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Local Public Sector Performance: Are Wisconsin City and Village Taxes Too High?

By

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Local Public Sector Performance: Are Wisconsin City and Village Taxes Too High?

Executive Summary

This applied research project examines questions concerning the economic efficiency of municipal government spending and taxation levels in Wisconsin. Using economic notions of local government effectiveness and efficiency, a theoretical and empirical model is presented and estimated using data from Wisconsin cities and villages. Theory suggests that expenditure and taxation levels are capitalized into local property values. In short, public goods and services and corresponding taxes are viewed as a normal good in an economic sense: more is better, too much is bad. From a property valuation perceptive, higher levels of public goods and services should increase property values. But, overprovision of the public good places downward pressure on property values. This inverted-U relationship is easily estimated from an empirical perspective. Two separate tests are estimated. The first examines capitalization rates of service provision (i.e., expenditures) into property values. The second complementary test examines capitalization rates of taxation levels (i.e., municipal taxes) into property values. Results for Wisconsin cities and villages suggest that service and taxation levels are positively related to property values suggesting that neither services or local taxation is **not** systematically too high. *In other words, based on rigorous economic theory, spending and taxing in Wisconsin's cities and villages are not too high and may indeed be too low.* It is important to note that this applied research study focuses on city and village taxation and spending, attention is *not* paid to public schools, counties, towns or other special districts that have taxing authority.

Local Public Sector Performance:
Are Wisconsin City and Village Taxes Too High?

" My first priority will be to do as much as I can to change the perception and the reality of Wisconsin being a high-tax state".
Governor Scott McCallum (Wisconsin State Journal, February 12, 2001)

I- Introduction

Wisconsin has been historically regarded as a relative high tax state. Comparing Wisconsin's state, county, municipal and other local government finances on the basis of population and/or income to other states typically serve as the foundation for such conclusions. Using such comparisons Wisconsin's state and local taxes per capita ranked 8th 1997 but 9th in 1992, a slight decline (Table 1). For the most current year for which the Census of Governments is available, Wisconsin total tax collection per person was $3,020, which is $273 above the US average (Figure 1). Taxes collected at the local level, however, Wisconsin ranked 13th in 1992 and actually dropped to 17th in 1997. At $1,051 collected per person at the local level, Wisconsin is **below** the national average by $21 (Figure 2).

Table 1: Wisconsin State & Local Tax Rankings

	1997		1992
		Per Capita	
State and Local Taxes	8		9
Local Taxes	17		13
		Per $1,000 Income	
State and Local Taxes	5		4
Local Taxes	15		11

Source: US Census of Governments

On the other hand, Wisconsin's state and local tax collection per $1,000 of personal income ranked 5th in 1997 and 4th in 1992. Wisconsin's collection of taxes at the state and local level was $128 per $1,000 of personal income, $17 higher than the national average (Figure 3). But is important to note that in 1992 state and local taxes collected was $134 in 1992, implying that Wisconsin's ability to pay (i.e., income) grew faster than tax burdens. Indeed, between 1992 and 1997, the gap between Wisconsin and the US average declined from $18 to $17 pre $1,000 of personal income.

Local tax collection, on a basis of $1,000 of personal income ranked as high as 11th in the nation in 1992, but dropped to 15th five years latter in 1997. In 1992, for every $1,000 of personal income Wisconsin's local governments collect $51, $4 higher than the national average. But by 1997, local governments in Wisconsin collected only $45 per $1,000 of income, a **decline** of $6 while at the same time the gap between Wisconsin and the national average declined to $2 per $1,000 of income. This significant shift at the local level, and to some extent at the state level as well, is due to the generous state aid programs for municipalities and public schools.

Yet, based on such rankings elected officials, as well as organized members of the civil society, have been continuously advocating lower taxes to decrease the size of the public sector throughout Wisconsin. A recent pledge to cut taxes came from the recently inaugurated Governor Scott McCallum:

> *"For too long Wisconsin has ranked near the top of every national survey when it comes to measuring overall tax burden. Wisconsin taxpayers have supported this level of taxation for too long."* (Wisconsin State Journal, February 4, 2001).

Figure 1: State and Local Taxes Per Capita (1997)

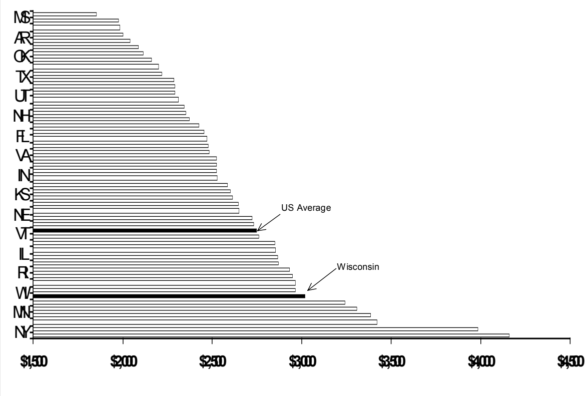


Figure 4: Local Taxes Per $1,000 of Income (1997)

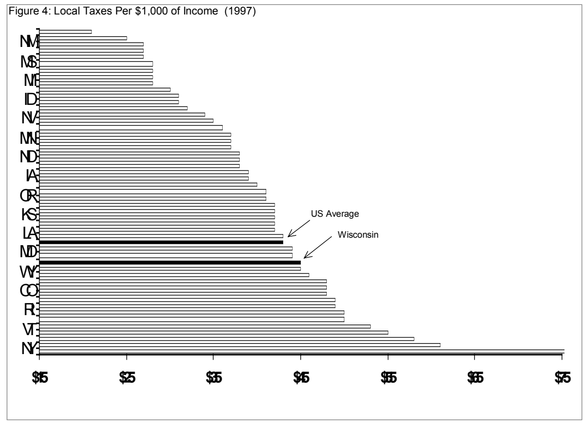


Figure 2: Local Taxes Per Capita (1997)

