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**Municipal Economies of Scale &
Scope and Post-Consolidation
Economic Performance:
A Literature Review**

By:
Grant Forsyth, Ph.D.

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Scale & Scope and
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With this latest monograph from the Institute for Public Policy & Economic Analysis, I welcome you to Eastern Washington University. I hope this research will inform your knowledge of the Inland Northwest. Efforts like this Institute monograph series are manifestations of this University's commitment to serve the region. I applaud the initiative of Eastern's Board of Trustees to launch this Institute.

Teaching remains our core mission at Eastern Washington University. Increasingly, teaching and research are interwoven. Our faculty members stay professionally current when publishing in peer-reviewed journals. These achievements, in turn, allow them to better convey the evolving knowledge base of our academic disciplines.

Our students receive an enhanced education if their classroom experience is informed by the content and enthusiasm of their professor's research. Increasingly, we ask students to conduct research projects of their own. Whether conducting their own projects or assisting professors, our students acquire a richer learning experience through research.

Research for academic journals is not the only area our faculty members target, however. Our University also asks its faculty to engage the communities and region from which we draw our students. This research provides a greater sense of place and a commitment by our faculty to it. It also translates academic methods and findings into a broader, and ultimately more relevant, arena: the lives of the residents of the Inland Northwest.

The overarching goal of the Institute for Public Policy & Economic Analysis is to serve the region by translating knowledge. It does this through a variety of activities, including this series, annual economic forecasts, contract research and its community indicators initiatives. I invite you to explore its web site (www.ewu.edu/policyinstitute) to learn more.

I have tremendous optimism that by collaborating with EWU's faculty, staff and partners, I will continue to ensure our institution will be anchored into the daily course of life throughout the Inland Northwest. During these difficult economic times, our collective future depends on an educated and informed citizenry. Helping our region reach higher levels of knowledge is something this University can and will do.

My office and that of the Institute director welcome all comments on how we might better serve.

Rodolfo Arévalo, PhD
President

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Executive Summary

This study reviews the academic literature focused on the relationship between (1) the size and scope of municipal service providers and production costs, and (2) the post-consolidation development of counties that underwent consolidation. Of particular importance are answers to the following questions: "Does increasing the size or scope of public service producers lead to lower costs per citizen served?" and "Is a county's post-consolidation economic development significantly better than pre-consolidation development?"

The major findings follow:

- The majority of studies focused on scale economies suggest that there are limited or no cost efficiencies associated with larger municipal police, fire, and waste management departments. When cost efficiencies exist, they are exhausted at relatively low population levels, where population is frequently used as the proxy for scale size. Although contracting for services appears to result in lower costs, there is a potential trade-off in terms of service quality. If scale economies do exist, they can be obscured by bureaucracies capturing and spending cost savings before they can be passed on to tax payers.

- Measures of community wealth and density were often important variables in explaining the observed cost stru-cture of a public service. High wealth communities tend to have higher service costs than poor communities, indicating that as income increases, the demand for higher-quality services also increases which, in turn, drives up average unit costs (AUC). High density communities tend to have lower waste management costs, but higher policing and fire service costs, indicating that increasing density will not automatically lower the AUC of all services.

- Although few in number, studies of scope economies indicate that cost reductions are possible through the merger of like-services. In particular, scope economies have been found in both protective (police & fire) and waste management services. Scope economies, and not scale economies, may offer the most likely source of cost savings.

- Time-series studies of post-consolidation effects find that service consolidations have potentially significant effects on the distribution of tax burdens within a county, while having no significant impacts on county economic development and limited impacts on social development.

The preponderance of evidence from the reviewed studies suggests: (1) there would be limited or no efficiency gains associated with consolidating key county services, and (2) consolidation would not substantially alter the county's economic development.

With respect to the first point, the available studies imply that for the larger cities in

Spokane County, the increased scale size resulting from service consolidation would not likely produce significant cost reductions because these cities are already operating independently at scale sizes that have exploited any of the limited cost advantages found in the literature. In addition, as discussed in the paper, population growth, increased density, and income growth—which are viewed as desirable outcomes in most communities—can create an operating environment that makes it more difficult to maintain or lower service costs, especially for protective services.

The conclusions above warrant an important caveat: scale and scope studies looking at non-protective and non-waste management services are few in number. That is, there are many services that municipalities provide that have never been analyzed for scale or scope economies—for example, these include programs related to social assistance, snow plowing, parks and recreation, youth programs, and environmental programs. Therefore, additional research into these areas may reveal possible cost savings.

1. Introduction

This study reviews the academic literature focused on the relationship between the (1) size and scope of municipal service providers and production costs, and (2) the post-consolidation development of counties that underwent consolidation. Of particular importance are answers to the following questions: "Does increasing the size or scope of public service producers lead to lower costs per citizen served?" and, "Is a county's post-consolidation economic development significantly better than pre-consolidation development?"

Empirical studies looking to answer these questions started in the late 1950s, largely in response to a growing urban reform movement that proposed that county citizens would be better served by larger public service providers created through some form of city-county consolidation. However, as this movement gathered momentum, many economists pointed out that there was little empirical evidence that costs, quality or long-run economic performance would be enhanced through consolidations.

As better municipal data became available in the 1960s, there was a surge of econometric studies looking at municipal *economies of scale, economies of scope, and post-consolidation economic performance.* The economies of scale studies examined the relationship between municipal population size and the per capita costs of providing public services. The economies of scope studies examined the cost savings that might result if separate public services with similar input requirements were merged because of similar input requirements. The studies of post-consolidation performance examined counties that underwent some form of consolidation to determine if there were significant changes in the intra-county distribution of taxes, revenue and expenditure growth, business development, or other socioeconomic indicators.

Before describing the findings of these studies, Section 2 provides a primer on economies of scale and scope. It is highly recommended that this section be read before continuing to Sections 3 through 5. Section 3 presents the findings of economies of scale studies; Section 4 presents the findings of economies of scope studies; and Section 5 presents the findings of studies looking at post-consolidation economic impacts. Finally, Section 6 provides a summary of the overall findings of the literature review.

2. A Primer on Economies of Scale and Scope

Before discussing the results of academic studies of economies of scale and scope in the public sector, it is important to understand the exact meaning of these concepts as applied by economists. As will be discussed below, *economies of scale* refers to the behavior of average cost per unit produced as the scale size of production increases. *Economies of scope* refers to the cost benefits associated with producers combining the production of more than one good or service under one roof because of similarities in the production process.

2.1 Economies of Scale

Economies of scale are best discussed using the long-run average cost curve (LRACC). The LRACC reflects the behavior of average unit cost (AUC) as output per year (Q) increases *due to an increase in the scale size of the producer*. AUC is defined as total operating costs in a given year (TC) divided by Q—that is, $AUC = TC/Q$. The "long-run" is defined as a time period sufficiently long that producers can vary all production inputs.

Consider Figure 1. In Figure 1a, as one moves from left to right on the horizontal Q-axis, the assumption is that as Q increases, so does the *scale size* of the producer. Scale size refers to the amount of inputs—land, labor, and capital—used in the production process. Therefore, increasing scale size means increasing the quantity of land, labor, and capital (e.g., tools, buildings, machinery, vehicles) used in the production process. For most public and private producers, reductions

in the AUC are most often connected to increased capital usage. Figure 1b shows three different producers: A, B, and C. Producer A has the smallest scale size, B the next largest, and C the largest. Here, as scale size increases, AUC falls for higher levels of Q, after which the curve becomes flats so that AUC no longer falls with a higher Q.

