On the Optimality of Financial Repression

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Financial Repression

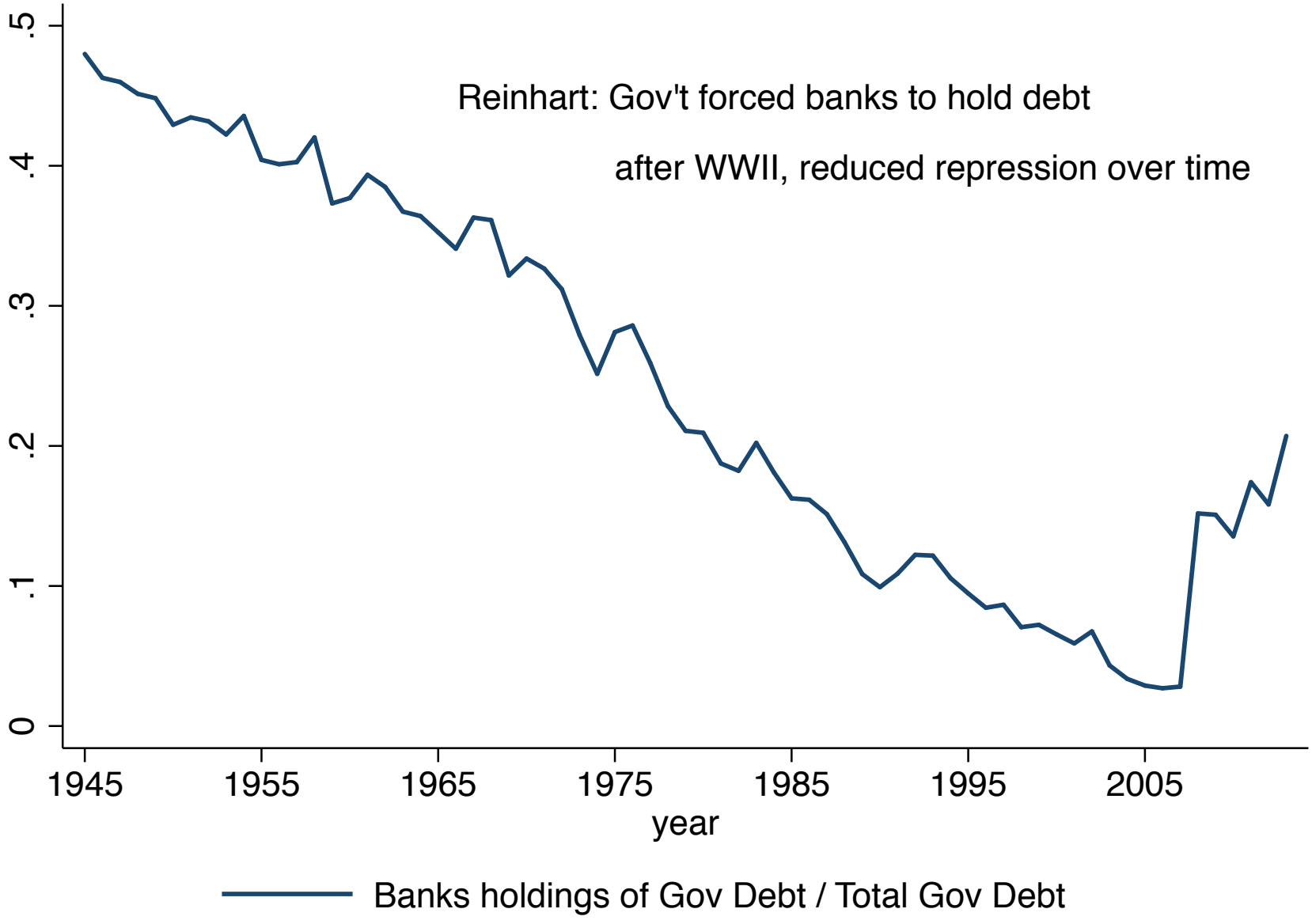
Regulation forcing financial institutions to hold gov't debt

- Regulation could be explicit or implicit
- We model regulation as a portfolio restriction
- We take the public finance approach pioneered by Lucas and Stokey rather than a safety and soundness approach

Financial Repression in Practice: Spending Needs

- Bank of England, France founded to hold gov't debt
- Civil war: Set up national banks required to hold debt to back bank notes
- Prior to 1860s US states required local banks to hold state debt (Calomiris and Haber (2013))
- After WWII gov't practiced financial repression to reduce burden of government debt (Reinhart and Sbrancia (2011))

