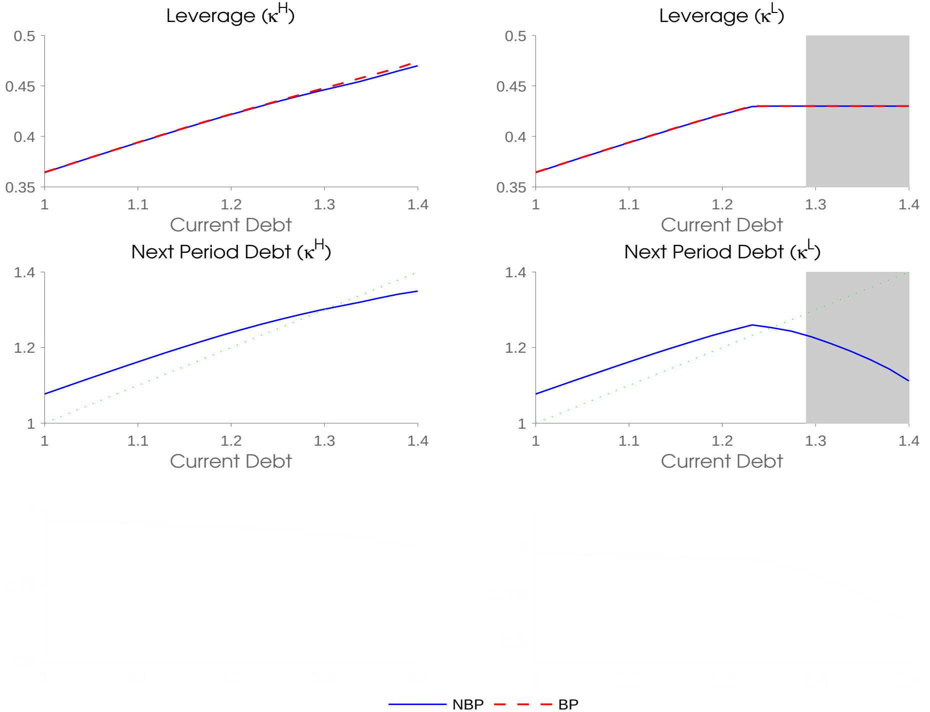
NBP denote no bailout policy

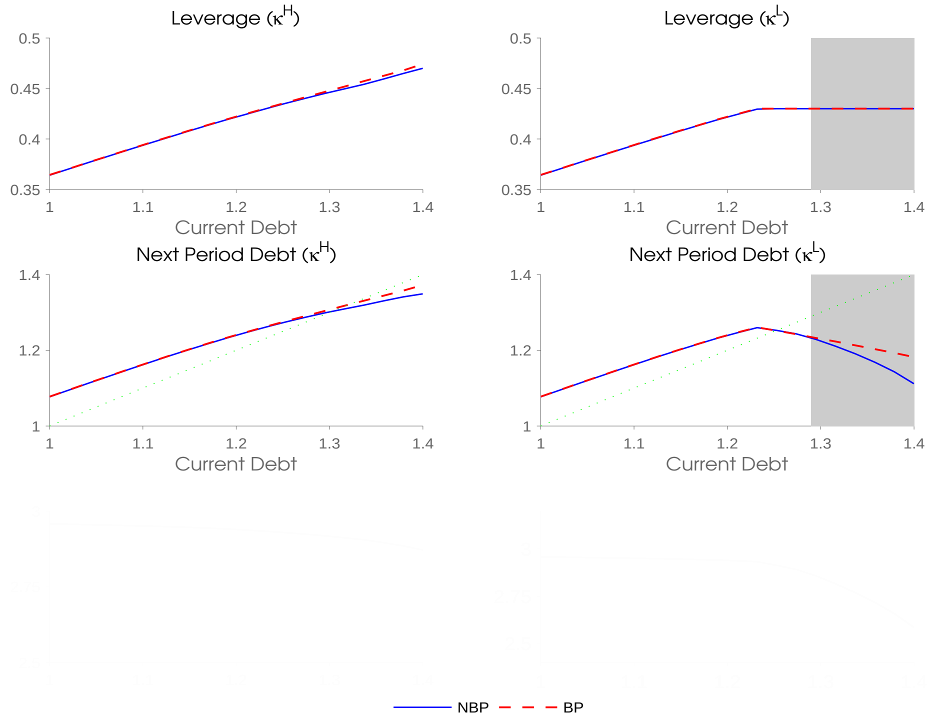


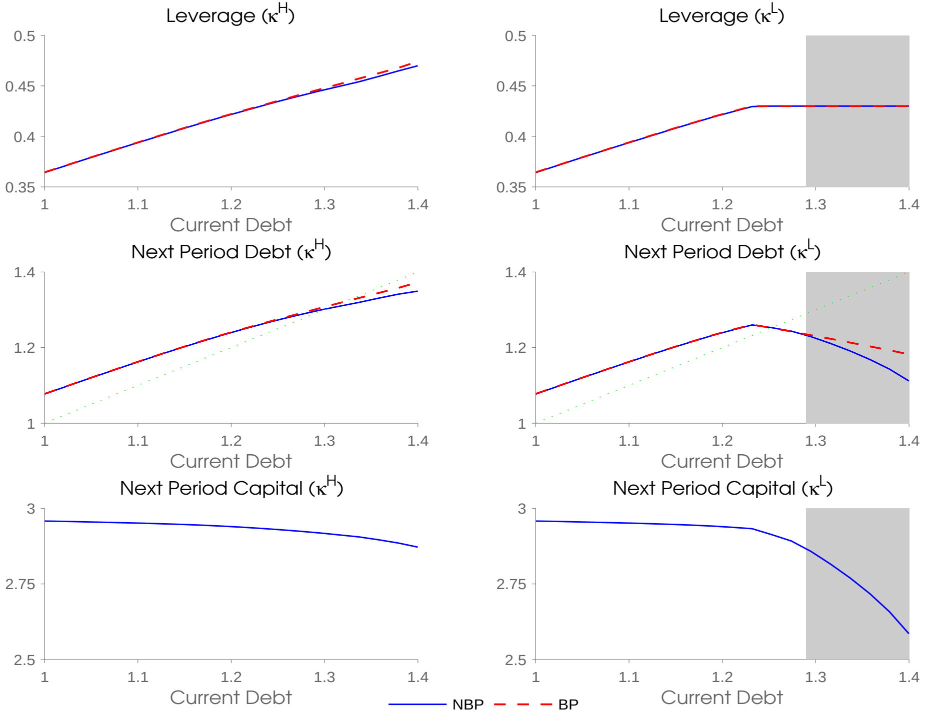
Leverage (κ^H)
0.5
0.45
0.4
0.35
1
1.1
1.2
1.3
1.4
Current Debt
Leverage (κ^L)
0.5
0.45
0.4
0.35
1
1.1
1.2
1.3
1.4
Current Debt
NBP



