Optimal Taxation in a Federal System of Governments

Russell S. Sobel*

This paper demonstrates that the optimal structure of taxation in a federal system of governments is one in which only lower level governments are allowed to tax, and the higher level of government receives its revenues as contributions from the lower level governments. The central inefficiency created when multiple levels are allowed to tax is a revenue externality between governments that is analogous to a common pool problem. A federal system with multiple levels of taxing authority results in combined tax rates higher than would be optimal, a higher excess burden of taxation, and an inefficiency bias in government spending.

1. Introduction

Within a federal system of governments there are several ways to allocate the power of taxation to provide revenues for all levels of government. The current structure in the United States (U.S.) gives federal, state, and local governments the power to tax individual citizens. Commonly there are more than three levels of taxing authority if special districts are included. The current literature on optimal taxation contains little consideration of how the power of taxation should be allocated in a federal system, and instead concentrates on the best way for a single government to raise revenue across its tax instruments. This issue is also directly relevant to whether international organizations, such as the United Nations (U.N.) or European Union should have the power of taxation.

This paper demonstrates that allowing multiple levels of government the power of taxation creates a common pool problem, with the result being that the combined tax rates of all governments are higher than would be optimal. The central idea is that a change in the tax rate of one level of government affects the revenues of other levels of government, resulting in an intergovernmental revenue externality. The adverse effects of allowing multiple levels of government the power of taxation are an increase in the deadweight loss of taxation, an inefficiency bias in government spending, and possibly lower total tax revenue.

After showing these results, I discuss alternative taxing institutions to internalize the externality. In this paper I argue that the system where only states have the power of taxation, and the federal government is financed through a system of contributions from the state governments, is the strictly preferred system of taxation in a federal system of governments. The feasibility of this solution is discussed within the context of the fiscal system that was present

---

* Department of Economics, P.O. Box 6025, West Virginia University, Morgantown, WV 26506, USA; E-mail rsobe2@wvu.edu.

I would like to thank Dwight Lee, Larry Kenny, Mike Stroup, Dan Sutter, Kwabena Gyimah-Brempong, Bill Trumbull, Tom Garrett, Subhayu Bandyopadhyay, and an anonymous referee of this journal for helpful comments and suggestions. Earlier versions of this paper were presented at the 1995 Southern Economic Association Meetings and the 1996 Public Choice Society Meetings.

Received January 1997; accepted June 1997.
under the first constitution of the United States, the U.S. Articles of Confederation (1777–1789), and the current financing method of the United Nations Organization. An alternative taxing institution that also overcomes the problems inherent in a federal system was present in the Confederate States of America during the American Civil War (1861–1865). In this alternative structure, states are allowed to submit revenues to the federal government (raised in any way the state wants) to offset federally imposed taxes on the state’s citizens.

2. The Problem with Multiple Taxation in a Federal System

Revenue externality between governments is the main problem that characterizes a system where multiple governments have the power of taxation. This externality can be demonstrated in a simple graphical model. Assume that some original government, government 1, is currently levying a unit tax of the amount $T_1$ on a good produced at constant marginal cost. A diagram of the impact of this unit tax is given in Figure 1a.

Now, suppose a second government, government 2, is allowed to tax this good as well and levies a unit tax of the amount $T_2$. The impact of this is shown in Figure 1b. The combined tax is now $T_1 + T_2$. The areas in Figure 1b are divided into sections identified by letters. When only government 1 was taxing the good, its tax revenue was the area corresponding to the combined area of $B + D$, and the excess burden of the tax was the area $E$. After the addition of the second government’s tax, the combined revenues of both governments are the area $A + B$. Area $B$ is the first government’s new level of tax revenue, and area $A$ is the second government’s tax revenue. The addition of the second government’s tax lowers the revenues of the first government by area $D$ because of the additional shrinkage in the tax base. Throughout the remainder of this paper, the negative impact of one government’s tax on the revenues of another government will be referred to as the intergovernmental revenue externality.

The combined revenues of both governments (area $A + B$) could either be smaller, larger, or the same as the revenues raised by the first government (area $D + B$) when it was the only government taxing the good. Whether total tax revenue will rise, fall, or stay the same depends on whether area $A$ (the revenue of the second government) is larger, smaller, or the same as area $D$ (the lost revenue of the first government). Which direction total revenue changes depends primarily on the tax rate elasticity of the tax base.

Turning to the excess burden of taxation, with both governments levying taxes, the com-
bined excess burden is the area $C + D + E$, which is strictly larger than the original excess burden of area $E$. A very important point in this analysis is that the portion of the new excess burden given by area $D$ is the lost revenue of the first government. Thus, the addition of the second government's tax not only lowers the revenue of the first government, but it converts that lost revenue into excess burden.

The situation depicted in the above model is descriptive of several real world taxes. For example, both the federal and state governments levy taxes on tobacco, gasoline, individual income, and corporate income. Other examples include federal import tariffs and state excise or sales taxes both applying to the same goods. When either one of these governments changes its tax rate, it will affect the revenues of the other government in a negative fashion. The presence of these intergovernmental revenue externalities is a very important, but usually neglected, issue within public finance. The most extensive work done in this area concerned the impact of the federal Tax Reform Act of 1986 on the revenues of state governments, which was generally positive.\(^1\) Although this change concerned more than just the tax rate, it is an example showing the importance of this phenomenon.

The reason this issue is so important is because governments tend to systematically ignore the impact they have on each other's revenues.\(^2\) Take, for example, the recent proposals for a federally imposed national sales tax. If imposed, this would result in a reduction in the size of the retail sales tax base as the rate of sales taxation increased. The 45 states that already have a retail sales tax would see a reduction in revenue at the current tax rate because of the shrinkage in the retail sales tax base. This impact of a federal national sales tax has been completely absent from the debate about the costs and benefits of this reform at the federal level.

