Tax corruption, public debt and the policy interaction in emerging economies

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Motivation

Three important aspects in emerging economies motivate our studies :

- **Public debt stabilization** is a big concern since high public debt has negative impacts for economic performance as discussed in IMF (2003)
- In stabilizing public debt, **decentralized monetary and fiscal policies imply a strategic dynamic interaction** between the two policy makers
- **Tax corruption** causes leakages in budgetary collection (Vazquez el al (2004)), leading to an impact on a dynamic linkage among public debt and conduct of fiscal and monetary policies

Research question

How the tax corruption influences the evolution of economy within the framework of dynamic strategic interaction between the fiscal and monetary authorities?

Results

Theoretically, a more severe tax corruption increases the public debt stock at the steady state. A higher level of tax corruption reduces government spending at the steady state and the speed of adjustment for public debt stabilization

Outline of the study

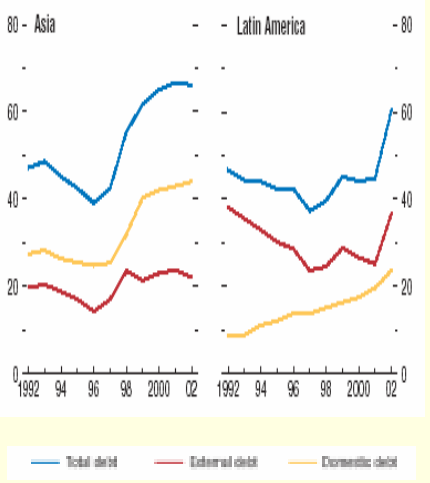
1. Introduction
2. A Model
3. Analysis of equilibrium
4. Discussion
5. Concluding remarks

1. Introduction

Important aspect: How is public debt stabilization a big concern in emerging economies?

- IMF (2003) points out public debt has roughly averaged at the level of 70% of GDP and shown a sharp increase since the early 1990s for almost emerging economies. For many of those countries, public debt climbed up to the range of 100%-150% of GDP in 2002 in spite of various effort for debt restructuring

- Prolonged excessive public debt may harm economic performance by crowding out investment as consequence of raising taxes when Ricardian equivalence does not hold or by reducing the rate of capital accumulation (Blanchard (1985))



1.Introduction

Important aspect: The decentralized monetary and fiscal policies and a dynamic policy game over stabilizing public debt

- In emerging economies, fiscal and monetary policies become relatively independent since the end of 1990s (Hawkin (2005)) and expected to play a role in the stabilization of public debt
- This issues of strategic dynamic interaction has been studied exstensively in the literature. Tabellini (1986) formulates a dynamic game to analyze how the strategic interaction between the central bank and fiscal authority plays a role in stabilizing public debt
- The strategic interaction and its implication on public debt stabilization is also investigated by Jensen (1994), Aarle et al (1995) Beestma and Bovenberg (1997, 1999) with a focus on advanced economies or the role of independence central bank in the context of forming the European Monetary Union.

1.Introduction

Important aspect: tax corruption as a feature of emerging economies

- Emerging economies often struggle against the *tax corruption* which is characterized by a situation where tax officials engage in corrupt activities by stealing from the treasury of public revenue or allowing widespread tax evasions (Vazquez et al (2004))

- Tax corruption negatively affects government's capacity to manage primary budget balance. As a result, the evolution of public debt and fiscal outcome linked through the government's budget constraint can be significantly altered

- This important aspect, however, has not been extensively addressed in the related literature on the strategic policy interaction except the studies of Huang and Wei (2003, 2005) based on the static model of Alesina and Tabellini (1987)

1.Introduction

The main objective of this study

- Incorporating explicitly tax corruption into the dynamic policy game between the fiscal and monetary authorities aimed at stabilizing public debt in emerging economies
- Examining the impact of tax corruption on the evolution of public debt, fiscal and monetary operation within the dynamic policy game under a framework of open-loop Nash equilibrium