Producers can increase scale size by internal growth or mergers with other like-producers. In fact, one of the stated goals of many private sector mergers is to create a larger firm with a lower AUC at higher levels of output. Thus, if the merger of A and B created a firm with the scale size equivalent to C, then, moving along the LRACC, the new firm would have an AUC equivalent to C. Of course, obtaining the full gains of the merger requires the elimination of duplicate managerial and administrative functions between the merging firms.

It is important to remember that Figures 1a and 1b reflect the LRACC under the assumption that factors such as input prices, output quality, and technology are constant as scale size increases. Changes in these factors will cause the LRACC to shift. Consider Figure 1c. If $LRACC_0$ is the original cost curve, then an increase in input prices or output quality for all producers would cause $LRACC_0$ to shift up to $LRACC_1$. Conversely, a decrease in input prices or quality for all producers would cause $LRACC_0$ to shift down to $LRACC_2$. An improvement in technology that was adopted by all firms will cause $LRACC_0$ to shift down to $LRACC_2$. This means AUC depends on more than just scale size, so estimating a real-world LRACC requires controlling for cost-related factors other than scale size.

The LRACC shape in Figure 1 is a common finding in studies of the long-run cost structures of private producers: At first, increasing scale size decreases AUC, but after a certain size, AUC remain constant with additional increases in size—for example, aluminum, automobiles, electric power, and hospitals (Nicholoson & Snyder, 2007). In the terminology of economists, the curve segment with a declining AUC would be described as exhibiting *increasing returns to scale*. The flat segment of the curve with a constant AUC would be described as exhibiting *constant returns to scale*.

If AUC increases as scale size increase, then the curve is exhibiting *decreasing returns to scale*. Increasing returns reflects Q increasing at a faster rate than TC as scale size increases; constant returns reflects Q increasing at the same rate as TC as scale size increases; and decreasing returns reflects Q increasing at a slower rate than TC as scale size increases.

Figure 1: The Long-Run Average Cost Curve

AUC

Figure 1a: The Long-Run Average Cost Curve

LRACC

Q/year

As Q increases, so does a producer's scale size.

AUC

Figure 1b: Producer Scale Size and the Long-Run Average Cost Curve

AUC_A .... A

AUC_B .... B

AUC_C C

LRACC

Q/year

Q_A Q_B Q_C

AUC

Figure 1c: Changes in Input Costs, Quality, and Technology and the Long-Run Average Cost Curve

A

A   B

A   B   C $LRACC_1$

   B   C $LRACC_0$
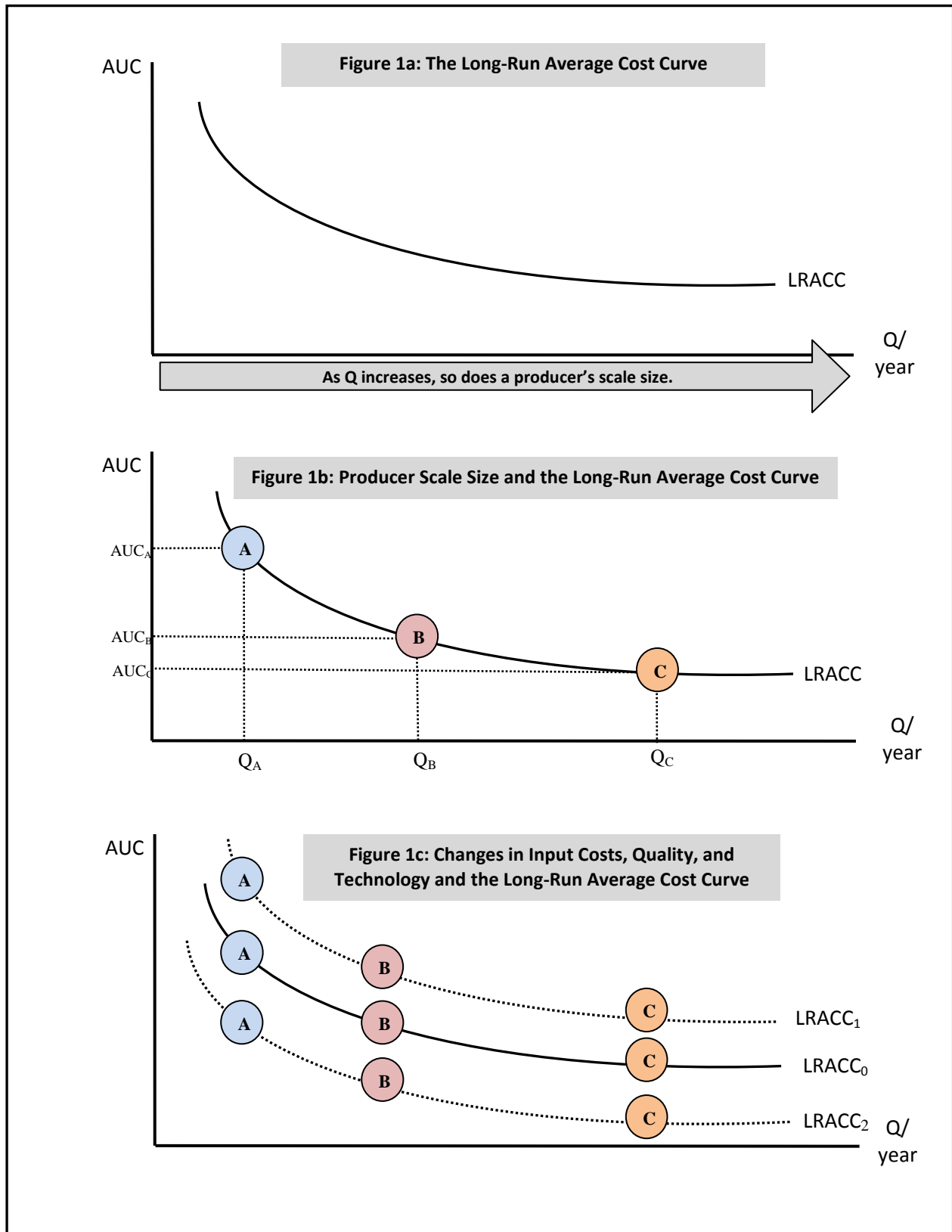
    C $LRACC_2$

Q/year

Figure 2 shows the possible shapes for the LRACC based on increasing, constant, and decreasing returns. Figure 2a shows increasing returns for all scale sizes; 2b shows constant for all scale sizes, 2c shows decreasing returns for all scale sizes; 2d shows a U-shape curve with increasing returns up to a given scale size where AUC is minimized, then decreasing returns after; 2e shows increasing returns up to a given scale size, then constant after; and 2f shows constant returns up to a given scale size, then decreasing returns after.

In the context of the public sector, producers A, B, and C can also represent municipalities at a particular point in time with different population sizes. Because direct measures of municipal "output" are not often readily available, many studies use population as a proxy for Q. Although the use of population as an output proxy has been criticized by some economists, it reflects the limitations of measuring costs and output due to the service orientation and disclosure limitations of public enterprises.[1] The assumption is that if output levels could be directly measured, there would be a high correlation between population, output, and scale size.

However, some studies use other measures of output, such as the number of crimes cleared (in the case of police services) in a given city, or the number of separate services provided by a single public producer in a given city. When population is the output proxy, AUC is measured as per capita expenditures (PCE) for a given service. In some studies, the long-run TC function (rather than the LRACC) is estimated, from which the shape of LRACC is inferred since AUC = TC/Q. The actual estimation of the municipal LRACC is discussed in more detail in Section 3.

