Journal of Public Economics 95 (2011) 122–133

Contents lists available at ScienceDirect

Journal of Public Economics

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

Heterogeneous firms, 'profit shifting' FDI and international tax competition

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ARTICLE INFO

Article history:
Received 14 October 2009
Received in revised form 19 August 2010
Accepted 18 October 2010
Available online 27 October 2010

JEL classification:
F23
H25
H73

Keywords:
Heterogeneous firms
Tax competition
Profit shifting
Tax havens

ABSTRACT

Larger firms are more likely to use tax haven operations to exploit international tax differences. We study tax competition between a large country and a tax haven. In the large country, heterogeneous firms operate under monopolistic competition and can choose to shift profits abroad. We show that a higher degree of firm heterogeneity (a mean-preserving spread of the cost distribution) increases the degree of tax competition, i.e. it decreases the equilibrium tax rate of the large country, leads to higher outflows of its tax base and thus decreases its equilibrium tax revenues. Similar effects hold for a higher substitutability across varieties.

1. Introduction

With globalization tax havens have become more important. The increased opportunities for multinational firms to shift profits towards these low tax jurisdictions have changed the strategic tax game for international profits and pose new challenges to policy makers. Recent empirical evidence by Desai et al. (2006) shows that larger firms use tax haven operations more intensively. This suggests that firm heterogeneity is relevant for international tax competition.[1]

Theory, however, has mainly focused on models with homogeneous firms.[2]

We introduce a tractable model of tax competition with heterogeneous firms between a large country and a tax haven. Firm heterogeneity is introduced in the way that has been found to be relevant empirically: heterogeneity in productivity and size.

The analysis reveals that economies with a higher degree of firm heterogeneity and higher substitutability across goods face stronger international tax competition. It also sheds new light on the ongoing policy debate on the desirability of tax havens.[3] While Slemrod and Wilson (2009) argue that tax havens reduce welfare by leading to suboptimal levels of taxation and public good provision, Hong and Smart (2010) provide a model in which tax havens can have a positive effect on welfare. In our model, similar to Slemrod and Wilson (2009), tax competition creates a distortion towards too low tax rates and an underprovision of the public good. When firms are more heterogeneous, this adverse effect from competing with the tax haven is larger, implying a lower level of welfare. Therefore, our model suggests that the extent to which a tax haven is harmful to a country depends on its industry structure. This new dimension affecting the strength of tax competition should be taken into account when evaluating optimal tax policies.[4]

In the model, firms in a large country operate in a monopolistically competitive industry. They make positive profits which are taxed by the government.[5] Given the tax rate, firms can decide to avoid paying taxes at home by opening an affiliate in a tax haven and shifting profits abroad. The governments of the large country and the tax haven set their tax rates non-cooperatively. Our setup allows us to derive the pure strategy Nash equilibrium of the tax game between the large country and the tax haven.

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[1] Desai et al. (2006) analyze data on American multinational firms from the Bureau of Economic Analysis annual survey of U.S. Direct Investment Abroad for the years 1982 to 1999. Grouping countries with US affiliates into tax havens and non-havens allows them to find correlations between tax haven activities and firm level characteristics. In line with these findings Graham and Tucker (2006) show that larger firms are more likely to avoid taxes through corporate tax shelters.

[2] Some notable exceptions will be discussed below.

[3] This has been raised among others in OECD (1998) in the context of its attempts to limit 'harmful' tax practices.

[4] Note that if taxes themselves were distortionary or if there was a Leviathan type government, welfare effects could be different.

[5] While, in practice, pure profits of firms are hard to determine, in the model we assume that firm profits are observable.

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doi:10.1016/j.jpubeco.2010.10.008

In equilibrium the tax haven undercuts the large country which gives firms an incentive to do 'profit shifting' FDI. While the fixed cost of opening an affiliate in the tax haven is the same for all firms, the gains from profit shifting depend on the level of profits a firm is making. In line with the findings of Desai et al. (2006), in equilibrium the most productive (and thus largest and most profitable) firms shift profits while less productive firms continue to pay taxes at home.

Tax competition is strongest when the distribution of profits across firms is such that the most productive firms account for a large share of aggregate profits. This is the case when firms are very heterogeneous and when monopolistic market power is low. In this case, the large country suffers a substantial outflow of its tax base. The tax haven gains as it can set a relatively high tax rate and still attracts a considerable fraction of the tax base.

When instead there is low firm heterogeneity and high monopolistic market power, the tax base does not react strongly to tax differences and the large country is 'protected' from international tax competition. It can set a relatively high tax rate without losing much of its tax base. The tax haven is forced to strongly undercut the large country in order to attract some of the tax base.[6]

The effect of an increase in the tax rate on tax revenues of a government is given by the own-tax elasticity of tax revenues. We show that this elasticity can be decomposed into two opposing effects, the *direct effect* and the *tax base effect*. On the one hand, holding the tax base constant, a higher tax rate directly implies an increase in tax revenues. On the other hand a higher tax rate makes it profitable for some firms to start profit shifting. This reduces the tax base and thereby tax revenues.[7]

To complement our findings, we also analyze the role of the fixed costs of profit shifting. When these fixed costs are high it is more costly for firms to shift profits. This allows the large country to set a higher tax rate, which in turn makes it more profitable for firms to shift profits. In equilibrium these two effects exactly offset each other and the fraction of firms shifting profits and the fraction of profits shifted abroad remains constant. With a higher tax rate and a constant tax base, the equilibrium tax revenues in the large country increase.

