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Taxation, risk-taking and growth: a continuous-time stochastic general equilibrium analysis with labor-leisure choice

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Abstract

This paper investigates the equilibrium relationship between taxation, portfolio choice (risk-taking) and capital accumulation. Specifically, it examines how taxes affect risk-taking and capital accumulation. We extend the existing literature by relaxing two crucial assumptions in modelling risk-taking behavior: (i) that the investment opportunity set is fixed and (ii) that there is no distinction between attitudes towards risk and behavior towards intertemporal substitution. We extend the investment opportunity set of individuals through optimally determined human capital; and distinguish intertemporal substitution from attitudes towards risk via a recursive utility function. In the presence of these extensions, the paper successfully derives a closed-form solution to the stochastic growth model with stochastic wage income.

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1. Introduction

The relationship between taxation, risk-taking and economic growth has been the topic of several papers in recent years (see Sandmo, 1989; Turnovsky, 1993; Smith, 1996b; Asea and Turnovsky, 1998, *inter alia*). Asea and Turnovsky (1998), for example, analyze the effect of taxes on capital income on risk taking and capital accumulation to address the question of whether taxing the return on investment increases the total amount of investment and the total amount of risk undertaken. This paper builds on this

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literature and extends it in two important directions. First, we explore the interaction between taxation, risk-taking and capital accumulation in a model with labor supply flexibility. We allow the labor-leisure choice to be endogenously determined within the model. This allows us to examine the impact of taxation on both capital and labor income on the growth rate, the volatility of the growth rate and the shares of equity, government bonds and the safe asset in the optimal portfolio. In order to carry out this analysis the paper successfully derives a closed-form solution to the stochastic growth model with stochastic wage income. Second, we distinguish between attitudes towards risk (the desire to smooth consumption across states of nature) and attitudes towards intertemporal substitution (the desire to smooth consumption across time).

To explore the interaction between taxation, risk-taking and capital accumulation in a model with labor supply flexibility and the separation of risk aversion and intertemporal substitutability, we adopt the continuous-time stochastic dynamic general equilibrium framework developed by (Eaton, 1981) and lately extended by (Grinols and Turnovsky, 1993).¹ Since the analytical framework is essentially an intertemporal CAPM in general equilibrium, the model is ideally suited to the analysis of the interactions between taxation, portfolio choice and growth. This offers an advantage over the models used in the endogenous growth theory literature, which explain the mean of the growth rate, and the real business cycle literature, which explains the variability of the growth rate. Since the former literature is interested in the first moment while the latter deals with the second moment, neither is useful for analyzing portfolio choice issues. Our model does not suffer from this shortcoming. We extend the Eaton–Grinols–Turnovsky (EGT) type of the continuous-time stochastic dynamic general equilibrium model: (i) to incorporate endogenous labor supply along the lines of (Bodie et al., 1992a) and (ii) to relax the parametric restriction on risk aversion and intertemporal substitution imposed by the expected utility function by adopting ‘generalized isoelastic preferences’ along the lines of Svensson (1989), Grinols (1996) and Obstfeld (1994b). Recently, the first extension has been received a considerable attention in the literature since the optimal choice of labor-leisure generates a flexible investment opportunity set, and thereby affects the optimal portfolio choice and furthermore leads to time-varying portfolio choice as opposed to the atemporal portfolio choice that is established in the classical Merton model (see Merton, 1969). However, mostly these papers use a partial equilibrium analysis (see Elmendorf and Kimball, 2000). To our knowledge, Basak (1999), Turnovsky (2000) and Turnovsky and Chattopadhyay (2003) are the only three papers which model labor in a continuous time general equilibrium framework. Basak (1999) provides analytical comparative static analysis of the effects of labor-leisure choice on consumption, stock market, and other fluctuations without explicitly solving it. There are also other limitations in the model of Basak: there is no capital and his analysis is restricted to the expected utility case. This is not surprising since there is no general

¹ See also Turnovsky (1993) (multi shocks), Grinols and Turnovsky (1994) (exchange rate determination and asset prices), Benavie et al. (1996) (optimal investment policy), Turnovsky and Grinols (1996) (optimal government finance policy and exchange rate management) Corsetti (1997) (exogenous labor and optimal government spending) Grinols and Turnovsky (1998) (debt policy) and Evans and Kenc (2003) (welfare cost of monetary and fiscal policy shocks).

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