One might think that a reform forcing governments to consider the impact of their tax policy on other governments in a cost–benefit analysis would solve this problem. Unfortunately, estimating the external revenue impacts on other governments would often be impossible. For example, suppose that the tax of the first government in Figure 1b was not a tax on the final product, but an increased final product price due to taxes on inputs in the production process (perhaps payroll or other taxes born by the firm and reflected in the cost of production). Without knowledge of what the price of the product would be in the absence of the preexisting taxes, it would be impossible to estimate both the external revenue impacts and the actual deadweight loss of taxation. In addition, this example shows that the taxes need not be on the exact same tax base for the externality to exist. Taxes on final products also affect taxes on factors of production, and interrelated markets and income effects also produce these affects, a phenomenon that will be discussed later.

When governments ignore the impact of tax policy on other governments, it will result in a systematic underestimation of the cost of taxation. This has serious implications for the efficiency of the government sector. In fact, there is strong reason to believe that these revenue

---

1 See Courant and Rubinfeld (1987) and Ladd (1993) for discussions of this issue.
2 For example, assume that the first government is the federal government and the second government is the state government. The addition of the state tax generates revenues for the state of area $A$ and lowers federal tax revenues by area $D$. Area $C$ represents the additional welfare loss to consumers in the state. Area $D$ is also part of the new excess burden; however, it does not directly change consumer welfare, because it was previously taken from consumers by the original federal tax. It does, however, represent some indirect loss in welfare through reductions in the output of the federal government or higher federal taxes in other areas. Because federal revenue and expenditures are split across all 50 states, this state's voters would have an incentive to consider only a very small fraction of area $D$. A similar argument can be made for why federal voters would not consider the full value of the impact of federal taxes on state revenues.
externalities will result in the funding of more inefficient projects when multiple levels of government are allowed to tax. For example, suppose the federal government is considering a project that creates a benefit of $100 million. Further suppose that the federal government could finance the project at a cost of $95 million (inclusive of relevant deadweight loss) through an increase in the federal income tax. This appears to be an efficient project. However, the $95 million cost underestimates the total cost of the tax revenue because it ignores the negative impact that the increase in the federal income tax rate has on state government revenues. Because the increase in the federal tax rate lowers the incentive to work, the income tax base will fall, meaning that states will now collect less revenue at existing state income tax rates (and sales tax revenues if consumption falls). Suppose that total state tax revenues fall by $6 million. Without an increase in the state income tax rates to offset this revenue reduction, state expenditures must fall by $6 million. This sacrifice of $6 million in state government spending programs (or the $6 million in additional taxes the state must now raise) should be included as costs in the federal decision-making process. Including this cost, the total cost becomes $101 million—greater than the $100 million benefit. Because these costs are not considered, however, a program in which total economic cost exceeds the benefits may easily pass, even through a political process that is apparently efficient. Thus, revenue externalities cause an inefficiency bias in government spending because they lead to an underestimation of the true cost of federal (and state) taxation.

An interesting extension of the above model is to continue with the optimal reactions of the first government when the second government introduces its tax. Returning to the example of a national sales tax, recall that state government sales tax revenues will fall with the addition of the federal sales tax. State governments must now decide how to cope with this loss of revenues. One reaction might be for states to raise state sales tax rates even further. This increase in state sales tax rates will, in turn, lower federal revenues from the national sales tax. The federal government may then attempt to maintain revenues by raising its national sales tax rate, which further reduces state tax collections.

A paper whose results can be easily interpreted within this framework is Flowers (1988). Under the assumption that the governments’ objectives are leviathan revenue maximization, she demonstrates that when two governments are allowed to tax the same good, the combined tax rate will lie on the backward-bending portion of the Laffer curve. To understand the logic behind her result, consider Figure 2a and b.

If only one government taxes a particular tax base, it could maximize tax revenue by setting a tax rate corresponding to the point at the peak of the Laffer curve. This is shown in Figure 2a. At point A, the government has maximized its tax revenue at a level of $T_1$ with a tax rate of $R_1$. Now suppose that a second government is given the option of also taxing this tax base. It must be true that the second government could generate positive revenue through a tax on this tax base compared with not taxing it. Thus, there is a revenue incentive for the second government to levy a positive tax rate. Figure 2b shows the impact of this double taxation. The governments are now operating at point B on the Laffer curve, with a combined tax rate of $T_1 + T_2$ and combined tax revenues of both governments of $R_1 + R_2$. To identify the revenues received by each government requires a straight line drawn from the origin to point B on the Laffer curve. Point C shows the revenue of the first government ($R_1$) where the

---

3 See footnote 2 for an explanation of why the politically relevant deadweight loss will not include the full value of the loss in the other government's revenue.
Figure 2a. Tax Revenue: One Taxing Government
Figure 2b. Tax Revenue: Two Taxing Governments

revenue line intersects the tax rate. The difference between the combined revenue of both governments \( (R_1 + R_2) \) and the revenues of the first government \( (R_1) \) shows the revenues raised by the second government \( (R_2) \). The point of this model is to show that the second government, acting in its own interest, may undertake a policy that is beneficial to it (in generating more revenue), but that results in an outcome on the backward-bending portion of the Laffer curve. Of course, the first government may now alter its tax rate in response to the second government imposing the tax. The Nash equilibrium result for this problem, as derived by Flowers, remains on the backward-bending portion of the Laffer curve. The intuition is that reductions in tax rates from this point create external revenue benefits. The government reducing its tax rate would lose revenue, while the other government would gain revenue. The combined revenue of both governments would rise because the gains outweigh the losses. This external benefit, however, is not individually incorporated into the decision-making calculus of each government.

