Commitment versus Discretion in a Political Economy Model of Fiscal and Monetary Policy Interaction

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Independence, Time Inconsistency and Commitment

Time Inconsistency Problem: incentive to inflate away current nominal bonds while promising not to do so in the future [Barro, Gordon (1983)]

- What are the consequences of price commitment?
- Why do we have nominal bonds?
- How does central bank independence help overcome the time inconsistency problem?

Model Preview

Start with standard Ramsey setup, add

- Political economy model for fiscal policy
- Nominal bonds
- Simple monetary authority

Mechanism:

- Split benevolent monetary, self-interested fiscal authorities
- Looks like principal-agent problem
- Monetary authority keeps fiscal in debt to constrain spending

Benevolent Fiscal Policy (Ramsey)

- Time inconsistency problem
- No revenue from nominal bonds
- Higher welfare with price commitment

Self-Interested Fiscal Policy (Political)

- Time inconsistency mitigated
- Some revenue from nominal bonds
- Lower welfare with price commitment

Literature Review

Papers I want you to keep in mind:

- Independent Central Bank: Rogoff (1985)
- Interaction Through Gov't Budget: Sargent, Wallace (1981)
- Usefulness of Nominal Debt: Bohn (1988)

Political Economy

- Fiscal Model: Barseghyan, Battaglini, Coate (2013)

Model: Consumer

Consumer:

- n identical consumers, indexed by i, choose c, l
- $u(c, g, l) = c + A\log(g) - \frac{l^{1+1/\epsilon}}{\epsilon+1}$
- $U = \sum_t \beta^t u(c_t, g_t, l_t)$ subject to

$$c + q\left(\frac{B'}{n}\right) \leq w_\theta l(1-\tau) + \frac{\left(\frac{B}{n}\right)}{P(B)} + T_i$$

- $w_\theta \in \{w_h, w_l\}$ with probabilities $\pi, 1-\pi$
- $q = \beta E_{\theta'}\left[\frac{1}{P(B')}\right]$
- Indirect utility before transfers is

$$W_\theta(\tau, g) = \frac{\epsilon^\epsilon (w_\theta(1-\tau))^{\epsilon+1}}{\epsilon+1} + A\log(g)$$

Model: Government, Firm, Central Bank

Government:

- Chooses $g, \tau, T_i \geq 0$
- $\text{Rev}_\theta(\tau) = n\tau w_\theta(\epsilon w_\theta(1-\tau))^\epsilon$
- Budget Constraint:

$$g + \sum_i T_i + \frac{B}{P} \leq \text{Rev}_\theta(\tau) + qB'$$

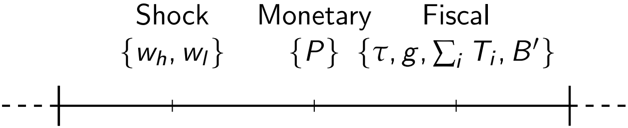
Firm:

- $z = w_\theta l$
- $c + g = z$

Central Bank:

- Chooses $P(B)$

Timing, Pricing (Equilibrium Selection)



Central Bank minimizes $|P - 1|$ to produce level of welfare

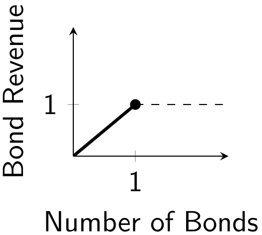
- Function solely of bonds chosen in previous period and shock
- Cannot commit to strategies requiring history

Government chooses smallest B to produce level of bond revenue

Example:

$$\text{Revenue} = qB = E\left[\frac{1}{P(B)}\right] B$$

$$P(B) = \begin{cases} B, & \text{if } B > 1 \\ 1, & \text{if } B \leq 1 \end{cases}$$



Plan

1. Model Analysis
   - Monetary Decision
     - Benevolent Fiscal Policy: $P = \infty$
     - Self-Interested Fiscal Policy: $P \neq \infty$
   - Fiscal Decision
     - Benevolent Fiscal Policy: $B = 0$
     - Self-Interested Fiscal Policy: $B > 0$
2. Price Commitment
3. Choice of Timing
4. Independent Monetary Authority

