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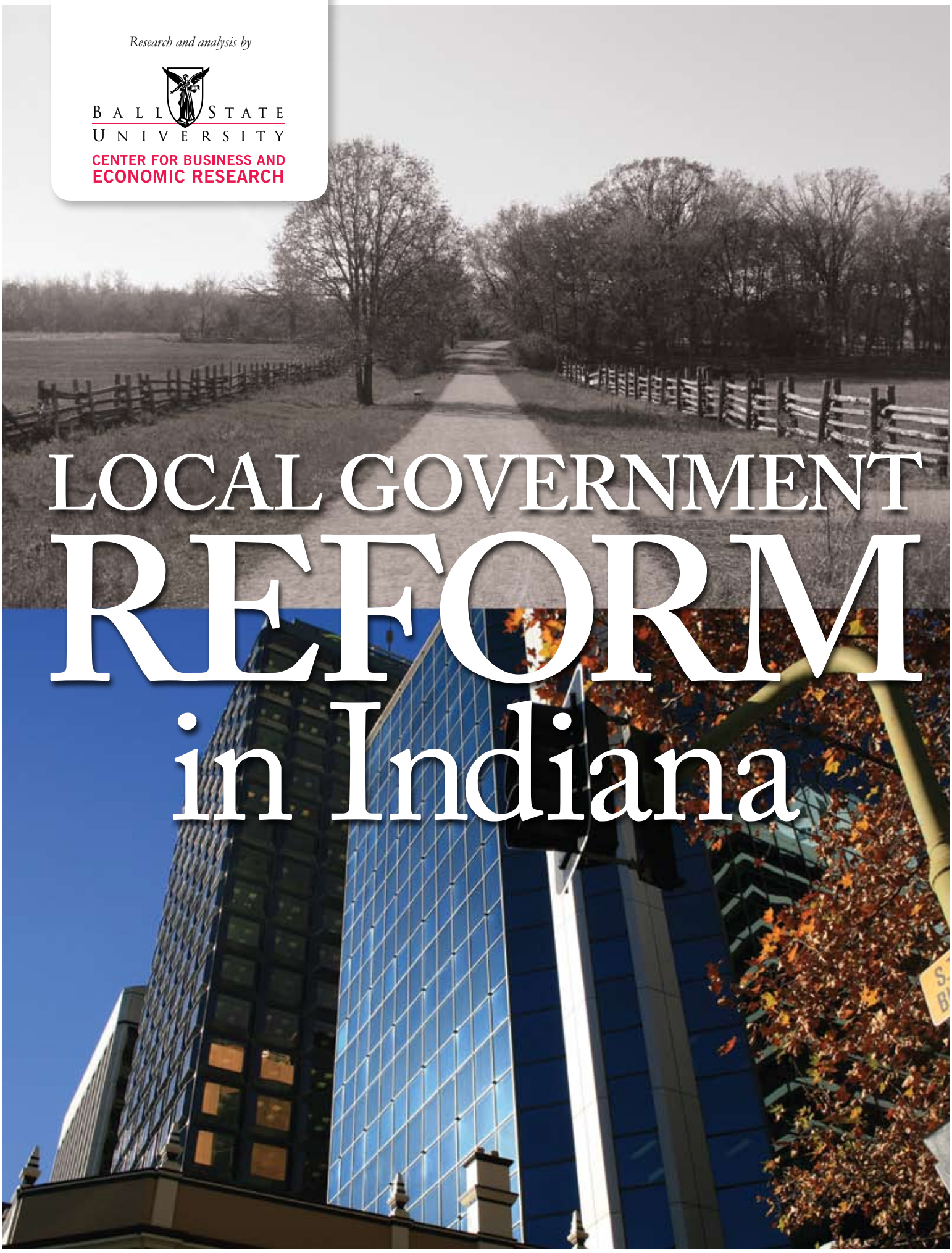

LOCAL GOVERNMENT REFORM in Indiana

Local Government Reform in Indiana

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Executive Summary

Dissatisfaction with local government in Indiana has been brewing for decades. Beginning in the 1970s, local government reform focused on restraining spending through modifications in the property tax system, the primary funding source for local governments. The focus broadened to the structure of local government and how modifications to this structure may reduce costs and/or increase the quality of local government services. In Indiana, the large number of local government taxing units (including counties, municipalities, townships, school districts and a variety of special districts) results in overlapping taxing districts where a resident may live in as many as 11 overlapping jurisdictions. The current structure of local government in Indiana is commonly viewed as resulting in unclear lines of authority, which limit accountability, decrease efficiency and increase the costs of government.

In response to calls for local government reform, the Kernan-Shepard Commission was instituted and in December 2007 issued a report (formally entitled *Streamlining Local Government*). Its recommendations contain broad and far reaching changes to the administration of local government in Indiana.

This study attempts to address the potential impact of consolidation on the costs of local government. This is a narrow undertaking and leaves important elements of local government reform for future analysis. Our primary focus is to examine the determinants of consolidation and to estimate both scale economies and efficiency gains from consolidating local government units. With property tax reform and the corresponding local government budget cuts, many local governments in Indiana are in a crisis climate and are considering some level of consolidation. The major point of most existing research is that it is the mismatch between taxes and the quality of public services that is important. Consolidations have occurred in locations where quality and spending are severely imbalanced.

We use statistical methods and data on consolidation referendum attempts in the United States since 1970 to test whether governments that consolidate (voters approve the consolidation referendum) have higher spending prior to consolidation (measured by local government employment, payrolls, or expenditures) than the average local government in the state. If these indicators are higher than the average local government in the state, this suggests that the consolidation is driven by the level of government spending. Citizens perceive spending to be "out of line," and consolidation is one way to address this. If, on the other hand, governments that consolidate have lower spending or spending is not statistically different from the average local government in the state, we interpret this to mean that consolidation is driven by the quality of government and that citizens view consolidation as one way of improving quality. We find that quality improvements are the impetus for consolidation.

We also examine the economic development effects of consolidation and find that consolidation has, at best, a limited effect on economic development but that context matters – consolidation may have a positive effect in some states and negative in others. Relative to the other counties in the state, Kansas City-Wyandotte experienced higher population and income growth after consolidation. In contrast, the consolidated counties in Montana experienced lower income growth relative to the non-consolidated counties. Consolidated counties in Louisiana experienced lower employment growth.

In total, these results suggest that claims supporting the positive effects of consolidation on economic development should be viewed with caution. While these results do not preclude the possibility that economic development will be effected, the sum of effects should be viewed as negligible to non-existent.

Projecting cost savings from government consolidation presents significant technical challenges. In order to circumvent some of these challenges we primarily focus on two methods for estimating the potential savings of local government consolidation in Indiana. The first method we employ is an estimate of the savings due to economies of scale in producing local government goods and services. The second method is an efficiency model of local government. We estimate scale economies and efficiencies using both aggregate and functional area models.

Scale economies exist in the private sector when a firm

that optimizes its production costs in the face of some fixed costs (e.g. plant and equipment, office space, or insurance coverage) enjoys lower per unit production costs as production increases. This idea is applicable to government as well as the private sector. Economists (and the general public) have long recognized that there is likely to be a general slackness in government operations. X-inefficiency occurs when a government fails to produce the maximum output obtainable with a given level of inputs. The result is that costs are higher. Government inefficiency may result from several sources including lack of competition, coordination difficulties, corruption, or padding the budget.

Aggregate Estimates

The results for the aggregate model strongly confirm the presence of scale economies in the provision of local government services in Indiana. The coefficient for population being statistically meaningful, of economically consequential magnitude and negative, means there is a decline in tax rates, as population rises in a county, holding other factors constant. This is the most critical finding of this initial estimate.

We find that scale economies exist in both the Metropolitan Statistical Areas (MSA) and non-MSA counties, but are roughly three times as pronounced in the smaller counties. This means that for the smaller counties, the cost savings benefits of Kernan-Shepard are likely to be significantly greater than for the larger counties. This result is heartening since it is exactly what economic theory predicts, and earlier empirical studies have confirmed.

Across Indiana counties roughly $200 million annually in savings may be available due to economies of scale in local government services under the proposed consolidation in non-school taxing districts. These scale economy savings will be concentrated in the smallest counties, with only about 20 percent of the savings occurring in the largest counties. Importantly, we estimate savings due to scale economies based on changing the size of the served population from the "average" not the most efficient unit of government.

For the aggregate efficiency model, we examine the relationship between the number of taxing jurisdictions and the property tax rate. The results for the aggregate efficiency model tells us that there is a strong positive relationship between the number of taxing districts in a county and the county mean tax rate indicating that average tax rates increase as the number of taxing jurisdictions increase.

In our lowest total estimate, we find potential savings of $422 million per year that could be realized due to consolidation and its associated reductions in X-inefficiency. Of this $422 million in savings more than $371 million of potential total savings occur in counties with populations greater than 50,000 residents. Once again we are estimating savings based solely on changing the number of governmental units at the local government that is at the 'average' level of efficiency. The potential savings could be dramatically larger should any improvement in the 'average' efficiency of local governments occur coincident to restructuring efforts that are part of the Kernan-Shepard report.

So, in our first two estimates we find that, for small counties considerable cost savings could be realized by spreading out the cost of government over more residents (consolidating), which would result in increased economies of scale. In our X-efficiency model, we find that local government is less efficient in counties with an abundance of taxing authorities. These are primarily the larger (more populous) counties.

Estimates for Functional Areas

Next, we investigate economies of scale and efficiency in several functional areas including police and fire protection, sewerage, solid waste, public welfare, administration, health, and libraries.

The results for fire protection in our model, show that in cities with populations greater than 25,000, the number of fire personnel increase significantly with the population but at a decreasing rate which suggests that there are high fixed costs (related to economies of scale). We also compare the number of fire personnel per capita in Indiana with the surrounding states. We find that the average Indiana municipality (with population greater than 25,000) has 128 fire protection personnel and a population of 58,218. Comparing Indiana to other states, this municipality would have 37 fewer fire protection personnel in Illinois, 64 fewer in Michigan, and 24 fewer in Ohio.

Our model results for police expenditures show per capita spending on police increases with population at a decreasing rate in smaller communities. This suggests diseconomies of scale in the less populated communities indicating that in smaller communities consolidation of police services is unlikely to decrease costs per citizen served. We also find no difference in spending patterns between Indiana and bordering states. For larger municipalities (> 50,000 population), police expenditures increase as the population becomes less dense. There is no evidence of scale economies nor of interstate differences except for Michigan where police expenditures are lower.

The models that we use to examine X-inefficiencies focus on the relationship between expenditures per capita for various government services in a county area and the number of local government units in each county in Indiana and the surrounding states. If X-inefficiencies exist, expenditures per capita will increase with the number of government jurisdictions in a county. The higher expenditures may result from coordination problems, managerial inefficiency, or other factors.

For fire protection we find a large, statistically meaningful presence of X-inefficiencies. Across our entire sample of communities, we find that each additional local government unit in a county increases the per person annual costs for fire protection services by 70 cents per year. We also found that per capita expenditures for fire services vary a great deal by state, and that Indiana residents pay less for services, on a per capita basis annually by between roughly $9 and $17 than in Illinois, Kentucky and Ohio. We pay more, by roughly $10 per person annually than Michigan residents. See Table 13.

Cumulative Savings of Local Government Consolidation (All Values in 2007 Constant Dollars)†			
Item	X-Inefficiency	Savings Per Person	Total Savings In Indiana
Fire Services	Yes	$12.07	$74,341,000
Police Protection	Yes	$13.85	$85,268,000
Sewerage	Yes	$18.11	$111,511,000
Solid Waste Management	No	0	0
Public Health	No	0	0
Welfare	No	0	0
Administration	Yes	$8.48	$52,250,000
Libraries	Yes	$4.14	$25,573,000
† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix			

Estimated Savings from Kernan-Shepard through Scale Economies and X-Inefficiency		
	Scale Economies	X-Inefficiency
Aggregate Estimate	$200,000,000	$422,000,000
Functional Area Estimates	$37,100,000	$360,000,000

We examine X-inefficiency in police protection services. Across our entire sample of communities, we find that each additional local government in a county increases the per person annual costs for police protection services by 97 cents per year. Our cross state analysis suggests that while Kentuckians pay the same cost as Hoosier's on a per capita basis, costs in the remaining border states range from $12 to $43 more per capita on an annual basis. See Table 13.

The presence of X-inefficiency in public safety is unsurprising. The cost of coordinating public services across different jurisdictions alone is a strong signal of the potential for X-inefficiencies. We find that each additional local government within a county leads to more than a $1.75 per person in public safety costs due solely to these inefficiencies.

We examine the presence of scale economies in a number of services: sewerage, solid waste management, public welfare, administration, health services, and libraries. At least one of these—sewerage—is a classic example of a natural monopoly, where high fixed costs and hence scale economies are the primary feature of production. However, with the exception of libraries, we found no evidence of scale economies in any of these services due to the quality of available data.

Our analysis finds significant and linear levels of X-inefficiency in sewer services. This estimate suggests that for each local government within a county, per capita sewer costs rise by $1.29 annually. Also, we found that per capita costs for sewerage are significantly higher in Indiana than in any of the surrounding states. The cost differentials range from between $31 and $59 per year higher in Indiana than in surrounding states. See table 14.

Additionally, we find evidence of X-inefficiencies in administration for large counties with populations above 100,000 and large differences among states in expenditures. Indiana was the median with respect to overall costs, with Ohio, at $54 more per person annually in administrative costs and Kentucky residents bearing $95 less annually on a per capita basis for administration. See Table 16.

Using data from 2007, we examine the presence of scale economies and X-inefficiency in the provision of library services in Indiana using data on Indiana's 238 separate library districts. We use circulation as a measure of output in our scale economies estimate and find significant economies of scale across the entire sample in both small and large communities. We also find that library services do suffer from X-inefficiency. In our model we find that each additional library district in a county increases per patron operating costs by $10 annually.

Summary

The individual functional areas of local government for which we have estimated the presence of scale economies and X-inefficiencies may be totaled to provide a cumulative estimate of the savings associated with adopting the size and scale recommendations incorporated in the Kernan-Shepard report. To do this, we apply the results from our estimates for functional areas presented above in one of two ways. For the scale economy estimates we increase the size of the average service area from the current level to that which would occur under the Kernan-Shepard recommendation. For the X-inefficiency estimates we eliminate the number of townships from the total number of governmental districts in the sample. This permits us to simulate the effect of the Kernan-Shepard recommendations on the cost of government operations in the state, both on a per capita and total effect.

Our estimates of individual functional area savings suggest that through reductions in X-inefficiency alone (with consolidation) Indiana's local governments could realize roughly $360 million annually in savings. This estimate is remarkably similar to the estimates of aggregate savings offered earlier in this report (of roughly $422 million in X-inefficiency savings). Both estimates employ the same basic model. However, the data sources differ (2006 in the earlier estimate, 2002 and 2007 data in the functional area estimates) and the proxy for the price of government is different in each setting.

From our examination of local government consolidation attempts in the United States since 1970, we find that service quality dominates efforts to consolidate local government. We also find little evidence that government consolidation stimulates economic development. However, from our examination of data from Indiana and the surrounding states, we do find that there are very significant cost savings associated with the type of government restructuring recommended by the Kernan-Shepard report. Our estimates suggests realizable savings that could range from $400 million to $622 million per year. Again, this savings is estimated at the 'average' level of government efficiency for both the aggregate and the func-

tional area estimates. We are not benchmarking against the most efficient governments in the State. Any efficiency gains by individual governments as they consolidate could generate much greater savings to taxpayers.

Introduction

Dissatisfaction with local government in Indiana has been brewing for decades.[1] Beginning in the 1970s local government reform focused on restraining spending through modifications in the property tax system, the primary funding source for local governments. The focus has broadened to the structure of local government and how modifications to this structure may reduce costs and/or increase the quality of local government services. In Indiana, the large number of local government taxing units (including counties, municipalities, townships, school districts and a variety of special districts) results in overlapping taxing districts where a resident may live in as many as 11 overlapping jurisdictions. The current structure of local government in Indiana is commonly viewed as resulting in unclear lines of authority, which limit accountability, decrease efficiency and increase the costs of government.

In response to calls for local government reform, the Kernan-Shepard Commission was instituted and in December 2007 issued a report (formally entitled *Streamlining Local Government*). Its recommendations contain broad and far reaching changes to the administration of local government in Indiana. Several of the recommendations in the report were included in the property tax reform legislation (HB1001) that passed in March 2008. However, like any such report, it generated several questions regarding the potential costs or savings of implementation.

The Kernan-Shepard Report includes a variety of recommendations to lower costs and increase accountability of local governments. With the property tax reform and the resulting caps on property taxes, local governments are faced with operating in an environment of lower revenues for the foreseeable future. Recommendations to reduce costs include local government consolidation: consolidating emergency public safety dispatch in counties or even multi-county regions, consolidating current township duties into the county, reorganizing school districts "to achieve a minimum student population of 2000" in the administrative unit, reorganizing library districts so that all citizens have access to a public library, merging municipal health departments with county health departments, encouraging voluntary "coordination and consolidation" of governmental units and services, and "strengthening the power of voters to compel consolidation."

This study attempts to address the issue of local government reform. We do so in four sections. First, we review the most relevant studies on the matter. We follow this with original analyses that focus on understanding local government restructuring. First we focus on the determinants of local government consolidation efforts nationwide since 1970. We next estimate the economic development impact of these consolidations. This is followed by our estimates of the aggregate cost savings that may occur in Indiana as a result of government consolidation. Here we focus on estimates of scale economies and X-inefficiency in local government. Our final estimates involve potential cost savings in the major functional areas of local government. We end with a summary and suggestions for policymakers who are undertaking the difficult work of reforming local government. We have not estimated the savings that could be achieved by combining the smallest school districts as recommended by the Kernan-Shepard report. The issue of school consolidation warrants a separate analysis.

Government Consolidation

The type of consolidation that has received attention both from the media and in the academic literature is city-county consolidation. As of 2003, 38 city-county consolidated governments existed in the United States[2] The first to be documented in the United States was New Orleans-Orleans Parish in Louisiana that consolidated in 1805. The most recent is Cusseta City—Chattahoochee County, Georgia in 2003. These are only two of the consolidations that have been attempted. This sort of consolidation usually occurs through a voter referendum process. Since 1970 just over 100

1 See the Indiana Commission for Local Government Reform website http://indianalocalgovreform.iu.edu/research/statewide.html for a reports related to local government reform dating back to 1935.

