

Fiscal Rules, Bailouts, and Reputation in Federal Governments

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Overview

- Local gov'ts over-borrow if expect bailout or transfer
 - Central gov't cannot commit to no-bailout/transfer clauses
 - Examples: Argentina, Brazil, German länders, EMU

- One proposed solution is to use fiscal rules
 - Defined as borrowing limits and punishments if these are violated
 - Example: Stability and Growth Pact

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 - Examples: Argentina, Brazil, German länders, EMU
- One proposed solution is to use fiscal rules
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 - Example: Stability and Growth Pact
- **Why can the central gov't commit to fiscal rules?**
 - But not to no-bailout clauses?

This Paper

- Study efficacy of fiscal rules when the central gov't can't commit
 - No-bailout clauses
 - Enforcing fiscal rules

- Local gov'ts uncertain about the type of the central gov't
 - Commitment type: always enforces fiscal constitution
 - No-Commitment type: chooses policy sequentially

- Compare equilibrium outcomes with and without fiscal rules

Fiscal Rules Can Incentivize Fiscal Indiscipline

When reputation is low (low probability of facing commitment type)

- Debt issued larger when constitution contains fiscal rules
- **Rules increase cost of maintaining good reputation**
 - With binding rules type of the central gov't is revealed earlier
 - Early revelation reduces cost of issuing debt for local gov'ts

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When reputation is high

- Debt issued smaller when constitution contains fiscal rules

Equilibrium Fiscal Rules

- Why do we observe fiscal rules in equilibrium?
 - When reputation is low rules can be detrimental
- Outcome of a signaling game between two types of central gov't
- When reputation is low
 - Commitment type finds it optimal to set tight rules
 - No-commitment type initially mimics but not does not enforce
 - Rules are violated by local gov'ts
- Rationalize several examples when:
 - Tight fiscal rules arise when the reputation is low
 - Fiscal rules have been instituted but not enforced

Related Literature

- Lack of commitment and bailouts:
 - Chari and Kehoe (2007, 2008), Cooper Kempf and Peled (2008), Rodden (2002)
- Repeated games with behavioral types
 - Kreps and Wilson (1982), Milgrom and Roberts (1982)
- Using fiscal rules to overcome commitment problem:
 - Beetsma and Uhlig (1999), Athey et al. (2005), Amador et al (2006), Halac and Yared (2014, 2017), Hatchondo, Martinez and Roch (2015), Alfaro and Kanczuk (2016), Azzimonti et al. (200x)
- Mechanism design
 - Halac and Yared (2018)
- Reputation:
 - Cole et al. (1995), Phelan (2006), D'Erasmus (2008)
- Uncertainty as commitment
 - Nosal and Ordóñez (2013)

Outline

- Model
- Fiscal rules promote indiscipline if reputation low
- Fiscal rules promote discipline if reputation high
- Supporting evidence
- Equilibrium fiscal constitution

MODEL

Environment

- $t = 0, 1, 2$
- Small open economy composed of N regions, $i \in \{1, \dots, N\}$
- Representative citizen has preferences over local public good

$$u^i = \sum_{t=0}^2 \beta^t u(G_{it}).$$

u is increasing, concave, Inada, $u \in C^1$, and $u(0)$ finite

- Two level of government:
 - Local government
 - Central government

Local Governments

- Benevolent
 - Maximizes utility of representative citizen in region
- It finances local public good provision with
 - Tax revenues: $Y_{it} = Y$ for all i, t
 - In paper we consider case with heterogeneity
 - Issue debt to foreign lenders (interest rate $1/q$)
 - Transfers from central government

Central Government

- Benevolent
 - Maximizes $\sum_{i=1}^N \frac{1}{N} u^i$
- It chooses
 - Transfers T_{it} such that $\sum_i T_{it} = 0$
 - Enforcement of fiscal rule $\sigma \in \{0, 1\}$
- It can be one of two types
 - Commitment type (C): follows policy in constitution
 - No-Commitment type (NC): chooses policy sequentially
- Prior probability of being the commitment type is π

Fiscal Constitution

Two Clauses:

- No bailout clause: $T_{it} = 0$
- Fiscal rule: (\bar{b}, ψ)
 - Debt limit: \bar{b}
 - Punishment ψ if $b_{i1} > \bar{b}$