Benevolent Fiscal Policy

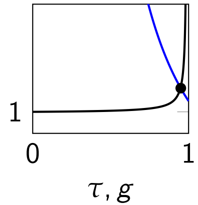
Benevolent Fiscal Planner maximizes total welfare

$$\max_{\tau, g, B', T_i} W_\theta(\tau, g) + \frac{\sum_i T_i}{n} + \beta\left[\pi v_H\left(B'\right) + (1-\pi) v_L\left(B'\right)\right]$$

FOC:

$$\frac{1-\tau}{1-\tau(1+\epsilon)} = \frac{nA}{g}$$

$$\frac{1-\tau}{1-\tau(1+\epsilon)} = -n\beta\left[\pi v_H'\left(B'\right) + (1-\pi) v_L'\left(B'\right)\right]$$



$\frac{1-\tau}{1-\tau(1+\epsilon)} > 1$ hence $T_i = 0$

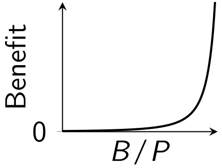
Monetary Policy with Benevolent Fiscal Policy

Monetary authority chooses P to maximize total welfare

$$v_\theta(B) = \max_P \left[\begin{array}{cc} \max\limits_{\tau,g,B',T_i} & \begin{array}{l} W_\theta(\tau,g) + \dfrac{\sum_i T_i}{n} \\ + \beta \left[\pi v_H\left(B'\right) + (1-\pi) v_L\left(B'\right) \right] \end{array} \\ \multicolumn{2}{c}{\text{s.t. } g + \sum_i T_i + \frac{B}{P} \leq \text{Rev}_\theta(\tau) + qB'} \end{array} \right]$$

FOC for $B > 0$:

$$\frac{\partial v_\theta(B)}{\partial P} = \left[\frac{\epsilon \tau(\frac{B}{P})}{1 - \tau(\frac{B}{P})(1+\epsilon)} \right] \frac{B}{nP^2}$$

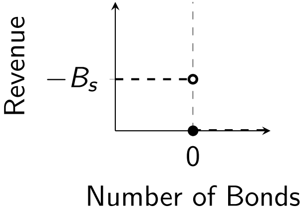


Thus

$$P(B) = \begin{cases} \infty, & \text{if } B > 0 \\ 1, & \text{if } B = 0 \\ \frac{B}{B_s}, & \text{if } B < 0 \end{cases}$$

Monetary Policy with Benevolent Fiscal Policy, $B < 0$

$$P(B) = \begin{cases} \infty, & \text{if } B > 0 \\ 1, & \text{if } B = 0 \\ \frac{B}{B_s}, & \text{if } B < 0 \end{cases}$$



$B < 0$ means government purchases bonds

- g_s: Samuelson level of government spending $\frac{nA}{g_s} = 1$
- B_s: Amount of bonds that can fund g_s hence $\tau = 0$

Monetary authority immediately turns any surplus into B_s bonds

- Requires high taxes one period to buy all B_s immediately
- AMSS (2002): Government accumulates B_s over time

Political Distortion

Self-Interested Fiscal Planner controlled by voting each period

- One randomly chosen consumer proposes τ, g, T_i, B'
- Needs $m > n/2$ votes for approval
- If proposal isn't approved, new random consumer chosen
- Continues $T \geq 2$ rounds then dictator appointed

End result

- Look at Markov perfect equilibrium, first proposal is accepted
- Equivalent to maximizing the utility of m consumers

Self-Interested Fiscal Policy

Self-Interested Fiscal Planner maximizes the utility of m consumers

$$\max_{\tau, g, B', T_i} W_\theta(\tau, g) + \frac{\sum_i T_i}{m} + \beta\left[\pi v_H\left(B'\right) + (1-\pi) v_L\left(B'\right)\right]$$

