Economic Modelling 42 (2014) 398–412

Contents lists available at ScienceDirect

Economic Modelling

journal homepage: www.elsevier.com/locate/ecmod

Optimal time-consistent fiscal policy under endogenous growth with elastic labor supply☆

Alfonso Novales, Rafaela Pérez *, Jesus Ruiz

Departamento de Análisis Económico, Universidad Complutense de Madrid, Spain
Instituto Complutense de Análisis Económico (ICAE), Spain

ARTICLE INFO

Article history:
Accepted 3 July 2014
Available online 12 August 2014

Keywords:
Time-consistency
Markov-perfect optimal policy
Ramsey optimal policy
Endogenous growth
Income tax rate
Government spending composition

ABSTRACT

We explore the implications of incorporating an elastic labor supply in an endogenous growth economy when characterizing the time-consistent Markov policy. We consider two policy instruments: an income tax rate and the split of government spending between consumption and production services. The Markov-perfect policy implies a higher income tax rate and a larger proportion of government spending allocated to consumption than those chosen under a commitment constraint on the part of the government. As a consequence, economic growth is slightly lower under the Markov-perfect policy than under the Ramsey policy. Under the Markov and Ramsey optimal policies, a higher weight of leisure in households' preferences leads to a lower optimal income tax rate and a lower proportion of public resources devoted to consumption. We also show that the policy bias that would arise when imposing a Markov policy designed ignoring the presence of leisure in the utility function would lead to a significant welfare loss.

© 2014 Elsevier B.V. All rights reserved.

1. Introduction

Considerable effort is being devoted to characterizing optimal policy in the absence of commitment by the current government with respect to policies taken by future governments. This is to recognize a peculiarity of actual economies that, if ignored, might lead to significant flaws in policy design. An additional motivation is to avoid proposing supposedly optimal policies from which we know beforehand that the government will have an incentive to deviate.

Klein et al. (2008) characterize the optimal time-consistent tax policy in an exogenous growth model with leisure and public consumption in the utility function. They propose a repeated game structure with successive governments, each one of them governing only for one period. Each government is supposed to be a dominant player that takes the optimal reaction of private agents as given when deciding the optimal policy. Ortigueira (2006) compares the results obtained under the structure in Klein, Krusell and Rios–Rull with those from an alternative design of the game in which the government and private agents make their respective decisions simultaneously, characterizing the behavior of the economy along the transition to the optimal steady-state. These two papers consider alternative fiscal structures, always with a single policy instrument: either a single tax levied on total income, a single tax on capital income or a single tax on labor income. Martin (2010) follows the same game structure as Klein et al. (2008), extending the analysis to the simultaneous consideration of different tax rates for capital and labor income, solving for the optimal time consistent choice for both fiscal instruments. A further exogenous growth analysis is done by Azzimonti et al. (2009), who characterize the Markovian tax rate raised on total income when used to finance public investment.

However, endogenous growth considerations should be important when searching for the design of an optimal policy. They not only allow for a more plausible representation of actual economies, but also for explicitly taking into account the effect of fiscal policy on the rate of growth. That extension has been done by Malley et al. (2002), who use an endogenous growth model and solve for the time-consistent path of distorting income tax rates to finance both productive and consumption government expenditures, under an exogenous split of total spending, logarithmic preferences and full capital depreciation. Novales et al. (2013) develop a further extension of the Malley et al. analysis to the consideration of an endogenously determined split of government spending between consumption and investment, assuming that private capital has incomplete depreciation in each period and that private agents have preferences represented by a constant relative risk aversion (CRRA) utility function in private and public consumption.

☆ The authors thank the financial support received from the Spanish Ministry of Science and Innovation through grant ECO2012-31941, the Research Groups funding program by the Universidad Complutense de Madrid and Banco Santander, the Xunta de Galicia through Grant 10PXIB300177PR and the Research Grant program in Economics at Fundación Ramón Areces (VIII-2010).

