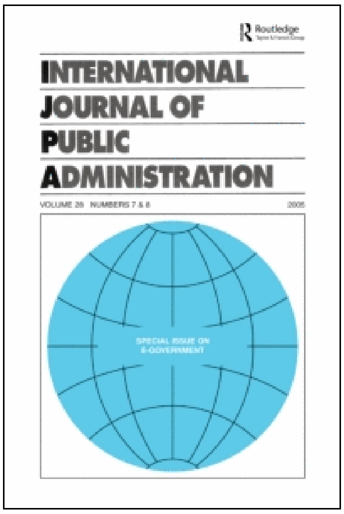

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Government, Effectiveness, Performance, and Local Property Values

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Government, Effectiveness, Performance, and Local Property Values

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Abstract: We offer a practical measure of local government effectiveness in the provision of public services relating service expenditures to aggregate property value. Building on the work of Brueckner (1979, 1982, 1983) and Henderson (1990, 1995) we present an aggregate property value maximization model where levels of local public services are capitalized into aggregate property values. Using data for Wisconsin municipalities we demonstrate that service expenditure levels, and simultaneously corresponding taxation levels, are suboptimal and should be increased. The aggregate property value maximization test suggests that local public services in Wisconsin are consistently under-provided. By monitoring local property values officials can objectively measure if public services are being provided in an optimal manner.

Keywords: effectiveness, expenditures, property values

INTRODUCTION

Local governments of all types are faced with increasing pressure to "do more with less," be "leaner and meaner" and to maintain high quality public services while at the same time reducing tax burdens (Welch, 1985; Hondle, Costa, & Cigler, 2004). Although the pressure to "do more with less" is not a new phenomenon, there is a sense across the United States that the pressure has reached critical levels (Osborne & Hutchinson, 2004). The frustration with the

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perceived "out of control" spending by state and local officials has resulted in a number of statutory and constitutional amendments such as California's Proposition 13, Massachusetts's Proposition 21/2, Missouri's Hancock Amendment, and Colorado's Taxpayer's Bill of Rights (TABOR). Yet, at the same time, there appears to be a "more for less paradox" where residents demand higher service quality and lower taxes (Welch, 1995).

The growing pressure to do more with less and to maintain or increase public service levels in the face of strong opposition to raising taxes of any form, local public officials are faced with trying something different. Part of this movement is captured in the New Public Management (NPM) where public administrators are looking to the private sector for management ideas (Barzelay, 1992; Ferlie et al., 1996; Hood, 1995; Osborne & Gaebler, 1992; Osborne & Plastrik, 1997; Roberts & Bradley, 2002). One tool that has come to the forefront from the NPM movement is the notions of "benchmarking," "performance measurement" and "productivity standards" to improve the effectiveness and efficiency of their operations (Ammons, 1996; Berman, 1998; Hatry, 1999; Rosen, 1993).

The explicit guidelines established by Government Performance Results Act of 1996, the Governmental Accounting Standards Board (GASB) in 2003, and the increasingly widespread use of productivity improvement efforts in larger cities strongly suggest that the pressure to adopt more aggressive management practices at all levels of government is real and unlikely to soften anytime in the near future.

The adoption of performance measurement programs serves two purposes. First, they are seen as an effective management tool for clearly establishing objectives and policies to achieve those objectives. This is clearly the intent of recent efforts by GASB to include performance information in financial statements. According to a recent report by GASB,

> For a government organization, financial statements, although providing important financial information about fiscal and operational accountability, do not provide all the information needed to determine whether the organization was successful… Information about the services delivered, policies established, and the effect of those policies have had is needed to allow citizens and other users to assess how well the organization is achieving its goals. (2005:2).

Second, local officials see these programs as effective marketing tools for converting valuable information to local residents. In establishing criteria, citizen involvement can help dispel misperceptions about fiscal policies. At the same time, performance measurement can help residents understand the need for raising taxes or reducing or even eliminating services.

The intent of this applied research study is to offer an alternative way of thinking about effectiveness and allocative efficiency in the provision of public services at the local level. By building on the idea of property value capitalization we outline a model of allocative efficiency that is consistent with Samuelson's (1954) condition of Pareto optimality in the provision of local public goods and services. By statistically modeling how public service levels are captured in, or capitalized into, aggregate property values normative statements about the effectiveness and/or allocative efficiency of local governments can be advanced.

Beyond these brief introductory comments, the study is composed of four sections. In the next section we review the theoretical foundations for our property value capitalization model by building on the property value maximization model of Brueckner (1979, 1982, 1983) and Henderson (1990, 1995). In the third section we outline our empirical application of the capitalization model using data for Wisconsin municipalities. We then present our empirical results and offer a way to use the results of the statistical modeling approach to draw inferences about the allocative efficiency, or effectiveness, of individual Wisconsin municipalities. The closing section of the study outlines the study accomplishments.

AN ECONOMIC MODEL OF PUBLIC SECTOR EFFECTIVENESS AND ALLOCATIVE EFFICIENCY

Performance measurement relative to allocative efficiency (or effectiveness) can fall into several unintended traps such as the performance paradox, tunnel vision and analysis paralysis (van Thiel & Leeuw 2002). This can range from the adoption of subjective measures that can change with the political winds of local elected officials to managers loosing sight of the bigger picture of why local governments provide certain services. As noted by Dowding and Mergoupis (2003) allocative efficiency or effectiveness is usually measured by examining satisfaction as revealed through citizen surveys, focus groups or informal interviews. Such interpretation of stated preferences, however, often lacks theoretical foundations and may be reduced to *ad hoc* exercises in political gamesmanship.

A problem with appealing to private sector management methods in the construction of performance measurements within government is the nature of public services. While private firms can measure profits, market shares and stock values, no comparable measures exist for the public sector. Public managers can measure inputs and outputs, but can not measure outcomes. Consider police protection where inputs are spending levels, outputs are response times and patrol rates, but outcome, deterred crime, is next to impossible to measure. Public managers have historically been limited to looking at inputs (e.g., spending) and are now focusing on outputs. Measuring outcomes is a much more difficult endeavor.

We suggest that by turning to rigorous theoretical models of spatially competitive markets as advanced by Tiebout (1956) and refined by Peterson (1981), Schneider (1989), and Schneider and Teske (1995), a more objective and constructive measure of local government effectiveness can be offered.[1] Building on the widely held notion of public service capitalization into local property values first offered by Oates (1969), a market based objective measure of allocative efficiency and/or effectiveness is offered. We suggest that the aggregate property value maximization models of Brueckner (1979, 1982, 1983) and Henderson (1980, 1985) offer such a test. In brief, Brueckner and Henderson show that local public services are offered in a manner such that if aggregate local property values are maximized, then the economic definition of allocative efficiency (effectiveness) offered by Samuelson (1954) is satisfied.

If individuals 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 levies imposed by local governments, the aggregate value of property in a given community can provide useful information about the performance of its local government. We expect this to 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 of public services at lower tax burdens. In the short run, given a fixed land as well as housing and commercial stock of property, 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 of public goods and services in a community are 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; at the same time it would require local governments to raise local taxes with exactly opposite effects on property values. This latter element of the theoretical model, that balanced budget requirements force taxes and spending levels to move in unison, tells us that we do not need to include both spending and taxation levels within the same model. Within our proposed framework including both service levels and taxations, as in the spirit of Oates (1969), introduces serious specification error into the empirical modeling. In this sense, the Brueckner-Henderson property value maximization model is a radical departure from the more tradition Oates-type empirical approach to modeling public good capitalization where both expenditures and taxes are included as control variables in regression analysis.

This theoretical result formalized the non-linear effects of local public expenditures on aggregate property value as an inverted U-shaped function

[1]This can also be thought of through the public choice model of fragmented and overlapping local jurisdictions that are competing for economic growth and development (Bish & Ostrom, 1979; March & Olsen, 1989; Ostrom, 1989; McCabe & Vinzant, 1999; Dowding & Mergoupis, 2003).

with the maximum occurring at the level where the provision of such public goods and services is efficient in an allocative sense. In other words, only at the point where public goods and services are fully capitalized into aggregate property values are the Samuelson conditions of Pareto optimality satisfied. Brueckner, and later Henderson, further explored this result in a test based on the effect of changes in the level of government expenditures on aggregate property values.

