County Spending and the Implicit Subsidy to "Urban Sprawl"

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This paper examines county spending patterns in Wisconsin, to determine whether that spending provides an implicit subsidy to urban-type development outside of any city or village limits. I estimate that counties spend around $180 less per person on their city and village residents that they do on their town residents. Or stated differently, a Wisconsin county typically spends $500 more on public services provided to a town household than it does for a city or village household. As a result, most urban households are paying a tax penalty of between $150 and $350 annually, providing most town households with a tax subsidy of between $150 and $350 annually, due to the difference in county services provided to them. This creates a strong incentive for the growth of residential developments in rural areas, i.e. in urban sprawl. A reform in the way town and city/village residents are taxed for county services is therefore warranted.

To some, it's a waste of natural resources, an ugly blight on our countryside. To others, it's the market at work, converting low value farmland into high value homesteads. Its proponents call it development; its opponents malign it as "urban sprawl".

To an economist, converting land from rural to urban/suburban use is efficient and appropriate if, but only if, the developers and homebuyers who enjoy the benefits of the land conversion also bear all of its costs. However, if some of the costs of their decision to develop are borne by others, through higher taxes or a lower quality of life, then the land conversion is being implicitly subsidized, and an inefficiently high level of low density development would be occurring.

This paper explores one potential form of implicit subsidy: the possibility that the local government services provided to those developers and homebuyers are being underpriced. Much of the "sprawl" occurring here in Wisconsin takes place outside of any incorporated city limits, in the "urban towns" that have sprung up across the state.[1] These towns retain the political and governmental structure of a rural town. However, although a few of them provide a complete array of services to their constituents, including police protection, the vast majority receive most of their governmental services from the county. In contrast, most city and village residents get many of their local government services provided by their city or village.

The costs of those county provided services are for the most part shared equally by all the county's taxpayers, whether they live in a city, a village or a town. As a result, city and village taxpayers pay not only for their own police protection, provided by their city/village tax financed police department, but also for the town dweller's police protection, through the portion of their county taxes going to the County Sheriff's Department. The town taxpayers in contrast pay for only a portion of their own police protection. This tax shifting increases the property taxes that city/village residents must pay, reduces the property taxes of town residents, and therefore increases the attractiveness of housing developments built out into the countryside.

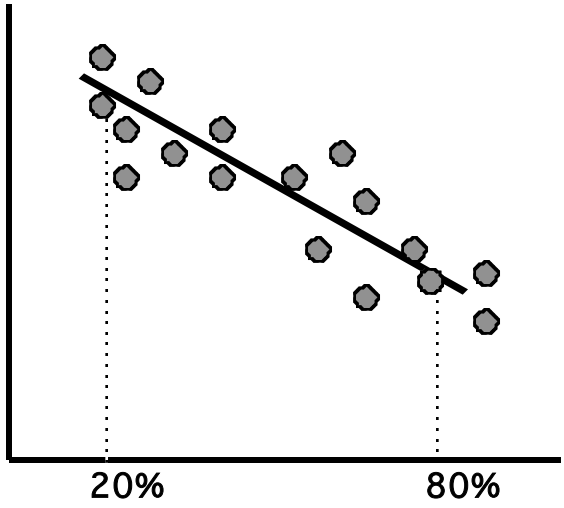
The extent to which this subsidization of rural development occurs should be apparent in the spending patterns of Wisconsin's 72 counties. If counties are providing services to town residents that cities and villages supply to their own residents, then county spending on those services should be higher, the more the county's residents live outside of cities and villages. Indeed, by looking at the relationship between county spending and town population, we should be able to determine not only whether such a subsidy occurs, but also how large the subsidy typically is.

The Conceptual Framework

Imagine two counties, each with 100,000 inhabitants: County A is mostly urban, County B mostly rural. If counties spend about the same amount on their urban and rural households, both counties should have roughly equal spending.

If counties spend more on their rural residents, e.g. by providing them with police and road maintenance services not produced for urban households, County B should spend more per capita than County A. We should then see a data pattern such as the one depicted in the graph below, with county per capita spending falling as the urban fraction rises.

If on the other hand counties spend more on their urban inhabitants, e.g. by providing more social services and jail facilities, County A should spend more per capita than County B. That would imply a data pattern exactly opposite the one portrayed below: county per capita spending would be rising as the urban fraction rises.



Fraction Living in Cities & Villages

The Model

County spending can vary from one county to the next for a number of reasons other than the urban/rural mix. Wealthier counties could spend more, because they can afford to. Larger counties, providing services over greater geographic area, may need to spend more to provide the same level of service to its more disperse population. And more populous counties may need to spend more, because there are more to serve.

