

Leviathan in the Crosshairs

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ABSTRACT

Following in the spirit of the Leviathan hypothesis, this paper empirically examines how the degree of local government market power influences efficiency in the local public sector. Like studies in industrial organization using the structure, conduct, and performance paradigm, the overall level of concentration in the market area measures market power and the market share of the individual municipality is held constant. In addition, an efficiency measure, aggregate property values, is used in the empirical test. The empirical results suggest that aggregate property values are lower and thus efficiency suffers, in more concentrated municipal market areas, *ceteris paribus*, thus providing some evidence for Leviathan-type governments.

I. Introduction

For over twenty years, economists have been vigorously examining and testing the Leviathan hypothesis, as advanced by Brennan and Buchanan (1980), and have been getting nowhere. The Leviathan theory predicts that more competition among governmental units constrains the excess public spending that results when monopolistic governments overproduce services and/or operate with some X-inefficiency. Researchers have tested the Leviathan theory by empirically examining the isolated relation between the number of governmental units and the amount of public spending in a market area. The market area is typically defined as geo-political boundaries like countries (Heil, 1991; Oates, 1985), states (Oates, 1985; Nelson, 1985; Wallace and Oates, 1988), metropolitan areas (Eberts and Gronberg, 1990; Zax, 1989), counties (Forbes and Zampelli, 1989), or cities (Santerre, 1991). Unfortunately, nearly just as many empirical studies find evidence validating as refuting the Leviathan theory as reflected by the impact of inter- and intra-jurisdictional competition on public spending habits.¹

In this paper, we ask a much broader question than the traditional Leviathan literature: Does competition among government units affect efficiency? To answer this question, we adopt the structure, conduct, and performance (SCP) paradigm of industrial organization (IO), like that used in explaining profitability differences among industrial firms. The SCP approach differs in three fundamental ways from previous empirical analyses addressing the Leviathan hypothesis. First, following the more widely accepted firm-level studies, the individual government unit (i.e., the individual community) constitutes the unit of observation. Of the studies cited above,

only Forbes and Zampelli (1989) and Santerre (1991) test the Leviathan hypothesis at the individual level of government. Forbes and Zampelli (1989, p. 569) note that the subcounty local public sector “is a more favorable setting to test the Leviathan hypothesis” because Tiebout-type (1956) shopping among communities plays a more important role. Curiously, both studies find that increased interjurisdictional competition is associated with higher rather than lower public spending. They point to the loss of administrative scale economies as the reason for the greater spending in less concentrated municipal market areas.

Second, since we focus on the individual governmental unit, the degree of market power is measured by the Herfindahl-Hirschmann Index (HHI) of market concentration while controlling for the market share of the individual municipality. In this way, the effect of increased market concentration on efficiency can be isolated from the economies and superiority that may be associated with larger sized organizations. Most of the earlier studies cited above on the Leviathan theory, basically examine how public spending in the entire market area (similar to the earlier industry studies in IO as discussed later) is related to competition, typically measured by the number of government units per capita. As such, relative size differences among individual government units are not considered.

Third, we specify a measure of efficiency - aggregate property values in each jurisdiction - as the dependent variable in our empirical test. As explained below, Brueckner (1982) shows theoretically that the maximization of aggregate property values is consistent with allocative efficiency in the local public sector. Thus, we are able to test if market power is associated with inefficiencies rather than just higher

revenues or public spending. Indeed, a finding of higher taxes and public spending in areas with fewer governmental units may simply reflect the greater municipal overburden placed on fewer but larger cities from supporting services such as public museums, zoos, and large parks. In addition, any shirking behavior and associated underproduction of public goods by local bureaucrats, politicians, and public employees might not be detected if the level of taxes or public spending is used as a performance measure. Given the alleged underproduction of education by local public schools, a measure of efficiency seems a more preferred measure of performance than budget size.

This paper proceeds in the following manner. The next section lays out the empirical model by discussing the SCP approach to industrial organization and Brueckner's model of property value maximization. In addition, the sample and data used in the empirical test are discussed in section II. Section III presents the empirical findings. The empirical results suggest that efficiency suffers in market areas with a few large municipalities. Section IV provides a summary.