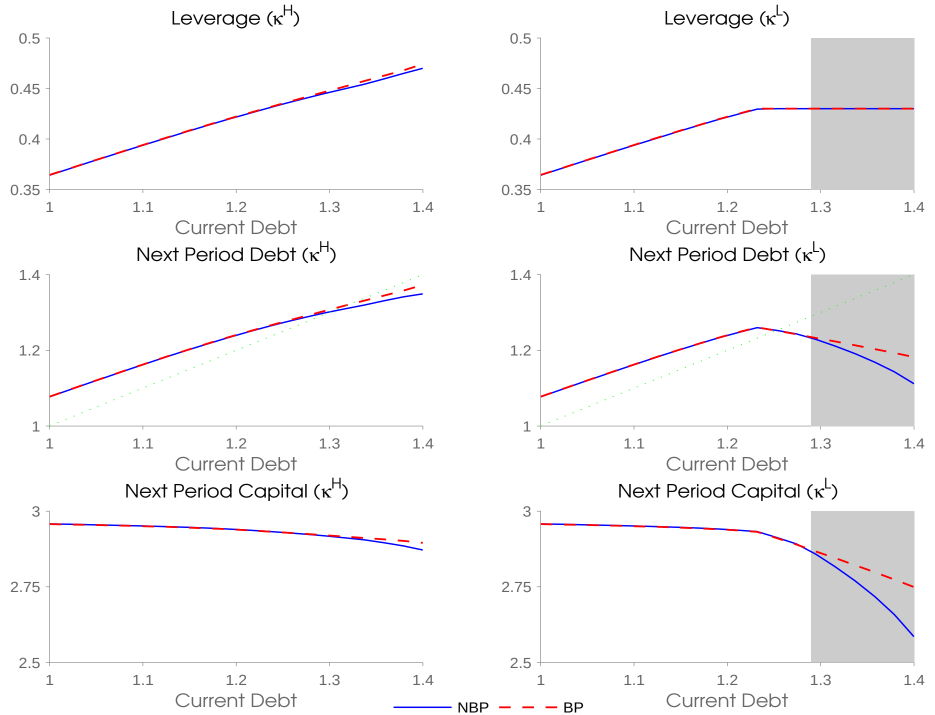
Leverage (κ^H)
0.5
0.45
0.4
0.35
1
1.1
1.2
1.3
1.4
Current Debt
Leverage (κ^L)
0.5
0.45
0.4
0.35
1
1.1
1.2
1.3
1.4
Current Debt
NBP
BP


Leverage (κ^H)
Leverage (κ^L)
0.5
0.45
0.4
0.35
1
1.1
1.2
1.3
1.4
Current Debt
Next Period Debt (κ^H)
Next Period Debt (κ^L)
Current Debt
NBP
BP

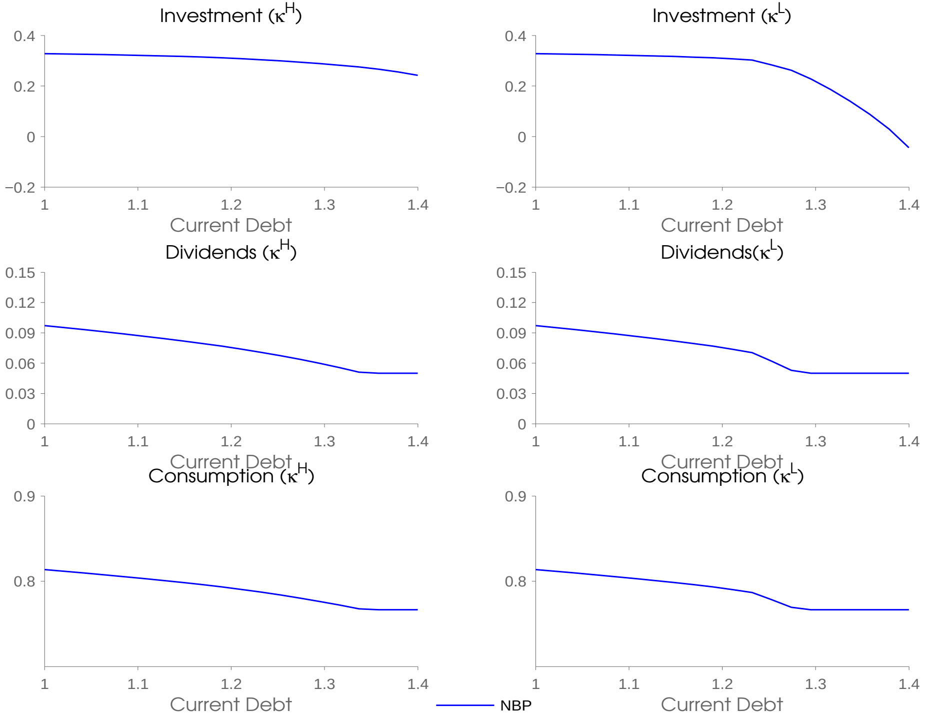

Leverage (κ^H)
0.5
0.45
0.4
0.35
1
1.1
1.2
1.3
1.4
Current Debt
Leverage (κ^L)
Next Period Debt (κ^H)
Next Period Debt (κ^L)
NBP
BP

