Regional Science and Urban Economics xxx (2013) xxx–xxx

Contents lists available at SciVerse ScienceDirect

Regional Science and Urban Economics

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

Risk sharing and the efficiency of public good provision under tax competition ☆

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ARTICLE INFO

Article history:
Received 4 March 2012
Received in revised form 11 March 2013
Accepted 12 March 2013
Available online xxxx

JEL classification:
H25
H71

Keywords:
Tax competition
Uncertainty
Risk sharing

ABSTRACT

This paper investigates tax competition under uncertainty, when local governments levy a linear source-based tax on corporate income. As the corporate tax transfers part of the risk of investment from firms to the government (risk sharing), two differences to the previous literature arise. First, the capital mobility externality may be positive or negative, depending on how strong the risk sharing effect of taxation is. Second, the sign of the tax exporting externality is also indeterminate. Each government not only exports the burden of taxation, but also bears risk which would have been borne by foreigners instead. Thus, while the socially optimal tax rate equates the risk exposure of the private and the public sectors, the equilibrium decentralized tax may be inefficiently high or low.

1. Introduction

Losses are treated in a different way from profits by tax authorities. If a firm experiences a loss, it usually receives a loss carryforward, which allows it to offset future profits and reduce tax payments. Alternatively, some countries also grant loss carrybacks, which take the form of an immediate tax refund against profits in the past. Thus, loss offset provisions facilitate investment of those firms, which operate in highly volatile industries and expect losses in the future (or already have loss carryforwards from the past).

It has long been known that a full loss-offset corporate tax reduces the risk premium charged on investment by lowering the volatility of after-tax income (Gordon, 1985). As a result, it may leave investment incentives unaffected. Nevertheless, much of the tax competition literature neglects uncertainty and the tax treatment of losses, mainly because of the tradition to model the corporate tax as being levied on the stock of capital rather than on profits.[1]

This paper departs from the literature by investigating the consequences of full loss-offset ad-valorem corporate taxation in a model of tax competition. A CAPM framework is considered, in which investors from n identical regions of a federation make optimal portfolio decisions. Each local government chooses a lump sum and a corporate income tax in order to maximize the utility of its representative household. Even in the presence of nondistortionary taxation, a positive corporate tax is levied in equilibrium, because of its risk sharing characteristic.

In contrast to previous studies on tax competition, we show that the sign of the capital mobility externality is indeterminate. The reason is that a higher tax rate reduces both expected return and risk of investment. The relative magnitude of each effect determines whether capital flows in or out of a region after a tax rate hike. Capital may move toward the jurisdiction which sets a higher tax rate if the economic environment is highly uncertain and investors are sufficiently risk averse. Moreover, since investors make an optimal portfolio choice, they invest part of their wealth in each region. This leads to exporting of taxation to foreigners. In the classical tax competition model, governments export part of the burden of taxes (see Huizinga and Nielsen, 1997; Lee, 1997). In addition to this negative externality, with full loss-offset provisions the risk borne by foreign investors is also reduced by home taxation. Thus, the sign of the tax exporting externality is ambiguous and it may turn out that it reduces equilibrium tax rates, while the capital mobility externality corrects them in upward direction. Altogether, it is unclear whether public goods are over- or underprovided in a tax competition game.

Uncertainty affects in different ways the two externalities which arise in the model. On one hand, when volatility is higher each government can set the corporate tax rate at a higher level, because the tax sensitivity of physical capital is reduced. On the other hand, some of the risk sharing is lost due to tax exporting. This effect reduces the optimal tax rate. It cannot be proved in general which of

☆ I am grateful for helpful comments by two anonymous referees. A previous version of the paper was presented at the conference of the Canadian Economics Association (Ottawa, 2011), the congress of the International Institute of Public Finance (Ann Arbor, 2011), the Doctoral Meeting of the Centre for Business Taxation (Oxford, 2011) and a public finance seminar at the University of Magdeburg. Comments by Marco Runkel are gratefully acknowledged. The usual disclaimer applies.

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[1] The modeling approach goes back to the seminal papers of Zodrow and Mieszkowski (1986) and Wilson (1986).

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http://dx.doi.org/10.1016/j.regsciurbeco.2013.03.002

the two effects dominates. Therefore, uncertainty may affect both positively and negatively equilibrium decentralized taxes.

As a result, this article is related to two strands of literature. The first deals with loss offset provisions and their impact on firms' investment decisions. The second focuses on tax competition under uncertainty and the efficiency of public good provision.

The role of the corporate tax rate as a risk sharing device in the presence of full loss-offset has long been understood. Early contributions to the literature include Domar and Musgrave (1944) and Mossin (1968) who show that a corporate income tax with full loss-offset provisions reduces the private risk borne by investors and increases their risk taking. On the other hand, Stiglitz (1969) and Mintz (1981) prove that private risk taking increases only if certain limitations on the utility function of investors are fulfilled. Moreover, Gordon (1985) shows that such a tax on corporate income may leave investment decisions unaffected, because it reduces both the expected return on investment and the uncertainty associated with it and these effects could be offsetting. More recently, Dreßler and Overesch (forthcoming) find empirical evidence that the tax rate sensitivity of investment is largely reduced for firms which have existing loss carryforwards.

Additionally, this article is related to the literature on tax competition under uncertainty. Chung and Wilson (1997) show that if a government is less risk-averse than private investors, it will levy a positive corporate tax and absorb some part of private risk. Their analysis focuses on finding a rationale for the use of source-based capital taxes in a tax competition setting. However, it neglects tax exporting and the implications of risk sharing for the sensitivity of investment to tax rate changes.