If no transfers, identical to Benevolent Fiscal Planner

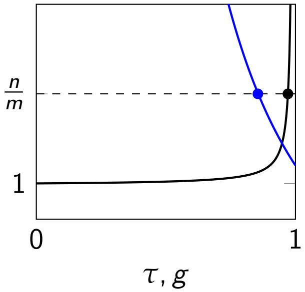
If transfers, FOCs

$$\frac{n}{m} = \frac{1-\tau^*}{1-\tau^*(1+\epsilon)}$$

$$\frac{n}{m} = \frac{nA}{g^*}$$

$$B'^* = \arg\max_{B'}\left[\frac{B'}{m} + \beta\left[\pi v_H\left(B'\right) + (1-\pi) v_L\left(B'\right)\right]\right]$$

τ^*, g^*, B'^* are constants



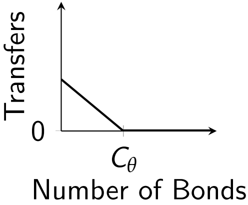
Self-Interested Fiscal Policy: Transfers

Transfers are surplus revenue

$$S_\theta(\tau, g, B'; \frac{B}{P}) = \text{Rev}_\theta(\tau) + qB' - g - \frac{B}{P}$$

When are there transfers?

- C_θ cutoff bond level for transfers
- $S_\theta(\tau^*, g^*, B'^*; C_\theta) = 0$



Self-Interested Fiscal problem is equivalent to

$$\max_{\tau, g, B', T_i} W_\theta(\tau, g) + \frac{\sum_i T_i}{n} + \beta \left[\pi v_H \left(B' \right) + (1 - \pi) v_L \left(B' \right) \right]$$
$$\text{s.t. } \tau \geq \tau^*, g \leq g^*, B' \geq B'^*$$

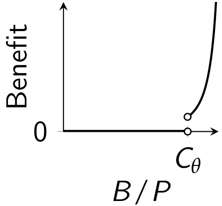
Monetary Policy with Self-Interested Fiscal Policy

Monetary authority chooses P to maximize total welfare

$$v_\theta(B) = \max_P \left[\begin{array}{ll} \max\limits_{\tau, g, B', T_i} & W_\theta(\tau, g) + \dfrac{\sum_i T_i}{n} \\ & + \beta\left[\pi v_H\left(B'\right) + (1-\pi) v_L\left(B'\right)\right] \\ & \tau \geq \tau^*, g \leq g^*, B' \geq B'^* \\ \text{s.t.} & g + \sum_i T_i + \dfrac{B}{P} \leq \mathrm{Rev}_\theta(\tau) + qB' \end{array} \right]$$

FOC:

$$\frac{\partial v_\theta(B)}{\partial P} = \begin{cases} \left[\frac{\epsilon\tau\left(\frac{B}{P}\right)}{1-\tau\left(\frac{B}{P}\right)(1+\epsilon)}\right]\frac{B}{nP^2}, & \text{if } B > C_\theta \\ 0, & \text{if } B < C_\theta \end{cases}$$



Increasing the price level

- If $\frac{B}{P} > C_\theta$: taxes down, public spending up; transfers $= 0$
- If $\frac{B}{P} < C_\theta$: taxes and public spending constant; transfers up

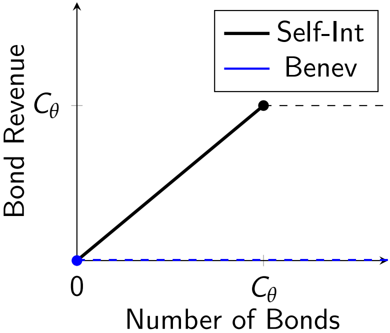
Price Comparisons

Thus with Self-Interested Fiscal Policy

$$P(B) = \begin{cases} \frac{B}{C_\theta}, & \text{if } B > C_\theta \\ 1, & \text{if } B \leq C_\theta \end{cases}$$

Compared to Benevolent Fiscal Policy

$$P(B) = \begin{cases} \infty, & \text{if } B > 0 \\ 1, & \text{if } B = 0 \\ \frac{B}{B_s}, & \text{if } B < 0 \end{cases}$$



Fiscal Policy Comparisons

How does central bank independence help overcome the time inconsistency problem?