2. Model

Desription of basic elements

- We consider a small open economy under an infinite horizon and deterministic environment. This output process is characterized by the wage-setting rule of a trade union and the profit maximization of representative firm. As a result, output is governed the following Lucas-type equation (Alesina and Tabellini (1987), Jensen (1994))

$$y_t = \alpha (\pi_t - \pi_t^e - \tau_t) \qquad (1)$$

- The tax corruption is introduced in the model by the term of actual tax collection in the approximation of government budget constraint (Tabellini (1986), Jensen (1994)):

$$\dot{d}_t = \mu d_t + g_t - \phi . \tau_t - \pi_t \qquad (2a)$$

2. Model

Dynamic decision problems of the central bank and fiscal authority

- The central bank chooses time path of inflation to pursue the stabilization of deviation of inflation, real output and public debt from the target levels

$$\underset{\pi_t}{Min} \ \frac{1}{2}\int_0^\infty \left[\pi_t^2 + y_t^2 + d_t^2 \right] e^{-\beta t} dt \qquad (3)$$

- The fiscal authority chooses the tax rate, public spending path to minimize the following intertemporal loss function

$$\underset{g_t, \tau_t}{Min} \ \frac{1}{2}\int_0^\infty \left[(g_t - \bar{g})^2 + y_t^2 + d_t^2 \right] e^{-\beta t} dt \qquad (4)$$

- Subject to constraints in (2a) and (2b) and output schedule in (1), the two policy makers try to set controlled instruments for their optimal decisions

- Policy makers are assumed to be impatient to a certain extent such that , i.e. $\beta > \mu$, the subjective marginal benefit of additional public debt stock is lower than the its objective cost marginal cost which induces policy makers directly feature public debt stock in their objective function rather than prefer unbounded public debt accumulation.

2. Model

The structure of dynamic policy game

- Initially, nominal wages are determined upon the wage-setting rule and the expected inflation is formed.
- Subsequently, the fiscal and monetary policies are conducted to minimize the intertemporal loss functions defined in (3) and (4) respectively subject to the dynamic budget constraint in (2a), (2b).
- Finally, output is produced accordingly the resulting aggregate schedule by firms.

3. Analysis of equilibrium outcome

Framework of open Nash equilibrium

- We analyze the dynamic policy game under a concept of open-loop Nash equilibrium
- An open-loop Nash equilibrium for the policy game is achieved if the specific course of choosing inflation rates to which the central bank commits himself is the best response to the time path of chosen tax rate to which the fiscal authority has committed.
- This setting requires a commitment technology has been described in Tabellini (1986) such that both policy makers submit their plans for future actions to a legislative body who is able to enforce those plans in the form of binding commitment.
- The commitment structure makes the time path of policy instruments are independent with the state of dynamic system.

3. Analysis of equilibrium outcome

Optimal path of controlled instruments

Current value Hamiltonians of the central bank and fiscal authority are:

$$H_C = \frac{1}{2}\left[\pi^2 + y^2 + d^2\right] + m_1\left[\mu d + g - \phi.\tau - \pi\right] \quad (5)$$

$$H_F = \frac{1}{2}\left[(g-\bar{g})^2 + y^2 + d^2\right] + m_2\left[\mu d + g - \phi\tau - \pi\right] \quad (6)$$

The first order conditions for the two optimization problems which characterize the outcome of open-loop Nash equilibrium are

$$\pi + \alpha.y = m_1 \quad (7a)$$

$$-\dot{m}_1 = (-\beta + \mu)m_1 + d \quad (7b)$$

$$-\alpha.y = m_2.\phi \quad (7c)$$

$$g - \bar{g} - m_2 = 0 \quad (7d)$$

$$-\dot{m}_2 = (-\beta + \mu)m_2 + d \quad (7e)$$

The transversality conditions require

$$\lim_{t \to \infty} m_{it}.d_t = 0 \quad \text{i=1,2} \quad (8)$$

3. Analysis of equilibrium outcome

Steady state and speed of adjusment

- The speed of adjustment $(-\bar{r})$ is determined in the following equation

$$\left[h^2 - (\phi + 1 + \beta - 2\mu)h - (\phi^2(1 + \frac{1}{\alpha^2}) + \phi + 1)\right] = 0 \quad (9a) \text{ where } \quad h = \beta - \mu - \bar{r}$$