Figure 2: Returns to Scale and the Shape of the Long-Run Average Cost Curve
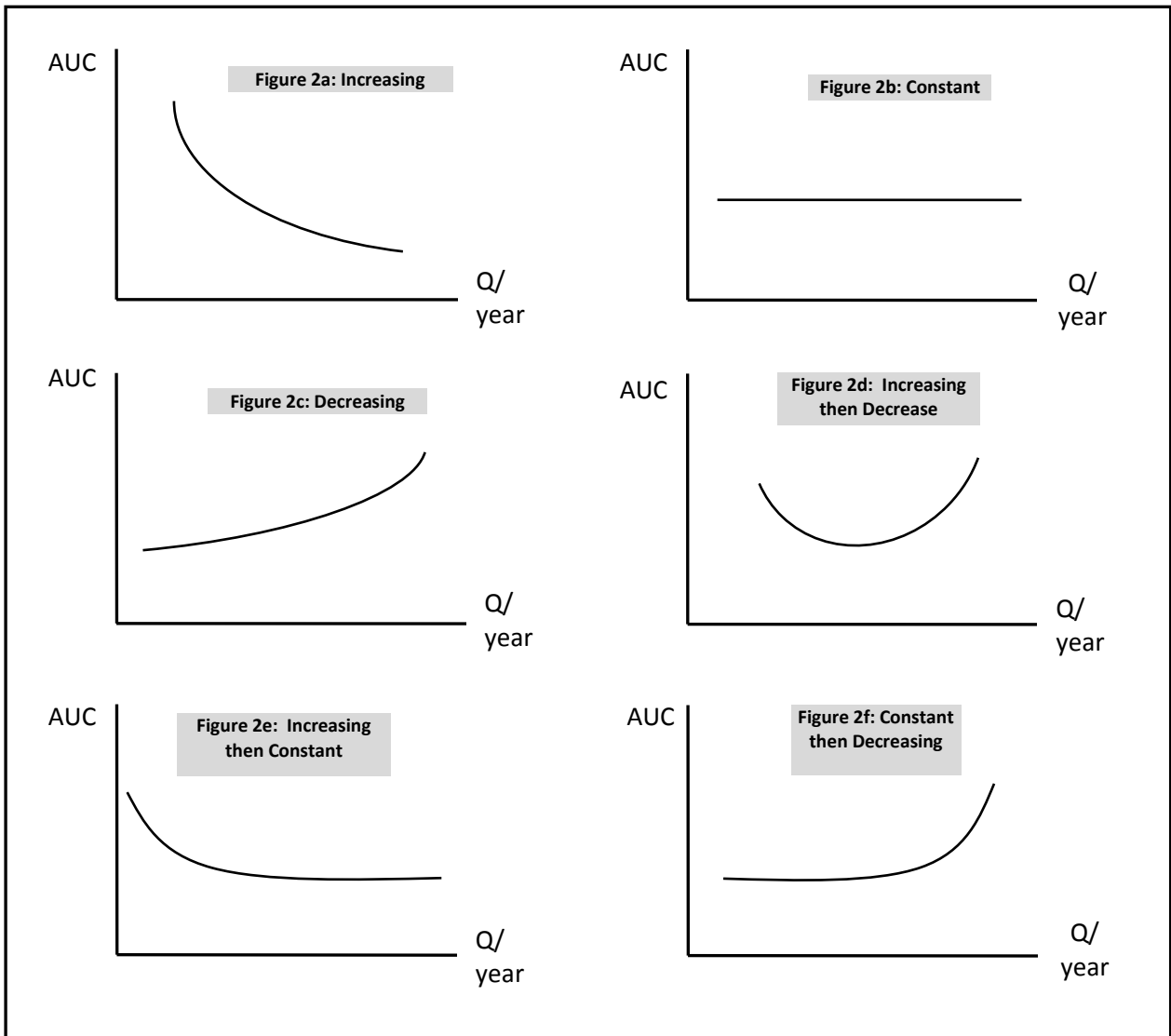
2.2 Economies of Scope

Economies of scope, which concerns multi-product producers, are best discussed by way of example. Assume that an entrepreneur owns two separate businesses. One business, housed in its own location, is a wine bar. The other business, in a different nearby location, is a Greek restaurant. In this case, the total operating costs of her businesses are $TC_{B+R} = TC_B + TC_R$, where TC_B are the wine bar's total annual costs and TC_R are the restaurant's the total annual costs.

Since both businesses are providing services that require similar inputs (land, labor, and capital) and marketing efforts, then it may be cost effective to combine both locations under one roof, thereby eliminating overlapping inputs and administrative costs. For example, rather than having to pay for one manager in each location—one for the bar and one for the restaurant—she may need only one manager for the combined bar-restaurant. There may also be savings in advertising one business instead of two, and in reducing duplicated capital such as refrigerators. If economies of scope exist, then the total costs of the combined bar-restaurant, TC_{BR}, would be less than TC_{B+R}, the total cost of running the bar and restaurant as separate entities—that is , $TC_{BR} < TC_{B+R}$.

Traditionally, studies of scope economies have focused on the private sector, even though economies of scope can also exist in public sector enterprises. Although fewer in number, studies of public sector scope economies tend to focus on waste management and emergency services.

3. Studies of Municipal Economies of Scale

Because police, fire, and waste management services dominate the budgets of both municipal and county governments, the majority of studies focus on these providers. However, there are also studies that examine scale economies in libraries, county court systems, and county extension offices. For each of the sub-sections that follow—Police Services, Fire Services, Waste Management Services, and Other Services—detailed tables in the Appendix provides a summary of each study's findings with respect to the shape of the LRACC.[2]

By way of summary, the studies in Appendix Tables 1 through 3 cover a wide range of times, locations, and municipal sizes in the U.S. and Canada. Taken as a whole, they are broadly representative of cities and towns in North America since the late 1950s to the current decade. A significant number of these studies were conducted in the 1970s and 1980s when municipalities, just as now, were experiencing deteriorating financial conditions and were searching for cost containment strategies. When there is a geographic focus, rather than a general sample of U.S. cities, the states of California, Florida, Illinois, New York, and Texas appear most frequently. With respect to municipal size, the cities analyzed range from as small as 1,000 residents (Collins & Downs, 1971) to over one million residents (Morris & Tweeten, 1971). This range of sizes easily encompasses the range of Spokane County's municipalities.

Estimating the shape of the LRACC generally requires use of a type of analysis called "cross-sectional econometrics." "Econometrics" is

statistical theory applied to economic problems. The "cross-sectional" component means the LRACC is estimated by comparing the AUCs between municipalities with different population sizes at the same point in time—for example, a given year. However, as was noted in Section 2.1, isolating the LRACC requires that factors other than scale size must be held constant. In cross-sectional econometrics, this is done by including factors such as community wealth, density, the crime rate, service quality, and wage costs as control variables in the estimation process. As will be discussed in Section 3.5, the community wealth and density turn out to be important determinants of municipal service costs.

Overall, the majority of these studies suggest that larger municipal service units are not associated with a lower average cost per citizen served. This finding appears to hold even as the data and cross-sectional econometric methods for estimating LRACCs improved in the 1980s. As will be shown below, when scale size cost efficiencies are found, depending on the service analyzed, they are exhausted at relatively low levels of population. This, in turn, suggests that for the larger cities in Spokane County, the increased scale size resulting from service consolidation would not likely produce significant cost reductions because these cities are already operating independently at scale sizes that have exploited any of the limited cost advantages found in the literature.