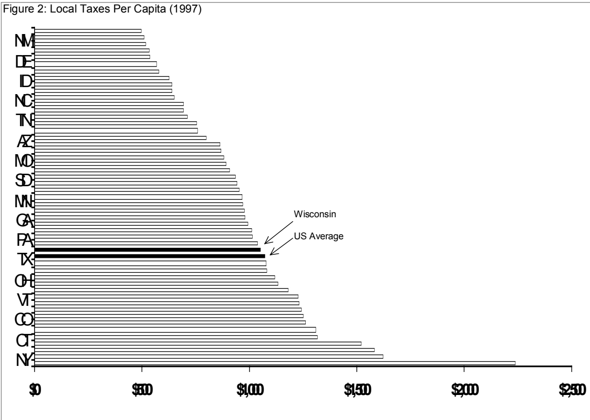
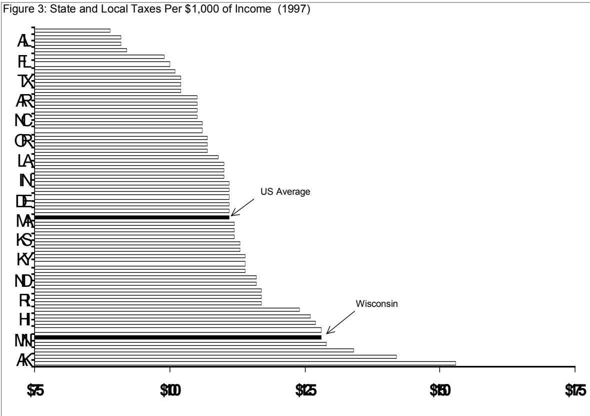


Figure 3: State and Local Taxes Per $1,000 of Income (1997)



The purpose of this applied research project is to reevaluate the perception of Wisconsin as an overly high-tax state. In our analysis, however, we will follow a different path. Instead of focusing on the usual interstate comparisons of tax burden measurements, we will concentrate on *intrastate* comparisons on the performance of local government's in particular Wisconsin cities and villages.

Local government is certainly the most visible face of government in Wisconsin. They are responsible for the provision of essential public services and goods as well as for the collection of taxes and fees that amount of a considerable part of the Wisconsin tax burden. Therefore, opinions about the role of government, the level of taxes in particular, will most certainly depend on how well local governments are performing their assigned tax and expenditure functions.

Two different criteria will be used to evaluate the performance of Wisconsin local government and, ultimately, to evaluate whether spending and taxes are too high. The first criteria is allocative efficiency, defined as the level of public output from which any small increase or decrease is not unanimously preferred by all citizens living in the community responsible for its provision. Any deviation from this level will always face some objections. For the specific case of the provision of local public goods, allocative efficiency is reached when the level of public good or service provided is such that its marginal cost of provision (including production and distribution) equals the sum of what each local resident would be willing to pay individuallly for the good. This condition is traditionally referred to as the *Samuelson condition* or *Pareto optimality*.

The second criterion is that of technical efficiency, being defined as the ability of the government to provide goods for its citizens at the lowest possible cost. The cost of provision of any given public good can be minimized through the appropriate use of the techniques and inputs required for its production. It can also be minimized through the appropriate use of the tax instruments which local governments have available to draw resources from their citizens in order to fund the production and delivery of the goods and services. Our focus here will be on the second aspect of the technical efficiency criteria, which will be defined simply as efficacy.

Using standard econometric techniques and based on formal economic models, we look at a sample of Wisconsin cities and villages. Based on the level of public expenditures, taxes and property values along with housing and socioeconomic characteristics observed at different communities, we will be able to assess whether Wisconsin cities and villages are spending too much. Since cities and village's public expenditures are mostly financed by taxes either raised at the local level or raised at the state level overspending at the local level will be closely related to over-taxation at the local and state level.[1]

Next section goes in more detail about the public role of Wisconsin cities and villages, its assigned functions and the resources they have available to perform such functions. An intuitive way the theory and statistical methodology behind our analysis of public sector efficiency is provided and then we proceed to report our main findings. We repeat the discussion for our analysis of public sector efficacy. Our basic conclusions about public sector efficiency and efficacy in Wisconsin are wrapped up in the conclusions. In a technical appendix we review the theory more formally for the interested reader.

II- Overview of Cities and Villages in Wisconsin

In 1999, there were 190 cities and 395 villages divided among 72 counties in Wisconsin. Together they account for 70 percent of the state's population. The remaining 30 percent reside in the state's 1265 towns. In spite of concentrating most of the population within their territories Wisconsin cities and specially their villages are small. Only 30 cities have populations over 20,000 and 69 percent have fewer than 10,000 residents. Wisconsin's largest city is Milwaukee with a population of 620,609 in 1996; the smallest city is Bayfield with 678. Villages are usually smaller than cities but more than half of Wisconsin's villages is larger than Bayfield.

Most of Wisconsin's cities adopt a mayor-council form of government. A board of trustees, on the other hand, usually governs villages. Despite these organizational differences, for the most part, cities and villages exercise the same statutory powers.

City and village governments also account for almost 50 percent of all property taxes raised and public expenditures executed at the local level and more than 40 percent of all transfers received from the state government (Table 2).

While towns and counties rely more heavily on state aids as a revenue source, cities and villages sources are more diverse, relying on charges for services, utility revenues, interest income, and proceeds from long-term debt. The basic sources of funding available to Wisconsin local governments are summarized in Tables 3 and 4. For the most part, however, property taxes are the major source of revenues available to all types of local government in Wisconsin.

[1] Federal aids supplied as much as 10 percent of local revenues in the 1970s, but they have since declined to less than 3 percent with the demise of federal revenue sharing and cutbacks in federal programs.

Table 2: Local government relative participation

	Property Tax Revenues		Intergov'l Rev		Expenditures	
(1997)	$ Millions	% of total	$ Millions	% of total	$ Millions	% of total
Counties	1,226	44.1	1,532	52.3	4,492	45.1
Cities	1,114	40.1	1,061	36.2	4,159	41.8
Villages	231	8.3	133	4.5	748	7.5
Towns	210	7.6	203	6.9	552	5.5
Total	2,781	100	2,929	100	9,951	100

Source: Annual Fiscal Report

Table 3: Sources of Funding to Local Governments
(% of 1997 revenues)

Source	Counties	Towns	Cities	Villages
Property Taxes	27.2	37.1	26.7	30.1
State Transfers	34	35.9	25.4	17.3
Subtotal	61.2	73	52.1	47.4
Licenses	0.3	1.9	1.1	1.5
Fines	0.6	0.5	1.1	1
Pub Serv. Charges	17.9	7	12.5	13.9
Intergov'Charges	5.8	1	1.6	1.4
Long term debt	3.8	9.5	11.7	18
Interest	2	3.1	3.9	4
Utility	<0.1	0.6	12.5	9.1
Other	8.4	3.4	3.5	3.7
Total	100	100	100	100

Source:Annual Fiscal Report

While towns spent nearly half of their revenues on transportation and counties spent more than 40 percent on the provision of health and sanitation services in 1997, Wisconsin cities and villages usually provided a more diversified range of services to their citizens (Table 5). Overall all local government levels spent the majority of their available resources on four broad expenditure categories: public safety, health/human services/sanitation and services that provide to overall life quality. The later includes all expenditures in recreation (e.g., parks), conservation and development.

