REVENUE DECENTRALIZATION, THE LOCAL INCOME TAX DEDUCTION, AND THE PROVISION OF PUBLIC GOODS

John William Hatfield

We consider a model where local and national governments invest in both productive and consumptive public goods using income tax revenue. Local governments will overprovide the consumptive public good if the local income tax is (fully or partially) deductible. However, without full deductibility, local governments will underprovide local productive public goods. Hence, to reduce the distortions in local governments’ decisions, a welfare-maximizing national government will underinvest in both types of public goods, assuming that the level of national public good provision does not directly affect the local governments’ decisions. We also consider an alternative fiscal structure where the national government sets one national tax rate and provides matching grants for expenditures on productive public goods; this can result in efficient levels of public good provision at both the local and national levels.

Keywords: fiscal federalism, fiscal externality, local income tax deduction, public good provision

JEL Codes: H21, H23, H71, H72, H77

I. INTRODUCTION

In the United States, the federal income tax deduction for state and local income taxes costs the federal government approximately $50 billion annually in revenue (Joint Committee on Taxation, 2008). Indeed, the recent President’s Advisory Panel on Federal Tax Reform (2005) has suggested that this deduction should be eliminated, arguing that it is expensive for the federal government and inappropriately provides incentives for state and local expenditures that in many cases reflect personal consumption expenditures.¹

¹ Policymakers continue to debate eliminating the state and local income tax deduction: see remarks by Senators Max Baucus (2012) and Orrin Hatch (2012), as well as testimony by Frank Sammartino (2012) of the Congressional Budget Office and Kim Reuben (2012) of the Tax Policy Center, before the United States Senate Committee on Finance.
This paper shows that the local income tax deduction is not necessarily inefficient, as its efficiency or inefficiency depends on the nature of the local public goods. Local consumptive public goods will be overprovided relative to the efficient level with the local income tax deduction while local productive public goods will be underprovided without it, so national policymakers face a trade-off when choosing the level of deductibility of local income taxes.

The local income tax deduction induces local governments to spend more on consumptive public goods, as the cost to local taxpayers is reduced; for every $1 spent on public goods, residents who itemize deductions on their federal tax returns will only pay a fraction of that, since they will not have to pay federal taxes on the income lost to local taxation. Hence, in the absence of important national external benefits, spending on local consumptive public goods will be inefficiently high, since local residents do not bear the full burden of the local spending. This intuition is the basis of many articles decrying this “tax break” (Mitchell, 2005). This intuition is also, in some respects, similar to that for soft budget constraints: with a soft budget constraint, or with a local income tax deduction, the national government will pay for some investment by local governments, and that leads local governments to overinvest in consumptive public goods.

However, for productive public goods, this intuition is reversed. Suppose there is no local income tax deduction, and consider the investment choice by local governments regarding a local productive public good that raises local incomes (and hence national income taxes). Without a local income tax deduction, local governments will underinvest in these public goods, since some of the gains from such investment will be taken by the national government through the income tax, while citizens of the local government must pay all of the costs. However, if the national government enacts a local income tax deduction, the local government also no longer pays all of the costs of investment in productive public goods. While the local government still does not capture all of the gains of the investment, these forces exactly balance out so that it is optimal for the local government to invest an efficient amount in local productive public goods. This is somewhat analogous to the difference between an income tax and a consumption tax: implementing a local income tax deduction, like switching from an income tax to a consumption tax, no longer taxes agents (i.e., local governments) on income used for investment. Many of the most important goods provided by local governments are productive public goods, including roads, fire protection, police, and the courts.

For any level of deductibility of local income taxes both of the local government’s spending decisions cannot be first-best. A welfare-maximizing national government must balance the incentives it gives local governments through the tax code to under- or overinvest in the two categories of public goods. Underinvestment in local productive public goods may be particularly costly as it reduces the income of the citizenry directly, and also indirectly as the national government must impose a higher tax rate (and hence

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2 See Qian and Roland (1998) and references contained therein.
3 For instance, the vast majority of spending on police protection is done by local governments; local governments spent approximately $207 billion on police protection, judicial costs, and corrections in 2008 (U.S. Census Bureau, 2011), while the Department of Justice only spent $21 billion (U.S. Department of Justice, 2009).
use a more distortionary tax system) to finance a particular level of national government expenditures. The key issue is the inability of the national government to distinguish between local productive and consumptive goods. If the national government is able to distinguish between the two types of goods, a local income tax deduction would be wasteful, as the national government could instead implement an appropriate matching grant for local productive public goods to obtain the first-best allocation.

We also consider the effect of this distortion on the incentives facing a welfare-maximizing national government. The size of the inefficiency will depend on the national income tax rate: the higher the national income tax rate, the larger the distortion in the incentives of the local governments. Hence, a welfare-maximizing national government will take these effects into account when setting its own fiscal policy and will underinvest in both productive and consumptive public goods so as to minimize the distortive effects of the national income tax.4

The local income tax deduction can be thought of as a simple subsidy for local spending by the national government. While for a purely consumptive local public good such a subsidy would induce local governments to spend too much on public goods, it can also be viewed as helping to correct the distortion in local governments’ incentives to invest in productive public goods due to the national income tax. Hence, the local income tax deduction may be a second-best solution to the national government’s problem.