This last relationship, between county spending and population, may be complicated by the presence of either economies or diseconomies of scale. Economies of scale imply that there are cost advantages to larger population, typically in the form of some "fixed" cost that can be spread out over a larger number of people. If economies of scale exist, we should observe the relationship

$$\text{Spending} = \alpha + \beta \text{ Population}$$

where α and β are constants, and α, representing fixed costs, would be positive.

Diseconomies of scale imply cost disadvantages to a more populous county. As the county's population grows, the size of the various county departments will grow. These larger

departments may in turn develop more complex, and costly, management hierarchies. If such diseconomies of scale exist, we should observe the relationship

$$\text{Spending} = \beta\ \text{Popn} + \gamma\ \text{Popn}^2$$

where γ would be a positive constant. A negative γ is also possible, and would be an alternative indication of economies of scale.

In the absence of any differences in county spending on city, village, and town residents, the relationship to estimate would be

$$\text{Spending} = \alpha + \beta\ \text{Popn} + \gamma\ \text{Popn}^2 + \delta\ \text{Wealth} + \phi\ \text{Area}$$

where the coefficients δ and ϕ would presumably be positive constants. To determine whether a spending difference (and therefore implicit subsidy) exists, I need to add an additional explanatory variable, measuring the number of city and village residents. The coefficient of the population variable, β, will then reflect the level of spending for a town resident. If λ is the city/village population coefficient, $(\beta+\lambda)$ will measure the level of spending for a city/village resident, so λ will measure any difference between county spending on town residents versus city/village residents. If an implicit subsidy is occurring, λ will be negative.

To also explore whether county spending on village residents differs from spending on city residents, a village population variable will also be added. This variable's coefficient μ will be positive if counties provide village residents with more services than city residents, negative if counties provide village residents with fewer services than city residents, and zero if village and city residents receive the same set of county services.

Finally, I've divided both sides of the spending relationship by county population, expressing all of the variables in per capita terms. This was done both to simplify the interpretation of the results, as well as to eliminate the problem of heteroskedasticity.[2] The resulting model is

$$\frac{\text{Spend}}{\text{Popn}} = \alpha\frac{1}{\text{Popn}} + \beta + \gamma\ \text{Popn} + \delta\frac{\text{Wlth}}{\text{Popn}} + \phi\frac{\text{Area}}{\text{Popn}} + \lambda\frac{(\text{Cit}+\text{Vil})}{\text{Popn}} + \mu\frac{\text{Vill}}{\text{Popn}}$$

This model will be estimated using ordinary least squares regression. My hypothesis, that counties spend more on town residents than on either city or village residents, implies that the estimated values for λ will be negative and for μ will equal zero.

The Data

My measures of county spending were taken from *Comparing County Expenditures*, compiled by the Wisconsin Taxpayers Alliance. Their report, based on unaudited annual financial reports filed by each county with the Wisconsin Department of Revenue, listed county spending levels in each of 6 categories -- General Government, Highway Maintenance and Construction, Judicial, Public Safety, Health & Human Services, and "Extracurricular" (i.e. cultural, educational, and recreational services) -- for the years 1994 through 1998. I used their 1998 spending levels.

The measures of the other variables were taken from the *State of Wisconsin 1999-2000 Blue Book*. The population figures, for both counties and their subjurisdictions, are official state population estimates for January 1, 1999. County wealth is measured as the county's full value property assessment, for 1997.[3]

The Results: Total County Spending

My initial analysis aggregates all 6 of the Wisconsin Taxpayer Alliance's 6 spending categories together. This allows me to examine whether there are any overall spending differences on town versus city/village residents.

Table 1 shows the estimated coefficients for my Total County Spending model.[4] Because there is considerable multicollinearity among the explanatory variables, I've reported results both including and excluding the variables with very statistically insignificant coefficients.

In addition, estimated results for a data set excluding Milwaukee County are reported. Because Milwaukee County's population and its %(city+village) are significantly larger that any other county, there is a possibility that this single county may act as an outlier, giving it an undue influence on the results. I report any case where the inclusion or exclusion of Milwaukee County has a significant impact on the estimated coefficients.

Table 1: Total County Spending

Independent Variables	Estimated Coefficients			
	Including Milwaukee Co.		Excluding Milwaukee Co.	
Intercept	599.16	591.72	589.72	597.14
	(7.66)	(10.67)	(7.52)	(10.87)
%(c+v)	-196.62	-189.29	-166.21	-171.12
	(-1.98)	(-2.12)	(-1.62)	(-2.09)
1/Popn	980879	992787	980238	976172
	(2.17)	(2.25)	(2.17)	(2.24)
Popn	0.00018	0.00018	-0.00002	
	(1.72)	(1.75)	(-0.10)	
Ass Val/Popn	-0.1075		0.0535	
	(-0.17)		(0.08)	
Area/Popn	1317.26	1320.14	1226.80	1202.00
	(1.75)	(1.84)	(1.63)	(1.69)
%Vill	10.92		25.84	
	(0.08)		(0.18)	
R Sq	0.553	0.553	0.562	0.561

