Can State Governments Redistribute Income?  
Using Source-Based Capital Taxes  
For Income Redistribution

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Abstract  Two sentiments are common among economists who study state and local public finance—that source-based capital taxation by subnational governments is a bad idea, and that state governments are powerless to redistribute income. These claims are consistent with the optimal tax literature, if the state is modeled as a small open economy—as a price taker, competing for geographically mobile factors and selling products in perfectly competitive national markets. We reject this view, and contend that the actions of the state government do influence national product and factor prices. This market power gives each state government a modest ability to redistribute income among its citizens. We construct a two-region, four-good, three-factor computational general equilibrium model of an economy, and perform simulations that show that subnational source-based capital taxes have national price effects and that they can be used to modestly redistribute income.

Keywords: State and local public finance, taxation, computational models

JEL Classifications: H71, C68

Introduction

Two sentiments are common among economists who study state and local public finance. The first sentiment is that source-based capital taxation at the state and local level should be avoided, since it drives capital out of the taxed region and creates substantial deadweight losses. The second sentiment is that it is impossible for a state government to redistribute income, since residents can relocate among states to blunt any redistributive efforts by the government. We believe that both of these sentiments are inaccurate, because they rely upon a theoretical construct—the small open economy—that is not a descriptively valid model of a state economy. To examine our belief, we will build a computational general equilibrium (CGE) model of a hypothetical economy comprising two open, interacting regional economies. We impose a source-based capital tax in one region and use the tax revenue to provide transfer payments to this region’s residents. The results of these simulations will support the notion that source-based capital taxation is an effective way to raise revenue for a subnational government, that state fiscal policy has national effects, and that a state government can indeed modestly redistribute income among its residents.
This paper proceeds as follows. We first review the claims made by others concerning the ineffectiveness of both source-based capital taxation and income redistribution by state governments, and we discuss an existing theoretical framework (developed by Harberger 1962 and extended by Mieszkowski 1972) that suggests that the claims may be inaccurate. Then we construct a CGE model of a hypothetical economy, which we use to demonstrate the modest redistributive power of source-based capital taxation by a subnational government in a national economy. Finally, we discuss the importance of these results to policymakers and suggest avenues for further research.

Capital Taxation in a Small Open Economy: Conventional View

A negative sentiment prevails regarding source-based taxation of capital by a state government. This negative sentiment has its roots in the optimal tax literature originated by Diamond and Mirrlees (1971), in which the existence of a small open economy is posited that by definition has zero market power in the much larger product and factor markets in which it participates. This stipulation dictates that any business capital tax imposed in such an economy leads to an outflow of capital that increases the gross cost of capital by the full amount of the tax, and it precludes the ability of sellers to shift any of the tax burden forward to consumers in the form of higher product prices. As a result, the burden of the tax is shifted to other less mobile factors of production in the state, creating significant distortions in factor use. In addition, the inability of the state to influence prevailing, exogenously-determined factor and product prices implies that no portion of the burden of the capital tax can be exported to nonresidents. This mechanical result—similar to the zero profit equilibrium inherent in perfectly competitive markets—has been applied to subnational capital taxation by Bradford (1978), Dixit (1985), Gordon (1986, 1992, 2000), Wilson (1986), Wildasin (1988), Bucovetsky (1991), Bucovetsky and Wilson (1991), Atkeson, Chari, and Kehoe (1999), Zodrow (1999), and Richter and Schneider (2001), among others. The essence of the argument is succinctly summarized by Gordon (1992):

If capital is mobile...then the net-of-tax return to investment cannot be lowered, since otherwise investors would transfer their funds elsewhere and continue to earn the going rate of return. Similarly, output prices cannot go up in response to the tax, due to competition from abroad. If firms are to continue to break even, in spite of the tax, the prices of (other) factors must fall by enough to compensate for the tax payments. But if these inputs end up paying the tax anyway; it is better to tax them directly—taxing capital income at source, unlike taxing these (other) factors directly, distorts the decision to invest...and produce. (p. 1161)