The "Brueckner-Henderson relationship" for the particular case where only one type of public good is provided is illustrated in Figure 1. If local governments are currently under-supplying the local public good (spending and corresponding taxation are too little), increases in expenditures coupled with an identical increase in taxes, should increase property values (point A). At some point, further increases in government expenditures would require unattractive tax levies thus causing aggregate property values to decline. This would indicate an over-supply of local public goods (too much taxing and spending) — 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).

The notion of spatial competition between communities resulting in measurable differences in local property values has produced a large and robust empirical literature (Hoyt, 1990; Kohlhepp & Ingene, 1979; Sonstelie & Portney, 1980; Wildasin, 1979; Yinger, 1982). But in an extensive review of the empirical literature Dowding, John, & Biggs (1994) find that support for Tiebout-Peterson spatial competition models depends on the approach of the study. More "macro" approaches (such as this study using municipal level data) tend to support the notion of spatial competition among jurisdictions whereas more "micro" approaches (individual household and firm data) tend to challenge this idea.

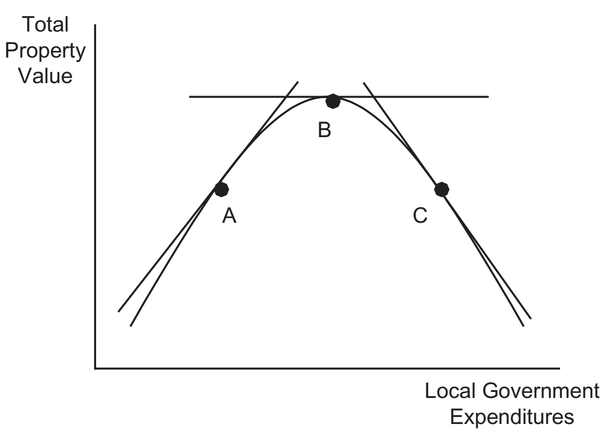

Figure 1. Property value hypersurface.

As noted by Krane, Ebdon, and Bartle (2004), more recent studies have found various flaws in the Tiebout-Peterson model and its application to local government behavior (Basolo & Huang, 2001; Musso, 2001; Rhode & Strumpf, 2000; Rusk, 1995; Smith & Smyth, 1996). In the simplest sense citizens are hard-pressed to judge the validity of service quality claims and typically possess little knowledge about services in other communities (Krane, Ebdon, & Bartle, 2004; Lowery, Lyons, & De Hoog, 1990; Ostrom, Bish & Ostrom, 1988). This lack of information is one motivation for local offices to adopt performance measures.

McCabe and Vinzant (1999) argue that in most spatial competition models migration, or exit and entry, becomes the only signal of preference and consumers call the shots.[2] Although out-migration is a clear signal of dissatisfaction and in-migration is a clear signal of satisfaction, migration is not the only way of expressing levels of satisfaction. Particularly in community level politics citizen involvement through voting plays a central role in political behavior (Lyons & Lowery, 1989; Lyons, Lowery, & DeHoog, 1992). Politics and voting for either officials and/or referenda are removed from the decision-making process in spatial competition theories of local fiscal behavior and performance. This embodies Tiebout's infamous "voting with their feet" statement; here people do not exercise in the political process via voting at the ballot box but rather by picking up and moving to another municipality.

One could argue that this central focus on migration is a weakness to the capitalization type model we offer here. Theoretical work by Brueckner and Joo (1991) and Sasaki (2000), however, suggest that when voting schemes are included in spatial competition models, the logic of capitalization follows. In short, for most households their primary source of wealth rests in their residences and property owners will vote strategically to maximize their net wealth. In other words, in a world of property ownership, agents will vote in a manner that will maximize their capital gains. Whether or not people "vote with their feet" or "through the ballot box" local officials still have a strong incentive to allocate public services in a manner consistent with aggregate property valuation maximization. Only in the case were the voter's preferences do not line up with the migrant's preferences are sufficient levels of noise introduced to cause potential distortions in empirical capitalization studies. Theory suggests that this problem is likely to occur in the short run, in the long run preferences will tend to converge through a traditional spatial competition sorting process.

One of the frustrations with the simpler Tiebout type world of spatial competition and migration is that local public officials are delegated to a passive roll; they establish a service level package with a corresponding tax mix and then step back and let people self-select. The Brueckner-Henderson model of property value maximization is more in the spirit of Peterson (1981) and

[2]Consumers here include both households and firms.

Schneider and Teske (1992, 1993a, 1993b, 1995) view of a political entrepreneur where local officials are active members of the local community. Within the spirit of growth machine theory (Molotch, 1976), local residents, business owners and public officials have a strong incentive to maximize capital-gains through property value maximization.

From a public administration perspective, property value maximization provides a clear decision rule for local officials. Here local officials can monitor the reaction of the local real estate market to changes in fiscal policy. Indeed, we suggest that the property value maximization approach provides local decision makers with a comprehensive and practical test of allocative efficiency (effectiveness).

To implement the Brueckner-Henderson test we follow the applications of the aggregate property value maximization model as suggested by Deller (1990a, 1990b), Taylor (1995), and Bates and Santerre (2003). This approach requires one to collect a sample of municipal observations on aggregate property values and public service provision levels. In practice, public expenditures serve as a proxy for quantity and quality. As argued by Afonso and Fernadandes (2006), Schwaur and Oates (1988, 1991), and Davis and Hayes (1993) among many others, effective levels of service provision, and hence property values, are also affected by other factors such as the wealth and socioeconomic characteristics of the local jurisdiction, measures of these variables are also required.

The assumption equating expenditures with service levels is clearly strong and ignores the input, output and outcome logic outlined above. If we assume technical efficiency, or all municipalities are operating at the cost curve, then expenditures and costs are identical and costs proxy service quantity and quality. Unfortunately, there is a significant body of research that challenges the technical efficiencies of local governments (e.g., Deller, Nelson, & Walzer, 1992). Still, in the eye of the consumer they equate their tax bill, or spending, with perceived level of services. If our approach to performance measurement has an Achilles heel, the reliance on spending as a measure of service levels is it. We still maintain that the theory tells us that significant insights into local government performance can be gained by paying attention to local property values.

The next step is to use multiple regression analysis to estimate the inverted-U that an increase or decrease in a given category of local public expenditure will have on a jurisdiction's total property value controlling for other factors. A statistically positive regression coefficient on expenditures indicates that all observations lie to the left of the peak of the inverted-U with the regression line being of the type that passes through point A in Figure 1. This result indicates that all jurisdictions share a common efficiency bias; specifically all jurisdictions are under-spending or at least are not overspending.

Analogously, a statistically negative coefficient indicates that all observations lie to the right of the peak of the inverted U-curve with the regression line passing through point C in Figure 1. All jurisdictions will be overspending or at least not under-spending. All individuals may perceive a decrease in expenditure and the corresponding decline in taxes as desirable.[3] The test is less conclusive when the estimated regression coefficients are not statistically significantly different from zero. Either jurisdictions do not present a common efficiency bias with some jurisdictions under-spending and others overspending or all communities are spending at the efficient level with the regression line passing through point B in Figure 1.[4] Brueckner prefers the former and less strong interpretation of the results.

AN EMPIRICAL MODEL OF PUBLIC SECTOR EFFECTIVENESS AND ALLOCATIVE EFFICIENCY

To estimate the model outlined in the previous section we use data for 1,830 municipalities in Wisconsin. Municipalities in Wisconsin are composed of 190 cities, 395 villages and 1,250 towns and are independent general purpose governments vested with a range of responsibilities. In Wisconsin, public education is the responsibility of independent school districts and court and jail services, along with most health and human services are the responsibility of county government, thus these services will be set aside for this study.[5] Expenditure and property valuation data are drawn from the Wisconsin Department of Revenue’s annual municipal and county revenues and expenditure report and the socioeconomic data are from the 2000 Census. Expenditure and property valuation data are an annual average over the period 1998 to 2000. We use an average to minimize the effects of large one-time unique expenditures that tend to introduce “spikes” into the data.