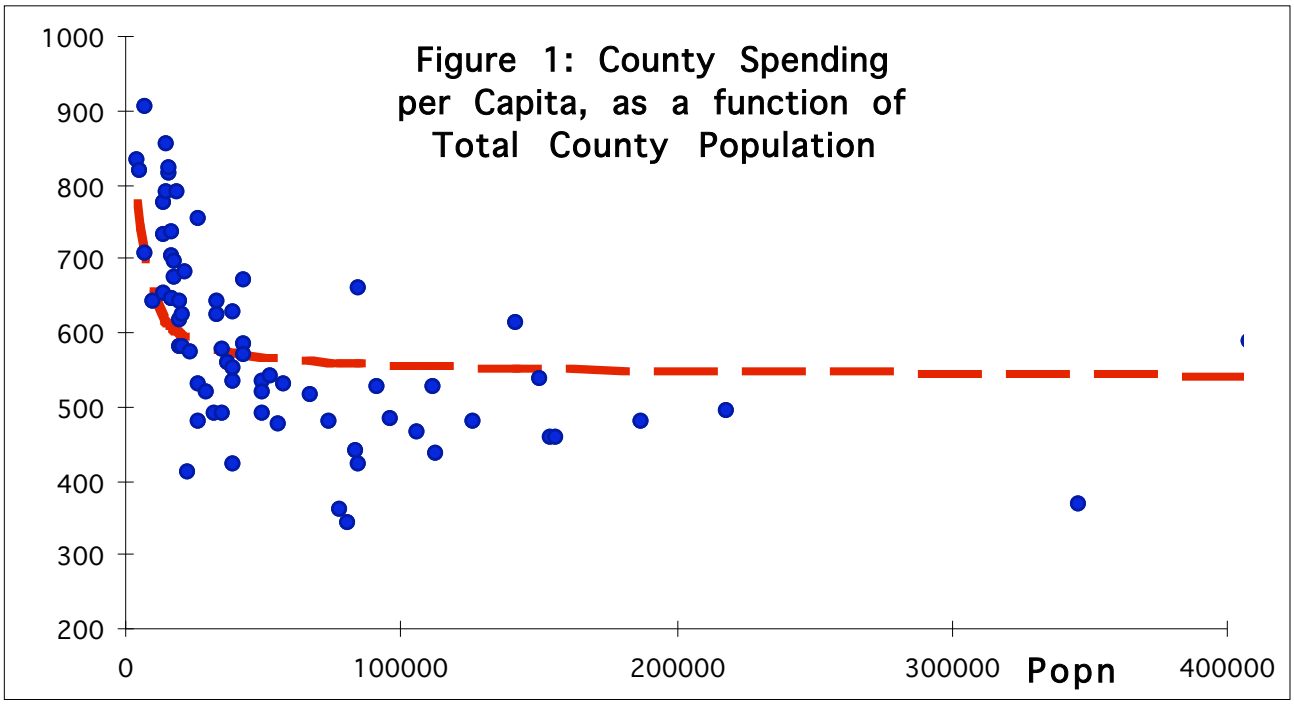
Note: t statistics are reported in parentheses

My results show first of all that there are clearly significant economies of scale in county spending, and that there may be some diseconomies of scale as well. In all four regressions, the 1/Population coefficient is statistically significant at the 0.1% level. The coefficient suggests that counties have around $1 million in fixed costs that they must incur, regardless of their population size. As my later results will demonstrate, these fixed costs appear to be

concentrated in 3 of the 6 spending categories: Judicial, Health & Human Services, and General Government.