This result implies that a single monopoly taxing authority can raise more revenue (taxing at point A, the peak of the Laffer curve) than the combined revenues of two taxing governments. Total social welfare is also lower with two governments because the resulting revenues could have been raised by a single monopoly government operating on the lower portion of the Laffer curve.⁴ Although it may, or may not, be realistic to assume that governments are leviathan revenue maximizers, the main idea is that combined state and federal taxes (on income for example) may be higher than would be optimal because of intergovernmental revenue externalities.⁵ In addition, the importance of this phenomenon is clearly increasing as government budgets become more pressed for revenue.

---

⁴ Interpreting the result in this way has important implications for empirical tests of the leviathan model of government. Empirical papers often test the leviathan model by estimating whether total revenues rise or fall with the number of governments in a country (Oates 1985; Nelson 1987; Forbes and Zampelli 1989; Zax 1989). The logic has been that with a fewer number of governments, there is less intergovernmental competition, and thus more power to extract tax revenue. The result here is that revenues decrease with the number of taxing authorities, not because of beneficial interjurisdictional competition, but because of the overtaxation of the tax base pushing the governments onto the backward-bending portion of the Laffer curve. It is relatively straightforward to extend the model to the case of \( n \) governments, and the result is that the combined tax rate increases with the number of taxing governments, but combined revenues fall.

⁵ Readers familiar with the industrial organization literature may draw a comparison between the overtaxation problem...
In the above models, one might assume that the revenue externalities are due to both governments taxing the same tax base. An idea often proposed in public finance is that the power of taxation should meet the separation norm, where each government has its own tax base. Even if the separation norm is met, however, and each government taxes a different tax base, the revenue externality will still be present through interrelated markets and income effects. An increase in the federal income tax, for example, will reduce earned income, reducing consumption, and thus state retail sales tax revenues. Excise taxes on specific goods also are affected, as well as tax revenues derived from taxes levied on factors of production. The phenomenon of intergovernmental revenue externalities is not confined to cases where governments tax the same base, but in fact is the norm across all forms of taxation.

The problem present when two governments have the power of taxation is analogous to a common pool problem. When the right to tax is held in common by at least two governments, the tax base will be over-utilized because of the failure of one unit to consider the impact of its actions on the other unit.

3. The Optimal Structure of Taxation in a Federal System: A Coasian Model

In the state of Louisiana, within each parish, multiple jurisdictions are allowed to levy a sales tax without consulting or cooperating with any other jurisdiction. The state legislature has attempted to control this problem by setting an upper bound on the combined level of the sales tax rates (Beck 1993). Setting a maximum limit on the combined tax rates of the governments is one possible solution to the problem. This solution, however, requires that the policy makers who implement the maximum limit be independent, unbiased observers with perfect information. An alternative method for controlling this problem is to design a system where the external revenue impacts are internalized. Because the externality is due to the common property nature of the right to tax, following the Coase theorem (Coase 1960), one way to correct this externality is to assign the right of taxation to a single level of government, the one that could make the most out of that right. The use of the term “right” within the context of the power of taxation is used here to describe a situation where a single government is given the exclusive use of the

---

in a federal system and double marginalization between a monopoly production firm and its downstream monopoly retailer (Spengler 1950; Bresnahan and Reiss 1985; Tirole 1988, ch. 4). In this model, if both firms maximize profits independently, the final retail price of the product will be higher than the monopoly price, and the profit of the two firms will be smaller than the maximum profit possible if a single firm operated both stages (vertical integration). The similarity with the federalism model is in the impact that the increased price of one firm has on the sales, and thus the profits, of the other firm. Within the context of the downstream monopoly problem, this is called the basic vertical externality, or the price externality. Because the total unit sales are a common base for both firms, a price increase by one firm exerts an external impact on the revenues of the other firm.

---

6 A paper whose results are somewhat related to this issue is Wagoner (1995). He considers the optimal provision of public goods in a case where there are two distinct governments, and two tax bases, each government restricted to taxing only one base. The objective of the governments in his model is to maximize the utility of the representative citizen. He finds that the addition of a second government still leads to an increase in the combined tax rate, even though the governments are taxing separate and distinct tax bases. The logic behind this result is that the external revenue impact is still present because the addition of the second tax creates an income effect which lowers the level of economic activity undertaken in the original tax base. Thus the result of higher combined tax rates is not dependent on the assumptions made about the objective function of government (leviathan revenue maximizing or social welfare maximizing) nor on whether the two governments tax the same tax base or two different and distinct tax bases.
power of taxation.\(^7\) The problems present in the previously discussed models are due to this right being shared in common. Thus, the similarity with the Coase theorem is that the optimal solution is generated when there is a well-defined and enforced right to the exclusive use of the power of taxation within the geographic locality. Thus, allowing only one level of government to have the power of taxation is consistent with a Coasian model of federalism.\(^8\)

This idea is similar to the system of taxation present in the U.S. under the Articles of Confederation, and the current system in the United Nations, where one level of government is given the sole power of taxation and the other relies on contributions from the taxing governments. In real-world cases of this type of federal system, the subfederal level was allowed to tax and the federal level received its revenues from the lower level governments.\(^9\)

There are two ways to show that the assignment of the right of taxation to a single government solves the externality problem. Returning to the Laffer curve diagram in Figure 3a, the Nash equilibrium result for two revenue-maximizing governments occurs at point A. Now, consider what would happen if the right to tax was given only to government 1, and government 2 received its revenues by assessing government 1 an amount equal to the revenue government 2 raised when it had the power of taxation in Figure 3a. The impact of this is shown in Figure 3b. Government 1 would now be faced with having to raise revenue to support both its own activities and the activities of the other government. This government would find that it could tax at the peak of the Laffer curve (point C) generating revenues of \(R_1\). The government could then send \(R_2\) of revenue to the second government, leaving government 1 with \(R_1 - R_2\) revenue.

\(^7\) Whether the power of taxation should be considered a “right” is clearly debatable. Within some definitions, such as Rand (1967), it could not be considered a right; under others, such as Holcombe (1994), it could be considered a right. Given the ambiguity of this issue, I do not want to make a claim in either direction. The use of the rights concept here provides some clear intuition into the problem, especially in reference to the common pool problem, and is used solely for this purpose.