Fiscal Policy

- Benevolent: suffers from time inconsistency
- Self-Interested: differing utility functions support bonds

Bonds

- Benevolent: $B = 0$
- Self-Interested: $B > 0$

Welfare

- Better off with Self-Interested due to tax smoothing

Where we are now

1. Model Analysis
    - Monetary Decision
        - Benevolent Fiscal Policy: $P = \infty$
        - Self-Interested Fiscal Policy: $P \neq \infty$
    - Fiscal Decision
        - Benevolent Fiscal Policy: $B = 0$
        - Self-Interested Fiscal Policy: $B > 0$
2. Price Commitment
    - No Price Commitment: $\tau = \tau^*$
    - Price Commitment: $\tau > \tau^*$
3. Choice of Timing
4. Independent Monetary Authority

Welfare Effect of Price Commitment

What are the consequences of price commitment?
Why do we have nominal bonds?

Price Commitment: Commit to $P = 1$

No Price Commitment (Nominal Bonds)

- Bonds repaid in good times, inflation in bad times
- Low taxes in good times, low taxes in bad times

Price Commitment (Indexed Bonds)

- Bonds repaid in good and bad times
- Low taxes in good times, high taxes in bad times

Price commitment results in lower welfare

No Price Commitment (Nominal Bonds)

In bad times $(w_\theta = w_l)$

$$P(B) = \begin{cases} \frac{B}{C_l}, & \text{if } B > C_l \\ 1, & \text{if } B \leq C_l \end{cases}$$

Monetary authority reduces real bond value to C_l

In good times $(w_\theta = w_h)$

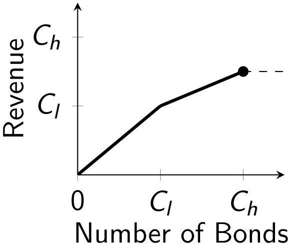
$$P(B) = \begin{cases} \frac{B}{C_h}, & \text{if } B > C_h \\ 1, & \text{if } B \leq C_h \end{cases}$$

Monetary authority reduces real bond value to C_h

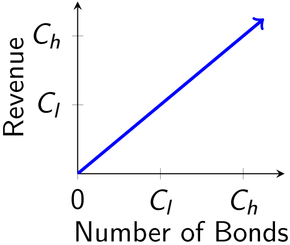
Real bond value will always be C_θ

- Taxes always at lowest: $\tau = \tau^*$

Issue C_h bonds since no risk



Price Commitment (Indexed Bonds)



In bad times ($w_\theta = w_l$): $P = 1$

In good times ($w_\theta = w_h$): $P = 1$

Issue $C_l < B < C_h$ bonds

- Benefit: increased transfers today
- Cost: possibility of high taxes tomorrow if $w = w_l$

If issue C_l, probability π taxes will be τ^*, $1 - \pi$ taxes will be τ^*

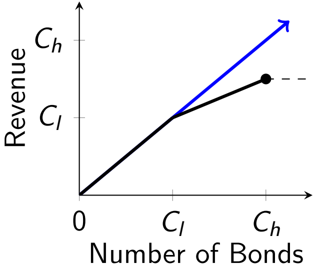
	w_h	w_l
C_l	τ^*	τ^*
B	τ^*	$\tau(B)$
$C_h + \epsilon$	$\tau(C_h + \epsilon)$	$\tau(C_h + \epsilon)$

Price Commitment Results

Wage	Monetary Authority's Action		
w_h:	$P = 1$	$P = 1$	$P = \frac{B}{C_h}$
w_l:	$P = 1$	$P = \frac{B}{C_l}$	$P = \frac{B}{C_l}$

$0 \quad C_l \quad C_h$

Bonds



No Price Commitment: Issue C_h bonds

- w_h: Tax rate will be τ^*
- w_l: Inflation reduces bonds to C_l, tax rate will be τ^*

