Efficiency and State and Local Taxation

Author(s): Athiphat Muthitacharoen and George R. Zodrow

Source: *Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association*, Vol. 101, 101st Annual Conference on Taxation (November 20-22, 2008), pp. 57-64

Published by: National Tax Association

Stable URL: https://www.jstor.org/stable/10.2307/prancotamamnta.101.57

EFFICIENCY AND STATE AND LOCAL TAXATION*

Athiphat Muthitacharoen, Congressional Budget Office
George R. Zodrow, Rice University

INTRODUCTION

PROPERTY TAXES AND SALES TAXES ARE THE two most important revenue instruments at the state and local government level in the United States. Most state tax revenue is generated by sales taxes, while the property tax is the most heavily utilized tax for local governments.[1] However, in recent years, local governments have reduced the share of property taxes in revenues while increasing reliance on alternative taxes, especially local sales taxes. For example, the property tax accounted for over 80 percent of total tax revenue for local governments in the 1970s, but only around 70 percent in 2007. Simultaneously, local reliance on sales taxes has increased, as sales taxes accounted for around 8 percent of total local government tax revenue in 1970, but by 2007 this figure had doubled to 16 percent.[2]

A natural question is whether this reduction in the use of the property tax and the accompanying increase in reliance on the sales tax is desirable from a social perspective. There are, of course, many dimensions in which this question might be answered, including the efficiency, equity, simplicity, revenue stability, and revenue adequacy properties of the various tax alternatives.[3] In this study, we focus on an intermediate run analysis of the relative efficiency consequences of local property and sales taxes, from the perspective of a single taxing jurisdiction that is modeled as a small open economy (e.g., a metropolitan area that either utilizes both sales and property taxes or is replacing local property tax revenues with an equal amount of state sales tax revenue).

The paper proceeds as follows. The following section briefly reviews the literature on the efficiency aspects of property and sales taxes. The third section presents the details of our partial equilibrium model of the use of property and sales taxes by a small open economy. Simulation results estimating the efficiency costs associated with local use of property taxes and sales taxes are presented in the fourth section. The fifth section summarizes the results and suggests some directions for future research.

AN OVERVIEW OF THE EXISTING LITERATURE

There are two alternative views regarding the economic effects of the property tax – the benefit tax view and the capital tax view. Under the benefit tax view, the property tax is an efficient benefit tax or user charge paid in exchange for local government services received. In marked contrast, under the capital tax view, the property tax is a tax on the use of capital and causes numerous inefficiencies, including reductions in the capital intensity of production and in the consumption of capital-intensive goods, reductions in the overall supply of capital to the taxing jurisdiction, and tax-induced misallocations of businesses and households across jurisdictions. In this study, we do not revisit the controversial debate between the two views.[4] Instead, we simply assume the validity of the capital tax view and then compare it on efficiency grounds to the sales tax.

Several previous studies address the economic efficiency effects of the property tax and sales tax. None of these studies, however, analyzes these two tax instruments within the context of a single model and estimates their relative efficiency costs from the perspective of a single taxing jurisdiction. For example, Bruce, Deskins, and Fox (2006) examine the tax base elasticities of state sales, corporate income and personal income taxes. Using a 1985-2003 panel of state data, they find that the personal income tax base is most responsive to changes in tax rates, followed by the sales tax base and the corporate income tax base, respectively. Focusing on the sales tax, they show that state sales tax bases decline by 0.53 percent in response to a 1-percent increase in the statutory sales tax base. This elasticity, however, becomes substantially smaller when the statutory tax rate is replaced with the effective sales tax rate.

*We would like to thank Tom Bogart and the participants of our session at the 101st Annual Conference on Taxation of the National Tax Association, Philadelphia PA, November 20-22, 2008, for helpful comments. The views expressed in this paper reflect the opinions of the authors and should not be interpreted as those of the Congressional Budget Office or the Baker Institute for Public Policy of Rice University.