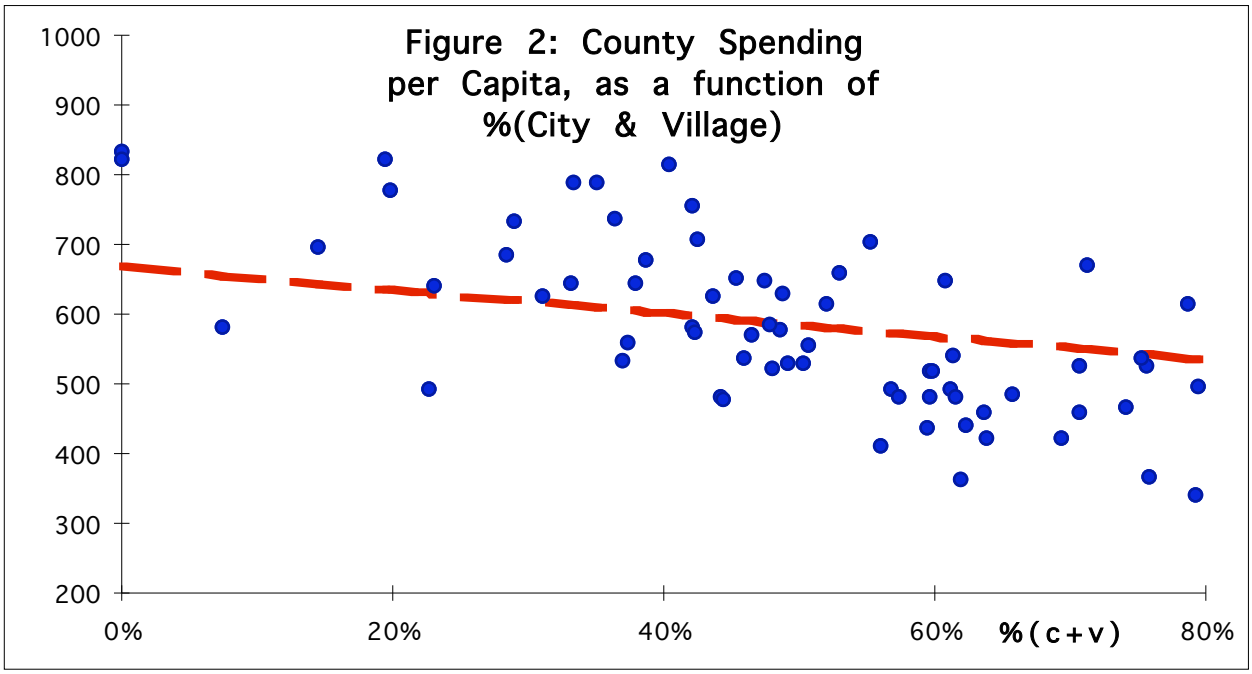
The two regressions that include Milwaukee Co. have positive and significant coefficients for the Population variable, implying that there are also diseconomies of scale in county spending. When Milwaukee Co. is excluded from the data set however, the Population coefficient is no longer statistically significant. That may imply that only Milwaukee County is large enough to experience these diseconomies, or it could merely reflect some other reason, such as local public preferences, that increases county spending in Milwaukee County.

Figure 1 shows the estimated relationship between county spending and population, drawn through a scatterplot of the data.[5] As you can see, the line fits the pattern of data points well, clearly demonstrating the presence of economies of scale in county governmental spending. The estimated relationship implies that counties with populations below 50,000 residents are inefficiently small, and that the consolidation of these low population counties could result in significant cost savings. Above a population of 50,000, however, the cost savings of further consolidation appear to be small to none.



More importantly to the focus of this paper, both the reduced variable regressions (the second and fourth columns) in Table 1 have a statistically significant negative coefficient for the %(c+v) variable. These coefficients suggest that counties spend around $180 less per person on their city and village residents that they do on their town residents.[6] The coefficients for %Village are statistically insignificant, implying that county spending on city residents and on village residents are equal. Figure 2 shows this estimated relationship between county spending and percent city and village residents.[7]

It might be easiest to interpret this result on a household basis. According to the U.S. Census Department, the average American household has 2.62 persons.[8] Using the $189.29 coefficient from the second column of Table 1, a Wisconsin county typically spends almost $500 more on public services provided to a county household than it does for a city or village household. If these town, city and village households are paying the same county taxes for those services, this spending differential does indeed constitute a rather substantial tax subsidy to town households, as well as a rather substantial tax penalty on city/village households.



The size of the subsidy or penalty that an individual household faces depends in part on the degree to which the county is urbanized. Suppose for simplicity that we have a county with a total population of just 1000 households. If only 10% of them live in cities or villages, the county will spend $500 x 900 = $450,000 on the "extra" services to its town residents. If the cost of these services is spread out evenly over all of the county's residents, the 100 urban households will each be paying $450 for services they don't receive -- their tax penalty for living in a city or village -- while the 900 town households will each be paying only $450 in taxes for their $500 in extra services -- a $50 subsidy.

If instead, 90% of the households live in cities or villages, by the same analysis the county will spend $50,000 on the extra services to its town residents; the urban households will each be paying $50 for those services they don't receive,while the town households will each be receiving a $450 taxes subsidy. Since (as Figure 2 shows) in two thirds of Wisconsin's counties, from 30% to 70% of the population resides in cities and villages, most urban households are paying a tax penalty of between $150 and $350 annually, providing most town households with a tax subsidy of between $150 and $350 annually, due to the difference in county services provided to them.

To complete the discussion of the results in Table 1, note that the Assessed Value coefficients are not statistically significant, so county spending does not appear to be a function of the tax base. As will be seen below however, increased property values do appear to result in a reallocation of county spending among the various spending categories. Observe also that the Area coefficients are significant only at the 10% level. This weak evidence that greater area increases county spending will reappear below, when we look at the areas of public safety spending and highway maintenance spending.