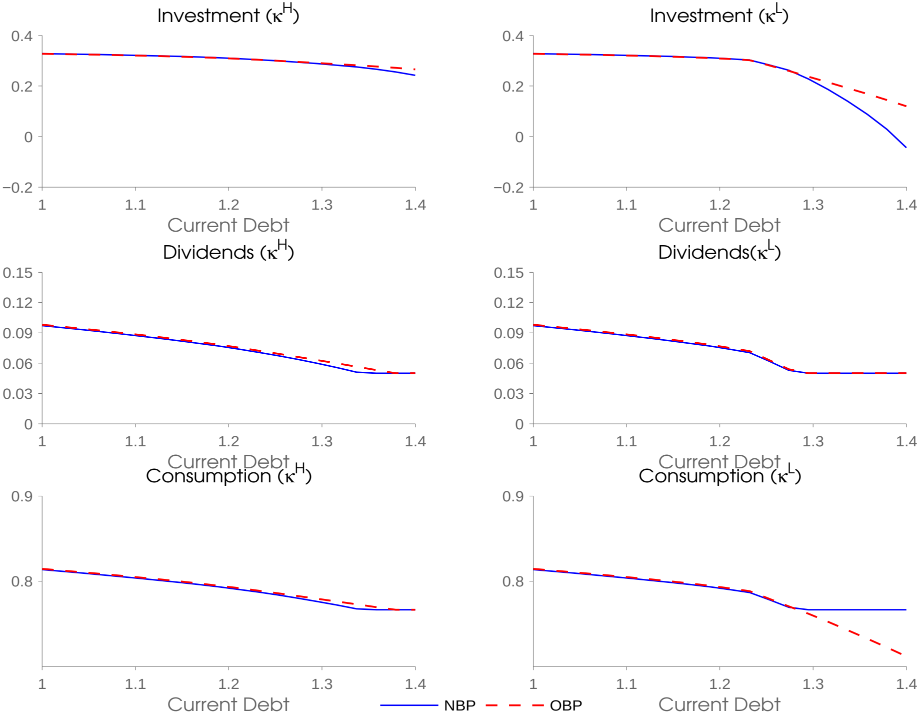


Leverage (κ^H)
Leverage (κ^L)
Next Period Debt (κ^H)
Next Period Debt (κ^L)
Next Period Capital (κ^H)
Next Period Capital (κ^L)
Current Debt
0.5
0.45
0.4
0.35
1.4
1.2
1
3
2.75
2.5
1.1
1.3
NBP
BP



Leverage (κ^H)
Leverage (κ^L)
Next Period Debt (κ^H)
Next Period Debt (κ^L)
Next Period Capital (κ^H)
Next Period Capital (κ^L)
0.5
0.45
0.4
0.35
1.4
1.2
1
3
2.75
2.5
1
1.1
1.2
1.3
1.4
Current Debt
NBP
BP


Investment (κ^H)
Investment (κ^L)
Dividends (κ^H)
Dividends(κ^L)
Consumption (κ^H)
Consumption (κ^L)
Current Debt
NBP
0.4
0.2
0
−0.2
0.15
0.12
0.09
0.06
0.03
0.9
0.8
1
1.1
1.2
1.3
1.4


Investment (κ^H)
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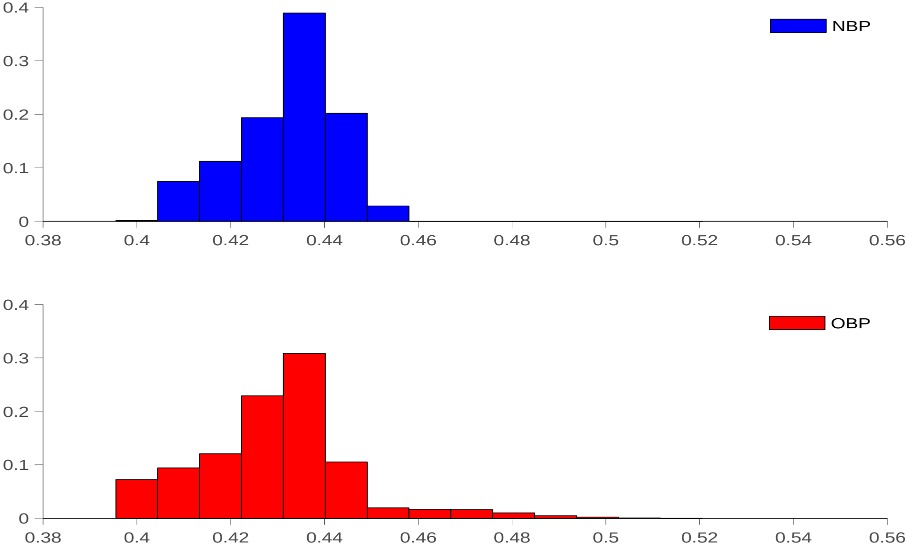
Dividends (κ^H)
Dividends(κ^L)
Consumption (κ^H)
Consumption (κ^L)
0.4
0.2
0
−0.2
0.15
0.12
0.09
0.06
0.03
0.9
0.8
1
1.1
1.2
1.3
1.4
Current Debt
NBP
OBP