Timing and Actions

- At $t = 0$, local gov'ts choose G_{i0} and b_{i1} subject to

$$G_{i0} \leq Y_{i0} + qb_{i1}.$$

- At $t = 1$
 - Central gov't chooses transfers $\{T_{i1}\}$ and enforcement of fiscal rule $\sigma \in \{0, 1\}$
 - Local gov'ts
 - Update their prior about central government type
 - Choose G_{i1} and b_{i2} subject to

$$G_{i1} + b_{i1} + \sigma\psi 1_{b_{i1} > \bar{b}} \leq Y_{i1} + T_{i1} + qb_{i2}.$$

- At $t = 2$
 - Central gov't chooses transfers $\{T_{i2}\}$
 - Local gov't consumes $G_{i2} = Y_{i2} - b_{i2} + T_{i2}$

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- At $t = 2$
 - Central gov't chooses transfers $\{T_{i2}\}$
 - Local gov't consumes $G_{i2} = Y_{i2} - b_{i2} + T_{i2}$

Characterize perfect bayesian equilibrium (pure strategies)

EQUILIBRIUM CHARACTERIZATION

Period 2

- State: $\mathbf{b}_2 = (b_{i2})$
- NC type will choose transfers to achieve *debt mutualization*.

$$G_{it} = Y - \frac{\sum_j b_{j2}}{N}.$$

- Value for local gov't

$$V_{i2}(\mathbf{b}_2) = u\left(Y - \frac{\sum_j b_{j2}}{N}\right).$$

- Commitment type will enforce constitution
 - Value for local gov't

$$V_{i2}^c(\mathbf{b}_2) = u(Y - b_{i2}).$$

Period 1: Local Gov't

- After central gov't chooses transfers and enforcement fiscal rule
- State: posterior π' and obligations for local gov'ts,

$$\mathbf{a}_{i1} = \mathbf{b}_{i1} - \mathbf{T}_{i1} + \psi \mathbb{I}_{\{\mathbf{b}_{i1} > \bar{\mathbf{b}}_1 \text{ and central gov't enforces fiscal rule}\}}$$

- Local governments choose $\mathbf{G}_{i1}, \mathbf{b}_{i2}$ to solve

$$V_{i1}(\mathbf{a}_1, \pi') = \max_{\mathbf{G}_{i1}, \mathbf{b}_{i2}} u(\mathbf{G}_{i1}) + \beta \pi V_{i2}^c(\mathbf{b}_{i2}) + \beta (1 - \pi) V_{i2}(\mathbf{b}_{i2}, \mathbf{b}_{-i2})$$

subject to

$$\mathbf{G}_{i1} + \mathbf{a}_{i1} \leq \mathbf{Y}_{i1} + \mathbf{q}\mathbf{b}_{i2}$$

taking as given strategy $\mathbf{b}_{-i2}(\mathbf{a}_1, \pi')$

- Denote equilibrium outcome at this node by $\mathbf{b}_2(\mathbf{a}_1, \pi')$

Over-Borrowing in Period 1

- Equilibrium

$$qu'(G_{i1}) = \beta\pi u'(Y - b_{i2}) + \frac{\beta}{N} (1 - \pi) u' \left(Y - \frac{\sum_j b_{j2}}{N} \right)$$

Over-Borrowing in Period 1

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- Efficient

$$qu'(G_{i1}) = \beta u'(Y - b_{i2})$$

- If $\pi < 1 \Rightarrow$ inefficient front-loading of public good consumption

$$qu'(G_{it}) < \beta u'(G_{it+1})$$

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Over-borrowing more severe when reputation is low

If No Reputation, Timing of Transfers Irrelevant

If know face NC type for sure \Rightarrow timing of transfers irrelevant

- Local gov'ts adjust borrowing anticipating transfers in period 2

Lemma

If $\pi' = 0$, the continuation values and public good provisions for the local governments are independent of transfers in period 1: for any $\mathbf{a}_1, \mathbf{a}'_1$ such that $\sum_i \frac{1}{N} \mathbf{a}_{i1} = \sum_i \frac{1}{N} \mathbf{a}'_{i1} \Rightarrow V_{i1}(\mathbf{a}_1, 0) = V_{i1}(\mathbf{a}'_1, 0)$.