Spending Categories with Clear Evidence of a Subsidy

(A) Highway Maintenance Spending

To further explore the above differences in county spending, and in particular to identify what additional services counties typically supply to their town residents, I've estimated the spending relationship described earlier for each of the Wisconsin Taxpayer Alliance's six spending categories. The first category, Highway Maintenance Spending, includes the "net cost of county highway administration, maintenance and construction financed from both general and proprietary funds." I would expect this spending to be greater per person, the lower the county's population density.

Table 2: Highway Maint. Spending

Independent Variables	Estimated Coefficients Including Milwaukee Co.		
Intercept	121.81 (4.21)	105.10 (5.51)	126.73 (12.14)
%(c+v)	-71.26 (-1.94)	-65.91 (-2.35)	-93.07 (-4.73)
1/Popn	-129254 (-0.77)		
Popn	-0.00003 (-0.76)		
Ass Val/Popn	-0.2384 (-1.00)		
Area/Popn	371.86 (1.34)	281.15 (1.35)	
%Vill	11.69 (0.22)		
R Sq	0.290	0.262	0.242

Note: t statistics are reported in parentheses

Table 2 presents the estimated coefficients for my Highway Maintenance Spending model. There is no evidence of either economies or diseconomies of scale, and only weak evidence that area affects highway spending: the Area coefficients, estimating about $300 of additional annual highway spending for each additional square mile of area, are not statistically significant in either of the regressions including that variable.

The %(city+village) coefficient is negative and statistically significant, implying that counties spend more highway dollars on town residents than on either city or village residents. The %Village coefficient is not significant, implying that there is no spending difference between city and village residents. The %(c+v) coefficient, of around $70 when area is controlled for, implies that counties typically supply town households with $180 more in highway construction and maintenance services than city residents.

This result is not particularly surprising, since county roads are generally located outside of cities, and frequently cease to be county roads after they have crossed the corporate boundary. The magnitude of the difference may be surprising however: the fitted equations imply that counties typically spend around $300 per household on town residents for highway construction and maintenance, and only about 40% of that amount, $120 per household, on city/village residents.

(B) Non-Jail Public Service Spending

Public Safety Spending includes the "costs of law enforcement, ambulance, inspection and emergency communications [as well as] expenditures for the operation of jails and other correctional facilities." Non-Jail Public Service Spending includes the former set of costs, but not the latter. Since cities and villages typically have their own police forces, I would expect significantly more county non-jail public safety spending on town residents than on city/village residents.

Table 3: Non-Jail Public Safety Spending

Independent Variables	Estimated Coefficients			
	Incl. Milwaukee Co.		Excl. Milwaukee Co.	
Intercept	67.09	59.45	65.35	58.09
	(4.50)	(4.43)	(4.37)	(4.53)
%(c+v)	-49.03	-46.97	-43.43	-42.45
	(-2.59)	(-2.65)	(-2.22)	(-2.71)
1/Popn	351478	312611	351360	305726
	(4.07)	(4.51)	(4.08)	(4.43)
Popn	0.0000	0.0000	0.0000	
	(1.31)	(1.44)	(-0.28)	
AssVal/Popn	0.4798	0.4886	0.5095	0.5126
	(3.91)	(4.02)	(4.07)	(4.33)
Area/Popn	-135.53		-152.20	
	(-0.95)		(-1.06)	
%Vill	-32.01		-29.26	
	(-1.16)		(-1.06)	
R Sq	0.645	0.635	0.651	0.641

Note: t statistics are reported in parentheses

The %(c+v) coefficients in Table 3 do in fact indicate that counties spend over $40 more per person, or about $120 more per household, in law enforcement services outside municipalities than inside them. Again this spending difference is statistically significant; again it is not

particularly surprising, since for example county sheriff departments typically patrol the same county roads that the county maintains.

Table 3 does show significant economies of scale in law enforcement, implying that low population counties could lower their patrol costs significantly through consolidation. Assessed Value also has a significant coefficient, implying that an additional million dollars of assessed value increases annual non-jail public safety spending by around $0.50.

Spending Categories with Weak to No Evidence of a Subsidy

(C) General Government Spending

General Government Spending includes "spending for legislative, legal, general and financial administration, general buildings and plant, and property records and control."[9] Since many of these functions will have similar costs independent of population size, I would expect to find substantial economies of scale in this category.

Table 4: General Govt Spending

Independent Variables	Estimated Coefficients Including Milwaukee Co.	
Intercept	37.24	37.07
	(2.74)	(3.29)
%(c+v)	-18.84	-19.31
	(-1.09)	(-1.44)
1/Popn	285219	303192
	(3.63)	(4.93)
Popn	0.00000	
	(0.22)	
Ass Val/Popn	0.5180	0.5180
	(4.64)	(4.86)
Area/Popn	35.42	
	(0.27)	
%Vill	-8.78	
	(-0.35)	
R Sq	0.609	0.607

Note: t statistics are reported in parentheses

Table 4 presents the estimated coefficients for my General Government Spending model. As in Total County and Non-Jail Public Service Spending, the 1/Population coefficient is positive and statistically significant, showing that there are indeed economies of scale in General Government. Somewhat surprisingly, the coefficient for Assessed Value per capita is also positive and significant: apparently, wealthier counties devote more resources to general government than poorer counties.