If there is only one type of local public good that is both productive and consumptive, we show that an appropriately chosen local income tax deduction can achieve the first-best. Without any deduction, the local government will spend too little, and with a full deduction, the local government will spend too much — hence the national government can find a partial deduction that induces the local government to spend at an efficient level. However, this result disappears with multiple local public goods. We also show that if the national government can provide a matching grant for productive public goods, it can also achieve the first-best, since the national government can independently change the local government’s decision regarding productive and consumptive public goods.

Surprisingly, for such an important provision of the tax code, the local income tax deduction has received scant attention in the public finance literature. It is discussed by Feldstein and Metcalf (1987), but they focus on the effects on the choice of local tax instruments, not on the effects on the efficiency of investment in local public goods.5 These effects have been discussed more comprehensively, although less formally, in the legal literature (Billman and Cunningham, 1985). Gramlich (1985) mentions the possible efficiency gains by eliminating the deduction (as he considers only consumptive public goods) but his argument concentrates on the redistributive consequences of eliminating the deduction. Gordon (1983) mentions that the local income tax deduction may be a solution to distortions in local governments’ incentives to underinvest in public goods.

4 This last result holds so long as national spending has no direct effect on the incentives of local governments. If, for instance, local and national consumptive public goods act as substitutes, the national government may overinvest in the national consumptive public good to reduce the incentives of a local government to invest in the local consumptive public good.

5 Metcalf (2011) builds on this work, showing that the Alternative Minimum Tax and the Bush tax cuts reduce the effects of local and state tax deductibility.
with spillovers; in our case, the distortion in local governments’ incentives to invest in the productive public good is the presence of the national income tax itself.

However, there is a large literature on vertical fiscal externalities, which should be seen as complementary to our work here. Beginning with Cassing and Hillman (1982), and recently summarized by Keen (1998), this literature considers the problem of overlapping jurisdictions that have the power to use the same distortive tax instrument. This “fiscal externality” leads to suboptimal taxation policy. There are two central issues to be considered when determining the effects on the national government of actions by subnational units. The first issue regards the choice and level of taxation instruments, and the fact that these taxes may distort individual agents’ economic decisions. This result, derived first by Flowers (1988) and subsequently by Keen and Kotsogiannis (2002), shows that local governments will not consider the effects on federal revenues when setting their own tax rates, and so the combined tax rate of national and subnational governments is higher than it would be under a unitary government. Hoyt (2001) shows that these problems can be mitigated with matching grants. However, our work is concerned with the second issue, i.e., how the taxing decisions of the national government distort the local governments’ spending decisions, rather than how giving the local and national governments access to the same distortive tax leads to suboptimal outcomes. Hence, we analyze how the national government’s taxation and spending decisions affect the level and composition of spending by local governments; many of these effects are discussed in Dahlby (1996).6

The paper most closely related to ours is Dahlby and Wilson (2003). They consider a model similar to ours — but without a local income tax deduction — and show that, for a large set of parameters, localities will overinvest in consumptive public goods, and underinvest in productive public goods. We show that the local income tax deduction can mitigate the inefficiencies identified by Dahlby and Wilson, and that a full local income tax deduction induces efficient investment in local productive public goods. More generally, we show that the local income tax deduction should be chosen to balance the distortive effects of national taxation on local investment in productive and consumptive public goods. We also consider the general equilibrium effects of the fiscal externality between the two levels of government. We show that the national government will underinvest in both productive and consumptive public goods in order to reduce the fiscal externality on local governments and therefore induce more efficient local spending patterns.

The paper is structured as follows. The next section introduces the model, and provides conditions for optimality and equilibrium. Section III characterizes the equilibrium policy under decentralized revenue collection. The final section concludes. All proofs may be found in the Appendix of the working paper (Hatfield, 2011).

II. MODEL

We consider an economy with two levels of government, national and local. The national government is benevolent: it chooses policy so as to maximize the welfare of

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6 Similarly, in the analysis by Johnson (1988), states engage in excessive redistribution in order to reduce the tax burden of their citizens.
the representative agent. The local government is also benevolent: it chooses policy to maximize the welfare of the representative agent in its jurisdiction.\footnote{The local governments could be thought of as state, county, or municipal governments in the U.S. context, or as provinces or subprovincial units in other nations. We shall refer to these units as local “jurisdictions” for brevity.} For simplicity, we assume that all jurisdictions are identical and normalize the population within each to 1.\footnote{We model the governments as beneficent for simplicity. A more realistic model could be built that would explicitly model the political process. However, so long as this political process produces a Condorcet winner when one exists, the results will be unchanged, as all agents are identical. We could also allow for agents to be differentiated according to a parameter that determines their productivity, but using the methodology of Lindbeck and Weibull (1987) to model political competition would also produce the same results.}

The national government decides on a national income tax rate $\tau_n \in [0,1]$, a local income tax deduction rate $\alpha \in [0,1]$, and per capita levels of investment in a productive public good $p_n \geq 0$, and consumptive public good, $g_n \geq 0$. The national government must also balance its budget, taking into account the subsequent decisions of the local government.