\(^8\) The solution to the double marginalization between a monopoly production firm and its downstream monopoly retailer in the industrial organization literature (see footnote 5) is to have the upstream firm levy a fixed franchise fee against the retailer, and let the retailer set the price of the product. In this manner, only one firm (the retailer) is in charge of maximizing the profits and the other can capture some of those profits without exerting an impact on the pricing decision of the retailer at the margin. This closely corresponds to the case where one level of government is given the monopoly power of taxation and the other level(s) of government are supported by revenues directly from the taxing government through a system of fixed fees.

\(^9\) This structure of taxation has been called reverse revenue sharing by authors such as Lee (1985, 1994).
left over for its own use (shown by point D). This is strictly more revenue for government 1 than was available at point B when both governments were imposing direct taxes. The main idea is that with only one government having the power of taxation, there is no incentive to move onto the backward-bending portion of the Laffer curve. Given any fixed assessment of revenue by the second government, the first government’s net revenues (after subtracting the contribution) will still be maximized at the peak of the Laffer curve. Any movement onto the backward-bending portion of the Laffer curve would hurt the revenues of the taxing government and leave the revenues of the assessing government unchanged. Thus, the Coasian assignment of the exclusive right of taxation solves the problem of overtaxation because it internalizes the revenue externality.

To this point, little argument has been made about which level of government should have the sole power of taxation. The next section of this paper will explore this idea in further detail.

4. Revenues and the Excess Burden of Taxation in a Federal System

Because of the interjurisdictional competition present at lower levels of government, one might assume that the revenue raising potential of the federal government would be larger than the revenue-raising potential of a system of state-only taxation. This factor would not be present, however, in a system of state contributions where each state was assessed a fixed percent of the federal budget. Because all states must come up with the money requested by the federal government, all states would have to increase tax rates. The competition between states would only come into play when the states were deciding how to raise the revenue. If both California and Florida were assessed a certain sum of money, the competition between states would focus on how to raise the taxes in the most efficient way possible. Thus, this system creates an incentive for all tax revenue (the state’s own revenue and the revenue collected for the federal government) to be raised in the most efficient manner possible. Having states raise the entire system’s tax revenue puts intergovernmental competition between the states to work in a way that will enhance the efficiency with which federal government revenue is raised.

A second major conclusion is that states can raise more revenue than the federal government (or at least the same amount of revenue at a lower deadweight cost). With heterogeneous states, the federal government, which is constrained to levy equal tax rates across all subfederal jurisdictions, cannot raise as much revenue as a system of subfederal governments who could levy different tax rates.

Following the Ramsey optimal tax rule, total deadweight loss is minimized when tax bases are taxed at different rates depending on the elasticities.10 Thus, to minimize the welfare cost of taxation, tax rates should be different in every state depending on the elasticity of the tax base in the state. The U.S. federal government is, however, constrained to levy equal tax rates across all states.11 This constraint means that federal taxes are strictly worse, in a welfare sense, than state taxes that can be independently set for each state.

When each state is able to set a different tax rate corresponding to the nature of the state’s tax base, states can raise any given amount of total revenue with less excess burden than the

---

10 See the familiar derivation of Harberger (1963) based on Ramsey (1927).
11 See Brennan and Buchanan (1977, 1980) for other interesting insights into the effects of the constraint that federal tax rates must be equal across states.
federal government. An alternative way of stating this is that for any given excess burden of taxation, states can raise more revenue than the federal government. Even the fact that price levels differ across states implies that federal income tax rates (based on nominal income) apply different tax rates to the same level of real income across states. Thus, even if the optimal tax rates on real income were identical across states, the federal government could still not minimize the welfare cost of taxation.

A graphical model can be used to demonstrate the general propositions presented above. Figure 4 contains a graphical representation of the Ramsey inverse elasticity rule applied to the case of two states. Appendix 1 contains a mathematical derivation of this model. In the graph, each axis measures the tax rate in the state. The isoexcess-burden curve shows all combinations of the two states’ tax rates that create a total combined excess burden of the amount $EB_0$. The slope of the isoexcess-burden curve is equal to the ratio of the marginal excess burden of the two taxes (note the similarity with isoquant/indifference curve analysis). The isoexcess-burden curve is necessarily concave to the origin because the excess burden of taxation increases with the square of the tax rate. The isoexcess-burden curves are everywhere dense, and any curve further from the origin represents a higher level of excess burden. The isorevenue curve shows all combinations of the state tax rates that generate identical combined revenue of the amount $R_0$. The isorevenue curves are also everywhere dense, and any curve further from the origin represents a higher level of revenue. The slope of the isorevenue curve is equal to the ratio of the marginal revenue from the two taxes. The isorevenue curve is necessarily convex to the origin because the additional revenue from an increase in the tax rate is diminishing in the tax rate. In fact, the Laffer curve relationship would imply that eventually the isorevenue curves

---

12 To my knowledge, this graphical representation of the Ramsey rule has never been done. A teacher of public finance may want to give this model further thought. I use it in my undergraduate class to derive the Ramsey rule without calculus. As long as students understand the indifference curve analysis, they can easily understand this model with the simple ideas of diminishing marginal tax revenue in the tax rate and increasing marginal excess burden in the tax rate. Some very simple algebra yields both the condition that the ratio of the tax rates must equal the inverse of the elasticity ratio, and the idea that the solution requires equating the marginal excess burden per marginal dollar of tax revenue across tax bases.
would turn back on themselves and have a positive slope. This feature will become important in an extension of this model.