US Debt and Banks Holdings



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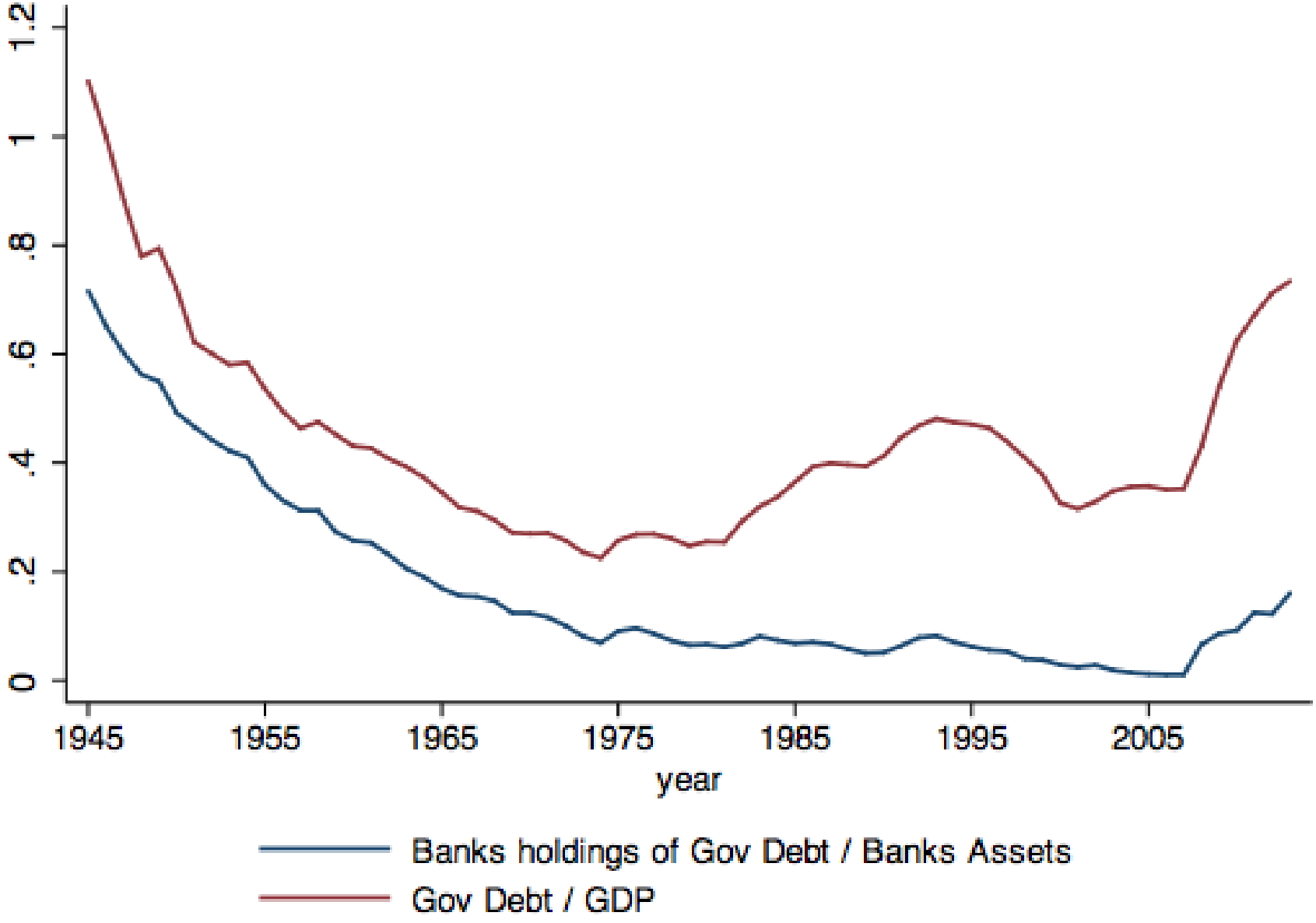

Our Reading of Historical Evidence

- Long history of financial repression
- Repression more likely in exceptional times (high spending needs or sudden stops)
  - Government issues a lot of debt
  - Forces banks to hold debt
  - Gradually reduces debt after exceptional times
  - Gradually reduces repression after exceptional times

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Our model suggests

- History puzzling if governments can commit
- Not so puzzling if they cannot

Basic Ideas of the Model

- Collateral constraint model

- Because of collateral constraints: capital + bonds held by banks constrained by net worth

With Commitment

Repression never optimal with commitment

Repression has two costs

- Taxes capital
- Distorts portfolio so crowds out investment

Better to tax capital and avoid extra distortion

Logic similar to result "never tax intermediate goods"

Without Commitment

Repression: costly way to purchase credibility to repay debt

Without Commitment

Repression: costly way to purchase credibility to repay debt

Logic:

How is credibility purchased?

- Banks forced to hold debt
- Default on such debt reduces net worth, investment

Why is credibility valuable?

- **Tax smoothing** benefits

Why is purchase costly?

- Ex-ante **crowding out** costs as with commitment

Model of Financial Frictions and Financial Repression

Model Overview

- Representative family of bankers and workers
- Banks are collateral constrained
- Gov't finances spending with distorting taxes and debt
- Gov't can choose minimum fraction of assets that banks must hold in the form of gov't debt (repression)

Representative Family of Bankers and Workers

- All investment done by banks
  - Households hold deposits at banks
- Bankers face collateral constraints
  - Limits deposits relative to bank assets
- Ensure collateral constraint always binding
  - Type of family members switches randomly
  - Prevents bankers from accumulating too much net worth

Representative Family of Bankers and Workers

Type of family members switches randomly

- Fraction $1 - \sigma$ of workers become new bankers
- Continue as banker with probability σ
- Switch to be worker with probability $1 - \sigma$
- New bankers endowed with random initial net worth with mean $\bar{n}$

Household Problem

$$\max_{\{C_t, L_t, B_{Ht+1}, D_{t+1}\}} \sum_{t=0}^{\infty} \beta^t U(C_t, L_t)$$

subject to

$$C_t + q_{t+1} B_{Ht+1} + q_{Dt+1} D_{t+1} \leqslant (1 - \tau_{lt}) w_t L_t + D_t + \delta_{Ht} B_{Ht} + X_t$$

$$B_{Ht+1} \geqslant 0$$

B_{Ht} : gov't debt held by hh, D_t : deposits, X_t : net dividends,
$\delta_{Ht} = 0$ denotes default on debt held by households

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Implies return on deposits greater than return on gov't debt

$$R_{Dt+1} = \frac{1}{q_{Dt+1}} \geqslant R_{Ht+1} = \frac{\delta_{Ht+1}}{q_{t+1}}$$

Bankers' Constraints

- Budget constraint

$$x_t + (1+\tau_{kt})k_{t+1} + q_{t+1}b_{Bt+1} \leqslant \overbrace{R_t k_t + \delta_{Bt} b_{Bt} - d_t}^{\text{net worth}=n_t} + q_{Dt+1}d_{t+1}$$

x_t = dividends, b_{Bt} = gov't debt held by banks, d_t = deposits
$\delta_{Bt} = 0$ denotes default on debt held by banks

- Collateral constraint ▸ Derivation

$$d_{t+1} \leqslant \gamma \left[R_{t+1}k_{t+1} + \delta_{Bt+1}b_{Bt+1}\right]$$

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- Collateral constraint ▸ Derivation

$$d_{t+1} \leqslant \gamma \left[R_{t+1}k_{t+1} + \delta_{Bt+1}b_{Bt+1}\right]$$

- Regulatory constraint

$$\frac{b_{Bt+1}}{R_{t+1}k_{t+1} + b_{Bt+1}} \geqslant \phi_t \quad \text{repression}$$