Income Redistribution in a Small Open Economy: Conventional View

Consistent with the criticism of source-based capital taxation is the common view that subnational governments cannot redistribute income. This theory is also generated by the small open characterization of subnational economies. According to this reasoning, a subnational tax that adversely affects high-wage workers cannot change the exogenously-determined national net wage; therefore, the tax causes an outflow of high-wage labor until its gross wage in the locality rises by the full amount of the tax, equalizing net-of-tax incomes in the taxed jurisdiction with the prevailing national level. This view is expounded by Roberts (1977), Epple and Romer
(1991), Wildasin (1991), Piketty (1995), Feldstein and Wrobel (1998), and others. The central reasoning of the view is unequivocally expressed by Feldstein and Wrobel:

State governments cannot redistribute income if individuals can migrate among political jurisdictions. Although state tax structures may appear to be redistributive, pretax real wages must adjust in the long run to make each individual’s potential after-tax real income the same in all jurisdictions. If the after-tax real income available to an individual were higher in one state than in another, individuals would locate in states where real net incomes were more favorable. In response to differences in the progressivity of tax rates, migration would raise pretax real incomes of high income individuals in states where such individuals were taxed more heavily and lower pretax incomes of lower income individuals in such states. In equilibrium, the real after tax income would be independent of state tax structure. (p. 370)

The Small Open Economy Characterization is Invalid for State Economies

State economies are not small in the technical sense of the Diamond-Mirrlees optimal tax model, for several reasons. The small assertion—that a state government has zero influence over nationally-prevailing product and factor prices—is technically wrong, since to be fully accurate this assertion requires that economic activity in each state be immeasurably (or infinitesimally) small. In other words, the assertion requires that both demand and supply for products and factors in the state be nonexistent—a clear fallacy that may be approximately accurate for the smaller state economy but which is far off target for large state economies such as California or Texas. In addition, the small assertion requires that all goods produced in a state compete with perfectly substitutable goods produced in other states (hence the complete lack of market power in goods prices). Neither evidence nor casual empiricism supports perfectly elastic demand for state production. Indeed, it is standard practice in multi-region CGE models to employ the Armington (1969) assumption that similar goods produced in different locations are not perfect substitutes. Econometric studies support this practice; Bilgic, King, Lusby, and Shreiner (2002), for example, using data from the 1993 U. S. Department of Commerce Commodity Flow Survey, estimate elasticities of substitution for 20 interstate-traded product groups ranging in value from .45 to 2.80.

It is equally inaccurate to assume that a state faces perfectly elastic labor supply, since this stipulates that people immediately migrate to equalize net wages across states when faced with even the smallest perturbation in a state’s labor tax rate. An additional implicit implication is that the wage is the predominant decision variable that affects individuals’ migration decisions. Evidence supporting perfectly elastic labor supply is limited; Feldstein and Wrobel’s oft-cited study estimates that a 1% increase in a state’s labor taxes causes no change in net wages in the state, consistent with a horizontal labor supply curve. Conversely, a plethora of empirical studies suggest that interstate wage differentials are persistent and are not the only determinants of migration patterns (e.g. Greenwood and Hunt 1984, Venti and Wise 1984, Roback 1988, Beeson and Eberts 1989, Gyourko and Tracy 1989, Evans 1990, Barro and Sala-i-Martin 1991, and Haughwout 2002). Many reasons are cited for the persistence of interstate wage differentials, including: migration costs; differences in individual preferences for natural amenities (such as climate) that vary by state; Tiebout-like differences in individual preferences for the structure of state government laws, taxes, expenditures, and institutions; uncertainty, implying that risk-averse individuals require a wage premium to induce their migration; an affinity to live in one’s birth state; and labor agglomeration effects that create non-wage rents.
Finally, it is invalid to stipulate that source-based capital taxation has no effect on an exogenously-determined national return to capital. As demonstrated by Harberger (1962), Mieszkowski (1972), Zodrow and Mieszkowski (1986), Mutti, Morgan, and Partridge (1989), and others, the burden of a partial capital income tax—a tax statutorily imposed only on some capital in the economy, leaving some statutorily taxed at lower rates—nevertheless is borne by all capital owners in the economy, as a uniform reduction in the net-of-tax return to capital throughout the economy. This implies that a capital tax imposed by a state government results in a decline in national net aggregate capital income by the amount of the tax. As demonstrated by Mieszkowski, this reduction in the national return to capital is accompanied by offsetting excise effects in the taxed state and in the rest of the nation; locally-produced product prices rise and non-capital factor returns (probably) fall in the taxed state, whilst in the other states non-capital factor returns (probably) rise and locally-produced product prices fall. In the national aggregate, the excise effects in different regions offset each other, implying that the national burden of a partial capital tax is borne by all capital owners in the nation.