3.1 Police Services

Table 1 provides summary of 18 studies of scale economies in police services in the U.S. (17) and Canada (1). **The majority of these studies suggest that there are limited or no cost reductions associated with larger municipal police departments.** Only one of these studies (Chapman, Hirsch, & Soneblum, 1975) finds evidence of a LRACC similar to Figure 2a—that is, increasing returns to scale. Of the remaining studies, five find decreasing returns to scale (Figure 2c); three find U-shaped returns (Figure 2d); three find constant then decreasing returns (Figure 2f); two find constant returns (Figure 2b); and four find two possible LRACCs, depending on the data used in the estimation. Of these latter four studies, two find either constant or U-shaped returns; one finds either constant or decreasing returns for fire and police combined; and one finds either constant returns or inverted U-shaped returns. In the case of U-shaped returns, decreasing returns are found after 20,000 to 40,000 residents (Ostrom & Parks, 1973; Southwick, 2005), 100,000 residents (Ostrom & Parks, 1973), and 250,000 residents (Morris & Tweeten, 1971; Popp & Sebold, 1972). In the case of constant then decreasing returns the inflection point is found after 50,000 residents (Gyimah-Brempong, 1987) and 250,000 residents (Gabler, 1969, 1971).

The lack of increasing returns to scale in police services may reflect, in part, that both policing and criminal activity change significantly as population increases. Ostrom, Parks, & Whitaker (1973) compare the budget allocations of central-city neighborhoods in Indianapolis to those of three small nearby cities. They find that the central-city neighborhoods spent about half their budgets on "supportive services" (e.g., crime labs) while the three small communities spent just over half their budgets on "assigned patrols." These allocations likely reflect differences in criminal activity between small and large cities. Morris & Tweeten (1971) find that the per capita costs of violent crime increases at an increasing rate after 250,000 residents and after one million for property crime. Likewise, Popp & Sebold (1972) and Ostrom & Parks (1973) find that crime rates related to robbery, burglary, aggravated assault, larceny, and auto theft increase—sometimes rapidly—as city size increases. Finally, adding to the importance of city size and criminal activity, Pachon & Lovrich (1977) find the rate of murder and manslaughter to be highly correlated with city population and, when controlled for, the positive relationship between city size and per capita police expenditures disappears. This suggests constant returns—or constant AUC—if crime rates are controlled for when estimating the LRACC.

Another explanation of the lack of increasing returns is what Nellor (1984) calls "bureau monopoly power." Nellor's findings, which indicate decreasing returns, suggest observing increasing returns in the data will be elusive for most publicly provided services if public employees are capable of quickly organizing to capture any savings that may result from service consolidations. Nellor concludes:

> *…this is not to say that potential for [increasing returns] does not exist, but rather that the institutional structure of large bureaus is such that, if [increasing returns] exist, the benefits which derive from them are likely to be absorbed by the employees of the bureau rather than the taxpayers (pp. 180-181).*

Controlling for population size, Nellor shows that changes in police expenditures and total personnel expenditures are significantly and positively related to changes in the proportion of the population employed by city government. However, bureau monopoly power will vary by state due to variations in the strength of employee collective bargaining rules and the transparency of the budgeting process.

In response to the growing emphasis on costs, Tiebout (1960) argues that focusing on AUC ignores the fact that citizens also care about service quality, and not just minimizing the cost of services. Therefore, even in the absence of increasing returns, if regional consolidation results in higher quality services, then Tiebout argues that this might be a sufficient rationale for consolidation. However, using surveys of central-city and suburban residents, Ostrom & Parks (1973, p. 385) find that, "…*neither* an increase in the population size of a jurisdiction *nor* an increase in the police [to] citizen ratio is positively associated with higher service quality." This suggests that even if increasing returns exist, citizens may have a preference for local police forces, even at a higher AUC, if service quality is perceived to be higher. Controlling for community demographic characteristics, Pachon & Lovrich (1977) also find that increasing jurisdiction size will not necessarily result in significantly higher levels of citizen satisfaction.

Quality issues associated with consolidation are also raised by Mehay (1979). This study examines the cost differences between cities that contracted with the county for police services and those that financed their own departments in Los Angeles County. Although contracting cities had lower operating costs, they also had higher crime rates than cities with

their own police departments. Mehay suggests that the lower operating costs of the contracting cities were offset by higher social costs to citizens in the form of higher crime rates from less effective police services. Mehay goes on to argue that this reflects service contracts without well established measures of police performance by which the contracted services can be evaluated. Such measures would also act as incentives for the contractor to behave in a way consistent with community interests, rather than its own, possibly divergent, interests

In summary, there is little evidence of increasing returns to scale—that is, falling AUCs as scale size increases—in the provision of police services. The literature suggests that this reflects, in part, that large cities tend to have higher crime rates and require higher cost policing activities. In addition, in municipalities where a significant proportion of the population is employed by city government, the evidence suggests that if cost efficiencies exist from increases in scale size, they may be absorbed by public sector employees if they have significant insider advantages with respect to wage bargaining and financial transparency. Finally, even if consolidation could produce lower costs, differences in citizen preferences regarding service quality and local control need to be carefully considered.

3.2 Fire Services

Table 2 provides a summary of nine studies of scale economies in fire services for the U.S. (8) and Canada (1). **As with police services, the majority of these studies suggest that there are limited or no cost efficiencies associated with larger municipal fire departments.** None of the studies finds increasing returns (Figure 2a). Two studies find constant returns (Figure 2b); two studies find increasing then constant returns (Figure 2e); one study finds U-shaped returns until 110,000 residents, then decreasing returns (Figure 2d); one study finds decreasing returns (Figure 2c); one study finds constant returns until 250,000 residents, then decreasing returns; and two find two possible LRACCs, depending on the data used in the estimation. Of these two studies, one finds either decreasing returns for volunteer fire departments (Figure 2c) or constant returns for fully-paid departments (Figure 2b); and the other study also finds either decreasing or constant returns for fire and police combined. In the case of increasing then constant returns, constant returns are found after 250,000 residents (Will, 1965) and after 7,000 residents (Hitzhusen, 1973).

In a related study of fire services by Duncombe (1992), the rate of substitution between capital and labor is found to be very low. This means it is difficult to substitute one input for another in response to the increasing price of the other input. Thus, if a city is facing rising labor costs, Duncombe's research indicates that the production of fire services is such that labor cannot be significantly reduced by using more fire trucks (i.e., capital). A similar problem likely exists for police services. In the extreme, if production reflects a *fixed proportions* technology, the ratio of capital to labor remains constant as scale size increases, implying no substitution between capital and labor. The limited substitutability may also reflect work rules that govern the provision of public services.