The Ramsey tax problem is to minimize the excess burden for any given level of revenue. For the level of revenue shown by \( R_0 \), the Ramsey solution corresponds to point A, with the tax rates denoted in the figure with asterisks. If one were to trace the expansion path connecting all such points of tangency, they would all lie on the straight line denoted in the figure as the “Ramsey Line.” At every point along this line, the ratio of the tax rates is equal to the inverse of the ratio of the elasticities of demand for the tax bases. Thus, all points satisfying the Ramsey inverse elasticity rule lie along this line. In addition, one may use the equality of the slopes of the two curves to illustrate that the marginal excess burden per marginal tax revenue dollar is equal across both states along the Ramsey line.

The model developed in Figure 4 can be extended to analyze the excess burden created by the forced equality of federal tax rates across states. This is done in Figure 5, which shows the solution from Figure 4 as point A. Added to this figure is a 45° line from the origin representing all combinations of tax rates in the two states that are identical. The federal government must remain along this line, as they are constrained to levy equal tax rates in the two states. To raise the same amount of revenue generated at point A would require moving along the \( R_0 \) isorevenue curve to where it meets the 45° line at point B. Thus, for the federal government to raise this amount of revenue would require an excess burden of \( EB_1 \), which is strictly larger than the excess burden created by the states raising this revenue (\( EB_0 \)). As was mentioned before, the corollary of this result is that for the same amount of excess burden associated with the federal tax (\( EB_1 \)), the states could generate a higher level of revenue (\( R_1 \)) by moving along the isoexcess-burden curve to point C. One needs only to draw an analogy to the monopoly price discrimination model to see the revenue benefits of allowing tax rates to differ among heterogeneous groups.  

A final extension of this graphical model is to consider the maximum revenue potential of

---

13 Note that it would require very large differences in tax rates across states if states want to levy tax rates that bring about the Ramsey result for the combined state and federal tax rate. In addition, the differential across states would need to grow as the federal tax rate becomes higher.
the government. Figure 6 shows a more comprehensive version of the isorevenue curves that includes the backward-bending portion of the Laffer curves. The main characteristic present in this extension is that beyond some tax rate $T^*$, tax revenue falls with marginal increases in the tax rate. The exact inflection points of the isorevenue curves would be at the tax rates that maximize tax revenue in each state, denoted with asterisks. There is a “satiation point” (point A) where the combined revenue from both states is maximized at $R_4$ (associated with the tax rates that maximize revenues in both states). Brennan and Buchanan (1980) show that this point must satisfy the Ramsey rule (and thus it must lie along the Ramsey line). In other words, the maximization of revenue across two tax bases requires setting the two tax rates in a manner than satisfies the Ramsey rule.

Consider the revenue potential of the federal government when it is constrained to levy equal tax rates across the two states. Along the $45^\circ$ line, maximum revenue occurs at point B, where the line is tangent to the highest isorevenue curve. Note that the highest possible level of revenue for the federal government is $R_2$, which is smaller than $R_4$. Because the two states have different tax rates at which revenue from the state is maximized, the federal government must set its rate as a weighted average of these two maximizing rates. Thus, the federal rate will be higher than the revenue maximizing rate in one state (here state B) and lower than the maximizing rate in the other state (here state A). Because of this weighted averaging process, the federal tax rate will lie on the upper (or backward-bending) portion of the Laffer curve in one state and on the lower portion of the Laffer curve in the other. The main conclusion here is that if states are heterogeneous, two states have the potential to raise more revenue than a federal government who must levy equal tax rates across the two states. Thus, even a revenue-maximizing federal government could raise more revenue under the state contribution mechanism than it can with its own taxes when it is constrained to levy equal tax rates across states.\textsuperscript{14}

\textsuperscript{14} Note several things. First, to satisfy the Ramsey rule, the equimarginal principle (equating the slopes of the curves) requires that the ratio of marginal tax revenues equals the ratio of marginal excess burdens. Rearranging terms yields that the marginal excess burden per dollar of marginal revenue must be equal across the two states. In the federally constrained case, the marginal excess burden per dollar of revenue is higher in the state with the more elastic tax base. Second, although the isoexcess-burden curves are not shown in Figure 6, one may envision how they would appear. Depending upon the shapes of the curves, total excess burden at point A may be either higher, lower, or the same as
Beyond the increased efficiency of tax revenue collection, and the potential for higher tax
revenue for the entire system, a state-level monopoly in the power of taxation would also yield
other beneficial gains, particularly in the compliance costs of tax collection. Because the best
way to administer taxes may differ across states, state-level competition would result in more
innovation in the area of tax collection. Some states may become testing grounds for new
innovations such as the flat tax.\textsuperscript{15}

The conclusion from this section is that from the revenue side, a system of state-only
taxation is the preferable alternative. In this system, the federal government might assess each
state a fixed share of the federal budget as is done currently in the United Nations.\textsuperscript{16}

5. Efficiency Impacts of State-Only Taxation on Government Spending

There is reason to believe that expenditure patterns may also systematically differ under a
system where only state governments had the power of taxation. One reason is that with lower
excess burdens of taxation, more spending projects become efficient to undertake. However,
other impacts would be more influential. Most notably, the incentive to undertake special interest
spending would fall as the cost of taxes is more concentrated. In the current system, very few
individuals would devote resources to resist a federal tax increase of $5 per person, but in the
proposed system, a state would bear the cumulative cost for all of its citizens, giving it a larger
incentive to fight against federal government special interest programs that do not yield benefits
beyond the costs. The state of California, for example, with a population of 31.4 million, would
stand to lose $157 million from a $5 per person federal tax increase. Lee (1985, 1994) mentions
that if the state contribution rates to the federal government are set equal to a fixed percent of
state tax collections, an interesting cost saving incentive would be present. If the state had to
turn over to the federal government a percent of its tax revenues, the state could gain anytime
it could reduce the cost of providing goods and services. That is, for any given level of state
government production, the less tax revenue that needs to be raised to finance it, the lower the
state’s contribution to the federal government.\textsuperscript{17}

As was discussed in a previous section of this paper, the revenue externalities present when
two levels of government have the power of taxation cause a systematic underestimation of the
cost of federal and state taxation. When only one level of government is granted the power of
taxation, all of the revenue impacts are internal and the government with the monopoly power
of taxation will take into account the full impact of tax rate changes on the tax base. Thus, for
example, if a state decided to increase its income tax rate, it is the one that would suffer the

\textsuperscript{15} Regarding the administrative costs of taxation, some authors have theorized that there are economies of scale in tax
collection, implying that federal tax collection is less costly than state-level collection. The existence of these economies
of scale has never been found in empirical studies on this issue, however.

