

Testing for tax smoothing in a general equilibrium model of growth

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Abstract

This paper constructs, estimates and tests a general equilibrium model of endogenous growth and optimal fiscal policy. Income tax revenues finance government consumption and production services, with the latter generating long-term endogenous growth. A key result from this model is that benevolent policymakers find it optimal to keep the income tax rate constant over time. Despite its popularity amongst theorists, there have been no formal econometric tests of this type of general equilibrium models. We find that data from 22 OECD economies uniformly reject the model over the period 1960–1996. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

Over the past decade, general equilibrium models of economic growth have increasingly been employed to study the role of fiscal policy in the growth process. The main idea (see Barro, 1990) is that some government-provided services enhance the productivity of private firms. For this reason, at the aggregate level, there are no diminishing returns, and hence the economy is capable of long-term (endogenous) growth. In this framework, given that government services are financed by distortionary taxes, it is particularly important to identify the optimal level of government expenditures and the associated optimal tax rate.

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In this context, for particular specifications of technology and preferences, Barro (1990) showed that the optimal income tax rate is constant.¹ The intuition is well-known: since tax policy is distorting, the fiscal authorities find it optimal to allocate this policy over time to avoid further intertemporal distortions. Basically, this means that the tax rate should change only if there are unanticipated shocks, i.e. tax rates should not be state-contingent. This is a form of the classic tax-smoothing result.²

There have been numerous papers that build upon Barro's (1990) setup to address various theoretical issues in economic growth (see for example Barro and Sala-i-Martin, 1992; Alesina and Rodrik, 1994; Benhabib and Velasco, 1996; Glomm and Ravikumar, 1994, 1997; Devereux and Wen, 1998). However, surprisingly, and despite its influence and popularity amongst theorists, there has been no formal testing of this class of general equilibrium models. This paper solves, and formally tests, a relatively general version of Barro's heavily cited general equilibrium model of endogenous growth, public (production and consumption) services and optimal policy, in which policymakers find it optimal to keep the tax rate constant over time.

The paper is organized as follows. In Section 2, we set up an endogenous growth model, in which a benevolent government³ chooses a path of distorting income tax rates to finance the provision of public services. We enrich the basic setup by making the reasonable assumption that the government uses the collected tax revenues to finance both public production services (which provide production externalities to firms) and public consumption services (which provide direct utility to households). The government acts as a Stackelberg leader vis-à-vis households and firms. We solve for Markov policy strategies, and hence Markov-perfect general equilibria, in which optimal policy is time consistent. We obtain an exact closed-form general-equilibrium solution, which consists of behavioral relations for private consumption, private capital, government

¹ In the basic Barro (1990) setup, the production function at the firm's level is Cobb–Douglas, with constant returns in capital per capita and public productive services. In this setup, the optimal tax rate is constant over time and equal to the productivity of public services. As we argue below, constant optimal tax rates are a rather robust result in this literature, especially when one focuses on time consistent policies (i.e. equilibria in which there are no commitment technologies). This is the type of equilibria we solve here for. We argue that this is reasonable since we will empirically test the model and in the real world governments cannot commit themselves to future policies.

² Barro (1979) showed that, when government expenditures are exogenous, and if it is optimal to keep tax revenues constant over time, the public debt inherits the properties of the state of the economy. That is, the public debt smoothes out intertemporal tax distortions. In Lucas and Stokey (1983), the smoothing device is returns to bonds. In Chari et al. (1994), it is revenues from capital income taxes and returns to bonds. In our model, it is the level of endogenous government expenditures. That is, when the budget is balanced, and if it is optimal to keep the tax rate constant over time, the level of government expenditures inherits the properties of the state of the economy. We therefore adopt the term "tax smoothing", even though we do not include public debt. The important point is whether it is optimal for policymakers to keep the tax rate constant. The specific device that smoothes tax distortions over time and across states of nature is less important for what we do in this paper.

³ Following most of the literature on growth and fiscal policy, we retain the usual complete neoclassical paradigm, for example full rationality, long-sighted agents and benevolent policymakers. Concerning the latter, in the medium run and in the context of a growth model, it seems sensible to assume that the preferences of society reflect the preferences of its constituents (see for example Chari et al., 1989; Stokey, 1991). However, we acknowledge that the assumption of a benevolent government can be restrictive (see the discussion in Section 4 below).

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