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ABSTRACT: We examine the tax assignment problem in a federation with two layers of government sharing an elastic tax base, in which Leviathan policy makers levy an excise tax in an imperfectly competitive market and producers lobby for tax rate cuts. If the lobby of producers is very influential on policy makers, we find that taxation by both layers of government might be optimal, provided that the market of the taxed good is highly concentrated; otherwise, it is optimal to assign the power to tax only to one level of government. Taxation by both layers of government is not optimal either when the influence of the lobby is weak, whatever the degree of market power. We also examine a richer set of tax setting outcomes, by considering the possibility that state policy makers have heterogeneous tax policy objectives.

JEL Codes: H71, H77, D70

Keywords: vertical tax externalities, tax assignment, lobbying, specific taxation.

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1 Introduction

According to the traditional fiscal federalism literature (Musgrave, 1959; Oates, 1972), decentralizing taxing powers is much more problematic than decentralizing expenditure functions, because of the tax-base mobility threat and also because of the likely violations of the principle of horizontal equity among identical individuals living in different jurisdictions of the federation. Despite these normative prescriptions, in the real world we observe important federal countries, like Canada and the United States, in which some of the main tax bases (e.g. corporate income, personal income, retail sales or excise taxes) are shared between the upper and the lower levels of government. Hence in these countries there is not a rigorous distinction between local and federal tax bases, as the traditional fiscal federalism theory prescribes. However, whenever this distinction does not occur, the tax bases of different layers of government overlap, giving rise to a common pool problem —the so-called vertical tax externality— with the tax decision of each level of government affecting the shared tax base, a fact generally leading to excessive taxation (Keen, 1995).

The literature analysing this issue (e.g. Boadway *et al.*, 1998; Keen and Kotsogiannis, 2002; Dahlby and Wilson, 2003) assumes welfare maximizing governments and therefore it takes a normative approach to the tax assignment problem. However, it is widely recognized that also political institutions play a crucial role in shaping fiscal policies, in addition to normative criteria. Indeed, the introduction of political factors into the traditional fiscal federalism models is the distinctive feature of the so-called 'second generation' theory of fiscal federalism (Oates, 2005). In this paper, our goal is to add a contribution to this field, by analyzing how the tax assignment problem in a federation is affected by the activity of a special interest group that lobbies the policy makers for moderate taxation when tax bases overlap.

In particular, we consider a federation composed of an upper level (federal) and a lower level (state) of government. Policy makers are assumed to be revenue maximizers and can levy an excise tax on a consumers' good that is produced in an imperfectly competitive market. There are no direct interactions between the state policy makers, since consumers are assumed to be immobile. If only one layer of government is allowed to tax, total taxation falls short of the social optimum, provided that firms succesfully lobby for tax rates reductions. When both layers of government are entitled to tax, total taxation may be either higher or lower than the social optimum, since the distortion due to the vertical tax externality and the distortion due to lobbying work in opposite directions.

Our main finding concerns the link between market structure, influence of the lobby, and the optimal tax assignment. If the market is highly concentrated, and if lobbying is highly effective, then aggregate tax revenue is maximized by entitling both layers of government with the power to tax. A highly effective lobbying can therefore justify tax base sharing among government layers of a federal nation. In this case, lobbying by firms works as a 'private' solution to the vertical tax externality problem, that could make redundant the adoption of a 'public' solution in the form of a compensation transfer mechanism (Boadway and Keen, 1996; Kotsogiannis, *forthcoming*). On the other hand, if lobbying is not very effective in influencing policy makers, whatever the degree of market power, or if lobbying is highly effective but firms have low market power, it is then optimal to assign taxation only to one layer of government.

We also consider a special case in which the policy maker of the state in which production is located refrains from full tax revenue maximization, due to her concern about occupational levels in the taxed industry. The introduction of this kind of preference heterogeneity allows us to derive some interesting asymmetric equilibria that closely match observed tax policy in the real world.

Lobbying by special interest groups has been recently introduced in the fiscal federalism literature by Bordignon *et al.* (2008). They focus on the role of lobbying on the choice between centralization and decentralization of public policies, finding that centralization is better for social welfare when the lobbying groups have conflicting interests, whereas decentralization might be better when the lobbies interests are aligned. This paper introduces lobbying in a more specific context than the one examined by Bordignon *et al.* (2008). Moreover, while they appeal, to model lobbying behavior, to the many-principals, one-agent (Dixit *et al.*, 1997) and to the many-principals, many-agents (Prat and Rustichini, 2003) literature, we appeal in this paper to the one-principal, many-agents literature (Segal, 1999).