Avenues Facilitating State Income Redistribution Using Source-Based Capital Taxes

The less than accurate stipulation that exogenously-determined national product and factor prices are unaffected by the actions of state governments stacks the deck against state government use of capital taxation and against state government efforts to redistribute income. A more realistic assumption—that state government actions do modestly influence national product and factor prices—leads to a more sanguine assessment, especially for states with relatively large economies. In this case, there exist avenues by which source-based capital taxes can be employed to redistribute income from rich residents to poor residents.

For example, a portion of the burden of a state’s source-based capital tax can be shifted forward to non-residents in the form higher product prices. Given a negatively-sloping demand curve for their output, in-state producers of goods for export can raise product prices without losing the entirety of their sales. At the same time, the benefit of the capital tax—the extra government spending made possible in the taxed region—remains within the region. In effect, residents of other regions are subsidizing the government spending made possible by the capital tax. This subsidy dampens the efficiency losses caused by the capital tax. In addition, a portion of the burden of a state’s source-based capital taxes is partially shifted backward to non-resident capital owners, since the national return to capital is depressed by the tax.

We should expect this partial shifting of the capital tax burden onto non-residents to reduce the degree to which capital flees the state, when compared to levels of capital flight under the small open economy assumption. This will dampen the economic distortions created by the capital tax compared to the small economy case.

Impediments to State Income Redistribution

The avenues described above that facilitate state income redistribution are mitigated by other less desirable effects. First, capital taxes will cause capital flight from the state, even if the supply of capital is not perfectly elastic. This will reduce the productive capacity of the state economy and shrink the aggregate income of the state’s residents; hence there is less income to
redistribute. This shrinkage will be exacerbated if some of the state’s richer residents flee the state upon imposition of the source-based capital tax. Though a source-based tax creates a much smaller incentive for a household to leave the state than does a residence-based tax (since statutory tax liability is not affected by the capital owner’s state of residence), there remains a small, indirect incentive for emigration, if the capital flight acts to reduce wage rates in the state. In addition, wealthier residents of the state may be encouraged to emigrate if a disproportionate amount of capital tax revenue is used to fund transfer payments to poorer residents. But to the extent that government services are funded by non-residents through tax exportation, a countervailing tendency is created encouraging an inflow of residents—attracted by the ability to consume government services funded by nonresidents. There is no a priori reason to expect that the incentive for wealthier to emigrate will exceed the incentive to immigrate; it is an empirical question, which hinges in part on the extent of the ability of the state to export its tax burden and the extent to which government benefits are disproportionately extended to less wealthy residents.

A Two-Region CGE Model

To simulate an attempt by a state government to redistribute income using source-based capital taxes, we construct a two-region CGE model of an economy designed to approximate some important characteristics of a U. S. state interacting with the rest of the U. S. economy. The major purpose of this model is to test the common views regarding state source-based capital taxation and income redistribution and to demonstrate that even a small state has some market power; it is not to model the U. S. economy with sufficient accuracy to provide precise policy guidance or precise forecasts to any existing government. Therefore, the model is stripped of unnecessary detail, but it retains features sufficient to serve our more general purposes.