Given the size of their populations and the important role that their governments have in the provision of basic public services and in the collection of taxes, Wisconsin cities and villages emerge as the natural locus where perceptions about the size and influence of government are formed. Next section presents the methodology used to capture citizens' perception about the size and efficiency of local governments.

Table 4: Local government relative participation

	Property Tax Revenues		Intergov'l Rev		Expenditures	
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Villages	231	8.3	133	4.5	748	7.5
Towns	210	7.6	203	6.9	552	5.5
Total	2,781	100	2,929	100	9,951	100

Source: Annual Fiscal Report

Table 5: Expenditure allocation by Local Governments
(% of 1997 revenues)

Item	Counties	Towns	Cities	Villages
Public Safety	12.2	16	22.3	18.8
Health/Sanit.	44.1	8.1	12.7	17.6
Transportation/Roads	16.1	47.2	15.5	17
Life quality/Ammenitie	7.6	4.8	14.3	9.8
Subtotal	80	76.1	64.8	63.2
Debt	4.8	8.3	13.9	17.8
Utilities	<0.1	0.6	11.9	9.8
Gen. Adm	9.3	14	6.7	8.6
Other	5.9	1	2.7	0.6
Total	100	100	100	100

Source:Annual Fiscal Report

III- Public Sector Efficiency

Part of the difficulty with the discussion that occurs in the public discourse about Wisconsin's taxing and spending levels is the lack of any rigorous way in which to frame and address the question. Here there is much that economic theory can provide as a foundation and framework. Here we build on the work of Oates, Brueckner and Laffer to a less extent.

A- Theory

If individual and businesses base their location decisions not only on the overall characteristics of a given community but also on the menu of public goods and services available along with the tax liabilities imposed by local governments, the overall value of property in a given community can provide useful information about the performance of its local government. That will happen because within a group of communities with similar geographical and socioeconomic characteristics, individuals and firms would be willing to pay more to live and operate, respectively, in the community, which provides the higher quality or volume of public services at lower tax rates. In the short-run given a fixed land and housing stock, this higher demand will be translated into higher property values for existent real estate in that community.

To the extent that resources for the public provision good and services in a community were at least partially raised through the imposition of property taxes, an increase in the level of those public goods would not have a trivial effect on property values. While an increase in local public services will increase the menu of amenities available to property renters or owners, bidding up property values; on the other it would require local governments to raise local taxes with exactly opposite effects on property values.

In a series of papers Brueckner formalized the line of logic outline above in a theoretical model that combines the property capitalization of local taxes and expenditures under a balanced budget.[2] Brueckner found that if government officials behave in a manner as to maximize total property value, the resulting decision rules that local officials follow implies that the Samuelson condition for allocative efficiency, as described in the introduction, is met.[3]

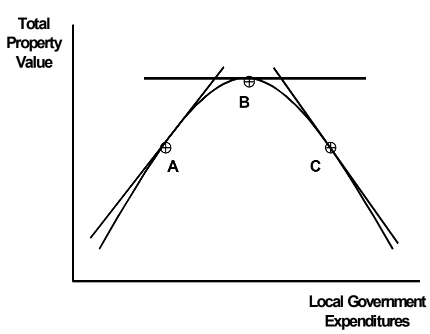
This theoretical result formalized the non-linear effects of local public expenditures on aggregate property value as an inverted U-shaped function with the maximum occurring at the level where the provision of such public goods and services is efficient in an allocative sense. Brueckner further explored this result in a test is based on the effect of changes in the level of

[2] Brueckner, Jan (1979). "Property Values, Local Public Expenditure, and Economic Efficiency." Journal of Public Economics 11, 223-245
[3] Appendix B summarizes Brueckner's model.

government expenditures on property values. [4]

The “Brueckner relationship” for the particular case where only one type of public good is provided is illustrated in Figure 5. If local governments are currently under-supplying the local public good (spending too little), increases in expenditures, even if followed by an identical increase in taxes, should increase property values (point A). At some point, further increases in government expenditures would require unattractive tax rates thus causing property values to decline. This would indicate an over-supply of local public goods (too much is spent) – point C. At the efficient level, any small increase or decrease away from it will have no effect on property values for that community (point B).

Figure 5: Property Value Hypersurface



In order to implement Brueckner’s test one needs to collect a sample of different communities observations on the aggregate value of all properties taxed in that community along with observations on the level of public goods and services it provides, with public expenditures being used as a proxy for quantities. Since property value is also affected by other factors such as the quantity and quality of housing in a particular community along with the location, the wealth and the socioeconomic characteristics of the community, measures of all these variables also need to be collected and factored into the test.

The next step is to use multiple regression analysis to estimate the “Brueckner relationship” that an increase in a given category of local public expenditure will have on a community’s total property value controlling for other factors. A statistically positive regression coefficient on expenditures indicates that all observations lie to the right of the peak of the inverted U-curve with the regression line being of the type that passes through point A in Figure 5. This result indicates that all communities share a common efficiency bias, which in this case is negative, specifically, all communities are under-spending or at least are not overspending.

Analogously, a statistically negative coefficient indicates that all observations lie to the left of the peak of the inverted U-curve with the regression line passing through point C in Figure 5. All communities will be overspending or at least not under-spending. All individuals may perceive a decrease in expenditure as desirable.

The test is less conclusive when the estimated regression coefficients are not statistically significantly different from zero. Either communities do not present a common efficiency bias with some communities under-spending and others overspending or all communities are spending at the efficient level with the regression line passing through point B in Figure 5.[5] Brueckner prefers the latter and less strong interpretation of the results.

As it was mentioned above, local public expenditures are at least partially financed with property taxes raised locally in the community. Because of that, the Brueckner relationship can be reinterpreted in terms of the effects of taxes on local public sector efficiency, specifically, under-spending can be associated with under-taxation, over-spending with over-taxation. This broad interpretation provides a link between the two tests provided in the applied research project.[6]

[4] Brueckner, Jan (1982). “A Test for Allocate Efficiency in the Local Public Sector.” Journal of Public Economics ,19, 311-331

[5] Another possibility is that local public expenditures are simply not capitalized into property values.