A local government chooses its policy taking the national level of income taxation, the local income tax deduction rate, and the investment in national public goods as fixed. In other words, a local government acts as a “policy-taker,” since its jurisdiction is small compared to the national economy; hence, it does not consider the effect on national finances of its decisions. Thus we can model the actions of local governments by considering one representative local government. This local government chooses a local income tax $\tau_l \in [0,1]$ and per capita levels of investment in a productive public good $p_l \geq 0$ and consumptive public good $g_l \geq 0$. Finally, after all policy choices have been made, agents produce and then consume their private consumption and the consumptive public good.

The marginal productivity of labor within each jurisdiction is given by $F(p_l, p_n)$, which is strictly increasing, strictly concave, twice continuously differentiable and satisfies the Inada conditions in each variable.\footnote{This last condition is not necessary, but greatly simplifies the analysis in that it eliminates the need to consider boundary conditions.} We say that $p_l$ and $p_n$ are weak substitutes if the cross-partial derivative of $F(p_l, p_n)$ is not positive. Finally, to simplify the analysis, we assume that the labor supply of the representative agent within each jurisdiction is fixed at 1, in order to concentrate on intergovernmental inefficiencies.

We can now state the budget constraints faced by the national and local governments. The local government faces the budget constraint

$$F(p_l, p_n)\tau_l = p_l + g_l.$$  

However, the national government, given the income tax rates $\tau_n$ and $\tau_l$, remits back to the citizens an amount equal to $\alpha$ times the tax paid on the income those citizens lost to local taxation; if $\alpha = 0$, there is no local income tax deduction, and if $\alpha = 1$, local income taxes are fully deductible. The budget constraint of the national government is

$$F(p_l, p_n)\tau_n = p_n + g_n + \alpha \tau_l \tau_n F(p_l, p_n).$$
An agent’s consumption is given by
\[ c = F(p_l, p_n)(1 - \tau_n - \tau_l + \alpha \tau_n \tau_l), \]
and each agent has a utility function given by
\[ u(c) + H(g_l, g_n), \]
where \( H \) denotes the level of utility obtained from investment in local and national consumptive public goods, while \( u(c) \) is the level of utility the agent obtains from private consumption. These functions are strictly increasing, concave, twice continuously differentiable and satisfy the Inada conditions. We shall say that \( g_l \) and \( g_n \) are weak complements if the cross-partial derivative of \( H(g_l, g_n) \) is not negative.

A. Welfare Optimality

We first characterize the optimal choice of policy from the point of view of the representative agent. Consider the problem of a social planner who can decide on both \( \tau_n \) and \( \tau_l \), as well as the investment levels in both national and local public goods, subject only to the budget constraints of the governments. The social planner will solve
\[
\max \{u(F(p_l, p_n)(1 - \tau_n - \tau_l + \alpha \tau_n \tau_l)) + H(g_l, g_n)\}
\]
subject to
\[
F(p_l, p_n)\tau_l = p_l + g_l
\]
\[
F(p_l, p_n)\tau_n = p_n + g_n + \alpha \tau_n F(p_l, p_n).
\]
By substituting the budget constraints into the maximization problem, the social planner solves:
\[
\max \{u(F(p_l, p_n) - (p_l + p_n + g_l + g_n)) + H(g_l, g_n)\}.
\]

Hence, the social planner simply chooses the optimal level of investment in each of the public goods, taking into account the resulting decrease in consumption. The first-order conditions of the social planner’s problem are:10
\[
F_l(p_l^*, p_n^*) = 1
\]
\[
F_n(p_l^*, p_n^*) = 1
\]

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10 We denote the derivatives of \( F(p_l, p_n) \) with respect to \( p_l \) and \( p_n \) by \( F(p_l^*, p_n) \) and \( F(p_l^*, p_n) \), respectively. \( H_l(g_l, g_n) \) and \( H_n(g_l, g_n) \) are similarly defined.
The first two equations state that at the optimal policy, the marginal increase in production by increasing public investment is exactly offset by the cost of that investment. The third and fourth equations are essentially the Samuelson conditions for investment in the consumptive public good. We shall refer to the investment levels defined above as first-best.

**B. Equilibrium**

The national government chooses a level of investment in both productive and consumptive public goods, as well as a national income tax rate and local income tax deduction. In doing so, the national government must ensure that its choices satisfy the national budget constraint, taking into account the decision local governments will make. The local governments choose their levels of investment in productive and consumptive public goods, as well as their tax rate, taking into account their own budget constraints, and the investment levels and tax policies of the national government. We assume that a jurisdiction is small — that is, the local government does not take into account the effect of its own policies on the national government’s spending decisions and taxation rate, but rather takes these as given when making its decision.