2 See Leland and Thurmaier (2006) for a list.

communities have had consolidation referenda on the ballot (some more than once), and less than 20 percent have passed.[3] Leland and Thurmaier (2005) note that often the consolidation effort fails while the charter specifying the details of the consolidation is being drafted before reaching the ballot because constituencies are unable to agree on the various components of consolidation.

Substantial variation exists in the types of local government consolidation that have occurred in the United States. The most extreme form is structural consolidation where one level of government is completely absorbed into another level of government. This type of consolidation is rare. More likely is functional consolidation where certain functions of government like school districts, parks departments, or library districts are consolidated. While no comprehensive count of the number of functional consolidations in the United States exists, this type of consolidation is fairly common.

While many functions of government are consolidated, there are usually some functions that are not. Typically school districts and city or county owned utilities are not included in the consolidation. In most cases the largest city in the county is consolidated with the county and their boundaries become coterminous, but often other smaller municipalities are excluded from the consolidation and continue separate government functions.

Background Rationale

Academic research on local government consolidation lacks the broad empirical studies that are common on many other fiscal matters. This absence is even more apparent when discussing the consolidation of intra-county government units such as townships since the more recent trend that has garnered much media attention has been towards consolidating city-county government around larger cities. Simply, the type of consolidation (township-county) that is proposed for Indiana largely occurred elsewhere many decades ago before the development of modern economic analysis. See Special Section—Township Governance.

Much of the academic literature on consolidation has focused on the process of city-county consolidation rather than outcomes. Most prior analyses consists of case studies of specific communities or comparative case studies.[4] Leland and Thurmaier (2006) find that consolidation referenda that are approved by voters usually focus on the economic development aspects of consolidation rather than increased equity or efficiency. They also suggest that in many cases successful consolidation referenda follow a three-step process: (Stage 1) A crisis climate develops that may have resulted from demographic shifts, changes in the quality of government services, etc. and citizens demand a government response. If citizens are not satisfied with the response (Stage 2) power deflation results in which citizens lose confidence in local government structure and support for consolidation develops, usually bolstered through the support of civic organizations and local media. (Stage 3) Finally, the initial support for consolidation is strengthened by accelerator events such as scandal or loss of a leader that ultimately coalesces in the passage of the consolidation referendum. With property tax reform and the corresponding local government budget cuts, many local governments in Indiana are in a crisis climate and are considering some level of consolidation.

Two prevailing points of view dominate the consolidation literature. On one hand, proponents of consolidation argue that metropolitan areas with many fragmented local governments result in service duplication, diseconomies of scale, and other inefficiencies which increase the costs of government. Consolidation increases the prospects for regional cooperation in economic development.

On the other hand, "Public Choice" theorists suggest that consolidation limits competition between smaller units of government. Such competition provides more choice for households deciding where to live and businesses deciding where to locate or expand and results in more efficient levels of service provision—as people and businesses "vote with their feet" in the face of poor service quality or high taxes.[5] This idea that citizens and businesses vote with their feet has received much empirical support, and is often referred to as "Tiebout Sorting." It is commonly known that households with children choose to live in the best school districts that they can afford. House prices in neighborhoods with good amenities such as parks and schools are higher than similar houses elsewhere indicating higher demand for houses in such neighborhoods. Numerous survey articles, including Wasylenko (1997), Ladd (1998), Newman and Sullivan (1988), Bartik (1991), examine the role of taxes and service quality on business location and expansion decisions. Some of the conclusions of this literature are: (1) Taxes have a small, statistically significant effect on the interregional location decisions of firms; (2) Fiscal differences within a region (intra-regional differences) play a more significant role in the location decision of firms; (3) Expenditures on public services (incorporating how tax revenues are used) are an important determinant of economic growth; (4) As controls for fixed effects and public services are added to interregional studies, the estimated tax elasticity increases in absolute value which indicates that better data and more sophisticated estimation techniques matter; (5) The interregional elasticity of economic activity with respect to taxes is between –0.1 and –0.6 which means that a ten percent reduction in taxes leads to a one to six percent increase in business activity.

The major point of this research is that it is the mismatch between taxes and the quality of public services that is important. Residents and businesses shun areas that have high taxes and low quality of public services. A larger number of local governments allows for more tax-service quality combinations so that residents and businesses may choose low taxes and a low level of public services or high taxes and a high quality

3 Calculated from Leland and Thurmaier (2006) tables 1/1 and 1/3.

4 Leland and Thurmaier (2004) and Durning (1995) are examples.

5 See Tiebout, C., "A Pure Theory of Local Expenditures", *The Journal of Political Economy*, 64(5):416-24, 1956. Dowding and John (1994) provide a review of over 200 empirical articles on the Tiebout hypothesis.

In Practice

Analysis of consolidation in the United States and Canada suggests that there are long-term benefits from consolidation particularly for regional coordination and planning. Fleishman (2000) conducted a comparative analysis to examine the ability of city-county consolidation to influence regional problem solving. The analysis is based on 1999 interviews with 44 local leaders in four Georgia communities: two with consolidated governments, Athens-Clarke County and Augusta-Richmond County, and two that rejected merger, Macon-Bibb County and Brunswick-Glynn County. Local leaders in the two consolidated communities had positive views of the consolidated communities' ability to address issues more quickly and "without governmental bickering" and set agendas that are "more forward looking", and take the lead "on regional issues affecting surrounding counties."

Reese (2004) examines the mandated consolidation seven cities and four townships with the Ottawa-Carleton Regional Municipality. Survey respondents indicated that in Ottawa, after consolidation, the quality of regional planning increased including growth management initiatives and coordination of investment in infrastructure with population growth.

In their analysis of UNIGOV in Indianapolis, Segedy and Lyons (2001) suggest that consolidation has improved the ability to manage growth, coordinate the provision of public infrastructure, and maintain a strong urban core and that UNIGOV may be a model for certain types of governments.

These studies suggest that consolidation can improve the process of governance.

of public services or other combinations according to their preferences. High taxes with low quality of public services are unlikely to be a popular choice, and this is a problem for some local governments in Indiana, particularly when they are adjacent to a low tax jurisdiction.

The Role of Townships

To our knowledge there are no studies examining the impacts associated with the consolidation of townships with county government. As stated above, in most states this sort of consolidation occurred many decades ago, so that any contemporary studies, even if performed, are no longer available. To bridge the gap in knowledge on townships, we provide general information on the role of townships in local government in Indiana and surrounding states with township forms of government. In the United States, 20 of 50 states still have some form of township government. See *Special Section—Township Governance*.

Studies of Consolidation Impacts

A limited body of work has focused on the impact of local government consolidation which may include city-county consolidation (mostly in the United States) or the consolidation of municipalities (in Canada and Europe). This work primarily focuses on consolidation in large urban areas and has examined how consolidation has affected the costs of government, costs of service provision, economic development, and personnel issues. Consolidations have occurred in locations where either quality or costs are severely imbalanced. We believe the evidence suggests that in many Indiana counties that sort of imbalance exists (Hicks, 2007a). In addition, variation in assessments and late notification about property taxes due have irritated taxpayers, motivating broad calls for change. We summarize some of the findings from the existing literature on local government consolidation.[6]

Costs of Government. There is little evidence of cost savings (lower budgets or taxes) from consolidation. Selden and Campbell (2000) studied the cost of government in Athens (GA) after its consolidation with the county. They found cost-savings in some departments and in real operating expenditures, but overall, an increase in real and per capita expenditures. The authors noted that "there is nothing intrinsic in the act of consolidation that will guarantee more efficient operations." In-depth interviews with department heads point to the importance of individual decision-making within the new government.

Two Canadian studies are among the most comprehensive performed in this topic and provide potential lessons for consolidation in the United States. Reese (2004) provides analysis based on a series of three rounds of interviews with elected and administrative officials in Ottawa beginning at consolidation and continuing for two years. Savings resulting from increased economies of scale have been realized for some services such as libraries and fire service. Other services, such as snow removal and street repair have not been consolidated and economies of scale have not been realized. As overlapping positions of elected and administrative officials were eliminated, cost savings have occurred. However, some departments were short-staffed. As different pay systems were consolidated and union contracts renegotiated, pay and benefit levels have tended to increase. Overall operating costs have remained steady. Property tax rates were reduced but at the same time assessment increased due to growth pressures, so tax bills have remained the same or increased slightly. Consolidation in Ottawa resulted in increased equity in service levels.

Vojnovic (2000) examines the transition and short-term effects of consolidation in five Canadian municipalities. A variety of data including interviews, legislation, tax rate and financial reports, and surveys with municipal officials are included in the analysis. In one municipality (Abbotsford), salary increases averaged 1.5%; in the other four municipalities, salary increases were considerably larger. Abbotsford's ability to contain salary increases was due to explicit agreements regarding salary changes made before the consolidation. Two municipalities had decreases in the overall costs of administration and service delivery after the consolidation, and two had increases. The fifth municipality is expected to have higher administrative costs since salaries were standardized at the highest levels. Larger municipalities have higher transition costs than smaller municipalities ($75.56 per capita

6 See Faulk and Schansberg (2006) for a literature review of articles focusing on the effects of consolidation.

in Halifax versus $3.70 in Victoriaville). In Victoriaville, numerous municipal functions were already merged prior to consolidation, which reduced transition costs. The author summarizes "the success of achieving greater efficiency and effectiveness in governance and service delivery will depend on the distinct history as well as the spatial and economic circumstances" of the local governments considering consolidation. (p. 1)

Quality of Service Provision. There is some evidence of improvements in the quality of service provision. A key reason for supporting local government consolidation is the potential for more comprehensive approaches to solving problems that are regional in scale. Several studies suggest that those participating in decision making believe they are more capable of addressing regional concerns through consolidated government. The few studies that focus on these issues suggest that citizens of consolidated governments have higher levels of satisfaction with local government and the services provided.

DeHoog, Lowery, and Lyons (1990) surveyed five types of communities in two metro areas (total of 10 surveys and 150-250 respondents in each community), in Louisville-Jefferson County (KY) and Lexington-Fayette County (KY) during the mid-1980s to examine the determinants of citizen satisfaction with local government. Louisville-Jefferson County was not consolidated at the time and Lexington-Fayette County was consolidated. They examined individual, jurisdiction and city/neighborhood specific characteristics. One of the topics that they considered was citizen satisfaction with consolidated government. They found that citizens of consolidated government have higher levels of satisfaction with local government in general and service provision in particular.

Economic Development. Although economic development is often the primary argument made in favor of consolidation, there is little evidence of increases in job growth or business locations or expansions resulting from consolidation. A limited number of studies have examined the relationship between consolidation and economic development. Economic development is often measured as increases in employment and business establishments. In a series of studies Carr, Feiock, et al. use time series econometric techniques to determine if consolidation affects growth in the number of business establishments. Feiock and Carr (1997) examine job growth in manufacturing, retail and service sectors after consolidation in Jacksonville, Florida compared to (nonconsolidated) Tampa/Hillsborough and all Florida counties from 1950 to 1993. They found a positive but statistically insignificant relationship between consolidation and establishment growth. The authors speculate that effects (and perhaps, interest in consolidation) are more distributional than growth-oriented in that consolidation allows certain groups to advance their agendas rather than increasing overall economic growth. Carr and Feiock (1999) use a similar econometric technique and data to analyze the attraction of manufacturing and retail/service firms to nine cities, before and after consolidation and found that consolidation was correlated with growth in the number of establishments in six of the nine areas examined. However, after controlling for economic development in the state, the (causal) statistical significance dissipates and the authors conclude that growth in these areas was the result of state or national trends and not consolidation. The most favorable conclusion is that consolidation did not decrease economic growth. The authors suggest that consolidation may lead to more efficient economic development efforts since decreased fragmentation would lead to less competition among jurisdictions reducing the use of costly economic development incentives. Carr, Bae, and Lu (2006) examine growth in manufacturing, retail, and service establishments of different sizes and payroll in Fayette County (Lexington), KY and Jefferson County (Louisville), KY from 1950 to 1997 (before the consolidation of Louisville-Jefferson County in 2000) and find little support that consolidation substantially altered development patterns from those that existed prior to the merger of Lexington-Fayette County.

Nelson and Foster (1999) examine the relationship between local government structure and per capita income growth from 1976 to 1996 in a cross section of 287 of the largest U.S. metropolitan areas. They conclude that "elastic central cities"—cities that were able to expand their geographic size through annexation or consolidation—large suburbs, and regional coordination were positively correlated with

In Practice

Personnel issues are among the most difficult to resolve during the consolidation process. Condrey (1994) examines issues surrounding the consolidation of county and city government employees in Athens-Clarke County, Georgia based on personal interviews with over 800 employees. The analysis spans 1991 through early 1993. While consolidation was expected to increase government efficiency and lower costs, the consolidated government's charter mandated that no employees should lose their jobs due to consolidation, employees should be assigned jobs with similar duties after consolidation, no employee should receive any reduction in compensation, former city and county workers with similar responsibilities should receive uniform compensation by the end of the fourth year after unification, duplicative activities should be eliminated through attrition and reassignment. Because the compensation scales and merit increases for city and county employees prior to consolidation were quite different, projected personnel costs actually increased (7%) after consolidation. As a result, personnel costs were held down by delaying the implementation of employee classification systems and pay plan, freezing general and merit increases, early retirement, and hiring. The consolidated government workforce actually increased by about 50 positions (due to staffing a court-mandated jail facility). Decreased employee morale led to the first attempt to unionize. Not all departments were merged. Separate departments continued to exist for parks and recreation, arts and environmental education. The confusion surrounding consolidation provided an opportunity for some departments to restructure and increase the number of managers and employees. The author concludes that efficiencies achieved through early 1993 were the result of spending cuts rather than efficiencies achieved from merging the two governments.

per capita income growth. Earlier, Foster (1993) analyzed population growth of 129 large metropolitan areas between 1962 and 1982 and found that consolidation (as measured by the central city dominance variable) was not a significant determinant of population growth.

In her study of Ottawa, Reese (2004) notes that competition for development in the region decreased but has not been eliminated, which suggests that there may be improvements in the quality or coordination of economic development activities. Finally, Rosentraub (2000) attributes much of Indianapolis' national reputation and downtown revitalization to the consolidation of core development services under a unified Department of Metropolitan Development through Unigov.

Personnel Issues. Durning (1995) and Durning and Nobbie (2000) find that government consolidation can lead to serious morale problems among government employees as distinct governments with different policies, pay scales, etc. are merged. The complexity of the transition and the stress and uncertainty that result are identified as reasons for low morale. Differences in compensation scales and employee classification systems are difficult to reconcile and contribute to morale issues. Such morale issues persist for several years after consolidation. The authors point out that employee views of the consolidated government differ from those of the public and cite an opinion survey of the citizens of the consolidated government that indicated widespread satisfaction with government services.

In four of the five Canadian municipalities that he examined, Vojnovic (2000) found that government employee responsibilities became more specialized after consolidation and the need for more specialized equipment (particularly for information and accounting systems) increased.

Analyses Relevant to Indiana

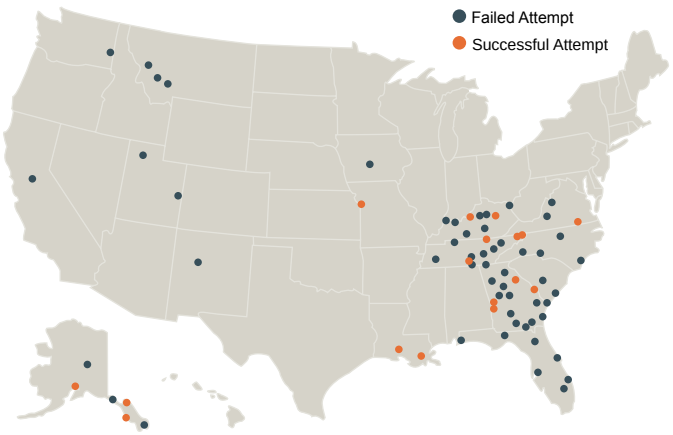
In this section we report new empirical findings on the impact of local government reform. We begin with an evaluation of the determinants of local government consolidation from 40 years of experience. This is followed by an evaluation of the economic development impacts of local government consolidation. We then present our estimates of potential cost savings due to the presence of scale economies and X-inefficiency in local government. These estimates are provided both for aggregate savings and for individual functional areas ranging from public safety to administration.

Determinants of Consolidation

We use data on cities-counties that have voted on consolidation referenda since 1970 to examine the determinants of consolidation. We are particularly interested in determining if there is statistical evidence to indicate that consolidation is driven by the level of spending or quality of government services. Specifically, we use statistical methods to test whether governments that consolidate (voters approve the consolidation referendum) have higher levels of spending, measured by local government employment, payrolls, or expenditures, than the average local government in the state. If these indicators are higher than the average local government in the state, this suggests that the consolidation is driven by government spending, citizen perceive spending to be "out of line," and consolidation is one way to address this. If, on the other hand, governments that consolidate have lower spending or spending is not statistically different from the average local government in the state, we interpret this to mean that consolidation is driven by the quality of government and that citizens view consolidation as one way of improving quality.