[6] One potential criticism of the Brueckner test concerns the functional form of the regression equation. While Brueckner’s model finds aggregate property values to be a single peaked concave function of local

B- Statistical Analysis

Data for the estimation are drawn from a sample of Wisconsin cities and villages. Out of a population of 585 cities and villages, twenty-nine villages and one city were eliminated due to missing values leaving a total of 554 observations. Data is drawn from the Census, Claritas, a private vendor of socio-economic data, and various issues of the Wisconsin Department of Revenues" report "County and Municipal Revenues and Expenditures."

The specification of the estimated model is intended to mirror the specification of the Brueckner model. Four general expenditure areas are defined to measure public good levels: expenditure on transportation (e.g. street and highway maintenance, public transit- (*roads*)); expenditure on public safety (e.g. law enforcement, fire fighting and prevention- (*safety*)); expenditure on health, human services and sanitation (*sanitation*); expenditure on life quality goods and services (e.g. conservation and development, parks and recreation- (*lifequality*)). As we saw in Section 2, although the responsibilities of Wisconsin local governments go beyond these areas, it was determined that they represent usually more than 60 percent of all cities and villages total local expenditures. All measures of local public expenditures presented above correspond to averages of values observed between the fiscal years of 1995 and 1997.

The dependent variable, aggregate property value, is measured by the total full value of all taxable general property as determined by the Wisconsin Department of Revenue excluding the full value of improvements to property within Tax Increment Finance Districts (*fvtif*). The total full value is determined independently of the locally assessed value and is meant to reflect the actual market value. The apportionment of all taxes is measured by *fvtif*. It is also averaged between 1995 and 1997.

The total number of housing units measures the absolute size of the community's housing stock in 1990 (*tothouse*). The quality of the housing stock is measured by four different variables: the percentage of houses built between 1970 and 1990 as a measure of the newness of the housing stock (*bw7090*), the percentage of houses with three or more bedrooms as a measure of the footage of each individual house (*bed*) as well as the percentage of houses with access to public water and sewage (*pubwat and pubsew*). All these variables were also from 1990.

Socioeconomic characteristics of the community such as the median household income (*mhincy*), the proportion of residents with at most a high school diploma (*s3p573*), the percentage of senior citzens, measured by the percentage of the current population over 65 years of age (*tpacy65*), the percentage of children, measured by the percentage of residents with less than eighteen years (*tpacy18*) along with the community location proxyed by its latitude (*ycoord*). A dummy variable, which equals 0 for cities and 1 for villages, was also used as an explanatory variable to separate the distinctions between cities and villages in Wisconsin (*city*).

All housing characteristic regression coefficients (*tothouse, bw7090, bed, pubwat and pubsew*) are expected to be positive. Among the socioeconomic characteristics, *mince,* being a proxy of community wealth is expected to have a positive coefficient estimate. On the other hand, there is no clear indication of whether tpacy *65* and *tpacy 18* should be expected to have an unambiguous effect. One could speculate that *s3p573* could be just another form to capture community wealth being a proxy of how low the community human capital level should be. For that reason *s3p573* should deliver a negative signal for its regression coefficient. Given the economic relevancy of the cities of Madison and Milwaukee and the more developed nature of southeastern Wisconsin in general, *ycoord* is expected to have a negative effect on property values.

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government expenditures, Brueckner's test specifies and estimates a linear function. A superior approach would be to employ a non-linear procedure that is capable of suggesting the "correct" functional form. We have chosen to employ a procedure, specifically the Box-Cox method, which allows the data to determine if the property value-public good expenditure relationship is linear or non-linear.

Given its average population size, cities are expected to have on average a larger property value, which would lead us to expect a negative regression coefficient for *city*. The value and signal of the remaining local public expenditure variables will be the object of the regression analysis presented below.

C- Empirical Results

The results of the regression analysis are presented in Table 6. Applying the Box-Cox procedure to the Wisconsin sample of cities and villages produced estimated lambdas indistinguishable from zero (both dependent and independent variables were transformed). This suggests that the appropriate functional form is logarithmic. The overall regression equation performs strongly with an equation F-statistics of 955.16 and an adjusted R^2 of .96 which is considered high for the cross-sectional nature of this study.

Among the housing characteristics variables the signs on total number of housing units (*tothouse*) and the spatial location of the municipality in Wisconsin (*ycoord*) and the age measure of the housing stock (*bw7090*) are positive, as expected, and statistically significant. The negative and statistically significant sign of access to public water (*pubwat*) is somewhat unexpected. Less unexpected was the insignificance of average number of bedrooms (*bed*) and access to public sewers (*pubwat*). Among the socioeconomic characteristics median household income (*mhincy*) and the percent of the population with a high school diploma (*s3p573*) behave as expected. The result for the dummy variable separating cities and villages suggest little difference between the two types of local organization.

The results of most interest to this applied research is the estimated coefficients on the four general expenditure categories (*safety, roads, sanitation, and lifequality*). In each case, the estimated coefficient is positive and statistically significantly different from zero at or above the 95 percent level of confidence. The

Table 6: Estimated Coefficients

Variable	Coefficient	t
safety	0.18	6.57
roads	0.15	5.32
sanitation	0.04	2.35
lifequality	0.07	4.63
tothouse	0.54	15.74
bw7090	0.10	2.50
bed	-0.03	-0.30
pubwat	-0.11	-5.16
pubsew	-0.02	-0.78
ycoord	-1.24	-1.72
city	0.05	0.73
mhincy	0.98	14.51
tpacy65	0.04	0.80
tpacy18	-0.40	-4.12
s3p573	-0.14	-2.11
Intercept	2.49	0.85
F-stat	955.16	
Adj. R2	0.96	

Note: All variables are in logs
Dependent variable is fvtif.

positive and significant coefficient presents *prima fascia* evidence that Wisconsin cities and villages are **not** systematically over providing public services. By superimposing the observed and the predicted combinations of aggregate property value for the different levels of local government expenditure observed in our sample in each of the four different categories helps illustrate this latter conclusion (Appendix Figures A1 to A4).

These results provide strong evidence that cities and villages in Wisconsin are not systematically over-spending and may indeed be under-spending. We could use this result to conclude that tax cuts, if followed by a correspondent decrease in disposable revenues at the local level and, thus, a decrease in expenditures, contrary to general perception, would not make Wisconsin citizens better off.