II. Development of the Empirical Model, Sample, and Data

Beginning with Bain (1951) among others, IO economists have examined performance differences among private manufacturing industries based on the SCP paradigm. While significant feedback effects exist among the three elements, the SCP model predicts that the structure of an industry indirectly affects performance through its impact on market conduct. For example, based upon the SCP model, IO economists predict that profits will be greater (and efficiency will be lower) in those

industries where independent monopoly pricing or collusive behavior takes place because of a few dominant firms and high barriers to entry. Early IO economists such as Bain (1951), Collins and Preston (1969), and Weiss (1974) tested the SCP model by studying the impact of the market concentration of sellers and barriers to entry, both indicators of market structure, on the profitability of the *industry*. Most of these studies found that industry profits are higher in more concentrated markets at a point in time, *ceteris paribus*.

However, critics like Demsetz (1973) pointed out that high seller concentration might simply reflect that large organizations are necessary for the efficient production of goods and services. If so, the high profits associated with high seller concentration indicate efficiency and not monopoly rents. That criticism prompted future SCP studies to focus on the individual firm rather than the industry (e.g., Shepherd, 1972). Firm level studies separately control for both the market share of the individual firm and some measure of market concentration such as the four-firm concentration ratio or the HHI. The SCP model predicts that profitability directly relates to market share because of efficiency considerations but to market concentration because of fewer choices and the market power of firms in the industry. For private firms in various manufacturing industries, research has tended to suggest that market share matters more than market concentration in explaining profitability.

SCP studies at the individual firm level have evolved over time to encompass other industries besides manufacturing and other ownership forms in addition to for-profit entities. More specifically, analysts have examined services like banking (e.g., Simons and Stavins, 1998) and not-for-profit organizations such as nursing homes

(Nyman, 1991) and hospitals (Noether, 1988 and Lynk, 1995). Despite these extensions, the “more modern” SCP approach has not been applied to the behavior of local governments. That seems unfortunate because the Leviathan theory, as advanced by Brennan and Buchanan, does suggest that competition among governments affects performance in the local public sector. At best, most of the previous empirical studies on the Leviathan theory, cited earlier, examine how public spending in the entire market area relates to competition, typically measured by the number of governmental units. That approach is similar to the early IO studies, which have fallen out of favor, as previously discussed.

The lack of a fiscal analogue to economic profits may provide a reason why public choice economists have not applied the SCP model to the public sector. Under various conditions (e.g., average cost equals marginal cost), profits represent a reasonable surrogate for the Lerner index of monopoly power. The Lerner index reflects the deviation between price and marginal costs such that higher values indicate lower levels of efficiency. However, studies examining the Leviathan hypothesis have not specified a performance measure similar to the Lerner index. Indeed, studies to date on the Leviathan hypothesis have almost relied exclusively on taxes and/or revenues as measures of performance in the public sector. Yet, additional taxes and revenues suggest little about allocative efficiency especially when more funds may be necessary to support more social spending in those market areas characterized by a few large governmental units or in a classic situation where shirking behavior and underproduction may also be relevant.

Fortunately, Brueckner (1982) has provided a fiscal analogue for profitability and efficiency at the local level of government. Based primarily on a bid-rent function that makes consumers indifferent with respect to various amounts of public goods and housing, Brueckner shows mathematically that the maximization of aggregate property values in a community is consistent with Samuelson's condition for the efficient provision of public goods (i.e., the sum of the marginal rates of substitution equals marginal social cost). The condition holds because aggregate property values in a community reflect the present value of future aggregate property rents less total public sector costs, or fiscal surpluses, much like the value of a corporation's stock represents the discounted stream of revenues less costs, or economic profits. Because public goods affect aggregate property rents through capitalization and total public sector costs as they are provided, an adjustment in the quantity of local public goods produces both benefits and costs to a community. Thus, maximizing aggregate property values involves choosing the efficient amounts and types of local public goods.

To test if public goods are produced efficiently, Brueckner derives a multiple regression model taking on a form similar to equation (1) with aggregate property values (P) as the dependent variable and housing stock (Q), business profits (Π), income (Y), intergovernmental aid (A), and a vector of local public goods (G) as independent variables. According to Brueckner's theoretical model, aggregate property values are expected to rise with increases in Q , Π , and A . The impact of Y on aggregate property values is theoretically unclear. Aggregate property values share an inverted U relationship with respect to each local public good. When a local public

good is efficiently provided, a marginal adjustment in quantity has no impact on aggregate property values. In contrast, aggregate property values increase (decrease) in response to an increase in a local public good that is initially underprovided (overprovided).²

$$P = P(Q, \Pi, Y, A, G) \quad (1)$$

However, our purpose is not to infer if various public goods tend to be under or over produced but to examine if the level of efficiency, as reflected in aggregate property values, depends on the market environment in which individual governmental units operate.³ Thus, the vector of local public goods is specified as a function of the market share of the individual government unit (S), the Herfindahl-Hirschman index of market concentration (HHI), and a number of exogenous demand and cost side factors (X) that may affect spending on local public goods. Substituting these factors into equation (1) provides the reduced form equation to be estimated.