\textsuperscript{16} As Lee (1985, 1994) points out, however, the assessment shares should be established in a way that discourages rent-
seeking by the states to change the assessments. This could be accomplished, for example, by setting these rates in an
inflexible formula specified in the U.S. Constitution.

\textsuperscript{17} Lee also discusses several other efficiency-enhancing features of a system where only states impose taxes and the
federal government is funded through a system of grants from the states.
entire consequences of the decline in the income (and sales) tax base. Thus, a system of state-only taxation would result in an increase in the efficiency of government as the cost of taxation would no longer be systematically underestimated.

It appears that from both the taxation and expenditure sides of public finance, the arguments seem to suggest that allowing states to have the monopoly power of taxation is the preferable outcome. Eliminating the federal power of taxation may appear radical, but only to those who are unfamiliar with American history and the workings of organizations such as the United Nations. The next section of this paper discusses several practical issues present under this type of financing system during the early U.S. experience and the experience of the United Nations.

6. How Practical is a System of State-Only Taxation?

The United States was governed by the Articles of Confederation for over a decade before the U.S. Constitution became effective on March 4, 1789.18 Under the Articles of Confederation, the federal government did not have the power of direct taxation, but rather relied on contributions from state governments. One often-heard criticism of the Articles is that it was an inadequate document for financing the federal government because states were often reluctant to pay their contributions.19 The collection rate experienced by the federal government under the Articles over all of its requisitions to the states was approximately 50%. This figure has been used by many to conclude that the system present under the Articles was inadequate. This conclusion, however, is based on a comparison with the collection rates the federal government receives today from its direct taxes on citizens. When this collection rate is viewed with respect to the states’ collection rates at that time, and the federal government’s collection rate during the early 1800s, after it obtained the power of direct taxation under the new U.S. Constitution, a much different picture emerges. The collection rate under the Articles was, in fact, higher than the collection rate experienced by the states from their own citizens during this period, and also higher than the federal government’s collection rate from individual citizens in the early 1800s when it did use its new power of direct taxation.20 The new federal government’s collection rate was so poor that President Jefferson did away with all direct taxes on citizens in 1802. They were reimposed for a few years during the War of 1812, but collection rates never exceeded 50 percent and the tax was repealed in 1817. Direct federal taxes were not again used until the Civil War, when the federal government created the Commission of Internal Revenue in the Treasury Department revolutionizing the process of tax collection in the United States. The point is that the federal government’s “poor” collection rate from the states under the Articles of Confederation was actually quite good compared with the collection rate from individuals at that time. This analysis calls into question the widely accepted view that the

18 The Articles of Confederation was passed by the Continental Congress on November 15, 1777, but was not ratified by the states until March 1781. Nonetheless, the Continental Congress’ requisition authority over the states, given to them in the Articles, was first exercised on November 22, 1777.
19 For a discussion of the workings of the Articles, see Jensen (1940). Studenski and Krooss (1963) and Bullock (1979 [1895]) both give a detailed account of government finances during this period.
20 Data on requisitions is from Bullock (1979 [1895]). Studenski and Krooss (1963) state that in both colonial times and under the Articles, state taxes were only paid by the patriotic and conscientious, with widespread evasion and inefficiency. The first federal direct tax under the new U.S. Constitution was levied in July 1798 on population, house values, and land. As of 1801 only half of the total amount due had been collected.
Articles provided inadequate funding for the federal government relative to giving the federal government the power of taxation. The second implication of this analysis is that the "low" collection rate experienced during the late 1700s cannot be used to infer what might happen today under a system like that present under the Articles.

The delegates who wrote the new U.S. Constitution decided to give the power of direct taxation to the federal government. The delegates at the constitutional convention were fighting to secure the interests of their constituents (and their own interests) in the new constitution. It is important to remember that the delegates, and their constituents, were the wealthier individuals who were major holders of the federal debt accumulated during the Revolutionary War. Based on this type of analysis, Beard (1935) concludes that the main reason delegates wanted to give the federal government the power of taxation in the new constitution was to ensure the government's repayment of the debt that the delegates and their constituents were holding. No written history of the discussion surrounding the federal government's power of taxation contains even a single mention of the overall economic impact, efficiency, or excess burden of federal taxation. The federal government was given the power of taxation because it benefitted the group of American citizens represented by delegates at the convention. As in many other cases, special interest groups, here the debt holders, were successful in altering the structure of government in their favor.21 Thus, simply because the federal government currently has the power of taxation, and that the current system was adopted over the alternative, does not mean that it is a more efficient, nor a social-welfare-enhancing, system of taxation relative to the one present under the Articles.