IV- Public Sector Efficacy

In the previous section we have found some preliminary evidence that Wisconsin cities and villages have not been spending too much in the provision of their public services. Our results also indicated that a decrease in expenditures would not result in a positive outcome for any Wisconsin resident. We used this result to conclude that tax cuts, if followed by a correspondent decrease in disposable revenues at the local level and, thus, a decrease in expenditures, contrary to general perception, would not make Wisconsin citizens better off.

A- Theory

An important assumption behind the Brueckner argument was that a decrease in tax rates would necessarily decrease revenues. A common argument against this logic would be that state and local governments are not using their tax instruments appropriately in order to maximize revenue collection. By decreasing tax rates they would be generating incentives for existent firms in the locale to hire more workers, increase their investments. They could even go beyond that by attracting new residents or businesses as a consequence of such tax cuts. In other words, taxes that are too high drive economic activity out of the region. Behind this argument is the idea of public sector efficacy where private resources should be collected at the lowest cost for society.

This argument is better illustrated in the famous Laffer curve, which expresses total revenues as an inverted-U function of state or local tax rates. The curve, as presented in Figure 6, is divided in two segments: the upward sloping portion of the curve is called the "normal" range and the downward-sloping segment is the "prohibitive" range. Right in the middle is the point where tax revenues are maximized and where local government activities are performed with efficacy. Tax cuts advocates would argue that tax rates are beyond their maximum and thus in the prohibitive range. The logic is remarkably similar to the Brueckner relationship outlined above.

The total amount of revenues collected from a given tax can be seen as the product of an average tax rate by the tax base. For an income tax, the total tax base would be the sum of wages and profits. Having this concept in mind, a change in a marginal tax rate would have two effects on the amount of tax revenues collected from that tax: a direct or first order effect, immediately captured through the average tax rate, and an indirect or second order effect captured by the tax base.[7]

Consider, for instance, a tax cut implemented by a decrease in property tax rates. If the total tax base is unchanged, a decrease in marginal tax base will decrease the total amount of revenues collected simply because each individual taxpayer will be paying less in taxes. A tax cut will, however, increase after tax wages and return to capital. That could result in an increase in investment by firms, more jobs, higher profits and a higher tax base.

Thus, the net effect of a tax cut will depend on the balance between the positive and second order effect. A negative net effect implies that a tax cut will decrease tax revenues. The direct effect dominates the indirect over the normal range where an increase in taxes will increase revenues. An increase in taxes will decrease tax revenues. This net positive effect decreases as we move towards the tax rate where revenues are maximized, becoming negative after that. A negative effect reflects that the indirect effect now dominates the direct effect. An increase in taxes under this prohibitive range will now decrease tax revenues. The rationale for each segment of the Laffer curve was based on this balance.

B- Statistical Analysis

As it is formally derived in the appendix, the elasticity of the property value with respect to changes in the property tax rate (i.e., the shape and sensitivity of the inverted-U curve) assumes a central role in the determination of the net effect. If the absolute value of the property value elasticity is greater than one a tax rate cut

[7] This argument is formalized in the Appendix

will decrease revenues meaning that the economy would be in the normal range of the local Laffer curve (local revenue hill). Otherwise, a tax cut will increase revenues. In this case the local economy would be in the prohibitive range of a possible local revenue hill. Local public sector efficacy will be achieved if the absolute value of the property value elasticity is one. Or as in the case of the Brueckner test, there is no systematic evidence of either over- or under-taxation. Simply estimating the elasticity of property values with respect to the property tax rate and testing this estimate against a null equal to negative one can implement a test of local public sector efficacy.

Using the same sample of Wisconsin cities and villages, the elasticity of property value with respect to the property tax rate was obtained by regressing the full value of property in a given community (*fvtif),* described before as our proxy for the base of the property tax, on different proxies of local tax rate, controlling for the same set of housing, and socioeconomic characteristics used in the Brueckner test, as well as for intergovernmental transfers (*transfers*).[8]

Within a given municipality different classes of property receive different tax treatments and rates. We have constructed a unique tax rate that tries to summarize the average burden imposed on a given community by its property tax schedule. Two proxies for a proportional and effective local property tax rate were obtained by dividing the total amount of property tax revenues raised in a given community by two alternative bases: aggregate income earned by community residents and aggregate property values. Behind the choice of each base is one assumption with respect to the incidence of the property tax. Aggregate income would be the appropriate base if property owners were able to shift the tax forward to renters with property values being the default if taxes were not shifted.

Having these in mind the computed "income tax rate" (*taxraty*) corresponds to the proportional tax rate having aggregate community income, measured in $1,000, as the tax base while *taxratp* is the tax rate using aggregate property values as the base.

C- Empirical Results

Given the intrinsic non-linearity in the relationship between property values and tax revenues, a Box-Cox procedure was used in order to suggest the most "appropriate" functional form. As in the Brueckner test of allocative efficiency, lambdas indistinguishable from zero were generated indicating that the appropriate form would be logarithmic.[9] In a regression in logs, elasticities between dependent and independent variables are equivalent to regression coefficients. It suffices, therefore, to look at their estimates to make inferences about overall local public sector efficacy in Wisconsin.

Given two tax rate measures, two sets of regression analysis are reported (Tables 7 and 8). The results of regressing the compute income tax rate (*taxraty*), plus the relevant control variables, on total property value (*fvtif*) are presented in Table 7, while the results using the aggregate property tax rate (*taxraty*) are presented in Table 8. Overall, both regression equations perform well given the cross-sectional nature of the data with the equation F-statistics being 1814.01 and 1439.64, respectively. In addition, the separate equations explain over 90 percent of the variation in property values (i.e., adjusted R^2 equal to .96 and .95, respectively).

Control variables that seem to have the strongest positive impact on aggregate property values include the age of the housing stock, with newer construction having a greater positive impact than older construction, household income levels and the size of the typical house as measured

[8] See the Appendix for a fuller justification of this specification.

[9] Both dependent and independent variables were transformed.

Table 7: Estimated Coefficients

Variable	Coefficient	t
taxraty	0.36	7.19
transfers	0.15	1.02
tothouse	0.82	4.92
bw7090	0.24	4.24
bed	0.31	2.10
pubwat	-0.07	-2.41
pubsew	0.01	0.19
ycoord	-1.49	-0.95
city	-0.04	-0.72
mhincy	1.13	11.68
tpacy65	0.05	0.73
tpacy18	-0.22	-1.96
owner	-0.09	-0.86
s3p573	-0.20	-2.09
Intercept	3.19	6.02
F-stat	1814.01	
Adj. R2	0.96	

Note: All variables are in logs
Dependent variable is fvtif.