The basic equation to be estimated takes the form:

$$\mathrm{TOTVAL} = \beta_0 + \beta_1 \mathrm{EXP} + \beta_2 (\mathrm{EXP} * \mathrm{EXP}) + \Sigma_{i=3\ldots21} \beta_i Z_i + \varepsilon \tag{1}$$

[3]We use the term taxation to include all locally generated sources of revenue including property and sales taxes as well as fees and charges.

[4]Another possibility is that local public goods and services are simply not capitalized into property values.

[5]School districts, being separate units of government, provide some difficulty for our modeling efforts. It is commonly argued in the literature that education is the primary local public good that draws residents and firms. In addition, for most states, public education comprises the lion’s share of the local property tax levy. In Wisconsin, as in many states, the school district is separate, overlaps municipal boundaries and functions independently of local municipalities. Given our interest in municipalities, including independent data on schools would introduce noise to the analysis, noise in the sense that public education policies are beyond the control of municipal officials.

where TOTVAL is total equalized assessed property value, EXP is expenditures by the local unit of government and Z is a set of 18 socioeconomic control variables and ε is a regression error term that assumed to be well behaved. The curvature of the expenditure-property value relationship is captured by expenditures squared (EXP*EXP) term.[6] In the strictest sense, if local governments are effective in terms of providing an optimal level of services we would expect $\beta_1=\beta_2=0$, or the data would be clustered at the top of the inverted-U outlined in Figure 1.[7] This result would provide prima facie evidence that municipalities in Wisconsin do not systematically over- or under-provide services.

Based on the theory there are two other possible out comes, one of over-provision and one of under-provision. In the case of over-provision we would expect to see $\beta_1 < 0$ and $\beta_2 \leq 0$ or the data is clustering on the right-hand-side of the inverted-U. This result is consistent with the argument that government is "too big." In the case of under-provision we would expect to see $\beta_1 > 0$ and $\beta_2 \leq 0$ or the data is clustering on the left-hand-side of the theoretical inverted-U. Here one could argue that public service levels are too small and spending, along with corresponding taxation levels, could be increased.[8]

Property valuation, the dependent variable in our models, warrants special discussion. In Wisconsin, property is to be assessed at full market value or fair market value and is defined as "the amount the property will sell for in an arms-length transaction on the open market between a willing seller not obliged to sell the property and a willing buyer not obliged to purchase it."[9]

Because assessors in different taxing districts may value similar properties at different levels, it is necessary for the Department of Revenue to convert the assessed values, by taxing jurisdiction, to a uniform level. These uniform

[6]One potential criticism of the Brueckner-Henderson 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 government expenditures, Brueckner's test specifies and estimates a linear function. Others, such as Deller (1990a, 1990b), employ a quadratic specification as suggested here.

[7]A second centers on the real possibility of Type II regression error, or incorrectly rejecting a false statistical null hypothesis. The condition $\beta_1=\beta_2=0$ is generally observed by statistical insignificance, often through small t-statistics. But, there are numerous other reasons beyond optimal service provision levels that might cause the statistical result of $\beta_1=\beta_2=0$. If the Brueckner test has a fatal flaw it centers on Type II error.

[8]A final possibility is $\beta_1 > 0$ and $\beta_2 < 0$ in which case the data are distributed over the whole range of the theoretical inverted U-shaped pattern. If this case prevails one needs to look at whole of the relationship and not the individual parameters separately.

[9]*Waste Management v. Kenosha County Review Board 184 Wis. 2nd 541, (1994).* For a general discussion of the Wisconsin property tax assessment process see "Guide for Property Owners," Wisconsin Department of Revenue 2004 available at: http://www.dor.state.wi.us/pubs/slf/pb060.pdf

values, or equalized values, are adjusted to be as close to 100 percent of market value as possible. The equalization occurs at the municipal rather than the individual property level and for our purposes serves as a quality check on property values. The equalized values are used for apportioning county property taxes, public school taxes, vocational school taxes, and for distributing property tax relief.

The control variables include:

- Population
- Percent of the Population under Age 20
- Percent of the Population Over Age 65
- Percent of Housing Stock Classified as Recreational
- Percent of Occupied Houses Occupied by Owners
- Percent of Persons over 25 with H.S. Education or Less
- Unemployment Rate
- Percent of Employed Persons in Farming, Fishing & Forestry
- Percent of Employed Persons in Professional Occupations
- Percent of Employed Persons in Manufacturing
- Percent of Households with Income less Than $15,000
- Percent of Households with Income Over $100,000
- Percent of Household with Social Security Income
- Per Capita Income
- Percent of Housing Stock Built since 1980
- Median House Value
- Median Rent Value
- Municipal Type Identifier

This collection of control variables is designed to capture several different elements of the local community and draws on the wealth of available capitalization literature (Bates & Santerre, 2003; Deller, 1990a, 1990b; Dowding, John & Biggs, 1994; Taylor, 1995). Indeed, if one were to tap into the broader hedonic literature in both the real estate as well as the environmental literature, there are literally hundreds if not thousands of empirical studies upon which we could draw. For brevity, we will reference only those studies that are germane to Wisconsin and the empirical analysis of local public services.[10] Population is intended to capture the scale or size of the municipality, age profiles and income measures capture demand preferences of local residents, and employment shares control for the structure of the local economy. Descriptive statistics of the set of control variables are provided in Table 1.

[10]We could also tap into the empirical median voter literature for additional insights into the underlying structure of demand for services adding dozens of studies to the relevant empirical literature.

Table 1. Sample Descriptive Statistics

	Average	Deviation	Min	Max
Population	2,899	16,061	37	596,974
Percent of the Population Under Age 20	28.5%	0.047	9.5%	58.1%
Percent of the Population Over Age 65	14.4%	0.054	2.8%	46.2%
Percent of Housing Stock Classified as Recreational	22.8%	0.503	0.0%	434.4%
Percent of Occupied Houses Occupied by Owners	82.1%	0.103	23.9%	98.9%
Percent of Persons over 25 with High School Education or Less	57.9%	0.115	6.5%	100.0%
Unemployment Rate	4.4%	0.031	0.0%	38.0%
Percent of Employed Persons in Farming, Fishing, and Forestry	2.6%	0.026	0.0%	20.0%
Percent of Employed Persons in Professional Occupations	26.4%	0.082	0.0%	83.2%
Percent of Employed Persons in in Manufacturing	22.4%	0.085	0.0%	58.8%
Percent of Households with income Less Than $15,000	12.8%	0.066	0.0%	46.9%
Percent of Households with income Over $100,000	7.5%	0.066	0.0%	67.3%
Percent of Households with Social Security income	34.1%	0.100	10.9%	89.3%
Per Capita income	$19,478	5,519$	7,915$	94,479
Percent of Housing Stock Built since 1980	29.8%	0.115	0.0%	85.4%
Median House Value	$100,936	44,650$	–$	810,000
Median Rent Value	$472	150$	–$	1,625

The age profiles are intended to capture the fundamental differences between older and younger households. Shields, Deller, and Stallmann (2001) find in a study of north-central rural Wisconsin that the impacts on the local economy including the housing market and local governments are fundamentally different for retirement age and younger families. In a complementary study they also find income structure can have an equally important role in altering the underlying structure of the local economy (Shields, Stallmann, & Deller, 1999). In a separate study of Wisconsin municipalities Deller, Marcouiller, and Green (1997) find that the ownership structure and mixture of recreational housing alter the underlying demand structure as well as the revenue mix of local governments. In Wisconsin there is a vast and well developed recreational housing market that needs to be controlled for in any property valuation study. In a collection of studies looking the flypaper effect and the Wisconsin Shared Revenues Program Deller and Maher (2005, 2006) find that economic structure with a focus on occupational structures and sources of income also has an important role in determining the underlying decision making process of local government officials. These latter variables also help proxy the mix of properties within any given municipality.

Including the percent of the population over age 25 that has a high school education or less captures not only demand considerations for property within the municipality, but also proxies demand for education within the municipality. As noted above a potential weakness of this study is that we focus on general purpose municipalities and do not include public education. If we appeal to the education production function literature (e.g., Deller & Rudnicki, 1993) a case can be made that general education levels within a community is a powerful predictor of the demand for public education. In essence, the higher the education level of the residents of the community, the greater the demand for quality public education and the greater the willingness to pay. Thus by explicitly including the education level of community within the model we are implicitly controlling for school quality.

