Monetary Unions in a Political Economy Model of Fiscal and Monetary Policy Interaction

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Intro

Motivation: Greece's experience in the Eurozone

1. Why did Greece join the Eurozone?
2. How did other Eurozone countries benefit?
3. Why and how Greece issued so much debt
4. *Why this was hidden until a large negative shock*

Model: Two key distortions

- Political economy governs fiscal decisions in countries
- Monetary Union doesn't monitor countries

Quick explanation:

- Greece joins to raise more revenue from nominal bonds
- Rest benefit from unexpected inflation due to Greek shocks
- Greek bonds look nominal but revealed to be indexed
- Tax revenue sufficient to repay bonds only in good times

Model Mechanism: Country

Inside each country:

- Looks like principal-agent problem
- Fiscal authority controlled by politics, issues nominal bonds
- Monetary authority controls price level (decides repayment)

Inflation serves two purposes:

- Today: Reduces debt burden on fiscal authority
- Tomorrow: Threat constrains ability of fiscal authority to raise revenue with nominal bonds

Captured Monetary Authority

- Controlled by politics
- No constraint
- Time inconsistency
- No revenue from bonds
- No tax smoothing

Independent Monetary Authority

- Benevolent
- Constrains coalition
- No time inconsistency
- Some revenue from bonds
- Some tax smoothing

Model Mechanism: Monetary Union

Why join a Monetary Union?

- Captured monetary authority replaced by independent
- Monetary Union allows government to issue nominal bonds
- Bond revenue used for tax smoothing, transfers

What can go wrong?

- Union doesn't monitor members
- Members don't report accurately

Inflation constraint on fiscal authority disappears

- Political fiscal authority can issue debt without constraint
- Nominal debt without inflation is indexed debt
- Issues too many bonds; revenue used to reward political party
- Indexed bonds require high taxes to repay after bad shocks

Literature

Political Economy

- Barseghyan, Battaglini, and Coate (2013)

Interaction with Nominal Bonds

- Miller (2015)

Monetary Unions

- Aguiar, Amador, Farhi, and Gopinath (2014)

Model: Consumer

Consumer:

- n identical consumers, 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

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

- $w_\theta \in \{w_h, w_l\}$ with probabilities $\pi, 1-\pi$
- $q = \beta E_{\theta'}\left[\frac{1}{P}\right]$
- 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:

- Maximizes utility of random m out of n consumers
- Chooses $g, \tau, B', T_i \geq 0$
- $\text{Rev}_\theta(\tau) = n\tau w_\theta(\epsilon w_\theta(1-\tau))^\epsilon$
- 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
- Can be Captured or Independent

Political Distortion

Fiscal authority 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

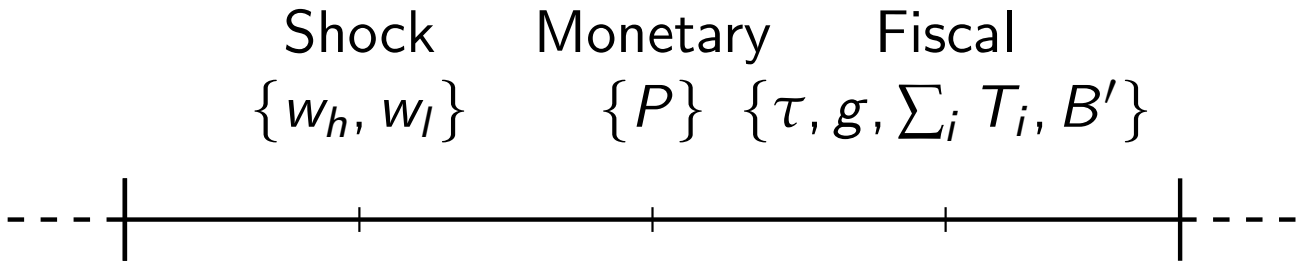
End result

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

Monetary Authority:

- Captured: controlled by same political coalition
- Independent: benevolent, maximizes overall welfare

Equilibrium Selection



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

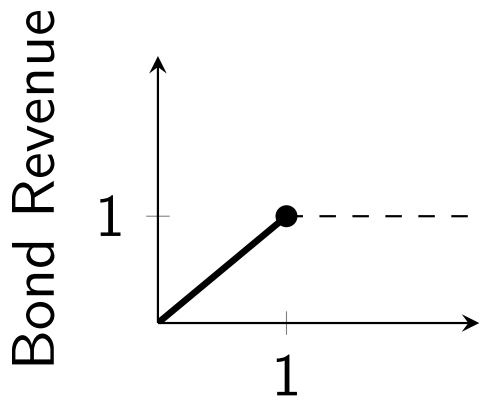
- Moves price level for strictly positive welfare gain
- Defaults to $P=1$ every period if no gains
- Function solely of bonds chosen in previous period and shock