Since Assessed Value has no apparent impact on total county spending, this suggests that wealthier counties pay for the additional administrative services -- or expensive administrative structures -- by reducing other forms of county spending. As will be seen below, this additional

administrative spending appears to come at the expense of in spending on health and human services.

None of the other variables have significant coefficients, using the standard 5% significance level. The %(c+v) coefficient is negative however, as would be expected if a spending subsidy in this category exists, and is significant at the 10% level if a one tail test is employed. This can probably best be interpreted as positive but very weak evidence that counties provide some additional administrative services to their town residents, that are not provided to their city/village residents.[10]

The most likely area of differential services would be in "property control," that is, zoning and building inspection services. Typically, cities and villages have their own planning and inspection departments. Towns generally do not, and therefore their planning and inspections are done mostly at the county level. The size of the coefficient, at around $19 per person, is consistent with this interpretation: in 1998, the City of Oshkosh, where I reside, spent about $15 per person in its Planning and Inspections Divisions.

Since these divisions typically collect fees for many of these services, the net subsidy to town residents will be less than $19 per person. Assuming that exactly half of these costs are paid for by user fees, these extra property services represent about a $25 benefit per household to town residents.[11]

Table 5: Extracurricular Spending

Independent Variables	Estimated Coefficients		
	Including Milwaukee Co.		Excl. Milw.
Intercept	46.70	29.30	33.90
	(2.66)	(2.71)	(11.67)
%(c+v)	-26.48		
	(-1.19)		
1/Popn	81200		
	(0.80)		
Popn	0.00004	0.00002	-0.00007
	(1.63)	(0.93)	(-2.14)
Ass Val/Popn	-0.1780		
	(-1.24)		
Area/Popn	-128.13		
	(-0.76)		
%Vill	22.00		
	(0.67)		
R Sq	0.074	0.012	0.062

Note: t statistics are reported in parentheses

(D) Extracurricular Spending

Extracurricular Spending includes the "costs of library, museum, ... other cultural and educational services [and] parks and recreational programs and facilities." As Table 5 shows, this category of spending appears to have no significant relationship to any of the

explanatory variables, with the possible exception of Population. The coefficient on that variable is however extremely sensitive to whether Milwaukee Co. is included in the data set, switching from positive (diseconomies of scale) and not quite significant at the 10% level in the first column, to negative (economies of scale) and significant at the 5% level in the third column.

While not statistically significant, the %(c+v) coefficient is negative and relatively large. This is consistent with the argument that counties may provide more cultural and recreational services to rural than to urban households. However, the weakness of these results leaves such an argument essentially unsupported by the data.

Spending Categories with No Evidence of a Countersubsidy

An earlier version of this paper was criticized because it "only looked at the areas [of county spending] that benefit their argument … If you look at such things as human services and county jails, you'll find that more city residents are using those services than are county residents."[12] The claim that a disproportionate number of jail inmates and social service recipients are urban dwellers doesn't necessarily imply that city residents are subsidized in these categories, because there are two possible stories for why this disparity occurs, only one of which implies a countersubsidy. Fortunately, these two stories have different empirical implications, so it should be possible to identify statistically which is the true story.

The first story is that cities in fact generate more crime and poverty than rural areas. Suppose we again have the two Counties A and B, differing only in the percent who are urban dwellers. If this first story is the correct one, County A should have more crime and poverty than County B, and should, therefore, need to spend more on jails and on human services.

The alternative story hypothesizes that cities and rural areas generate the same amount of crime and poverty, but assumes that those who are the least well off – and hence most likely to commit crimes or need public assistance – choose to reside in the urban rather than rural parts of the county. For example, since rental housing, especially subsidized rental housing, is more likely to be available in cities and villages than in the countryside, those who cannot afford to own their own home are more likely to end up within the cities and village than outside them.

If this second story is the correct one, then the disproportionate number of city dwellers in jail or receiving social services does not represent a subsidy to urban taxpayers, since many of those urban jail inmates or city social service recipients are merely displaced county residents. If the rural areas are merely shipping their problems to the city, they should bear a proportionate fraction of the cost of addressing those problems.

In the first story, County A, the urban county, should have higher jail and social service costs than County B, the rural county. In the second story, both counties should have roughly the same jail and social service costs, since their equal populations generate equal amounts of crime and poverty. Hence, the important statistical question is whether the fraction of county population located within municipalities has a positive impact (story A) or no impact (story B) on per capita county spending in these two areas.