Table 8: Estimated Coefficients

Variable	Coefficient	t
taxratp	0.10	3.05
tothouse	0.88	4.85
bw7090	0.22	3.59
bed	0.34	1.91
pubwat	-0.04	-1.40
pubsew	0.01	0.23
ycoord	-2.17	1.82
city	-0.11	-1.75
mhincy	1.20	10.33
tpacy65	0.14	1.72
tpacy18	-0.26	-1.86
s3p573	-0.20	-1.87
owner	-0.35	-2.22
Intercept	5.52	0.82
F-stat	1439.64	
Adj. R2	0.95	

Note: All variables are in logs
Dependent variable is fvtif.

by number of bedrooms. A higher percentage of the population that is young seems to place downward pressure on values as does access to public water supplies. This latter result, much like with the Brueckner test above, is somewhat unexpected. The remainder of the results on these control variables can be reviewed at the reader's leisure.

The elasticity of property values with respect to changes in both measures of local tax rates revealed themselves to be positive and statistically different from zero and thus also statistically different from negative one under a two-tailed test. In other words, tax rates broadly defined for Wisconsin cities and villages are **not** sufficiently high to starve-off economic activity. Figures 6 and 7 help illustrates this point by superimposing the observed and the predicted combinations of aggregate property value – the size of the tax base in question – for the range of average taxes observed in our sample of Wisconsin cities and villages.

These results suggest that Wisconsin cities and villages are not over-taxing their citizens. A consequence of that is that tax cuts in the property tax schedules would not improve the revenue-raising capacity of cities and villages.

V-Conclusion:

This applied research report represented a rigorous theoretical and analytical attempt to better evaluate the performance of the local public sector in Wisconsin. Instead of limiting our analysis to interstate comparisons of tax burden, we decided to take a closer look at how Wisconsin local governments, in particular its cities and villages have been using their tax and expenditure functions.

For Wisconsin cities and villages, taxes are simply not a strain on the local economy and indeed, the services that these taxes support, such as police, roads and parks, directly and indirectly benefit Wisconsin residents. Based on these results as well as other applied studies, the debate should not focus on absolute levels of spending and taxation, but the mix between service and taxation rates. Wisconsin residents and businesses benefit from the services cities and villages provide and the corresponding level of taxation has not counteracted those benefits.

Based on the Brueckner's test for allocative efficiency in the local public sector and on a sample of Wisconsin cities and villages, we did not find evidence that Wisconsin city and village governments were over-spending. This result seems to indicate that a decrease in taxes leading to a decrease in local expenditures would not make Wisconsin cities and village's residents better off and may indeed make them worse off.

One could argue that, even tough there seems to be no evidence of misuse of public resources, the same level and quality of public services and goods could be provided at a lower cost for Wisconsin residents. Based on the idea of the Laffer curve and on the concept of public sector efficacy, we started touching this issue by asking whether the same level of property tax revenues, the most important source of funding at the local level, could be raised with a lower property tax rate. Our results indicated that a decrease in the current average property tax rates observed in each city or village in Wisconsin will necessarily imply a decrease in the total amount of tax revenues.

Our results bring a very different picture to the perspective of Wisconsin being a high tax state. While, there is some clear indication that their performance falls short from what should be expected of efficient and effective governments, cutting taxes, at least local taxes, does not seem to be the answer to fostering better local governments. Indeed, the results suggest that Wisconsin cities and villages may be under-providing key services.

In the end, Wisconsin residents value the services that are being provided by cities and villages. It is a general misperception that taxes are too high and that the local economy is suffering as a result. These results suggest quite the opposite; cities and villages may be spending too little on key services. In the end people and businesses acknowledge that there is no free lunch and that key services are of value and that taxes must be levied to pay for those services. If the citizenry perceive that they are "not getting what they pay for," then potentially serious problems exist. The results of this applied research effort suggest that Wisconsin cities and villages are not to that point.

It is important to draw attention to the limitations of this study. First and foremost, we focus on cities and villages, no attention is paid to other jurisdictions that have taxing authority including the public school system, county and town government, or overall state tax burdens. Clearly, the broader question "are overall tax burdens too high in Wisconsin" is not addressed. The tiered system of local government in Wisconsin, and indeed throughout much of the Midwest, greatly complicates the ability to taxpayers to separate out the individual affects of separate units of government. This affect, commonly referred to as "fiscal illusion" is the subject of future analysis.

Figure A1: Property Value (fv) vs Lifequality (life)- Observed (x) and Predicted Values

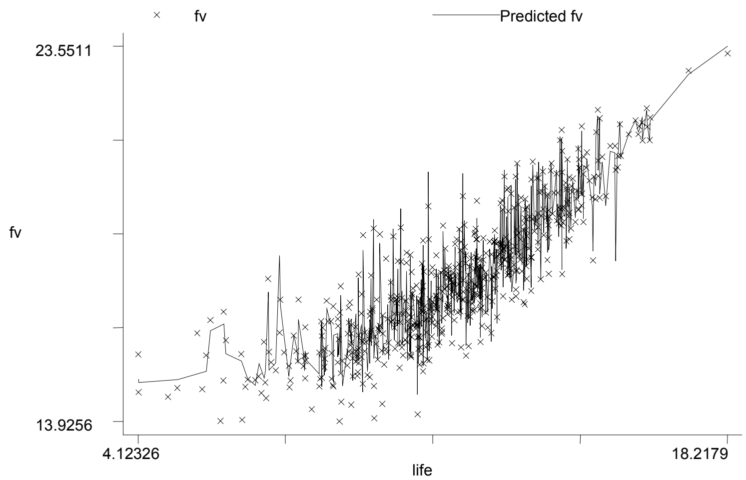


Figure A2: Property Value (fv) vs Roads (roads)- Observed (x) and Predicted Values