The major features of the model are as follows:

- The economy is divided into two regions, State and Large.
- Within each region two types of goods are produced—Traded and Nontraded. A portion of the traded good is consumed outside the regional economy; 100% of the nontraded good is consumed within the region.
- Production of each good requires three inputs: Skilled labor, Unskilled labor, and Capital.
- Two types of households exist in the economy—Rich and Poor. Rich households earn income supplying Skilled Labor and Capital to producers. Poor households earn income supplying Unskilled Labor and Capital to producers. All households gain utility consuming three goods—Nontraded goods, Traded goods produced in their home region, and Traded goods imported from the other region.
- There is neither a national government, nor is there a regional government in the Large region.
- There exists a government in the State region that is inactive in the benchmark equilibrium. In the counterfactual equilibria, the State regional government levies a tax on capital used by the region’s Traded goods producer, and it redistributes the revenue to Poor households in the region.
- Traded goods can be costlessly transported between regions. Capital freely moves between regions to equalize its after-tax return. Households are mobile between regions, and migrate to equalize interregional utilities of the same household type.
- In equilibrium, all factor and product markets clear, the State government’s budget is balanced, and utilities of like households are equalized between regions.

Below is a mathematical depiction of the firms and households:

Firms: Each producer in a region is characterized by this nested CES production function:

\[ Q = \alpha \left[ \beta S^{\frac{\sigma - 1}{\sigma}} + (1 - \beta) B^{\frac{\sigma - 1}{\sigma}} \right]^{\frac{\sigma}{\sigma - 1}} \]  

where \( Q \) is units of output, \( \alpha \) is a scale parameter, \( \beta \) is a distribution parameter, \( \sigma \) is a substitution elasticity, \( S \) is units of skilled labor employed, and \( B \) is a composite combination of unskilled labor and capital:

\[ B = \alpha_B \left[ \beta_B L^{\frac{\sigma_B - 1}{\sigma_B}} + (1 - \beta_B) K^{\frac{\sigma_B - 1}{\sigma_B}} \right]^{\frac{\sigma_B}{\sigma_B - 1}} \]  

where \( \alpha_B \) is a scale parameter, \( \beta_B \) is a distribution parameter, \( \sigma_B \) is a substitution elasticity, \( L \) is units of unskilled labor employed, and \( K \) is units of capital employed.

Each firm is assumed to earn zero profits. Hence each faces the budget constraint:

\[ pQ = w_S S + w_L L + r(1 + \tau)K \]  

where \( p \) is the per unit output price, \( w_S \) is the skilled wage, \( w_L \) is the unskilled wage, \( r \) is the net return to capital, and \( \tau \) is the source-based capital tax rate. \( \tau \) is always zero in the large region, and \( \tau \) is also zero in the State region in the benchmark (no-tax) equilibrium. \( \tau \) exceeds 0 only for the traded goods producer in the State region in the counterfactual equilibria; that is, the State region is only permitted to tax capital used by the traded goods sector. There are no other taxes in the model.

Cost-minimization results in the following factor demand functions per unit of output:

\[ s = \frac{\beta^\sigma w_s^{-\sigma}}{\alpha(\beta^\sigma w_s^{1-\sigma} + (1 - \beta)^\sigma p_B^{1-\sigma})^{\frac{\sigma}{\sigma - 1}}} \]  

\[ b = \frac{(1 - \beta)^\sigma p_B^{-\sigma}}{\alpha(\beta^\sigma w_s^{1-\sigma} + (1 - \beta)^\sigma p_B^{1-\sigma})^{\frac{\sigma}{\sigma - 1}}} \]
\[ k = \frac{\left(1 - \beta_B\right)^{\gamma_s} (r(1 + \tau))^{-\gamma_s}}{\alpha_B \left(\beta_B^{\gamma_s} w_L^{1-\gamma_s} + (1 - \beta_B)^{\gamma_s} (r(1 + \tau))^{1-\gamma_s}\right)^{\frac{\gamma_s}{\gamma_s - 1}}} b \]  

\[ l = \frac{\beta_B^{\gamma_s} w_L^{1-\gamma_s}}{\alpha_B \left(\beta_B^{\gamma_s} w_L^{1-\gamma_s} + (1 - \beta_B)^{\gamma_s} (r(1 + \tau))^{1-\gamma_s}\right)^{\frac{\gamma_s}{\gamma_s - 1}}} b \]  

where \( p_B \) is the hypothetical price of the composite factor:

\[ p_B = \frac{1}{\alpha_B} \left(\beta_B^{\gamma_s} w_L^{1-\gamma_s} + (1 - \beta_B)^{\gamma_s} (r(1 + \tau))^{1-\gamma_s}\right)^{-\frac{1}{\gamma_s}} \]  