The city-county combinations that have had successful consolidation referenda since 1970 are shown in Exhibit 1. The dataset that we use was constructed from the data in Appendix Table A supplemented with county employment, payroll, and expenditure data from the Census of Governments in the year of the vote or the closest Census year

Exhibit 1: Successful U.S. Consolidation Attempts Via Referendum Since 1970



City	County	State	Year Of Vote	Percent Vote In Favor
Anchorage et. al.	Anchorage Borough	AK	1970, 1971, 1975	NA, NA, 62
Sitka	Sitka Borough	AK	1971	77
Haines	Haines Borough	AK	2002	51
Yakutat	Yakutat Borough	AK	1992	90
Cusseta	Chattahoochee	GA	2003	69
Athens	Clarke	GA	1972, 1982, 1990	48, 50, 59
Columbus	Muscogee	GA	1970	81
Augusta	Richmond	GA	1971, 1974, 1976, 1988, 1995	42, 52, 46, 57, 67
Kansas City	Wyandotte	KS	1997	60
Lexington	Fayette	KY	1972	69
Louisville	Jefferson	KY	1982, 1983, 2000	50, 48, 54
Lafayette	Lafayette Parish	LA	1992	60
Houma	Terrebonne Parish	LA	1981	54
Anaconda	Deer Lodge	MT	1976	56
Butte	Silver Bow	MT	1976	62
Lunchburg	Moore	TN	1987	52
Hartsville	Trousdale	TN	2000	52
Suffolk	Nansemond	VA	1972	76

Table 1: Descriptive Statistics and Variable Definitions							
Variable	Mean	Median	Max.	Min.	Std. Dev.	Obs.	Definition
Consolidation Dummy	0.157	0	1	0	0.366	108	=1 if consolidation referendum passed =0 otherwise
Population Ratio	0.525	0.514	1.215	0.080	0.223	108	City population as a proportion of the county population
Repeat Indicator	1.463	1	5	1	0.802	108	The number of consolidation referendum attempts
Southeast Dummy	0.769	1	1	0	0.424	108	=1 if state is in the Southeastern region [includes FL, GA, KY, LA, NC, SC, TN, VA] =0 otherwise
Employment Ratio	1.120	0.991	8.663	0.234	0.792	108	Local government employment per capita in the county as a proportion of local government employment per capita in the state
Expenditure Ratio	1.113	0.990	9.451	0.165	0.866	108	Local government expenditures per capita in the county as a proportion of local government expenditures per capita in the state
Payroll Ratio	1.114	1.006	9.345	0.193	0.850	108	Local government payroll per capita in the county as a proportion of local government payroll per capita in the state
Metro Dummy	0.546	1	1	0	0.500	108	=1 if the county is in a metro area =0 otherwise
Population Growth Rate	0.159	0.139	0.836	-0.160	0.153	108	Population growth rate over the 10 years prior to the consolidation referendum [or the closest 10 year period that is available]

Sources: Calculated from data in Leland and Thurmaier (2006), Table 1/3, *Census of Governments* Vol. 3 No. 2 and Vol. 4 No. 5 *Compendium of Public Employment*, various years, *BEA Metro* definitions closest to referendum date, and various census publications

before the vote, and other demographic data.[7]

We use a statistical model to examine the determinants of referenda success (the referenda being approved).[8] The success of the referenda is a function of the spending on local government services, demographics, and characteristics related to the location. We expect that the likelihood of consolidation will be higher if the city population is a larger share of the county population, the number of consolidation referenda attempts increases, city-county areas are in the southeast, and they are metropolitan areas. The expected relationship between the employment ratio, expenditure ratio, payroll ratio and the referendum outcome is indeterminate. If the level of government spending is driving the referenda results, then the sign on these variables will be positive and significant indicating that local government employment, expenditures, and payroll is higher than the state average. If voters are more concerned with the quality, then the expected sign on these variables will be negative and significant indicating that local government spending relative to the state average is not the issue. This suggests that voters perceive the quality of local government services to be the issue.

Table 1 shows the descriptive statistics for the variables used in the consolidation referendum model and the variable definitions and data sources. Of the 108 referenda since 1970 for which we have complete data, 15.7 percent eventually approved consolidation. Fifty-two percent of the county population lived in the city considering consolidation. The average number of consolidation attempts was 1.5. Just over 76 percent of the attempts were in southeastern states, and just over half were in metro areas. Typically, local government employment, expenditures, and payroll per capita in county areas considering consolidation referenda were just over 10 percent higher than the same measures for the state as a whole. The average population growth rate was almost 16 percent over the 10-year period before the referenda.

The results of the probit analysis are shown in Table 2. The population ratio is positive and significant indicating that a consolidation referendum is more likely to be approved if the city population is a larger share of the total population in a county. Each of the measures of local government spending is negative and significant. Local government spending in city-county areas that approved consolidation are lower than the state average. This suggests that *government spending* is not driving consolidation. The *quality* of government services is the impetus.

Expectation predictions show that the model is a good predictor of referendum failure (98.9 percent correct) but a weaker predictor for referendum success (23.53% correct). This tells us, in essence, that a just a few factors explain quite well the probability of a consolidation vote failing. This is dominated, not surprisingly, by the strong positive relationship between the proportion of county residents residing within a city. This means that consolidation is more likely in counties with a higher proportion of the population residing within a city.

The Quality Issue

As mentioned, government spending is only one concern of residents and policymakers. Quality of services is a significant part of the analytical treatment of government consolidation/fragmentation revolves around the quality of services. Briffault (1996) studied local government efficiency

7 The Census of Government is at five-year intervals in years ending in 2 and 7.

8 We employ the well known probit model which estimates the incremental effect of selected variables on the probability that the referendum passes. $\Pr(X)_i = f(A_i, \Gamma_i, \varepsilon_i)$

Table 2: Regression Results for Consolidation Referendum Models						
	Employment		Expenditures		Payroll	
Variable	**Coefficient**	**z-Statistic**	**Coefficient**	**z-Statistic**	**Coefficient**	**z-Statistic**
Constant	-0.355	-0.385	-0.656	-0.756	-0.596	-0.648
Population Ratio	2.263**	2.594	1.899**	2.369	1.931**	2.382
Repeat Indicator	0.287	1.344	0.307	1.499	0.259	1.255
Southeast Dummy	0.046	0.116	-0.116	-0.286	-0.065	-0.163
Employment Ratio	-1.906**	-2.108	-	-	-	-
Expenditure Ratio	-	-	-1.387*	-1.853	-	-
Payroll Ratio	-	-	-	-	-1.403*	-1.714
Metro Dummy	-0.488	-1.278	-0.311	-0.791	-0.293	-0.748
Population Growth Rate	-1.734	-1.282	-1.859	-1.429	-2.049	-1.580
McFadden R-squared	0.213778		0.196262		0.190589	
Obs with Dep=0	91					
Obs with Dep=1	17					
Significance: * 0.10 level, ** 0.05 level, *** 0.01 level						

in the context of local jurisdictional boundaries. He concludes:

> "Decentralization, which is intended to promote the political empowerment of individuals and communities, has produced the very structural constraints that serve to limit the ability of metropolitan area localities to respond to the needs of metropolitan area residents. Local boundaries are too narrow to permit effective self-governance for metropolitan area residents. They need to be supplemented by a regionally bounded metropolitan political structure endowed with the regulatory and fiscal capacity to tackle regional problems and the accountability that election by a metropolitan area electorate provides." (Briffault, 1996, p 223).

An extensive study of local government size and the perceived quality of services in over 100 North Carolina communities reported:

> " . . .size of government is positively related to the perceived quality of public services. No significant relationship is found between the number of administrative units in a locality and citizens' perceived quality of services. However, the number of administrative units per capita is significantly and negatively related to quality of services. The findings suggest the consequences that might occur when policy makers decide to reorganize or alter the size of governmental units in response to public pressure for budgetary restraint. Namely, smaller public labor forces and more administrative units per capita would be likely to lower the public's perception of quality of public services." (Christenson and Sachs, 1980, p 89).

Measuring government quality in aggregate for service provision has thus far defied analysts' ability beyond observing the patterns of Tiebout sorting of individuals. That is, communities with relatively poor public services (especially in relation to costs) are most likely to see out-migration, whereas high quality public service areas will see in-migration.

Quality of services matters, but data on the quality of individual services can only be derived by survey responses or proxies (such as crime per capita for policing or home insurance rates for fire protection). These proxies suffer significant weaknesses for two reasons. First, many factors beyond the quality of public services may affect them. Second, there is a significant problem with the direction of causation. For example, high per capita reported crime rates could be due to a very effective police department, with good reporting of crime.

Aggregate measures of quality are likely limited to observation of resident behavior with respect to in- and out-migration. This study does not attempt to evaluate empirically the quality of public services, relying instead on existing studies for each functional area.

Consolidation and Economic Development

The potential role government consolidation may play in economic development is an issue that has garnered much interest among policymakers. Economic development officials, at state and regional levels, often contend with large numbers of local venues in their efforts to promote business attraction. From this perspective, it seems clear that government fragmentation would serve as a disincentive to economic growth. However, public choice theorists also argue that the putative intergovernmental competition inherent in a less consolidated government might offer to stimulate economic growth. This makes the issue one of the actual experience of consolidated government.

In order to test the role local government consolidation plays in economic development we examine each state in which a successful consolidation of city and county governments has occurred from 1970 through 2004. We use county level data covering this period where city-county consolidations have occurred. We are interested in determining if consolidation affects economic development as measured by annual population growth, employment growth, personal income growth, and per capita income growth.

We use a statistical model to examine the determinants of economic growth. In the model we control for consolidation and fixed effects which take into account differences among counties in each state that do not vary over time. This is a pure 'treatment model' of consolidation which takes the form:

$$Y_{i,t} = \alpha + \alpha_i + \beta(Consol_{i,t}) + \varepsilon_{i,t}$$

where each of four economic development proxies (population, employment, real personal income and real per capita income) is a function of a common and county specific intercept, a binary variable for counties in which consolidation has occurred[9] and a white noise error term. We test each state separately in our panel model and report only the consolidation effects.

The results suggest that consolidation has, at best, a limited effect on economic development but that context matters – consolidation may have a positive effect in some states and negative in others. Relative to the other counties in the state, Kansas City-Wyandotte experienced higher population and income growth after consolidation. In contrast the consolidated counties in Montana experienced lower income growth relative to the non-consolidated counties. Consolidated counties in Louisiana experienced lower employment growth.

Table 3: Consolidation and Economic Development†

State	Population	Total Employment	Real Personal Income	Real Per Capita Personal Income	Consolidated City-County
Georgia	-	-	-	-	• Columbus-Muscogee County (1970) • Athens-Clarke County(1990) • Augusta-Richmond County (1995) • Cusseta-Chattahoochee County (2003)
Kansas	778**		197*	1.20 **	• Kansas City-Wyandotte County (1997)
Kentucky	-	-	-	-	• Lexington-Fayette County (1973) • Louisville-Jefferson County (2000)
Louisiana	-	-1,323*	-	-	• Orleans –Orleans Parish (1805) • Baton Rouge-East Baton Rouge Parish (1947) • Houma-Terrebonne Parish (1981) • Lafayette-Lafayette Parish (1992)
Montana	-	-	-79.6**	-3.36**	• Anaconda-Deer Lodge County (1976) • Butte-Silver Bow County (1976)
Tennessee	-	-	-	-	• Nashville-Davidson County (1962) • Lynchburg-Moore County (1987) • Hartsville-Trousdale County (2000)

Significance: * 0.10 level, ** 0.05 level, *** 0.01 level
Models of Indiana and Virginia displayed econometric concerns that did not permit convergence of the model to acceptable levels, and are thus not reported.
† This model was estimated in a panel employing a least squares estimate. The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

The magnitude of these effects are small. For example, the largest effects occur in Kansas, in which consolidation results in an increase in population in Kansas City/Wyandotte County of 778 residents in the post-consolidation period, which is roughly 4 tenths of one percent of the county population. Real income increased by roughly $1.20 per person in the county. Similarly, in Montana, the only statistically meaningful effects were losses in income that amounted to a decrease of $3.36 per person over the post- consolidation period. See Table 3.

In total, these results suggest that claims supporting the positive effects of consolidation on economic development should be viewed with caution. While these results do not preclude the possibility that economic development will be effected, the sum of effects should be viewed as negligible to non-existent within the empirical literature. Our findings are similar to those of Carr and Feiock (1999) who conducted a similar treatment model test on counties in 9 states in which consolidation had occurred. As with our results, Carr and Feiock found limited support for aggregate effects, leading them to conclude that there was no link between consolidation and economic development.

9 All consolidated cities-counties in a state are included in the dummy variable. See Table 3 for a list.

Aggregate Estimates of Potential Savings

As the reviews of existing studies suggest, projecting cost savings from government consolidation presents significant technical challenges. In order to circumvent some of these challenges we offer a three-pronged approach to estimating the potential savings of local government consolidation in Indiana.

The first method we employ is an estimate of the savings due to economies of scale in producing local government goods and services. The second method is an efficiency model of local government. The final effort is a simple accounting of activities that could be eliminated due to redundancies. We then summarize these impacts.

At the outset it may be helpful to explain in some detail the differences in the concepts between scale economies and the efficiency model. Scale economies arise simply from the presence of fixed production costs (such as overhead). In applying this to local government, the presence of costs that do not vary with the size of the municipality will, all else being equal, be higher in smaller communities. For technical reasons we do not estimate what is the optimal (or least cost) size of government. Instead, we simply measure whether or not observed costs in Indiana vary with the quantity of public services provided. The presence of fixed costs for public services is one of the explanations for annexation efforts by local governments.

Annexation by cities is an acceptance of the potential presence of scale economies in local government provision.[10]

The efficiency of local government is necessarily measured differently from the presence of economies of scale. In this process, we are attempting to measure what economists have long labeled X-inefficiency. This type of inefficiency arises when the mechanisms for making appropriate managerial decisions are absent. We quote Leibenstein:

> "X-efficiency is not the same thing as what is frequently referred to as technical efficiency, since X-efficiency may arise for reasons outside the knowledge or capability of management attempting to do the managing . . . In other words, it is not only a matter of techniques of management, or anything else "technical" in carrying out decisions, that is involved in X-efficiency" (Leibenstein, 1980, pp 27-28).

Extrapolating this argument to local government in Indiana we would suggest that X-inefficiency occurs because some key factors that would control costs or improve quality are not present in the structure of government. While this is hardly a challenging argument to make, there are also empirical findings to support the argument. Reporting the results of a meta-analysis of X-inefficiency studies in the *American Economic Review*, Dr.'s Ken Button and Thomas Weyman-Jones find:

> "bureaucratic or publicly administered industries are on average less efficient, have lower extremes of efficiency, and show a wider dispersion of efficiency than privately owned, competitive, or weakly regulated industries." (1992, p 444).

The magnitude of these effects, scale economies and X-inefficiencies, is the focus of the following section of the study. We begin with scale economies.

Economies of Scale in Local Government

The studies we discussed earlier outline the potential presence of economies of scale in local government services. This is an extrapolation of the relatively straightforward economic concept of scale economies, which deserves a restatement in the context of government services.

Scale economies exist in the private sector when a firm that optimizes its production costs in the face of some fixed costs (e.g. plant and equipment, office space, or insurance coverage) enjoys lower per unit production costs as production grows.

10 Throughout this report we refer to existing studies of consolidation, scale economies, X-inefficiency and related issues. Perhaps the most common type of empirical analysis is data envelope analysis (DEA) or a stochastic version of this modeling. DEA and related models are used for measuring inefficiencies arising from the misallocation of inputs. This is much the same as we attempt here. However, we are not interested in measuring the absolute inefficiencies associated with local government. Instead we provide estimates of efficiency gains associated with implementing some of the consolidation recommendations offered in the Kernan-Shepard report. For that reason we will not employ DEA models, relying instead on stochastic analysis which provides parametric estimates to be used in our simulations of consolidation.

Example: Joint Purchasing Practices

Another recommendation of the Kernan-Shepard Commission is to increase joint purchasing by units of local government to reduce costs. There are opportunities for joint purchasing both within functional units of a single government such as a city or county and among local government units such as cities, towns, and counties.

While joint purchasing arrangements are usually between local governments or local and state governments, Wisconsin and Minnesota recently announced a plan to cooperate to reduce the cost of their respective state governments. this initiative includes joint purchasing, sharing big ticket items such as boats and warehouses along state borders and sharing call centers.

Joint purchasing is a straight forward example of economies of scale. Cost savings result from joint purchasing practices. The benefit of joint purchasing is that small units of government can experience cost savings by partnering with other units and buying in bulk. The cost associated with joint purchasing practices is that it takes time and planning to implement. Large units of government often purchase in enough volume and frequency to justify hiring specialized procurement staff and purchasing software while in small units of government joint purchasing would become a duty of existing staff. The undetermined issue is the magnitude of savings attributable to joint purchasing arrangements. We do not conduct additional analysis to estimate cost savings attributable to joint purchasing.

We were not able to find any comprehensive studies that have quantified cost savings resulting from the joint purchasing practices of local government units.[1] We did find a study that examines the use of procurement methods and impediments to joint purchasing. Dunscombe and Searcy (2007) analyze procurement practices for materials, supplies, and equipment in 679 of New York State's school districts. Of the five traditional procurement methods examined, "piggybacking" on state contracts (21.7 percent of districts) was the most used followed by the use of cooperative service agreements (18.8 percent) through one of New York's regional Boards of Cooperative Educational Services. Cooperative purchasing with other governments had the lowest participation (7.4 percent of districts). The benefits of using cooperative purchasing included lower prices, time savings and greater access to vendors and better quality goods. Administrative costs and difficulty organizing cooperatives were given as reasons for the limited use of cooperative purchasing. Reducing these sorts of information and transaction costs is key to increasing the use of joint purchasing.

1 Estimates in the 2004 "Compete study" issued by the Indiana Chamber of Commerce suggest that local governments could save around 18 percent on purchases of large equipment and vehicles through the state's Quantity Purchase Agreement Program.

This idea is among the first economic phenomenon to be discussed by scholars (as early as Thomas Aquinas), and is as applicable to government as well as the private sector, though we might relax the assumption that government is attempting to minimize costs. There is an extensive literature which estimates the presence of economies of scale in government activities ranging from public safety to schools. An economist writing in 1934 found:

> "In Colorado counties with less than 20 million dollars in assessed valuation and below 20,000 in population paid more than three times as much for county services as compared to costs of similar services in the wealthier counties above 20 million in valuation and 20,000 in population. Similar findings were made in Mississippi and North Carolina only the costs of the poorer counties were higher compared with the wealthier units." (Heckert, 1934, p 536).

Another researcher, writing in regard to local government structure and costs in 1937 offers:

> "Many of the modern functions of government cannot be performed efficiently unless they are conducted on a reasonably large scale. A small population means high unit costs. Furthermore, a small population generally is associated with a low population density. A few people are distributed over a large area in such a way that the cost of roads and schools per capita becomes very high." (Scoville, 1937, pp 288-9).

The traditional picture of scale economies presents the cost of an activity across the range of production.[11] See Figure 1.