Hawkins (2002) estimates the excess burden associated with the use of sales taxes under various tax structures. His study is based on a partial equilibrium analysis that focuses primarily on the allocative consumption distortions arising from tax exemption. He reports excess burdens, with and without pyramiding attributable to sales taxation of business inputs, for three progressively narrower sales tax bases. Hawkins finds that the excess burden of the sales tax rises with the price elasticity of demand of the taxed goods. That is, the exemption of highly price-elastic goods such as food and gasoline involves relatively larger distortions than the exemption of low price-elastic goods such as services and utilities.[5] Overall, neglecting the effects of pyramiding due to sales taxation of business inputs, he estimates that the efficiency costs of the three sales tax options, relative to a uniform base, range from 23.3-38.5 percent of revenues, with the excess burdens rising as the tax base becomes narrower and rates increase.[6] He then considers the effects of the tax pyramiding that arises due to the widespread sales taxation of business inputs, as stressed by Ring (1999); these estimates most closely reflect the efficiency costs of existing sales tax structures. Somewhat surprisingly, Hawkins (2002) finds that pyramiding reduces the efficiency costs of sales taxation because taxed inputs are disproportionately important in the production of goods that exempt from the sales tax and are demanded relatively inelastically. Specifically, with pyramiding, the efficiency costs of the three sales tax options, relative to a uniform base, range from 17.9-26.7 percent of revenues.

Russo (2005) concentrates on the efficiency consequences of various revenue-neutral sales tax reforms designed to reduce erosion of the sales tax base. He recognizes that broadening the sales tax base would reduce existing distortions between taxed and untaxed goods and services, resulting in lower tax rates and thus enhancing the efficiency of the tax system. However, taxing more business services could also reduce efficiency as it distorts production decisions, since services make up a large fraction of production inputs. Russo (2005) considers the long-run effects of a sales tax reform within the context of a model that, like the one in this paper, treats the taxing jurisdiction as a small open economy. He finds that broadening the tax base, as expected, lowers the excess burden of the sales tax system. In a reform in which the sales tax is transformed to a pure consumption tax (extending the tax to all commodities while removing tax on business inputs), the excess burden declines by an amount equivalent to 0.2 percent of consumption, or approximately 4.5 percent of total sales tax revenue.[7]

Nechyba (1998) studies the efficiency consequences of replacing an income tax on mobile capital with land value taxation, holding revenues constant. He assumes the supply of land in the taxing jurisdiction is fixed, while the supply of capital to the economy is perfectly elastic. Starting from an initial equilibrium in which the tax rates on land rent and capital income are 17 percent and 27.4 percent, respectively, he simulates the effects of a tax on land rents that is sufficiently large to eliminate the tax on capital. The higher the elasticity of substitution between land and capital, the more effective any incremental increase in the tax on land rents is in lowering the tax on capital, as a larger increase in the capital stock translates into a larger increase in the level of output and tax revenues. For example, if the capital-land substitution elasticity equals 0.25, a 60.5 percent tax on land rents is sufficient to eliminate the tax on capital income and the substitution of land taxes for property taxes results in a 43 percent increase in the capital-land ratio and a 32 percent increase in output. However, if the land-capital substitution elasticity is 0.5, the tax rate on land rents has to rise to only 50.9 percent to eliminate the capital income tax, and this policy change causes the capital-land ratio to more than double with output rising by 89 percent. These results suggest that the taxation of capital income has significant efficiency costs, but Nechyba (1998) does not explicitly calculate efficiency costs in his model.[8]

Wildasin (1989) investigates another source of efficiency losses due to local property taxation – the underprovision of public services that arises when local officials are reluctant to use the property tax because they are concerned it will drive mobile capital out of their jurisdiction, as suggested in the tax competition models of Zodrow and Mieszkowski (1986) and Wilson (1986). He presents some illustrative calculations of the welfare losses due to this underprovision of local public services. In the case in which local governments rely entirely on property taxation – which requires a property tax rate of 30 percent – the deadweight loss from distorted local public spending is substantial, equaling 8.2 percent of total local public expenditure. However, these deadweight losses are far lower when taking into account the transfers that local governments receive from higher levels of government, With a property tax rate of 10 percent that reflects such transfers, Wildasin (1989) estimates that the deadweight loss due to the property tax is on the order of only 0.3-0.6 percent of total public expenditures.

THE MODEL

This section describes our model, including the calculation of the efficiency costs associated with an increase in local property and sales taxes. The model has four production sectors: agriculture (A), manufacturing (M), housing services (H) and non-housing services (S). The goods produced by the agricultural and manufacturing sectors are tradable, while housing and non-housing services are non-tradable. All production sectors use capital, labor, and land as inputs, with land in each production sector fixed. The model thus analyzes the effects of sales and property taxes in an intermediate-run context; over a longer run period, land could be reallocated between the various production sectors.

