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On the role of public debt in an OLG model with endogenous labor supply

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Abstract

This paper argues that some propositions reported in a recent paper by [Fanti., L., Spataro, L., 2006. Endogenous labor supply in Diamond's (1965) OLG model: A reconsideration of the debt role. Journal of Macroeconomics 28, 28–438] are not warranted. They claim that including an endogenous labor supply in an overlapping generations model may change the conclusions concerning the capital accumulation and welfare effects of (internal) public debt issue. We show that their results are not the consequence of the Cobb–Douglas preferences they posit, but of a rather incomplete development of their model. When this incompleteness is corrected, and under general assumptions on preferences and technology, the propositions arrived at originally by [Diamond, P.A., 1965. National debt in a neoclassical growth model. American Economic Review 55, 1126–1150] in a model that does not take the labor–leisure decision into account continue to hold. In particular, no matter whether the starting point is a dynamically efficient or inefficient steady state, an increase in the stock of public debt per taxpayer unambiguously depresses the capital–labor ratio and raises the interest rate. Moreover, the welfare level will increase (decrease) when the starting point is a dynamically inefficient (efficient) steady state.
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1. Introduction

Ever since the celebrated paper by Diamond (1965) the overlapping generations (OLG) model has become a standard tool to deal with both macroeconomic and public finance issues. In a recent contribution to this *Journal*, Fanti and Spataro (2006) (F–S henceforth) introduce an endogenous labor supply in Diamond's (1965) model and reconsider the role of public debt. This is an important extension, since the standard approach focuses on savings decisions and neglects labor–leisure decisions. In particular, F–S posit Cobb–Douglas preferences and discuss the consequences of the government issuing internal public debt on steady state capital accumulation and welfare when taxes (subsidies) fall on (are received by) the younger generation. They claim to have shown that when the starting point is a dynamically inefficient steady state (i.e., a situation where the interest rate falls short of the population growth rate), the relationship between public debt issue and the steady-state levels of the interest rate and welfare is ambiguous: it may even be the case that an increase in debt is welfare worsening. These results are thus different from those arising from Diamond's (1965) setting.

The purpose of this paper is to show that F–S's claims are not warranted since they are the consequence of a rather incomplete development of their model. When this incompleteness is corrected, and under general conditions (i.e., without restricting the analysis to Cobb–Douglas preferences), it is shown that the introduction of an elastic labor supply does not change the propositions arrived at by Diamond (1965) in his OLG model without a labor–leisure decision. In particular, no matter whether the starting point is a dynamically efficient or inefficient steady state, an increase in the stock of public debt per taxpayer unambiguously depresses the capital–labor ratio and raises the interest rate. The welfare level will increase when the starting point is a dynamically inefficient steady state and will decrease when the economy's capital–labor ratio is below its golden rule level.

2. The model

The framework is the OLG model developed by Diamond (1965), extended to include a labor–leisure decision. All the individuals are identical and live for two periods. In the first one they consume c_1 and work an amount of time defined as their time endowment (normalized to unity) minus their leisure, l. In the second one they fully retire and consume c_2. Denoting $N(R)$ the number of workers (retirees), the demographic structure is $N = (1 + n)R$, where n is the rate of population growth. The technology is represented by a constant-returns-to-scale production function $Y = F(K, L)$ which relates output Y to capital K and labor L, where $L = N(1 - l)$. This can be rewritten as $y = f(k)$, with $f'(\cdot) > 0$ and $f''(\cdot) < 0$, where k and y are capital and output per unit of labor. Under competition, the rate of return to capital r and the wage rate w are given, respectively, by $r = f'(k)$ and $w = f(k) - kf'(k)$.

As in Diamond (1965), the government issues internal public debt and levies (grants) lump-sum taxes (subsidies) upon the young. F–S assume that the stock of debt per taxpayer, B/N, is kept constant at a certain ratio b. If τ is the lump-sum tax/subsidy on each young individual, the government budget constraint in each period is $b(1 + n) + \tau = b(1 + r)$, so that $\tau = (r - n)b$, which will be positive or negative according to whether r is greater or less than n.