To estimate the presence and magnitude of scale economies in Indiana's local governments we employ a normalized quadratic cost function of the form:

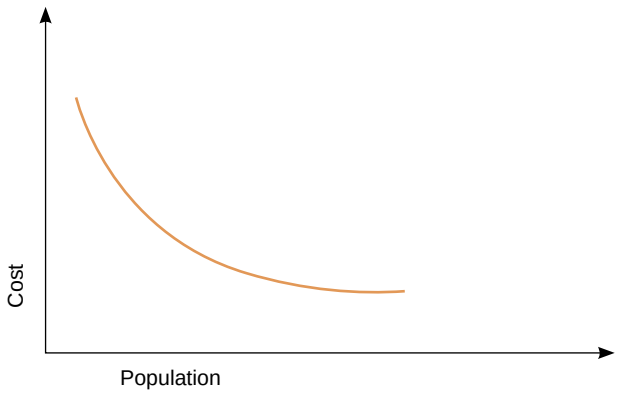
$$C_i = \alpha_a + \sum_{i=1}^{n} aP_i^a + a_y\Psi + \frac{1}{2}\left[\sum_{i=1}^{n} aP_i^a + a_y\Psi^2\right]$$

where the cost is a function of fixed and variable costs, with normalized input prices. For government production, we use the price of government services (tax rates) and the number of residents served (population) as the quantity measure.[12] Normalizing, and including a stochastic component which permits random or unexplained variation in the data to exist yields the following expression:

11 Economies of scale, and scale economies are synonymous and are mathematically $\partial C_i / \partial Q_i \leq 0$ (where the cost of producing good i, declines as output, Q, increases). In our example output is service to population.

12 For a recent application to scale economies in government services, see Garrett (2001), who estimates scale economies in rural extension councils and Sjoquist and Walker (1999) who estimated scale economies in local assessor offices.

Figure 1: Scale Economies



$$C_i = \alpha + \beta_1\Psi + \frac{1}{2}\left[\beta_2\Psi^2\right] + e_i$$

where the β's are estimated in an econometric model. This is a common approach, which when adapted to our available data for empirical testing appears in general form as:

$$C_i = f(\alpha_i, \Psi_i, \Psi_i^2, \varepsilon_i)$$

where cost, C, (the average tax rates), in county i, in year t, are a function of a county fixed effects term (α), population as the quantity measure (ψ) in county i, year t, its square and a random error term which captures unexplained variation. This specification is common, and applied on county level data for Indiana's counties from 1988 through 2003.[13]

The inclusion of the squared population term in the estimation is consistent both with the normalized quadratic cost function, and also provides an estimate of the non-linear range of scale economies that appear in Figure 1. This quadratic term permits us to isolate whether or not the specific range of estimates we have made occur across a nonlinear range.

The long history that economists have with the notion of scale economies provides us with sufficient clarity to appreciate that non-linearities likely exist across the range of government size in our sample. For our purposes, it is not sufficient to simply note their size, but also to ultimately simulate savings from the changes proposed in the Kernan-Shepard report. To accomplish this, we estimate the scale economies in two samples: Indiana counties within and outside Metropolitan Statistical Areas. Results of both estimates appear in Table 4.

These results strongly confirm the presence of scale economies in the local provision of government in Indiana. The coefficient for population being both statistically meaningful, of economically consequential magnitude and negative means there is a decline in tax rates, as population rises in a county, holding other factors constant. This is the most critical finding of this initial estimate.

13 For a more detailed description of these data see Hicks (2006).

Table 4: Local Government Scale Economies in Indiana, 1988-2003†		
	MSA Counties	Non-MSA Counties
Intercept	12.87296***	16.48543***
Population	-0.0000487**	-0.000228***
Population Squared	1.18E-11	-1.3E-11
Autoregressive Element	AR-3	AR-2
Fixed Effects	yes	yes
EGLS	yes	yes
Adjusted R-squared	0.40	0.58
Panel Durbin-Watson	1.44	2.14

Significance: * 0.10 level, ** 0.05 level, *** 0.01 level
† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

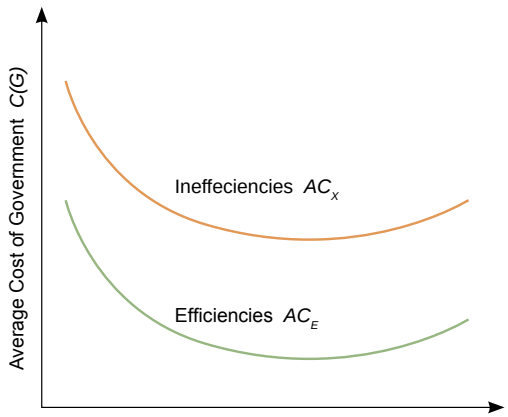
Table 5: Estimated Savings from Kernan-Shepard through Scale Economies		
	MSA Counties	Non-MSA Counties
High Estimate	$42,997,000	$195,448,000
Expected Savings	$35,371,000	$165,597,000
Low Estimate	$27,774,000	$135,746,000

We note, but do not report the full sample of all 92 Indiana counties experienced scale economies that were non-linear (they decreased as the county size increased), which, in part, motivated the dual sample approach. In the two samples we observe that scale economies exist in both the MSA and non-MSA counties, but are roughly three times as pronounced in the smaller counties. This means that for the smaller counties, the cost savings benefits of Kernan-Shepard are likely to be significantly greater than for the larger counties. This result is heartening since it is exactly what economic theory predicts, and earlier empirical studies have confirmed.

In order to evaluate the potential impact of cost savings across local governments we construct a simulation model from these results. In the estimate presented above, we have a very statistically strong, inverse relationship between the price of government (average county tax rates) and the population of the county. Extrapolating this relationship to the recommendations of the Kernan-Shepard report, we can estimate the impact of changing the size of the average taxing unit from its current level to that under Kernan-Shepard. We avoid the greatest concern arising from this approach, which is the presence of a non-linear relationship between population and average property tax rates, by separating the sample into MSA and non-MSA counties. Our simulation model then applies the rate change due to consolidation of government size to the property tax base to estimate total savings.

Thus we predict, for Indiana counties, in total, that roughly $200 million in savings may be available due to economies of scale in local government services due to the proposed consolidation in non-school taxing districts. However, the scale economy savings will be concentrated in the smallest counties,

Figure 2: X-Inefficiency



with only about 20 percent of the savings occurring in the largest counties. Importantly, we estimate savings due to scale economies based on changing the size of the served population from the "average" not the most efficient unit of government. It is common in research on government efficiency to employ data envelope analysis (DEA) that provides a measure of efficiency based on the most efficient unit of government, and then estimating cost efficiencies against this benchmark. Our study provides a far more conservative estimate of savings, since we are only using the average level of efficiency across all counties. The savings that could ensue from local government restructuring that results in efficiency improvements that bring local governments into line with the most efficient units could result in dramatically higher savings to taxpayers. See table 5.

These results align remarkably well with economic theory, and are based upon a well known modeling approach. However, we are also interested in the X-inefficiency that may occur in local government, and it is to this issue we now turn our analysis.

X-inefficiency in Local Government

Economists (and the general public) have long recognized that there is likely to be a general slackness in government operations. X-inefficiency occurs when a government fails to produce the maximum output obtainable with a given level of inputs. The result is that costs are higher. Graphically, ACe is the efficient level of average cost while ACx represents higher costs to produce any given level of output. See Figure 2. Lack of competition is one reason that government fails to achieve minimum costs. Local government is the only provider of many services and for many services this makes sense. The point is that without competition, local government, like a monopoly in the private sector, does not have the same incentive (and perhaps ability if cost saving technology is expensive) to minimize costs. Government inefficiency may result from several other sources including coordination difficulties,

corruption, or padding the budget.[14] Coordination difficulties are particularly relevant in this analysis.

It is important to note that this is an inherent condition of government, and though it may result from corruption or intentional inefficiencies, it is the absence of efficiency signals through a market that causes the X-inefficiency in government. The Kernan-Shepard report is significant in both its breadth and detail. Though it was not designed as an academic study, the anecdotal comments so carefully drawn into the document detail the notion of X-efficiency which we have already explained.[15] Coordination difficulties are particularly relevant in this analysis.

Niskanen (1971) developed a specific model of X-inefficiency in government, which details the relationship between elected officials and bureaucrats. This is an example of a specific model. We will not force a single example of X-inefficiency to explain all circumstances of inefficiency. Without further arguing what most readers will accept as self evident – that government is often less efficient than the private sector—we offer a model of X-inefficiency in local government. Suppose one element of X-inefficiency is, as we have mentioned, caused by coordination failures between local governments. This could be simply the cost involved with police or fire departments resolving border concerns, or it could be a more complex interaction on tax rates and harmonization. This has a cost we describe as:

$$C = \alpha + \Omega_1 \sum_{i=1}^{n} G + \frac{1}{2}\Omega_2 \left[\sum_{i=1}^{n} G\right]^2$$

which takes the same form as the normalized quadratic cost function with information flows replacing output from the cost function. This form also permits us to derive some simple conclusions about the role coordination costs potentially play in government activity. The first order conditions of this expression suggest that information costs should be a positive, but decreasing cost of the number of units (G) with which a government must coordinate. This is but one of several potential mechanisms, all of which have similar predictions about government efficiency.

Our formulation of an X-inefficiency model is consistent with other treatments of X-inefficiency (Hicks, 1998, 2008) and also in estimating similar inefficiencies in government. Hawkins and Dye (1970), Wheaton (2006) employed measures of the number of government units within a county in their test of inefficiency

Employing a cross sectional model of Indiana counties in 2003 we estimate the relationship between the cost of government (local average property tax rates) and the number of local taxing agencies.[16] Our model then takes the form:

$$T_i = f(Z_i, G_i, G_i^2, \varepsilon_i)$$

where the average tax rate (T) in county i, is a function of control variables Z for each county, and the number of local taxing districts G, and its squared value. We also include a white noise error term. [17]

In this specification, we have little guidance on what appropriate control variables may be employed. We considered population density, educational achievement (percentage of residents with both bachelors and HS degrees), per capita income, presence of an interstate highway, the GINI coefficient for 2000, which measures local income inequality, the presence of a state or private university and median house values from the 2000 Census.

In order to determine which variables mattered most, we combined them into a single regression, and subjected them to a number of specification tests (including stepwise regressions and a Hausman test). The variables that emerged as meaningful (both in magnitude and statistical significance) across different combinations of variables were the number of taxing authorities, population density and the GINI coefficient, which measured income inequality (most likely apparent in urban counties with very poor and affluent regions alike).

In the entire sample, we observe no nonlinearities that rise to statistical meaning. However, when we separate the sample by size (with either the median of 33,000 residents or mean of 67,000) we repeatedly find that the largest counties experience the largest coefficients for X-inefficiency. An example of one estimate appears in Table 6.

This model tells us that there is a strong positive relationship between the number of taxing districts in a county and the county mean tax rate. The significance of the squared population variable suggests that there is not a linear relationship between taxing districts and tax rates.

From these results we construct a simulation model similar to that employed in the scale economies estimate and simulation above. In this case, the simulation is performed entirely within the range of the estimates since we simply reduce the number of taxing authorities in each county by that proposed by Kernan-Shepard. Thus, this is a far more reliable test than the scale economies measure.

By varying the size of the district in our sample (to counter the non-linearity we observe) we obtain interesting results. We find that the bulk of savings occurs in the largest counties. Indeed, we find savings due to X-inefficiency in counties beneath the median size of roughly 33,000 residents to comprise less than $10 million. For counties above the median of 33,000 residents, we find, in our smallest total estimate, savings of $422 million that could be realized due to consolidation and its associated reductions in X-inefficiency. Of this

14 Cost savings may also be realized from the joint use of certain common inputs such as billing or accounting. This type of cost savings results from economies of scope which are not addressed in this study. It is generally believed that higher costs resulting from X-inefficiency outweigh cost reductions due to economies of scope (Kaserman and Mayo 1995, p. 479).

15 In particular, we note the comments by citizens, the media and local government officials on pages 19 and 22.

16 This relationship follows work on hierarchies initially suggested by Oliver Williamson (1973).

17 Simple empirical models of this relationship are also available in Hicks, Michael J. (2007b).

Table 6: X-Inefficiency Model, 26 Largest Counties	
Variable	Coefficient
Intercept	-4.674945
Taxing Districts	0.094557*
Taxing Districts Squared	-0.001365*
Gini Index (Income Inequality)	0.160166***
Proportion Of Adults With BA Degree	-0.04178*
Proportion Of Adults With HS Diploma	0.029365
Population Density	0.001175*
Per Capita Income	-0.040086
Adjusted R-Squared	0.32
F-Statistic	4.34
Prob(F-Statistic)	0.001
Durbin-Watson Stat	2.29
	N=390
Significance: * 0.10 level, ** 0.05 level, *** 0.01 level	

$422 million in savings more than $371 million of potential total savings occur in counties with populations greater than 50,000 residents. Once again we are estimating savings based solely on changing the number of governmental units at the local government that is at the 'average' level of efficiency. The potential savings could be dramatically larger should any improvement in the 'average' efficiency of local governments occur coincident to restructuring efforts that are part of the Kernan-Shepard report.

So, in our first two estimates we find that, for small counties considerable cost savings could be realized by spreading out the cost of government over more residents (consolidating), which would result in increased economies of scale. In our X-efficiency model, we find that efficiency in local government is worse in counties with an abundance of taxing authorities. These are primarily the larger counties. We would also like to compare these results to an accounting of costs associated with local government.

A Quick Accounting of Local Government Costs

A third method of estimating the potential savings from implementing the Kernan-Shepard report involves reducing the number of elected officials by the total discussed in the report. Like other methods, this is imperfect because it is unclear how many of these elected officials duties will have to be undertaken by other officials (potentially a more costly activity). Still, it is possible that the bulk of sub-county elected officials serve decision making roles that could be executed at a more consolidated level of government (more efficiently). Also, the total compensation (and other associated costs) of these locally elected leaders is not immediately apparent, even from a detailed examination of township budgets and other reports released by the Department of Local Government Finance. However, if we are to compare the magnitude of the potential savings potentially achieved by implementing the Kernan-Shepard report, an estimate of this is useful.

Assuming that for each of the roughly 5,800 elected officials eliminated through implementation of the Kernan-Shepard report, total support costs are $35,000 annually. This includes salary and benefits, office expenditures, travel and other costs not transferred to other administrative or elected bodies, then the savings from Kernan-Shepard implementation exceed $200 million. This is remarkably consistent with the scale economy estimates produced above. If the costs are double the $35,000 (and we believe this is likely, even for part-time officials) the savings appear very similar to our X-efficiency gains from consolidation.

An earlier series of studies published by the Indiana Chamber of Commerce performed a similar accounting of consolidated government services. These reports, known colloquially as the Compete studies, provide in their 2004 estimate, a range of savings between $64 million and $122 million across the state's local governments. This is less than, but in the same order of magnitude as our scale economy estimates for the state.

Other studies that perform similar accounting estimates of savings reveal comparable findings. Krause (1996) simulated local government consolidation in North Dakota as part of proposals before the states' Legislative Assembly. He found that consolidation had the largest reduction of costs associated with individual services (reductions of 4.9 percent for the most sweeping reforms).

Potential vs. Realized Savings

Our estimates provide expected savings that could be realized from consolidation of local government of the type proposed in the Kernan-Shepard report.[18] However, these potential savings may not be realized by all local governments. Individual local governments may choose to continue local spending levels for a variety of reasons. First, local governments may choose to extend service areas for some activities (such as library services). Also, local governments may wish to employ some of the savings to improve service quality or quantity. These are inherently local choices that will depend upon the current cost of government (which varies widely) and the perception of service quality in each community. Also, changes to many of the proposals through the legislative process could alter the potential cost savings impact of consolidation.

The proposals contained within the Kernan-Shepard report outline significant flexibility for local governments in this decision. Only in the case of library services covering some 400,000 citizens are service increases clearly spelled out in the recommendations. From an economic perspective, the use of newly available resources for either service quality improvements or lower local taxes is a benefit.

Capturing the gains from consolidation is not guaranteed. We have presented evidence from cross-sectional county

18 Here we use the term 'expected' in the mathematical sense, in that this is the most likely outcome given the empirical estimates in this study. The actual savings could be much larger if restructuring involves governments adopting 'best practice' of the more efficient local governments, or lower if they adopt less efficient practices.

data that there is potential for gains to be realized. Yet, for these gains to translate to lower cost, government is crucially dependent on factors of local political culture, citizen participation, monitoring of elected officials, and the actual process of government reorganization.

Functional Area Estimates of Potential Savings

Next, we investigate economies of scale and efficiency in several functional areas including police and fire protection, sewerage, solid waste, public welfare, administration, health, and libraries. We begin by reviewing findings from the literature on consolidation of public safety services and then provide estimates for these functional areas.

Studies of Public Safety Services

Consolidation of specific government functions have a long history in the United States. Public safety services – especially police and fire protection—have been the target of consolidation efforts for over two hundred years. Proponents of this functional consolidation argue that the consolidation of police services will increase efficiency through a reduction of duplicate services, equipment and positions and increase effectiveness by eliminating political tampering, lessen the ability of criminal activity to move from one jurisdiction to another, increase professionalism, and lower turnover rates by providing more opportunities in the merged agency. Opponents of the consolidation of police services argue that local control is important to citizens and lower costs are not likely to result from consolidation. Differences between pay scales and issues involving longevity and union membership are identified as the most difficult to address during consolidations.

As noted in the earlier discussion, if economies of scale exist, the average cost of producing police services decreases as the level of production increases. That is, the per citizen costs for policing services will be smaller in larger communities. However, it is particularly difficult to measure the quantity of police services provided. Some measures of police services that have been used in the literature include the number of arrests and the inverse crime rate, both of which represent only a small portion of the activities that police officers perform. Studies testing for economies of scale in the production of police services use different measures of cost and services and different assumptions and statistical methods, so it is difficult to compare results or draw firm conclusions. The more recent literature in this area suggests that police services do not experience economies of scale as the level of production increases, so creating larger departments through the consolidation of police services would not lead to lower costs of provision.

McDavid (2002) examined the 1996 consolidation of three police departments in Halifax, Canada. The study compared data from surveys, interviews, and budget and manpower reports three years before and four years after the consolidation. After consolidation the number of sworn officers decreased which resulted in higher workloads for sworn officers. Service levels, as measured by the number of officers serving the population, also decreased. Expenditures on police services increased primarily due to union negotiations, which included substantial salary increases. Consolidation did not affect crime rates. Citizens were also surveyed on their perception of the quality of policy services before and after consolidation. The majority of respondents in each year surveyed (78.1% in 1999) believed that the quality of police services stayed the same.