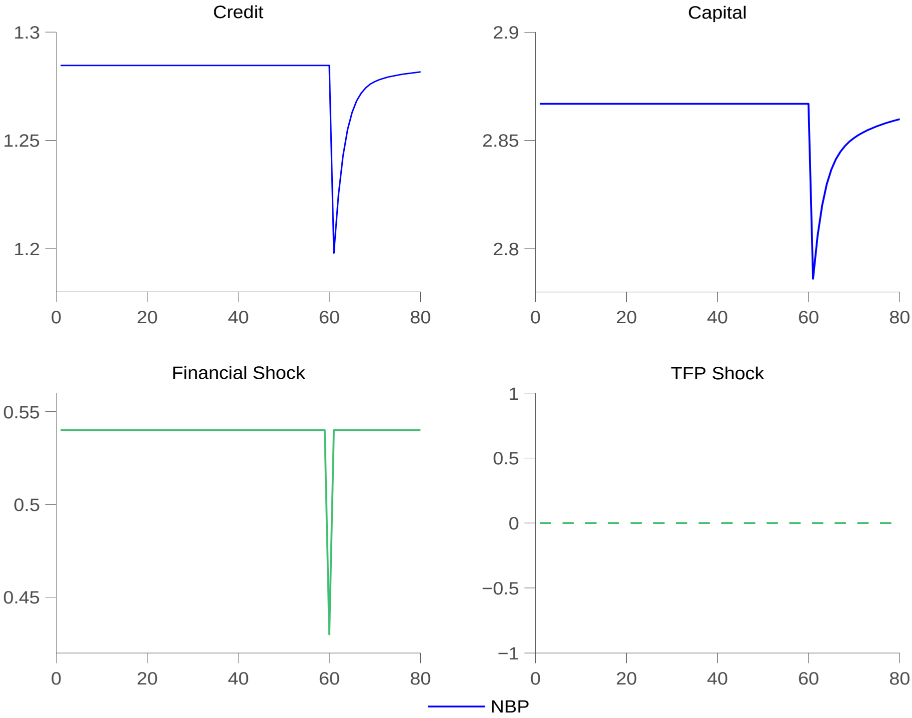
Ergodic Distribution Leverage



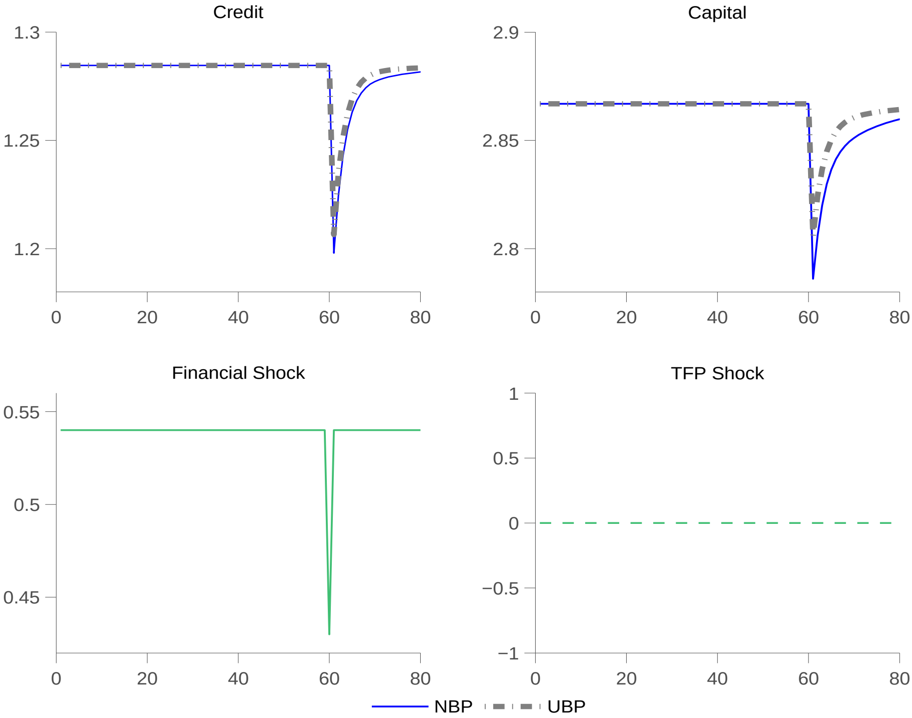
Non-linear impulse response

What is the economy's response to a negative financial shock?

- Simulate economy for a long period of time for a sequence of TFP shocks equal to the average and positive financial shocks
- Hit the economy with a one-time negative financial shock
- Compare economy without intervention to economy with anticipated and unanticipated bailouts
- Role for macro-prudential policy



Credit
1.3
1.25
1.2
0
20
40
60
80
Capital
2.9
2.85
2.8
0
20
40
60
80
Financial Shock
0.55
0.5
0.45
0
20
40
60
80
TFP Shock
1
0.5
0
−0.5
−1
0
20
40
60
80
NBP


Credit
1.3
1.25
1.2
0
20
40
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2.9
2.85
2.8
0
20
40
60
80
Financial Shock
0.55
0.5
0.45
0
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TFP Shock
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−0.5
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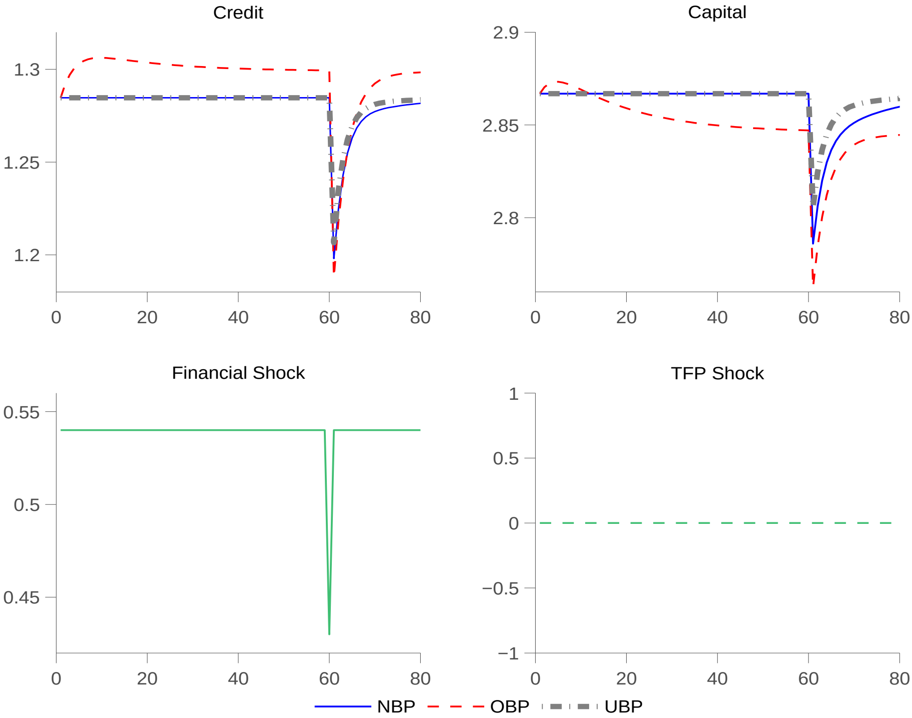
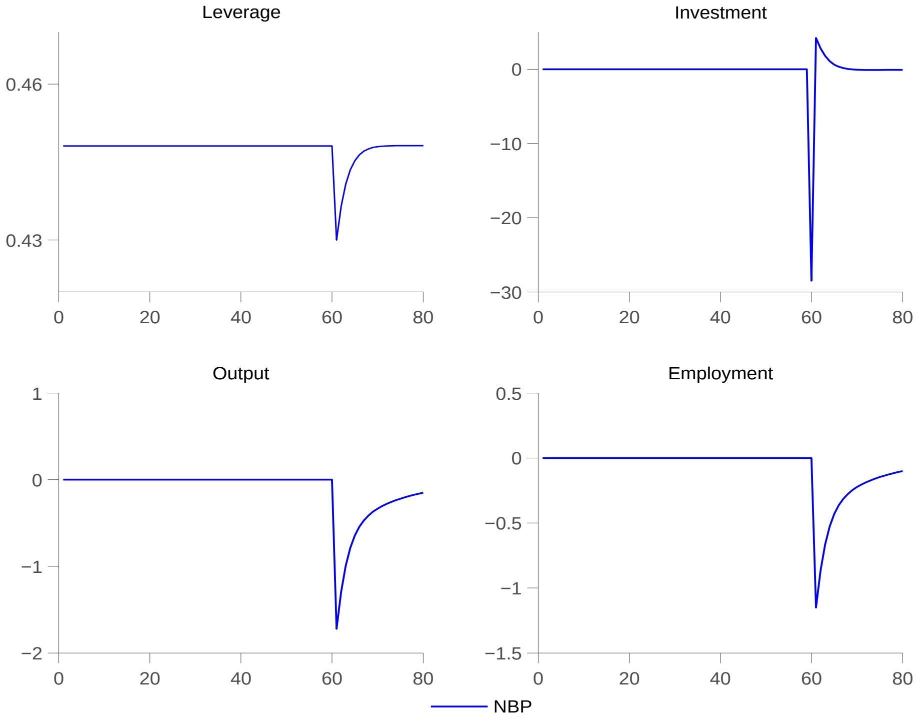
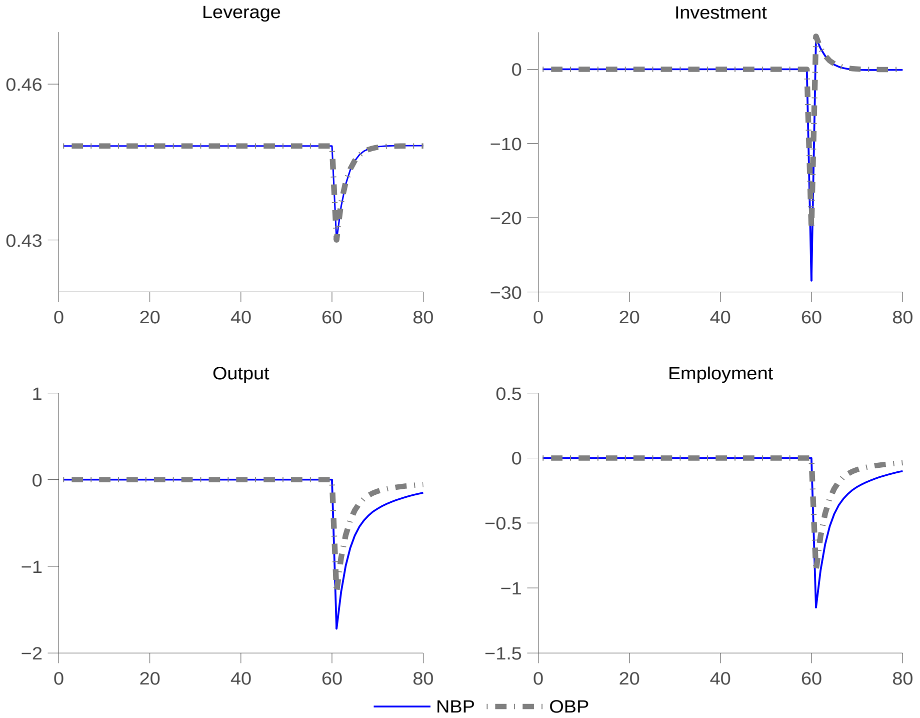
60
80
NBP
UBP