$$P = P(Q, \Pi, Y, A, S, HHI, X) \quad (2)$$

The relationship between the degree of market concentration (HHI) and aggregate property values is of particular interest to us. In the spirit of the Leviathan theory, we hypothesize that efficiency may be compromised and thus aggregate property values will be lower in market areas with less competition among governmental units. In particular, the fewer (and more dissimilarly sized) governmental units in a market area characterized by a high value for the HHI mean that bureaucrat/politicians in any one municipality face less of a Tiebout-type sorting incentive to produce efficiently or to completely satisfy consumer wants. For example, local bureaucrats and politicians may engage in expense preference behavior by maximizing discretionary spending on

the five P's of power, prestige, pay, perquisites, and patronage (Williamson, 1963; Santerre, 1991).⁴ Alternatively, local politicians may overspend to maximize their chances of reelection as they satisfy the rent-seeking behavior of various special interest groups. However, the degree of intergovernmental competition limits the amount and types of spending chosen by decentralized governments. In particular, the Tiebout (1956) model suggests that people “vote with their feet” in pursuit of localities offering their most preferred fiscal package. Thus, an inverse relation is anticipated between HHI and P.⁵ The market share of the individual government unit (S) should control for any economies or superiority that may be associated with larger size; thus allowing us to isolate the independent impact of market concentration on efficiency.

Cross-sectional data for 1998 are collected from the 169 towns and cities in Connecticut. For several reasons, Connecticut towns and cities provide a good sample for testing the theory. First, organized country governments do not exist in Connecticut thereby eliminating much of the problems associated with delineating fiscal responsibilities and power in many other U.S. cities (see Santerre, 1991). Second, municipal boundaries are fixed and land annexation does not take place in Connecticut like in some areas of the U.S. Land annexation means that jurisdictional control may be endogenous which would further complicate the analysis. In addition, since fixed municipal boundaries prevent new municipalities from forming, entry barriers protect existing communities from potential competitors. Contestable market theory suggests that the degree of actual competition does not matter for efficiency when the threat of potential competition exists.

Lastly, both employment and housing are diffused throughout Connecticut. The so-called central cities in Connecticut are not large by national standards. Bridgeport, the largest city, contains less than 140 thousand people. Furthermore, McEnroe (1997, p. 66) writes of Connecticut: “In the 1990s, suburban wage earners are almost as likely to commute suburb-to-suburb as suburb-city. Some people drive through suburbs and drive through cities to get to other suburbs.” The diffusion of jobs and housing helps to promote competition but also means that suburbs and even some rural communities may be just as likely as central cities in Connecticut to possess some degree of market power over the provision of local public goods, or maybe even more because of product differentiation emanating from demographic, spatial, or geographical uniqueness (Bates, 1993).⁶

Following the manner in which banking markets are defined (e.g., Simons and Stavins, 1998), the relevant geographical market (RGM) for local government services is defined as the metropolitan area for urban towns and cities and the county for rural communities. This definition of the RGM for government services corresponds perfectly with the classification of the ten Connecticut labor market areas as defined by the state Department of Labor. Similar to the use of firm sales in IO, total public expenditures serve as the basis for calculating market shares and the HHI.⁷ Following Brueckner, employment is used as a proxy for profits in each municipality. A list of all of the variables used in the empirical test along with their means, standard deviations, minimum and maximum values, and data sources are provided in Appendix 1.

III. Empirical Results

All of the variables in the empirical model are expressed as logarithms so the estimated coefficients can be interpreted as elasticities. Because market value of properties represents the dependent variable and real estate values are widely known to depend on location, three distance variables are also included in the regression model. The location variables capture the number of linear miles from the nearest border of each town or city to New York City, the coast, and the nearest central city. Urban economic theory typically allows for property values to decline exponentially with distance so the three distance variables are not expressed as logs. The coefficient estimate on each location variable can be interpreted as the average percentage reduction in property values per mile. It should also be noted that the null hypothesis of homoscedasticity cannot be rejected. The basic multiple regression results are reported in column 2 of Table 1 where the estimated coefficients and associated t-statistics (in absolute values) are reported opposite each independent variable.