The taxing jurisdiction is assumed to be a small open economy that faces a fixed net rate of return on capital (the supply of capital is perfectly elastic), a fixed price for the tradable agricultural good, and a fixed price for the tradable manufactured good, which is the numeraire. All markets are assumed to be perfectly competitive. Each resident of the jurisdiction owns one unit of labor, an equal share of the fixed supply of local housing land, and an equal fixed share of a national portfolio that includes all of the fixed national supply of capital and the fixed national supply of land used for production of all goods other than housing. The small open economy assumption implies that the actions of the single taxing jurisdiction do not affect the aggregate value of the national portfolio.

All tax rates are stated on a tax-exclusive basis. Denote by, T_j, $j \in \{A,M,H,S\}$ the sales tax on consumption of goods A, M, H, and, S and T_p the property tax rate. For consumption of any good j, the consumer pays $P_j(1 + T_j)$, while producer receives P_j. We assume that the consumption of manufactured goods is fully taxed, the consumption of agricultural goods and housing services is exempt from the sales tax, and the consumption of services is subject to a reduced sales tax rate. That is, $T_A = T_H = 0$, and $T_M > T_S > 0$. The property tax is imposed on all uses of capital and land in all sectors except the agricultural sector (A). For each unit of capital, the capital owner receives the after-tax return r while capital costs producers, in all sectors except agriculture, $r(1 + T_p)$. In each sector, land supplies are fixed and, using the restricted profit function approach, the producer pays Π_j for the use of land while landowners, in all sectors except agriculture, receive. $\Pi_j / (1 + T_p)$

Producer Optimization

All production sectors are characterized by constant elasticity of substitution (CES) technology

$$Q_j = \Psi_j \left(\alpha_{Kj} K_j^{\rho_j} + \alpha_{Lj} L_j^{\rho_j} + \alpha_{Vj} \bar{V}_j^{\rho_j} \right)^{1/\rho_j}, \; \sigma_j = \frac{1}{1-\rho_j},$$

where Q_j is the amount of good j produced within the jurisdiction, K_j is the amount of capital used in sector j, L_j is the amount of labor used in sector j, and $\bar{V}_j$ is the fixed amount of land in sector j. The intermediate run analysis assumes labor is partially mobile in the sense that it is perfectly mobile across productions sectors but the total supply of labor ($\bar{L}$) within the taxing jurisdiction is fixed, so that $L_A + L_M + L_H + L_S = \bar{L}$. Capital is perfectly mobile across all production sectors and is supplied perfectly elastically to the taxing jurisdiction, implying that the net rate of return on capital, r, is fixed.

Using the restricted profit function approach for the CES production functions (Diewert, 1978), gross returns to land (residual profits), for $j \in \{M,H,S\}$, are

$$\Pi_A = \alpha_{V_A}^{\sigma_A/(\sigma_A-1)} \bar{V}_A \Big[(P_A \Psi_A)^{1-\sigma_A} - \alpha_{K_A}^{\sigma_A} r^{1-\sigma_A} - \alpha_{L_A}^{\sigma_A} w^{1-\sigma_A} \Big]^{1/(1-\sigma_A)}$$

$$\Pi_j = \alpha_{V_j}^{\sigma_j/(\sigma_j-1)} \bar{V}_j \Big[(P_j \Psi_j)^{1-\sigma_j} - \alpha_{K_j}^{\sigma_j} (r(1+T_P))^{1-\sigma_j} - \alpha_{L_j}^{\sigma_j} w^{1-\sigma_j} \Big]^{1/(1-\sigma_A)}.$$

Differentiation of the restricted profit expressions with respect to output prices yields outputs:

$$Q_A = \frac{\partial \Pi_A}{\partial P_A} = \alpha_{VA}^{\sigma_A/(\sigma_A-1)} \Psi_A^{1-\sigma_A} P_A^{-\sigma_A} \Big[(P_A \Psi_A)^{1-\sigma_A} - \alpha_{KA}^{\sigma_A} r^{1-\sigma_Y} - \alpha_{LA}^{\sigma_A} w^{1-\sigma_A} \Big]^{\sigma_A/(1-\sigma_A)} \bar{V}_A$$