Newborn Bankers Problem

$$\max \sum_{s=t}^{\infty} Q_{s,t} \sigma^{s-t} \left[\sigma x_s + (1-\sigma) n_s \right]$$

subject to portfolio constraints and

$$x_s + (1+\tau_{ks}) k_{s+1} + q_{s+1} b_{Bs+1} - q_{Ds+1} d_{s+1} \leqslant n_s$$

$$d_{s+1} \leqslant \gamma \left[R_{s+1} k_{s+1} + \delta_{Bs+1} b_{Bs+1} \right]$$

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Capital can earn higher return than deposits

$$\frac{R_{t+1}}{1+\tau_{kt}} \geqslant \frac{1}{q_{Dt+1}} = R_{Dt+1}$$

Strict when collateral constraint binds
Banks cannot increase deposits to invest in capital

Resource Constraint and Government

- Resource constraint

$$C_t + G_t + K_{t+1} \leqslant F(K_t, L_t)$$

- Government budget constraint

$$G_t + \delta_{Ht} B_{Ht} + \delta_{Bt} B_{Bt} \leqslant q_{t+1}(B_{Ht+1} + B_{Bt+1}) + \tau_{lt} w_t L_t + \tau_{kt} K_{t+1}$$

- Allow for discriminatory default: $\delta_{Ht} \neq \delta_{Bt}$
  - Equivalent to non-discriminatory default with bank bailout

Natural Restrictions on Policies

To keep government from circumventing collateral constraint

- $\tau_{kt} \geqslant 0$
  - Prevents direct subsidy of banks

- $q_{t+1} \leqslant q_{Dt+1}$
  - Prevents indirect subsidy of banks
  - Pay high interest on bank debt
    (and default on household debt)
  - No one thinks of financial repression as too high rates

Results on financial repression also hold with alternative assumptions

Restrictions Come from Micro Model

- Households can set up fraudulent banks
- Fraudulent banks cannot create capital goods
- All banks can exaggerate value of capital holdings
- Government cannot distinguish type of banks; households can
- If governments attempt subsidy, fraudulent banks will be set up
- Implies natural restrictions on policies

Absent Regulation Banks Hold No Debt

- Have shown

$$R_{Dt+1} = \frac{1}{q_{Dt+1}} \geqslant R_{Ht+1} = \frac{\delta_{Ht+1}}{q_{t+1}}$$

and

$$\frac{R_{t+1}}{1+\tau_{kt}} \geqslant R_{Dt+1}$$

with first inequality strict if collateral constraint binds

- So if collateral constraint binds, absent regulation banks hold no debt as

$$\frac{R_{t+1}}{1+\tau_{kt}} > R_{Bt+1} = \frac{\delta_{Bt+1}}{q}$$

  - No point in paying R_D for deposits to invest at R_B when deposits can be used to earn $R/(1+\tau_k)$ on capital

Absent Regulation Banks Hold No Debt

- Have abstracted from other motives from holding debt such as liquidity considerations
- Can incorporate such motives
- Regulation should be thought of as requiring banks to hold debt above and beyond other motives for holding government debt

Financial Repression Not Optimal with Commitment

Financial Repression Not Optimal with Commitment

Proposition.

- The Ramsey outcome can be implemented with no financial repression, that is, $\phi_t = 0$ for all t

- If the collateral constraint binds for some t then $\phi_t = 0$ and $B_{Bt+1} = 0$ unique way to implement Ramsey outcome

Proof When Collateral Constraint Binds Need $\phi = 0$

- Can show $q = q_D$ wlog

Aggregate bank budget constraint

$$(1+\tau_k)K' + q_D B'_B - q_D D' = \sigma N + (1-\sigma)\bar{n}$$

with $N = F_K K + \delta_B B_B - D$, and the collateral constraint

$$D' = \gamma \left[F'_K K' + \delta' B'_B \right],$$

Shift debt from banks to HH by 1 unit and reduce D' by 1 unit

- Relaxes collateral constraint
- Reducing B'_B increases K': Reduces crowding out cost

Argument Is General

Financial repression has two effects

- Raises revenues by taxing bank assets
- Distorts banks' portfolio decisions

Better to

- Raise revenues by directly taxing bank assets
- Avoids portfolio distortions

Ruling out tax on bank assets hard to justify

- Need to see bank assets to practice repression

Financial Repression Is Optimal w/o Commitment

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Markov equilibrium

- If tax smoothing motive strong enough repression optimal

Sustainable equilibrium: main focus of analysis

- Trigger to Markov after government deviation
- Reputation supports modest amount of debt
- Repress only when spending needs exceptionally high
- Afterwards run down debt slowly

Markov Equilibrium

Repression Is a Costly Way to Purchase Credibility

If no repression then banks hold no debt.
Will households?

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If no repression then banks hold no debt.
Will households? No

- Defaulting on households has no cost and positive benefits
- So without repression households do not hold debt either. Must have balanced budget. No tax smoothing

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Is a non-balanced budget with repression

- Credible? Yes if ex post costs of default (reduction in banks net worth) large enough
- Desirable? Yes if tax smoothing gains outweigh crowding out costs

Primal Markov Problem, $S = (K, D, B_B, B_H, G)$

$$V(S) = \max U(C, L) + \beta V(S')$$

s.t. resource constraint, government budget

$$G + \delta_B B_B + \delta_H B_H = \left(F_L + \frac{U_L}{U_C}\right) L + q_D(S')[\delta_B(S')B'_B + \delta_H(S')B'_H]$$

aggregate banks budget

$$K' + q_D(S')\delta_B(S')B'_B - q_D(S')D' = \sigma\left(F_K K + \delta_B B_B - D\right) + (1-\sigma)\bar{\pi}$$

collateral constraint

$$D' = \gamma\left[R(S')K' + \delta_B(S')B'_B\right]$$

Current government takes red functions as given ▸ Definition

Simplifying Assumptions

Cyclical pattern of government spending

- $G_t = G_H$ if t even and $G_t = G_L$ if t odd

Linearity in consumption and production

- $U(C, L) = C - v(L)$
- $F(K, L) = \omega_K K + \omega_L L$

Role of Assumptions:

- On G_t
  - Makes issuing debt desirable even in long run
- On U and F
  - Eliminates all the cross-partial terms
  - Ensures simple expressions for prices: $q_D = \beta$ and $R = \omega_K$

Optimality of Financial Repression w/o Commitment

Proposition. If the spread between G_H and G_L is sufficiently large, in any Markov equilibrium the government sells debt in the high state and forces banks to hold it.

Idea

- Tax smoothing gains large when spread G_H and G_L large
- So repress when gains large enough relative to costs

Simplifying Primal Markov Problem

- Choose tax revenues from labor, $T = \tau_L \omega_L L$

- Let net utility from labor be given by

$$W(T) = \omega_L \ell(T) - v(\ell(T))$$

  where $\ell(T)$ is optimal labor supply response to T

Simplified Primal Markov Problem

Guess and verify value function has form

$$V(S) = \omega_K K + A_R + A_N N + \max \left\{ \overbrace{H(B_B, G)}^{repay}, \overbrace{H(0, G) - A_N B_B}^{default} \right\}$$

where the *tax distortion* function H satisfies

$$H(B_B, G) = \max_{B'_B, T} W(T) - A_B B'_B + \beta H(B'_B, G')$$

subject to government budget and no-default constraint

$$H\left(B'_B, G'\right) \geqslant H\left(0, G'\right) - A_N B'_B$$

Intuition for Tax Distortion Function

$$H(B_B, G) = \max_{B'_B, T} W(T) - A_B B'_B + \beta H(B'_B, G')$$

s.t. gov't budget and rewritten no-default constraint

$$A_N B'_B \geqslant H\left(0, G'\right) - H\left(B'_B, G'\right)$$

- $W(T)$ measures utility losses from labor tax distortions
- $A_B B'_B$ is ex-ante crowding out cost of repression
- $A_N B'_B$ is ex-post cost of defaulting on bank debt

No Default Constraint Implies No-Default Region

- Tax benefits of future default

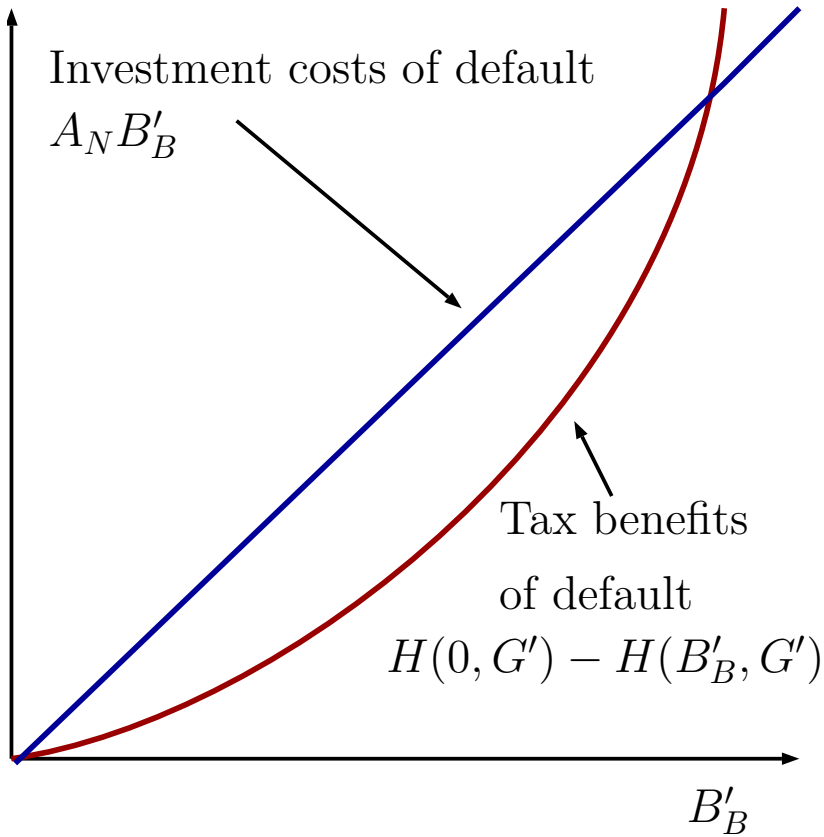
$$H\left(0, G'\right) - H\left(B'_B, G'\right)$$

  Tax benefits increasing and convex function of B'_B
- Investment cost of default

$$A_N B_B$$

Next plot no-default region

Credibility of Debt Issue



Tax Smoothing Considerations

- Tax smoothing benefits of issuing debt

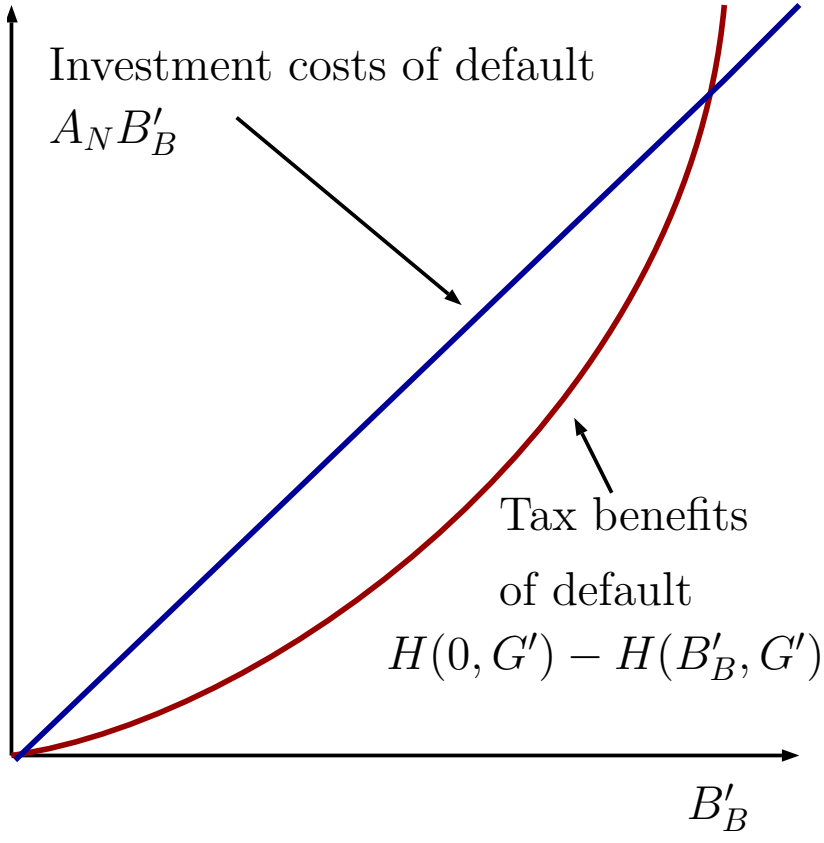
$$W(B_B + G - \beta B'_B) + \beta H(B'_B, G')$$