Another example of this type of system is the financing structure of the current United Nations Organization. In several respects, the U.N. may be viewed as a higher federal system to which the U.S. belongs. The U.N. raises its revenue by assessing each member country a certain proportion of the total budget based on the economic characteristics of the country. Each country can then raise the money any way it wants. The U.N., however, sometimes has trouble getting member countries to provide the money in a timely fashion because of its lack of enforcement power.22 Throughout the history of the U.N., and even during the tenure of its predecessor the League of Nations, a hotly debated issue has been whether to give the organization the power to directly tax the citizens of member nations. Many people believe that the current system provides a valuable constraint against unwarranted growth of the U.N. system, especially in the area of world income redistribution. If this is true, one must consider the possibility that the framers of the U.S. Constitution, in giving the power of direct taxation to the U.S. federal government, are partially responsible for removing the constraint that might have prevented the U.S. federal government from adopting its massive income transfer orientation.23

Many times in the U.N. system, nations have used the threat to withhold their contributions as a bargaining tool in the political process. Additionally, in the current U.N. system, nations can easily withdraw from being members of the organization. This provides a valuable constraint

21 Many people might believe that they had a legitimate claim, but there were other ways to ensure repayment without giving the federal government the power of taxation. Additionally, many people would argue that other special interest groups have legitimate claims. Thus, the legitimacy of the claim does not have a bearing on the argument that they were a special interest group and that they altered the structure of government in their favor.

22 For discussions relating to the system of U.N. financing, and suggested reforms, see Mendez (1992) and United Nations (1986, 1992).

23 See Holcombe (1991) for a similar argument.
against the power of the U.N. to impose policies that are not in the interest of all nations.\textsuperscript{24} It is interesting to contrast this ease of withdrawal, and voluntary nature of membership, with what happened in the U.S. when the Southern states attempted to secede from the Union in the early 1860s. These Southern states believed that a state had the right to withdraw from the voluntary association of states formed by the U.S. Constitution. In fact, the first state to secede, South Carolina, did so through an act repealing its 1788 ratification of the U.S. Constitution, negating a previous act, rather than as a new act proclaiming its independence (as was done by colonies to begin the U.S. Revolutionary War). Clearly the U.S. federal government did not agree that states had this right. In the words of Abraham Lincoln, the U.S. President at that time, regarding his view of the objective of the war, “My paramount objective is to save the Union, and not either to save or destroy slavery.”\textsuperscript{25} By precedent, the structure of the U.S. federal system is clearly such that a state cannot threaten to leave the Union to avoid payment of its share of a federal tax. A state may, however, threaten to withhold payment until a later date, or just fail to pay the amount owed as its contribution to the federal government. Although this is possible, it is very unlikely. If the federal government can design a system that fosters the compliance of 250 million taxpayers, they can certainly design one that fosters the compliance of 50 taxpayers (the states).

A second alternative structure that not only allows state-only taxation, but also builds into the system an enforcement mechanism, is the one taken by the federal government of the Confederate States of America for its 0.5% property tax levied during the early stages of the American Civil War. Although the Confederate government did have the power to collect this tax directly from individuals, it gave states the option to submit revenues that negated their citizens’ tax liability.\textsuperscript{26} The states could raise this revenue any way they wanted, by actually imposing the tax, by imposing another different tax, by using existing revenues, or by borrowing.\textsuperscript{27} This structure is relevant to the current issue because under a system such as this, states could choose whether to keep their monopoly power of taxation or allow the federal government to tax the citizens of the state directly.\textsuperscript{28} As an extra incentive to the states, the Confederate government gave a 10% discount on the total tax liability to states choosing to submit the revenues for their citizens. Only two of the states chose not to assume the payments of the tax, and the ones who did assume the payments came up with the revenue by issuing state bonds or by imposing other types of taxes. The 10% discount given to the states was much greater than the actual cost of collecting the tax. In Mississippi, where the federal government collected

\textsuperscript{24} The United Nations Educational, Scientific, and Cultural Organization (UNESCO) is an interesting case of nations leaving a U.N. organization. In December 1984, the U.S. withdrew from UNESCO partially because of the organization’s rapid budget growth and partially because of its anti-Western orientation. Several other major nations followed the U.S. by also withdrawing from the organization, sending its budget into disarray, and causing major reforms in the organization.

\textsuperscript{25} The source for this quote is Compton’s Interactive Encyclopedia for Windows (on CD ROM), 1995 edition.

\textsuperscript{26} Statute 3, chapter 23, sections 4 and 24, adopted in 1861 by the Provisional Congress of the Confederate States of America. For the full text of the statutes see Confederate States of America (1864). For a discussion of the finances of the Confederacy see Schwab (1901) and Smith (1901).

\textsuperscript{27} The U.S. federal government allowed states to collect the revenues for the tax bill of the War of 1812 and also in the Federal direct tax of 1861 (Smith 1901). States only collected the revenues, however, and did not have the flexibility to substitute alternative revenue sources in these instances.

\textsuperscript{28} Holcombe (1992) discusses the differences between the Confederate and U.S. Constitutions and concludes that the Confederate Constitution contained better constraints against the government’s ability to grant favors to special interest groups. Holcombe (1991) shows that the U.S. Constitution relaxed some of the constraints imposed on the federal government by the Articles, and the Confederate Constitution added additional constraints over the U.S. Constitution.
the tax, the cost of collection was only two percent.\textsuperscript{29} The Confederacy's overall collection rate for this tax was almost 100\%. This structure of taxation adopted by the Confederacy is important because it shows that there is a way to allow for a system where only states levy taxes, but the federal government is given an enforcement mechanism to overcome any free-rider problems with states not complying with requisitions.

A modern reform along these lines would be to adopt a law that a state could submit revenues to the federal government to negate its citizens' tax liabilities on any one federal tax, or all federal taxes. This would allow the state to keep its monopoly power of taxation if it chose to submit the revenues directly, and it would also overcome the problem of the high deadweight cost of federal taxes due to its inability to discriminate across states when imposing tax rates. For example, a mineral-rich state could levy higher severance taxes to collect the revenue to offset citizens' federal personal income tax liabilities.

7. Concluding Remarks

This paper has shown that allowing multiple levels of government the power of taxation is not the optimal way of financing a federal system of governments. When multiple levels of government have the power of taxation, changes in the tax rate of one government directly affect the revenues of other levels of governments. The presence of this intergovernmental revenue externality results in a common pool problem and the resulting outcome is that tax rates are higher than would be optimal. This not only implies a higher deadweight loss of taxation, but also an inefficiency bias in government spending as each level of government systematically underestimates the cost of taxation.