$$Q_j = \frac{\partial \Pi_j}{\partial P_j} = \alpha_{Vj}^{\sigma_j/(\sigma_j-1)} \Psi_j^{1-\sigma_j} P_j^{-\sigma_j} \Big[\left(P_j \Psi_j \right)^{1-\sigma_j} - \alpha_{Kj}^{\sigma_j} \left(r(1+T_P) \right)^{1-\sigma_j} - \alpha_{Lj}^{\sigma_j} w^{1-\sigma_j} \Big]^{\sigma_j/(1-\sigma_j)} \bar{V}_j,$$

and differentiation with respect to factor prices yields the factor demands:

$$L_A = \frac{\partial \Pi_A}{\partial w} = \alpha_{VA}^{\sigma_A/(\sigma_A-1)}\left(\frac{\alpha_{LA}}{w}\right)^{\sigma_A}\left[\left(\Psi_A P_A\right)^{1-\sigma_A} - \alpha_{KA}^{\sigma_A} r^{1-\sigma_A} - \alpha_{LA}^{\sigma_A} w^{1-\sigma_A}\right]^{\sigma_A/(1-\sigma_A)} \bar{V}_A$$

$$K_A = \frac{\partial \Pi_A}{\partial r} = \alpha_{VA}^{\sigma_A/(\sigma_A-1)}\left(\frac{\alpha_{KA}}{r}\right)^{\sigma_A}\left[\left(\Psi_A P_A\right)^{1-\sigma_A} - \alpha_{KA}^{\sigma_A} r^{1-\sigma_A} - \alpha_{LA}^{\sigma_A} w^{1-\sigma_A}\right]^{\sigma_A/(1-\sigma_A)} \bar{V}_A$$

$$L_j = \frac{\partial \Pi_j}{\partial w} = \alpha_{Vj}^{\sigma_j/(\sigma_j-1)}\left(\frac{\alpha_{Lj}}{w}\right)^{\sigma_j}\left[\left(\Psi_j P_j\right)^{1-\sigma_j} - \alpha_{Kj}^{\sigma_j}\left(r(1+T_P)\right)^{1-\sigma_j} - \alpha_{Lj}^{\sigma_j} w^{1-\sigma_j}\right]^{\sigma_j/(1-\sigma_j)} \bar{V}_j$$

$$K_j = \frac{\partial \Pi_j}{\partial r(1+T_P)} = \alpha_{Vj}^{\sigma_j/(\sigma_j-1)}\left(\frac{\alpha_{Kj}}{r(1+T_P)}\right)^{\sigma_j}\left[\left(\Psi_j P_j\right)^{1-\sigma_j} - \alpha_{Kj}^{\sigma_j}\left(r(1+T_P)\right)^{1-\sigma_j} - \alpha_{Lj}^{\sigma_j} w^{1-\sigma_j}\right]^{\sigma_j/(1-\sigma_j)} \bar{V}_j.$$

Consumer Optimization

The analysis assumes that the utility function of the representative resident of the taxing jurisdiction is characterized by a constant elasticity of substitution function (CES) defined over consumption of the tradable goods (A, M), and the non-tradable goods (H and S), or

$$U(A,M,H,S) = \left(\delta_A X_A^{\rho} + \delta_M X_M^{\rho} + \delta_H X_H^{\rho} + \delta_S X_S^{\rho}\right)^{1/\rho},$$

where $\sigma_D = 1/(1-\rho)$ is the elasticity of substitution between each pair of goods. The associated indirect utility function is

$$V(P,M) = M\left(\sum_{j=A,B,C,D} \delta_j^{\sigma_D}\left(P_j(1+T_j)\right)^{1-\sigma_D}\right)^{1/(\sigma_D-1)},$$

where M is the income of the representative resident of the taxing jurisdiction and reflects returns on individual holdings of capital, labor, and land plus transfers received or

$$M = r\bar{K} + w\bar{L} + \bar{\Pi}_A + \frac{\bar{\Pi}_M}{1+\bar{T}_P} + \frac{\bar{\Pi}_S}{1+\bar{T}_P} + \frac{\Pi_H}{1+T_P} + G,$$

where w is the wage rate, $\bar{K}$ is the total amount of capital owned by residents in the initial equilibrium, $\bar{L}$ is the total amount of labor supply, $\Pi_j (j \in A,M,S)$ is the amount of land rent in sector j earned by residents in the initial equilibrium, $\bar{T}_p$ is the property tax rate in the initial equilibrium, and, as defined below, G is the amount rebated back to residents. Note that capital services can be exported but the income generated from the exported capital must be spent within the taxing jurisdiction, on goods that are either produced within the taxing jurisdiction or imported from the other jurisdictions.