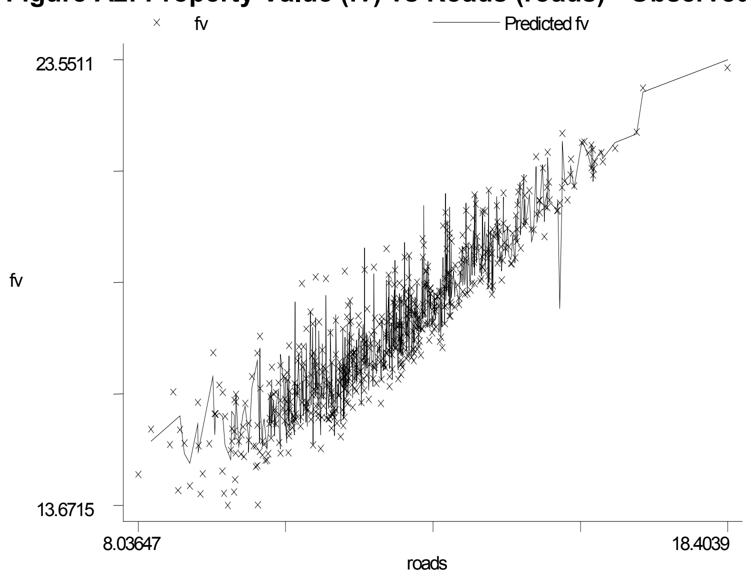


Figure A3 Property Value (fv) Vs Sanitation (sanit)- Observed (x) and Predicted Values

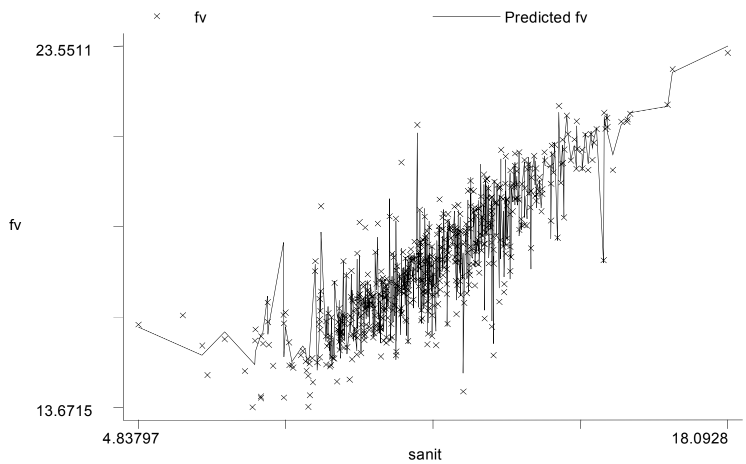


Figure A4: Property Value (fv) vs Public Safety (safety)- Observed (x) and Predicted Values

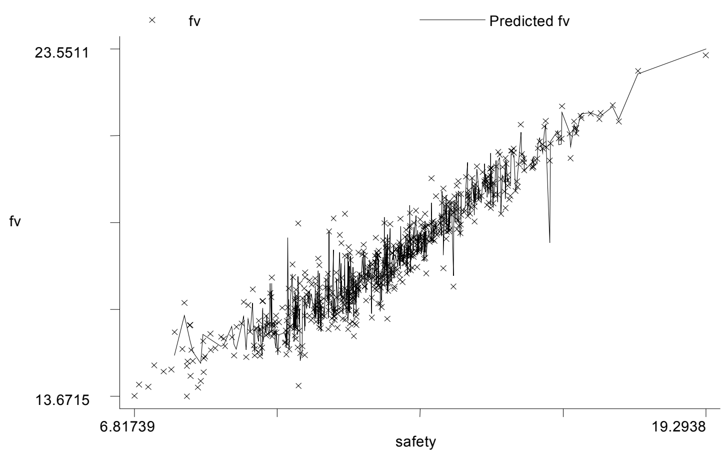


Figure A5: **Property value (fv) vs Local Tax $ paid for every $1,000 of income (taxraty) Observed (x) and Predicted Values**

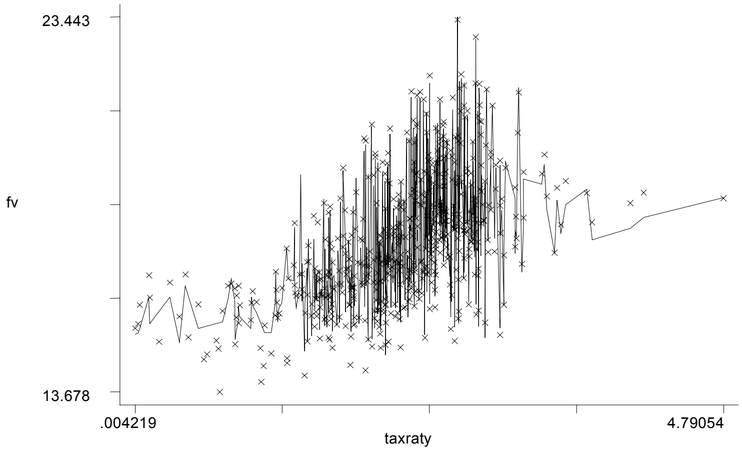
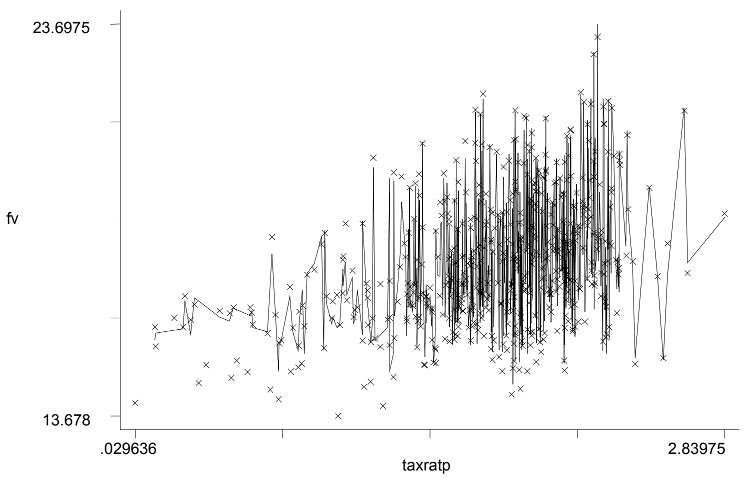


Figure A6: Property value (fv) vs (Local Taxes/full value)*1000-taxratp. Observed (x) and Predicted Values



A. The Brueckner Model

This section of the appendix formalizes the arguments on the derivation of the Brueckner curve by summarizing the main steps for its derivation. (This Appendix draws from Deller (1990), Regional Science and Urban Economics, 20:395-406)

The analysis begin by assuming that preferences are identical and rents vary in a way that each consumer in a given income group achieves the same level of utility across all governmental jurisdictions. The utility function for the ith individual can be written

$$u = u\,(h_i, g, x_i) \qquad \text{(A1)}$$

where g is the level of a public good, hi is a measure of housing services consumed and xi is a numeraire composite good consumed by the ith individual. Since the level of utility achieved msut be the same for all individuals with a given income, the utility in eq.(A1) must satisfy

$$u(h_i, g, x_i) = \theta\,(y_i) \qquad \text{(A2)}$$

where y_i is the income of the ith individual and utility is non-decreasing in income ($\theta' \geq 0$).