Several alternative institutional structures internalize this externality and result in preferable outcomes. The first allows only state governments the power of taxation and the federal government raises its revenues through contributions from the states. This is a practical structure of government that was actually used during the early history of the United States under the Articles of Confederation. It is also analogous to the structure currently in practice in the United Nations Organization. Thus, this paper also serves as an argument for why the U.N. and the European Union should not be given the power of taxation, both of which are policies that repeatedly come up for consideration.

A second alternative is to allow states the option of submitting revenues directly to the federal government in lieu of the federal taxes levied on the citizens of the state. This was the approach used by the Confederate States of America during the beginning of the American Civil War. In fact, they encouraged states to do this by giving a discount if the money was submitted directly from the state government. This system not only preserves the possibility of a welfare-enhancing move to state-only taxation, but it also builds into the system an enforcement mechanism under which the federal government may overcome any free-rider problems with states that do not comply with federal revenue requisitions. Under either of these reforms, state-level competition is also put to work in a way that reduces the welfare cost of raising \textit{federal} revenues.

\textsuperscript{29} Information on this subject is from Schwab (1901) and Smith (1901).
Appendix: Derivation of the Graphical Ramsey Rule Model

The main results and characteristics of the graphical model of the Ramsey rule are derived here.

The Isoexcess-Burden Curves

The standard expression for the excess burden of an ad valorem tax is \( \text{EB} = \frac{1}{2} t t Q P \) and the marginal excess burden with respect to the tax rate (MEB) is \( \text{MEB} = d \text{EB}/dt = t Q P \). The excess burden is positive and increasing in the tax rate. The total excess burden across two states, \( A \) and \( B \), is \( \text{EB} = \text{EB}_{A} + \text{EB}_{B} \). The isoexcess burden curves can be found through total differentiation, \( d \text{EB} = \text{MEB}_{A} d t_{A} + \text{MEB}_{B} d t_{B} \). Setting \( d \text{EB} = 0 \) and solving for \( d t_{A}/d t_{B} \) yields \( d t_{A}/d t_{B} = -\text{MEB}_{B}/\text{MEB}_{A} = -\text{MRS}_{\text{emb}} \). This shows the rate at which the tax rates can be substituted for one another leaving total excess burden unchanged. Call this the marginal rate of substitution in excess burden (MRS\text{emb}), which is positive and increasing in each tax rate, yielding negatively sloped (and concave to the origin) isoexcess-burden curves.

The Iso revenue Curves

Total tax revenue (for an ad valorem tax) is \( \text{TR} = t Q(t) \) and \( d Q(t) < 0 \). The marginal revenue from an increase in the tax rate (MR) is equal to the inverse of the slope of the Laffer curve, which is initially positive, goes to zero at the revenue-maximizing tax rate, then becomes negative. The formula for MR can be found through differentiation of the TR equation with respect to \( t \), which is \( \text{MR} = d \text{TR}/dt = Q + t d Q/dt \). Because \( d Q/dt \) is negative, MR is decreasing in the tax rate. Now the total revenue across the two states \( A \) and \( B \) is \( \text{TR} = \text{TR}_{A} + \text{TR}_{B} \). The isorevenue curve can be found through total differentiation \( d \text{TR} = \text{MR}_{A} d t_{A} + \text{MR}_{B} d t_{B} \). Setting \( d \text{TR} = 0 \) and solving for \( d t_{A}/d t_{B} \) yields \( d t_{A}/d t_{B} = -\text{MR}_{B}/\text{MR}_{A} = -\text{MRS}_{\text{r}} \). This shows the rate at which the tax rates can be substituted for one another leaving total revenue unchanged. Call this the marginal rate of substitution in revenue (MRS\text{r}), which is decreasing in each tax rate when both taxes are on the lower portion of the Laffer curve (both MR\text{A} and MR\text{B} are positive), yielding a negatively sloped (but convex to the origin) isorevenue curve. When both taxes are on the backward-bending portion of the Laffer curve, the isorevenue curve is also negatively sloped (both MR\text{A} and MR\text{B} are negative). When one is on the lower portion of the Laffer curve while the other is on the backward-bending portion (one MR is negative, one positive), the isorevenue curves are positively sloped. The inflection points in the isorevenue curves occur when either (or both) MR are zero. This is when the tax rate is exactly at the peak of the Laffer curve and revenues are being maximized.

The Ramsey Optimal Tax Rule

For the Ramsey optimal tax rule solution, the tangency of both curves implies \( MRS_{\text{emb}} = MRS_{\text{r}} \). From above, these are equal to \( \text{MEB}_{B}/\text{MEB}_{A} = \text{MR}_{B}/\text{MR}_{A} \), which can be equivalently written as \( \text{MEB}_{B}/\text{MR}_{A} = \text{MEB}_{B}/\text{MR}_{B} \). Thus, the marginal excess burden per dollar of marginal tax revenue must be equal across the two taxes. To derive the Ramsey rule, equations for MEB and MR can be substituted with one exception. Standard derivations of the Ramsey result require assuming that the second order effect in the MR equation is zero. Thus, for solution purposes, MR and MEB may be written as \( \text{MR}_{A} = P_{A} Q_{A} \) and \( \text{MEB}_{A} = t_{A} \text{Q}_{A} P_{A} \). Substitution yields \( \text{MEB}_{B}/\text{MR}_{A} = t_{B} \text{Q}_{B} \). Equations for MEB\text{B} and MR\text{B} can be derived similarly. Finally, equating yields \( t_{A} \text{Q}_{A} = t_{B} \text{Q}_{B} \). This solution can be written as \( t_{A}Q_{A} = \text{Q}_{B} \), which is the familiar Ramsey rule.

References