* Corresponding author at: Departamento de Fundamentos del Análisis Económico I. Facultad de Ciencias Económicas. UCM. Campus de Somosaguas, 28223 Madrid, Spain.
E-mail addresses: anovales@ccee.ucm.es (A. Novales), rmperezs@ccee.ucm.es (R. Pérez), jruizand@ccee.ucm.es (J. Ruiz).

http://dx.doi.org/10.1016/j.econmod.2014.07.009
0264-9993/© 2014 Elsevier B.V. All rights reserved.

These extensions are very relevant, since in Malley et al. (2002) setup, the Ramsey policy is not subject to a time consistency problem and it coincides with the Markov perfect solution, a result shown by Novales et al. (2013).[1]

In this paper we extend the analysis of Novales et al. (2013) by considering an elastic labor supply in an endogenous growth economy in which the government takes decisions on public consumption and production services each period. The government raises revenues through income taxes, and decides which percentage to devote to public consumption or production services.

We start by computing the analytical solution in a relatively simple environment similar to the one used by Malley et al. (2002), where consumers have logarithmic preferences that are separable across commodities and over time, and private capital fully depreciates each period. The novelty with respect to those authors is that we solve not only for the Markov-perfect tax rate but also for the time-consistent composition of total government expenditures, further considering an elastic labor supply. The optimal time-consistent policy and the resulting allocation of resources are then compared to the Ramsey solution.

For the more general case with incomplete depreciation of private capital and CRRA preferences in private and public consumption, as well as leisure, the optimal fiscal policies cannot be characterized analytically. There, we numerically compute the three solutions. For the Markovian time-consistent policy we assume that our model lacks transitional dynamics, as is typical in AK-type economies like the one in this paper.[2] We show that the Markov policy imposes a higher income tax and it devotes a higher proportion of revenues to public consumption than the Ramsey optimal policy, in line with the results in Novales et al. (2013) under inelastic labor supply. The time consistent optimal policy also leads to a slightly lower working time and a lower rate of growth relative to the Ramsey solution.

In spite of the fact that the qualitative comparison between the Markov and Ramsey solutions is similar to the inelastic labor supply case, this paper shows that the consideration of leisure in the utility function has non trivial effects on the design of optimal policy. Relative to an economy with an inelastic supply of labor, we show that taking into account the welfare effect of leisure leads the time-consistent Markov policy to impose a lower income tax rate and to devote a lower proportion of public resources to consumption, rather than to production services. As a consequence, a suboptimal policy that ignores the presence of leisure in the utility function implies a significant welfare loss that we illustrate below.

We also show that a higher appreciation for leisure leads to a lower working time. The welfare gain of higher leisure renders public consumption less necessary, and a higher proportion of public resources will be devoted to production services. Additionally, the income tax rate will be lower. The fall in working time is the dominant effect in the determination of the growth rate, which is lower for economies with a higher preference for leisure.

The paper is organized as follows: we describe the model economy in Section 2. In Section 3 we characterize the solutions to the Markov, Ramsey and Planner's optimization programs. An analytical solution is obtained in Section 4 under the more restricted assumptions on preferences and capital depreciation. In Section 5 we compute the optimal policies and allocations of resources for the three solution concepts, under a CRRA utility function and incomplete depreciation of private capital. A welfare comparison of the Markov and Planner's solutions is done in Section 6. In Section 7 we analyze the welfare consequences of applying a policy designed when ignoring the presence of leisure in the utility function, and Section 8 concludes.

[1] Azzimonti et al. (2009) also show this result for an exogenous growth economy.

[2] Besides, absence of transitional dynamics has been analytically shown by Novales et al. (2013) in a similar economy, under an inelastic labor supply.