  Increase B'_B reduces taxes today, raises future taxes
- Crowding out cost of issuing debt

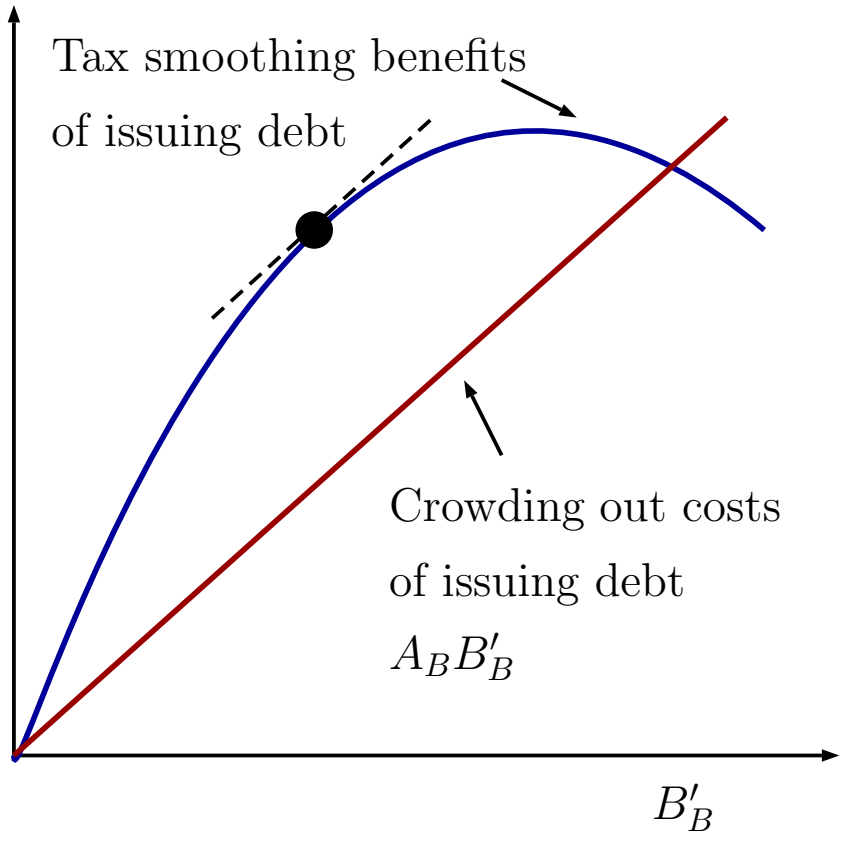
$$A_B B'_B$$

Next plot benefits greater than costs region

Credibility of Debt Issue



Desirability of Debt Issue



Optimal to credibly issue debt at •

$$-\beta W'(B_B + G - \beta B'_B) + \beta H_B(B'_B, G') = A_B$$

Running Down Debt Slowly Optimal After Big War

Fiscal needs in period 0 exceptionally high
For all $t \geqslant 1$ spending back to cyclical pattern

Proposition.
In a Markov equilibrium debt falls over time as do taxes.

Contrast with Ramsey. Under Ramsey:

- Never pay off initial debt
- Taxes constant over time
- No repression

Running Down Debt Slowly Optimal After Big War

Ramsey policy

- Compares cost of raising taxes today to benefit of reducing future taxes
- Costs and benefits purely from distorting labor supply

Markov policy

- Must repress to prevent future default
- Gets additional benefits relative to Ramsey from reducing future taxes by reducing bank held debt
- So incentive to reduce debt over time stronger in Markov

Front-Loading Distortions Optimal Under Markov

$-W'(T)$: marginal cost of raising T in labor tax revenues

Ramsey: First order condition

$$-\beta W'(T_t) = -\beta W'(T_{t+1})$$

so taxes constant over time

Markov: If B'_B strictly positive first order condition

$$-\beta W'(T_t) = A_B - \beta W'(T_{t+1})$$

so taxes fall over time after big war

Best Sustainable Equilibrium

Definition of Best Sustainable Equilibrium

Restrict attention to equilibria supported by reversion to Markov

- Sustainability constraint: continuation allocations at least as good as Markov

- Theorem: Any allocations and policies which constitute a competitive equilibrium and satisfy the sustainability constraint is a sustainable outcome.

Recursive Representation of Continuation

Value function has form

$$V(S) = \omega_K K + A_R + A_N N + H(B, G)$$

$$H(B, G) = \max_{B'_H, B'_B, T} W(T) - A_B B'_B + \beta H(B', G')$$

subject to government budget and sustainability constraint

$$H\left(B', G'\right) \geqslant h(B'_B, G')$$

where

$$h(B'_B, G') \equiv \max\left\{H_M\left(B_B, G'\right), H_M\left(0, G'\right) - A_N B'_B\right\}$$

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- An increase in B'_B relaxes the sustainability constraint

Response to Exceptional Fiscal Needs

Fiscal needs in period 0 exceptionally high
For all $t \geqslant 1$ spending back to cyclical pattern

Proposition. There is a critical value G^* such that if $G_0 > G^*$ there is financial repression

When G_0 high

- Trigger strategies alone cannot support enough debt
- Get better tax smoothing by forcing banks to hold debt