Government chooses smallest B to produce level of bond revenue

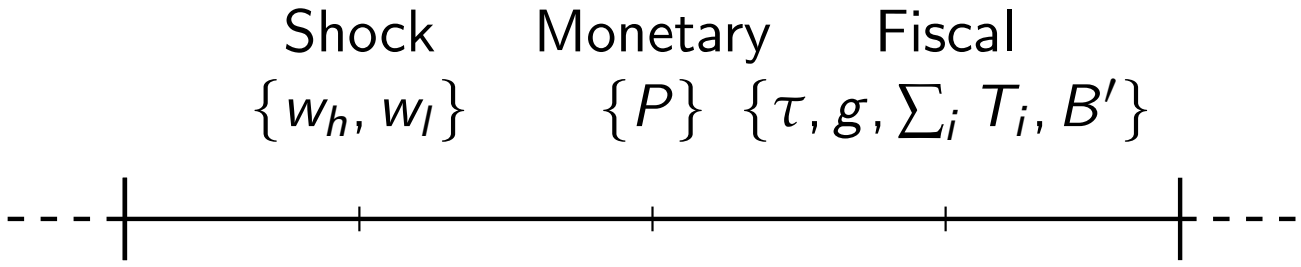
Example:

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

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



Plan



1. Single Country
   - Fiscal Policy
   - Monetary Policy
     - Captured Monetary Authority: $B = 0$
     - Independent Monetary Authority: $B > 0$
2. Monetary Union
   - Perfect Monetary Union
   - Imperfect Monetary Union

Fiscal Policy Overview

Fiscal Planner maximizes the utility of m consumers

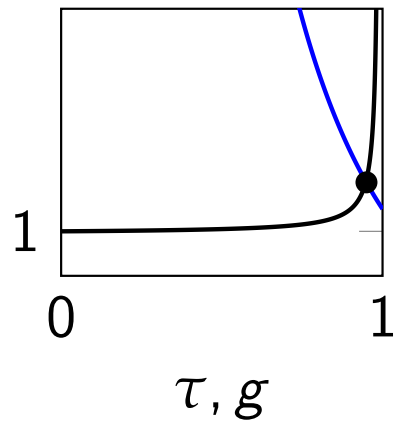
$$\max_{\tau,g,B',T_i} W_\theta(\tau,g) + \frac{\sum_i T_i}{m} + \beta\left[\pi v_H\left(B'\right) + (1-\pi)v_L\left(B'\right)\right]$$

$$\text{s.t. } g + \textstyle\sum_i T_i + \frac{B}{P} \leq \text{Rev}_\theta(\tau) + qB'$$

If no transfers:

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

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

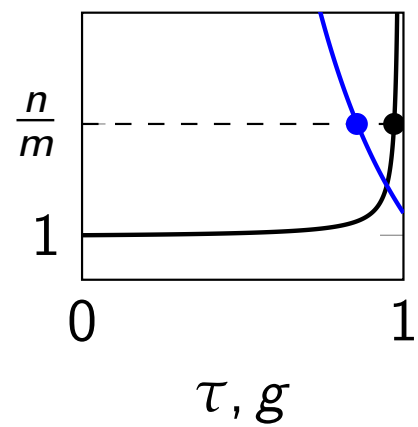


If transfers, τ^*, g^*, B'^* are constants:

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

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

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



Fiscal Policy Explanation

Will use revenue from taxes/bonds to

1. Repay bonds
2. After repaying, lower taxes/raise government spending
3. If taxes low enough, increase transfers

C_θ: Level of real bonds $\frac{B}{P}$ below which transfers are positive

- $\text{Rev}_\theta(\tau^*) + qB'^* - g^* - \frac{B}{P} > 0$

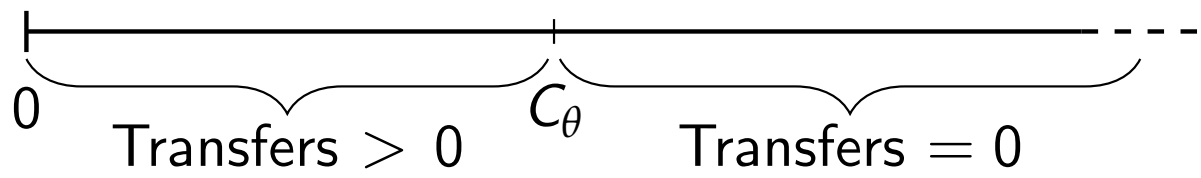
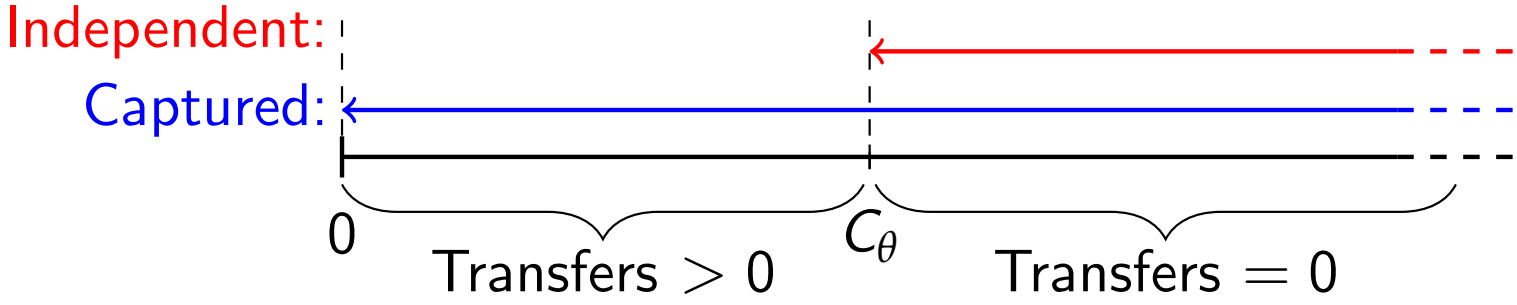


Figure : Transfers as function of level of real bonds

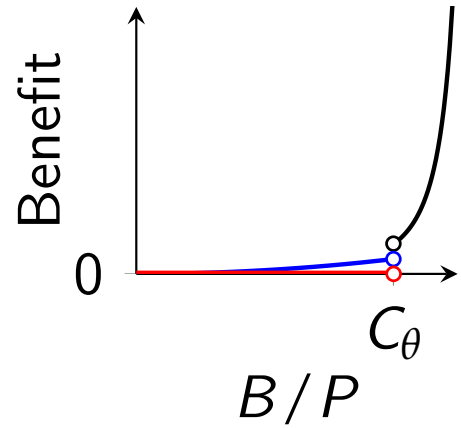
Monetary Policy Overview

Monetary Authority chooses price level P

$$v_\theta(B) = \max_P [(\text{Fiscal Problem})]$$



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



Increasing the price level P

- 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

Fiscal Authority, Independent Monetary Authority

Fiscal Authority always issues C_h

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 $(w_\theta = w_h)$

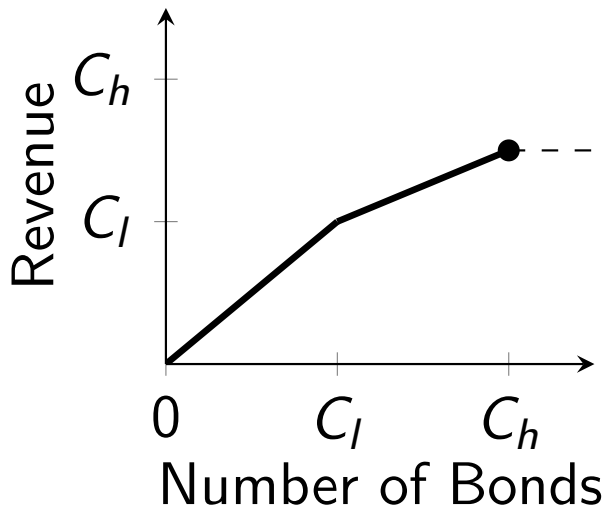
$$P(B) = \begin{cases} \frac{B}{C_h}, & \text{if } B > C_h \\ 1, & \text{if } B \leq C_h \end{cases}$$