Credit
1.3
1.25
1.2
0
20
40
60
80
Capital
2.9
2.85
2.8
0
20
40
60
80
Financial Shock
0.55
0.5
0.45
0
20
40
60
80
TFP Shock
1
0.5
0
−0.5
−1
0
20
40
60
80
NBP
OBP
UBP


Leverage
0.46
0.43
0
20
40
60
80
Investment
0
−10
−20
−30
0
20
40
60
80
Output
1
0
−1
−2
0
20
40
60
80
Employment
0.5
0
−0.5
−1
−1.5
0
20
40
60
80
NBP



Leverage
0.46
0.43
0
20
40
60
80
Investment
0
−10
−20
−30
0
20
40
60
80
Output
1
0
−1
−2
0
20
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Employment
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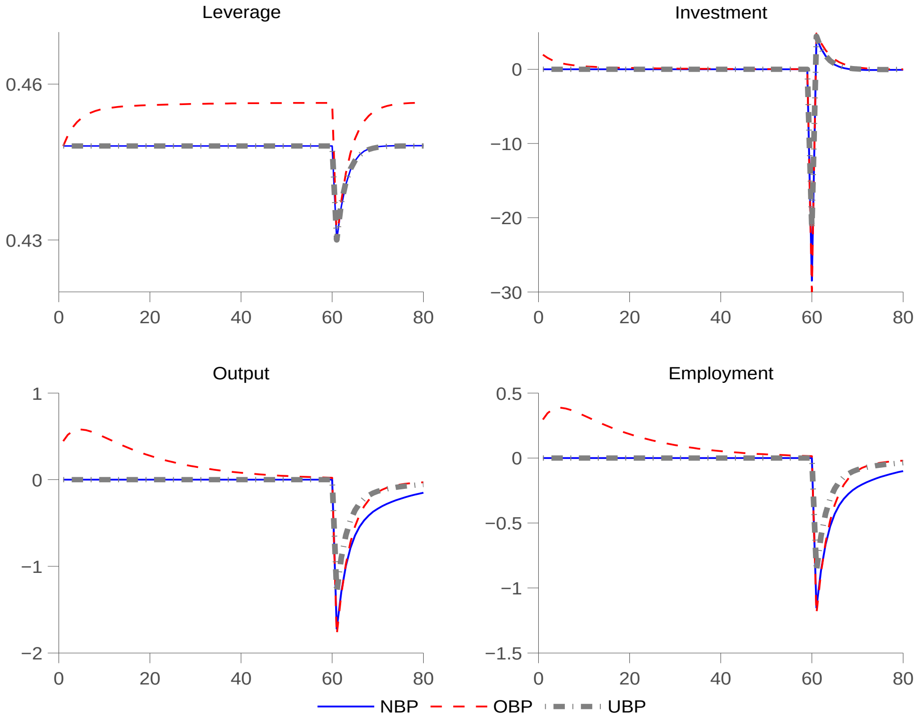
−1
−1.5
0
20
40
60
80
NBP
OBP