Hence, an equilibrium is a set of investment levels \{p_l, p_n, g_l, g_n\} and tax policies \{τ_l, τ_n, \alpha\} such that the local government maximizes the welfare of the representative agent within its jurisdiction taking the national income tax rate and levels of investment in the national public goods as fixed. The local government solves:

1. \[
\max_{u, τ_l, p_l, g_l} \{u(F(p_l, p_n)(1 – τ_n – τ_l + \alpha \tau_n \tau_l)) + H(g_l, g_n)\}
\]

subject to the budget constraint that

2. \[
F(p_l, p_n) τ_l = p_l + g_l
\]

taking as given the tax rate \(τ_n\) and investment decisions \(p_n\) and \(g_n\) of the national government.

The national government maximizes the welfare of the representative agent taking the response of the local government to the national government’s policy choices as given. The national government solves

3. \[
\max_{u, τ_l, p_l, g_l} \{u(F(p_l, p_n)(1 – τ_n – τ_l + \alpha \tau_n \tau_l)) + H(g_l, g_n)\}
\]
subject to the budget constraint that

\[ F(p_l, p_n) \tau_n = p_n + g_n + \alpha \tau_l F(p_l, p_n) \]  

taking the tax rate \( \tau_i \) and investment decisions \( p_i \) and \( g_i \) of the local government as functions of the national government’s decisions, as calculated in (1).

III. CHARACTERIZATION OF EQUILIBRIUM

We first consider the policy decisions made by local governments, which take both the national tax rate and the provision of national public goods as given.

A. The Problem of the Local Government

Substituting the local budget constraint (2) into the local maximization problem (1), the problem for the local government is

\[ \max_{p_l, g_l} \{u(F(p_l, p_n)(1 – \tau_n) – (1 – \alpha \tau_n)(p_l + g_l)) + H(g_l, g_n)\} \]

The first order condition for this problem with respect to investment in the local productive public good is

\[ \alpha \tau_l = \frac{1 – \alpha \tau_n}{1 – \tau_n} \]

If \( \alpha < 1 \), the local productive public good is underprovided, relative to the optimal level of provision \( p_l^*(p_n) \). The local government discounts part of the return from investing in the local productive public good as some of the benefits of that investment go to the national government. The national income tax has created a fiscal “tragedy of the commons” — a local government will not invest in the local productive public good up to the point where the total marginal benefit is equal to the total marginal cost, as some of the returns from such investment are captured by other jurisdictions in the form of the national provision of public goods.

If \( \alpha = 1 \), then the local productive public good is provided at efficient levels. An increase in taxes of \( \epsilon \) to increase \( p_l \) costs local residents \( (1 – \alpha \tau_n)\epsilon \) and results in an increase in local after-tax income of \( F(p_l, p_n)(1 – \tau_n)\epsilon \). Hence, local governments will choose to have \( F(p_l, p_n) = 1 \), i.e., invest efficiently in the local productive public good if and only if \( \alpha = 1 \).

We can also calculate how a change in the tax rate \( \tau_n \) (holding fixed \( \alpha, p_n^* \), and \( g_n^* \)) affects local investment in productive public goods. As \( \tau_n \) increases, \( (1 – \alpha \tau_n)/(1 – \tau_n) \) increases if \( \alpha < 1 \). Hence, from (6) we have that \( F(p_l, p_n) \) is increasing in \( \tau_n \), and since \( F(\cdot) \) is concave in \( p_n \), the investment by the local government in productive public goods is decreasing in \( \tau_n \). Intuitively, as the national tax rate increases, the fraction of returns
from local public investment that go to the national government also increases, and so the incentive for the local government to invest in productive public goods is smaller.

Taking the first order condition for the problem of the local government with respect to local investment in the consumptive public good, yields

\[ \frac{H_i(g_i, g_n)}{u'(c)} = 1 - \alpha \tau_n. \]

If \( \alpha > 0 \), the local consumptive public good is overprovided, relative to the provision \( g_i^*(g_n) \), where \( g_i^*(g_n) \) is the Samuelsonian choice of investment in \( g_i \) given \( g_n \). When a jurisdiction spends $1 on local consumptive public goods, the cost to its citizens is not $1, but instead $\{(1 - \alpha \tau_n)\}$, as local residents receive a rebate from the national government for the spending done by their local government. Hence we have a different fiscal tragedy of the commons — each local government overinvests in consumptive public goods since some of the costs of this investment are borne by other jurisdictions through the mechanism of the local income tax deduction.

If \( \alpha = 0 \), there is no local income tax deduction, and local governments will invest efficiently in the local consumptive public good, since spending $1 on the consumptive public good costs local residents $1, and so the local government will spend up to the point where \( u'(c) = H(g_i, g_n) \).

The preceding results are summarized in the following proposition.

**Proposition 1.** For a given local income tax deduction level \( \alpha \in [0,1] \), national tax rate \( \tau_n > 0 \), and investments of \( p_n \) and \( g_n \),

1. the level of local investment in productive public goods \( p(p_n) \) is less than or equal to the first-best, i.e., \( p(p_n) \leq p_i^*(p_n) \), with equality if and only if \( \alpha = 1 \), and
2. the level of local investment in consumptive public goods \( g(g_n) \) is more than or equal to the first-best, i.e., \( g(g_n) \geq g_i^*(g_n) \), with equality if and only if \( \alpha = 0 \).

