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Government, Effectiveness, Performance and Local Property Values

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Abstract

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

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 of local public services while at the same time reducing the tax burden on local residents (Welch 1985; Hondle, Costa and Cigler 2004). Although the pressure to "do more with less" is not a new phenomenon, there is a sense across the U.S. that the pressure has reached critical levels (Osbourne and Hutchinson 2004).

The growing pressure to do more with less and to 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. In response, officials are increasingly turning to 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 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 intent of this applied research study is to offer an alternative way of thinking about effectiveness in the provision of public services at the local level. By building on the idea of property value capitalization within the regional economics literature we outline a model of allocative efficiency. By statistically modeling how public service levels are captured, or capitalized, into property values normative statements about the effectiveness 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 municipalities in our sample. 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 and Leeuw 2002). This can range from subjective measures to managers loosing sight of the bigger picture. As noted by Dowding and Mergoupis (2003) allocative efficiency is usually measured by examining satisfaction as revealed through citizen surveys. Such interpretation of stated preferences, however, often lacks theoretical justification. We suggest that by turning to models of competitive markets as advanced by Tiebout (1956) and refined by Peterson (1981) 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 effectiveness is offered. We suggest that the 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 local property values are maximized, then the economic definition of allocative efficiency (effectiveness) offered by Samuelson (1954) is satisfied.

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

[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 and Ostrom 1979; March and Olsen 1989; Ostrom 1989; McCabe and Vinzant 1999).

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.

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, and latter Henderson, further explored this result in a test based on the effect of changes in the level of government expenditures on property values.

The "Brueckner 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 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).

The notion of Tiebout-Peterson-like competition between communities resulting in measurable differences in local property values has produced a large and robust empirical literature (Hoyt 1990; Kohlhepp and Ingene 1979; Sonstelie and Portney 1980; Wildasin 1979; Yinger 1982). But in an extensive review of the empirical literature Dowding, John and Bigss (1994) find that support for Tiebout-Peterson depends on the approach of the study. More "macro" approaches tend to support Tiebout-Peterson whereas more "micro" approaches tend to challenge Tiebout-Peterson. As noted by Krane, Ebdon and Bartle (2004) more recent studies (Basolo and Huang 2001; Musso 2001; Rhode and Strumpf 2000; Rusk 1995; Smith and Smyth 1996) have found various flaws in the Tiebout-Peterson model and its application to local government behavior. 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 and Bartle 2004; Lowery, Lyons and De Hoog 1990; Ostrom, Bish and Ostrom 1988)

McCabe and Vinzant (1999) correctly argue that in Tiebout-Peterson-like competition models migration, or exit and entry, becomes the only signal of preference and consumers call

the shots. 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 and Lowery 1989; Lyons, Lowery and DeHoog 1992).

While 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) suggest that when voting is introduced the logic of capitalization follows. In short, for most households their primary source of wealth rests in their residents and will vote strategically to maximize their net wealth. 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. The 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 Tiebout-Peterson-type sorting process.

One of the frustrations with a Tiebout-Peterson world of 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. Our model provides a clear decision rule for local officials, one of property value maximization. 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 test we follow the applications of the property value maximization model as suggested by Deller (1990a, 1990b), Taylor (1995) and Bates and Santerre (2003) one needs 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. Since property values are also affected by other factors such as the wealth and socioeconomic characteristics of the community, measures of these variables are also required.

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 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 with the regression line being of the type that passes through point A in Figure 1. 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 1. 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 1.[2] 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 study.

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. 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:

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

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.[3] In the strictest sense, if

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

[3] 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

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.[4] This result would provide prima fascia 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 $\beta_2 < 0$ 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 $\beta_2 < 0$ 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.

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."[5] 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 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:

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concave function of local government expenditures, Brueckner's test specifies and estimates a linear function.

[4] 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.

[5] *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 on the web at: http://www.dor.state.wi.us/pubs/slf/pb060.pdf

- 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 High School Education or Less
- Unemployment Rate
- Percent of Employed Persons in Farming, Fishing and 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 and Santerre 2003; Deller 1990a, 1990b; Dowding, John and Bigss 1994; Taylor 1995). 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.

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
- Parks and Recreational Services
- Conservation and Community Development Programs

By examining individual expenditure categories allocative efficiency judgments can be made on services by type.

Empirical Results

A total of eleven 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 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 the sample mean.[6] 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 ten 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 is 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 wealthy households, those with income over $100,000 is significant. For the latter, a ten 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. 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

[6] 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).

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 ten percent increase in the percent of housing classified as recreational increases total property value by less than one 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 ten 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 ten 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 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 $\beta_2 < 0$). 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. 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 .467 suggesting that a ten percent increase in total expenditures will increase total property value by about 4.7 percent (Table 4).

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.[7] 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, public service levels in Wisconsin are universally under-provided, or given Brueckner's 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 elasticity. Generally, the smaller the slope elasticity the closer the service level is to optimality.

Application to Individual Municipalities The power of the Brueckner 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

[7] 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.

administration, 10.2 percent on road maintenance, nine 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 ten percent, 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 4). This provides clear evidence for the officials of Blanchardville to devote additional responses to waste collection, road maintenance, police and fire protection and parks and recreational services in that order.

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 size 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 five 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.[8]

The slope elasticity for total expenditures for Turtle Lake is 1.169 suggesting that a ten 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

[8] It is important to note that 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.

to this area. But unlike Blanchardville, the data suggests that waste services are close to optimal for Turtle Lake.

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 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 ten percent increase in police expenditures could see a six percent increase in property values.

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 one-half million 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 ten percent increase in total spending would increase total property values by about 2.7 percent (Table 4).[9] The data also suggests 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

[9] 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.

cultural and educational services where the slope coefficients are -.1566 and -.2498, respectively. 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's, 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 the government. Is the political structure 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 been interested in providing an objective market-based measure of allocative efficiency. We build on the idea of the Tiebout-Peterson notion of 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. Observations to the left of the peak are said to be under-providing services and increases in service levels 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 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 tax 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 expenditures 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 “paralyze 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.

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Figure 1: Property Value Hypersurface

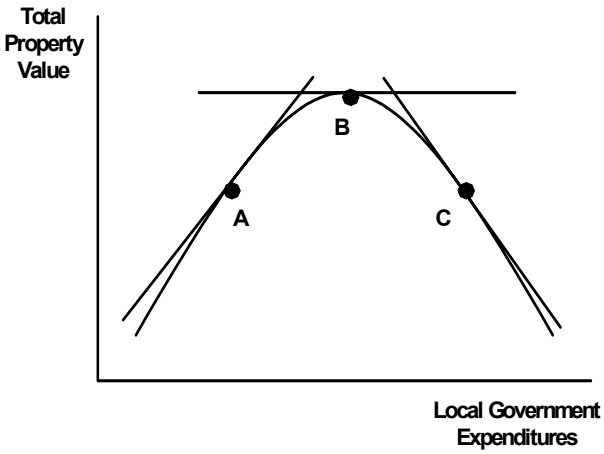

Table 1 Sample Descriptive Statistics

	Average	Standard 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 Household 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

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)		
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 (cont)

	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)
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.

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 Houses 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 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 of 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

Table 3 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

Table 4: 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 Educational 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