Although capital-labor substitutability may be low in fire services, Ahlbradt (1973a, 1973b) finds that Scottsdale, Arizona in the early 1970s had 50% lower per capita costs from contracting with a private sector producer, compared to the estimated cost of providing its own services. In this case, the private producer is a for-profit fire company which Arizona regulated as a private-sector utility provider. The cost of Scottsdale producing its own fire services is estimated via a control group of municipal fire service costs in cities in Washington's King County metropolitan area. Ahlbrandt uses the King County fire departments to estimate the relationship between per capita costs and city characteristics such as population, assessed valuations, and a fire insurance rating index. This estimated relationship is then applied using the same descriptive data for Scottsdale to estimate the theoretical per capita cost of the public provision of fire services in Scottsdale. From this, it is determined that the contracting cost is 50% lower than the public provision cost. The study also shows that the per capita costs in five other Arizona cities (Flagstaff, Glendale, Phoenix, Tempe, and Yuma) with public providers were also considerably higher than the private provider costs in Scottsdale.[3]

As noted earlier, service quality, and not just cost, is also an important issue when considering the provision of services. Considering this issue, Ahlbradt (1973b) qualitatively compares and contrasts the institutional workings of the private and public

providers. From this analysis, the conclusion is that in addition to providing lower costs, the private provider's operating behavior,

> *…is evidence to support the hypothesis that a competitive firm's services will more accurately reflect the tastes and preferences of the community than that of a bureaucratic producer. This is made possible because of decreased emphasis on political influences, the lack of producer bias, more detailed cost information, and greater variety of alternatives from which to choose (p. 58).*

Nevertheless, no community survey data are provided to support this conjecture. In addition, the argument that a private producer will be less politicized is largely speculative and ignores the possibility that the political activities of a regulated monopolist may be more focused on state rather than local officials.

In summary, there is also little evidence of increasing returns to scale—that is, falling AUCs as scale size increases—in the provision of fire services. In studies where some increasing returns are detected, they found that increasing returns are exhausted at relatively low levels of population. The literature does suggest that private providers will be able to deliver fire services at a lower per capita cost than public producers. However, the relative service quality between public and private producers is not sufficiently explored.

3.3 Waste Management Services

Table 3 provides a summary of 11 studies of waste management services in the U.S. (10) and Canada (1). **As with protective services, the majority of these studies suggest that there** **are limited or no cost efficiencies associated with larger municipal waste management departments.** None of the studies finds increasing returns to scale (Figure 2a). Five studies find constant returns (Figure 2b); two find increasing then constant returns (Figure 2e); one finds U-shaped returns, with decreasing returns after 9,500 residents; one finds decreasing returns (Figure 2c); one finds inverted U-shaped returns with increasing returns after 324,000 residents; and one finds either constant or decreasing returns for solid waste, sewage, and streets combined. In the case of increasing then constant returns, constant returns are found after 1,000 to 4,000 residents (Collins & Downes, 1977) and after 20,000 to 50,000 residents (Stevens, 1978).

As with Ahlbradt's (1973a, 1973b) analysis of fire services, Kemper & Quigley (1976) and Stevens (1978) find that communities served by a private producer face lower costs than those served by a public producer. Stevens' study finds the cost difference between private and public producers increases with size, becoming statistically important for cities with populations over 50,000. However, neither study provides an analysis of quality differences between producer types.

In summary, there is little evidence of consistent increasing returns—that is, falling AUCs as scale size increases—in the provision of waste management services. In studies where some increasing returns are detected, they found that increasing returns are exhausted at relatively low levels of population. The literature does suggest that private providers will be able to deliver waste management services at a lower per capita cost than public producers. However, the relative service quality between public and private producers is not sufficiently explored.

3.4 Other Services-Libraries, Courts, and County Extension Offices

A few studies have focused on scale economies outside of police, fire, and waste management services. DeBoer (1991, 1992) examines the county court and library systems in Indiana and Garrett (2001) examines county extension councils in Kansas.[4] In all three studies, increasing then constant returns are found (Figure 2e). In the case of the court system, constant returns set in after 10,000 cases per year; for libraries, constant returns set in after a circulation of 216,000 items; and for county extension councils, constant returns set in after 1.3 million agent contacts per year.

Since 1.3 million was so much larger than the largest number of contacts in any given county, Garrett argues that a consolidation of extension councils would result in significant savings, which is an atypical finding compared to the other studies in Tables 1 though 3. In contrast, Deboer shows that increasing returns in the library and court systems are exhausted fairly quickly as scale size increases. As a point of reference, the City of Spokane library system has an annual circulation of about 1.9 million items, while the Spokane County system has an annual circulation of 1.7 million items. The Spokane County district court handled 85,000 filed cases in 2009. By comparison, the City of Ellensburg Public Library (Kittitas County, Washington), which serves a population of only 18,000, has an annual circulation of about 185,000 items. Likewise, the Kittitas County district court handled 23,000 filed cases in 2009. The Kittitas County example shows that a service area need not have a large population before the increasing returns measured by DeBoer would be exhausted.

3.5 Community Wealth, Density, and Service Costs

As was noted in the economies of scale primer, the LRACC can only be identified if other factors that might influence costs (i.e., other than scale size) are held constant. In the context of the empirical studies examined here, this is done by incorporating these factors into the LRACC estimation process. Of the variables typically incorporated in the estimation process, **measures of community wealth and density were often important variables in explaining observed cost structures**.

In studies where community wealth is considered, the AUC of services tended to be higher in wealthier communities (Schmandt & Stephens, 1960; Hirsh, 1970; Sunley, 1971; Bodkin & Conklin, 1971; Popp & Sebold, 1972; Ahlbradt, 1973a 1973b; Southwick & Butler, 1985; Schneider, 1986; Abizadeh & Yousefi, 1988; Yousefi & Abizdeh, 1992; Bradbury & Stephenson, 2003; Southwick, 2005). In other words, if one could compare two communities that were identical except for wealth, one should find that the wealthier community has higher per capita expenditures.[5] Typical measures of community wealth are household income or per capita assessed valuation of property.

This finding likely reflects that many publicly produced services, like many private services, are what economists generally call *normal goods*. A normal good is any good or service that people consume more of as their wealth rises.[6] The opposite of a normal good is an *inferior good*, which is any good or service which people consume less of as their wealth increases. For example, when their income

increases, individuals tend to shift away from eating at fast food restaurants (the inferior good) and towards more expensive, higher-quality restaurants (the normal good). Of course, the converse is true when income declines. Extending this to public services, these studies suggest that as wealth rises, communities become more sensitive to the social and economic costs of fires, criminal activity, and uncollected waste, which, in turn, translates into a higher demand for higher quality, and therefore more costly, services compared to poorer communities. This means rising community wealth can be a factor behind rising per capita costs over time.

Several studies find that population density can also influence AUC levels across communities. On the surface, it seems logical to assume increased density would unambiguously lower the cost of both waste management and protective services. However, if increased density comes with increased traffic congestion and crime, then the AUC of services will rise.

In the case of waste management services, Kemper & Quigley (1976), Callan & Thomas (2001), and Dubin & Navarro (1988) find evidence of increasing returns to community density. For example, Kemper & Quigley find that the unit cost of refuse collection fell significantly until density, measured by tons of waste per pick-up mile, reached four to ten tons. After this, AUC approximated constant returns to density. However, other studies find that density does not necessarily impact police and fire services in the same way.

Morris & Tweeten (1971) and Southwick (2005) find that the crime rate increases with community density (population per square mile). Sunley (1971), Walzer (1972), and Duncombe (1992) found that communities with higher density tend to have higher AUC in the provision of police and fire services. These results suggest that any policy—for example, Washington State's Growth Management Act—that aims at increasing urban density needs to carefully incorporate strategies for traffic reduction and crime prevention.