Note that, in both cases, the level of distortion in the decisions by the local governments is increasing in the level of the national income tax. We can define a level of distortion in local decisions, independent of the level of \( \alpha \), as the ratio of the two first order conditions:

\[ \frac{H_i(g_i, g_n)}{F_i(p_i, p_n)u'(c)} = 1 - \tau_n. \]

As the national income tax rate increases, this “tax wedge” between spending on local productive and consumptive public goods increases. By changing \( \alpha \), we can change which decision gets distorted, but the level of distortion, as measured by the tax wedge, remains the same.

Furthermore, the local income tax deduction acts as a subsidy for public spending by local governments. It subsidizes local spending by effectively giving the local government...
\(\alpha_n\) for every dollar of local spending. In general, such a subsidy would distort the spending of the local government away from efficient levels, and in the case of consumptive public goods, it does exactly that. However, for productive public goods, this subsidy exactly offsets the distortion imposed by the existence of the national income tax itself.

We can also calculate how local government policy will change as a function of the taxation parameters chosen by the national government.

**Proposition 2.** Given investments \(p_n\) and \(g_n\) by the national government,

1. holding the national income tax rate \(\tau_n\) fixed, local investment in both types of public goods is increasing in the level of the local income tax deduction \(\alpha\), i.e., \(\partial p_l / \partial \alpha, \partial g_l / \partial \alpha \geq 0\), and

2. holding the local income tax deduction \(\alpha\) fixed, local investment in productive public goods is decreasing with the national income tax rate \(\tau_n\), i.e., \(\partial p_l / \partial \tau_n \leq 0\).

The first result states that both types of local public goods are increasing in the tax deduction. Investment in the local productive public good increases as more of the income generated from this public investment is retained by the local citizenry. Investment in the local consumptive public good, however, increases for two reasons. First, there is a price effect: the price of the local consumptive public good (from the perspective of the local government) decreases, as an increase in \(\alpha\) means that the national government bears a larger burden of the costs. Second, there is an income effect: the after-tax income of the citizens increases with \(\alpha\), so the local government will spend more on the local consumptive public good to equalize the marginal utility from consumption and the consumptive public good.\(^{11}\)

The second result states that an increase in the national income tax reduces local investment in the productive public good. When the national tax rate is increased, local governments invest less in local productive public goods, since less of the income generated from the public investment is retained by the local citizenry. However, we cannot sign the change in the local consumptive public good as the income and price effects are offsetting. On the one hand, the price of the local consumptive public good is decreasing in \(\tau_n\), so the local government should purchase more of it (the price effect). On the other hand, the after-tax income of the citizen is also decreasing in \(\tau_n\), and so the local government should purchase less of the local consumptive public good (the income effect).

**B. The Problem of the National Government**

We now turn to the problem of the national government. The national government maximizes the welfare of all citizens, and it takes the response functions of the local governments as given. By substituting the identity \(F(p_l, p_n)\tau_l = p_l + g_l\) for the local income tax, we obtain the problem of the national government:

\[
\max_{x, \tau, \tau', \beta_n} \{u(F(p_l, p_n)(1 - \tau_n) - (p_l + g_l)(1 - \alpha \tau_n)) + H(g_l, g_n)\}
\]

\(^{11}\) This second effect relies on the fact that the local consumptive public good is normal, i.e., agents prefer that a larger amount is spent on the consumptive public good as income increases.
subject to

\[ F(p_i, p_n) \tau_n = p_n + g_n + \alpha \tau_n (p_i + g_i) \]

where \( p_i \) and \( g_i \) are functions of the national government’s decisions.

Taking the first order condition with respect to the tax rate \( \tau_n \) yields

\[ \lambda = u'(c) \frac{F(p_i, p_n) - \alpha (p_i + g_i)}{F(p_i, p_n) - \alpha (p_i + g_i) + \tau_n \frac{\partial I}{\partial \tau_n}} \]

where \( \lambda \) is the Lagrange multiplier with respect to the budget constraint of the national government and \( I = F(p_i, p_n) - \alpha (p_i + g_i) \) is income taxable by the national government. The “shadow price” of the budget constraint is larger than \( u'(c) \), as long as taxable income is decreasing in \( \tau_n \). As in the analysis of how \( g_i \) changes with \( \tau_n \), there is both an income and a price effect of changing \( \tau_n \). We can write

\[ \frac{\partial I}{\partial \tau_n} - (F_i(p_i, p_n) - \alpha) \frac{\partial p_i}{\partial \tau_n} - \alpha \frac{\partial g_i}{\partial \tau_n}. \]

From Proposition 2, we have that \( \frac{\partial p_i}{\partial \tau_n} \leq 0 \). Since \( F(p_i, p_n) \) is larger than 1, the first term must be negative. The second term is the effect on local spending on consumptive public goods from a change in the national tax rate. This effect is composed of both an income effect that lowers spending — raising the national tax rate increases the marginal utility of private consumption — and a price effect that raises spending — raising the national tax rate lowers the cost of providing a given amount of the local consumptive public good. As long as the income effect does not dominate both the price effect and the effect of taxes on local productive public goods, \( \lambda > u'(c) \).\(^{12}\) In this case, spending is costly for the national government as it both reduces the consumption of the representative agent directly and further distorts decisions by local governments.