Households: Each household in a region is characterized by this nested CES utility function.

\[ U = \alpha_U \left[ \beta_U^{\sigma_U} N^{\sigma_U} (1 - \beta_U) T^{\sigma_U} \right]^{\frac{\sigma_U}{\sigma_U - 1}} \]  

where \( U \) is total utility, \( \alpha_U \) is a scale parameter, \( \beta_U \) is a distribution parameter, \( \sigma_U \) is a substitution elasticity, \( N \) is units of the nontraded good consumed, and \( T \) is a composite combination of traded goods produced in each region:

\[ T = \alpha_T \left[ \beta_T^{\sigma_T} T_L^{\sigma_T} (1 - \beta_T) T_S^{\sigma_T} \right]^{\frac{\sigma_T}{\sigma_T - 1}} \]  

where \( \alpha_T \) is a scale parameter, \( \beta_T \) is a distribution parameter, \( \sigma_T \) is a substitution elasticity, \( T_L \) is units of the Large region’s traded good consumed, and \( T_S \) is units of the State region’s traded good consumed.

Rich households face the budget constraint:

\[ p_L T_L + p_S T_S + p_N N = w_S S_H + rK_{HR} \]  

where \( p_L \) is the per unit price of the large region’s traded good, \( p_S \) is price per unit of the State region’s traded good, \( p_N \) is the price per unit of the nontraded good, \( S_H \) is the household’s exogenously-determined endowment of skilled labor, and \( K_{HR} \) is the Rich household’s exogenously-determined capital endowment.

Poor households face the budget constraint:

\[ p_L T_L + p_S T_S + p_N N = w_L L_H + rK_{HP} + \tau r K_T / X \]
where $L_H$ is the exogenously-determined household endowment of unskilled labor, and $K_{HP}$ is the exogenously-determined household endowment of capital. The term $\tau RK_T/X$ is relevant only in the State region; $K_T$ is the amount of capital employed by the State region’s traded goods producer, and $X$ is the population of Poor households in the State region. Thus any tax revenue collected by the State region is redistributed as a transfer payment to each Poor household in the region.

Utility-maximization results in the following demand functions:

$$N = \frac{1}{\beta_U^{\sigma_Y} p_N^{\sigma_Y} Y} \left( \frac{1}{\beta_U^{\sigma_Y} p_N^{\sigma_Y} + (1 - \beta_U^{\sigma_Y}) p_T^{\sigma_Y}} \right)^{\sigma_Y - 1}$$  \hspace{1cm} (13)

$$T = \frac{(1 - \beta_U^{\sigma_Y})^{\sigma_T} p_T^{\sigma_T} Y}{\left( \frac{1}{\beta_U^{\sigma_Y} p_N^{\sigma_Y} + (1 - \beta_U^{\sigma_Y}) p_T^{\sigma_Y}} \right)^{\sigma_Y - 1}}$$ \hspace{1cm} (14)

$$T_S = \frac{(1 - \beta_T^{\sigma_T})^{\sigma_T} p_S^{\sigma_T}}{\alpha_T \left( \beta_T^{\sigma_T} p_L^{1 - \sigma_T} + (1 - \beta_T^{\sigma_T}) p_S^{1 - \sigma_T} \right)^{\sigma_T - 1}}$$ \hspace{1cm} (15)

$$T_L = \frac{\beta_T^{\sigma_T} p_L^{\sigma_T}}{\alpha_T \left( \beta_T^{\sigma_T} p_L^{1 - \sigma_T} + (1 - \beta_T^{\sigma_T}) p_S^{1 - \sigma_T} \right)^{\sigma_T - 1}}$$ \hspace{1cm} (16)

where $Y$ is the individual’s disposable income, and $p_T$ is the hypothetical price of the composite traded good:

$$p_T = \frac{1}{\alpha_T \left( \beta_T^{\sigma_T} p_L^{1 - \sigma_T} + (1 - \beta_T^{\sigma_T}) p_S^{1 - \sigma_T} \right)^{\sigma_T - 1}}$$ \hspace{1cm} (17)

**Characterizing the CGE Model Using U. S. Data**

We use U.S. government data from 2002, and other statistics and estimates, to characterize our 2-region economy:
In 2002 there were 130 million workers in the United States, so we populate our model with 130 million workers. 87 million of these workers were production workers earning an average salary of $17,500, so we populate our model with 87 million Poor households, endowing each household with 17,500 units of unskilled labor valued at $1 per unit in the benchmark. The remaining 43 million workers earned an average of $80,500, so we populate our economy with 43 million Rich households, endowing each household with 80,500 units of labor in the benchmark period.