4. Studies of Municipal Economies of Scope

Although studies of economies of scope are few in number, they do suggest scope economies may be the most likely source for reductions in the cost of publicly provided services. Swersey, Goldring, & Geyer (1993) find significant labor savings from the merger of ambulance services with fire services in New Haven, Connecticut. Prior to the merger, medical and fire services operated as separate units, with two medics per ambulance and four fire fighters per truck. As a result of the merger, two fire fighters per truck were trained to use the ambulances, effectively eliminating the need for the two medics per ambulance under the old system. This was possible because many of the skills required for a fire fighter overlap with those needed to work on a medical response team.

In a study of police and fire services across cities in California, Grosskopf & Yaisawarng (1990) find the potential for scope economies because of overlapping capital requirements. That is, scope economies could be realized through police and fire services sharing capital costs related to equipment, buildings, and related infrastructure. Thus, the cost savings come from reducing the duplication of capital required for production of both police and fire services. Finally, Callan, & Thomas (2001) find scope economies between traditional refuse collection and recycling, again because similarities between the capital and labor needed to perform both services. Currently, the combined collection of refuse and recycling has been a feature of the City of Spokane's waste management for several years.

5. Studies of Post-Consolidation Economic Impacts

Rather than searching for direct evidence of scale and scope economies, some studies started focusing on the post-consolidation economic impacts of counties that experienced either partial or comprehensive consolidation. These time-series studies examine both tax effects and pre- and post-consolidation economic and social development, and found that **service consolidations have potentially significant impacts on the distribution of the intra-county tax burdens, while having no significant impact on county economic development**. The studies focused on economic development examine changes in the number of firms, private sector payrolls, and social conditions as a result of consolidation.

5.1 Taxation Impacts

The only study found that examines the distributional impacts of consolidation on taxation is Cowing & Holtmann (1974). This study analyzes the pre- and post-distribution of tax burdens from the consolidation of welfare services in Broome County, New York. This consolidation was concluded by an act of the state's legislature, as opposed to a local referendum. Prior to consolidation, welfare services were run in three separate districts—the City of Binghamton, Town of Union, and the rest of the county—each with its own levy authority. The consolidation of welfare services created one district with a unified levy authority.

Cowing & Holtmann find that prior to consolidation, the levy per $1,000 of assessed property value was just over $13 for the City of Binghamton and nearly $3 for both the Town of Union and the rest of the county. After the consolidation, a uniform levy of nearly $6 was imposed. The levy represented a decline for Binghamton at the expense of Union and the rest of the county. When the tax changes were broken down by household income class across the county, the study finds the change in taxation resulted in a tax cut for owner- and renter-occupied households across all income classes in the City of Binghamton, while county households outside the city saw a tax increase. When all county areas are aggregated together, the study finds that low- and high-income owner-occupied households enjoyed a tax decline, at the expense of those in the middle income groups. The authors note that this reflects Binghamton having a relatively large share of the county's wealthiest and poorest households, while the areas outside the city were more middle class.

The study makes the point that the imposition of a unified county levy may seem equitable on the surface, but the actual tax changes by area and income class may not be uniform. That is, any consolidation that unifies taxing districts and imposes a single rate of taxation can result in significant, and possibly unintended, tax redistributions.
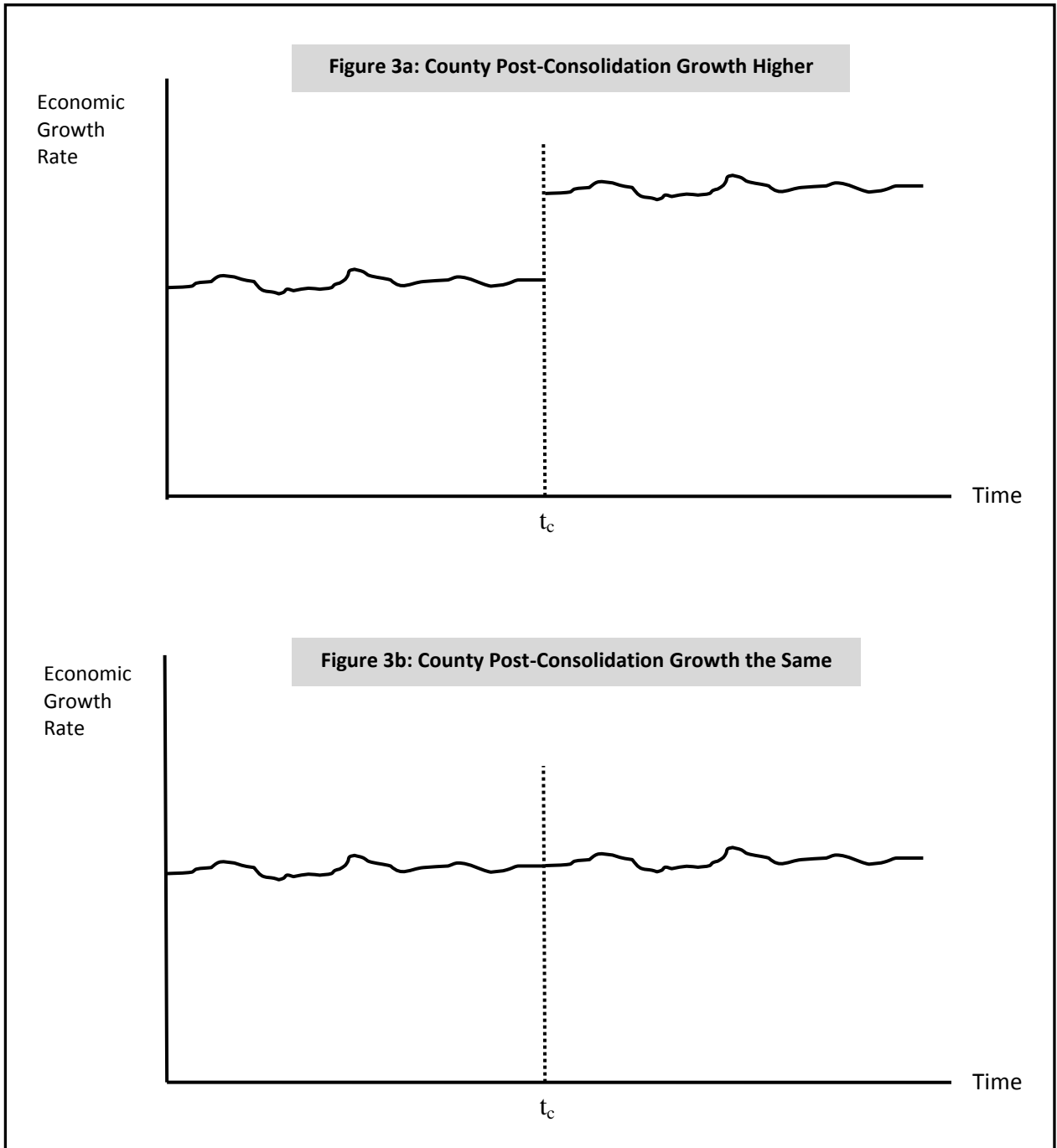
5.2 Post-Consolidation Economic Development

Time-series studies that test for improvements in post-consolidation economic development are Benton & Gamble (1984), Feiock & Carr (1997), Carr & Feiock (1999), Carr, Bae, & Lu (2006), and Jepson (2008). The first four studies focused on pre- and post-consolidation economic activity, while the fourth focused on pre- and post-consolidation socioeconomic indicators, such as poverty, citizen involvement, density, and environmental quality. Before discussing these studies, a discussion on study methodology is needed.