Wildasin and Wilson (1998) consider tax exporting in a framework with uncertain capital, labor and land income. Investors trade ownership shares and find it optimal to own only foreign land, because home land income is positively correlated with labor income. Thus, each government sets the tax on land income at 100% and expropriates foreign-owned land. Therefore, Wildasin and Wilson find that tax exporting is intensified in an uncertain environment, while the current article has an opposite result. The difference between this article and Wildasin and Wilson (1998) is later discussed in further detail.

Lee (2004) also investigates tax competition in a risky environment and shows that a corporate tax levied on the stock of capital can serve as insurance against uncertain wage income. An increase in the corporate tax rate drives capital out of a region, which reduces both the expected wage and uncertainty associated with wage income. There are two differences between the current article and Lee (2004). First, we consider how an ad valorem tax can be used to reduce the volatility of capital income. Second, this paper assumes that investors cannot fully diversify away capital income risk, which leads to implications of risk transfer for the signs of the externalities in the model.

Panteghini and Schjelderup (2006) and Panteghini (2009) analyze the relationship between corporate taxation and uncertainty in a tax competition setting. Panteghini and Schjelderup (2006) consider a model in which investors choose the optimal time of investment and find a negative relationship between volatility and the optimal tax rate. The intuition is that an increase in uncertainty reduces the overall level of FDI and by lowering the tax rate, the government can alleviate this effect. On the other hand, Panteghini (2009) finds a positive impact of volatility on corporate taxation, because it reduces the optimal level of profit shifting of multinationals though internal debt. This article contributes to the literature by analyzing further implications of uncertainty for decentralized tax rates.

The rest of the paper is organized as follows. Section 2 describes the model and determines the optimal household and firm behavior. Sections 3 and 4 solve for the optimal policies followed by a social planner and by decentralized governments, respectively. Section 5 concludes and provides policy implications and directions for future research.

2. The model

We consider a two period CAPM model under uncertainty similar to that of Gordon (1985), Gordon and Varian (1989) and Nielsen (1998) and employed in the tax competition literature by Chung and Wilson (1997) and Lee (2004). The economy consists of n symmetric jurisdictions with indices $i = 1,\ldots,n$. Each region is inhabited by a representative household and hosts a firm, which produces a homogeneous good.

In the beginning of period one the representative firm in country j decides on how much capital k_j to invest. Then, it "goes public" and sells shares to investors. The total value of firm j is given by V_j and depends on the amount of capital k_j it plans to acquire. In its investment decision, the firm maximizes the total value of equity accruing to its initial shareholders $V_j - k_j$.

In period two, the jth firm produces $y_j = \theta_j f(k_j)$ units of output. The production function $f(k_j)$ exhibits decreasing returns to scale with $f' > 0 > f''$. Furthermore, the multiplicative shocks to production θ_j are i.i.d. normal random variables with $E(\theta) = 1$ and $V(\theta) = \sigma^2$.[2] Moreover, it has to pay a proportional corporate income tax in the amount $t_j y_j$, where t_j denotes the statutory tax rate.[3] By using a linear tax schedule, we assume full-loss offset, since both profits and losses are taxed at the same rate.[4] Finally, the firm pays back the capital stock to its owners,[5] such that the overall return to investment in firm j is

$$r_j = \left(1-t_j\right)y_j + k_j. \tag{1}$$

2.1. Household behavior

The resident of country i is endowed with a capital stock $\bar{k}_i$ and initial ownership shares $\bar{s}_i^j$ of the j firms ($\sum_i \bar{s}_i^j = 1$). Thus, her total initial wealth is given by

$$w_i = \bar{k}_i + \sum_{j=1}^{n} \bar{s}_i^j \left(V_j - k_j\right). \tag{2}$$

The individual allocates w_i among investment alternatives in period one and consumes in the second period. Resident i can invest in s_i^j shares of the jth firm, when it goes public ($\sum_i s_i^j = 1$). Once the ownership structure is determined, each household contributes to investment according to its share s_i^j. It can also invest in riskless bonds paying a risk-free interest rate r_f. These bonds are in zero net world supply.[6] Lastly, the consumer pays a lump sum tax in the amount T_i. Therefore, she faces the following budget constraint

$$c_i = \sum_{j=1}^{n} s_i^j r_j + \left(1 + r_f\right)\left(w_i - \sum_{j=1}^{n} s_i^j V_j\right) - T_i, \tag{3}$$

[2] This means that we neglect economy wide shocks and consider only idiosyncratic volatility in each region. The reason is that introducing a common shock will not affect the core results of the model.

[3] With a linear tax the government has a share both in the expected return to investment and the risk associated with it. The problem of the paper would vanish if the stochastic portion of corporate income could be taxed separately from the deterministic part as in the seminal paper on risk sharing from Eaton (1981).

[4] Note that the tax base y_j is equal to output $\theta_j f(k_j)$ and cannot be negative in reality. Nevertheless, the extreme simplification of neglecting any tax deductions does not affect qualitatively the results.

[5] It is assumed that capital does not depreciate.

[6] As a result, bond holdings can be interpreted as borrowing from or lending to residents of other jurisdictions.

Please cite this article as: Kalamov, Z.Y., Risk sharing and the efficiency of public good provision under tax competition, Regional Science and Urban Economics (2013), http://dx.doi.org/10.1016/j.regsciurbeco.2013.03.002