In 2002, compensation of employees comprised 2/3 of national income. We heroically assign the remaining 1/3 as capital income (ignoring the contribution to national income of other factors of production such as land). IRS data on capital ownership indicates that workers earning near $80,000 in labor income also earned approximately five times as much capital income as persons earning around $20,000 in labor income. Hence we endow each Rich household in our model with five times the capital as each Poor household. Combining these assumptions, in the we endow each Poor household with 8,250 units of capital and each Rich household with 41,250 units of capital, valued at $1 per unit in the benchmark period.

We assume that national income equals gross domestic product, so we set total national production at $7.4755 trillion in the benchmark period.

In 2002, approximately 2/3 of U. S. GDP was categorized as services or structures. We will use this categorization as a proxy for Nontraded goods. Hence we heroically assume that 2/3 of total national production in our model is Nontraded goods and 1/3 is Traded goods. We further assume that in the benchmark period, the price per unit of each good is $1. Combining these assumptions, we assume benchmark national Nontraded goods production of 4.9837 trillion units, and benchmark Traded goods production of 2.4918 trillion units.

Data compiled by Fullerton and Rogers (1993) indicates that, to a very rough approximation, production of services and structures requires half as much capital per unit of output as does production of other goods. We therefore assume that production of Nontraded goods in our model requires half as much capital per unit as does production of Traded goods. This means that in the benchmark period 1.2459 trillion units of capital are employed nationally in Nontraded goods production, and precisely the same amount is employed nationally in Traded goods production.

Once capital’s contribution to the value of national production of each good is calculated, labor’s contribution is a residual, since capital and labor are the only two production factors in our model. Hence in the benchmark period 3.7377 trillion units of labor are employed nationally in Nontraded goods production, and 1.2459 trillion units of labor are employed in Traded goods production.

We must specify the proportion of production labor relative to nonproduction labor that is employed by Traded and Nontraded producers. Regrettably, we can find no compelling data or estimates for our aggregated production sectors to assign an educated proportion to each production sector. Therefore, we make the heroic assumption that the proportion
of production to nonproduction labor is identical in both the Traded goods sector and the Nontraded goods sector.

- **Size of the State region: Two formulations.** We wish to examine the power of both a relatively small state and a relatively large state to use source-based capital taxes to redistribute income. We therefore formulate two versions of our CGE model.
  
  - In formulation 1 we design the State region to have benchmark total production equal to approximately 2/10 of 1% of the nation’s total production, because the average gross state product of the 3 smallest U.S. state economies has the same relationship to U.S. GDP.
  
  - In formulation 2 we design the State region to have benchmark total production equal to approximately 9.7% of the nation’s total production, because the average gross state product of the 3 largest U.S. state economies has the same relationship to U.S. GDP.

**Parameter Specification: Elasticities of Substitution**

- Elasticities of substitution in production: We employ an elasticity of substitution of .5 between capital and production labor, of 1 between capital and nonproduction labor, and 1 between nonproduction labor and production labor. These values are consistent with those obtained by econometric research surveyed by Fullerton and Rogers (1993), Hamermesh (1992), and Hamermesh and Grant (1979).

- Elasticities of substitution in consumption: We assume an elasticity of substitution of .5 between Traded and Nontraded goods. We assume an elasticity of substitution between the traded good produced in the two regions of 2.80—the upper bound of estimates by Bilgic, King, Lusby and Shreiner (2002).