In addition to examining total expenditures, we look for effectiveness levels in ten separate expenditure categories including:

- Total Expenditures
- Government Administration
- Police Protection
- Fire Protection
- Ambulatory Service
- Road Maintenance
- Waste Services
- Health and Human Services
- Cultural and Educational Services[11]
- Parks and Recreational Services
- Conservation and Community Development Programs

By examining individual expenditure categories allocative efficiency judgments can be made on services by type. This categorical detail avoids potential problems with aggregation bias and provides detailed insights into the allocative efficiency of specific types of services.

EMPIRICAL RESULTS

A total of 11 models (Models A through K) are estimated and reported in Table 2. In general the models performed well explaining between 90.3 and 95 percent of the variation in total property values with an average adjusted R^2

[11]Educational services offered by municipalities do *not* include K-12 education. These tend to be specialized offerings that may be in partnership with local business associations or university extension services.

Table 2. Property Value Model

	Model A	Model B	Model C	Model D	Model E
Intercept	–96.5560	–74.6720	–16.5540	–1.3015	272.0740
	(1.49)	(1.21)	(0.26)	(0.02)	(3.22)
Population	0.0224	0.0234	0.0239	0.0346	0.0313
	(17.20)	(21.66)	(19.39)	(26.17)	(114.53)
Percent of the Population under Age 20	–250.2100	–346.3630	–302.3230	–356.4440	–586.0340
	(2.49)	(3.62)	(3.04)	(3.27)	(4.42)
Percent of the Population over Age 65	–19.9390	–98.3274	–53.9972	–232.6420	–566.4460
	(0.19)	(0.99)	(0.52)	(2.07)	(4.13)
Percent of Housing Stock Classified as Recreational	16.9877	10.8467	15.9804	25.9772	39.0298
	(1.86)	(1.24)	(1.77)	(2.63)	(3.24)
Percent of Occupied Houses Occupied by Owners	215.1770	215.6450	204.9500	258.3840	145.6450
	(4.59)	(4.84)	(4.42)	(5.07)	(2.39)
Percent of Persons over 25 with High School Education or Less	–89.1717	–67.7449	–114.7850	–77.5502	–119.5710
	(1.66)	(1.33)	(2.17)	(1.33)	(1.69)
Unemployment Rate	–235.9840	–316.2500	–299.3720	–238.0530	–168.1620
	(2.18)	(3.07)	(2.80)	(2.03)	(1.17)
Percent of Employed Persons in Farming, Fishing and Forestry	–64.6245	–31.7128	–93.5784	118.1190	131.4230
	(0.47)	(0.24)	(0.69)	(0.80)	(0.73)
Percent of Employed Persons in Professional Occupations	17.9763	–28.9577	23.9710	95.6765	218.4670
	(0.28)	(0.47)	(0.38)	(1.37)	(2.57)
Percent of Employed Persons in in Manufacturing	–91.9161	–110.9210	–81.9878	–118.4160	–63.0888
	(2.12)	(2.69)	(1.91)	(2.52)	(1.10)
Percent of Households with Income less than $15,000	–80.2174	–27.4875	–61.0315	–59.9768	–56.3423
	(0.99)	(0.36)	(0.77)	(0.68)	(0.53)

Percent of Households with Income over $100,000	420.4310	335.7540	448.6910	313.6790	313.8180
	(3.66)	(3.08)	(3.95)	(2.52)	(2.07)
Percent of Household with Social Security Income	61.5655	55.0916	54.9999	91.0274	110.6570
	(1.03)	(0.97)	(0.93)	(1.41)	(1.40)
Per Capita Income	–0.0005	–0.0011	–0.0015	–0.0001	–0.0010
	(0.31)	(0.78)	(1.04)	(0.08)	(0.52)
Percent of Housing Stock Built Since 1980	76.1947	54.3793	113.0990	96.0333	79.9225
	(2.48)	(1.86)	(3.71)	(2.86)	(1.96)
Median House Value	0.0000	0.0001	0.0000	0.0000	0.0000
	(0.01)	(0.41)	(0.19)	(0.15)	(0.06)
Median Rent Value	0.0859	0.0602	0.0700	0.0629	0.0793
	(3.18)	(2.34)	(2.63)	(2.15)	(2.23)
Municipal Type Identifier	–1.4328	12.2136	–5.4485	–42.7885	–69.8399
	(0.19)	(1.67)	(0.74)	(5.55)	(7.40)
Total Expenditures	25.9860				
	(22.08)				
Total Expenditures Squared	–0.0272				
	(43.15)				
Government Administration		347.6090			
		(24.07)			
Government Administration Squared		–2.9307			
		(34.28)			
Police Protection			152.5230		
			(21.02)		
Police Protection Squared			–0.7987		
			(36.90)		

(*Continued*)

Table 2. (*Continued*)

Fire Protection				130.0500	
				(12.54)	
Fire Protection Squared				−2.1755	
				(36.28)	
Ambulatory Service					738.1100
					(12.25)
Ambulatory Service Squared					−146.4240
					(6.23)
Adjusted R-squared	0.9448	0.9499	0.9461	0.9352	0.9033
F-stat	1584.43	1754.15	1625.36	1336.40	865.42

Number in parentheses is the absolute value of the t-statistic.

Table 2. Property Value Model (*Continued*)

	Model F	Model G	Model H	Model I	Model J	Model K
Intercept	–99.8295	135.6210	33.6149	–62.1255	125.9400	–15.5005
	(1.49)	(2.00)	(0.47)	(0.84)	(1.61)	(0.21)
Population	0.0358	0.0232	0.0415	0.0448	0.0274	0.0359
	(37.46)	(22.33)	(55.82)	(52.91)	(90.38)	(41.70)
Percent of the Population under Age 20	–347.3100	–457.7350	–407.8740	–402.7220	–468.0430	–360.5770
	(3.34)	(4.36)	(3.68)	(3.53)	(3.85)	(3.11)
Percent of the Population over Age 65	–192.9050	–324.6620	–342.1510	–299.9970	–327.9210	–220.5570
	(1.79)	(2.99)	(2.99)	(2.54)	(2.61)	(1.84)
Percent of Housing Stock Classified as Recreational	16.2084	21.7850	32.3058	27.5811	29.7518	30.4077
	(1.71)	(2.29)	(3.22)	(2.66)	(2.68)	(2.90)
Percent of Occupied Houses Occupied by Owners	267.3350	156.2180	283.6460	324.3610	184.7770	284.0190
	(5.52)	(3.19)	(5.52)	(6.12)	(3.30)	(5.29)
Percent of Persons over 25 with High School Education or Less	–53.3999	–106.3460	–57.0999	–45.6824	–104.2790	–81.6732
	(0.96)	(1.90)	(0.97)	(0.75)	(1.61)	(1.32)
Unemployment Rate	–261.6890	–268.4780	–246.8370	–250.9730	–70.9170	–239.2280
	(2.34)	(2.38)	(2.07)	(2.04)	(0.54)	(1.92)
Percent of Employed Persons in Farming, Fishing and Forestry	141.4930	–15.3901	140.4970	196.0520	10.8727	92.8058
	(1.00)	(0.11)	(0.94)	(1.27)	(0.07)	(0.59)
Percent of Employed Persons in Professional Occupations	9.7156	74.4219	114.9120	78.2895	212.7720	92.6237
	(0.15)	(1.11)	(1.62)	(1.07)	(2.73)	(1.25)
Percent of Employed Persons in in Manufacturing	–114.1850	–119.8720	–130.1120	–142.8440	–66.2829	–115.2860
	(2.54)	(2.65)	(2.73)	(2.90)	(1.26)	(2.31)
Percent of Households with Income less than $15,000	7.8696	–50.2462	–54.3708	22.3066	–117.5110	–96.8182
	(0.09)	(0.60)	(0.61)	(0.24)	(1.20)	(1.04)

(*Continued*)

Table 2. (*Continued*)