Total property and sales taxes revenue (G), which is returned lump-sum to residents, is

$$G = T_P r(K_M + K_H + K_S) + \left(\frac{T_P}{1+T_P}\right)(\Pi_M + \Pi_H + \Pi_S) + \sum_{j=A,M,H,S} T_j P_j X_j.$$

Note that our assumptions ignore any separate effects of public goods and services on individual utility or production. The representative resident spends his income (M) on goods A, M, H, and S. Solving the utility maximization problem yields consumer demands:

$$X_j = \left(\frac{\delta_j}{P_j(1+T_j)}\right)^{\sigma} M\left(\sum_{j=A,M,H,S} \delta_j^{\sigma}\left(P_j(1+T_j)\right)^{1-\sigma}\right)^{-1}.$$

Measuring Relative Efficiency Costs

The efficiency costs of property and sales taxation in the model are measured using an equivalent variation approach. Starting from an initial equilibrium with existing property and sales taxes, the government finances a 1 percent increase in revenues with either the property or the sales tax. The additional revenue is returned lump sum to residents. The efficiency cost is the equivalent variation following the tax increase and rebate, expressed as percentage of the additional revenue raised.

For a CES utility function, the expenditure function associated with utility level U is

$$e(P,U) = U\left[\begin{array}{l}\delta_A^{\sigma^D}(P_A(1+T))^{1-\sigma^D} + \delta_M^{\sigma^D}(P_M(1+T))^{1-\sigma^D} \\ +\delta_H^{\sigma^D}(P_H(1+T))^{1-\sigma^D} + \delta_S^{\sigma^D}(P_S(1+T))^{1-\sigma^D}\end{array}\right]^{1/(1-\sigma^D)}.$$

Denoting P^0, U^0 as the price and utility levels in the initial equilibrium, and U^1 as the utility level after the tax change and rebate, the efficiency cost associated with the tax change, expressed as a percentage of the additional tax revenue, is

$$EC = -EV / R = -[e(P^0, U^1) - e(P^0, U^0)] / R.$$

RESULTS

This section provides the results of some illustrative simulations measuring the relative efficiency costs associated with the use of property and sales taxes by a single taxing jurisdiction in the small open economy model described above. The production cost shares for all sectors are calculated using the U.S. Benchmark Input-Output Accounts for 2002.[9] The agricultural sector is heavily land intensive ($\theta_{KA} = 0.17$, $\theta_{LA} = 0.32$, $\theta_{VA} = 0.51$). The manufacturing sector is heavily labor intensive ($\theta_{KM} = 0.35$, $\theta_{LX} = 0.61$, $\theta_{VX} = 0.04$). The housing services sector is relatively intensive in capital ($\theta_{KH} = 0.45$, $\theta_{LH} = 0.26$, $\theta_{VH} = 0.29$). Finally the services sector, which includes services other than housing, is heavily intensive in labor ($\theta_{KS} = 0.30$, $\theta_{LS} = 0.67$, $\theta_{VS} = 0.03$). The substitution elasticities in both production and consumption are based on the values used in Morgan, Mutti, and Partridge (1989). These substitution elasticities are $\sigma_A = 1$, $\sigma_M = 0.8$, $\sigma_H = 0.1$, $\sigma_S = 1$ and $\sigma_D = 0.75$. The shares of consumption expenditure are based on data from the U.S. Bureau of Labor Statistics (2006) consumer expenditure survey. These shares are $\beta_A = 0.14$, $\beta_M = 0.16$, $\beta_H = 0.20$, $\beta_S = 0.5$. Furthermore, since there is no clear consensus on the values of substitution elasticities and the values used are quite dated, three additional simulations are provided to show the sensitivity of the results to alternative assumptions regarding the various substitution elasticities. In the low substitutability case, all substitution elasticities are assumed to be 0.5. In the Cobb-Douglas case, all substitution elasticities are assumed to be 1. In the high substitutability case, all substitution elasticities are assumed to be 1.25.

