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A note on optimal fiscal policy in an economy with private borrowing limits[☆]

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HIGHLIGHTS

- A model with non-distortionary taxes, heterogeneous households, and borrowing constraints is proposed.
- Tax financing tightens private borrowing constraints whereas public debt financing relaxes them.
- For high public debt, private borrowing constraints are fully relaxed and Ricardian equivalence holds.
- Optimal policy preserves binding borrowing constraints so as to reduce interest rates on public debt.

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ABSTRACT

We consider the implications for optimal fiscal policy when taxes are non-distortionary and households are heterogeneous and borrowing constrained. The main result is that optimal policy keeps some households borrowing constrained in order to reduce interest rates on government debt.

1. Introduction

How should a government finance a temporary public spending increase? The standard analysis of this question builds on the work of Barro (1979) and Lucas and Stokey (1983) who consider environments with distortionary taxes. According to this analysis, the government's desire to dynamically smooth tax distortions means that debt should be chosen to keep tax rates relatively constant over time.

In this note, we consider the answer to this question when taxes are non-distortive, and when households are heterogeneous and borrowing constrained. Other work has emphasized the role of public debt in relaxing borrowing constraints, such as Aiyagari and McGrattan (1998), Holmstrom and Tirole (1998), Krishnamurthy and Vissing-Jorgensen (2012), and Woodford (1990). We complement this work by describing how the existence of private borrowing constraints impacts a government's optimal financing decision.

We consider a two-period model with rich and poor borrowing constrained households.[1] The government finances some initial public spending with lump sum taxes and debt. Tax financing tightens private borrowing constraints, whereas debt financing relaxes them. At high enough debt levels, the government fully

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1 Bassetto (2014), Niepelt (2003), and Werning (2007) also consider extensions of Lucas and Stokey (1983) which introduce heterogeneity, though their work does not consider the role of private borrowing constraints.

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relaxes borrowing constraints, and Ricardian Equivalence holds for marginal changes in debt. The main result is that even though such a policy is feasible, it is not optimal. The optimal policy of a utilitarian government keeps some households borrowing constrained in order to reduce interest rates on public debt.

2. Model and main result

We consider a simple two-period model with rich and poor borrowing constrained households. The government finances some initial public spending with lump sum taxes and debt.

2.1. Environment

There are two types of households indexed by $i = \{L, H\}$ each of size 1/2. Each household has a constant endowment y^i where $y^H > y^L$ and faces the following budget constraints at $t = 0$ and $t = 1$, respectively:

$$c_0^i + qb^i = y^i - \tau_0, \quad \text{and} \tag{1}$$

$$c_1^i = y^i - \tau_1 + b^i. \tag{2}$$

At date 0, households pay lump sum taxes τ_0 and they use their income net of taxes to purchase consumption c_0^i and public debt b^i at a price q. At date 1, they receive b^i and use their income net of taxes to finance consumption. Households cannot borrow so $b^i \geq 0$.[2] Households choose c_0^i, c_1^i, and b^i to maximize their utility

$$\sum_{t=0,1} \log\left(c_t^i\right)$$

subject to their budget constraints and borrowing limits. This yields the following Euler equation:

$$q \geq \frac{c_0^i}{c_1^i}, \tag{3}$$

which is a strict inequality only if $b^i = 0$.

The government finances some initial public spending $g > 0$ by raising taxes $\tau_0 \gtreqless 0$ and issuing public debt $B \geq 0$. Its period 0 budget constraint is thus

$$g = \tau_0 + qB. \tag{4}$$

In the second period, the government repays outstanding debt with taxes τ_1

$$\tau_1 = B. \tag{5}$$

The market clearing condition on government debt is

$$B = \frac{1}{2}b^L + \frac{1}{2}b^H. \tag{6}$$

The government is utilitarian and chooses taxes and debt to maximize social welfare:

$$\frac{1}{2}\sum_{i=L,H}\sum_{t=0,1} \log\left(c_t^i\right). \tag{7}$$

2.2. Competitive equilibria

Before characterizing optimal policy, we characterize the competitive equilibria which emerge under different levels of public debt. We show that for high levels of public debt, marginal changes in debt have no impact on allocations and welfare. In contrast, for low levels of public debt, marginal changes in debt affect allocations and welfare.

2.2.1. High public debt

Let $\overline{y} = \frac{1}{2}y^L + \frac{1}{2}y^H$ and define

$$B^* = \frac{g}{\overline{y} - g}\frac{y^H - \overline{y}}{2}.$$

Lemma 1 (*High Public Debt*)**.** *If $B > B^*$, then (3) is an equality for $i = L, H$, and the values of $\left\{\left\{c_t^i\right\}_{i=L,H}\right\}_{t=0,1}$ and q are uniquely defined and independent of the value of B.*

This lemma states that if the government supplies enough debt at date 0, then fiscal policy has no effect on the margin on household allocations and social welfare. The intuition for this result is as follows. If public debt is sufficiently high, then the level of taxation in the initial period is very low. Both rich as well as poor households rationally anticipate that taxes must rise in the future in order to finance this spending spree, so that both types of households own positive levels of public debt in order to save in anticipation of this tax increase. Consequently, if the government were to increase current taxes τ_0 by some amount $\epsilon > 0$, then households of all types would anticipate a decrease in future taxes τ_1 by ϵ/q (since government debt is reduced) and they would therefore decrease their savings qb^i *uniformly* by ϵ. Thus, the change in government policy has no impact on household allocations and interest rates.

This finding is in the spirit of the Ricardian equivalence result, though it relies on the level of debt being sufficiently high that all households participate in the savings market. This allocation and equilibrium interest rate are identical to those in an economy absent credit constraints. More specifically, substitution of (4)–(5) into (1)–(2) implies that:

$$c_0^i = y^i - g - q\left(b^i - B\right), \quad \text{and} \tag{8}$$

$$c_1^i = y^i + \left(b^i - B\right). \tag{9}$$

In the absence of a binding credit constraints, (3) binds for both household types. This fact, combined with (6), (8), and (9), implies that

$$q = \frac{\overline{y} - g}{\overline{y}}. \tag{10}$$

Substitution of (10) into (3) and (8)–(9) implies that

$$b^H - B = -b^L + B = B^*,$$

which is only feasible if $B \geq B^*$ since $b^L \geq 0$. Thus, a high enough supply of public debt allows the government to effectively replicate private markets in economies in which such markets are non-existent. Interestingly, this implies that in contrast to economies in which debts are financed via distortionary taxes (e.g., Barro, 1979 and Lucas and Stokey, 1983), excessively high levels of public debt do not actually reduce social welfare on the margin.

2.2.2. Low public debt

We characterize competitive equilibria when the government issues low levels of public debt.

Lemma 2 (*Low Public Debt*)**.** *If $B < B^*$, then $\left\{\left\{c_t^i\right\}_{i=L,H}\right\}_{t=0,1}$ and q are uniquely defined for every B. As the government increases B from below B^*, (i) q decreases, (ii) b^L is constant at 0 and b^H increases, (iii) c_0^L increases and c_0^H decreases, and (iv) c_1^L decreases and c_1^H increases.*

[2] All of our results hold if households can borrow up to a binding limit $\underline{b}$, so that $b^i \geq \underline{b}$.