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



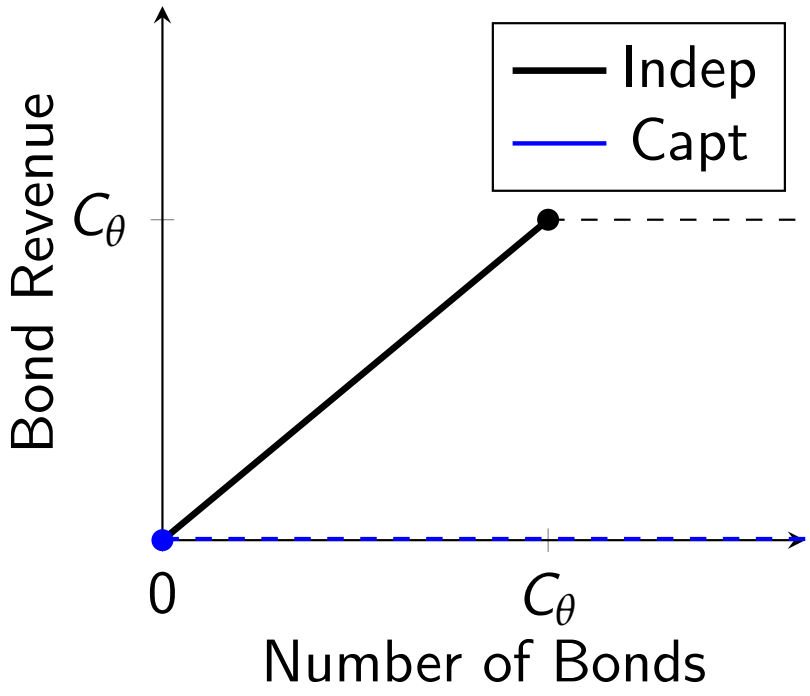
Single Country Equilibrium

Independent Monetary Authority

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

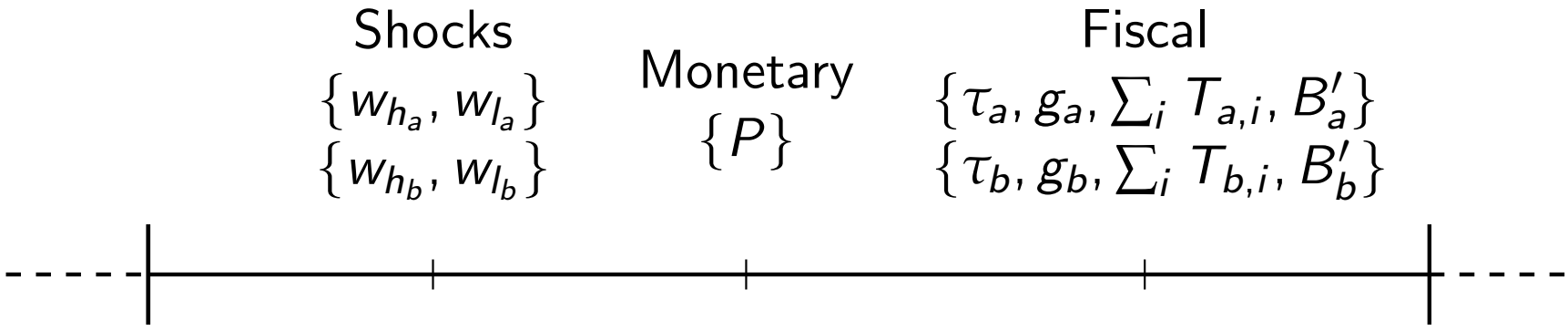
Captured Monetary Authority

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



Independent: $B = C_h$, rely on inflation to repay in bad times
Captured: $B = 0$, will always inflate everything away