For the most part, the coefficient estimates on Brueckner's control variables possess the expected signs and are statistically different from zero. More housing units, employment, and per capita income are all associated with higher property values as Brueckner's theoretical model predicts. The lone exception is the negative and statistically significant parameter estimate on intergovernmental aid. Other studies estimating the Brueckner model such as Brueckner (1982), Deller (1990), and Taylor (1995) also find an inverse relation between grants and property values, most likely reflecting reverse causality.

Not surprisingly, the regression results show that greater poverty and population density are associated with lower property values.⁸ In addition, the regression results indicate that all three location variables have negative coefficients, as expected, and two of the three are statistically different from zero. Given the small elasticity estimates, it appears that the three rent gradients are fairly flat with respect to distance.

For the purposes of this paper, the more important results are those associated with the variables intended to capture the relation between municipal market power and efficiency. Notice that the coefficient estimate on the log of market share is positive and statistically significant, indicating that municipalities with larger market shares may enjoy some economies or superiority that lead to increased efficiency in the provision of local public goods. However, while controlling for the relative size of the individual municipality, the coefficient estimate on the HHI indicates that aggregate property values are lower in markets characterized by a few large municipalities. Evidently, when fewer municipalities exist in a market area, decision-makers in each municipality face less incentive to produce with efficient production methods and/or to satisfy consumer wants. Thus, aggregate property values are lower.⁹

As an additional test of the effect of municipal market power on efficiency, the number of nonpublic schools per capita in the market area is specified as an additional independent variable in the empirical model. Since spending on public education often amounts to more than 50 percent of a municipality's budget in Connecticut communities, a greater availability of private schools may put pressure

on municipal and local public school decision makers to produce more efficiently (Hoxby 1994a). Thus, a positive coefficient estimate is expected on the number of nonpublic schools per capita in the market area.

The regression results in column 3 of Table 1 support this expectation. Specifically, the coefficient estimate on the number of nonpublic schools is positive and statistically significant. Its coefficient estimate can be interpreted as suggesting that a 10 percent increase in the number of nonpublic school results in a 2.1 percent increase in aggregate property values, *ceteris paribus*. The results for the other variables remain similar despite the inclusion of this variable in the regression model.

IV. Conclusion

The Leviathan theory has resulted in a relatively large number of studies empirically examining how competition affects government behavior. However after 20 year or more, nothing definitive can be drawn from the various studies. Some research finds that more competition among government leads to lower taxes while others find no relation or higher taxes. About the only thing the Leviathan literature has provided are clever titles like: “Searching for Leviathan”, “Is There a Leviathan in Your Neighborhood”, “Is Leviathan a Mythical Beast”, and “Median-voter or Leviathan: Who Runs City Hall”.

This paper improves upon earlier studies testing the Leviathan hypothesis by empirically examining how competition among government units affects efficiency as measured by aggregate property values. In addition this study examines the impact of interjurisdictional competition on efficiency while simultaneously controlling for the

relative size of the individual governmental unit. No previous study has followed this approach. An additional variable controls for the number of private schools that public schools compete with in their market area.

The empirical findings suggest that competition among local governments improves resource allocation. Holding constant the size of the individual municipality, greater efficiency, as reflected in higher property values, occurs in market areas where a relatively large number of equally sized governments exist. In addition, the results indicate that greater efficiency takes place in market areas with more nonpublic schools per capita. Consequently, this paper provides some evidence to support the use of school vouchers for financing public education.

Of course, this is the first study to examine the impact of interjurisdictional competition on efficiency in the local public sector using a more modern SCP approach and aggregate property values as a measure of efficiency. Other studies may not draw similar conclusions using data from other states or areas. Consequently, we are not willing to fire the gun although we may have Leviathan in the crosshairs. Future studies following this approach are definitely worthwhile given these strong and suggestive preliminary results.

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Table 1: Multiple Regression Results

Dependent Variable: log of Aggregate Property Values

Variable	Estimated Coefficient (t-statistic)	Estimated Coefficient (t-statistic)
Constant Term	0.465 (0.50)	1.210 (1.28)
Brueckner Variables		
log of Housing Units	0.791 (15.44)	0.817 (16.01)
log of Employment (proxy for profits)	0.151 (6.09)	0.150 (6.17)
log of Intergovernmental Aid	-0.036 (1.60)	-0.053 (2.34)
log of Per Capita Income	0.628 (8.24)	0.535 (6.54)
Demographic Control Variables		
Log of Poverty Rate	-0.117 (5.48)	-0.126 (5.95)
Log of Density	-0.105 (3.32)	-0.096 (3.10)
Distance Variables		
Miles to New York City	-0.004 (3.37)	-0.004 (3.33)
Miles to Coast	-0.002 (2.30)	-0.002 (2.67)
Miles to Nearest CBD	-0.001 (0.50)	-0.001 (0.43)
Market Power Variables		
log of Market Share	0.085 (2.96)	0.071 (2.50)
log of HHI	-0.130 (2.47)	-0.159 (3.02)
log of Non-Public Schools Per Capita in the Market Area		0.211 (2.78)
Adjusted R ²	0.98	0.98
Observations	169	169