Figure 3 demonstrates the effect these studies are testing for. Let t_c be the year of city-county consolidation. If consolidation has a positive impact on a county's rate of economic growth, then there should be a measurable upward shift in growth following consolidation (Figure 3a); if consolidation had no impact, then we should find no significant change in growth (Figure 3b).

However, since it is possible that the change in Figure 3a could reflect factors other than consolidation, it is important to have control counties that did not experience consolidation over the same period.

For example, if the change in Figure 3a reflects broader regional or national trends, then we should also observe the change in Figure 3a in one or more of the control counties. If so, this would reduce the likelihood that the observed growth increase in the consolidating county was driven by consolidation. The converse would be true if the growth increase in the consolidating county was not observed in the control counties.

Figure 3: Testing for Post-Consolidation Changes in Economic Development

Figure 3a: County Post-Consolidation Growth Higher

Economic Growth Rate

Time

t_c

Figure 3b: County Post-Consolidation Growth the Same

Economic Growth Rate

Time

t_c

Benton & Gamble (1984) examine pre- and post-consolidation growth rates in total and per capita tax revenues, total expenditures, and public safety expenditures in Jacksonville-Duval County, Florida, using Tampa-Hillsborough, Florida as the control county. The study finds no significant difference between long-run pre- and post-consolidation growth rates which, it concludes, is evidence that the long-run impacts of consolidation will not result in a lower growth rate in tax burdens or expenditures.

Feiock & Carr (1997), Carr & Feiock (1999), and Carr, Bae, & Lu (2006) compare pre- and post-consolidation performance by looking at changes in the number of firms and payroll in manufacturing, services, and retail, using non-consolidated counties as control groups. Following Benton & Gamble (1984), Feiock & Carr (1997) focuses on firm numbers in Jacksonville-Duval County, Florida, using Tampa-Hillsborough, Florida as the control county. Using similar data, Carr & Feiock (1999) extend this analysis to nine counties that underwent consolidation. Finally, adding payroll growth to the analysis, Carr, Bae, & Lu (2006) focuses on Lexington-Fayette County, Kentucky, using Louisville-Jefferson County, Kentucky as the control county. None of these studies show that consolidation improved the rate of business development, adding support to the conclusions of Benton & Gamble (1984).

Most recently, Jepson (2008) examined 8 counties that consolidated with more than 100,000 residents between 1961 and 1992. Each of these counties was paired with 4 other counties that would serve as the non-consolidated control group. (There was no overlap in the 4 counties paired with each of the 8 consolidated counties.)

Tests were done to determine if certain county socioeconomic characteristics were significantly different between the consolidated counties and a control group. The characteristics were central-city vitality[7], citizen involvement, density, environmental quality, share of non-whites, share of poverty, and share taking public transportation to work. Except for the share of poverty, which was lower, and citizen involvement, which was higher, the study finds no measurable difference between the consolidated and control counties. Although lower poverty and higher citizen involvement are positive outcomes, these potential benefits are not typically the stated goals of pro-consolidation groups, which tend to be more focused on cost and planning efficiencies (LeLand & Thurmaier, 2005).

6. Summary of Findings

This study reviews the academic literature focused on the relationship between (1) the size and scope of municipal service providers and production costs, and (2) the post-consolidation development of counties that underwent consolidation. Of particular importance are answers to the following questions: "Does increasing the size or scope of public service producers lead to lower costs per citizen served?" and, "Is a county's post-consolidation economic development significantly better than pre-consolidation development?"

Before reviewing the literature, Section 2 provided a primer on economies of scale and scope. Next, Section 3 presented the findings of economies of scale studies; Section 4 presented the findings of economies of scope studies; and Section 5 presented the findings of studies looking at post-consolidation economic impacts. The findings in Sections 3 through 5 are based on a review of over 50 studies, the earliest starting in the late 1950s. The major findings follow:

First, the majority of studies that focused on scale economies suggest that there are limited or no cost efficiencies associated with larger municipal police, fire, and waste management departments. When cost efficiencies exist, they are exhausted at relatively low population levels, where population is frequently used as the proxy for scale size. Although contracting for services appears to result in lower costs, there is a potential trade-off in terms of service quality.

If scale economies do exist, they can be obscured by bureaucracies capturing and spending cost savings before they can be passed on to tax payers.

Second, measures of community wealth and density were often important variables in explaining the observed cost structure of a public service. High wealth communities tend to have higher service costs than poor communities, indicating that as income increases, the demand for higher- quality services also increases which, in turn, drives up AUC. High density communities tend to have lower waste management costs, but higher policing and fire service costs, indicating that increasing density will not automatically lower the AUC of all services.

Third, although few in number, studies of scope economies indicate that cost reductions are possible through the merger of like-services. In particular, scope economies have been found in both protective and waste management services. Scope economies, and not scale economies, may offer the most likely source of cost savings.

Fourth, time-series studies of post-consolidation impacts find that service consolidations have potentially significant impacts on the distribution of the intra-county tax burdens, while having no significant impacts on county economic development and limited impacts on social development.

The preponderance of evidence from the reviewed studies suggest (1) there would be limited or no efficiency gains associated with consolidating key county services, and (2) consolidation would not substantially alter the county's economic development. With respect to the first point, the available studies suggests that for the larger cities in Spokane County, the increased scale size resulting from service consolidation would not likely produce significant cost reductions because these cities are already operating independently at scale sizes that have exploited any of the limited cost advantages found in the literature. In addition, as discussed in the paper, population growth, increased density, and income growth—which are viewed as desirable outcomes in most communities—can create an operating environment that makes it more difficult to maintain or lower service costs, especially for protective services.

The conclusions above warrant an important caveat: scale and scope studies looking at non-protective and non-waste management services are few in number. That is, there are many services that municipalities provide that have never been analyzed for scale or scope economies—for example, these include programs related to social assistance, snow plowing, parks and recreation, youth programs, and environmental programs. Therefore, additional research into these areas may reveal possible cost savings.

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Appendix

Table 1: Summary of Studies Examining Economies of Scale in Police Services

Scale Findings, Figure 2	City Locations	Q Proxy	Details of LRACC Shape
Increasing Returns, 2a:			
Chapman, Hirsch, & Sonenblum (1975)	Los Angeles, CA	Prevented property crime rate and felony arrest rate.	
Constant Returns, 2b:			
Hirsch (1959)	St. Louis, IL Metro Area	City population	
Pachon & Lovrich (1977)	Various U.S.	City Population	Constant returns controlling for differences in the murder/manslaughter rate.
Decreasing Returns, 2c:			
Bodkin & Conklin (1971)	Ontario, Canada	City population	Decreasing returns in Canadian cities.
Votey & Phillips (1972)	Various U.S.	City population	
Nellor (1984)	Various U.S.	City population	
Gyimah-Brempong (1989)	FL	Inverse of crime rate by city and city population.	
Finney (1997)	Los Angeles County, CA	Inverse of crime rate by city and total arrests by city	
U-Shaped, 2d:			
Morris & Tweeten (1971)	Various U.S.	City population	U-shaped with decreasing returns for cities over 250,000 residents. Significant decreasing returns for cities over one million residents.
Ostrom & Parks (1973)	Various U.S.	City population	U-shaped returns. For suburban cities, decreasing returns after 20,000 residents; for central cities, decreasing returns after 100,000 residents.
Southwick (2005)	NY	City population	U-shaped returns using the crime rate and police per 1,000 residents as a proxy for AUC. The crime rate increases after 23,000 residents; police per capita increase after 36,000 residents.
Constant then Decreasing, 2f:			
Gabler (1969)	OH, TX, and NJ	City population	Constant returns until 250,000 residents, then decreasing returns.
Gabler (1971)	CA, IL, MA, NY, OH, TX, and NJ	City population	Constant returns until 250,000 residents, then decreasing returns.
Gyimah-Brempong (1987)	FL	Five different crime clearances by city and city population	Constant returns until 50,000 residents, then decreasing returns.
Other Combinations:			
Walzer (1972)	IL	City total services index (a count of police services provided) and City population	Depends on the proxy measure of output used. If an index of police activities is used as the output proxy, then the results suggest a U-shape (Fig. 2d). If population is used, then constant returns are suggested (Fig. 2b).
Popp & Sebold (1972)	Various U.S.	City Population	Depending on how costs are measured, constant returns (Fig. 2b) or a U-shape with significant decreasing returns for cities with more than 250,000 residents (Fig. 2d).
Darrough & Henineke (1979)	Various U.S.	Five different crime clearances by city and city population	Depending on the statistical tests applied, constant returns (Fig. 2b) or an inverted U-shape (inverted Fig. 2d).
Mehay (1981)	CA	City population	Constant (Fig. 2b) or decreasing returns (Fig. 2c) for police and fire services combined.