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- Can drop T_1 as decision for central gov't and state for local gov't
- NC decides whether to enforce the constitution or not

Period 1: Central Gov't

- State $\mathbf{b}_1 = (b_{i1})$ and prior π
- Central gov't chooses whether to enforce constitution
 - Let $\sigma(\pi, \mathbf{b}_1)$ be gov't strategy: 1 if enforce, 0 o/w

- Posterior

$$\pi'(\pi, \zeta; \sigma) = \begin{cases} \frac{\pi}{\pi + (1-\pi)\sigma} & \text{if } \zeta = 1 \\ 0 & \text{if } \zeta = 0 \end{cases}$$

where $\zeta = 1$ if constitution enforced and $\zeta = 0$ otherwise

- Enforcing constitution has
 - Costs: Dispersion in local public good provision
 - Benefits: Less over-borrowing due to maintained reputation

Period 0

- State in period 0: prior π
- Local government chooses public good and debt to solve

$$\begin{aligned} V_{i0}(\pi) = & \max_{G_{i0}, b_{i1}} u(G_{i0}) + \\ & + \sigma \beta V_{i1} \left(b_{i1} + \psi \mathbb{I}_{b_{i1} > \bar{b}_1}, b_{-i1} + \psi \mathbb{I}_{b_{-i1} > \bar{b}_1}, \pi \right) \\ & + (1 - \sigma) \beta \left[\pi V_{i1} \left(b_{i1} + \psi \mathbb{I}_{b_{i1} > \bar{b}_1}, b_{-i1} + \psi \mathbb{I}_{b_{-i1} > \bar{b}_1}, 1 \right) \right. \\ & \left. + (1 - \pi) V_{i1} (b_{i1}, b_{-i1}, 0) \right] \end{aligned}$$

subject to

$$G_{i0} \leq Y_{i1} + qb_{i1}$$

- Taking as given the strategy $b_{-i1} = b_{-i1}(\pi)$
- $\sigma = \sigma(\pi, b_{i1}, b_{-i1})$: local gov't i internalizes effect of its debt issuance on enforcement by central gov't

**IF REPUTATION LOW:
FISCAL RULES PROMOTE FISCAL INDISCIPLINE**

Low Reputation

If reputation (π) is low enough, $\beta \leq \bar{\beta}$, and N large enough, then

- Without rules: unique equilibrium where
 - NC type enforces fiscal constitution in period 1 (no-bailout)
 - Central gov't type is not revealed in period 1 (late revelation)
- With binding rules: unique equilibrium where
 - Fiscal rule is violated by local gov'ts
 - NC type does not enforce fiscal constitution in period 1
 - Central gov't type is revealed in period 1 (early revelation)
- Debt issued is larger with rules
 - Early revelation implies lower cost of issuing debt

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No Rules \Rightarrow Late Revelation

Central gov't in period 1 chooses whether to follow constitution (no bail out)

- Costs: Dispersion in local public good provision
 - Zero on path (all regions are symmetric) ▶ Heterogeneous
- Benefits: Less over-borrowing due to maintained reputation
 - Euler equation without bailout, $\pi' = \pi$

$$u'(Y - b_{i1} + qb_{i2}) q = \beta \pi u'(Y - b_{i2}) + \frac{\beta}{N} (1 - \pi) u' \left(Y - \frac{\sum_j b_{j2}}{N} \right)$$

- Euler equation with bailout, $\pi' = 0$

$$u'(Y - b_{i1} + qb_{i2}) q = \frac{\beta}{N} u' \left(Y - \frac{\sum_j b_{j2}}{N} \right)$$

No Rules \Rightarrow Late revelation of central gov't type

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Fiscal Rules \Rightarrow Early Revelation

Central gov't in period 1 chooses whether to follow constitution (no bail out + fiscal rule)

- Costs:
 - Dispersion in local public good provision (as without rules)
 - Zero on path
 - Enforce penalty on local gov't that violates the rule
- Benefits: Less over-borrowing due to maintained reputation

