



# Optimal income taxation and decentralized fiscal federalism<sup>☆</sup>

Thomas Aronsson

Department of Economics, Umeå University, SE – 901 87 Umeå, Sweden

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## ABSTRACT

This paper concerns redistribution and public good provision under asymmetric information, which are here ingredients of a policy-problem facing each member state (nation) of an economic federation with decentralized leadership. Each member state is assumed to have its own redistributive policy and pattern of public consumption, whereas the federal level redistributes (ex-post) between the member states. The results show how and why federal ex-post redistribution may modify the use of income taxation and public good provision at the national level, relative to the policy outcome in the absence of a federal government, as well as how the national policy incentives depend on whether or not the federal government uses distortionary taxes.

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## 1. Introduction

There is a growing literature dealing with optimal nonlinear taxation and public good provision under asymmetric information.<sup>1</sup> Earlier studies in this area are typically based on models of a single jurisdiction with one single government. Real world economies, on the other hand, are often characterized by several levels of government, where each such level has responsibility for its own activities and funds. Therefore, although earlier research gives valuable insight into the incentives underlying tax and expenditure policies, it tends to abstract from the institutional structure within which the public policies are decided upon. In a European context, this fiscal federalism argument is probably even stronger than before, as part of the redistributive policy is now formally decided upon at the European Union (EU) level. An important question, therefore, is how the redistribution policy carried out by a supranational authority affects the use of income taxation and

expenditure policies at the national level. This is also the basic question to be addressed by the present paper.

To be more specific, this study deals with optimal redistributive income taxation and public good provision as a policy-problem facing each member state of an economic federation, which is characterized by decentralized leadership. The concept of decentralized leadership is meant to imply that the lower (e.g. national) level of government acts as first mover (and has commitment power) vis-à-vis the federal level. The idea behind this extension of the optimal income tax model is to combine a framework for domestic redistribution and public consumption with a decision-structure of particular relevance for Europe. It has been argued in earlier research (which is further discussed below) that the EU exemplifies an economic federation with decentralized leadership. This is so for at least two reasons. First, the EU is still in the process of being developed, and the national (member state) governments may already have precommitted to policies based on their own objectives. Second, the member states have a significant influence over union policy via the Council of Ministers, which is comprised of ministers from the member state governments.

The division of responsibilities that this paper attempts to capture is that, while each member state has its own revenue collection, redistributive policy and pattern of public consumption, there is also redistribution between the member states that is decided upon by the federal level. Again, the EU serves as a raw model in the sense that the structural funds offer a broad spectrum of means for redistribution between countries. I will take the idea of decentralized leadership to its extreme point by analyzing how “ex-post” redistribution carried out by

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E-mail address: [thomas.aronsson@econ.umu.se](mailto:thomas.aronsson@econ.umu.se).

<sup>1</sup> Seminal contributions to the theory of optimal nonlinear income taxation and/or mixed taxation are, e.g., Mirrlees (1971), Phelps (1973), Atkinson and Stiglitz (1976), Mirrlees (1976), Sadka (1976), Atkinson (1977), Stern (1982), Stiglitz (1982) and Edwards et al. (1994). See also the related literature dealing with public good provision under nonlinear taxation; e.g., Christiansen (1981) and Boadway and Keen (1993).

a federal government affects the incentives governing redistributive tax policy and public good provision at the national level. The decision-problem facing each national government is based on the two-type optimal income tax model developed by Stern (1982) and Stiglitz (1982), which is here extended in such a way that the national government recognizes (and incorporates into its decision-problem) how its contributions to, and benefits from, federal redistribution are affected by its own policies.<sup>2</sup>

The study of optimal taxation and public expenditure in the context of economic federations has so far mainly focused on centralized leadership, where the federal government is able to commit to its policies, whereas the lower-level governments are not.<sup>3</sup> Only a few earlier studies have examined the incentive structure underlying public policy in economic federations with decentralized leadership. An important question that this literature addresses is how federal ex-post redistribution affects the incentives for public good provision at the lower level of government. Caplan et al. (2000) consider an economy with federal lump-sum redistribution between the local jurisdictions and spillover effects of local public goods. In their study, the redistribution carried out by the federal government is directed towards the private sector (i.e. private consumption), and they find that decentralized leadership gives rise to an efficient outcome. On the other hand, as shown by Köthenbürger (2007), if the federal (lump-sum) redistribution is, instead, directed towards the public funds at the lower level of government and the public good is impure, then this result no longer applies, meaning that decentralized leadership might lead to inefficient provision of public goods.<sup>4</sup> Other issues dealt with in earlier literature on decentralized leadership are, e.g., tax competition<sup>5</sup> and environmental policy.<sup>6</sup>

There are (to my knowledge) no earlier studies dealing with redistributive nonlinear taxation in an economic federation with decentralized leadership, where each lower-level government redistributes income among its own residents as well as rationally anticipates how its own policy-choices affect the transfer payment it receives from (or the contribution it gives to) the federal level. To be able to focus on how the combination of federal redistribution and decentralized leadership affects the policies decided upon at the national level, I disregard any direct horizontal interaction between lower-level jurisdictions such as policy induced factor mobility or spillover effects of national public goods. Instead, all horizontal interaction discussed here is due to the system for federal redistribution. This does not reflect a belief that direct horizontal interaction is unimportant; only that it is well understood from earlier literature, whereas the aspects of public policy addressed here are not. The major questions to be examined are; (i) how does federal redistribution in terms of public funds affect the incentives underlying redistributive income tax policy and public good provision at the national level, when the national governments are first movers vis-à-vis the federal government, and (ii) how does it matter for the national public policy whether the federal government redistributes lump-sum or uses distortionary finance?