Table 2: Summary of Studies Examining Economies of Scale in Fire Services

Scale Findings, Figure 2	City Locations	Q Proxy	Details of LRACC Shape
Constant, 2b:			
Gabler (1971)	CA, IL, MA, NY, OH, TX, and NJ	City population	
Duncombe & Yinger (1993)	NY	City population	
Decreasing, 2c:			
Bodkin & Conklin (1971)	Ontario, Canada	City population	
U-Shaped, 2d:			
Hirsch (1959)	St. Louis, IL Metro Area	City population	U-shaped returns with decreasing returns after 110,000 residents
Increasing then Constant, 2e:			
Will (1965)	Various U.S.	City population	Increasing returns until 250,000 residents, then constant returns.
Hitzhusen (1973)	TX	City population	Increasing returns until 7,000 residents, then constant returns.
Constant then Decreasing, 2f:			
Gabler (1969)	OH, TX, and NJ	City population	Constant returns until 250,000 residents, then decreasing returns.
Other Combinations:			
Ahlbradt (1973a, 1973b)	King County, WA and Scottsdale, AZ	City population	Decreasing returns for volunteer departments (Fig. 2c). Constant returns for fully paid volunteer and non-volunteer departments (Fig. 2b).
Mehay (1981)	CA	City population	Constant (Fig. 2b) or decreasing returns (Fig. 2c) for police and fire services combined.

Table 3: Summary of Studies Examining Economies of Scale in Waste Management Services

Scale Findings, Figure 2	City Locations	Q Proxy	Details of LRACC Shape
Constant, 2b:			
Hirsch (1959)	St. Louis, IL Metro Area	City population	
Hirsch (1965)	St. Louis, IL Metro Area	City Population	
Gabler (1969)	OH, TX, and NJ	City population	Constant returns for waste management and sewage control combined.
Gabler (1971)	CA, IL, MA, NY, OH, TX, and NJ	City population	Constant returns for waste management and sewage control combined.
Callan & Thomas (2001)	MA	City tons of refuse	Constant returns.
Decreasing, 2c:			
Bodkin & Conklin (1971)	Ontario, Canada	City population	Decreasing returns for waste management and sewage control combined.
U-Shaped, 2d:			
Hall & Jones (1973)	TX	City population	U-shaped returns with mild decreasing returns after 9,500 residents.
Increasing then Constant, 2e:			
Collins & Downes (1977)	St. Louis, IL Metro Area	City households	Increasing returns until 1,000 households (1,000-4,000 residents), then constant returns.
Stevens (1978)	Various U.S.	City tons of refuse or cubic yards of refuse	Using tons of refuse, increasing returns until 50,000 residents, then constant returns. Using cubic yards of refuse, increasing returns until 20,000 residents, then constant returns.
Other Combinations:			
Kitchen (1976)	Various Canadian	City population	Inverted U-shape with decreasing returns until 324,000 residents, then increasing returns (Fig. 2d inverted).
Mehay (1981)	CA	City population	Constant (Fig. 2b) or decreasing returns (Fig. 2c) for solid waste, sewage, and streets combined.

Table 4: Summary of Studies Examining Economies of Scale in Other Services

Scale Findings, Figure 2	City Locations	Q Proxy	Clarification Note
Increasing then Constant, 2e:			
DeBoer (1991)	IN	Court cases per county	Increasing returns until 10,000 cases per year, then constant returns.
DeBoer (1992)	IN	Circulation of items	Increasing returns until an annual circulation of 216,000, then constant returns.
Garrett (2001)	KS	Agent contacts per county	Increasing returns until 1.3 million contacts, then constant returns.

Endnotes

[1] For this and related issues, see Tiebout (1960) and Schmandt & Stephens (1960)

[2] For an earlier literature review of municipal economies of scale, see Fox (1980). The studies reviewed by Fox for police, fire, and waste management services were also independently reviewed by the author of this study.

[3] To validate his approach for Scottsdale, Ahlbrandt also uses the King County cost relationship to estimate the per capita costs in Flagstaff Glendale, Phoenix, Tempe, and Yuma. He then compares these costs to the actual per capita costs to show they are very close.

[4] Extension offices provide research and educational assistance, usually with an agricultural focus. Typically the county extension services are centrally managed from a state university with a significant agricultural focus. For example, in Kansas, this is currently provided by Kansas State University and, in Washington, by Washington State University.

[5] The between economic development and government activity was first explored in the 1880s by the German economist Adolf Wagner. Wagner's analysis was at the country level, and his finding of a positive relationship between economic development and government activity is currently known as "Wagner's Law." Although this "law" is not empirically universal, Wagner's Law is supported by studies looking across regions within the U.S. (Abizadeh & Yousefi, 1988; Yousefi & Abizdeh, 1992).

[6] A special case of a normal good is called a "luxury good." The difference between a regular normal good and a luxury good is the relative change in quantity consumed as income changes. A luxury good is observed when, for example, a 10% increase in a person's income causes a more than 10% increase in the quantity consumed. In contrast, if a regular normal good is observed, then a 10% increase in income will cause quantity to increase by 10% or less.

[7] Vitality = (business establishments in the downtown of the main city/total establishments in the larger metro area in 2002)/(Same ratio calculated for 1998).

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Eastern offers students the opportunity to study one-of-a-kind, in-demand disciplines such as biotechnology, cybersecurity, forensic science, children's studies, dental hygiene and urban planning. In addition, Eastern is the only regional university in the state to offer a doctorate in physical therapy.

Eastern enhances its strong commitment to teaching and learning by vigorously pursuing grants, extramural funding and student-faculty research collaborations. For the most recent fiscal year, the University secured a total of $17 million in grants and extramural funding.

A focus on personal attention, faculty excellence and community collaboration allows Eastern to accomplish its mission of preparing well-rounded students ready to hit the ground running in their chosen career fields. Eastern will give you the chance to start something big!

Accreditations

The University is accredited by the Northwest Association of Schools and Colleges and many discipline-specific associations, such as the American Assembly of Collegiate Schools of Business, the National Association of Schools of Music, the Computing Sciences Accreditation Board, the NAtional Council of Accreditation of Teacher Education, the Planning Accreditation Board and many more.