Taking the first order condition with respect to the local income tax deduction rate \( \alpha \), we obtain

\[ \lambda = u'(c) \frac{(p_i + g_i)}{(p_i + g_i) - \left( F_i(p_i, p_n) - \alpha \right) \frac{\partial p_i}{\partial \alpha} - \alpha \frac{\partial g_i}{\partial \alpha}}. \]

If we assume that \( \lambda > u'(c) \), we have

\[ (F_i(p_i, p_n) - \alpha) \frac{\partial p_i}{\partial \alpha} - \alpha \frac{\partial g_i}{\partial \alpha} > 0. \]

The above expression is the indirect effect on national revenues from a change in the local income tax deduction rate, which is positive if \( \lambda > u'(c) \). That is, when the local

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\(^{12}\) For instance, if utility is quasilinear in consumption, this condition will always hold, as there will be no income effect.
tax deduction increases, the increase in taxable income from a greater investment in productive public goods will more than offset the decrease in taxable income from the increase in local spending on local consumptive public goods. In particular, estimates of the change in national revenues due to eliminating the local income tax deduction (such as Mitchell (2005)) will likely overstate the gains to national revenue if they do not consider the effect that eliminating this deduction will have on local spending decisions.\textsuperscript{13}

Taking the first order condition of the problem of the national government with respect to $g_n$ and simplifying we obtain

$$H_n(g_i, g_n) = \lambda \left( 1 + \alpha \tau_n \frac{\partial g_i}{\partial g_n} \right).$$

The national government will likely underinvest in national consumptive public goods as long as $\lambda > u'(c)$. That is, it will choose a $g_n < g_n^*$, the solution to the social planner’s problem. By underinvesting in national consumptive public goods, the national government can reduce the tax wedge, and hence reduce the distortion from optimality in choices by local governments.

However, if local and national investments in consumptive public goods are substitutes, then $\frac{\partial g_i}{\partial g_n} < 0.\textsuperscript{14}$ In that case, the national government may wish to overinvest in the national consumptive public good in order to reduce investment in the local consumptive public good by local governments. However, if $g_i$ and $g_n$ are complements, then the national government has even more reason to underinvest in the consumptive public good, as such investment would increase the already inefficiently high investment in consumptive public goods by local governments.

Taking the first order condition of the problem of the national government with respect to $p_n$, and simplifying, we obtain

$$F_i(p_i, p_n) = \frac{\lambda \left( 1 + \alpha \tau_n \frac{\partial g_i}{\partial p_n} - \frac{\partial p_i}{\partial p_n} \tau_n (F_i(p_i, p_n) - \alpha) \right)}{\lambda \tau_n + u'(c)(1 - \tau_n)}.$$  

The national government will underinvest in national consumptive public goods if $\lambda > u'(c)$. That is, they will choose a $p_n < p_n^*$, the solution to the social planner’s problem. Note that $\frac{\partial g_i}{\partial p_n} > 0$, as the more the national government invests in productive public goods, the more income is available to residents within each jurisdiction, so the local government will choose to invest even more in the local consumptive public good. This gives the national government yet another reason to be cautious when investing in the national productive public good, as local governments overinvest in the local

\textsuperscript{13} A similar point is made with respect to removing the tax exemption on municipal bonds by Poterba and Verdugo (2011).

\textsuperscript{14} For a proof of this statement, see the proof of Proposition 3 in Hatfield (2011).
consumptive public good in response. However, the national government will not wish to invest more in the national productive public good to make up for the fact that the local governments underinvest in productive public goods; it will be more effective to lower the national tax rate instead.

However, if investments in productive public goods are complements, then \( \partial p_i/\partial p_n \) may be positive.\(^{15}\) In that case, the national government may wish to overinvest in the national productive public good in order to induce more investment in the local productive public good by local governments, by making such investment more effective. However, if \( p_i \) and \( p_n \) are substitutes, then the national government has even more reason to underinvest in the productive public good, as investment in the national productive public good will reduce the already inefficiently low investment in productive public goods by local governments.

We summarize these results in the following proposition:

**Proposition 3.** So long as taxable national income is decreasing in the national tax rate, the national government will choose

1. a level of national investment in productive public goods \( \hat{p}_n \) that is less than first-best, i.e., \( F_n(p_l(\hat{p}_n), \hat{p}_n) > 1 \), as long as \( p_i \) and \( p_n \) are weak substitutes, and
2. a level of national investment in consumptive public goods \( \hat{g}_n \) that is less than first-best, i.e., \( H_n(g_l(\hat{g}_n), \hat{g}_n) > u'(c) \), as long as \( g_i \) and \( g_n \) are weak complements.