McAninch and Sanders (1988) conducted a survey to measure attitudes of 102 police officers (the entire population of officers) in Bloomington and Normal, Illinois on consolidation of the two departments. They found that majority of the officers believed that a consolidated department would operate more economically, more effectively address local crime, and eliminate duplicate services and equipment. Perceived threats to pension, future raises, choice of days off, and choice of shift assignment were identified as the primary determinants of opposition to consolidation by officers in Bloomington (the larger city).

Finney (1997) examined economies of scale in consolidated police departments for 14 suburban departments over a four-year period in Los Angeles County (CA). In Los Angeles County, 45% of the local jurisdictions use intergovernmental agreements to provide police services. He found that the average cost of providing police services (measured by the inverse crime rate and the number of arrests) increased with the quantity of police services provided, which might

In Practice

An earlier study, Krimmel (1997), compared operational costs of the Northern York (PA) Regional Police Department (a consolidated police department consisting of eight municipalities) with eight similar and non-consolidated police departments in neighboring Lancaster County. The operational costs of the consolidated department were 28% lower than those of the non-consolidated departments (25% lower on a per capita basis). The number of officers per 1,000 population was 34% less and the number of patrol vehicles was 56% lower than in the non-consolidated department. Other benefits of consolidation were:

- the department offered more services (a canine unit, investigations unit, and juvenile specialists were added after consolidation),
- officers were able to participate in more training opportunities,
- officers had more professional choices within the department, and
- officers received higher salaries.

The management style of the police board overseeing the consolidated department is touted as a major contributor to the department's success. Each municipality has a member on the board.

Table 7: Variable Definitions and Sources†	
Variable	Definition
Fire Protection Employment	Number Of Fire Personnel Per Thousand Population In Municipality
Police Protection Employment	Number Of Police Personnel Per Thousand Population In Municipality
Police Protection Expenditures	Expenditures For Police Protection Per ThousanD Population In Municipality.
Population	Population Of Municipality
Population Squared	
Population Density	Persons Per Square Mile
Poverty Rate	Percentage Of Persons With Income Below The Poverty Level
Illinois Dummy	=1 For IL =0 Otherwise
Kentucky Dummy	=1 For KY =0 Otherwise
Michigan Dummy	=1 For MI =0 Otherwise
Ohio Dummy	=1 For OH =0 Otherwise
† Tables with descriptive statistics are in the appendix.	

Sources: *2002 Census Of Government* Vol. 3 No. 1 Employment Of Major Local Governments, Table 2; *2002 Census Of Government* Vol. 4 No. 4 Finances Of Municipal And Township Governments, Table 18; *2002 Census Of Government* and *U.S. Census Bureau State and County Quickfacts*

suggest they experience diseconomies of scale.[19] However, the author noted that the jurisdictions that contracted for police services appear to base their decision on cost considerations in that "police expenditures by the contracting municipalities typically are far below those found in comparably sized cities with independent police departments." [20]

Two earlier studies are worth mentioning at this point because the current research tends to confirm prior analysis.[21] Gyapong and Gyimah-Brempong (1988) estimated a production function for police services using 1984 and 1985 data on 130 municipal police departments in Michigan cities with populations of 5,000 or more. Number of arrests is the measure of output.[22] Their estimate of economies of scale is positive indicating increasing returns to scale, but it is not statistically significant. Earlier, Gyimah-Brempong (1987) found statistically significant diseconomies of scale (average costs increase as the number of arrests increase) in the average police department in Florida using 1982 and 1983 data from 256 police departments in municipalities with populations of 5,000 or more. He also divided the sample to test for economies of scale in small, medium, and large cities. He found that police departments in large cities (41 of the 256 cities in the dataset) experienced statistically significant diseconomies of scale for police services, while police services in small and medium cities did not exhibit significant economies or diseconomies of scale.

Duncombe and Yinger (1993) perform the most rigorous analysis of returns to scale in the provision of fire protection services. Their analysis indicates that the provision of fire services exhibits constant returns to population scale meaning that average costs remain constant as provision (measured by the population) increases. This result "implies that consolidating small fire departments will not result in significant cost savings."

Estimates of Scale Economies (Public Safety)

To investigate the potential costs savings for public safety services, we use data from the 2002 Census of Governments for municipalities with populations of 25,000 or larger in Indiana and the surrounding states (Illinois, Kentucky, Michigan, and Ohio.)[23] The Census of Governments contains data on the number of fire protection personnel, number of police protection personnel, and total expenditures on police protection. The descriptive statistics for this data are shown in the appendices, while Table 7 outlines the data sources and variable definitions. The tables show that for cities of this size the average number of fire and police personnel per thousand population is higher in Indiana than any of the border states except Kentucky. There is also more variation in the level of fire personnel per

19 Whether diseconomies of scale exist is difficult to determine. Diseconomies of scale imply that average costs (costs per unit of a service provided) increase as output increases. Thus, the cost of providing law enforcement per average unit increases as more public services are provided. These studies use total expenditure (cost) on police, total number of arrests, and crime rate in each jurisdiction. They find a positive relationship between police expenditures and number of arrests and between police expenditures and the crime rate – two separate equations -- and interpret this relationship to mean that police costs increase with the number of arrests and the crime rate.

20 This suggests that there are severe measurement problems with the statistical methods used in these sorts of studies. In these studies (Finney and the Gyapong et al. studies), cost is a function of arrests or crime rate (the outputs), input prices (wages and capital costs), and socioeconomic variables. These studies estimate a translog cost function which is a nonlinear regression technique. The fundamental problem is that public outputs like the production of police services are difficult to measure; these studies have used the intermediate good arrests as a proxy for production.

21 Several studies in the 1970s addressed economies of scale and the provision of police services, but studies from this period are not the main focus of this literature review. Walzer (1972) finds that police departments in Illinois experience economics of scale – decreasing average costs (measured as per capita expenditure on police) as the scale (a measure of the quantity of services provided by the police in different jurisdictions) increased. Other studies not reviewed in detail here: Chapman, Hirsch and Sonenblum also find economies of scale are present for police services. Ehrlich (1973), Popp and Sebold (1972) and Votey and Philips (1972) find diseconomies of scale. The assumptions and statistical methods used in these studies have been criticized in more recent studies.

22 Using number of arrests as the output measure may be problematic since arrests represent only a portion of the services that police provide.

23 Data is not available for municipalities with populations below 25,000.

In Practice

Fire Department Consolidation
Coventry, Rhode Island

A modest sized town of just over 33,000 residents, Coventry has struggled with municipal efficiency for at least two decades. A Coventry Merger Study Committee examined fire services for the town in 1989. The issue at hand was the merger of some of the seven independent fire districts that served the city. The issues were the same then as they were in 2006 when the merger finally occurred: cost, dissimilar service, and concerns over volunteer manpower.

As part of the pre-merger efforts in 2004, Robert Seltzer, Chief of one of the fire districts performed a study of consolidation efforts in other communities. His study drew heavily on several unpublished reports from the National Fire Academy in Emmitsburg, Maryland. The studies he cited showed no negative consequences associated with mergers, and in many cases improved services and or cost savings to taxpayers. Importantly, Chief Seltzer provided 15 specific functional recommendations covering operations ranging from budget formats to recall of off-duty chiefs for large scale incidents.

In 2006, four of the seven fire districts merged into the Central Coventry Fire District.

The cost savings were significant. According to the 2007 budget for the fire departments, the savings ranged from between 8 cents and 29 cents per $1,000 of residential assessed property in the town. Chief Selzer recognized the savings in costs of the department, telling a local reporter in 2007 that "Our Blue Cross went down. Our phone bills were cut in half. When we started looking at all of that, there was real savings."

The department saw significant improvement in capital as well. They sold older and extra equipment and now boast a fleet of three engine trucks, a ladder truck, fourteen additional specialized vehicles and four boats.

The department has 38 permanent fire fighters, 10 volunteers and an annual budget of over $4 million, and as of this writing one of the remaining departments in the city was exploring joining the consolidated force.

See:

Lisa Vernon-Sparks "Coventry's new fire district solidly in the black" *The Providence Journal*, October 31, 2007

Seltzer, Robert W. *Successful Fire Department Consolidations and their Implications for the Coventry Fire Departments*. October 2004.

capita in Indiana relative to the border states, again with the exception of Kentucky, and the level of police protection with the exceptions of Kentucky and Michigan.

We then conduct analysis to determine if the number of fire and police protection employees per thousand population increases or decreases with population size and population density. Another model examines the relationship between police expenditures per thousand and population. Data on fire expenditures is not available at the municipal level of government. We also determine if the number of fire and police per capita and police expenditures per capita is different in Indiana relative to the surrounding states.

Table 8: Fire Protection Employment Per Thousand in Municipalities (With Population Over 25,000)†

	Total Sample	Population < 50,000	Population >50,000
Variable	Coefficient	Coefficient	Coefficient
Constant	2.166***	0.379	2.141***
Population	1.01e-06***	0.0001	1.09e-06***
Population Squared	-3.19e-13***	-1.46e-09	-3.45e-13***
Illinois Dummy	-0.663***	-0.647***	-0.659***
Kentucky Dummy	-0.0198	0.2497	-0.179
Michigan Dummy	-1.142***	-1.134***	-1.138***
Ohio Dummy	-0.459***	-0.477***	-0.400*
Adjusted R-Squared	0.431	0.406	0.437
F-Statistic	18.67390	10.574	8.105
Prob(F-Statistic)	0.000	0.000	0.000
Durbin-Watson Stat	2.001	2.302598	2.263
	N=141	N=85	N=56

Significance: * 0.10 level, ** 0.05 level, *** 0.01 level

† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

Fire Protection. The model we test is designed to evaluate the potential for scale economies in fire service, but we do not have a proxy for price. Thus we test whether fire service provision, on a per capita basis is linear with respect to population and population density. Our model results show that the number of fire personnel increase significantly with the population but at a decreasing rate which suggests that there are high fixed costs (related to economies of scale). [24] This is a clear finding, which suggests the presence of fixed costs in fire service, though lack of data on fire expenditures precludes our estimating the magnitude of the effect on taxpayers.

In comparing Indiana to other states, we find the number of fire personnel is significantly lower per thousand population in Illinois (0.66 personnel lower), Michigan (1.14 lower), and Ohio (0.46 lower). See Table 8. In this dataset, the average municipality (with population greater than 25,000) in Indiana has 128 fire protection personnel and a population of 58, 218. This municipality would have 37 fewer fire protection personnel in Illinois, 64 fewer in Michigan, and 24 fewer in Ohio.

Police Protection. In our examination of police protection, we first examine the relationship between number of police personnel and population for municipalities. We again separate the model into cities with populations less than 50,000 and greater than 50,000. This is designed to capture differences inherent in cities of different size groups.

Our first test is of the relationship between police department employment, per thousand residents and city size. A

24 The model we use is a standard ordinary least squares model, corrected for heteroscedasticity using White's [1980] heteroscedasticity invariant, variance-covariance matrix.

Table 9: Police Protection Per Thousand Population in Cities (With Populations Over 50,000)†		
Variable	Coefficient	Coefficient
Constant	2.237	1.1343
Population	3.18e-06***	-
Population Squared	-7.01e-13*	-
Population Density	-	6.85e-05
Poverty Rate	-	0.067***
Illinois Dummy	-0.036	0.482
Kentucky Dummy	0.224	0.401
Michigan Dummy	-0.031	0.364
Ohio Dummy	0.163	0.512
Adjusted R-Squared	0.373	0.320
F-Statistic	6.543	5.321
Prob(F-Statistic)	0.000	0.000
Durbin-Watson Stat	0.779	2.029
	N=57	N=56

Significance: * 0.10 level, ** 0.05 level, *** 0.01 level
† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

positive, but non-linear relationship between these variables suggests the presence of fixed costs (overhead) and thus scale economies in police protection.

For municipalities with population less than 50,000 the regression results are not statistically meaningful and we conclude that the size of the city was not correlated with police officers per 1,000 residents. We do not show the results for this model. For cities with greater than 50,000 residents (table 3) the number of police personnel increases with population at a decreasing rate and increases with the poverty rate (our proxy for the crime rate which is not available).

Further, when we examine the number of police personnel per thousand residents in our model, we find that Indiana is not significantly different from that of other states considered in our analysis. This suggests uniform police to resident ratios in the five state region we examine. See Table 9.

Expenditures on Police Protection. We are fortunate to have data on expenditures from the most recent Census of Government. Our second analysis of the police element of public safety considers municipal expenditures on police protection.[25] Again bifurcating our data for municipalities with populations greater or less than 50,000 residents, we create a model of scale economies. This model is identical to our aggregate model of scale economies in that spending adjusted to a per capita basis (in our case, expenditures per 1,000 residents) is a function of the size of the community and its square. The latter to capture non-linearities in the scale economy function. We include state specific dummy variables for use in identifying state specific differentials in spending levels.

The results of our model (Table 10) show that the per capita spending on police increases with population at a decreasing rate in smaller communities. This suggests diseconomies of scale in the lower populated communities which

Table 10: Police Expenditures Per Thousand Population†				
	Cities With Population < 50,000		Cities With Population > 50,000	
Variable	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-174.242	128.9562	135.848*	132.312*
Population	0.016**	-	0.00003	-
Population Squared	-2.08e-07**	-	-1.53e-11	-
Population Density	-	-0.000515	-	-0.002997***
Poverty Rate	-	-0.357149	-	0.919
Illinois Dummy	-0.617	-0.370292	-5.643	9.139
Kentucky Dummy	24.633	17.28749	-1.572	-21.409
Michigan Dummy	-34.631*	-31.86168	-29.349**	-20.781
Ohio Dummy	8.945	5.749507	7.839	14.474
Adjusted R-Squared	0.084	0.038	0.109	0.183
F-Statistic	2.781	1.767	2.583	3.872
Prob(F-Statistic)	0.015	0.112	0.025	0.002
Durbin-Watson Stat	2.153	2.095	1.710	1.679
	N=118	N=118	N=79	N=78

Note: The level of performance of the second model reported here is so poor (F = 1.766) so that no inference should be made from its results.
Significance: * 0.10 level, ** 0.05 level, *** 0.01 level
† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

means that in communities of this size consolidation of police services is unlikely to decrease costs per citizen served. We also find no difference in spending patterns between Indiana and bordering states with the exception of Michigan.

For larger municipalities (> 50,000 population), police expenditures increase as the population becomes less dense. There is no evidence of scale economies nor of interstate differences except for Michigan in which police expenditures are lower in both estimates of larger cities.

These results require some analysis beyond the other findings we report in this study. First, it is clear that changes to police department sizes are unlikely to generate significant savings from scale economies. Indeed, there is some evidence of diseconomies of scale among smaller policing units. The mixed results among cities of different sizes substantiate the argument against scale economies as a source of cost savings. The density issue is also of interest. Here, large, but low density communities show lower policing costs on a per capita basis than similarly sized communities that are densely populated. We believe that this represents lower policing costs in large suburban areas which are less densely populated) than in traditional urban areas.

Anecdotally, these findings confirm a belief that policing units tend to be staffed very similarly across geographic areas, not only in Indiana, but in three of the four bordering states. We believe that this is because police forces are exposed to significant fiscal federalism. Fiscal federalism exists in policing due to two factors. First, there are extensive intergovernmental payments between federal, state and local jurisdictions for

25 Data is not available on fire expenditures at the municipal level.

Table 11: Police Expenditures Per Thousand Population in Cities With Populations Above 90,000†		
Variable	Coefficient	Coefficient
Constant	133.878*	123.182*
Population	-3.22e-05	-
Population Squared	6.21e-12	-
Population Density	-	-0.005**
Poverty Rate	-	0.952
Illinois Dummy	15.579	27.243
Kentucky Dummy	31.519	-1.037
Michigan Dummy	-8.387	3.156
Ohio Dummy	56.293**	56.502***
Adjusted R-Squared	0.380	0.399
F-Statistic	3.862	3.984
Prob(F-Statistic)	0.008	0.008
Durbin-Watson Stat	1.646	0.195
	N=29	N=28

Significance: * 0.10 level, ** 0.05 level, *** 0.01 level
† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

law enforcement. These payments will often be contingent on size and operations and thus tend to standardize policing functions. Second, there are police forces at both the state and federal level to guide local police departments and vice versa. This suggests the size and scope of operations will be similar in similar communities. The presence of fiscal federalism, which is necessary due to the shared nature of law enforcement will tend to drive out some of the inefficiencies noted in other local services. We stress that this area of inquiry is not part of our empirical analysis and we cannot confirm or refute an hypothesis of fiscal federalism's role in limiting interstate and intercommunity differences in police expenditures and staffing on a per capita basis. We can say that the manning levels are indeed consistent with this hypothesis however, and leave the more specific analysis of the causation to scholars in disciplines more attuned to this issue.

The final model (Table 11) uses data for cities with population greater than 90,000 residents to test for scale economies. Although the sample size is too small (<30) to draw firm conclusions, the results of this model suggest that economies of scale take effect for municipalities with populations over 90,000. The negative sign on the population coefficient suggests that expenditures per capita begin to decrease. However this result is not statistically significant so again, no firm conclusions are warranted.

Estimates of X-inefficiencies (Public Safety)

The models that we use to examine X-inefficiencies focus on the relationship between expenditures per capita for various government services in a county area and the number of local government units in each county in Indiana and the surrounding states. Depending on the service, the number of local government units will include either the number of municipalities and the county or the number of townships,

Table 12: Variable Definitions and Sources†	
Variable	Definition
Fire Protection Expenditures Per Capita	Fire Expenditures/ County Population
Police Protection Expenditures Per Capita	Police Expenditures/County Population
Number Of Cities And County	Sum Of The Number Of Cities In A County And County
Number Of Cities And County Squared	(Sum Of The Number Of CitieS In A County And County) Squared
Number Of Cities And County And Townships	Sum Of The Number Of Cities And Townships And County
Number Of Cities And County And Townships Squared	(Sum Of The Number Of Cities And Townships And County) Squared
GINI Coefficient	Measure Of Income Inequality: 0 Means Perfectly Equal Distribution, 100 Means Very Unequal Distribution
High School GraduAtes	Proportion Of Population Age 25+ With A High School Diploma
Bachelor's Degree	Proportion Of Population Age 25+ With A Bachelor's Degree Or Higher
Per Capita Income	Income/Population
Population Density	Persons Per Square Mile
Illinois Dummy	=1 For IL =0 Otherwise
Kentucky Dummy	=1 For KY =0 Otherwise
Michigan Dummy	=1 For MI =0 Otherwise
Ohio Dummy	=1 For OH =0 Otherwise

† Tables with descriptive statistics are in the appendix.