Leverage
0.46
0.43
0
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Investment
0
−10
−20
−30
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40
60
80
Output
1
0
−1
−2
0
20
40
60
80
Employment
0.5
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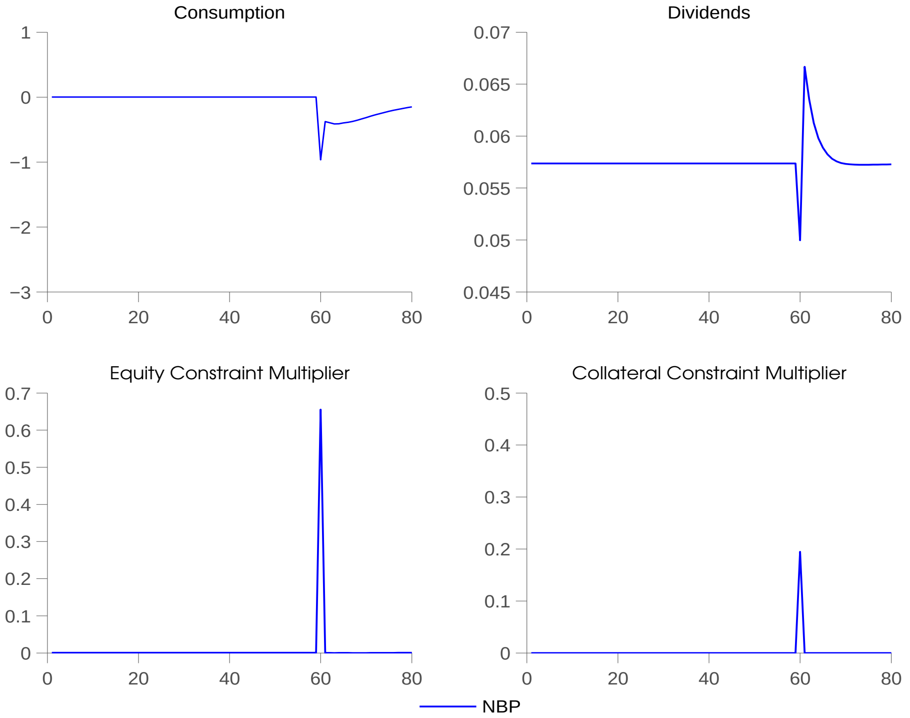
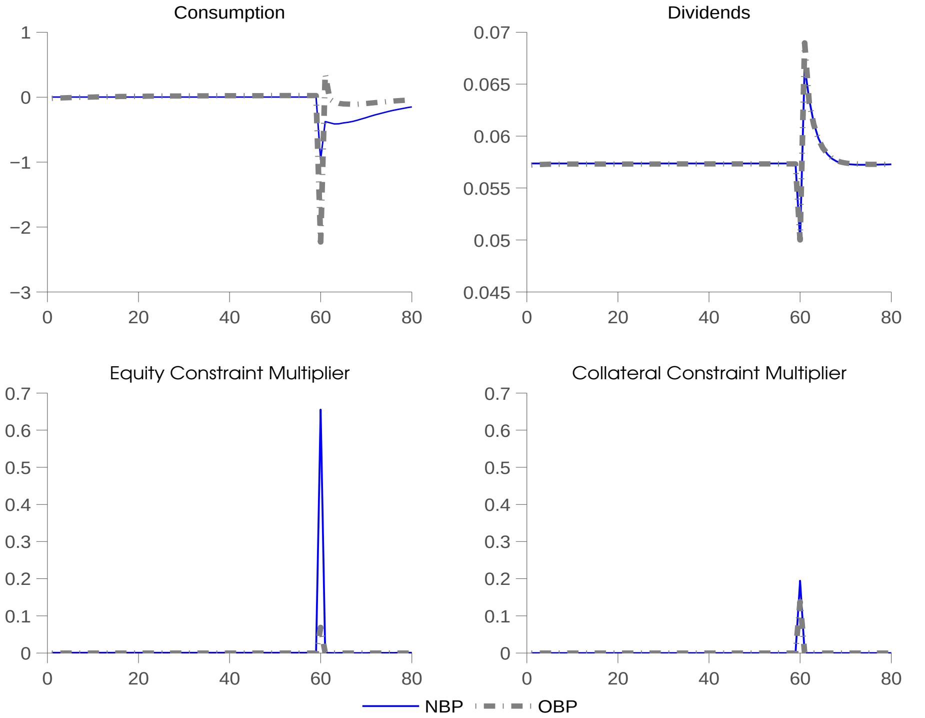
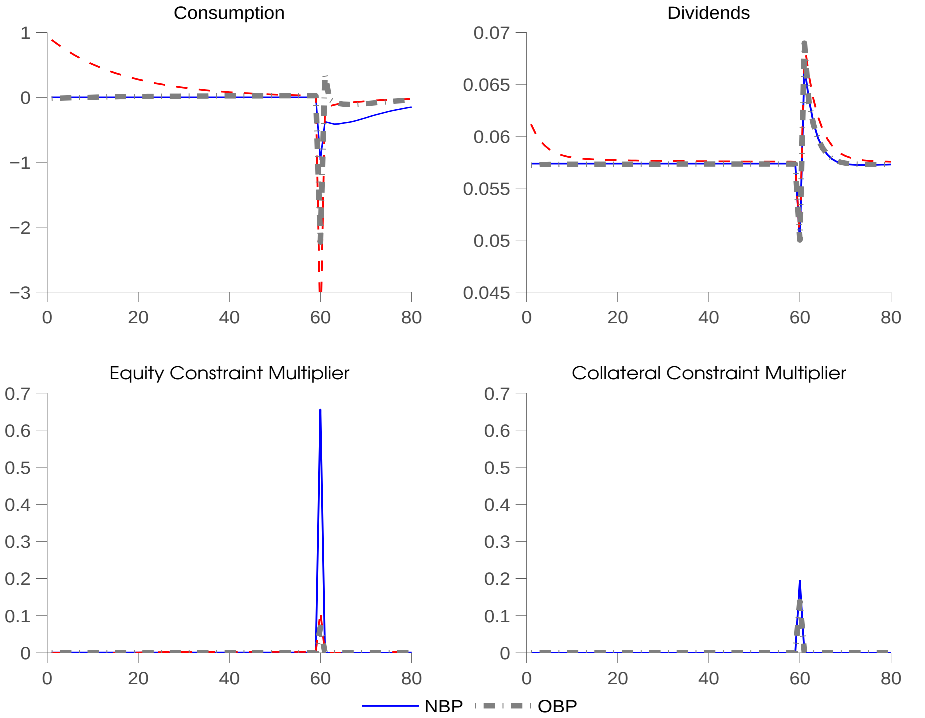
−0.5
−1
−1.5
0
20
40
60
80
NBP
OBP
UBP

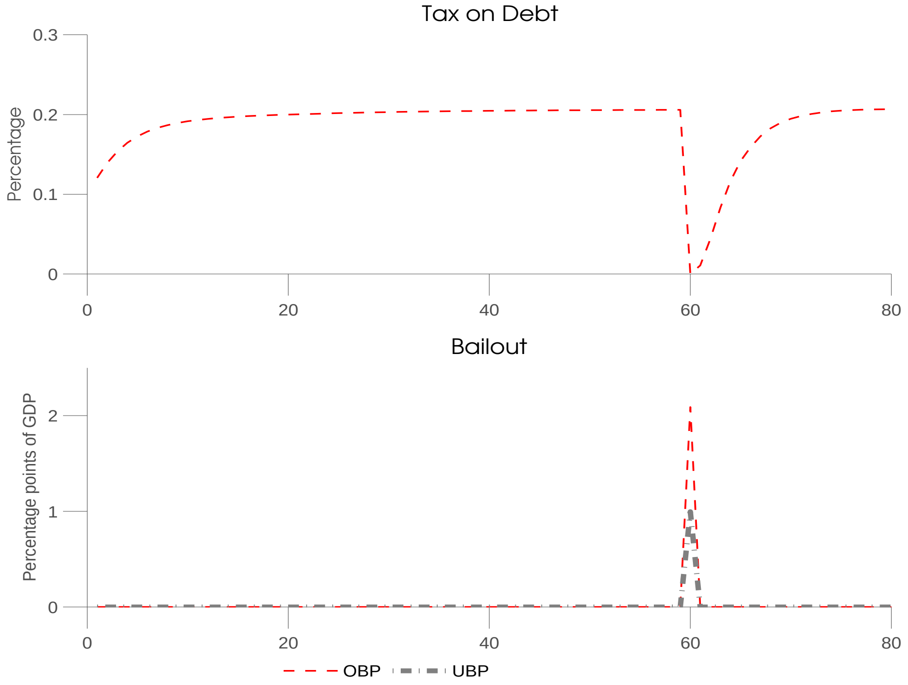

Consumption
Dividends
Equity Constraint Multiplier
Collateral Constraint Multiplier
NBP