If local governments are given only one responsibility and the national government can choose \( \alpha \), then it is possible to attain the first-best. For example, assume that \( H(g_l, g_n) = H(g_n) \), i.e., local consumptive public goods do not exist. Then by choosing \( \alpha = 1 \), the national government can attain the first-best. Proposition 1 assures us that the local productive public good will be chosen efficiently; since this happens regardless of the national income tax \( \tau_n \), the national government can now choose to implement the first-best national policy.

### C. Comparative Statics of Optimal Policy

There is no straightforward comparative static of the optimal national policy with respect to the local income tax deduction. In particular, the optimal choice of \( \alpha \) is not necessarily monotonic in the importance of local consumptive public goods. Consider the case where the utility of the agent is given by

\[
c + H(g_l) + J(g_n)
\]

so that utility is quasilinear. Further assume that there is no national productive public good. If \( H(g_l) = \theta \min \{1, g_l\} \), then for \( \theta = 0 \) or \( \theta \geq 1 \), the optimal policy choice by the

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\(^{15}\) For a proof of this statement, see the proof of Proposition 3 in Hatfield (2011).
national government is to choose \( \alpha = 1 \). If \( \theta = 0 \), there is no local consumptive public good, and so the national government can obtain the first-best by choosing \( \alpha = 1 \), which eliminates the distortion in the choice of \( p_l \) by the local government. If \( \theta \geq 1 \), then the local government will choose \( g_l = 1 \) for any nonnegative local income tax deduction rate \( \alpha \), and so the national government can again obtain the first-best by choosing \( \alpha = 1 \). However, if \( \theta = 1/2 \), then it may be optimal for the national government to choose an \( \alpha = \theta = 1/2 < 1 \) so that the local government does not wish to invest in the local consumptive public good.

D. A Unitary Local Public Good

In this section, we show that the national government can achieve the first-best when local government spending is unitary. By unitary, we mean that the local government spending \( g_l \) finances a general public good used for both production and consumption, so that the production function is now \( F(\text{gl}, \text{pn}) \). Let \( (g_l^*, p_n^*, g_n^*) \) be the first-best levels of public good provision.

The problem of the local government becomes

\[
\max_{c_1, g_l} \{ u(F(g_l, p_n)(1 - \tau_n - \alpha \tau_l + \alpha \tau_l)) + H(g_l, g_n) \}
\]

subject to the budget constraint \( F(g_l, p_n)\tau_l = g_l \), taking the tax rate \( \tau_n \) and investment decisions \( p_n \) and \( g_n \) of the national government as given.

Taking the first order condition for the problem of the local government with respect to investment in the local public good, we obtain

\[
F_i(g_l, p_n) + \frac{H_i(g_l, g_n)}{u'(c)} = 1 + \tau_c(F_i(g_l, p_n) - \alpha).
\]

It then follows that the national government can obtain the first-best choice of \( g_l \) by choosing \( F_i(g_l^*, p_n^*) = \alpha \) regardless of the choice of \( \tau_n, p_n, \) or \( g_n \). Intuitively, the national government directly controls the level of spending by the local governments by choosing the level of the local income tax deduction. Hence, the national government can choose its taxation and spending levels to implement the first-best national policies, and then use the local income tax deduction to induce the local governments to choose the first-best level of local spending. Since the national government maximizes the welfare of the representative agent, it will choose policies to implement the first-best. This yields

**Proposition 4.** The national government will choose \( p_n = p_n^*, g_n = g_n^*, \) and \( \alpha = F_i(g_l^*, p_n^*) \). The equilibrium outcome is first-best.

This result highlights the fact that the national income tax distorts the mix, not the level, of spending by the states in our basic model. When states have only one spending
decision, the national government can implement the first-best by careful choice of the national tax rate and local income tax deduction. However, if states have discretion over spending on productive public goods versus consumptive public goods, the national government can no longer implement the first-best.

E. Matching Grants

In this section, we show that a national government can use a targeted matching grant in order to achieve the first-best outcome. Suppose that the national government can choose a matching grant level \( \gamma \), where the national government agrees to pay for a proportion \( \gamma \) of local spending on the local productive public good. The local budget constraint then becomes

\[
F(p_l, p_n) \tau_l = p_l (1 - \gamma) + g_l.
\]

Using this new budget constraint, we can solve the local government’s problem (1) and obtain:

\[
F'(p_l, p_n) = \frac{(1 - \gamma)(1 - \alpha \tau_n)}{1 - \tau_n}
\]

and

\[
\frac{H'_l(g_l, g_n)}{u'(c)} = 1 - \alpha \tau_n.
\]

Setting \( \gamma = \tau_n \) and \( \alpha = 0 \) induces the local government to choose optimal values of investment in both types of public goods, regardless of the national income tax rate. The budget constraint for the national government is given by

\[
F(p_l, p_n) \tau_n (1 - \alpha \tau) = p_n + g_n + \gamma p_l.
\]

Since the national government can ensure that local governments invest optimally in both types of public goods by choosing \( \gamma = \tau_n \) and \( \alpha = 0 \), it can then obtain the first-best by choosing the national income tax rate to cover the cost of not only the matching grant, but also first-best investment in the national productive and consumptive public goods, which implies

**Proposition 5.** The national government will choose \( p_n = p_n^* \), \( g_n = g_n^* \), \( \alpha = 0 \), and \( \gamma = \tau_n \). The local government will choose \( p_l = p_l^* \) and \( g_l = g_l^* \).