Sources: *U.S. Census Bureau*, *2002 Census Of Governments*, Nielsen, Francois (2002) Income Inequality In U.S. Counties Www.Unc.Edu/~Nielsen/, *U.S. Census Bureau State and County Quickfacts*

municipalities, and the county. If X-inefficiencies exist, expenditures per capita will increase with the number of government jurisdictions in a county. The higher expenditures may result from coordination problems, managerial inefficiency, or other factors discussed earlier.

We also control for other characteristics that are expected to influence expenditures. GINI is a measure of income inequality where a GINI coefficient of zero means that the income distribution is perfectly equal—everyone has the same income—and a GINI coefficient of 100 means one person has all the income and everyone else has none—very unequal. We also control for the education level of the population in the county area using two variables, the percentage of persons age 25 or older who have a bachelor's degree or higher and the percentage of persons age 25 or older who have a high school diploma. We include variables to control for per capita income and population density per square mile. The dummy variables for the surrounding states measure expenditures per capita in Indiana relative to each of the surrounding states. A negative sign on the coefficient indicates that expenditures per capita are lower in the comparison state while a positive sign

Table 13: X-Inefficiency in Fire and Police Expenditures†		
Variable	Fire Protection Coefficient	Police Protection Coefficient
Constant	-195.306***	-208.837***
Number Of Local Government Units (Cities, County)	-	0.974***
Number Of Local Government Units Squared (Cities, County)	-	-0.016***
Number Of Local Government Units (Cities, County, Townships)	0.706***	-
Number Of Local Government Units Squared (Cities, County, Townships)	-0.011***	-
GINI Coefficient	1.601***	2.548***
High School Graduates	1.673***	2.109***
Bachelor's Degree	0.203	-0.461
Per Capita Income	0.002**	0.001
Population Density	0.032***	0.058***
Illinois Dummy	17.461***	36.089***
Kentucky Dummy	17.584***	-2.079
Michigan Dummy	-10.403***	12.445***
Ohio Dummy	9.588**	43.444***
Adjusted R-Squared	0.459	0.668
F-Statistic	38.291	89.377
Prob(F-Statistic)	0.000	0.000
Durbin-Watson Stat	1.859	2.046
	N=484	N=485

Significance: * 0.10 level, ** 0.05 level, *** 0.01 level

† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

indicates that expenditures per capita are higher in the comparison state relative to Indiana. Summary statistics appear in the appendices, while variable definition and sources used in this estimate appear in Table 12.

Our first model examines fire protection services and the role X-inefficiency plays in generating costs for taxpayers. In this model we find a large and statistically meaningful presence of X-inefficiencies. Across our entire sample of communities, we find that each additional local government unit in a county increases the per person annual costs for fire protection services by 70 cents per year.

We also found that per capita expenditures for fire services vary a great deal by state, and that Indiana residents pay less for services, on a per capita basis annually, between roughly $9 and $17, than in Illinois, Kentucky and Ohio. We pay more, roughly $10 per person annually, than Michigan residents. See Table 13.

When we examine X-inefficiency in police protection services we find very similar results to the fire protection services, there is strong evidence of X-inefficiencies in police services. Across our entire sample of communities, we find that each additional local government unit in a county increases the per person annual costs for police protection services by 97 cents per year.

Our cross state analysis suggests that while Kentuckians pay the same cost as Hoosier's on a per capita basis, costs in the remaining border states range from $12 to $43 more per capita on an annual basis.

The presence of X-inefficiency in public safety is unsurprising. The cost of coordinating public services across different jurisdictions alone is a strong signal of the potential for X-inefficiencies. That each additional local government within a county leads to more than a $1.75 per person in public safety costs due simply to these inefficiencies.

Other Services

We examine the presence of scale economies in a number of services: sewerage, solid waste management, public welfare, administration, health services, and libraries. At least one of these—sewerage—is a classic example of a natural monopoly, where high fixed costs and hence scale economies are the primary feature of production. However, with the exception of libraries, we found no evidence of scale economies in any of these services. There are four likely causes for this. First, there may simply be no scale economies in some of these services, as they are not provided at the smaller levels of government. Second, data availability on actual costs is limited. For example, we have neither the capital cost structure nor intergovernmental transfers for sewerage, two large contributors to total expenditures for sewerage. Thus, while theory would suggest sewer services as a prime candidate for economies of scale, we do not observe them in our analysis. Third, there may not be service provision for these items within the range of areas in which scale economies would be apparent. Finally, the most likely reason is that regulatory restrictions on these activities dictate a small range of expenditures in each location, masking any presence of economies of scale. Small regions might not deliver specific services, such as sewerage and treatment facilities due to high levels of fixed costs. We know this to be the case, but how it affects our data is not clear. Other levels of consolidation (city/city or county/county) have not been examined in our analysis.

Sewerage

We examine X-inefficiency in sewer services and construct a similar model as that for other X-inefficiency estimates.

Table 14: X-Inefficiency Other Services (Sewer And Solid Waste Management)†		
Variable	Sewerage Coefficient	Solid Waste Mgt Coefficient
Constant	-62.456	-36.912
Number Of Local Government Units (Cities, County)	1.296*	0.011
Number Of Local Government Units Squared (Cities, County)	-0.012	-0.003
GINI Coefficient	1.4096	0.755
High School Graduates	1.858***	0.749**
Bachelor's Degree	2.772*	-0.039
Per Capita Income	-0.004	-0.001
Population Density	0.029*	0.015***
Illinois Dummy	-59.769***	-10.905**
Kentucky Dummy	-42.695***	0.901
Michigan Dummy	-44.729***	-5.809
Ohio Dummy	-31.123***	-4.654
Adjusted R-Squared	0.287	0.029
F-Statistic	18.456	2.253
Prob(F-Statistic)	0.000	0.011
Durbin-Watson Stat	2.011	2.065
	N=477	N=461
Significance: * 0.10 level, ** 0.05 level, *** 0.01 level † The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix		

Again, we posit that per capita expenditures are a function of the number of local governments within a county and its square (a test for non-linearities). We also include the control variables outlined above. Data are of the provisions of sanitary and storm sewers and sewage disposal facilities and services.[26]

Our analysis finds significant and linear levels of X-inefficiency in sewer services. This estimate suggests that for each local government within a county, per capita sewer costs rise by $1.29 annually. Also, we found that per capita costs for sewerage are significantly higher in Indiana than in any of the surrounding states. The cost differentials range from between $31 and $59 per year higher in Indiana than in surrounding states. See table 14.

Solid Waste Management

We estimated the presence of X-inefficiencies in solid waste management by employing the same model described above, and found no evidence of X-inefficiencies. Data are for street cleaning, solid waste collection and disposal, and provision of sanitary landfills.[27] With the exception of Illinois, where per capita costs for this service are roughly $11 higher annually than in Indiana, there is no apparent regional variation in costs for this service that are apparent among the states that we consider.

Table 15: X-inefficiency Other Services (Public Welfare)†	
Variable	Public Welfare Coefficient
Constant	-207.139**
Number of local government units (cities, county, townships)	0.104
Number of local government units squared (cities, county, townships)	-0.005
GINI coefficient	3.241**
High school graduates	4.022***
Bachelor's degree	-0.195
Per Capita Income	-0.009***
Population Density	0.023**
Illinois Dummy	-24.684***
Kentucky Dummy	-52.968***
Michigan Dummy	21.477*
Ohio Dummy	144.273***
Adjusted R-squared	0.524
F-statistic	46.119
Prob(F-statistic)	0.000
Durbin-Watson stat	1.956
	N=451
Significance: * 0.10 level, ** 0.05 level, *** 0.01 level † The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix	

Public Welfare

Support of and assistance to needy persons is contingent upon their need. The types of services provided by local governments includes: cash assistance paid directly to needy persons under the categorical programs (Old Age Assistance, Temporary Assistance for Needy Families (TANF), AID to the Blind, and Aid to the Disabled) and under any other welfare programs (but excludes pensions to former employees and other benefits not contingent on need). This includes vendor payments made directly to private purveyors for medical care, burials, and other commodities and services provided under welfare programs; and provision and operation by the government of welfare institutions. Other public welfare includes payments to other governments for welfare purposes, amounts for administration, support of private welfare agencies, and other public welfare services. Health and hospital services provided directly by the government through its own hospitals and health agencies, and any payments to other governments for such purposes are classed under those functional headings rather than here. [28] In Indiana, the role of county and local governments in these services is limited and formulaic. Our analysis yielded little or no X-inefficiencies for these services. However, there were interstate differences

26 Source: *2002 Census of Governments*, Vol. 1 No. 1, Government Organization

27 Source: *2002 Census of Governments*, Vol. 1 No. 1, Government Organization

28 Source: *2002 Census of Governments,* Vol. 4 No. 5, U.S. Census Bureau, Compendium of Government Finances

Table 16: X-Inefficiency Other Services (Administration)†	
Variable	Administration (Pop > 100,000) Coefficient
Constant	215.957
Number Of Local Government Units (Cities, County, Townships)	1.209*
Number Of Local Government Units Squared (Cities, County, Townships)	-0.011**
GINI Coefficient	2.032
High School Graduates	-2.371
Bachelor's Degree	1.215
Per Capita Income	0.001
Population Density	0.023*
Illinois Dummy	21.343
Kentucky Dummy	-95.077***
Michigan Dummy	-9.853
Ohio Dummy	54.228***
Adjusted R-Squared	0.502
F-Statistic	8.710
Prob(F-Statistic)	0.000
Durbin-Watson Stat	2.382
	N=85
Significance: * 0.10 level, ** 0.05 level, *** 0.01 level † The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix	

in costs ranging from $52 per person less in Kentucky to $144 per person higher in Ohio. Much of this difference, we believe, is due to the level of government responsible for disbursement of funds and so does not reflect actual taxpayer cost differences. See table 15.

Poor Relief. Overseeing the poor and distributing poor relief is a primary duty in many townships.[29] The trustee is charged to care for the poor by the most economical means available and at the same time is charged to be sure that the necessary needs of an individual or family are met. The applicant must show that they are unable to provide those needs through personal effort and that they have exhausted all other means.

Many trustees creatively cooperate with other agencies and churches in their areas, keeping costs controlled and delivering services needed. The advantage the Trustee's systems has over other forms of welfare is the freedom to discern whether or not an individual has and is willing to put forth that personal effort to help themselves. We have not separately empirically analyzed this expenditure stream, but note it here as it is part of the overall duties of Indiana's townships.

Administration

Our analysis of administrative duties includes Census of Government reported data on both financial administration and other administrative duties. Activities involving finance and taxation includes central agencies for accounting, auditing, and budgeting; the supervision of local government finances; tax administration; collection, custody, and disbursement of funds; administration of employee retirement systems; debt and investment administration; and the like.[30]

Our analysis yielded evidence of X-inefficiencies in administration for large counties with populations above 100,000 and large differences among states in expenditures. Indiana was the median with respect to overall costs, with Ohio, at $54 more per person annually in administrative costs and Kentucky residents bearing $95 less annually on a per capita basis for administration. See Table 16.

Table 17: X-Inefficiency Other Services (Health)†	
Variable	Health Coefficient
Constant	126.071
Number Of Local Government Units (Cities, County)	0.330
Number Of Local Government Units Squared (Cities, County)	-0.0133
Gini Coefficient	-0.371
High School Graduates	0.791
Bachelor's Degree	4.083*
Per Capita Income	-0.012**
Population Density	0.0355***
Illinois Dummy	15.005*
Kentucky Dummy	44.579***
Michigan Dummy	225.656***
Ohio Dummy	94.435***
Adjusted R-Squared	0.258
F-Statistic	16.202
Prob(F-StatistIc)	0.000
Durbin-Watson Stat	2.129
	N=483
Significance: * 0.10 level, ** 0.05 level, *** 0.01 level † The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix	

Health

The data on health expenditures that we use includes spending on outpatient health services, other than hospital care, including: public health administration; research and education; categorical health programs; treatment and immunization clinics; nursing; environmental health activities such as air and water pollution control; ambulance service (if provided separately from fire protection service); and other general public health activities such as mosquito abatement. It also includes financing, construction, and operation of nursing homes.[31] There are 94 public health departments in Indiana.

29 See Indiana Code Title 12.

30 Source: U.S. Census Bureau, Compendium of Government Finances: 2002, Vol. 4 No. 5

31 *2002 Census of Governments*, Vol. 1 No. 1, Government Organization

In Practice

Library Consolidation: Minneapolis and Hennepin County Library

By 2006, the Minneapolis Library system was facing double digit budget cuts as a result of a series of property tax reforms instituted between 1997 and 2001. The decision to close three of the city's 14 libraries was difficult in a city that prided itself on being ranked the "Most Literate City in America."

The board's of both Hennepin County Library System and the Minneapolis Public Library Systems began talking mergers. After months of close coordination between the staffs of both systems, the mergers were unanimously agreed upon by the City Council and County Commission. The merger took place on January 1, 2008.

A key part of the consolidation was the re-opening of three libraries in Minneapolis that were shuttered in 2006 due to budget limitations. The City provided almost $8 million in transition funding to the library system, but the combined operating budgets rose less than the rate of inflation from 2007 to 2008. At the same time, Minneapolis voters passed an $18 million bond referendum for library capital improvements. Consolidation of services did not mean a lack of interest by voters.

Hennepin County Library System boasts a circulation of well over 13 million items, and more than 750 staff members, 41 libraries and an expanded bookmobile program made possible by the consolidation of the libraries. Citizens of the County enjoy a medical library with web access for medical literature – a rarity among public libraries.

In January, 2009 the final step towards consolidation occurred with the libraries finalizing their electronic merger with a single website serving all the libraries. (See www.hclib.org).

Source: 2008 Hennepin County Library System Annual Budget

Regression analysis for the total sample shows no evidence of X-inefficiency but large differences in spending among states with the states bordering Indiana spending from $15 to $225 more per capita on public health. See Table 17.

Libraries

We perform the same analysis of library districts as we have performed for the other local public services. Using data from 2007, we examine the presence of scale economies and X-inefficiency in the provision of library services in Indiana. Absence of data on library districts from the Census of Governments necessitates analysis of Indiana's 238 separate library districts. Descriptive statistics appear in Table 18. The average number of library districts in a county is 3.5 with operating costs of just over $1 million and circulation of over 300,000 items. There is substantial variation in operating costs and circulation ranging from about $5,700 to almost $32 million and from 60 to over 14 million items, respectively.[32]

Table 18: Descriptive Statistics, Libraries

Variable	Mean	Std. Dev.	Median	Max.	Min.	Obs.
Number of Library Districts (In A County)	3.50	1.81	3	8	1	238
Operating Costs ($)	1,147,869	2,914,781	376,874.5	31,840,821	5,719	238
Population (2000)	24,416	64,265	8,778	832,693	241	238
Circulation (Number of Items – Books, CD, DVDs, etc.)	11,733.1	1,068,058	78,780	14,183,909	60	238

Our scale economies estimate poses the same empirical specification as in the earlier estimates. That is, the cost per person in the library district is a function of the total number of persons in the district and the square of the number of persons. The latter value was included to examine non-linearities in economies of scale.

As in the other examples, we separate our sample into large and small library districts with circulation of 100,000 items serving as the dividing point and we test two models of scale economies. Our base model of scale economies posits that per capita operating costs for library districts is a function of population and population squared for the district. For the larger library districts, our estimate of scale economies did not enjoy statistical significance and thus is not reported here. We observed economies of scale for the smaller libraries.[33] In total, we find that efficiencies gained through achieving economies of scale could account for $37.1 million in savings for library systems in the state.

Our second analysis of libraries focuses on X-inefficiency of library services. For this we construct the now familiar model, where cost per capita of served population is a function of the number of library districts within the county. In this estimate we find that library services do suffer from X-inefficiency. In our model we find that each additional library district in a county increases per patron operating costs by $10 annually. See Table 19.

We find considerable X-inefficiencies and in one measure, economies of scale in Indiana's library districts. We are not the first to identify such costs associated with local library

32 The smallest library (York Township Public Library) reports a service population of 241 persons, with a circulation of 60 items and an annual expenditure of 5,700. The next smallest library has a circulation of over 1,000. Our estimates, omitting York Township from the data series does not affect our results, but we are suspicious of the accuracy of this data point.

33 In a second specification, where we use circulation as a measure of output in our scale economies estimate we found significant economies of scale across the entire sample and in both small and large communities. For those libraries serving the smallest half of communities, we find scale economies when using circulation as the quantity measure. We do not use these results in order to remain consistent across measures, though circulation may also be a good measure of quantity.

Table 19: Libraries: Economics of Scale **and X-Inefficiency**†		
Variable	Scale Economies Circulation < 100,000 Coefficient	X-Inefficiencies Coefficient
Constant	52.45***	27.31422***
Population	-0.003095***	-
Population Squared	1.59e-7***	-
Number Of Library Districts	-	10.17297***
Number Of Library Districts Squared	-	-1.015514**
Adjusted R-Squared	0.02	0.038
F-Statistic	2.34	5.658
Prob(F-Statistic)	0.099	0.004
Durbin-Watson Stat	2.359	1.856
	N=138	N=238

Significance: * 0.10 level, ** 0.05 level, *** 0.01 level
† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

Table 20: Cumulative Savings of Local Government Consolidation (All Values in 2007 Constant Dollars)†			
Item	X-Inefficiency	Savings Per Person	Total Savings In Indiana
Fire Services	Yes	$12.07	$74,341,000
Police Protection	Yes	$13.85	$85,268,000
Sewerage	Yes	$18.11	$111,511,000
Solid Waste Management	No	0	0
Public Health	No	0	0
Welfare	No	0	0
Administration	Yes	$8.48	$52,250,000
Libraries	Yes	$4.14	$25,573,000

† The residuals were estimated using White's [1980] heteroscedasticity invariant variance-covariance matrix

systems. A study of New York's 235 libraries found that X-inefficiencies accounted for roughly 24 percent of the total expenditures by the library system (Vitaliano, 1997). Our estimates of X-inefficiency in Indiana's libraries are roughly 9.3% percent of total library expenditures in the state, while scale economies account for 13.4% of costs.

Summary and Suggestions

In this section we attempt two important tasks. First, we summarize our estimates of the impacts of local government consolidation. Our estimates of the determinants of government consolidation and the economic development impacts need no further summary here so we confine this section to potential cost savings. We then offer considerations for policymakers undertaking the difficult task of reforming local governments. These include not only potential fiscal and administrative incentives to promote reform, but also suggestions regarding the process of reforming local government.