Running Down Debt Slowly Optimal After Big War

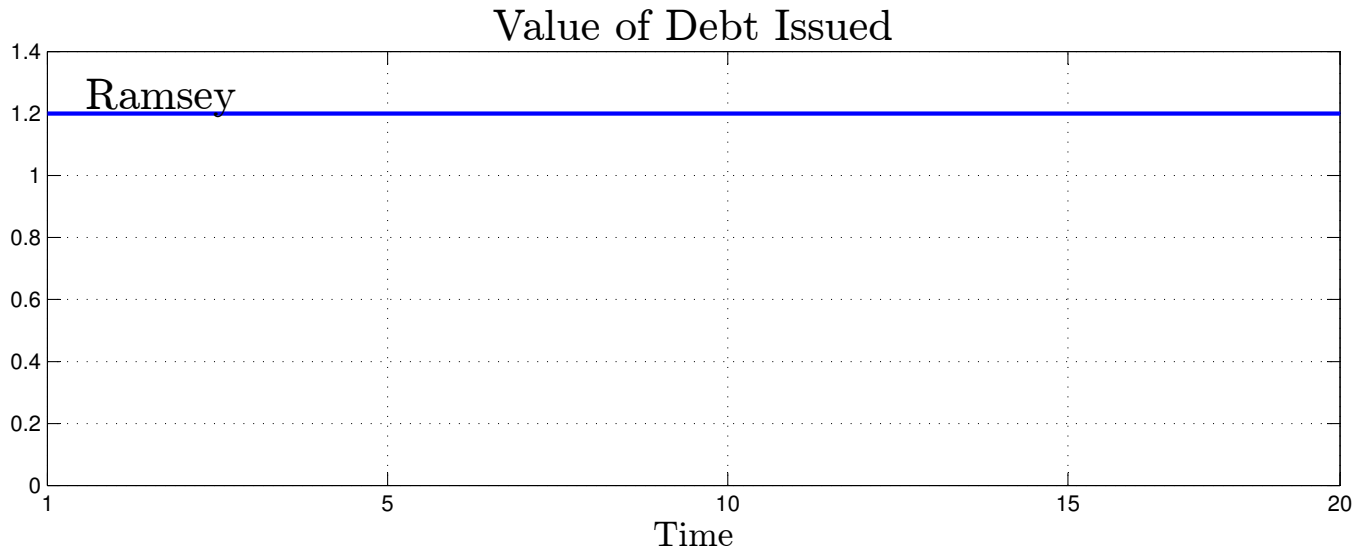
Proposition. In the best sustainable equilibrium debt falls over time as do taxes. Eventually reaches sustainable Ramsey equilibrium with perfect tax smoothing and no repression.

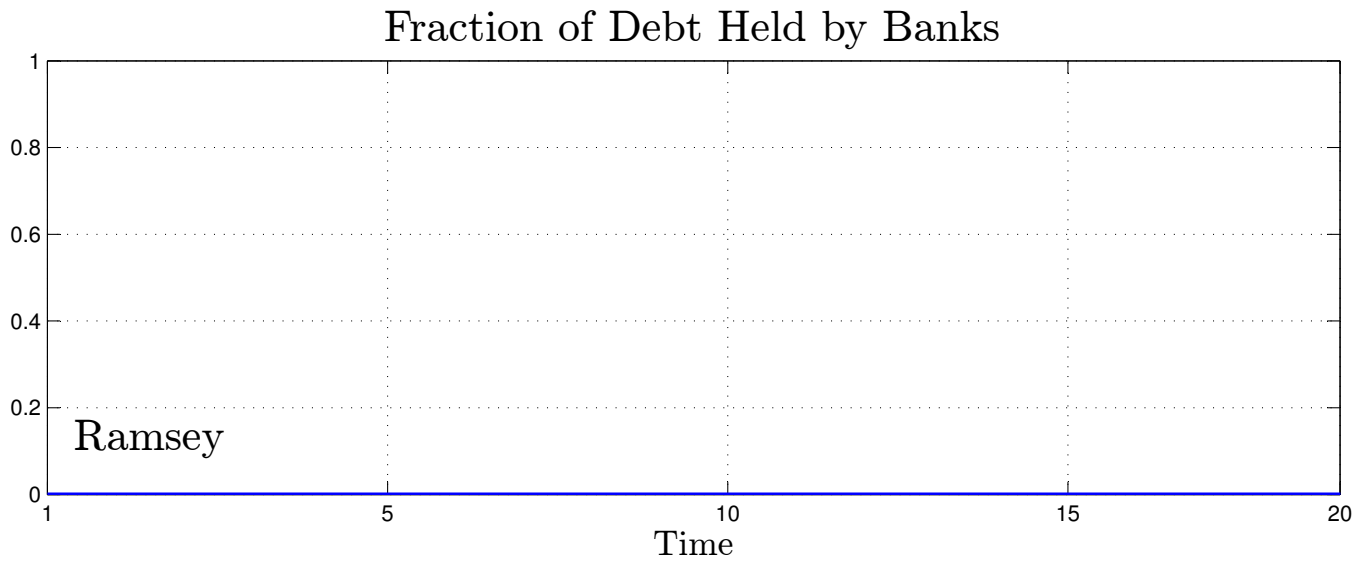
Proof similar to Markov proof

Numerical Illustration in Stochastic Model

- $\mathsf{G} \in \{\mathsf{G_L}, \mathsf{G_H}\}$, Markov transition matrix for G
- Start economy just after large war with $\mathsf{G_0}$ high
- Sample path of always peace