Price Commitment: Issue $C_l < B < C_h$ bonds

- w_h: Tax rate will be τ^*
- w_l: Tax rate will be $\tau(B) > \tau^*$

Price commitment results in higher taxes hence lower welfare

Fiscal Dominant Timing

Shock $\{w_h, w_l\}$ — Fiscal $\{\tau, g, \sum_i T_i, B'\}$ — Monetary $\{P\}$

Government budget constraint must hold at end of period

$$g + \sum_i T_i + \frac{B}{P} \leq \text{Rev}_\theta(\tau) + qB'$$

Changing timing changes the model

- Nominal bonds will never raise revenue

Comparison

Price commitment results in higher welfare

- Allows bonds for tax-smoothing/transfers
- Standard result of price commitment

Fiscal Dominant Timing: Analysis

$$P(B) = \begin{cases} \frac{B}{\text{Rev}_\theta(\tau)+B'-g-\sum_i T_i}, & \text{if } B > 0, \text{Rev}_\theta(\tau) + qB' > g + \sum_i T_i \\ \infty, & \text{if } B > 0, \text{Rev}_\theta(\tau) + qB' = g + \sum_i T_i \\ 1, & \text{if } B = 0 \end{cases}$$

Fiscal authority can't commit to tax revenue next period

- Relies on monetary authority to inflate away bonds
- Either fiscal policy type: no revenue from bonds
- Fiscal time inconsistency vs. monetary time inconsistency

Price Commitment

- Equivalent to default timing, price commitment

Independent Monetary Authority

Why is the monetary authority separate from politics?

Captured monetary authority suffers from time inconsistency

Fiscal Policy	Monetary Policy: Independent	Monetary Policy: Captured
Self Int.	$B \geq 0$ transfers	$B = 0$ transfers
Benev.	$B = 0$ no transfers	$B = 0$ no transfers

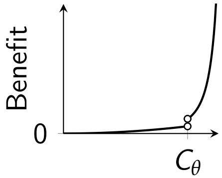
Highest welfare: independent monetary authority, self-interested fiscal authority, nominal bonds with no price commitment

Captured Monetary Policy

Captured monetary authority with self-interested fiscal authority maximizes the utility of m consumers

$$v_\theta(B) = \max_P \left[\begin{array}{cc} \max\limits_{\tau,g,B',T_i} & W_\theta(\tau,g) + \frac{\sum_i T_i}{m} \\ & + \beta\left[\pi v_H\left(B'\right) + (1-\pi) v_L\left(B'\right)\right] \\ \text{s.t. } \tau \geq \tau^*, g \leq g^*, B' \geq B'^* & \end{array} \right]$$

$$\frac{\partial v_\theta(B)}{\partial P} = \begin{cases} \left[\frac{\epsilon\tau\left(\frac{B}{P}\right)}{1-\tau\left(\frac{B}{P}\right)(1+\epsilon)}\right]\frac{B}{nP^2}, & \text{if } B > C_\theta \\ \left(\frac{n}{m}-1\right)\frac{B}{nP^2}, & \text{if } B < C_\theta \end{cases}$$



- If $\frac{B}{P} > C_\theta$ taxes down, public spending up, transfers $= 0$
- If $\frac{B}{P} < C_\theta$ transfers to m increase

$$P = \begin{cases} \infty, & \text{if } B > 0 \\ 1, & \text{if } B = 0 \end{cases}$$

Conclusions

How can we overcome the time inconsistency problem?

- Price Commitment
- Self-Interested Fiscal Policy

What are the consequences of price commitment?

- Lower utility in bad times

Why do we have nominal bonds?

- Monetary constraint on fiscal policy
- Absorb shocks

Why do we have an independent central bank

- To overcome the time inconsistency problem

Fiscal Dominant Timing: Comparison

		Dominant Timing	
		Monetary	Fiscal
Fiscal Policy	Self Int.	$B \geq 0$ transfers	$B = 0$ transfers
	Benev.	$B = 0$ no transfers	$B = 0$ no transfers

Back