The individual functional areas of local government in which we have estimated the presence of scale economies and X-inefficiencies may be totaled to provide a cumulative estimate of the savings associated with adopting the size and scale recommendations incorporated in the Kernan-Shepard report. To do this, we apply the results from our estimates for functional areas presented above in one of two ways. For the scale economy estimates we increase the size of the average service area from the current level to that which would occur under the Kernan-Shepard recommendation. For the X-inefficiency estimates we eliminate the number of townships from the total number of governmental districts in the sample. This permits us to simulate the effect of the Kernan-Shepard recommendations on the cost of government operations in the state, both on a per capita and total effect. See Table 20.

Our estimates of individual functional area savings suggest that through reductions in X-inefficiency alone (with consolidation) Indiana's local governments could realize roughly $360 million annually in savings. This estimate is remarkably similar to the estimates of aggregate savings offered earlier in this report (of roughly $422 million in X-inefficiency savings). Both estimates employ the same basic model. However, the data sources differ (2006 in the earlier estimate, 2002 and 2007 data in the functional area estimates) and the proxy for the price of government is different in each setting. In the aggregate X-inefficiency estimate we use the average county tax rate as the "price of government" variable, whereas in the functional area estimates we employ government expenditures per capita as a "price of government" proxy. Both estimates fall easily with the statistical confidence interval of one another, and while it is common to resolve differences in empirical estimates of this nature, the proximity of these results largely alleviates this need. We also estimated the presence of scale economies in these functional areas. Though we did find some evidence of scale economies, only our estimates of library-related scale economies enjoyed statistical significance to generally accepted levels. So with the exception of libraries we are unable to provide estimates of scale economy effects.

For library services we find the presence of economies of scale in services for districts with circulation below 100,000. Within these 125 districts, which are spread throughout Indiana, we estimate that consolidation, which increases the size of these districts to the average size of an Indiana county, would result in significant savings. We estimate that increasing the size of the small libraries to the size of a single county wide system would cut $37.1 million from the cost of library services.

Our overall estimates of savings due to scale economies and X-inefficiency in functional areas are modestly lower than in our estimates derived from the aggregate estimates. This could result from a number of factors. The aggregate estimates rely on Indiana specific data, with property tax rates serving as the proxy for the price of government. In the functional area estimates we use data from the Census of Government and use data on expenditures per capita as a proxy for the price of government. The time periods also differ (libraries are 2007 data), Indiana specific data are from 2006 or earlier while the most recent Census of Government data are from 2002. For these reasons (and due to differences in reporting of specific government operations in some areas) it is unsurprising that the estimates differ. In total however, we find similar results from both approaches. Indeed, the proximity of both results given the data and temporal differences suggests realizable savings that will easily range from $400 million to $622 million. Again, these savings estimates are estimated at the 'average' level of government efficiency for both the aggregate and the functional area estimates. We are not benchmarking against the most efficient governments in the State. Thus, we have not captured any potential gains that could be realized by incorporating changes that increase the 'average' efficiency

Table 21: Estimated Savings from Kernan-Shepard through Scale Economies and X-Inefficiency		
	Scale Economies	X-Inefficiency
Aggregate Estimate	$200,000,000	$422,000,000
Functional Area Estimates	$37,100,000	$360,000,000

of local governments in Indiana. Any changes coincident to the implementation of the Kernan-Shepard recommendations that improves efficiency levels that approach the most efficient local governments could result in significantly larger savings (perhaps an order of magnitude larger). See Table 21.

Our findings fit well within the context of the overall literature on government restructuring. In examining economies of scale and X-inefficiencies we estimate a range of costs that could well exceed 2 percent of total costs of local government. This is very consistent with findings of other studies of local government efficiencies. However, the theory behind the inefficiencies needs some clarification. (See Krause, 1996)

The notion of scale economies has not been controversial at any time. An application of this issue to local governments has a fairly long history, and the issues surrounding them are well understood by researchers and laypersons alike. We find evidence of scale economies in many, but not all, small institutions and communities across the state.[34] This is consistent with existing studies over the past 75 years.

The theory surrounding X-inefficiency is a more difficult matter. Here there are two opposing explanations. Public choice theorists argue that X-inefficiency in governments arises from lack of competitive pressure to perform well. Thus, more jurisdictions would reduce inefficiency through heightened competition. Research in public finance argues that that factors beyond the scope of competitive pressure leads to X-inefficiencies. Examples of this are coordination costs between local governments. The argument is further muddied by the fact that as there are more smaller (and overlapping) units of local government, residents are less able to engage in Tiebout sorting. This makes the question an empirical matter, which we statistically test.

We find fairly broad support for the public finance explanation of X-inefficiency. In aggregate, and in most functional areas, we find that the more government bodies within a region, the higher the per person costs of government. This problem is more common within larger areas and is consistent with the findings by other researchers.

So, we find that potential cost savings occur in both smaller and in larger regions, with higher costs due to inability to achieve economies of scale affecting smaller areas and X-inefficiencies affecting larger areas. This too, is not a new finding. Writing in 1963, Harvey Shapiro noted:

> "Numerous studies of individual local governmental services suggest that those units with small populations encounter diseconomies of scale. One result is that the citizens of these units do not receive a quality and quantity of municipal services that is equal to the services provided by the more populous local governments. The high per capita property taxes levied by these low-population local governments provide an additional reason for concern over the performance of these units. This situation exists for the small (population) local governments in sparsely populated counties, as well as for those in the heavily populated metropolitan counties." Shapiro, 1963 pp 180.

Our findings fall well within the range of cost estimates provided by other researchers and are consistent with economic theory.

Incentives to Encourage Consolidation

As part of any policy discussion, potential incentives for implementation of the policy should be considered. Such incentives have been implemented in U.S. states and in other countries. Sorensen (2006) analyzes the local government consolidation process in Norway. In 2001, the Norwegian parliament revised legislation on local government consolidation to include incentives to encourage consolidation of municipalities. In Norway, block and earmarked grants from the national government account for about 33 percent of municipal government revenue and municipalities with smaller populations receiving larger grants to compensate for diseconomies of scale. To encourage consolidation, the national government provides compensation for preliminary costs related to consolidation and provides merger grants to fully compensate the local government for the loss of block grants for 10 years after consolidation and partial compensation for an additional 5 years.

Gordon and Knight (2008) examine school district consolidation in Iowa. The state government provided incentives to school districts voluntarily choosing to consolidate between 1991 and 1993. The incentives included a reduction in the foundation grant tax rate over a five-year period and allowed school districts that consolidated to continue to weight students in such a way that yielded additional revenue for the district for five years after consolidation.

Vojnovic (2000) notes examples of incentives offered in Canada during the transition period after consolidation. Quebec's 1995 consolidation initiative involved the merger of 416 existing municipalities with populations of less than 10,000 into 179 new municipalities. The provincial government (similar to state) doubled grants from $50 per capita to $100 per capita and increased lump-sum consolidation grants to $20,000 (from $10,000). The province also provided grants to compensate consolidated municipalities for the loss

34 One area of exception here is in police protection services. We do not find that scale economies exist for small police units, and hence per capita costs increase as the size of the force increases (for very small police jurisdictions). Though looking at quality matters Wheaton (2006) found that small police departments aided in performance (measured as crime rates).

of government subsidies that they would have received if they had not consolidated. The grant extended for eight years after consolidation with partial compensation for an additional three years. After a four-year period, municipalities that chose not to merge received a reduction in payments from the province (used to fund police protection) and equal to the amount that would have occurred if the municipalities had merged. Another example—the province of Quebec provided transition grants over a five-year period when the cities of Victoriaville and Arthabaska and the parish of Sainte-Victoire consolidated. These grants were used to reduce debt servicing which ultimately lowered property tax rates.

To encourage consolidation, one approach (and the approach taken in the studies that we have reviewed above) is to provide financial incentives to consolidate or lessen the financial burden of consolidation on affected parties. The state could establish a consolidation transition fund. The fund could be in the form of a grant or the ability to increase a local tax to be used for economic development and transition purposes for a number of years. The time period during which consolidation should take place and a time period for transition funding should be set in advance.

An alternative approach would be to reduce or remove state support for certain local government functions after the transition period. For example, after the predetermined number of years, townships and their associated counties that do not consolidate would lose DLGF support during the budget process or the township property tax levy would be incrementally reduced over a period.

Considerations for Local Governments

Finally, based on our reading of the literature, conversations and correspondence with individuals who have worked on this issue, we close with a few considerations for local governments contemplating consolidation.

Consolidation agreements should include the expected level and direction of changes in staff salaries, service standards, and taxes. Detailing the changes regarding personnel in advance will mitigate morale issues during the transition. Advanced knowledge about the service levels and taxes after consolidation will lead to greater resident satisfaction with local government.

When tax rates and service levels differ dramatically in government units to be consolidated, tiered rate structures and service levels may be appropriate so that residents are paying an appropriate tax rate for the services that they receive.

Movement toward a tax service quality balance will "self correct" some budget concerns. As the level of taxes and quality of services come into balance, in-migration and investment should occur that will increase property values and lead to increases in property, sales and income tax revenues.

Any effort to restructure local government inevitably faces the issue of geographical variations in the cost, quality and coordination of governance. Calls to restructure government are often motivated by sharp regional variation in the cost and quality of government, as well as efforts to address the consequences of these imbalances. Teibout sorting of residents may have exacerbated the political divide across these jurisdictions. Restructuring efforts which focus on a single dimension such as tax rates or service quality may be less effective than those which stress regional balance of services and costs.

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SPECIAL SECTION

Township Governance

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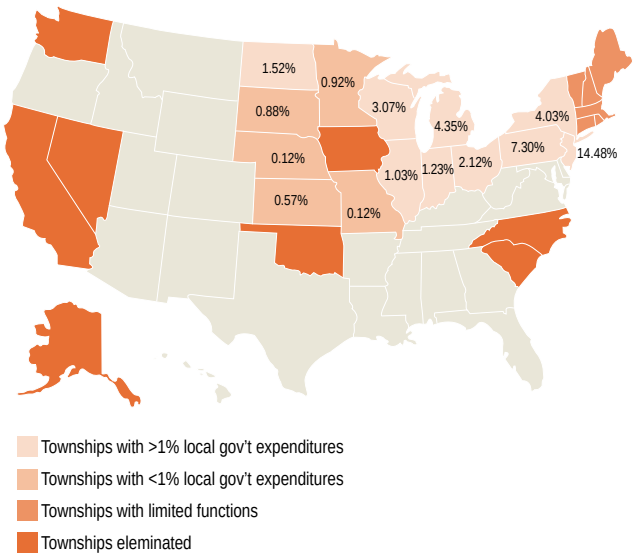
According to the U.S Census of Governments (2002), twenty states continue to use some form of township government. See Figure 1. Of these twenty, Kansas, Minnesota, Missouri, Nebraska, and South Dakota have township government expenditures of less than one percent of total local government expenditure. Illinois, Indiana, Michigan, Ohio, Pennsylvania, New Jersey, North Dakota, and Wisconsin have township expenditures greater than one percent of total local government expenditure. New York has identified incorporated townships, but these township governments lack many of the powers afforded to most townships across the United States. The New England states comprised of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont, combine municipal and area governments to form a local government with functions similar to township governments.

Table1 represents the expenditures of township governments as a percent of total local government expenditure at the state level in select Midwestern states. In comparison to Illinois, Michigan, Ohio, Pennsylvania, and Wisconsin,

Figure 1: States with Township Governments



Source: 2002 *Census of Governments*, Volume 1, Number 1, Government Organization, GC02(1)-1

Township Budget Process

Illinois

1. Preparation of tentative budget → 2. Post proposed final budget at least 6 days prior to public hearing → 3. Public hearing on proposed final budget → 4. Township Board approval of budget → 5. Budget sent to and approved by County Tax Allocation Board

Michigan

1. Preparation of tentative budget → 2. File ordinance with township clerk (30 days before public hearing) → 3. Township clerk makes the tentative budget available for public inspection for at least 30 days → 4. Public hearing (held on or before last day of the first quarter of the fiscal year) → 5. Township board must approve all or parts of the tentative budget at public hearing.

Indiana

1. Preparation of budget by township trustee → 2. Budget published twice in each of two newspapers published within the township (at least 10 days prior to public hearing) → 3. Public hearing (taxpayers may object to budget by filing petition no more than 7 days after hearing) → 4. Township Board approval of budget → 5. County Auditor certifies the proposed budget → 6. Budget goes to Indiana Department of Local Government Finance for final review and approval

Note: We had planned to include information on Ohio's township budget process but were unable to identify a source to document the process. We know from communicating with government officials that property taxes on all overlapping jurisdictions including townships are limited to one percent of assessed value. Property taxes above this one percent cap have to be approved by voters. In townships, the additional levy can be used to fund current expenses (includes cemeteries), roads, recreation, fire and EMS, police, open space preservation.

Sources: Illinois Compiled Statutes (60 ILCS 1/80 60). Bauckham, John H. *Authorities and Responsibilities of Michigan Township Officials, Boards and Commissions - The Little Red Book*, 4th ed.,1995, Michigan Townships Association. From Chapter 5. "Budget and Fiscal Responsibilities." *Accounting and Uniform Compliance Guidelines Manual for Townships*, State Board of Accounts of Indiana, 2007.

Table 1: Expenditures of Township Governments as a Percent of Total Local Government Expenditure in State														
State	IL	IN	MI	OH	PA	WI	KS	MN	MO	ND	NJ	SD	NE	NY
Education		0.010		0.000						42.385	1.280			0.000
Libraries	0.004	0.001	0.077	0.001	0.069	0.020	0.006				0.278	0.001		0.056
Public Welfare	0.057	0.220	0.002	0.002		0.001					0.034			0.031
Hospitals	0.031		0.000	0.000	0.000	0.000					0.000	0.000		0.031
Health	0.036	0.010	0.033	0.040	0.032	0.090	0.000			0.001	0.154	0.000		0.041
Highways	0.389	0.000	0.199	0.642	1.496	1.384	0.398	0.513	0.093	0.922	0.937	0.756	0.121	0.795
Air transportation	0.000		0.003		0.000	0.003					0.000			0.012
Parking facilities	0.000		0.000	0.000	0.001	0.001				0.001	0.011			0.004
Water transport and terminals					0.002	0.001					0.000			0.001
Transit subsidies				0.000							0.000			0.000
Police Protection	0.006	0.000	0.419	0.255	1.023	0.141				0.014	2.420			0.263
Fire Protection	0.002	0.624	0.522	0.543	0.253	0.298	0.030	0.094		0.015	0.507	0.043		0.108
Correction			0.001	0.000	0.000	0.000					0.001	0.000		0.001
Protective inspection and regulation	0.000		0.162	0.000	0.058	0.032					0.167			0.040
Natural resources	0.006		0.001	0.000		0.030								0.025
Parks & Recreation	0.017	0.035	0.165	0.039	0.382	0.057	0.000			0.010	0.512	0.000		0.315
Housing and Community Development	0.002	0.000	0.026	0.000	0.214	0.002				0.002	0.204			0.083
Sewerage	0.007		0.370	0.000	0.574	0.125				0.013	1.022	0.001		0.164
Solid Waste Mgt	0.000	0.000	0.107	0.010	0.254	0.159				0.024	0.675			0.419
Financial Admin	0.141	0.162	0.206	0.246	0.095	0.113	0.070	0.000		0.094	0.386	0.034		0.113
Judicial and Legal	0.000	0.000	0.033	0.003	0.062	0.032				0.001	0.248			0.071
General Public Bldgs	0.011	0.000	0.111	0.016	0.232	0.087				0.005	0.291			0.091
Other Gov't Admin	0.161	0.002	0.278	0.073	0.433	0.185		0.174	0.015	0.001	0.344			0.105
TOTAL Township Government Expenditure ($ thousands)	527,739	254,478	1,704,509	939,073	2,966,319	678,329	51,471	203,708	21,071	26,795	4,607,529	17,746	9,556	4,992,276
TOTAL Local Government Expenditure ($ thousands)	51,383,691	20,687,497	39,488,545	42,720,325	40,613,964	22,076,842	9,098,054	22,200,217	17,266,374	1,765,565	31,825,746	2,011,049	7,769,254	123,857,251

* 0.000 indicates a value of less than one thousandth of a percent.

**It should be noted that Illinois township expenditures are only accrued in certain areas of the state.

Census of Governments, Volume 4, Number 5, Compendium of Government Finances: 2002

Indiana's township government expenditures are significantly less with regard to libraries, highways, police protection, solid waste management, general public building expenses, judicial and legal expenditures, and general government administration, all of which account for less than one hundredth of a percent of total local government expenditure at the township level. Hospital, parking facilities, protective inspection and regulation, natural resource, and sewerage expenses do not contribute to Indiana's township government expenditures. Education, health, parks and recreation, and housing and community development expenditures in Indiana's townships are similar to those in the comparison states, comprising less than one hundredth of one percent each of total local government expenditure. Also notable is Indiana's township expenditures on public welfare, fire protection, and financial administration, which account for approximately 0.2 percent, 0.6 percent, and 0.2 percent of total local government expenditures respectively. These expenditures, in addition to those previously mentioned, are all similar to the expenditures in the comparison states with the exception of public welfare, which makes up less than one hundredth of one percent of total local government expenditures in Illinois, Michigan, Ohio, Pennsylvania, and Wisconsin.

The individual expenditures in the remaining states (KS, MN, MO, ND, NJ, SD, NE) are also comparable to those in the states previously mentioned, with the exception of North Dakota. It should be noted that North Dakota's education expenses concerning township government comprise approximately 42 percent of total local government expenditures.

When comparing total township government expenditures in Table 2, the states not directly neighboring Indiana have significantly lower expenditures than the states that border Indiana, with the exception of New Jersey and Pennsylvania. Indiana also has a total expenditure ($254,478,000), less than half that of the lowest total township government expenditure in its surrounding states (IL: $527,739,000).