Percent of Households with Income over $100,000	203.6370	378.1050	289.6960	245.2840	422.0330	357.8380
	(1.72)	(3.16)	(2.30)	(1.88)	(3.05)	(2.71)
Percent of Household with Social Security Income	83.9480	95.2778	107.6800	86.0024	110.2150	84.0404
	(1.36)	(1.53)	(1.64)	(1.27)	(1.53)	(1.22)
Per Capita Income	0.0009	–0.0008	0.0001	0.0004	–0.0007	–0.0001
	(0.57)	(0.54)	(0.08)	(0.24)	(0.40)	(0.05)
Percent of Housing Stock Built Since 1980	55.5402	91.8929	73.9159	50.0723	75.6091	54.1312
	(1.75)	(2.86)	(2.18)	(1.43)	(2.03)	(1.53)
Median House Value	0.0001	0.0000	0.0000	0.0001	–0.0001	0.0000
	(0.75)	(0.07)	(0.19)	(0.54)	(0.58)	(0.15)
Median Rent Value	0.0496	0.0769	0.0606	0.0482	0.1061	0.0859
	(1.78)	(2.73)	(2.04)	(1.57)	(3.26)	(2.76)
Municipal Type Identifier	–21.8292	–31.4774	–59.8229	–39.7682	–55.0061	–40.6184
	(2.82)	(4.23)	(7.74)	(4.82)	(5.92)	(4.94)
Road Maintenance	211.3250					
	(14.65)					
Road Maintenance Squared	–4.9395					
	(36.09)					
Waste Services		573.4530				
		(28.37)				
Waste Services Squared		–15.9108				
		(33.61)				
Health and Human Services			273.4740			
			(12.21)			
Health and Human Services Squared			–16.9264			
			(30.77)			

Cultural and Educational Services			181.4080		
			(11.44)		
Cultural and Educational Services Squared			−28.5255		
			(31.15)		
Parks and Recreational Services				150.5560	
				(7.88)	
Parks and Recreational Services Squared				14.3685	
				(5.51)	
Conservation and Community Development Programs					164.2150
					(19.68)
Conservation and Community Development Programs Squared					−4.4592
					(28.70)
Adjusted R-squared	0.9398	0.9330	0.9288	0.9192	0.9267
F-stat	1445.7	1290.12	1207.19	1052.99	1169.87

Number in parentheses is the absolute value of the t-statistic.

of .9327. Equation F-statistics are all significant at the 99 percent level of confidence ranging from 865.42 to 1754.15 with and average F-statistic of 1333.16. The presentation of the results beyond these summary comments will focus first on the results related to the set of control variables and then the efficiency results associated with service levels.

Control Variables

Of the 17 control variables ten are consistently significant at or above the 95 percent level of confidence across the eleven specification of the model. For ease of discussion, we have computed an "average" value of the coefficient and corresponding t-statistic and report those averages in Table 3. Because of differences in scaling across many of the control variables direct interpretation and comparison of individual average coefficients is difficult and to facilitate discussion we have computed a coefficient elasticity that is computed at

Table 3. Base Model Summary Estimates

	Average Parameter	Average t- Statistic	Elasticity
Population	0.0313	(45.41)	0.628
Percent of the Population Under Age 20	–389.6032	(3.52)	–0.768
Percent of the Population Over Age 65	–243.595	(2.06)	–0.242
Percent of Housing Stock Classified as Recreational	24.2601	(2.38)	0.038
Percent of Occupied House Occupied by Owners	230.9234	(4.57)	1.312
Percent of Persons Over 25 with High School Education or Less	–83.3912	(1.43)	–0.334
Unemployment Rate	–235.9948	(2.05)	–0.073
Percent of Employed Persons in Farming, Fishing, and Forestry	56.9052	(0.63)	0.010
Percent of Employed Persons in Professional Occupations	82.7152	(1.18)	0.151
Percent of Employed Persons in Manufacturing	–104.992	(2.25)	–0.163
Percent of Households with income Less Than $15,000	–52.1660	(0.65)	–0.046
Percent of Households with income Over $100,000	338.9969	(2.74)	0.177
Percent Household with Social Security income	85.5005	(1.30)	0.202
Per Capita income	–0.0004	(0.42)	–0.055
Percent of Housing stock Built since 1980	74.6173	(2.24)	0.154
Median House Value	0.0001	(0.28)	0.009
Median Rent Value	0.0714	(2.42)	0.233

the sample mean.[12] Consider population with a coefficient elasticity of .628, this implies that a ten percent increase in the municipality's population will translate into a 6.3 percent increase in total property values, all else held constant.

The age structure of the municipal population also significantly influences the aggregate property values: a ten percent increase in the percent of the population under age 20 will decrease total property values by 7.7 percent while a 10 percent increase in the percent of the population over age 65 will lead to a decline in total property values by 2.4 percent. Both of these results make intuitive sense, younger families tend to live in more modest homes as do older persons. Surprisingly, per capita income and the percent of households with income less that $15,000 are not statistically significant, but percent of high income households, those with income over $100,000 is significant. For the latter, a 10 percent increase in the percent of households with an annual income of over $100,000 will see a 1.8 percent increase in total property value. This result is as expected; public services are traditionally viewed as normal goods and as income increased people demand more of the good or service.

In addition, education levels of the local population seem to have a weak impact on total property values. The negative coefficient is consistent with expectations and prior research and the coefficient elasticity appears to be reasonable, the low t-statistic suggests that education of the population does not in isolation influence property values. The negative and significant coefficient on the unemployment rate is as expected and a ten percent increase in the unemployment rate will see slightly less than a one percent decline in property values.

Our measures capturing the characteristics of the housing stock also tend to be statistically significant. The percent of the housing stock classified as recreational, a major component of the recreational industry in Wisconsin, has a positive albeit modest impact on total property value. A 10 percent increase in the percent of housing classified as recreational increases total property value by less than 1 percent. This modest coefficient of elasticity is explained by the wide variation in the recreational housing market in Wisconsin which ranges from small hunting cabins to large lakefront summer homes.

Municipalities that tend to have a newer housing stock, as measured by percent of the housing stock built since 1980, also tend to have higher overall property values. A 10 percent increase in share of the housing stock that is newer will see a 1.5 percent increase in total values. Surprisingly, median house value does not appear to impact total property values, but median rent does. Indeed, a 10 percent increase in median rent suggests that total property values increases by 2.3 percent. The direction of causation here warrants a note. It is more likely that high rents do not cause higher property values, but rather higher

[12]A coefficient elasticity is simply the value of the partial derivative of the equation evaluated at the sample mean: $(\partial Y/\partial X)(X/Y)$ where X and Y are sample means for the independent and dependent variable respectively. For a linear regression equation this reduces to $\beta_i(X_i/Y)$ where β_i is the regression coefficient of the i^{th} variable (X_i).

property values, everything else held constant, results in higher rents. It is important to keep in mind that the role of the control variables is to separate out the impact of public service levels (i.e., expenditures) on aggregate property values.

Our final set of control variables are intended to capture the structure of the municipal's economy. Here we include the percent of persons employed in traditional extractive industries (e.g., farming, fishing, and forestry) which crudely captures the "ruralness" of the local economy, percent of persons in professional occupations, and percent in manufacturing. We also included percent of households with social security income which is intended to complement the age profile and income variables. Of the four measures only one, percent of persons employed in manufacturing, is associated with total property values in a statistical sense. Interestingly higher levels of dependency on manufacturing for employment has a negative impact of total property values, a ten percent increase in dependency decreases property values by 1.6 percent. The final control variable is the municipal type identifier and tends to be negative and significant and given its coding suggests that towns and villages have lower property values than cities, everything else held constant.