I will consider two versions of the model; Case I means that the federal government redistributes lump-sum (from an ex-post per-

<sup>2</sup> Although from a different perspective, the inability of commitment at the federal level, and the consequences of this inability for incentives at the lower level of government, are also addressed in the literature on soft budget constraints and bailouts (e.g., Goodspeed, 2002; Wildasin, 2004; Besfamille and Lockwood, 2008). See also the overview article on soft budget constraints by Kornai et al. (2003). A major issue in that literature is that the central government tends to “bail out” local governments with financial problems which, if expected, will soften the budget constraint and distort the incentives for fiscal restraint at the local level. Fink and Stratmann (2009) show that soft budget constraints lead to increased public deficit and debt at the state level in the German federation.

<sup>3</sup> See, e.g., Boadway and Keen (1996), Dahlby (1996), Boadway et al. (1998), Sato (2000), Aronsson and Wikström (2001), Dahlby and Wilson (2003) and Aronsson and Blomquist (2008).

<sup>4</sup> See also Boadway et al. (2003).

<sup>5</sup> See Köthenbürger (2004).

<sup>6</sup> See Silva and Caplan (1997), Caplan and Silva (1999) and Aronsson et al. (2006).

spective) between the national governments, whereas Case II implies that the federal government raises revenue for redistributive purposes by imposing a tax (or fee) on each country, which is proportional to labor income. This distinction is reasonable in the sense that, while the assumption of lump-sum redistribution at the federal level provides a simpler model and seems to be in accordance with most earlier comparable studies, distortionary finance is a more realistic description of the options for funding available at the supranational level.<sup>7</sup> In each case, the order of decision-making is as follows. First, each national government implements an income tax policy and decides upon the provision of a public good, where it treats the other national governments as Nash competitors while anticipating how the federal government and the domestic private sector respond to its policy-choices. Second, the federal government decides upon redistribution between the countries taking the national tax policy as exogenous, while anticipating the behavioral response (if any) by the private sector in each country. Finally, the private sector makes its labor supply, consumption and production decisions treating the public policy decided upon by both levels of government as exogenous.

The outline is as follows. Section 2 presents the model and the outcome of private optimization. The optimal tax and expenditure policies are analyzed in Section 3. Section 4 summarizes and concludes the paper. Proofs along with some other derivations are presented in Appendix A.

## 2. The model

Consider an economic federation comprising a given number of lower-level jurisdictions, whose governments behave as Nash competitors to one another. As the number of lower-level jurisdictions is, by itself, of no concern, it will be normalized to two. Each lower-level jurisdiction will be referred to as a “country” in what follows and consists of two types of immobile residents; a low-ability type (denoted by superindex 1) and a high-ability type (denoted by superindex 2). The distinction between ability-types refers to productivity, which is interpreted to mean that the high-ability type faces a higher gross wage rate than the low-ability type. As the number of individuals of each ability-type in each country is not important for the qualitative results derived below, it will be normalized to one.

The utility function facing ability-type  $i$  in country  $j$  is written

$$u_j^i = u(c_j^i, z_j^i, g_j) = \bar{u}(c_j^i, z_j^i) + v(g_j) \quad (1)$$

where  $c$  is the consumption of a private good,  $z$  leisure and  $g$  the consumption of a (national) public good. Leisure is, in turn, defined as a time endowment,  $H$ , less the time spent in market work,  $l$ . The function  $u(\cdot)$  is increasing in each argument and strictly concave. I also assume that the consumer treats  $g$  as exogenous. The expression after the second equality means that the public good is additively separable from the other goods in the utility function; this assumption simplifies the analysis and is fairly common in earlier literature on optimal taxation and public good provision in economic federations referred to in the Introduction.

The budget constraint facing the consumer is given by

$$w_j^i l_j^i - T_j(w_j^i l_j^i) - c_j^i = 0 \quad (2)$$

where  $w$  is the gross wage rate; as indicated above,  $w_j^2 > w_j^1$ . The function  $T_j(\cdot)$  is the income tax decided upon by the national government in country  $j$ . The price of the private consumption good has been normalized to one.

<sup>7</sup> Note that, although the EU is not formally equipped with the power of taxing its residents, the fees paid by the member states are, to a large extent, either proportional to the national income or to the tax base for the value added tax.

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