Defining R_i as the rent of the ith individual must pay for housing services hi, given public consumption g, the budget constraint of the ith consumer is $x_i + R_i = y_i$. Rearranging the budget constraint and substituting, eq.(A2) can be restated as

$$u\,(h_i, g, y_i - R_i) = \theta\,(y_i) \qquad \text{(A3)}$$

Eq.(A3) implicitly defines the bid-rent function, which gives rent as a function of housing services, public good consumption, and income. For a given level of income and hence some fixed level of utility, the effect of a change i the other arguments in eq.(A3) on rent can be determined.

$$R_i = R(h_i, g, y_i) \qquad \text{(A4)}$$

Totally differentiating eq.(4) yields eq.(A5) where the numerical subscripts denote partial derivatives and i indicates that the utility function is evaluated at i's consumption bundle.

$$u1_i\, dh_i + u_i 2\, dg - u_i 3 dR_i = 0 \qquad \text{(A5)}$$

By holding housing services fixed, the effect of a change in the public good level on rent can be determined by rearranging eq.(A5):

$$\partial R_i / \partial g_i = u_{i12} u_{i3} > 0. \qquad \text{(A6)}$$

The implication of eq.(A6) is that a higher level of public good results in higher rent. Note that the ratio of partial derivatives in eq.(A6) is equal to the marginal rate of substitution (MRS) between public good and the composite good.

To complete the model it is necessary to examine the value of property. In a perfect competitive market, the value of the property is equal to the net rent received discounted over time:

$$V_i = (R_i - T_i)/\alpha \qquad \text{(A7)}$$

where V_i is the value of the ith property, T_i is the property taxes paid on the ith property and α is the discount rate. Total property value is the sum of the values of all properties:

$$V = \sum_{i=1}^{n} V_i = \sum_{i=1}^{n} (R_i - T_i)/\alpha \qquad \text{(A8)}$$

With a balanced government budget, the total amount of property tax paid equals the total cost of providing the public good. Since the total cost will be a function of the public good level, c (g), eq. (A8) can be written as

$$V = \left(\sum_{i=1}^{n} R_i - c(g) \right) / \alpha \qquad \text{(A9)}$$

Differentiating eq.(A9) with respect to the public good yields

$$\frac{\partial V}{\partial g} = \sum_{i=1}^{n} \frac{\partial R_i}{\partial g} - \frac{\partial c(g)}{\partial g} \qquad \text{(A10)}$$

Suppose now that the public good level is chosen to maximize total property value. Since it can be shown that V is a strictly concave function of g under standard assumptions, maximization requires that $\partial V/\partial g = 0$. But since the last term in eq.(A10) is marginal cost of producing an additional unit of the public good and the sum of $\partial R_i/\partial g$ is equal to the sum of the marginal rates of substitution across individuals, $\partial V/\partial g = 0$ implies the Samuelson condition for allocative efficiency in public good provision.

Thus, if government officials behave in a manner as to maximize total property value, the resulting first-order condition implies that the Samuelson condition for Pareto-Efficiency is met.

B. Test for Local Public Sector Efficacy

Let G = c (g) be the total cost required to provide the level of g of the local public good. The local government budget constraint is given as

$$G_i = \tau_i V_i + Z \qquad \text{(B1)}$$

The cost required to provide the local public good is financed with a tax revenues on property ($Ti = \tau_i V_i$), whose total base amounts to the sum of all property in that particular community as well as with intergovernmental transfers.[10] Eq.(B1) implicitly determines g as a function of τ_i and Z. Recall from eq.(A7) that V_i is a function of T_i and Ri. Recall also from eq.(B4) that R_i is a function of h_i, g and y_i. Thus, V_i is ultimately a function of the property tax rate (τ_i), the level of public services provided (g), as well as a function of housing and socioeconomic characteristics of the community.

Community i revenue frontier is defined as the amount of disposable revenues it has available being specified as:

$$\Re = \tau_i V_i (\tau_i, Z, h_{i,} y_i) + Z \qquad \text{(B2)}$$

[10] Transfers are assumed to be determined exogenously in this model. In reality given for instance revenue sharing transfers they would be also be a function of other variables in the model such as income, housing characteristics or even government expenditures.

A small decrease in the property tax rate ($\Delta\tau_i$), when matched with adjustments in local public goods as required in the community budget constraint- eq.(B2), results in an equilibrium balanced budget change in community revenues of:

$$\Delta\Re = \Delta\tau_i V_i + \tau_i \Delta V_{i.} \qquad \text{(B3)}$$

The first term $-\Delta\tau_i V_i$ – measures the direct revenue effect of a small increase in the property tax rate. The second term measures the indirect effect of the rate increase as local tax bases respond to changes in local tax rates and to balanced budget adjustment in G for given levels of h_i and y_i.

The second term can also be written as a function of the elasticity of the property tax base with respect to small changes in the property tax $-\varepsilon$ - defined as

$$\varepsilon = \frac{\Delta V_i / V_i}{\Delta\tau_i / \tau_i} \qquad \text{(B4)}$$

In order to see that just isolate ΔV_i in (B4), substituting in the second-term in (B3). The expression for the indirect effect is now $\varepsilon\Delta\tau_i V_i$ and eq.(B3) is reduced to

$$\Delta\Re = (1+\varepsilon)\, \Delta\tau_i V_i \qquad \text{(B5)}$$

Thus, the effect of a small decrease in property tax rates will depend on the signal and magnitude of ε. If $\varepsilon>-1$, $\Delta\Re>0$, a tax rate cut will decrease revenues meaning that the economy would be in the normal range of the local Laffer curve (local revenue hill). Otherwise, $\Delta\Re <0$, and a tax cut will increase revenues. In this case the local economy would be in the prohibitive range of a possible local revenue hill. Local public sector efficacy will be achieved if $\varepsilon=-1$.

A test of local public sector efficacy can be implemented by simpling estimating the elasticity of property values with respect to the property tax rate. A statistically significant elasticity (positive or negative) indicates the existence of a common inefficacy bias among the local government units in the sample.