Allocative Efficiency

Now let us turn attention to the set of results central to this analysis, the results on public service levels proxied through expenditures. Recall that we have three potential results: optimality ($\beta_1=\beta_2=0$), over-provision ($\beta_1 < 0$ and $\beta_2 < 0$) under-provision ($\beta_1 > 0$ and $\beta_2 \leq 0$). Consider first total expenditures (Model A), here both coefficients are statistically different from zero at above the 99 percent level of confidence, thus we can easily reject the result of optimality ($\beta_1=\beta_2=0$). For total expenditures, the data for Wisconsin municipalities supports the idea of under-provision ($\beta_1=25.9860 > 0$ and $\beta_2=-.0272 < 0$). This result suggests that spending levels, and corresponding taxation levels, could be increased for most municipalities in Wisconsin. Given Wisconsin's reputation as a "high tax and spend" state, this result is somewhat unexpected.[13] To determine the relative shape of the curve we compute the partial derivative of the equation with respect to expenditures and evaluate at the sample mean. For total expenditures the value of the partial derivative is 25.84 and the slope elasticity, again evaluated at the mean, is .469 suggesting that a ten percent increase in total expenditures will increase total property value by about 4.7 percent (Table 4).[14]

[13]The "high tax and spend" reputation is partially a function of Wisconsin's high level of spending on education which is not captured in the municipal data.

[14]Given our discussion in footnote eight the elasticity allows us to look at the whole relationship and address the possible interpretation that the result $\beta_1 < 0$ $\beta_2 < 0$ means the data are distributed over the whole range of the inverted U-shaped relationship.

Table 4. Allocative Efficiency Summary Estimates

	Slope Coefficient	Slope Coefficient t-statistic	Slope Elasticity
Total Expenditures	25.9316	(22.06)	0.4691
Government Administration	346.0752	(24.04)	0.6268
Police Protection	151.9171	(20.98)	0.3988
Fire Protection	128.9954	(12.45)	0.2164
Ambulatory Service	729.5727	(12.36)	0.1472
Road Maintenance	208.5157	(14.52)	0.4104
Waste Services	570.2736	(28.24)	0.3944
Health and Human Services	272.0265	(12.16)	0.0805
Cultural and Educational Services	176.3269	(11.13)	0.1087
Parks and Recreational Services	153.8599	(8.28)	0.1224
Conservation and Community Development Programs	162.7638	(19.49)	0.1833

As we move across expenditure categories we see that the slope coefficients are all positive and statistically significant at or above the 99 percent level of confidence. But, there is wide variation in the values of the slope elasticities. Consider general government administration spending where the slope elasticity of .6268 suggests that a ten percent increase in total spending in this category could see total property values increase by 6.3 percent, again evaluated at the sample mean.[15] But the slope elasticity for cultural and educational services is only .1087, suggesting that a ten percent increase in this service area will see only a 1.1 percent increase in total property values. In general, the "standard" services such as police protection, road maintenance and waste services will have a larger impact on property values than more "luxury" services such as cultural and educational services and parks and recreational services.

These latter results warrant three observations. First, municipal provided public service levels in Wisconsin are universally under-provided, or given Brueckner's more lenient interpretation, there is no evidence of systemic over-provision of municipal services. Second, the level of optimality varies significantly with type of public services and looking at total expenditures in isolation will mask important differences across service types. Third, we can identify which services are closer to their optimal levels by examining the size of the slope

[15]This latter result is particularly interesting because of the widely-held believe that local governments tend to be bloated with top heavy administration costs. This result provides some evidence refuting this common believe.

elasticity. Generally, the smaller the slope elasticity the closer the service level is to optimality.

Application to Individual Municipalities

The power of the Brueckner-Henderson test of allocative efficiency, or effectiveness, is that the statistical modeling can be evaluated on a municipal by municipal basis. Consider the Village of Blanchardville, a municipality with a population 806 located about half way between Madison, Wisconsin, and Dubuque, Iowa. This is a rural community in one of the few counties in Wisconsin, that is still predominately dependent upon production agriculture as its economic base. The Village has a total budget of $667,000 of which 24.9 percent is spent on protective police and fire services, 10.9 percent on general government administration, 10.2 percent on road maintenance, 9 percent on parks and recreational services, and the balance distributed over the remaining expenditure categories. Aggregate property value is assessed at just above $25.8 million.

The slope elasticity for total expenditures for Blanchardville is .669 suggesting that if total expenditures increased by 10 percent, matched by increases in revenues, total property values would increase by about 6.7 percent. The slope elasticity for individual services range from .977 for general administration and .726 for waste collection (water and solid waste) to .181 for ambulatory services and .098 for conservation and community development efforts (Table 5). This provides clear evidence for the officials of Blanchardville to devote

Table 5. Efficiency Estimates for a Sample of Municipalities

	Village of Blanchardville	Village of Turtle Lake	City of Stevens Point	City of Madison
Total Expenditures	0.6691	1.1693	0.6233	0.2677
Government Administration	0.9772	1.5276	0.4753	0.3588
Police Protection	0.5305	0.9005	0.6025	0.2969
Fire Protection	0.3812	0.3269	0.2990	0.0370
Ambulatory Service	0.1807	0.0866	0.4271	0.0000
Road Maintenance	0.5547	0.5392	0.4631	0.0973
Waste Services	0.7263	0.0397	0.4140	0.1617
Health and Human Services	0.0380	0.0000	0.0131	–0.0548
Cultural and Education Services	0.1918	0.1643	0.0183	–0.2498
Parks and Recreational Services	0.3529	0.1416	0.4304	0.3571
Conservation and Community Development Programs	0.0979	0.3858	0.1411	–0.1566
Population	806	1,065	24,551	208,054

additional responses to waste collection, road maintenance, police and fire protection and parks and recreational services in that order. In terms of Figure 1, Blanchardville is consistently to the left of the peak or under providing services.

Consider now the example of the Village of Turtle Lake, a municipality with a population 1,065 located about half way between Eau Claire and Superior, Wisconsin. This is a rural community has a much larger daily population then residents due to the employment opportunities within the village limits. In addition to the location of a handful of medium-sized manufacturing firms, Turtle Lake is also home to a medium-sized Native American casino which employees about 900 persons. The Village has a total budget of $1.67 million of which 13.1 percent is spent on police protection, 5.6 percent on fire services, 9.8 percent on general government administration, and only 5.7 percent on road maintenance. Just over 5 percent of the Village's budget is spent on conservation and community development and is reflective of the Village's attempts to build its economic base by taking advantage of the active casino. For example, the Village is seriously considering building a municipal golf course to complement the casino. Aggregate property value is assessed at just above $36.7 million.[16]

The slope elasticity for total expenditures for Turtle Lake is 1.169 suggesting that a 10 percent increase in total expenditures would result in an 11.7 percent increase in total property values (Table 4). Based on our theory of capitalization, service levels in Turtle Lake are sub-optimal and spending levels could be significantly increased. By examining the slope elasticities for the individual expenditure categories, guidance can be lent into how additional resources could be spent. Additional resources should be devoted to police protection, road maintenance, and fire protection. The data also suggest that despite the apparent high level of spending on conservation and community development, additional resources could be devoted to this area. Unlike Blanchardville, the data suggest that waste services are close to optimal for Turtle Lake. Again referring to Figure 1, Turtle Lake tends to be located to the left of the peak and services, other than waste services, tend to be under-provided.

The City of Stevens Point is a medium-sized city with a population of 24,500 and is located in the geographic center of Wisconsin. Stevens Point is a regional hub and has a diverse economic base and is home to the University of Wisconsin-Stevens Point which is a four-year institution with a student population of 8,700. The City has an annual budget of just over $25 million of

[16]Because of the legal status of the Chippewa Tribe, the Turtle Lake Casino is exempt from the property tax and is not included within our measure of assessed value. This presents a potential problem with using assessed value computed for property taxes in that tax exempt properties are excluded. For communities with a state university, state prison, or federal lands the issue of tax exempt properties can be a source of significant error in the model.

which 16.3 percent is spent on police services, 9.9 percent on fire protection, 9.8 percent on road maintenance and 8.1 percent on parks and recreational services.

Overall, like nearly all Wisconsin municipalities, total expenditures could be increased; a ten percent increase in total expenditures would result in an increase of total property values of 6.2 percent (Table 4). The model suggests that Stevens Point is close to providing cultural and educational services at an optimal level but all other services could be systematically increased. For example, a ten percent increase in parks and recreational services could result in a 4.3 percent increase in total property values and a 10 percent increase in police expenditures could see a 6 percent increase in property values. Again, Stevens Point tends to be located to the left of the peak (Figure 1) or optimal level of spending.