Costs outweigh benefits if β small enough

Rules increase costs of maintaining good reputation

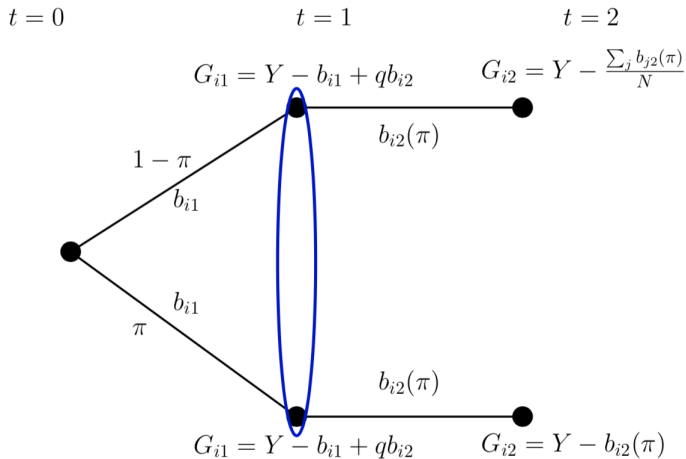
▶ Show optimal to violate

Low Reputation

If reputation (π) is low enough, $\beta \leq \bar{\beta}$, and N large enough, then

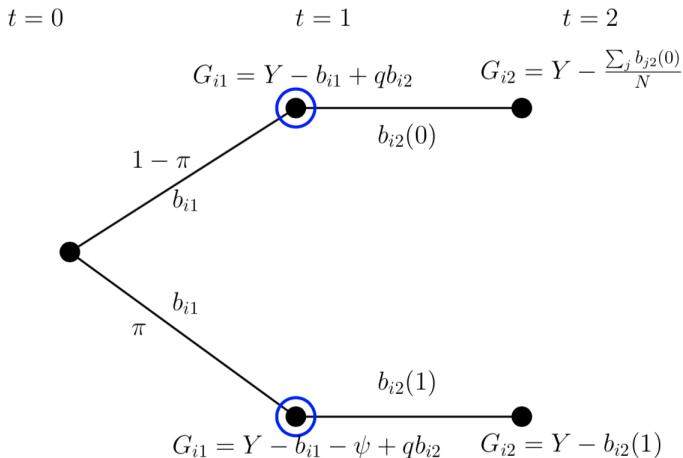
- Without rules ($\psi = 0$): unique equilibrium where
 - NC type enforces fiscal constitution in period 1 (No-bailout)
 - Central gov't type is not revealed in period 1 (late revelation)
 - With binding rules ($\psi > 0$, \bar{b} small): unique equilibrium
 - Fiscal rule is violated by local govts
 - NC type does not enforce fiscal constitution in period 1
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- Debt issued is larger with rules
 - Early revelation implies lower cost of issuing debt

Late Revelation and Debt Issuance



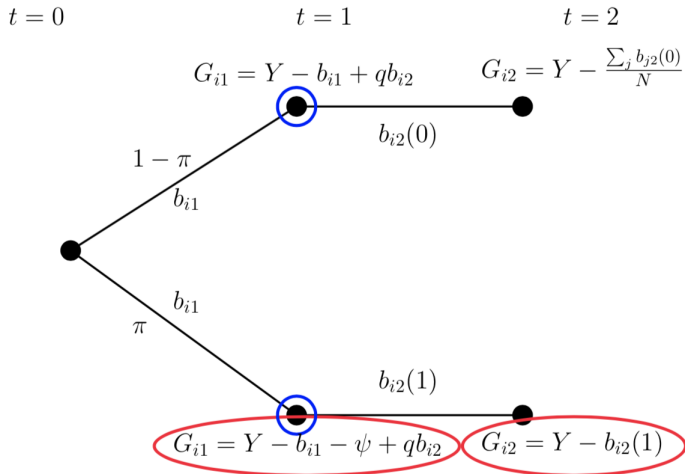
Debt issued in period 1 not contingent on gov't type

Early Revelation and Debt Issuance



Debt issued in period 1 contingent on gov't type

Early Revelation and Debt Issuance



If face commitment type: can spread adjustment in period 1 and 2
 \Rightarrow lowers cost of servicing debt issued in period 0

Sketch of Proof

Consider the case without fiscal rules (no bailout in period 1)