Consumption
1
0
−1
−2
−3
0
20
40
60
80
Dividends
0.07
0.065
0.06
0.055
0.05
0.045
0
20
40
60
80
Equity Constraint Multiplier
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
Collateral Constraint Multiplier
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
NBP
OBP

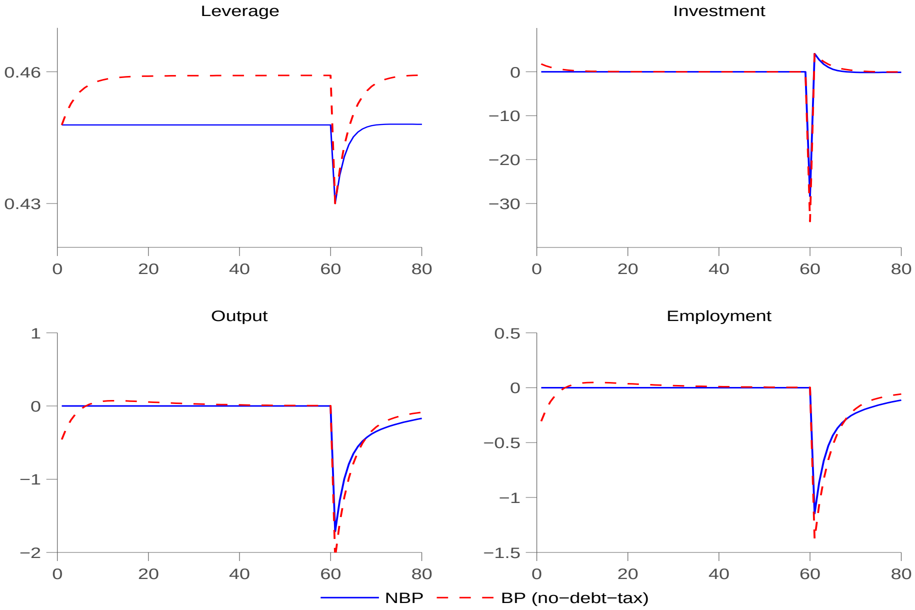


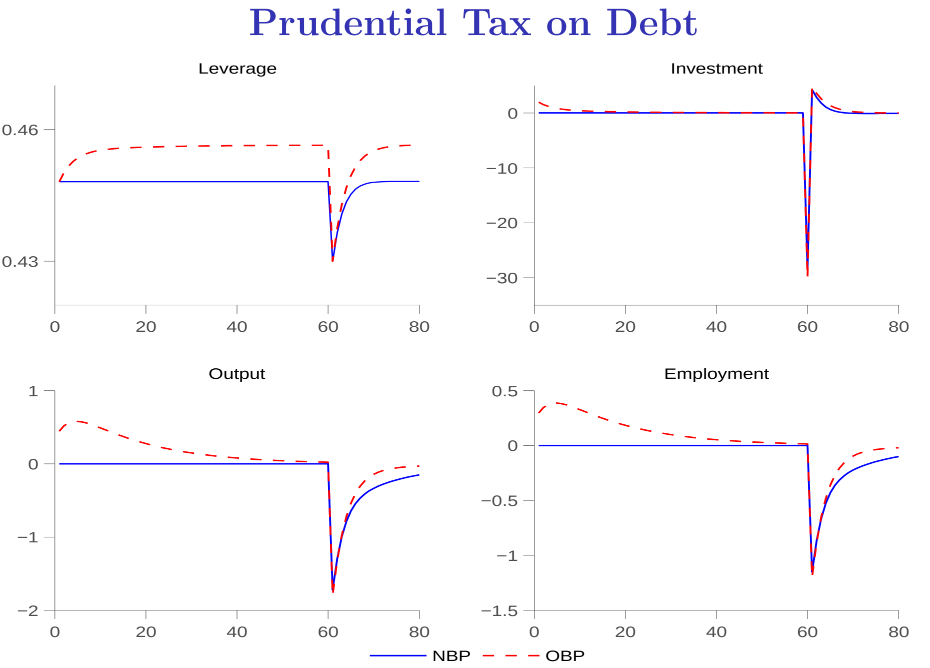
Consumption
1
0
−1
−2
−3
0
20
40
60
80
Dividends
0.07
0.065
0.06
0.055
0.05
0.045
0
20
40
60
80
Equity Constraint Multiplier
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
Collateral Constraint Multiplier
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
NBP
OBP



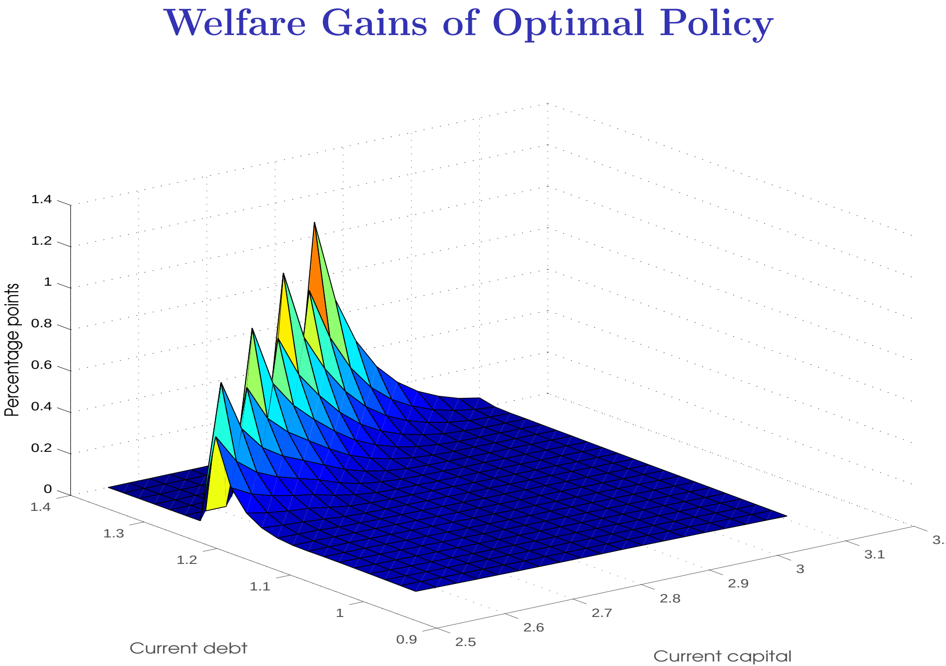
Tax on Debt
Percentage
0.3
0.2
0.1
0
0
20
40
60
80
Bailout
Percentage points of GDP
2
1
0
0
20
40
60
80
OBP
UBP