- At the steady state, imposing an ex-post condition of rational expectation: $\pi^e = \pi$ we arrive at the observations for outcome of public debt, tax rate, government spending and inflation respectively as following

$$d^S = \frac{(\beta - \mu).\bar{g}}{\frac{\phi^2}{\alpha^2} + \phi + \mu^2 - \mu\beta + 2} \qquad 9(b); \tau^S = \frac{\phi^2.\bar{g}}{\frac{\phi^2}{\alpha^2} + \phi + \mu^2 - \mu\beta + 2} \qquad 9(d)$$

$$g^S = \bar{g}(1 - \frac{1}{\frac{\phi^2}{\alpha^2} + \phi + \mu^2 - \mu\beta + 2}) \qquad 9(c); \pi^S = \frac{(\phi + 1).\bar{g}}{\alpha^2(\frac{\phi^2}{\alpha^2} + \phi + \mu^2 - \mu\beta + 2)} \qquad 9(e)$$

4. Discussion of results

Impact of tax corruption on steady state outcome and speed of adjustment

Computing the derivative with respect to level of tax corruption to the steady-state outcomes and speed of adjustment, we finds:

- Debt stock is higher for an economy associated with more serious tax corruption at the steady state. Intuition is as follow.

The more severe corruption in tax collection creates more burden for the fiscal authority in reducing the public debt on her own side.

This burden of debt stabilization, however, can not be mitigated by externality from the inflation tax which is determined in the optimization program of the central bank.

As a result, an immitigable heavier burden of debt stabilization on the fiscal authority leads to a higher stock of public debt in the long-run.

- Lower level of government spending at the steady state is implied for a country with more serious tax corruption.

The more severe inefficiency in tax collection suppresses the actual revenue and result in a reduction of its spending in attempt to stabilize public debt when the externality from inflation tax is restrained.

4. Discussion of results

Impact of tax corruption on steady state outcome and speed of adjustment

- It is shown that the more severe tax corruption is associated with slower speed of adjustment to the steady state for public debt.

Tax corruption reduces the externality of public debt stabilization on the fiscal authority as she has to reduce public spending and deviate more from its spending target.

On the other hand, lower actual tax collection implies less externality of reducing public debt on the central bank.

The two effects together bring about the slower speed of debt stabilization.

- The effect of tax corruption on inflation and tax rate at the steady state is generally ambiguous

These are possible due to the different optimal response of conventional tax and inflation tax to the level of tax corruption which indicates the relative cost between the alternatives of tax collection

5. Concluding remarks

- In many emerging economies, public debt has been recently a big concern in policy discussion. The strategic interaction between fiscal and monetary authority is expected to play a role in stabilizing public debt as it is observed an increasingly decentralized trend of policies formulation in those economies
- Tax corruption, an important feature of emerging economies, has not been addressed adequately in the related literature on the dynamic policy interaction within a debt stabilization
- In this study, we examine impacts of the feature of tax corruption associated with corruptions or weak-tax related infrastructure in emerging economies within a framework of dynamic policy game to analyze the evolution of public debt, fiscal and monetary outcome in emerging economies.

5. Concluding remarks

- The main results are an economy associated with a more severe tax corruption ends up with a higher level of public debt, lower level of public spending at the steady state and a slower speed of adjustment for public debt stabilization. However, the impacts of tax corruption on tax rate and inflation at the steady state are ambiguous.
- There are several ways to further study those related issues. We may study outcomes of this game in a coordinated policy design and a closed-loop concept for comparative purposes. On the other hand, we may consider to endogenize the level tax corruption. Those issues should be interesting and important for possible researches

Comments and discussion are welcome

Thank you!