- Period 0 Euler equation

$$\begin{aligned} qu'(G_{i0}) &= \beta u'(Y - \mathbf{b}_{i1} + q\mathbf{b}_{i2}(\mathbf{b}_1, \pi)) \\ &\quad + \frac{\beta^2}{N} (1 - \pi) u'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \pi)) (N - 1) \frac{\partial \mathbf{b}_{-i2}(\mathbf{b}_1, \pi)}{\partial \mathbf{b}_{i1}} \end{aligned}$$

- Period 1 Euler equation

$$\begin{aligned} qu'(Y - \mathbf{b}_{i1} + q\mathbf{b}_{i2}(\mathbf{b}_1, \pi)) &= \beta \pi u'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \pi)) \\ &\quad + \frac{\beta(1 - \pi)}{N} u'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \pi)) \end{aligned}$$

- Substitute period 1 Euler into period 0 Euler

Sketch of Proof

- Without rules, b_{i1} must equate $qu'(Y + qb_{i1})$ to

$$\begin{aligned} & \frac{\beta^2}{q} \pi u'(Y - \mathbf{b}_{i2}(b_1, \pi)) + \frac{\beta^2}{Nq} (1 - \pi) u'(Y - \mathbf{b}_{i2}(b_1, \pi)) \\ & + \frac{\beta^2}{N} (1 - \pi) u'(Y - \mathbf{b}_{i2}(b_1, \pi)) (N - 1) \frac{\partial \mathbf{b}_{-i2}(b_1, \pi)}{\partial b_{i1}} \end{aligned}$$

Sketch of Proof

- Without rules, \mathbf{b}_{i1} must equate $q\mathbf{u}'(Y + q\mathbf{b}_{i1})$ to

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- With rules, \mathbf{b}_{i1} must equate $q\mathbf{u}'(Y + q\mathbf{b}_{i1})$ to

$$\begin{aligned} & \frac{\beta^2}{q} \pi \mathbf{u}'(Y - \mathbf{b}_{i2}(\mathbf{b}_1 + \psi, \mathbf{1})) + \frac{\beta^2}{Nq} (1 - \pi) \mathbf{u}'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \mathbf{0})) \\ & + \frac{\beta^2}{N} (1 - \pi) \mathbf{u}'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \mathbf{0})) (N - 1) \frac{\partial \mathbf{b}_{-i2}(\mathbf{b}_1^b, \mathbf{0})}{\partial \mathbf{b}_{i1}} \end{aligned}$$

Sketch of Proof

- Without rules, b_{i1} must equate $qu'(Y + qb_{i1})$ to

$$\frac{\beta^2}{q} \pi u'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \pi)) + \frac{\beta^2}{Nq} (1 - \pi) u'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \pi)) \\ + \frac{\beta^2}{N} (1 - \pi) u'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \pi)) (N - 1) \frac{\partial \mathbf{b}_{-i2}(\mathbf{b}_1, \pi)}{\partial b_{i1}}$$

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With rules, b_2 contingent on type of gov't

Taking limits as $N \rightarrow \infty$

- Without rules, \mathbf{b}_{i1} solves

$$q\mathbf{u}'(Y + q\mathbf{b}_{i1}) = \frac{\beta^2}{q}\pi\mathbf{u}'(Y - \mathbf{b}_{i2}(\mathbf{b}_1, \pi))$$

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For π small enough

$$\mathbf{b}_{i2}(\mathbf{b}_1 + \psi, \mathbf{1}) < \mathbf{b}_{i2}(\mathbf{b}_1, \pi)$$

Taking limits as $N \rightarrow \infty$

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For π small enough

$$\mathbf{b}_{i2}(\mathbf{b}_1 + \psi, \mathbf{1}) < \mathbf{b}_{i2}(\mathbf{b}_1, \pi)$$

Early resolution of uncertainty reduces cost of issuing debt
 \Rightarrow **More debt when constitution has fiscal rules**