Where we are now

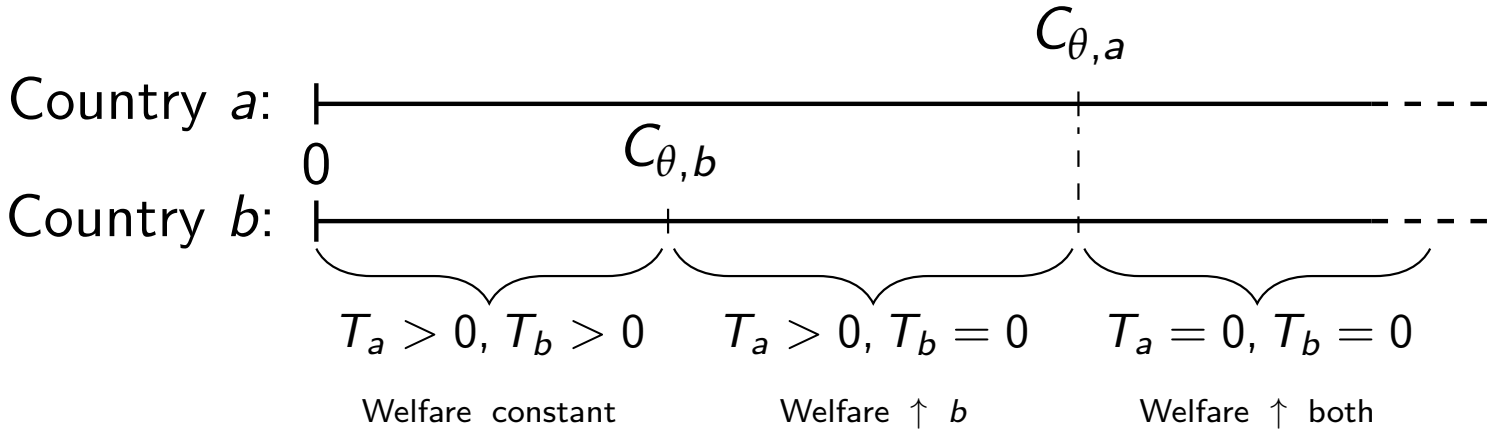


1. Single Country
   - Fiscal Policy
   - Monetary Policy
     - Captured Monetary Authority: $B = 0$
     - Independent Monetary Authority: $B = C_h$
2. Monetary Union: Two countries $\{a, b\}$
   - Perfect Monetary Union: $B \approx C_h$
   - Imperfect Monetary Union: $B > C_h$

Perfect Monetary Union: Monetary Authority

Perfect Monetary Union knows all variables from both countries

$$\begin{aligned} v_{\theta_a,\theta_b}(B_a, B_b) &= v_{\theta_a}(B_a) + v_{\theta_b}(B_b) \\ &= \max_P \left[(\text{Fiscal Problem})_a + (\text{Fiscal Problem})_b\right] \end{aligned}$$



Increase P until both countries are at or below their cutoff $C_{\theta,\{a,b\}}$

- On path: identical to independent monetary authority

Perfect Monetary Union: Fiscal Authority

Country a issues bonds:

$$\underbrace{\pi^2 C_{h_a}}_{\text{H,H}} + \underbrace{\pi(1-\pi) C_{h_a}\left(\frac{C_{l_b}}{C_{h_b}}\right)}_{\text{H,L}} + \underbrace{(1-\pi)\pi C_{l_a}}_{L,H} + \underbrace{(1-\pi)^2 C_{h_a}\left(\min\left[\frac{C_{l_a}}{C_{h_a}}, \frac{C_{l_b}}{C_{h_b}}\right]\right)}_{L,L}$$

On path: Both countries issue amount above

- Countries issue more bonds than they would individually
- Count on inflation caused by bad shock in the other
- Possible transfers in both

Off path: Country a issues too much

- Monetary authority raises price level
- Drives country b below cutoff $C_{\theta,b}$
- No transfers in country a, positive transfers in country b,

Imperfect Monetary Union: Monetary Authority

Imperfect Monetary Union ignores country b

$$\begin{aligned} v_{\theta_a,\theta_b}(B_a, B_b) &= v_{\theta_a}(B_a) \\ &= \max_P \left[(\text{Fiscal Problem})_a\right] \end{aligned}$$

Country B solves $(\text{Fiscal Problem})_b$ knowing price won't change

- Bonds look nominal, actually are indexed
- Consumers hold bonds assuming inflation will come

Why would a Monetary Union ignore country b?

1. Unobservable debt
   - Country doesn't report accurately to monetary authority
   - Then country knows it can issue nominal bonds with impunity
2. Aversion to transfers:
   - Monetary Union assigns negative welfare to transfers
   - Then monetary union won't inflate after learning about (1)

Imperfect Monetary Union: Fiscal Authority

Political coalition in ignored country issues indexed bonds

- Issues amount of bonds $C_{l,b} < B_b < C_{h,b}$
- Uses revenue for transfers to itself

Nominal Bonds

- Bonds repaid in good times, inflation in bad times
- Tax rate: τ^* in good times, τ^* in bad times

Indexed Bonds

- Bonds repaid in good and bad times
- Tax rate: τ^* in good times, $\tau(B_b) > \tau^*$ in bad times

Ignored country is revealed only after a bad shock

Interaction of Distortions:

- Political coalition in ignored country can issue bonds to gorge today counting on good times (and low taxes) tomorrow.

Conclusions

Why did Greece join the Eurozone?

- Replace captured monetary authority with independent
- Able to issue nominal bonds, smooth taxes

How did other Eurozone countries benefit?

- Shocks to Greece cause unexpected inflation across union
- Revenue from inflation tax used for transfers

Why and how did Greece issue so much debt?

- Greece ignored (by choice or not) by Eurozone
- Revenue used to reward political coalition

Why was the excess debt hidden until a large negative shock?

- Debt repaid by low taxes in good times, same as nominal
- Can't rely on inflation tax in bad times, need high taxes