No Prudential Tax on Debt





Prudential Tax on Debt
Leverage
Investment
Output
Employment
NBP
OBP


Welfare Gains of Optimal Policy
Percentage points
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1.4
1.3
1.2
1.1
1
0.9
Current debt
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
Current capital

Conclusions

- Substantial effects of bailouts on risk-taking and on recovery from recession
- Part of the increase in leverage is socially desirable (insurance effects)
- Best approach is to complement bailouts with prudential policy
  - This offsets moral hazard effects
  - Delivers time-consistent policy
- Moving forward: foundations for financial shocks and equity constraint, crowding-out effects of bailouts

Extra Slides

Financial Flows ▸ back

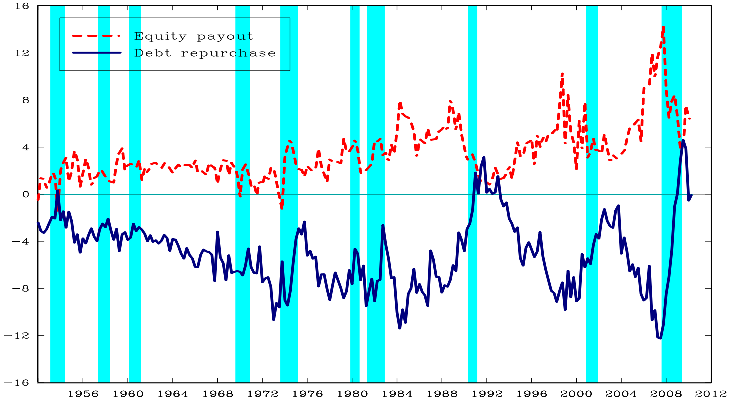


FIGURE 1. FINANCIAL FLOWS IN THE NONFINANCIAL BUSINESS SECTOR (CORPORATE AND NONCORPORATE), 1952.I-2010.II. SEE THE ONLINE APPENDIX FOR DATA SOURCES.

Source: Jermann and Quadrini (AER, 2012) from Flow of Funds

Equity Injections

back

$$e_t b_t = \Upsilon_t$$

$$T_t = \Upsilon_t(1+\varphi)$$

$$\tau_t = \frac{\mathbb{E}_t m_{t+1}(1+\eta_{t+1}) + \mu_t}{\mathbb{E}_t m_{t+1}(1+\eta_{t+1}(1-e_{t+1})) + \mu_t} - 1$$

$$T_t^f = \frac{b_{t+1}\tau_t}{R}$$

Debt Relief

back

$$
\begin{aligned}
\gamma_t b_t &= \Upsilon_t \\
T_t &= \Upsilon_t (1+\varphi) \\
\tau_t &= \frac{\mathbb{E}_t m_{t+1}(1+\eta_{t+1}) + \mu_t}{\mathbb{E}_t m_{t+1}(1+\eta_{t+1})(1-\gamma_{t+1}) + \mu_t} - 1 \\
T_t^f &= \frac{b_{t+1}\tau_t}{R}
\end{aligned}
$$

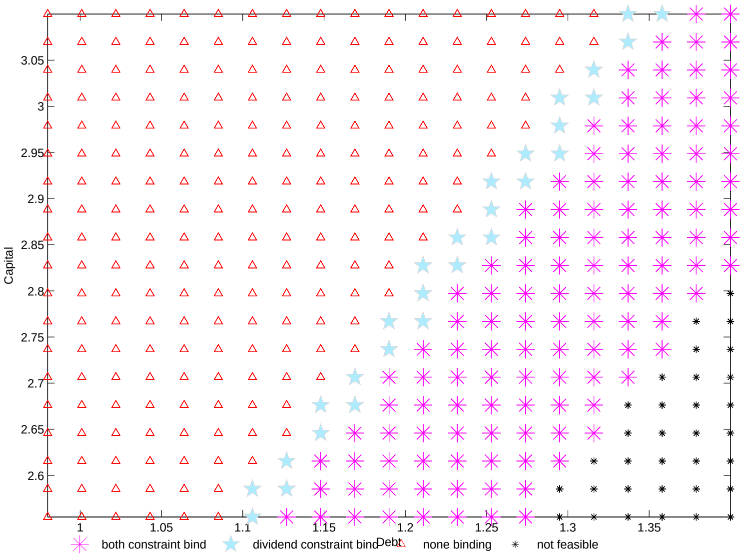
Recursive Competitive Equilibrium

back

- firms' policies $\left\{\hat{d}(k,b,X),\hat{h}(k,b,X),\hat{k}(k,b,X),\hat{b}(k,b,X)\right\}$ and firm's value $V(k,b,X)$
- households's policies $\{\hat{s}(s,X),\hat{n}(s,X)\}$ and SDF $m(X,X')$
- prices for labor and stocks $w(X),p(X)$
- a law of motion of aggregate variables $X'=\Gamma(X)$

i. households solve their optimization problem
ii. firms's policies and firm value solve their Bellman equation
iii. markets clear in equity and labor market $(\hat{s}(1,X)=1)$, $(\hat{h}(K,B,X)=\hat{n}(1,X))$
iv. the law of motion is $\Gamma(\cdot)$ is consistent with individual policy functions and stochastic processes for κ and z.

Binding Region



Planner's problem ▸ back

$$\max_{k_{t+1},b_{t+1},d_t,c_t,\Upsilon_t,h_t,p_t} E_0 \sum_{t=0}^{\infty} \beta^t u(c_t - G(h_t))$$

$$b_t + c_t + k_{t+1} + \Upsilon_t \varphi = (1-\delta)k_t + F(z_t, k_t, h_t) + \frac{b_{t+1}}{R}$$

$$\bar{d} \geq (1-\delta)k_t + F(z, k_t, h_t) - w_t^* h_t^* + \frac{b_{t+1}}{R} + \Upsilon_t - b_t - k_{t+1}$$

$$b_{t+1} \leq \kappa k_{t+1}$$

$$where \quad h_t^*, w_t^* \quad w_t^* = G'(h_t^*) = F_L(z_t, k_t^*, h_t^*)$$

$$p_t u'(t) = \beta \mathbb{E}_t u'(t+1)(d_t + p_{t+1})$$

Remark: similar results if planner internalizes wage effects

“The nation must work together to strike the right balance between our need to promote the public trust and using taxpayer money prudently to strengthen the financial system...to get credit flowing to working families and businesses.”

Geithner, T. (2009): My Plan for Bad Bank Assets,.Wall Street Journal, March 23

Table: Second Moments

	No Bailout Policy	Optimal Bailout Policy	Data
Output	2.3	2.2	2.3
Consumption	2.0	2.1	1.6
Employment	1.5	1.5	0.8
Investment	9.9	9.6	9.0

Note: Moments in the model correspond to the stochastic steady state. Moments in the data correspond to annual data from 1950-2010.

back