The national income tax induces the local governments to invest too little in productive public goods, but the matching grant allows the national government to adjust this investment to first-best levels. The key assumption is that the matching grant can be
targeted at a particular type of local public good. A grant to all forms of local government spending would encounter the same problems as the local income tax deduction, as it would reduce the underinvestment in productive public goods by local governments but increase the spending on local consumptive public goods beyond efficient levels.

IV. CONCLUSIONS

We have shown that the local income tax deduction can be welfare-enhancing if the local government must provide both productive and consumptive public goods. While a local income tax deduction will cause overinvestment in local consumptive public goods, it will increase investment in local productive public goods, which will be underprovided without a full local income tax deduction. Furthermore, since there does not exist a local income tax deduction rate that correctly aligns local governments’ incentives for both productive and consumptive public goods, national governments will underinvest in public goods to reduce the distortion in the local governments’ decisions due to the national income tax.

The key issue is that some public goods that local governments provide produce taxable benefits, such as increased income, while other public goods produce nontaxable benefits, such as a more beautiful neighborhood. In this paper, productive public goods provide taxable benefits, while consumptive public goods provide nontaxable benefits. The income tax thus creates a tax bias favoring the nontaxable consumptive public goods over the taxable productive public goods, and hence creates incentives for local governments to invest more in consumptive than productive public goods. However, if the national government is able to isolate which local public goods are productive, i.e., provide taxable benefits, and which are consumptive, i.e., provide nontaxable benefits, then a local income tax deduction should not be implemented, but rather an appropriate matching grant for local productive public goods should be used. It is only when this differentiation can not be made by the national government that a local income tax deduction may be optimal.

This problem is not solved, but is rather exacerbated, by having the national government be the sole revenue collector. When the national government raises the revenue for local and national spending, the national tax rate is higher, and hence the incentives of local governments to underinvest in productive public goods and overinvest in consumptive public goods are further distorted. Indeed, a national government can always do better by allowing the local governments to raise all the resources they wish to spend and choosing an appropriate level of local income tax deduction.16

Using an average marginal tax rate of 31.0 percent (Barro and Redlick, 2011), the implied subsidy from the local income tax deduction by the federal government to the

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16 These results are shown formally in Hatfield (2011).
states is on the order of $43 billion.\(^{17}\) Property taxes used by local governments are also
deductible, and the implied subsidy to local governments for spending is on the order
of $69 billion.\(^{18}\) The numbers estimated here are, of course, only very rough estimates
of the size of the effects of the local income tax deduction. More research is needed to
properly estimate the quantitative effects of removing this deduction on national tax
revenues, as well as on the spending of state and local governments within the United
States on both consumptive and productive public goods.

In this paper, we have assumed welfare-maximizing governments, and such govern-
ments are not wholly reflected in reality, to say the least. If local governments are (par-
tial) Leviathans, who will spend too much on both types of public goods, then reducing
the local income tax deduction would be beneficial, as it would reduce spending on
both types of public goods — the first-best would still not be achieved, however, as
such local governments would still overspend on consumptive public goods relative
to productive public goods.

Accounting for the effect of the tax deduction on agents’ labor decisions also weakens
the case for a local income tax deduction. Increasing the local income tax deduction
creates incentives for local governments to spend, and thus tax, more. It is well-known
that local governments overtax under these assumptions, as they do not consider how
the effect of their taxes on labor supply affects national government revenues (Flowers,
1988). A local income tax deduction further encourages local governments to raise local
income taxes, further exacerbating the effect on national revenues.

On the other hand, if local government investment is subject to positive spillovers
in either productive or consumptive public goods, the case for a local income tax
deduction is strengthened. The provision of both types of goods is increasing in the
level of local income tax deduction, so if both are underprovided with no local income
tax deduction, the introduction of such a deduction may move the economy closer to
welfare-maximizing levels of both types of goods.

This paper has shown that the local income tax deduction may be a useful tool for
national governments to mitigate the distortionary effects of national tax policy. The
local income tax deduction increases local spending on both productive and consump-
tive public goods, and so its welfare consequences depend on the mix of public goods
available to local governments as well as the underlying incentive structure facing local
policymakers. Understanding the effects of national tax policy on local tax and spending
decisions remains an area ripe for future research.

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\(^{17}\) According to the U.S. Census of Governments, states collect approximately $246 billion in income taxes.
While not all taxpayers itemize, approximately 80 percent (Toder and Rosenberg, 2007) of tax liability is
paid by itemizing taxpayers (and these taxpayers likely face a higher marginal rate). Furthermore, taxpayers
are allowed to itemize state sales taxes when they do not itemize state income taxes, so the true size of the
effect on the decisions of state governments is larger than that calculated by just looking at income taxes.

\(^{18}\) The U.S. Census of Governments reports that local governments collected $396 billion in property tax
revenues in the 2007 fiscal year.
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