Appendix 1: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum Value	Maximum Value	Data Source
Aggregate Property Values (\$000)	1,558,993	2,120,058	59,822	17,964,182	OPM
Market Share	0.060	0.0818	0.0021	0.5137	OPM
HHI	0.1301	0.0841	0.0471	0.2959	OPM
Non-Public Schools Per Capita	1.116	0.3151	0.9005	2.2527	DED
Housing Units	8,188	10,272	321	56,153	ECD
Employment	9,492	15,265	70	120,630	ECD
Intergovernmental Aid (\$000)	12,655	26,517	119	220,171	ECD
Per Capita Income	38,282	15,670	19,210	108,008	ECD
Poverty Rate	1.637	2.568	0.10	19.40	ECD
Population Density	876	1,290	23.80	8,589	ECD
Miles to New York City	133	28	59	188	Authors
Miles to the Coast	25	18	0	71	Authors
Miles to the CBD	14	10	0	61	Authors

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Endnotes

¹ See Taylor (2000) for a very nice summary of the research on government competition.

² Brueckner (1982), Deller (1990), Bates and Santerre (2003), and Taylor (1995) have all tested the Brueckner model. Taken together the four studies provide little evidence to support the overproduction of local public goods. Some evidence exists for the underproduction of public goods, however. Using a panel data set of 48 large U.S. cities, Grossman, Mavros, and Wassmer (1999) find that competitive pressure reduces the degree of technical inefficiency as evidenced by lower aggregate property values. By construction, our approach allows us to determine the impact of competition on both technical and allocative efficiency.

³ When testing the Brueckner model, expenditures are used instead of the actual units of the various public goods. This practice reflects the difficulty of separating out the price and output associated with a service and implicitly assumes that the prices of public goods are the same across jurisdictions. Since we are examining the market power of municipalities, the assumption of fixed prices seems inappropriate and justifies our reduced form equation approach.

⁴ Maximizing discretionary expenditures is perfectly consistent with the underproduction of goods and services. The organization essentially maximizes profits or fiscal surplus by restricting output and raising price. The profits or surplus are then used to support expense preference behavior. As noted earlier, previous studies have found some evidence of underproduction when testing the Brueckner model.

⁵ Note that a direct relationship is typically expected between the value of a private firm and the HHI because of the higher profits resulting from market power. However, if company executives pursue expense preference behavior, market value could actually decline with a loosening of the product market constraint as more discretionary spending takes place.

⁶ Bates and Santerre (2003) use 1995 data from these same Connecticut towns and cities to examine the impact of a state mandated expenditure floor on aggregate property values. But by 1998, the year of our data, the state mandate became much less constraining. Essentially, Connecticut communities are now only required to spend any additional school grants on education.

⁷ One might be concerned about the potential endogeneity of each community's market share and hence the HHI. However, unlike in private markets, the market share of municipalities is constrained to the extent that any one municipality is unable to drive the others completely out of the political marketplace, especially in towns and cities in Connecticut and other New England states with fixed municipal boundaries and no organized county governments. In addition, suitable instruments that affect market share but not aggregate property values are difficult to conceptualize. Even topographical factors such as rivers, streams, and lakes, like those used by Hoxby (1994b) as instruments, would affect aggregate property values because of their value as amenities. In any case, Hoxby reaches qualitatively similar results using an instrumental variables approach and ordinary least squares.

⁸ It should be pointed out that the inclusion of other demographic factors in the empirical model, such as pupils per capita, the percentage of the population greater than 65 years of age, percentage of the population that is white, and population growth over the last seven years, resulted in statistically insignificant coefficient estimates on those variables. The general findings of the results reported in Table 1 remain unchanged with the inclusion of these other demographic factors, however.

⁹ The same qualitative results are obtained when population rather than total expenditures is used to calculate market shares and a four-firm concentration ratio is used rather than the HHI.