2. The model economy

We consider an economy with a private agent and a competitive firm that maximizes profits subject to a technology that produces the single consumption commodity. We assume that the private agent has each period one unit of time to allocate between leisure and working time. The stock of private capital, k_t, and production public services, $i_{p,t}$,[3] are used together with labor time, l_t, as inputs in a production technology: $y_t = Bk_t^{\alpha}(l_t\ i_{p,t})^{1-\alpha}$, where B is a scale parameter. The firm pays a rent $r_tk_t + w_tl_t$ to the private agent for the use of private capital and labor, solving each period the static profit optimization problem:

$$\underset{\{k_t,l_t\}}{Max}\,\Pi_t = Bk_t^{\alpha}\left(l_t\,i_{p,t}\right)^{1-\alpha} - r_tk_t - w_tl_t.$$

Markets for production inputs are competitive and, as a consequence, at each point in time input prices are equal to their marginal product:

$$r_t = r\left(k_t, i_{p,t}, l_t\right) = \alpha\frac{y_t}{k_t} = \alpha B\left(k_t/\left(l_t\,i_{p,t}\right)\right)^{\alpha-1}, \tag{1}$$

$$w_t = w\left(k_t, i_{p,t}, l_t\right) = (1-\alpha)\frac{y_t}{l_t} = (1-\alpha)B\left(k_t/\left(l_t\,i_{p,t}\right)\right)^{\alpha} i_{p,t}. \tag{2}$$

We denote by η_t the proportion of the proceeds from households' income taxes that are used each period to finance public consumption services, g_t, the remaining tax revenues being used to pay for production services, $i_{p,t}$. The government budget constraint is $g_t + i_{p,t} = \tau_t(r_tk_t + w_tl_t)$, where

$$g_t = \eta_t\tau_t(r_tk_t + w_tl_t), \tag{3}$$

$$i_{p,t} = (1-\eta_t)\tau_t(r_tk_t + w_tl_t). \tag{4}$$

Households maximize their life-time discounted aggregate utility, $\sum_{t=0}^{\infty}\rho^tU(c_t, g_t, l_t)$, defined over private and public consumption, c_t, g_t, and leisure, $1 - l_t$, subject to a flat tax rate τ_t on total income. They know the current values of τ_t and η_t, and expect future governments to follow policies $\tau_{t+1} = \mathcal{T}(k_{t+1})$ and $\eta_{t+1} = \mathcal{H}(k_{t+1})$. The typical household solves the problem:

$$v(k_t;\tau_t;\eta_t;\mathcal{T};\mathcal{H}) = \underset{\{c_t,k_{t+1},l_t\}}{Max}\left[U(c_t, g_t, l_t) + \rho\tilde{v}(k_{t+1};\mathcal{T};\mathcal{H})\right] \tag{5}$$

given k_0, taking as given all policy variables and prices: $\{\tau_t, \eta_t, g_t, w_t, r_t\}_{t=0}^{\infty}$, subject to the budget constraint,

$$c_t + k_{t+1} - (1-\delta)k_t = (1-\tau_t)[w_t\,l_t + r_t\ \ k_t]. \tag{6}$$

leading to the following optimality conditions

$$\frac{U_l(c_t, g_t, l_t)}{U_c(c_t, g_t, l_t)} = (1-\tau_t)w_t \tag{7}$$

$$1 = \rho\frac{U_c(c_t, g_t, l_t)}{U_c(c_{t+1}, g_{t+1}, l_{t+1})}\left[1-\delta + (1-\tau_{t+1})r_{t+1}\right], \tag{8}$$

jointly with the budget constraint given by Eq. (6) and the transversality condition $\lim_{T\to\infty}\lambda_{t+T}k_{t+1+T} = 0$, where λ_t is the costate variable.[4]

[3] In line with Barro (1990), and Cazzavillan (1996).

[4] Along the paper we denote partial derivatives by $F_v \equiv \frac{\partial F}{\partial v}$.

دریافت فوری ← متن کامل مقاله

ISIArticles
مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات