Jorgenson: I am concerned that further progress in reducing the level of poverty requires much more focus on households that need assistance most urgently, namely, those with the lowest levels of consumption. Based on the profiles presented above, I believe there are some important differences from the conventional wisdom. The most needy are not the elderly or young households but those with a head of household in the prime age groups. Female-headed households are over-represented in the poverty population, but not to the extent reported by the Census Bureau. Rural and nonwhite households are dramatically over-represented in the poverty population. These are the households that should be the focus of attention in redesigning government programs.

EEJ: What you are urging then is more attention toward the impact of commodity-specific transfer programs.

Jorgenson: Exactly. Using data from the Consumer Expenditure Survey, we can measure the proportion of households and individuals who are unable to attain levels of specific categories of consumption that are above minimum acceptable standards. Poverty alleviation programs are most often implemented on a commodity-specific basis. Yet, this information is unavailable in the Current Population Survey. For example, the food stamp program is designed to ensure that the poor attain an adequate nutritional level. Housing programs in the form of rent subsidies or public housing provide minimal levels of shelter for those who satisfy stringent income requirements. The Medicaid program provides health care service to the indigent poor. An income-based poverty measure is ill-suited to address the important issue of the impact of commodity-specific transfer programs. The change in the poverty measure that I am urging will provide a more appropriate criterion for evaluating the effectiveness of commodity-specific programs.

EEJ: Let's conclude with some references to which we may turn for further detail.

REFERENCES


This concludes a series of "Conversations with the Editor." Other Conversations in the series are:

Don McCloskey Vol. XI, No. 4, 1985
H. Peter Gray and Roy Licklider Vol. XII, No. 2, 1986
Martin Bronfenbrenner Vol. XIII, No. 1, 1987
Sir John Hicks Vol. XIV, No. 2, 1988
John Kenneth Galbraith Vol. XIV, No. 6, 1988
Robert Dorfman Vol. XIV, No. 1, 1989
F.M. Scherer Vol. XIV, No. 2, 1989
Andrew Brimmer Vol. XV, No. 3, 1989
Jagdish Bhagwati Vol. XV, No. 3, 1989
Wallace Peterson Vol. XVI, No. 2, 1990
Amriti Rizzi Vol. XVI, No. 3, 1990

INTRODUCTION

The Leviathan theory, advanced by Brennan and Buchanan [1980], posits that government, as a monopolist, seeks to maximize its own utility. In this model, government receives utility either directly or indirectly from excess public spending. Utility can accrue directly to government since excess public spending represents higher in-kind or money income for public bureaucrats. Alternatively stated, excess public spending provides bureaucrats with greater amounts of the five Ps: power, prestige, pay, perquisites and ability to avoid patronage.

Excess public spending may also indirectly provide utility to politicians as they satisfy the rent-seeking behavior of special interest groups. Politicians can increase their probability of becoming reelected by supplying wealth-redistributing special interest group legislation and, in return, demanding votes and campaign contributions from special interest groups. The special interest group legislation enables a politician to put together an overall majority of votes by combining various programs that benefit several separate interest groups with cost falling disproportionately on the general public. The implicit tradeoff involved in satisfying the different demands of the various interest groups suggests that public spending is higher than the median level of expenditure.

Empirical studies, beginning with Oates [1985], have tested the Leviathan theory by determining the impact of political fragmentation and centralization on subnational government spending. Oates presents evidence that government spending is concentrated among government units that have relatively unconstrained governments. Several studies conducted at the state (Nelson [1987]), county (Zas [1989]) and SMSA (Eberts and Greenberg [1983]) levels of aggregation have shown empirically that interjurisdictional competition constrains government size.

Focusing on the Leviathan effects of special interest groups rather than governmental competition, Olson [1965] draws a theoretical connection between years of democratic stability and increased government size. He argues theoretically that special interest groups have more time to accumulate during longer periods of democratic stability and finds empirically that years of democratic stability are directly related to the size and number of special interest groups in the states of the U.S. Moreover, Olson [op. cit.] goes on to explain that "... these institutional conditions must use their lobbying power to influence governmental policy...." Extending Olson's analysis, Mueller and Munzer [1986] provide a more systematic theoretical linkage and find empirically that longer periods of democratic stability at the country level are associated with a larger public sector.

While many of these studies on governmental competition and special interest groups point to the relevance of the Leviathan theory for explaining government behavior and implicitly suggest that fiscal restraints are needed to harness the monopoly power of government, they have not focused specifically on city government behaviour. Yet, Forbes and Zanongi [1989, p. 569] note that the suburban local

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I thank Laurie Bates, Arie Shmidh and the anonymous referees of this journal for their helpful comments on earlier versions of this paper, and the Bentley College Institute for Research and Faculty Development for providing financial support.
public sector is "a more favorable setting to test the Leviathan hypothesis." To fill this void, this study examines the effect of interjurisdictional competition and special interest groups on the size of city government. In particular, this paper aims to determine if Leviathan or the median-voter runs city hall.

To accomplish this objective, the median-voter framework is specified as the basis for the theoretical and empirical models. Other studies searching for Leviathan and pre-1972 empirical models that Borchardt and Deacon [1972, p. 891] argue were "ad hoc constructions with little basis in the theory of choice." Since the Leviathan monopsony model represents an alternative view of public sector behavior, the competitive median-voter model should be specified as the default model if the alternative Leviathan model fails to operate. Moreover, a focus on the median-voter enables a measure of tax-price that previous Leviathan studies fail to incorporate in their empirical analyses.

The empirical results find mixed support for a Leviathan model of city government behavior. While more stable city governments are associated with higher public expenditures, as the model predicts, the findings also imply that greater interjurisdictional competition causes higher rather than lower city expenditures and government size. On balance, however, the results suggest that Leviathan does not run city hall.

THEORETICAL DEVELOPMENT OF THE EMPIRICAL MODEL

Suppose initially that the level of city expenditures is determined by the demands of the median-voter. Downs [1957] points out that the median position may dominate all other collective political outcomes because city expenditures are decided by a simple majority voting rule in a public referendum or because politicians are a representative democracy gravitated towards the middle of the preference distribution; to maximize their number of voters. In either case, the resulting desired expenditures (EX) can be derived from a utility maximization model and expressed as a function of various exogenous variables influencing the median-voter's behavior including tax-price (P), income (Y), share of intergovernmental aid (A) and tastes (T), or:

\[ E_X = E_X(P, Y, A, T) \]

The level of spending on local public goods is inversely related to tax-price but directly related to both increased income and intergovernmental aid since local public goods are typically found to be normal goods.

Now, consider how the city government might behave if it possessed some monopoly power. Rational voter ignorance (see Downs [1957]) and agenda control (see Fillipin, Rosner and Rosenthal [1982]) may provide the source of this power. As mentioned in the introduction, the government may use the monopoly power to directly or indirectly advance its own interests through excess public spending. Given an excess spending motivation behind the behavior of bureaucrats and politicians, equation 1 can be modified to incorporate this likely behavior in the following way:

\[ E_X = E_X + \delta E_X \]

where \( E_X \) represents the government expenditures supplied and \( k \) takes on values greater than or equal to one. When \( k \) equals one, the median-voter's desired level of expenditures is provided. Values of \( k \) greater than one imply that expenditures supplied exceed desired public expenditures. Fiscal institutions such as a Niskanen [1971] "all or none" situation or "reversion budgeting" can place the median-voter in a position where he is slightly better off with excessive expenditures than a much lower-than-desired level of spending. Obviously, the budget maximizing bureaucrat and politician wish to increase the value of \( k \) as much as possible. The willingness and ability to increase this "Leviathan multiplier" depends on various factors, however.

In particular, Brennan and Buchanan [1980] have argued that competition among government units limits the degree that officials can increase public spending. A larger number of jurisdictions provides a greater menu of choices for consumer-voters. More intense competition among communities affects the city government's ability to increase public expenditures beyond the median level as consumer-voters shop around for the jurisdiction offering the most efficient fiscal package (Tiebout [1956]).

Also, Mueller and Murrell [1987, pp. 126-27] point out that the willingness to increase public expenditures is influenced by the number of special interest groups. To compete effectively for votes and campaign contributions, politicians may find themselves offering increasingly more wealth transfers as special-interest groups grow in number. A larger number of special interest groups means that the demand for special interest legislation is higher and politicians must willingly compete to supply more wealth transfers. Thus, a greater number of special interest groups influences the willingness to increase the Leviathan multiplier. Both the degree of interjurisdictional competition (C) and number of special interest groups (N) can be specified in equation 2 to capture these influences.

\[ E_X = k(C, N) \cdot E_X(P, Y, A, T) \]

Note that the value of \( k \) decreases with \( C \) and increases with \( N \), contrary to the findings above. Thus, more interjurisdictional competition results in lower government expenditures and a greater number of special interest groups causes higher expenditures.

Substituting equation 1 into equation 3 yields the following function:

\[ E_X = E_X(P, Y, A, T) \]

(5)

Assuming that equation 5 represents a multiplicative functional form and then taking the natural logarithm of this function yields:

\[ \ln E_X = \ln B_X + \ln C + \ln N + \ln P + \ln Y + \ln A + \ln T \]

Equation 6 can be estimated to determine the effect of interjurisdictional competition (C) and special interest group activity (N) on the level of government spending. According to the Leviathan theory, the estimated coefficient on \( C \) should be negative (\( B_X < 0 \)). This theory also suggests that the parameter estimate on the variable representing the number of special interest groups will be positive (\( B_X > 0 \)). The median-voter model predicts that \( B_X < 0, B_X > 0, B_X > 0 \). The next section discusses the sample and data.