**IF REPUTATION HIGH:
FISCAL RULES PROMOTE FISCAL DISCIPLINE**

High Reputation

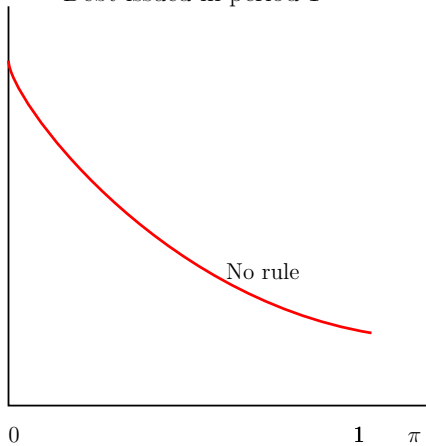
If reputation (π) is high enough, if

$$u(Y_{i0} + q\bar{b}) + \beta V_{i1}(\bar{b}, \pi) \geq \max_{b_i > \bar{b}} u(Y_{i0} + qb_i) + \beta V_{i1}(b_i + \psi, \bar{b}_{-i}, \pi)$$

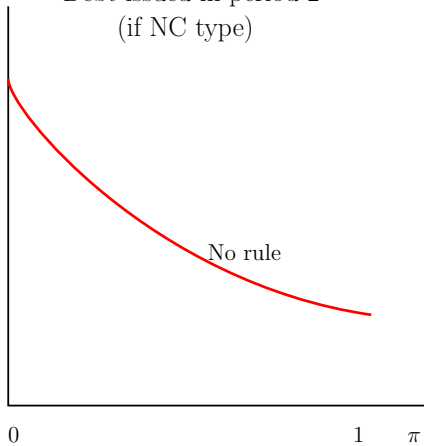
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- With binding rules: unique equilibrium where
 - Fiscal rule is obeyed by local gov'ts
 - Central gov't type is not revealed in period 1 (early revelation)
- Debt issued is smaller with binding rules
 - Local gov'ts obey the rule not to pay penalty (enforced with high probability off-path)

RECAP

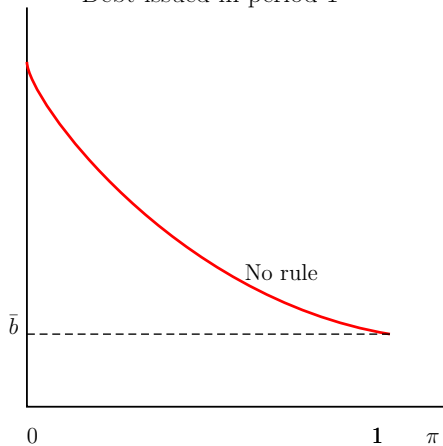
Debt issued in period 1



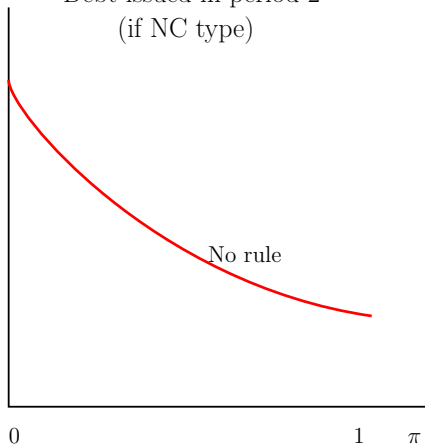
Debt issued in period 2
(if NC type)