The rest of the paper is organized as follows. Section 2 sets up the basic model and characterizes the equilibrium in the oligopoly markets, for given tax rates. It also derives the social optimum, that is the tax rates that maximize the policy makers' objective functions in the benchmark case of no vertical tax externalities and no lobbying. Section 3 considers tax setting in the federation in the presence of vertical tax externalities between higher and lower levels of government. Section 4 introduces lobbying by producers and examines its impact on tax policy. Section 5 addresses the tax assignment problem, i.e. whether it is better to give the power to tax only to one level of government or to both levels. Section 6 provides conclusions and lines for future research.

2 The framework

Consider a federation composed of the central (or federal) government and two regional (or state) governments. Both layers of government might be entitled to levy an excise tax on a commodity that is consumed in both regions but that is produced only in one region.[1] We rule out the possibility of cross border shopping by assuming that consumers make purchases of the good only in their own region of residence. The number of producers is given and we assume that they compete *à la Cournot* in each regional market.[2] Policy makers at all levels are assumed to care for tax revenue collected. However, tax policy may not be exclusively determined by Leviathan behavior. Policy makers may also be interested in cashing campaign contributions offered by firms in exchange for tax rates cuts. Moreover, we consider the possibility that the policy maker in charge in the jurisdiction in which production takes place may refrain from setting a high tax burden, in order to limit the negative impact on production, and thus on occupational levels, in the taxed industry. Consumers' surplus, instead, is assumed to bear no weight whatsoever in tax policy setting.[3]

Tax setting is modelled as a two-stage process. In the first stage, the producers' association lobbies the policy makers in order to win tax rates cuts that increase firms' profits. In the second stage, the central and the local policy makers simultaneously and

[1] This is just a stylized way for capturing the fact that production of some commodities is usually concentrated in some regions, whereas its consumption is uniformly distributed across regions.

[2] We consider consumption-based commodity-taxation only in a *specific* (or *excise*) form, although it is well known that specific and *ad valorem* taxes are not equivalent in terms of tax incidence if the taxed goods are exchanged in non-competitive markets (see, e.g. Myles, 1995, chapter 11, for a throughout survey). One reason for this choice is that we have in mind goods like cigarettes, gasoline or alcoholic drinks, that are generally taxed in a specific form, although in some countries a mix of both types of tax instruments is applied (Cnossen, 2009). Another reason is that our analysis focuses on the interplay between vertical tax externalities and lobbying and not, like most of the literature dealing with the comparison of the two types of tax instruments, on efficient tax structures.

[3] This is an extreme but simple way for capturing the idea that it is desirable to limit the consumption of the taxed good, either for paternalistic reasons (like in the case of unhealthy cigarettes smoking) or for correcting market failures (like in the case of pollution generating gasoline consumption).

independently set their own tax rate.[4] There is then a third and final stage in which local markets equilibrium is determined, given the tax rates set at the previous stages. The model is solved backward. We thus start from the final stage and solve for the equilibrium in the regional markets.

2.1 Regional oligopoly markets

We model an oligopoly market in each region i, $i = 1, 2$, in a partial equilibrium framework. All firms are located in region 2 and their number, $m \geq 1$, is fixed (the model encompasses a monopoly market as a limit case for $m = 1$). We also assume that all firms are identical, selling an homogenous good in both regions and producing at constant marginal (and average) costs $c > 0$ (there are no fixed costs).

Consumers are immobile and purchase the consumption good at the prevailing market price only in their own region of residence. They are also assumed to be identical both within and across regions, with an individual demand function that takes a linear form:

$$q = b(a - p), \tag{1}$$

where p is the consumer's price, q is quantity consumed, $a > 0$ and $b > 0$ are the demand parameters. Let Q_i be aggregate consumption and let $n_i > 0$, $i = 1, 2$, be the mass of consumers that are resident in region i; we also normalize the mass of consumers resident in the federation to unity, i.e. $n_1 + n_2 = 1$. By aggregating the individual demand (1) we then get the inverse market demand in region i as:

$$p_i = a - \frac{Q_i}{bn_i}, \quad i = 1, 2. \tag{2}$$

Let T and t_i be the specific tax rates levied, on a destination basis, respectively by the federal and the state i governments, on firms' sales.[5] Let q_{ji} be the quantity sold

[4] An alternative modelling strategy would be to consider a Stackelberg game and therefore to split the second stage into two sub-stages, with the federal policy maker choosing first and the regional policy makers choosing second.

[5] We are assuming that producers make direct sales to consumers. Introducing a retail sector would not affect the analysis, provided that retailers operate at constant marginal costs, equal to average costs, in perfectly competitive markets. Under these hypotheses, it is equivalent to levy the tax on producers or to retailers. Moreover, only producers make positive profits and have an incentive to lobby for tax rates reductions.

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