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Stochastic taxation and asset pricing in dynamic general equilibrium

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Abstract

Tax rates have fluctuated considerably since federal income taxes were introduced in the U.S. in 1913. This paper analyzes the effects of stochastic taxation on asset prices in a dynamic general equilibrium model. Stochastic taxation affects the after-tax returns of both risky and safe assets. Whenever taxes change, bond and equity prices adjust to clear the asset markets. These price adjustments affect assets with long durations, such as equities and long-term bonds, more than short-term assets. Under plausible conditions, investors require higher term and equity premia as compensation for the risk introduced by tax changes.
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1. Introduction

One of the few certain forecasts about the tax system is that it will change. Since federal income taxes were introduced in 1913, the tax system of the U.S. has been

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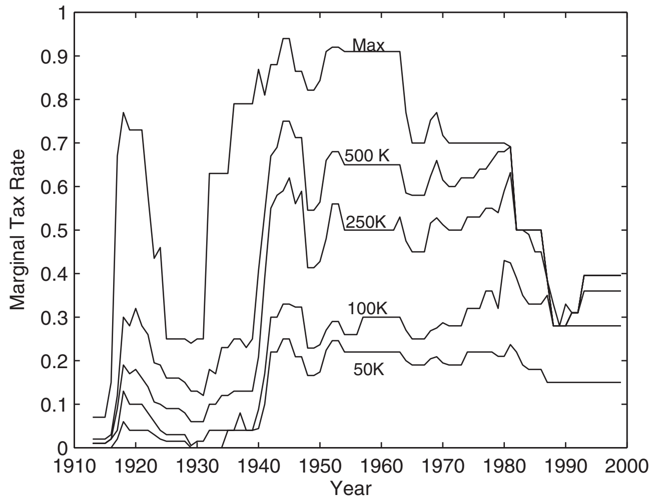

Fig. 1. Marginal income tax rates at different real income levels. The marginal income tax rates over the period from 1913 to 1999 are depicted for families with real income levels of 50, 100, 250, and 500 thousand U.S. dollars (with 1999 consumer prices), and the marginal tax rate for the highest tax bracket.

reformed several times. Tax rates have fluctuated considerably over this period, as depicted in Fig. 1, which shows the federal marginal income tax rates for individuals in five different tax brackets.[1] Besides marginal tax rate changes, other provisions of the tax code also changed, adding to the overall uncertainty of tax law. This paper investigates how stochastic tax policies affect asset prices and whether they introduce an additional risk factor in the economy, which changes equity and term premia.

This paper analyzes the effects of stochastic taxation on asset prices in a dynamic general equilibrium model. The theoretical model generalizes the Lucas (1978) asset pricing model by introducing a flat consumption tax that follows a two-state Markov chain. Whenever taxes change unexpectedly, stock and bond prices adjust instantaneously to clear the asset markets. The price adjustments are larger for assets with long durations, such as equities and long-term bonds, than for assets with shorter durations. This paper demonstrates that individuals require higher expected returns for holding the assets with larger price changes. Hence, long-term bonds and equities tend to pay on average higher returns than short-term bonds.

Stochastic taxes affect asset prices in three ways. First, they change the level of disposable income over time (*income effect*). Frequent tax changes increase the variability of consumption for a given production process. A higher variability of consumption significantly affects asset prices and leads to a higher equity premium, as previously shown in the asset pricing literature. Second, time-varying tax rates distort the relative price of consumption over time and affect the incentives to save

[1] A detailed description of the data is given in Appendix A.1.

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