Actual state and local tax structures are of course quite diverse; the initial equilibrium reflects "typical" or average values. In the initial equilibrium for all simulations, government expenditures are assumed to be 6 percent of total income,[10] with all expenditures initially financed by a mix of property and sales taxes. The property tax is imposed on all uses of capital and land except that employed in the agricultural (A) sector. The sales tax is imposed on the consumption of manufacturing goods (M) and at a lower effective tax rate on nonhousing services (S). The agricultural sector is assumed to be exempt from the sales tax, which is plausible to the extent its output reflects tax exempt food for home consumption. Given the estimate by Russo (2005) that untaxed commodities make up around 60 percent of total personal consumption expenditures, the consumption shares of M and S imply that the effective sales tax rate on services is 48 percent of the rate imposed on manufacturing goods.[11] Finally, the initial tax rates are calibrated to be consistent with the tax bases and the ratios of revenues from property and sales taxes to total state and local government revenues from these two taxes (0.47 and 0.53, respectively).[12] This results in a property tax rate of 8.5 percent and a sales tax rate on manufactured goods of 8.4 percent in the initial equilibrium.[13]

Two simulation exercises illustrate the relative efficiency costs of the two taxes. (Note that these results are obtained in a partial equilibrium framework that ignores labor supply and saving effects and thus understates the efficiency costs of the two taxes. On the other hand, the analysis also ignores the deductibility of property tax and sales taxes which would temper efficiency costs.) In each case, an additional 1 percent of total tax revenue is raised, in the first case, entirely with the property tax and in the second case entirely with the sales tax. The additional tax revenue is rebated on a lump sum basis to the representative consumer.

Table 1 shows the percentage changes in various key variables following an increase in either the property or the sales tax. In the first simulation, the property tax increases by approximately 2.4 percent to yield a 1 percent increase in total tax revenue. The increase in the property tax rate raises the cost of capital to local producers and thus drives capital away from the jurisdiction. The resulting capital outflow reduces the marginal productivity of local production factors, so that, wages and net housing land rents decline.[14] The property tax increase also changes relative prices and causes a large decline in the demand for housing services which are relatively capital intensive. The efficiency cost associated with the increase in the property tax is roughly 14.4 percent of the additional tax revenue raised.

In the second simulation, the sales tax is raised by approximately 1.9 percent to yield the same additional 1 percent of tax revenue. The increase in the sales tax rate increases the after-tax prices of manufacturing and services, both of which are

Table 1
Percentage Changes in Key Variables and Associated Efficiency Costs of Property and Sales Taxes

Variables	*Simulation 1: Raise Property Tax*	*Simulation 2: Raise Sales Tax*
Δ (Property Tax Rate)	2.368	0
Δ (Sales Tax Rate)	0	1.900
ΔP_H	0.026	0.052
ΔP_S	0.008	0.002
$\Delta(P_S(1 + t_s))$	0.008	0.075
ΔX_A	-0.033	0.014
ΔX_M	0.003	-0.059
ΔX_H	-0.016	0.012
ΔX_S	-0.003	-0.006
ΔK	-0.173	0.008
Δw	-0.077	-0.004
$\Delta(\Pi_H/(1 + T_P))$	-0.003	0.002
Efficiency Cost as % of Revenue Raised	14.40%	12.93%
Δ(Tax Revenue)	1%	1%

Note: Δ denotes percentage change of a variable.

relatively labor-intensive, increasing demand for the agriculture and housing goods, which are relatively intensive in land and capital, respectively. This shift in demand raises the price of housing and creates downward pressure on labor demand, which in turn causes wage to decline. It also results in an increase in the demand for capital by local producers. The resulting capital inflow partially offsets the reduction in the wage since it enhances marginal productivity of the local factors. Overall the efficiency cost associated with increasing the sales tax is nearly 13 percent of the additional tax revenue raised.

These two simulations suggest that local use of the property and sales taxes involves significant excess burdens at the margin, with the property tax slightly less efficient than the sales tax. The use of the property tax distorts production decision primarily by altering the cost of capital, while the use of sales tax distorts relative prices and thus alters consumption decisions. Although these distortions operate through different channels, the simulations suggest that the associated efficiency costs are quite similar. Table 2 below presents the relative efficiency costs of the two taxes under different assumptions about the elasticities of substitution. All substitution elasticities are assumed to be 0.5 in the low substitutability case and 1.25 in the high substitutabity case. As expected, efficiency costs increase with the magnitude of the elasticities of substitution. Although the efficiency costs of the property and sales taxes are roughly similar in the low substitutability case (and the property tax is more efficient), the efficiency cost of the property tax tends to increase relative to the efficiency cost of the sales tax as the degree of substitution rises, and the property tax is the less efficient tax instrument in the latter two simulations.