But not all communities in Wisconsin are under-providing services. Consider the case of Madison, the capital of Wisconsin and the home to the University of Wisconsin-Madison. The City has a population of just over 200,000 persons and the metropolitan area has a population of about 500,000 people. The City has an operating budget of just over $232 million with 15.7 percent devoted to police services, 11.2 percent to fire protection, 11.3 percent to conservation and community development efforts, and only 4.4 percent to road maintenance. Total assessed value is about $11.6 billion and large tracts of land are except from the property tax and hence not included in this analysis including all state government properties such as the University of Wisconsin.

Examining the slope elasticities by service type presents some very interesting results. First, overall service levels again appear to be too low with a slope elasticity of .2677 suggesting that a 10 percent increase in total spending would increase total property values by about 2.7 percent (Table 4).[17] The data also suggest that Madison should increase spending on police protection, waste services, and perhaps the most on parks and recreational services. Based on the slope elasticities, spending on road maintenance and fire protection appear to be close to optimal.

Possibly the more interesting result is that the model suggests that Madison is spending too much money on conservation and community development programs as well as cultural and educational services where the slope coefficients are -.1566 and -.2498, respectively. In these two category of services

[17]In the city of Madison ambulatory services are provided through the fire department. This points to the care that must be taken when looking at individual municipalities. Although the data adhere to strict accounting standards, the level of aggregation may mask important local considerations. A second potential complication is when one local government contracts with another to supply a particular service. The local government servicing the contract will appear to higher spending levels than if no contract was in place.

Madison is to the right of the optimal level located at the peak of the inverted U-shaped pattern predicted by the theory (Figure 1). This latter result may be the result of the large number of cultural and educational services offered through the UW-Madison as part of its outreach efforts as well as the number of state museums and other services offered. The model seems to be suggesting that the City is duplicating cultural and educational opportunities. Health and human services may also be over-provided but in Wisconsin these services are predominately the responsibility of county government.

DISCUSSION AND CONCLUSIONS

The public sector at all levels is under increased pressure to do more with less. This challenge, while not necessarily new, has traditionally been viewed as a two part problem. The first part centers on the political structure, whether it be a city council or a town board, ability to determine the optimal, or allocative efficient, level of services. Within the public administration literature this is widely described as the effectiveness of government. Within the economic literature it is referred to as Pareto optimality. In the simplest sense the question is if the political structure is able to match the demands of the local citizenry in terms of service level provision. The second, once the optimal allocation is determined, are those services produced at the lowest possible cost to the taxpayer. This second component is often referred to as production efficiency.

While this separation is attractive from an academic perspective, in practice such subtleties are seldom discussed in public forums. Perceptions of waste and inefficiency are addressed though reductions in expenditures. But these reductions have allocative efficiency implications. This research has provided an objective market-based measure of allocative efficiency. We build on the idea of the Tiebout-Peterson notion of spatially competitive markets where municipalities compete for residents and businesses. Specifically we employ the idea of property value maximization as advanced by Brueckner and later Henderson.

Public services are capitalized into property values in such a way that an inverted-U can be statistically traced out. Jurisdictions to the left of the peak are said to be under-providing services and increases in service levels, matched by corresponding increases in local taxes, can result in higher property values. Municipalities that are to the right of the peak of the inverted-U are said to be over-providing services and a reduction in service levels and taxation will result in increased aggregate property values. Observations that are at the peak of the curve are said to be providing services at an optimal level. In addition, because municipalities generally run a balanced budget we need only look at expenditure levels. Under a balanced budget increases (decreases) in expenditures must be match with an equal increase (decrease) in revenues. Thus looking at expenditures or revenues is looking at two different sides to the same coin.

Using detailed expenditure data matched to census data for Wisconsin municipalities we traced out what the inverted-U relationship looks like for total expenditures and ten separate services. We found systematic evidence of service under-provision throughout much of the data. Given Wisconsin's reputation as a high tax and spending state, this finding is somewhat surprising. Indeed, current public debates over fiscal policies have followed a common theme; taxes are too high but we expect the level of services to be maintained if not enhanced. Over time Wisconsin residents have grown to demand high levels of public services and the model supports that causal observation.

We have also demonstrated that the statistical modeling can be used to assess the level of allocative efficiency of individual observations. By computing a slope elasticity evaluated at the observed values of any given municipality a normative statement about allocative efficiency can be made. Slope elasticities close to zero are indicative of spending levels close to optimality. The further the slope elasticity is from zero, either negative or positive, the greater the degree of allocative inefficiency. In addition, if total expenditure is decomposed by service area, such as police protection or road maintenance, and individual models are estimated, then insights into how specific spending patterns should be altered can be observed.

Like any performance measurement, the indicators we offer here should be viewed as an additional piece, albeit a large piece, to a complex puzzle. While the introduction of performance measures into public fiscal policy discussions has been widely welcomed, care must be taken not to fall into the trap of "paralysis by analysis" or being overwhelmed with performance measures that may be contradictory or not internally consistent. A laundry list of performance measures diffuses focus, spawns unproductive "busywork," and provides enough bureaucratic cover to justify pet projects or protect turf.

REFERENCES

Afonso, A., & Fernadandes, S. (2006). Measuring local government spending efficiency: Evidence for the Lisbon region. *Regional Studies, 40*(*1*), 39–54.

Ammons, D. N. (1996). *Municipal benchmarks: Assessing local performance and establishing community standards*. Newbury Park, CA, SAGE Publications.

Barzelay, M. (1992). *Breaking through bureaucracy: A new vision for managing government*. Berkeley, University of California Press.

Basolo, V., & Huang, C. (2001). Cities and Economic Development: Does the City Limits Story Still Apply? *Economic Development Quarterly*, *5*(4), 327–339.

Bates, L. J., & Santerre, R. E. (2003). The impact of a state mandated expenditure floor on aggregate property values. *Journal of Urban Economics*, *53,* 531–540.

Berman, E. M. (1998). *Productivity in public and nonprofit organizations: Strategies and techniques*. Newbury Park, CA, SAGE Publications.

Bish, R. L., & Ostrom, V. (1979). *Understanding urban government: Metropolitan reform reconsidered*, 5th ed. Washington, DC, American Enterprise Institute for Public Policy Research.

Brueckner, J. K., (1979). Property values, local public expenditure, and economic efficiency. *Journal of Public Economics*, 11, 223–246.

Brueckner, J. K., (1982). A test for allocative efficiency in the local public sector. *Journal of Public Economics*, *19*, 311–331.

Brueckner, J. K., (1983). Property value maximization and public sector efficiency. *Journal of Urban Economics. 14*, 1–16.

Brueckner, J. K., & Joo, M.-S., (1991). Voting with capitalization. *Regional Science and Urban Economics*, *21*, 453–469.

Davis, M., & Hayes, K. (1993). The demand for good government. *Review of Economics and Statistics*, *75*, 148–152.

Deller, S. C. (1990a). Pareto-Efficiency and the provision of public goods within a rural setting. *Growth and Change*, *21*, 30–39.

Deller, S. C. (1990b). An application of a test for allocative efficiency in the local public sector. *Regional Science and Urban Economics*, *20*, 395–406.

Deller, S. C., & Maher, C. (2005a). Categorical municipal expenditures with a focus on the flypaper effect. *Public Budgeting and Finance*, (*Fall*), 73–90.

Deller, S. C., & Maher, C. (2006). A model of asymmetries in the flypaper effect. *Publius: The Journal of Federalism*, *36*(2), 213–229.

Deller, S. C., & Rudnicki, E. (1993). Production efficiency in elementary education: The case of Maine public schools. *Economics of Education Review*. *12*, 45–57.

Deller, S. C., Marcouiller, D.W., & Green, G.P. (1997). Recreational housing and local government finance, *Annals of Tourism Research*, *24*, 3:687–705.

Deller, S. C. Nelson, C.H., & Walzer, N. (1992). Measuring managerial efficiency in rural governments: The case of low-volume rural roads. *Public Productivity and Management Review*, *15*(*Spring*):355–370.