Dynamics After Large War





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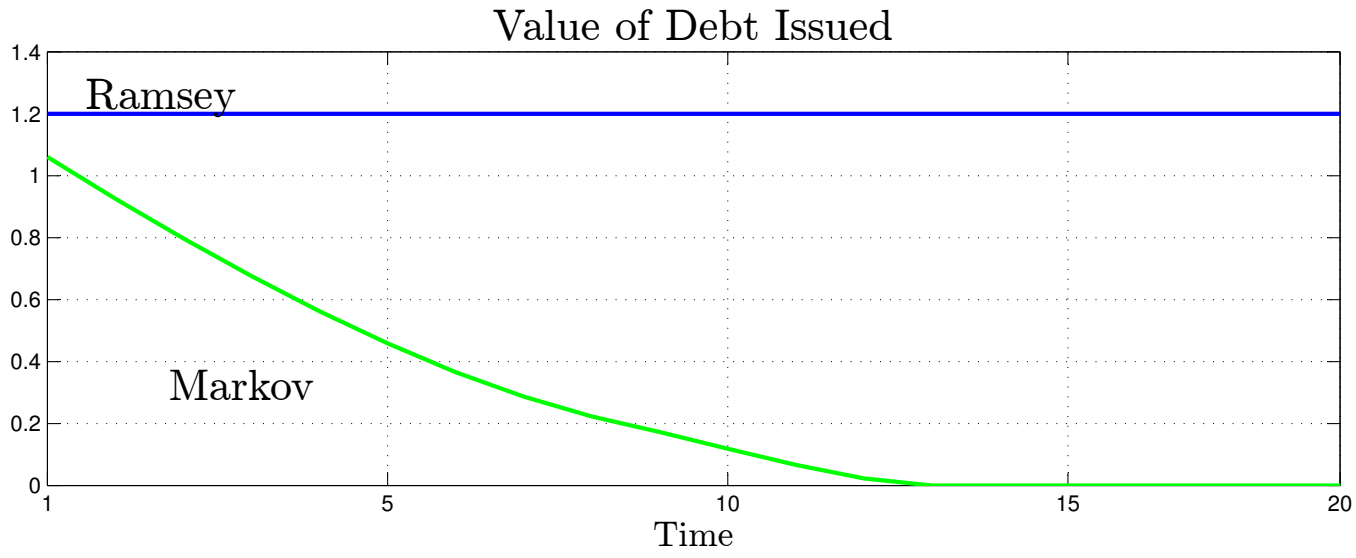
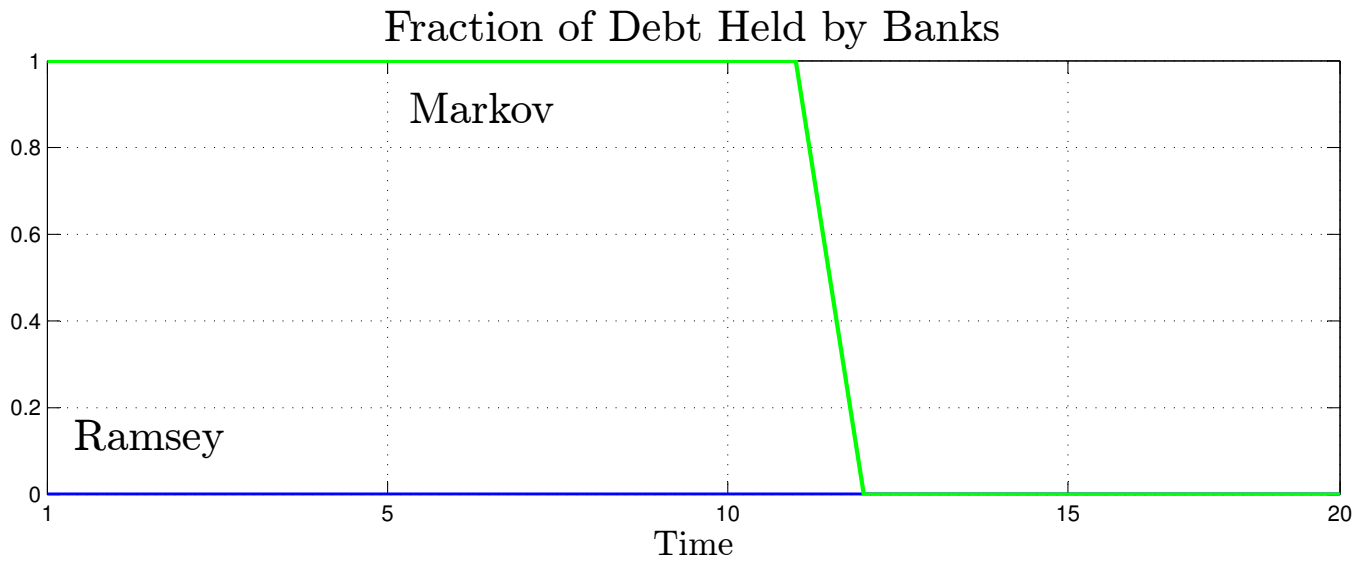
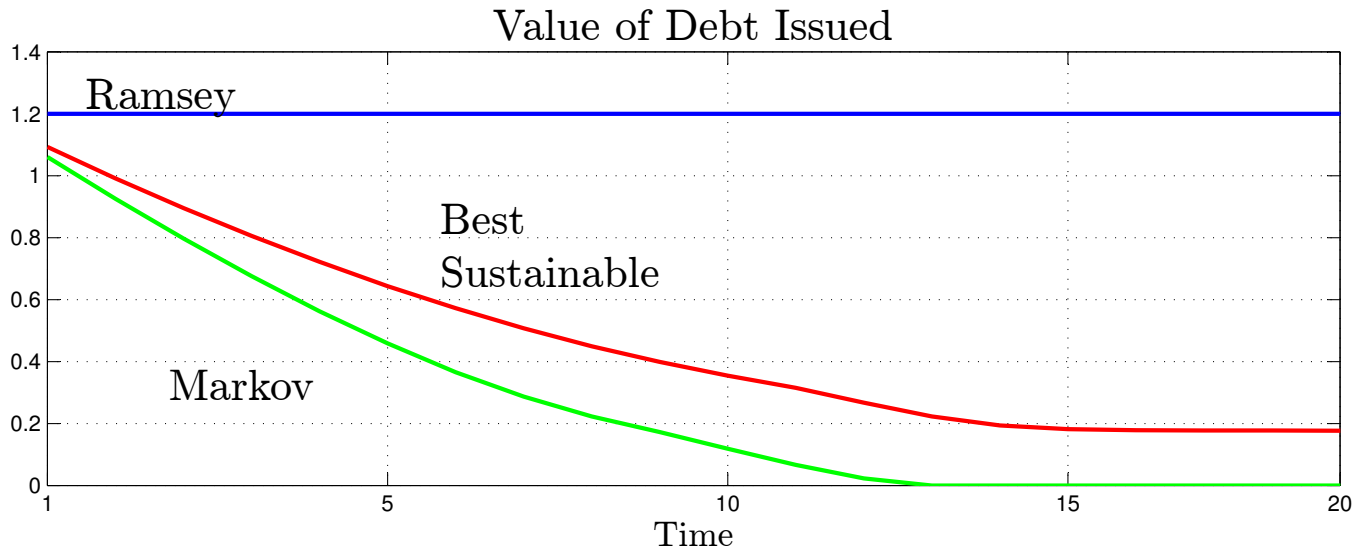
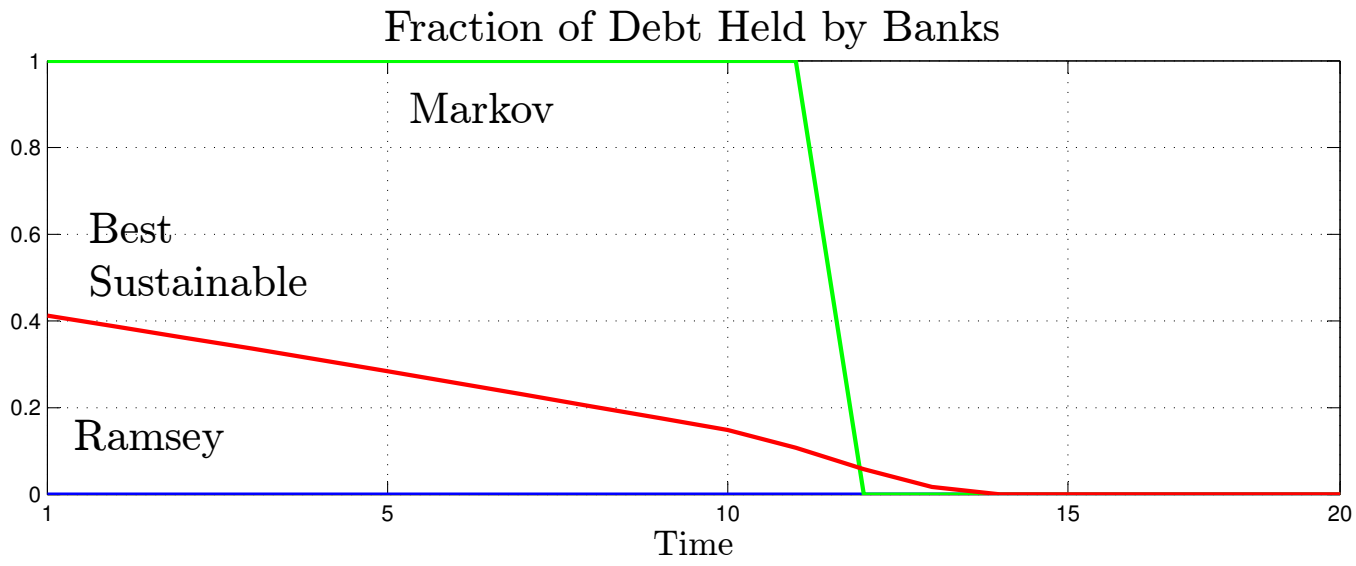