CONCLUSION

This paper presents some preliminary results on the relative efficiency costs of state and local use of property and sales taxes in a simple model of a small open economy that faces a perfectly elastic supply of capital and produces tradable manufacturing and agricultural goods and non-tradable housing and other services. Starting from an initial equilibrium with existing property and sales taxes, the government raises either the property tax or the sales tax to finance an additional 1 percent of total tax revenue. The simulation results suggest that, although the distortions of the two taxes operate through different channels, the efficiency costs associated with these two taxes are roughly similar. Our tentative conclusion is that it is far from obvious that the local use of the property tax is less distortionary than the local use of the sales tax, as is sometimes asserted.[15]

Table 2
Associated Efficiency Costs of Property and Sales Taxes under Different Substitutablity Assumptions

Efficiency Cost as % of Additional Revenue	*Base Case*	*Low Substitutability*	*Cobb-Douglas*	*High Substitutability*
Exercise 1: Property Tax	14.401%	12.153%	17.672%	19.070%
Exercise 2: Sales Tax	12.926%	12.694%	14.130%	15.066%

It is important to note that this study accounts only for the distortions associated with production and consumption allocation decisions. An obvious direction for future research is the construction of a model that would also capture several other important distortions, including distortions of labor supply and saving decisions and the underprovision of local public services. In addition, more careful modeling of the taxation of business inputs and the partial deductibility of sales taxes coupled with the full deductibility of property taxes would be useful extensions of the model.

Notes

1 In 2007, revenues from property and sales taxes make up 30 and 33 percent, respectively, of total state and local government tax revenue. Property taxes are 28 percent of own-source local tax revenue, and sales and excise taxes are 31 percent of own-source state revenue. See U.S. Bureau of Economic Analysis, National Income and Product Accounts (NIPA, 2008, Table 3.3).

2 U.S. Bureau of Economic Analysis, National Income and Product Accounts (2008, Table 3.21).

3 For such an analysis of state sales and income taxes, see Zodrow (1999).

4 For recent discussions of the two views, see Fischel (2001a, b) and Zodrow (2001a, b).

5 Hawkins (2002) estimates compensated own-price elasticities of -0.24 for services, -0.11 for utilities, -0.50 for food and -0.80 for gasoline.

6 Hawkins (2002) assumes a 1 percentage point increase in the sales tax rate on the uniform base, and then assumes equal yield tax rates on the narrower bases; these rates range from 2.4-3.3 percent. These estimates are thus intermediate between marginal and average efficiency costs, but are presumably closer to average efficiency costs.

7 Authors' calculation (see U.S. Bureau of Economic Analysis, NIPA, 2008, Tables 1.1.5, 1.1.6 and 3.3).

8 In an empirical study of such a tax substitution, Oates and Schwab (1997) suggest that differentially high property taxation of land in Pittsburgh stimulated additional development.

9 The U.S. Benchmark Input-Output Accounts are published by the U.S. Bureau of Economic Analysis (2008). All subsequent cost shares are also based on this calculation.

10 This reflects the ratio of total state and local government revenues from property and sales taxes to GDP in 2007 (U.S. Bureau of Economic Analysis, NIPA, 2008, Tables 1.1.5 and 3.3).

11 With $\beta_M = 0.16$ and $\beta_S = 0.5$, 48 percent of services has to be subject to sales taxes in order for 40 percent of personal consumption expenditure to be subject to the sales tax.

12 See U. S. Bureau of Economic Analysis, NIPA, 2008, Tables 1.1.5 and 3.3.

13 The effective sales tax rate for services is 4 percent. This rather high tax rate on services is reasonable given that a substantial share of state sales tax revenue arises from taxing business inputs and firms purchase a relatively large fraction of services (see Cline, Neubig, Phillips, and Fox, 2005; Fox and Murray, 1988; and Due and Mikesell, 1994).

14 Note that changes in land rents of the other three production sectors do not affect income of the residents because land in those sectors are part of the national portfolio.

15 See, for example, Martinez-Vazquez, Noiset, and Rider (2008) and Bahl and Wallace (2008).

References

Bahl, Roy and Sally Wallace. A New Paradigm for Property Taxation in Developing Countries. Manuscript: Georgia State University, Atlanta, 2008.