Appendix

Table A: U.S. Consolidation attempts via referendum since 1970

(Green shading indicates that the referendum passed)

City	County	State	Year of Vote	Percent Vote in Favor
Fairbanks	Fairbanks North Star	AK	2001	22
Anchorage et. al.	Greater Anchorage	AK	1970	NA
Anchorage et. al.	Greater Anchorage	AK	1971	NA
Anchorage et. al.	Greater Anchorage	AK	1975	62
Sitka	Greater Sitka Borough	AK	1971	77
Haines	Haines Borough	AK	1998	49
Haines	Haines Borough	AK	2002	51
Ketchikan	Ketchikan Borough	AK	2001	42
Yakutat	Yakutat	AK	1992	90
Sacramento	Sacramento	CA	1974	25
Sacramento	Sacramento	CA	1990	44
Gainesville	Alachua	FL	1975	25
Gainesville	Alachua	FL	1976	32
Gainesville	Alachua	FL	1990	34
Pensacola	Escambia	FL	1970	25
Tampa	Hillsborough	FL	1970	42
Tampa	Hillsborough	FL	1972	42
Tallahassee	Leon	FL	1971	47
Tallahassee	Leon	FL	1973	46
Tallahassee	Leon	FL	1976	45
Tallahassee	Leon	FL	1992	40
Okeechobee	Okeechobee	FL	1979	32
Okeechobee	Okeechobee	FL	1989	21
Fort Pierce	St. Lucie	FL	1972	37
Volusia Area	Volusia	FL	1985	45
Macon	Bibb	GA	1972	40
Macon	Bibb	GA	1976	32
Metter	Candler	GA	1994	30
Savannah	Chatham	GA	1973	58
Cusseta	Chattahoochee	GA	2003	69
Athens	Clarke	GA	1972	48
Athens	Clarke	GA	1982	50
Athens	Clarke	GA	1990	59
Douglasville	Douglas	GA	1994	25
Brunswick	Glynn	GA	1987	51
Gainesville	Hall	GA	2001	47
Lakeland	Lanier	GA	1986	35
Columbus	Muscogee	GA	1970	81
Hawkinsville	Pulaski	GA	1999	48
Augusta	Richmond	GA	1971	42
Augusta	Richmond	GA	1974	52
Augusta	Richmond	GA	1976	46
Augusta	Richmond	GA	1988	57
Augusta	Richmond	GA	1995	67
Conyers	Rockdale	GA	1989	55
Griffin	Spalding	GA	1991	31
Griffin	Spalding	GA	1997	39
Tifton	Tift	GA	1984	35
Waycross	Ware	GA	1999	45
Des Moines	Polk	IA	1994	35
Des Moines	Polk	IA	2004	35
Evansville	Vanderburgh	IN	1974	26
Kansas City	Wyandotte	KS	1997	60
Ashland and Catlettsburg	Boyd	KY	1975	17
Ashland and Catlettsburg	Boyd	KY	1992	34
Owensboro	Daviess	KY	1990	28
Lexington	Fayette	KY	1972	69
Frankfort	Franklin	KY	1989	36
Frankfort	Franklin	KY	2004	25
Louisville	Jefferson	KY	1982	50
Louisville	Jefferson	KY	1983	48
Louisville	Jefferson	KY	2000	54
Georgetown	Scott	KY	1988	42
Campbellsville	Taylor	KY	2002	NA
Bowling Green	Warren	KY	1990	24
Lafayette	Lafayette	LA	1992	60
Houma	Terrebonne Parish	LA	1981	54
Anaconda	Deer Lodge	MT	1976	56
Missoula	Missoula	MT	1975	46
Missoula	Missoula	MT	1983	25
Butte	Silver Bow	MT	1976	62
Asheville	Buncombe	NC	1982	38
Durham	Durham	NC	1974	32
Charlotte	Mecklenburg	NC	1971	31
Wilmington	New Hanover	NC	1973	26
Willmington	New Hanover	NC	1987	41
Willmington	New Hanover	NC	1995	42
Albuquerque	Bernalillo	NM	1973	44
Albuquerque	Bernalillo	NM	2003	39
Albuquerque	Bernalillo	NM	2004	42
Portland	Multnomah	OR	1974	28
Charleston	Charleston	SC	1974	40
Columbia	Richland	SC	1973	46
Tullahoma	Coffee	TN	2001	29
Winchester	Franklin	TN	1999	39
Morristown	Hamblen	TN	1978	31
Chattanooga	Hamilton	TN	1970	48
Chattanooga	Hamilton	TN	1984	34
Knoxville	Knox	TN	1978	NA
Knoxville	Knox	TN	1983	NA
Knoxville	Knox	TN	1996	46
Jackson	Madison	TN	1987	49
Clarkesville	Montgomery	TN	1981	16
Clarkesville	Montgomery	TN	1996	NA
Lunchburg	Moore	TN	1987	52
Memphis	Shelby	TN	1971	48
Kingsport	Sullivan	TN	1981	12
Kingsport	Sullivan	TN	1988	32
Hartsville	Trousdale	TN	2000	52
McMinnville	Warren	TN	2000	28
Bristol	Washington	TN	1971	18
Moab	Grand	UT	1976	21
Salt Lake	Salt Lake	UT	1975	39
Staunton	Augusta	VA	1984	59
Bedford	Bedford	VA	1995	24
Emporia	Greensville	VA	1987	57
Suffolk	Nansemond	VA	1972	76
Roanoke	Roanoke	VA	1990	45
Spokane	Spokane	WA	1995	41

Note: The consolidation of Indianapolis-Marion County into UNIGOV was the result of legislative action in 1969 and did not occur through a referenda process. As a result, Indianapolis is not included in this dataset. Broomfield-Broomfield County, Colorado was consolidated via legislative decision in 1998 and is not included. Yakutat, AK is included in the table but not included in the regression analysis due to data availability limitations.

Source: Leland and Thurmaier (2006) Table 1/3

Table B-1: Descriptive Statistics, Public Safety Services (Economis of Scale)						
Indiana	Mean	Median	Std Dev	Min	Max	Obs.
Fire Protection Personnel per thousand Population	2.22	2.27	0.51	1.22	3.38	24
Police Protection Personnel per thousand Population	2.61	2.48	0.86	1.49	5.99	25
Expenditures on Police Protection per thousand Population	131.22	130.00	56.86	19.00	271.00	27
Population	76,992	38,987	135,627	25,363	791,926	32
Population Density (population per square mile)	2,408	2,335	922	926	5,756	32
Fire Protection Personnel	128	103	85	35	347	24
Police Protection Personnel	147	121	102	56	475	25
Expenditures on Police Protection	9,550	6,295	10,642	590	53,653	27
Illinois	Mean	Median	Std Dev	Min	Max	Obs.
Fire Protection Personnel per thousand Population	1.56	1.54	0.45	0.14	3.14	47
Police Protection Personnel per thousand Population	2.44	2.29	0.62	1.41	5.52	53
Expenditures on Police Protection per thousand Population	126.20	128.00	39.81	31.00	245.00	70
Population	85,629	39,071	321,426	25,405	2,896,016	79
Population Density (population per square mile)	4,902	3,867	3,919	1,956	25,405	79
Fire Protection Personnel	185	66	730	7	5,068	47
Police Protection Personnel	414	99	2,180	36	15,977	53
Expenditures on Police Protection	11,096	5,199	36,976	960	313,387	70
Kentucky	Mean	Median	Std Dev	Min	Max	Obs.
Fire Protection Personnel per thousand Population	2.25	2.10	0.41	1.79	2.85	6
Police Protection Personnel per thousand Population	2.85	2.62	0.57	2.29	3.82	7
Expenditures on Police Protection per thousand Population	139.00	125.50	42.99	88.00	219.00	10
Population	75,343	30,089	91,036	26,307	260,512	11
Population Density (population per square mile)	4,902	3,867	3,919	1,956	25,405	79
Fire Protection Personnel	256	99	273	59	683	6
Police Protection Personnel	307	121	369	61	978	7
Expenditures on Police Protection	11,956	5,118	15,577	2,391	47,460	10
Michigan	Mean	Median	Std Dev	Min	Max	Obs.
Fire Protection Personnel per thousand Population	1.10	1.08	0.47	0.10	2.30	31
Police Protection Personnel per thousand Population	2.42	2.34	0.88	0.07	5.06	32
Expenditures on Police Protection per thousand Population	100.76	95.00	33.62	26.00	174.00	41
Population	82,971	53,364	138,900	25,946	951,270	45
Population Density (population per square mile)	3,860	3,707	1,601	1,263	8,002	45
Fire Protection Personnel	120	47	319	8	1,787	31
Police Protection Personnel	285	98	846	5	4,810	32
Expenditures on Police Protection	9,295	4,788	17,676	796	113,842	41
Ohio	Mean	Median	Std Dev	Min	Max	Obs.
Fire Protection Personnel per thousand Population	1.79	1.77	0.35	0.96	2.41	33
Police Protection Personnel per thousand Population	2.51	2.44	0.76	1.31	5.31	37
Expenditures on Police Protection per thousand Population	136.69	137.00	44.24	22.00	250.00	49
Population	76,523	38,098	119,639	25,139	711,470	56
Population Density (population per square mile)	3,199	2,909	1,795	914	11,329	56
Fire Protection Personnel	182	71	316	32	1,546	33
Police Protection Personnel	263	87	532	42	2,538	38
Expenditures on Police Protection	13,188	5,780	24,620	551	144,754	49
Total Sample	Mean	Median	Std Dev	Min	Max	Obs.
Fire Protection Personnel per thousand Population	1.66	1.66	0.58	0.10	3.38	141
Police Protection Personnel per thousand Population	2.50	2.41	0.75	0.07	5.99	154
Expenditures on Police Protection per thousand Population	124.85	126.00	44.23	19.00	271.00	197
Population	81,059	40,105	215,738	25,139	2,896,016	223
Population Density (population per square mile)	3,756	3,011	2,800	642	25,405	223
Fire Protection Personnel	163	71	473	7	5,068	141
Police Protection Personnel	303	98	1,352	5	15,977	155
Expenditures on Police Protection	11,073	5,353	26,839	551	313,387	197
Source: Authors Calculations from Census of Governments data						

Table B-2: Descriptive Statistics, X-Inefficiency, Government Services						
Indiana	Mean	Std. Dev.	Min	Median	Max	Obs.
Number Of Cities And County	7.2	3.4	2	7	20	92
Number Of Cities, Townships, And County	18.1	5.5	6	18	33	92
Gini Coefficient	34.9	2.4	29.5	34.6	39.9	92
Percent Of Population Age 25+ With High School Diploma	80.6	4.8	60.2	80.8	94.2	92
Percent Of Population Age 25+ With Bachelor's Degree Or Higher	14.6	6.6	7.6	12.9	48.9	92
Per Capita Income	166.5	262.8	23.1	84.9	2172.9	92
Population Density	18,976	2,482	15,926	18,557	33,109	92
Police Expenditures Per Capita	78.6	36.9	15.6	74.3	186.7	92
Fire Expenditures Per Capita	46.6	34.1	1.6	38.2	152.0	92
Sewerage Expenditures Per Capita	106.7	83.2	8.5	86.9	651.7	92
Solid Waste Management Expenditures Per Capita	31.0	31.5	1.0	21.3	217.3	90
Public Welfare Expenditures Per Capita	63.1	37.6	5.6	52.9	259.2	92
Administration Expenditures Per Capita	178.8	44.5	96.7	170.2	308.6	92
Health Expenditures Per Capita	24.7	26.6	1.7	18.3	233.3	92
Population (2002)	66,938	110,016	5,764	33,810	862,451	92
Illinois	Mean	Std. Dev.	Min	Median	Max	Obs.
Number Of Cities And County	13.7	13.0	3	11	122	102
Number Of Cities, Townships, And County	27.7	18.8	3	26	151	102
Gini Coefficient	35.6	2.9	29.7	35.2	47.1	102
Percent Of Population Age 25+ With High School Diploma	80.9	5.3	63.3	81.4	91.0	102
Percent Of Population Age 25+ With Bachelor's Degree Or Higher	15.7	7.0	6.9	13.4	41.7	102
Per Capita Income	186.8	630.8	11.9	48.8	5683.7	102
Population Density	18,696	3,048	13,325	17,950	32,102	102
Police Expenditures Per Capita	118.9	41.7	36.6	110.2	322.6	102
Fire Expenditures Per Capita	64.6	34.9	1.1	59.4	204.8	102
Sewerage Expenditures Per Capita	58.5	43.4	6.2	47.8	224.9	101
Solid Waste Management Expenditures Per Capita	20.6	20.8	0.1	15.4	100.0	90
Public Welfare Expenditures Per Capita	41.3	63.6	0.5	9.2	341.5	100
Administration Expenditures Per Capita	195.6	51.6	90.9	189.2	471.9	102
Health ExpenDitures Per Capita	46.5	32.5	0.0	40.8	176.8	101
Population (2002)	123,384	538,825	4,339	27,657	5,364,160	102
Kentucky	Mean	Std. Dev.	Min	Median	Max	Obs.
Number Of Cities And County	4.5	7.9	1.0	3.0	86.0	120
Number Of Cities, Townships, And County	82.9	672.1	1.0	9.0	7,396.0	120
Gini Coefficient	40.6	3.8	30.0	40.7	49.1	120
PeRcent Of Population Age 25+ With High School Diploma	67.7	9.4	49.2	68.3	86.5	120
Percent Of Population Age 25+ With Bachelor's Degree Or Higher	11.6	5.5	4.9	9.7	35.6	120
Per Capita Income	15,622	3,173	9,716	15,690	25,374	120
Population Density	108	203	22	59	1,802	120
Police Expenditures Per Capita	55.1	35.4	3.1	50.3	174.3	120
Fire Expenditures Per Capita	36.7	38.5	0.4	21.3	229.0	119
Sewerage Expenditures Per Capita	49.9	51.7	1.0	36.2	299.8	114
Solid Waste Management Expenditures Per Capita	29.3	30.5	0.5	20.5	169.3	113
Public Welfare Expenditures Per Capita	6.3	12.9	0.1	1.2	76.0	89
Administration Expenditures Per Capita	83.9	49.9	29.4	75.1	438.7	120
Health Expenditures Per Capita	80.5	121.5	0.3	53.2	1,091	119
Population (2002)	34,083	68,527	2,306	17,938	696,068	120
Sources: U.S. Census Bureau 2002 Census Of Governments, State And County Quickfacts						

Table B-2: Descriptive Statistics, X-Inefficiency, Government Services (Continued)						
Michigan	Mean	Std. Dev.	Min	Median	Max	Obs.
Number Of Cities And County	7.4	6.1	1.0	6.0	40.0	83
Number Of Cities, Townships, And County	91.7	218.8	1.0	36.0	1,600.0	83
Gini Coefficient	36.4	2.0	32.7	36.2	41.4	83
Percent Of Population Age 25+ With High School Diploma	82.7	4.2	72.2	82.9	91.5	83
Percent Of Population Age 25+ With Bachelor's Degree Or Higher	16.4	7.2	7.8	14.3	48.1	83
Per Capita Income	18,858	3,047	14,457	17,967	32,534	83
Population Density	189	433	4	57	3,357	83
Police Expenditures Per Capita	99.3	40.0	49.2	88.7	286.9	83
Fire Expenditures Per Capita	43.5	23.0	13.0	39.6	136.1	83
Sewerage Expenditures Per Capita	74.5	53.4	9.4	59.4	291.6	82
Solid Waste Management ExPenditures Per Capita	28.1	32.1	0.3	16.2	198.2	83
Public Welfare Expenditures Per Capita	98.1	111.8	0.0	53.8	508.6	82
Administration Expenditures Per Capita	173.5	55.3	100.5	163.1	443.6	83
Health Expenditures Per Capita	261	281	4	183	1,293	83
Population (2002)	120,994	274,737	2,255	38,794	2,040,153	83
Ohio	Mean	Std. Dev.	Min	Median	Max	Obs.
Number Of Cities And County	11.7	7.3	4.0	10.0	58.0	88
Number Of Cities, Townships, And County	190.2	386.9	16.0	100.0	3,364.0	88
Gini Coefficient	36.1	2.8	31.0	36.2	42.8	88
Percent Of Population Age 25+ With High School Diploma	81.2	5.3	51.5	82.1	92.9	88
PerceNt Of Population Age 25+ With Bachelor's Degree Or Higher	14.9	6.8	6.0	12.6	41.0	88
Per Capita Income	18,742	3,150	13,731	18,386	31,600	88
Population Density	287	477	31	117	3,044	88
Police Expenditures Per Capita	135.3	50.7	46.3	133.2	282.0	88
Fire Expenditures Per Capita	64.3	38.0	2.9	61.7	194.7	88
Sewerage Expenditures Per Capita	88.2	53.6	9.6	78.2	390.3	88
Solid Waste Management Expenditures Per Capita	29.3	26.0	0.4	21.8	145.0	85
Public Welfare Expenditures Per Capita	217.2	92.1	56.1	190.5	552.0	88
Administration Expenditures Per Capita	208.4	55.6	99.6	202.8	355.4	88
Health ExpenditureS Per Capita	127	76	10	111	417	88
Population (2002)	129,664	213,990	13,114	57,146	1,372,770	88
Total Sample	Mean	Std. Dev.	Min	Median	Max	Obs.
Number Of Cities And County	8.7	9.0	1.0	7.0	122.0	485
Number Of Cities, Townships, And County	157.7	785.1	1.0	49.0	14,884.0	485
Gini Coefficient	36.9	3.6	29.5	36.3	49.1	485
Percent Of Population Age 25+ With High School Diploma	77.9	8.7	49.2	80.3	94.2	485
Percent Of Population Age 25+ With Bachelor's Degree Or Higher	14.4	6.8	4.9	12.5	48.9	485
Per Capita Income	18,025	3,303	9,716	17,727	33,109	485
Population Density	182	429	4	73	5,684	485
Police Expenditures Per Capita	95.1	50.4	3.1	87.7	322.6	485
Fire Expenditures Per Capita	50.6	36.5	0.4	43.7	229.0	484
Sewerage Expenditures Per Capita	74.0	61.8	1.0	58.6	651.7	477
Solid Waste Management Expenditures Per Capita	27.7	28.8	0.1	19.2	217.3	461
Public Welfare Expenditures Per Capita	83.5	101.6	0.0	44.1	552.0	451
Administration Expenditures Per Capita	163.3	69.6	29.4	162.6	471.9	485
Health Expenditures Per Capita	102	158	0	51	1,293	483
Population (2002)	91,312	295,466	2,255	32,859	5,364,160	485
Sources: U.S. Census Bureau 2002 Census Of Governments, State And County Quickfacts						

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