(E) Health & Human Services Spending

Health & Human Services Spending includes the "costs of public and mental health services, income maintenance, social services, aging services, veterans services, and other health and human services financed from general funds." Under story A, mostly urban counties should spend more on human services than mostly rural counties, so the %(c+v) coefficient should be positive. Under story B, since cities and villages typically do not provide these types of services to their residents here in Wisconsin, the %(c+v) coefficient should be zero.

Table 6 presents the estimated coefficients for my Health & Human Services model. Menominee County, which is a reservation for the Menominee tribe, was excluded from the data set, since its per capita spending level in this category was nearly twice as high as the next highest county. Its observed H&HS spending per capita was $953.71; its predicted H&HS spending, using the estimated coefficients in the first column of Table 6, was only $443.96.

Table 6: Hlth & Hum Svc

Independent Variables	Estimated Coefficients Excluding Menominee Co.	
Intercept	320.82 (5.74)	300.11 (14.06)
%(c+v)	-43.31 (-0.61)	
1/Popn	571792 (1.44)	834455 (3.99)
Popn	0.00007 (0.92)	
Ass Val/Popn	-1.1603 (-2.52)	-1.0531 (-2.55)
Area/Popn	348.67 (0.60)	
%Vill	4.73 (0.05)	
R Sq	0.263	0.246

Note: t statistics are reported in parentheses

As the table shows, there are significant economies of scale in health and human service spending. Per capita spending is also influenced by assessed property value, but in the opposite direction from what I had expected: additional wealth results in less spending, not more. This undoubtedly reflects need: counties with lower property values most likely have lower average income levels, and therefore a greater need for human service spending.

This would also explain why assessed value has no significant impact on total county spending. As county wealth rises, spending on general government and public safety increases (because it can be afforded), while spending on human services falls (because it is not needed). The net effect is therefore small, and statistically insignificant.

The table also shows that, consistent with story B, the percent city and village residents has no significant impact on per capita health and human service spending. Indeed, the %(city+village) coefficient is negative, suggesting that counties spend more on social services for each rural resident that they do for each city/village resident. Again, however, this coefficient has a small t-statistic, implying that the estimated coefficient is not significantly different from zero.

Table 7: County Jail Spending

Independent Variables	Estimated Coefficients			
	Incl. Milwaukee Co.		Excl. Milwaukee Co.	
Intercept	22.75	21.81	23.64	17.36
	(1.51)	(1.49)	(1.55)	(1.20)
%(c+v)	-2.12	-2.76	-4.99	8.29
	(-0.11)	(-0.15)	(-0.25)	(0.47)
1/Popn	-227591	-228149	-227531	-221357
	(-2.60)	(-2.63)	(-2.59)	(-2.52)
Popn	0.0000	0.0000	0.0001	
	(1.92)	(1.98)	(1.48)	
AssVal/Popn	0.17141	0.17090	0.15622	0.20829
	(1.38)	(1.39)	(1.22)	(1.69)
Area/Popn	448.91	458.33	457.45	445.18
	(3.10)	(3.26)	(3.12)	(3.11)
%Vill	-8.54		-9.95	
	(-0.31)		(-0.35)	
R Sq	0.211	0.210	0.196	0.168

Note: t statistics are reported in parentheses

(F) Jail Spending

Table 7 shows the estimated relationship between per capita county jail spending and the various explanatory variables. In three of the four regressions reported, the %(city + village) variable has a negative coefficient, which would imply that counties with higher urban proportions (County A) have lower jail costs than their more rural neighbors (County B). In all four regressions, including the one with a positive %(c+v) coefficient, the t-statistics are very small, implying that those estimated coefficients are not significantly different from zero.

These results strongly suggest that there is no relationship between %(city + village) and county per capita jail spending, consistent with story B. If there is a relationship, it is a negative relationship, implying that counties must spend more on their jails for each rural resident that they do for each urban resident.

(G) Judicial Spending

Judicial Spending includes "spending for the courts, the law library, public defenders and coroner." As Table 8 shows, there is no evidence that judicial spending per capita varies by town, city or village residency.

There do appear to be significant economies of scale, with around $50,000 in fixed costs per county. There may also be diseconomies of scale, although the Population coefficient that suggests these diseconomies is only statistically significant when Milwaukee County is included in the data set.