Bruce, Donald, John Deskins and William Fox. On the Relative Distortions of State Sales, Corporate Income and Personal Income Taxes. Manuscript. University of Tennessee, Knoxville, 2006.

Cline, Robert, Thomas Neubig, Andrew Phillips, and William F. Fox. 2005.Total State and Local Business Taxes: Nationally 1980-2004 and by State 2000-2004. *State Tax Notes*, May 9, 2005, p. 423, 2005 STT 88-2, or Doc 2005-8667.

Diewert, W. Erwin. Optimal Tax Perturbations. *Journal of Public Economics* 10 (October 1978): 139-177.

Due, John F. and John L. Mikesell. *Sales Taxation: State and Local Structure and Administration*. Washington D.C.: Urban Institute Press, 1994.

Fischel, William A. Municipal Corporations, Homeowners and the Benefit View of the Property Tax. In Wallace E. Oates, ed., *Property Taxation and Local Government Finance.* Cambridge MA: Lincoln Institute of Land Policy, 2001a, pp. 33-77.

Fischel, William A. Homevoters, Municipal Corporate Governance, and the Benefit View of the Property Tax. *National Tax Journal* 54 (March 2001b): 157-173.

Fox, William F. and Matthew Murray. Economic Aspects of Taxing Services. *National Tax Journal* 41 (March 1988): 19-36.

Hawkins, Richard R. Popular Substitution Effects: Excess Burden Estimates for General Sales Taxes. *National Tax Journal* 55 (December 2002): 755-770.

Martinez-Vazquez, Jorge, Luc Noiset, and Mark Rider. Assignment of the Property Tax: Should Developing Countries Follow the Conventional View? Manuscript: Georgia State University, Atlanta, 2008.

Morgan, William, John Mutti, and Mark Partridge. A Regional Equilibrium Model of the United States: Tax Effects on Factor Movements and Regional Production. *Review of Economics & Statistics* 71 (November 1989): 626-635.

Nechyba, Thomas J. Replacing Capital Taxes with Land Taxes: Efficiency and Distributional Implications with an Application to the United States Economy. In Dick Netzer, ed., *Land Value Taxation*. Cambridge MA: Lincoln Institute of Land Policy, 1998, pp.183-204.

Oates, Wallace E. and Robert M. Schwab. The Impact of Urban Land Taxation: The Pittsburgh Experience. *National Tax Journal* 50 (March 1997): 1-21.

Ring, Raymond. Consumers' Share and Producers' Share of the General Sales Tax. *National Tax Journal* 52 (March 1999): 79-90.

Russo, Benjamin. An Efficiency Analysis of Proposed State and Local Sales Tax Reforms. *Southern Economic Journal* 72 (October 2005): 443-462.

U.S. Bureau of Economic Analysis. National Income and Product Accounts. Washington, D.C.: U.S. Bureau of Economic Analysis, 2008.

U.S. Bureau of Economic Analysis. U.S. Benchmark Input-Output Accounts. Washington, D.C.: U.S. Bureau of Economic Analysis, 2008.

U.S. Bureau of Labor Statistics. Consumer Expenditure Survey. Washington, D.C.: U.S. Bureau of Labor Statistics, 2006.

Wildasin, David E. Interjurisdictional Capital Mobility: Fiscal Externality and a Corrective Subsidy. *Journal of Urban Economics* 25 (March 1989): 193-212.

Wilson, John D. A Theory of Interregional Tax Competition. *Journal of Urban Economics* 19 (May 1986): 296-315.

Zodrow, George R. and Peter Mieszkowski. Pigou, Tiebout, Property Taxation and the Underprovision of Local Public Goods. *Journal of Urban Economics* 19 (May 1986): 356-370.

Zodrow, George R. *State Sales and Income Taxes: An Economic Analysis*. College Station, TX: Texas A&M University Press, 1999.

Zodrow, George R. Reflections on the New View and the Benefit View of the Property Tax. In Wallace E. Oates, ed. *Property Taxation and Local Government Finance.* Cambridge MA: Lincoln Institute of Land Policy, 2001a, pp. 79-111.

Zodrow, George R. The Property Tax as a Capital Tax: A Room with Three Views. *National Tax Journal* 54 (March 2001b): 139-156.