**Model Calibration**

Calibration of the CGE model assigns values to the remaining unspecified parameters—the scale and distribution parameters in the production and utility functions. The calibration procedure used for our model is similar to the procedure described in great detail in Shoven and Whalley (1992); it involves combining the real world data, the values specified for elasticities of substitution, and the assumptions of utility maximization and cost minimization to derive the unique values of the distribution and scale parameters that are consistent with the data, the elasticities, and the optimizing behavior of consumers and firms.

This procedure is fairly standard in the CGE literature. For brevity the detailed calculations are not included here but the process is quite straightforward. Units of factors and goods are defined so that the price per unit is $1 for each factor and good in the benchmark equilibrium. Cost minimization, given the CES form of the production function, implies that distribution parameters for each factor reflect the portion of total cost allocated to each factor; for example, since 34.7% of total factor cost is allocated to skilled labor in the traded goods sector, \( \beta \)
from equation (1) equals .347 in that sector. Production function scale parameter $\alpha$ is calibrated to ensure that total factor productivity is exactly sufficient to produce the specified output and $\alpha_B$ is calibrated so that the relative productivity of labor to capital is accurate. Applying similar methodology to consumers, utility maximization stipulates that distribution parameters for each good reflect the portion of the consumer’s budget that is spent on each good; for example, since 2/3 of total consumption is nontraded goods, $\beta_U$ from equation (9) equals 2/3. Scale parameter $\alpha_U$ is calibrated to produce a convenient scale to measure utility, while $\alpha_T$ is calibrated to maintain the correct preference structure among traded and nontraded goods.

Simulating Changes in Tax Policy

Above, we have described our CGE model’s benchmark, no-tax equilibrium. Next, we undertake two separate counterfactual simulations. Both involve a tax in the State region imposed upon the capital used by the producer of Traded goods in the region. (The statutory incidence of this tax is that it is paid by the Traded goods producer in the State region directly to the region’s government).

Simulation 1: A 20% tax is imposed upon the value of capital used by the Traded goods producer in the State region. All tax revenue is distributed to Poor Households in the State region on an equal per household basis. The State region is relatively small, producing 2/10 of 1% of national output in the benchmark equilibrium.

Simulation 2: Once again, a 20% tax is imposed upon the value of capital used by the Traded goods producer in the State region, and all tax revenue is distributed to Poor households in the State region on an equal per household basis. In this simulation, however, the State region is relatively big, producing 9.7% of national output in the benchmark equilibrium.

Results of both simulations are displayed in table 1.

Analysis of Simulation Results

In both simulations, the State regional government redistributed income from Rich to Poor households; Rich utilities fell and Poor utilities rose. Though the effect was quite modest in simulation 1, it is nontrivial, even though the State Region’s GDP is only 2/10 of 1% of the size of the Large region. In simulation 2, the State region, due to its increased market power, had greater influence with redistribution. Notice also that in both simulations, the State government’s tax policy affected both product and factor prices in the Large region—an indication that the application of Diamond/Mirlees’ infinitesimally small economy to the analysis of state government fiscal issues is unwise.

Consider the avenues facilitating the State region’s successful income redistribution. Most important was the market power of the State traded goods producer. Recall that much of the State region’s Traded goods production is consumed by residents of the Large region. The higher capital tax imposed on State Traded goods causes their price per unit to rise. This is a burden upon all who consume State region Traded goods—including residents of the Large
region. Notice that the product price rose to a much larger extent in simulation 2 than in simulation 1; this is because of the greater importance of the State traded good in consumption in simulation 2. As a result, a greater portion of burden of the State region’s capital tax was shifted to Large region residents. Consequently, the percentage decline in the State region’s GDP was less pronounced in simulation 2 compared to simulation 1. Less important, but still nontrivial, is the decline in the net return to capital nationwide, consistent with the predictions of Mieszkowski (1972). This burden is shared by capital owners (Rich and Poor) in the State and Large regions.

Note that the deadweight loss associated with the capital tax (as evidenced by the decline in national GDP in both simulations) was not severe enough to completely thwart the redistributive efforts of the State region. The economic pie shrank, but more was still available to Poor residents of both regions.