Dowding, K., & Mergoupis, T. (2003). Fragmentation, fiscal mobility, and efficiency. *The Journal of Politics*, *65*(*4*):1190–1207.

Dowding, K., John, P., & S. Biggs. (1994). Tiebout: A survey of the empirical literature. *Urban Studies*, *31*, 767–97.

Ferlie, E., Ashburner, L., Fitzgerald, L., & A. Pettigrew, (1996). *The New Public Management in Action*. Oxford, Oxford University Press.

Governmental Accounting and Standards Board. (2003). *Reporting performance information: Suggesting criteria for effective communication*. Norwalk, CT, GASB.

Governmental Accounting and Standards Board.(2005). *Government service efforts and accomplishments performance reports: A guide to understanding*. Norwalk, CT, GASB.

Hatry, H. P. (1999). *Performance Measurement: Getting results*. Washington, DC, The Urban Institute Press.

Henderson, J. V., (1980). Community development: The effects of growth and uncertainty. *American Economic Review*, *70*, 894–910.

Henderson, J. V., (1985). The Tiebout model: Bring back the entrepreneurs. *Journal of Political Economy*, *93*, 248–264.

Hondle, B. W., Costa, J.M., & Cigler, B.A. (2004). *Fiscal health for local governments: An introduction to concepts, practical analysis and strategies*. Boston, MA: Academic Press.

Hood, C. (1995). The 'New Public Management' in the 1980s: Variations of a theme." *Accounting, Organizations and Society*, *20*(*2/3*), 93–109.

Hoyt, W. H. (1990). Local government inefficiency and the Tiebout hypothesis: Does competition among municipalities limit local Government inefficiency? *Southern Economic Journal*, *57*(*2*), 481–496.

Inman, R., (1979). The fiscal performance of local governments: An interpretative review, In P. Mieszkowski & M. Strazheim, Eds., *Current issues in urban economics*. Baltimore, Johns Hopkins University Press, pp. 270–321.

Kohlhepp D. B., & Ingene, C. A. (1979). The effect of municipal services and local taxes on housing values. *Real Estate Economics*, *7*(*3*), 318–343.

Krane, D., C. Ebdon & Bartle, J. (2004). Devolution, fiscal federalism, and changing patterns of municipal revenues: The mismatch between theory and reality. *Journal of Public Administration Research and Theory*, *14*(*4*), 513–533.

Lyons, W. E., Lowery, D., & DeHoog, R. H. (1992). *The politics of dissatisfaction: Citizens, services, and urban institutions*. Armonk, NY, M. E. Sharpe.

Lowery, D., Lyons, W., & De Hoog, R. H. (1990). Institutionally induced attribution errors: Their composition and impact on citizen satisfaction with local government services. *American Politics Quarterly*, *18*, 169–96.

Lyons, W. E., & Lowery, D. (1989). Governmental fragmentation vs. consolidation: Five public choice myths about creating informed, involved, and happy citizens. *Public Administration Review*, *49*, 533–43.

March, J., & Olsen, J. (1989). *Rediscovering institutions: The organizational basis of politics*. New York, Free Press.

McCabe B. C., & Vinzant, J. C. (1999). Governance lessons: The case of charter schools. *Administration & Society*, *31* (*3*) 361–377.

Molotch, H. L. (1976). The City as a growth machine: Towards a political economy of place. *American Journal of Sociology*, *72* (*4*) 686–691.

Musso, J. A. (2001). The political economy of city formation in California: Limits to Tiebout sorting. *Social Science Quarterly*, *82* (*1*) 139–153.

Oates, W. A. (1969). The effects of property taxes and local spending on property values: An empirical study of tax capitalization and the Tiebout hypothesis. *Journal of Political Economy*, *77*, 957–971.

Osborne, D., & Gaebler, T. (1992). *Reinventing government. How the entrepreneurial spirit is transforming the public sector, from the schoolhouse to statehouse, city halls to the Pentagon*. Reading, MA, Addison-Wesley.

Osborne, D., & Hutchinson, P. (2004). *The price of government: Getting the results we need in an age of permanent fiscal crisis*. New York, Basic Books.

Osborne, D., & Plastrik, P. (1997). *Banishing bureaucracy: The five strategies for reinventing government*. New York, Addison-Wesley.

Ostrom, V. (1989). *The intellectual crises in American public administration*, 2nd ed. Tuscaloosa, University of Alabama Press.

Ostrom, V., Bish, R. & Ostrom, E. (1988). *Local government in the United States*. San Francisco, ICS Press.

Peterson, P. (1981). *City limits*. Chicago, University of Chicago Press.

Rhode P. W., & Strumpf, K. S. (2000). Assessing the importance of Tiebout sorting: Local heterogeneity from 1850 to 1990. *American Economic Review*, *93*(*5*)

Roberts, N. C., & Bradley, R. T. (2002). Research methodology for new public management. *International Public Management Journal*, *5*, 17–51.

Rosen, E. D. (1993). *Improving public sector productivity: Concepts and practices*. Newbury Park, CA, SAGE Publications.

Rusk, D. (1995). *Cities without suburbs*, 2nd ed. Washington, DC, Woodrow Wilson Center Press.

Samuelson, P. A. (1954). The Pure Theory of Public Expenditures. *Review of Economics and Statistics*, *36*, 387–389.

Sasaki, K. (2000). Local Public Goods and the Capital-Gain Effects. *Regional Science and Urban Economics*, *30*, 45–57.

Schneider, M. (1989). *The political economy of suburbia*. Pittsburgh, PA, University of Pittsburgh Press.

Schneider, M., & Teske, P. (1992). Toward a theory of the political entrepreneur: Evidence from local government. *American Political Science*, *86*, 737–747.

Schneider, M., & Teske, P. (1993a). The antigrowth entrepreneur: Challenging the equilibrium of the growth machine. *Journal of Politics*, *55*, 720–736.

Schneider, M., & Teske, P. (1993b). The Progrowth Entrepreneur in Local Government. *Urban Affairs Quarterly*, *29*, 316–327.

Schneider, M., & Teske, P. (1995). *Public Entrepreneurs*. Princeton, NJ, Princeton University Press.

Schwaur, R., & Oates, W. (1988). Economic competition among jurisdictions: Efficiency enhancing or distortion inducing? *Journal of Public Economics*, *35*, 333–354.

Schwaur, R., & Oates, W. (1991). Community composition and the provision of local public goods. *Journal of Public Economics*, *44*, 217–237.

Shields, M., Deller, S. C., & Stallmann, J. I. (2001). Comparing the impacts of retirees versus working-age families on a small rural region: An application of the Wisconsin economic impact modeling system. *Agricultural and Resource Economics Review*, *30* (*1*): 20–31.

Shields, M., Stallmann, J. I. & Deller, S. C (1999). Simulating the economic and fiscal impacts of high and low-income elderly on a small rural region. *Review of Regional Studies*, *29* (*2*):175–196.

Smith, S. R., & J. Smyth, (1996). Contracting for services in a decentralized system. *Journal of Public Administration Research and Theory*, *6*, 277–96.

Sonstelie, J. C., & Portney, P. R. (1980). Gross rents and market values: Testing the implications of Tiebout's hypothesis. *Journal of Urban Economics*, *7*, 102–118.

Taylor, L. L. (1995). Allocative inefficiency and local government. *Journal of Urban Economics*, *37*, 201–211.

Tiebout, C. (1956). A pure theory of local expenditures. *Journal of Political Economy*, *64*, 416–424.

van Thiel, S., & Leeuw, F. L. 2002. The performance paradox in the public sector. *Public Performance & Management Review*, *25*(*3*), 267.

Welch, S. (1985). The 'more for less' Paradox: Public attidtudes on taxing and spending. *Public Opinion Quarterly*, *49* (*Autumn*), 310–316.

Wildasin, D. E., (1979). Local public goods, property values, and local public choice. *Journal of Urban Economics*, *6*, 521–534.

Wilson, W. (1987). "The study of administration. In J.M. Sharfritz and A.C. Hyde, Eds., *Classics of public administration*. Homewood, IL, Dorsey.

Yinger, J., (1982). Capitalization and the theory of local public finance. *Journal of Political Economy*, *90*, 917–943.