We also compare our model to a model with homogeneous firms. We confirm that the model with homogeneous firms is the limit case of our model with heterogeneous firms and find that tax competition is lowest when firms are perfectly homogeneous. Firm heterogeneity increases the degree of tax competition by increasing the mobility of the tax base.[8]

Starting with Zodrow and Mieszkowski (1986) and Wilson (1986) a large and growing theoretical literature has analyzed the increasing competitive pressures on governments to reduce corporate tax rates.[9] While this literature tends to focus on outflows of capital, several theoretical contributions have considered the possibility of multinational firms to shift profits to jurisdictions with lower tax rates.[10] Recent empirical studies have shown that the mobility of profits has a considerable impact on the ability of governments to increase tax income by increasing tax rates.[11] The quantitative importance of tax havens in this context has been documented by Hines and Rice (1994), Hines (2004) and Desai et al. (2006).

Several recent contributions have addressed firm heterogeneity in international tax competition.

Burbidge et al. (2006) introduce a particular type of firm heterogeneity into a model with perfect competition, immobile labor and mobile capital. They model firm heterogeneity as an idiosyncratic, exogenous comparative advantage in one of the locations.

A different strand of the literature introduces firm heterogeneity into models of tax competition in a 'New Economic Geography' (NEG) context.[12] Baldwin and Okubo (2009) outline an NEG model with tax competition and firm heterogeneity in productivity. They do not derive the equilibrium of the tax game. Instead they assume an exogenous tax difference and focus their analysis on the trade-off between base-widening and rate-lowering tax reforms.

Davies and Eckel (2010) also propose an NEG-type model of tax competition with heterogeneous firms and endogenous location choice. They show that in the case of symmetric countries no equilibrium in pure strategies exists. Due to the complexity of their model an equilibrium does only exist under very particular conditions.

In recent work, Haufler and Stähler (2009) build on this and provide a model of tax competition with heterogeneous firms and endogenous firm location that is sufficiently simple to prove the existence of an equilibrium if countries are sufficiently asymmetric. They show that an increase in demand increases tax competition. Since they keep the endogenous location choice, their model remains too complex to derive equilibrium tax rates and revenues in closed form.

The remainder of the paper is structured as follows. Section 2 presents the case of a large country in financial autarky. Section 3 introduces profit shifting. The equilibrium is derived in Section 4. Section 5 discusses the main results. Section 6 concludes.

2. Financial autarky

We first outline the structure of the large country in financial autarky. Labor is the only input in production. There is a unit mass of workers each of which inelastically supplies one unit of labor. There are two sectors, one producing varieties of a differentiated good and one producing a homogeneous good. One unit of the homogeneous good is produced using one unit of labor. It is used as the numeraire. We only consider equilibria in which the homogeneous good is produced. This implies that wages are unity. There is a fixed and exogenous measure of firms that are owned by consumers in the large country.

2.1. Preferences

The workers are all identical and share the same quasi-linear preferences over consumption of the two goods and a good provided by the government:

$$U = \alpha ln\mathbf{Q} + \beta \mathbf{G} + \mathbf{q}_0 \quad \text{with} \quad \mathbf{Q} = \left(\int_{\Omega} q(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right)^{\frac{\sigma}{\sigma-1}}, \tag{1}$$

[6] For analytical tractability we focus the analysis on a proportional profit tax. If the government in the large country could additionally set a deductible, this instrument could be used to reduce pressures from tax competition by putting relatively more tax burden on less mobile firms. As long as the government is unable to perfectly discriminate between firms with different profits, tax haven operations are more profitable for larger firms.

[7] It is possible to further decompose the tax base effect into an *intensive* and an *extensive* margin. In our baseline model only the latter is active. In Section 5.5 we analyze an extension allowing for adjustments both on the intensive and the extensive margin.

[8] Heterogeneity affects tax competition through the distribution of the tax base (profits) across firms. Thus any policies or other factors that increase the heterogeneity of firm profits increase tax competition in a similar way. For example the presence of multi-product firms as in Bernard et al. (2010), Mayer et al. (2009) and Eckel and Peter Neary (2010) would imply larger variance of the profit distribution for a given productivity distribution and thus increase tax competition.

[9] See Wilson (1999), Wilson and Wildasin (2004) or Fuest et al. (2005) for surveys.

[10] See e.g. Elitzur and Mintz (1996), Haufler and Schjelderup (2000), Janeba (2000), Mintz and Smart (2004), Peralta et al. (2006) and Bucovetsky and Haufler (2008).

[11] See Bartelsman and Beetsma (2003), Clausing (2003), Mintz and Smart (2004), Huizinga and Laeven (2008), Grubert and Mutti (1991), Hines and Rice (1994), Hines (1999) and Egger et al. (2010).

[12] NEG models of tax competition with homogeneous firms typically consider the location decision of firms between two asymmetric countries (e.g. Kind et al. (2000), Ludema and Wooton (2000), Baldwin and Krugman (2004), Borck and Pflueger (2006) and Ottaviano and van Ypersele (2005)).