Dynamics After Large War





Extensions

- Open economy version with sudden stops: Details
  - Shocks to maximal amount can credibly borrow from foreigners
  - Practice financial repression when there is a sudden stop
  - Stop repressing when foreign lending increases

- Discriminatory default not crucial for results Details

Conclusion

- Financial repression widely practiced
- Puzzle if governments can commit to future policy
- Puzzle resolved if governments cannot commit
- Financial repression only in bad times
- Policy for, say, European Union: Forcing banks not to hold local debt may be a bad idea

Additional Slides

Deriving the Collateral Constraint

- Banker can abscond with fraction $1-\gamma$ of banks assets
- After absconding can pretend to be new banker with initial net worth given by fraction $1-\gamma$ of banks assets
- Let ν_{t+1} denotes value of assets with bank
- Any contract with no absconding must satisfy

$$\nu_t \cdot (R_t k_t + \delta_{Bt} b_{Bt} - d_t) \geqslant \nu_t \cdot (1-\gamma)(R_t k_t + \delta_{Bt} b_{Bt})$$

- Yields collateral constraint

Back

Definition of Markov Equilibrium

- Value function $V(S)$, allocation and policy rules, $C(S), L(S)$, $S'(S)$, $\delta_B(S), \delta_H(S)$
- Pricing functions: $q_D(S)$, $R(S)$

such that it solves fixed point problem

- Value function, allocations and policy rules solve primal Markov problem given pricing functions and default rules, $q_D(S')$, $R(S')$, $\delta_B(S'), \delta_H(S')$
- Pricing functions satisfy

$$q_D(S) = \beta \frac{U_C(S'(S))}{U_C(S)}$$

$$R(S) = F_K(S)$$

Back

Discriminatory Default Not Crucial for Results

- So far government default decision discriminatory
- If the government must choose same default rates for HH and banks
  - All our results go through
  - Government still find it optimal to practice repression
  - Tax smoothing gains need to be smaller relative to the case with discrimination
  - Leveraging effect induces HH to hold debt in Markov equilibrium

Back

Foreign Lending and Sudden Stops

Foreign Lending and Repression

Country can credibly commit to repay foreigners any

$$B_{Ft+1} \leqslant \bar{B}_{Ft+1}$$

$\{\bar{B}_{Ft+1}\}$ maximal credible borrowing limits
Generated by time varying cost of foreign default

Consider economies with constant $\bar{B}_F$
Proposition. Economies with

- $\bar{B}_F < \bar{B}_F^*$ practice financial repression
- $\bar{B}_F > \bar{B}_F^*$ do not

Sudden Stops and Repression

Assume with $\bar{B}_{Ft} = \bar{B}_F$ never optimal to repress

Consider economy with temporary sudden stop in period 0,
That is $\bar{B}_{F1} < \bar{B}_F$ and return to $\bar{B}_F$ thereafter

Proposition. If $\bar{B}_{F1}$ sufficiently small

- Practice financial repression in period 0
- Stop repressing when foreign lending increases

Back