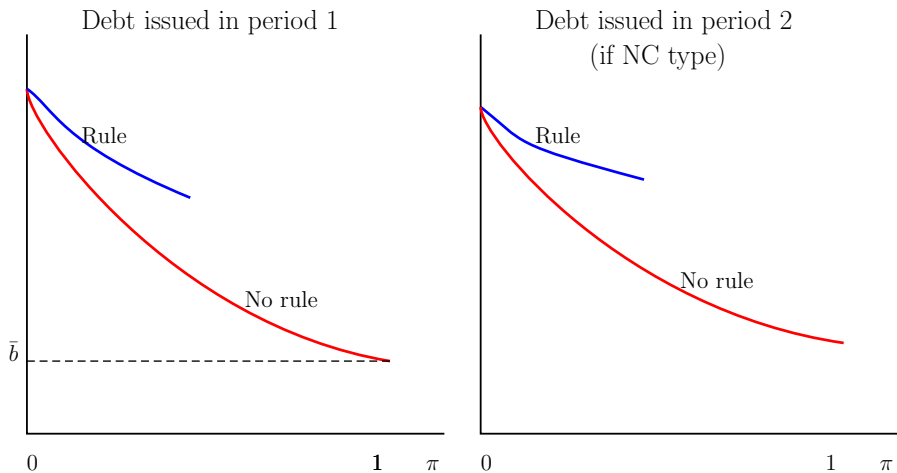


Debt issued in period 1



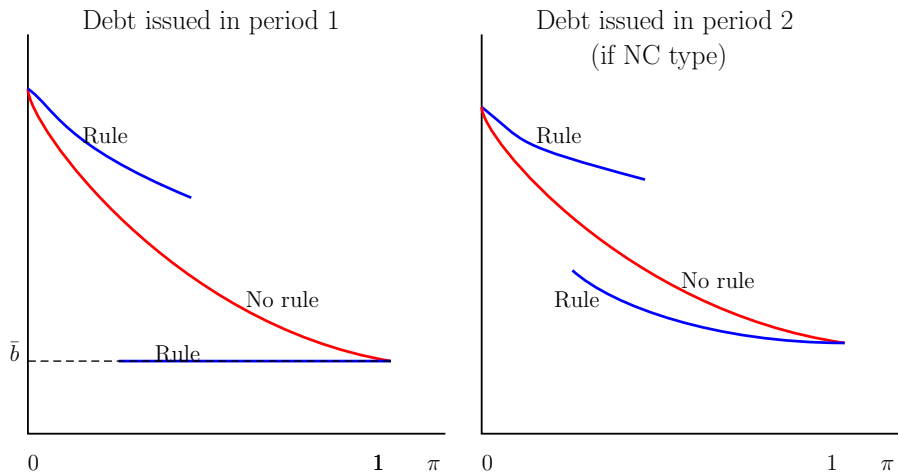
Debt issued in period 2
(if NC type)





For low reputation:

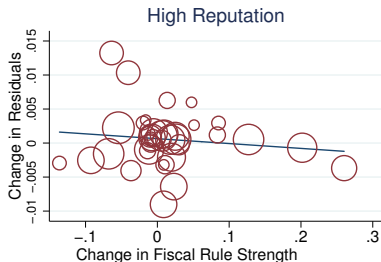
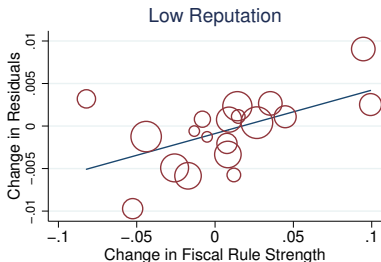
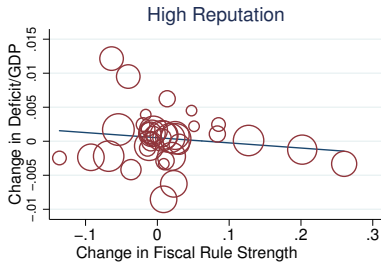
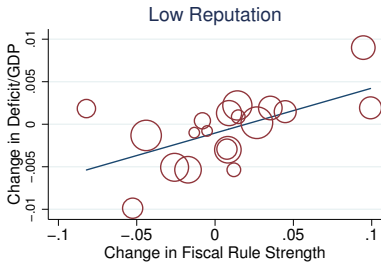
- More debt with fiscal rules
- Fiscal rule is violated



For high reputation:

- Less debt with fiscal rules
- Fiscal rule is not violated

How Deficits Respond to Tighter Rules in Practice?



EQUILIBRIUM FISCAL RULES

Equilibrium Fiscal Rules

- Why do we observe rules in equilibrium if reputation is low?