Finally, consider the fact that the fiscal policy of subnational government has nontrivial national effects not only on the national output but also on the national distribution of income. The spillover effects resulting from the exportation of state taxes concern many economists (e.g. Sheffrin 2000), since the burden of the exported taxes—including their efficiency-distorting and income-redistributing effects outside the statutorily taxed jurisdiction—introduces a disconnect between the wishes of voters and the consequences to outsiders.

Further Research: Robustness of Armington Elasticity Estimates

We believe that the results of our CGE model demonstrate the folly of representing a state government as powerless to affect exogenously-determined national prices, and we are confident that the Armington assumption implying non-infinite price elasticities of demand for traded goods is correct. But we are less confident about the precise values of elasticities of substitution among similar goods produced in different states. As our analysis has demonstrated, the extent of the ability of state governments to both effectively tax mobile factors and to redistribute income depends crucially on the values of these substitution elasticities. Further research is warranted that investigates the appropriate values of these elasticities for a multi-state U.S. CGE model, perhaps using methodology similar to Liu, Arndt, and Hertel’s (2004) examination of this issue for a global multi-country CGE model.

Conclusion

The widely disseminated claim that state governments cannot redistribute income is flawed, as is the claim that source-based capital taxation is an ineffective tax instrument for state governments. To ignore the market power of state governments is to misunderstand the implications of their actions and to mislead policymakers. It is clear that even a small state government can affect factor and product prices not only in their own state but also in the rest of the nation, and is equally clear that state governments can institute policies that affect the distribution of income not only locally but nationally as well. It is not the purpose of this paper to suggest that it is sound fiscal policy in a federal economy to assign redistributive powers to subnational governments. But such redistribution is possible and it has national implications. We wish to soften the unequivocal claims concerning the futility of subnational capital taxation and
income redistribution, and to urge researchers to forego the inaccurate depiction of states as small economies with zero market power.

Footnotes

1. The author thanks Peter Mieszkowski for his counsel on prior versions of this research.

2. The research literature developing and employing CGE models is rich, and this paper relies upon this body of work for many of its methodologies. Shoven and Whalley (1972) is a seminal work; recent important contributions include Dixon and Rimmer (2004) and Cutler and Strelnikova (2004).

3. Some subscripts have been suppressed for brevity and readability.

References


Table 1. Simulation Results

| Equilibria With 20% Tax Imposed on Capital Used in State Production of Traded Good |
|---------------------------------|---------------------------------|
| Simulation 1:                  | Simulation 2:                  |
| State Produces 0.2% of National GDP | State Produces 9.7% of National GDP |

Utilities (compared to benchmark)

| % Change in Rich Utility | -0.0191% | -3.47% |
| % Change in Poor Utility | +0.0167% | +3.17% |

(Utilities are equal for like households in both regions)

Population (compared to benchmark)

| % Change, Rich Population, State Region | -4.65% | -1.97% |
| % Change, Rich Population, Large Region | +0.0009% | +0.19% |
| % Change, Poor Population, State Region | +10.77% | +4.89% |
| % Change, Poor Population, Large Region | -0.0022% | -0.4743% |

Product Prices (compared to benchmark)

| % Change, State Traded Good | +1.1071% | +5.5806% |
| % Change, Large Traded Good | -0.000068% | +1.7727% |
| % Change, State Nontraded Good | +0.00221% | +0.02974% |
| % Change, Large Nontraded Good | -0.000002% | +0.01174% |

Factor Prices (net)

| Capital in Nation | 0.999989 | 0.987765 |
| Rich Labor in State | 0.999988 | 0.999970 |
| Rich Labor in Large | 0.999988 | 0.999970 |
| Poor Labor in State | 0.999971 | 0.999956 |
| Poor Labor in Large | 0.999971 | 0.999956 |

(All factor prices = 1 in the benchmark equilibrium)

Production (compared to benchmark)

| % Change, State Traded Good | -57.27% | -40.80% |
| % Change, Large Traded Good | +0.09% | +1.82% |
| % Change, State Nontraded Good | +5.22% | +3.66% |
| % Change, Large Nontraded Good | +0.0011% | +0.513% |

Gross Domestic Product (compared to benchmark)

| % Change | -0.001% | -0.225% |