Table 8: Judicial Spending

Independent Variables	Estimated Coefficients			
	Incl. Milwaukee Co.		Excl. Milwaukee Co.	
Intercept	18.91	17.87	18.46	18.53
	(4.81)	(19.88)	(4.68)	(16.90)
%(c+v)	0.96		2.40	
	(0.19)		(0.47)	
1/Popn	52678	48248	52648	42542
	(2.31)	(3.58)	(2.32)	(2.94)
Popn	0.00002	0.00002	0.00001	0.00001
	(3.29)	(4.10)	(0.78)	(1.24)
Ass Val/Popn	-0.0440		-0.0364	
	(-1.36)		(-1.10)	
Area/Popn	-1.14		-5.42	
	(-0.03)		(-0.14)	
%Vill	3.09		3.80	
	(0.42)		(0.52)	
R Sq	0.271	0.240	0.152	0.113

Note: t statistics are reported in parentheses

Summary

The results above give clear evidence that counties provide more services, about $500 per household, to their town residents than to their city/village residents. These additional services are primarily concentrated in the categories of general government spending (around $50 per household), highway construction and maintenance spending (around $180 per household), and public safety spending (around $120 per household).

If these additional services were paid for solely by the county's town residents, there would be no public policy issue. But the costs of those services are generally spread evenly over town, city, and village dwellers alike. The end result, that town residents receive services that they don't fully pay for, and city/village residents pay for services they don't receive, penalizes those who live within the cities and villages, while subsidizing those who locate out in the towns.

Besides being unfair, this spending and taxation pattern creates a strong incentive for the growth of residential developments in rural areas, i.e. in urban sprawl. Unless there is in fact some public policy goal being accomplished -- a doubtful proposition -- it is difficult to justify such a large subsidy to rural residential development. The logical policy conclusion is that a reform in the way town and city/village residents are taxed for county services is warranted.

REFERENCES

Pindyck, Robert S. and Rubinfeld, Daniel L., *Econometric Models and Economic Forecasts*, 4th Edition, Irwin McGraw-Hill, Boston MA, 1998.

Wisconsin Legislative Reference Bureau, *State of Wisconsin 1999-2000 Blue Book*, Wisconsin Department of Administration, Madison WI, 1999.

Wisconsin Taxpayers Alliance, *Comparing County Expenditures*, Madison WI, 1999.

ENDNOTES

1. In 1998, Wisconsin had 6 towns -- Caledonia and Mount Pleasant in Racine County, Grand Chute in Outagamie County, Menasha in Winnebago County, Pewaukee in Waukesha County, and Bellevue in Brown County -- with populations over 10,000 persons, larger than 70% of Wisconsin's cities and 95% of its villages.

2. Heteroskedasticity exists when the variances of the error terms are systematically related to the explanatory variables. It reduces the model's efficiency, and biases the t-statistics. See Pindyck and Rubinfeld (1998), or any other econometrics text. Both a Breusch-Pagan test and a White test of the errors showed significant heteroskedasticity in the unadjusted data. The conversion to per capita values corrected the problem.

3. Area is measured in square miles, Assessed Value in millions of dollars.

4. I have adjusted the total spending level for Menominee Co. to generate these results. As I will discuss below, the health and human service spending for this county is dramatically higher than any other county, exceeding its predicted level (based on the coefficients in the first column of Table 6, estimated from the other 71 counties) by $509.75 per capita. Menominee County's total spending was therefore reduced by that

figure, to obtain total spending coefficients that are unaffected by its unusual human service spending.

5. The estimated relationship depicted in Figure 1 uses the coefficients from the third column in Table 1, that is, including all of the variables and excluding the data from Milwaukee County.

6. When the original, unadjusted total spending measure for Menominee Co. is used, all four regressions yield statistically significant negative coefficients for %(c+v). The coefficients range from -176 to -241, and generally imply that counties spend around $220 less per person on their city and village residents that they do on their town residents.

7. Again, the estimated relationship uses the coefficients from the third column in Table 1.

8. U.S. Census, March 1998 Current Population Survey. It can be accessed on line at http://www.census.gov/population/socdemo/hh-fam/98ppla.txt.

9. *Comparing County Expenditures*, page 1.

10. I routinely looked for nonlinearities in all the relationships between county per capita spending and %(City+Village). I only detected significant nonlinearities relative to general government spending and public safety spending. In general government, the estimated quadratic curve was convex, implying that general government spending initially rises as the urban proportion rises, peaks at %(c+v) = 38%, and falls thereafter; the estimated coefficients were 97.22 %(c+v) -128.90 $\%(c+v)^2$.

This pattern appears to derive solely from the very high general government spending level in Door County. When that county was removed from the data set, the nonlinearity disappeared. Since I find the convex pattern the nonlinearity implies highly implausible, I have chosen to discount this result as a mere statistical anomaly. I should also note that without Door County, the linear model's %(c+v) coefficient is statistically significant, and equals -24.63.

11. In 1998, the City of Oshkosh's Planning and Inspections Divisions generated enough revenue to cover about 54% of its costs; in 1997 Winnebago County's Planning Department covered about 20% of its costs with generated revenues. The 50% figure I use is therefore probably on the generous side.

12. "Alliance: End tax 'double whammy' ", *Duluth News Tribune*, January 14, 2001.