Equilibrium Fiscal Rules

- Why do we observe rules in equilibrium if reputation is low?
- Outcome of a signaling game between two types of government
 - Both types announce constitution before period 0
 - NC type chooses whether to enforce in period 1
- For $\pi \approx 0$, $\beta < \underline{\beta}$, unique equilibrium constitution with no rules
- For $\pi \approx 0$, $\beta \in [\underline{\beta}, \bar{\beta}]$, unique equilibrium constitution with rules
 - **Rules are violated and not enforced**
 - **Early resolution of uncertainty**

Equilibrium Fiscal Rules

- For π low and $\beta < \bar{\beta}$ no-commitment type does not enforce rule
- For π low and $\beta > \underline{\beta}$ commitment type values separation
 - Reputation jumps to 1 in period 1
 - No over-borrowing from period 1 to period 2
- For $\beta \in [\underline{\beta}, \bar{\beta}]$ unique equilibrium with rules and no-enforcement

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- **Rationalizes why we often observe central gov'ts with low reputation setting up tough fiscal rules**

Fiscal Rules in Practice

- Previous results account for
 - Episodes where fiscal rules instituted but not enforced
 - Fiscal rules being instituted by gov'ts with low reputation
- Two examples
 1. Eurozone
 2. Brazil

Stability and Growth Pact in the Eurozone

- In 2003 FR and DE violate SGP but sanctions not imposed
 - Power to discipline fiscal policy weakened
- In 2009 European debt crisis and bailout of Greece
 - Reputation and credibility of central authorities low
- Introduce “Six-Pack,” “Fiscal Compact” to strengthen fiscal rules
- Provisions violated by Spain and Portugal without sanctions

“My perception is that the European Commission has basically given up on enforcing the rules of the Stability and Growth Pact.”

— Jens Weidmann, governor of the Bundesbank

Brazil

- Fiscal behavior of the states major source of instability
 - Resulted in sub-national debt crises in 1989, 1993, and 1997
- Large bailout in 1997 by the federal government
 - Reputation and credibility of central authorities low
- Subsequently gov't approves the Fiscal Responsibility Law
 - Fiscal rules and sanctions for noncompliance

Conclusion

- Fiscal rules are often imposed to promote fiscal discipline
- If cannot commit, fiscal rules detrimental when reputation low
 - Incentivize over-borrowing
 - Increase costs for central gov't to maintain good reputation
- Arise in equilibrium when reputation low even if detrimental
- Rationalize several historical examples when:
 - Fiscal rules have been instituted but not enforced
 - Tight fiscal rules arise when the reputation is low

ADDITIONAL SLIDES

Even w/ Heterogeneity: No Rules \Rightarrow Late Revelation

Heterogeneity $Y_{i0} \Rightarrow$ debt distribution in 1 not degenerate

Central gov't in period 1 chooses whether to follow constitution (no bail out), for $\pi \approx 0$:

- Costs: Dispersion in local public good provision
 - Are second order
 - Local gov'ts almost certain to receive transfer in period 2
 - So adjust their borrowing to keep period 1 consumption constant

$$qu'(G_{i1}) = \beta\pi u'(Y - b_{i2}) + \frac{\beta}{N}(1 - \pi) u'\left(Y - \frac{\sum_j b_{j2}}{N}\right)$$

so for $\pi \rightarrow 0 \Rightarrow G_{i1} = G_1$ for all i

- Benefits: Less over-borrowing due to maintained reputation
 - Are first order
- So for low level of reputation optimal to enforce constitution

Optimal To Violate Fiscal Rule

If NC type doesn't enforce the penalty in period 1 and π small
 \Rightarrow Optimal for local governments to violate the rule

- If other $N - 1$ local gov'ts violate the rule, $\mathbf{b}_{-i1} = \mathbf{b}_1 > \bar{\mathbf{b}}$
- If gov't i deviates and issues $\mathbf{b}_{i1} = \bar{\mathbf{b}}$ its payoff is

$$V^{\text{dev}} = u(Y + q\bar{\mathbf{b}}) + \beta\pi V_1(\bar{\mathbf{b}}, \mathbf{b}_{-i,1}, 1) + \beta(1 - \pi)V_1\left(\frac{N-1}{N}\mathbf{b}_1 + \frac{\bar{\mathbf{b}}}{N}, 0\right)$$

- If it issues $\mathbf{b}_{i1} = \mathbf{b}_1 > \bar{\mathbf{b}}$ its payoff is

$$V = u(Y + q\mathbf{b}_1) + \beta\pi V_1(\mathbf{b}_1 + \psi, 1) + \beta(1 - \pi)V_1(\mathbf{b}_1, 0)$$

- If π small $\Rightarrow V > V^{\text{dev}} \Rightarrow$ optimal to violate the rule