SAMPLE AND DATA

The sample contains 168 of the 170 cities in the United States with populations above 100,000 in 1980. Only Honolulu and Washington D.C. are not included. Honolulu is excluded because the state rather than the local government determines the amount of local public spending. Washington D.C. is not included because of its unique status as a federal capital. Large cities are selected as the sample to ensure the existence of rational voter ignorance. Tullock [1967] argues that the private net benefit of additional public sector information is lower in more populated jurisdictions. As mentioned above, rational voter ignorance may be a source of government monopoly power.

Total municipal expenditures per capita (\( E_X \)) serve as the dependent variable in equation 6. Municipal spending may differ across cities, however, because of different functional and fiscal responsibilities. Therefore, a number of control variables are used to hold constant across cities any state mandated or institutional differences in functional and fiscal responsibilities. A state-specific index measuring the degree of functional dissection of cities (FUNC) is one of the control variables. This index was developed for the Advisory Council on Intergovernmental Relations by Zimmerman [1981]. Various state and local officials were surveyed concerning their perceptions of the amount of discretionary authority exercisable by each type of local government (e.g., towns, cities and counties) in their respective states. In particular, the authorities in each state rated from one to five the degree of functional autonomy that cities possess in their state. Higher values for this index imply that...
cities in the state generally have less ability to expand their powers over a broader range of functions. Thus, lower city expenditures should be associated with higher values for this index, ratio_par._

Also, 31 cities in the sample are not serviced by an independent county government because either the city and county are conterminous (e.g., New York, Boston) or an organized county government exists in the state (e.g., Connecticut and Rhode Island). In this case, a dummy variable, representing the absence of an independent county government, is created (NICITY). Higher municipal expenditures should result when this dummy variable takes on the value of one since, in effect, the jurisdiction provides both municipal and county services.

The degree of interjurisdictional competition (COMP) is measured in both absolute and relative terms following previous studies. For example, Zas [1989] uses governments per capita and per square mile within the county as a relative measure while Forbes and Zampelli [1989] use the absolute number of county governments to represent the degree of governmental competition. Eberts and Giroir [1988] employ both ways to measure competition. In this paper, the absolute measure is represented by the number of all municipal governments (i.e., general purpose governments) in the SMSA and the relative measure is found by dividing the number of municipal governments by the population in the SMSA. Municipal governments in the same SMSA compete for voters within the same relevant product and geographical markets. Following Olson [1982] lead, the amount of evidence that the city has experienced democratic stability serves as a proxy for the number of special interests groups (N). Olson [1982] and Walls and Oates [1988] use the year since achieving statehood as the beginning period of democratic stability for states in the U.S. Their measure of democratic stability, however, is state rather than city specific so a different measure is used here.

Given that this study focuses on city government behavior, the year of incorporation as a city represents a reasonable benchmark to denote the beginning of democratic stability. The city can be regarded as the ultimate stage of progression from village, borough or unincorporated town. Prior to incorporation as a city, the village or town is in a transitory stage within a hierarchy of local government structures, at least in terms of fiscal discretion. The power to perform more services, to levy increased taxes and to borrow a greater amount of money is usually conferred when city status is realized. Adjustments to the incorporation date are made from some cities in the sample, however, because major deviations may have had a significant effect on political stability.

First, twenty-six cities, such as New York City, Hartford, Philadelphia and Phoenix, incorporated before their states actually entered the union. Acculturation to a new Constitution may have had a destabilizing effect on the political economy of the city. In fact, some cities incorporated before the Revolutionary War took place. In this case, the year of statehood rather than the city incorporation date is used to represent the beginning date of democratic stability.

The second adjustment deals with thirty-four ex-confederate cities that incorporated before the end of reconstruction in 1877. Olson [1982] points out that the Civil War greatly affected democratic stability in the South. The war-torn south had to be reestablished, carpetbagger corruption ruled some cities and federal troops occupied and partly controlled most confederate areas. Because of these events, the year 1878 is used as the beginning of democratic stability for confederate cities that incorporated before the end of reconstruction in 1877. No adjustments to the date are necessary for the nonconfederate cities that incorporated after their states entered the union and the ex-confederate cities that incorporated after 1877. Uninterrupted years of democratic stability are measured by subtracting the adjusted incorporation date from 1878, the year of the expenditure date. For the 168 cities in the sample, the uninterrupted years of democratic stability range from six (Anchorage, Alaska) to 194 years (Philadelphia, PA) with a mean and standard deviation of 105 and 37 years, respectively.

Tax-price (P) is calculated in a novel way compared to other studies that use the median-voter framework (e.g., Bergstrom and Goodman [1972] or Flinnou et al. [1982]) because cities in the sample receive some degree of alternative tax sources (i.e., property taxes, income taxes, city sales taxes). For example, Mobile, Alabama derives only 7.3% of its tax revenues from the property tax while Worcester, Massachusetts raises 99.5% of tax revenues from this same source. Tax-price is calculated by

\[
\text{Tax-price} = \left[ \text{V}_c \left( \frac{1}{\text{Y}_c} \right) - \text{P}_c \right] + \left[ \text{V}_t \left( \frac{1}{\text{Y}_t} \right) - \left( 1 - \text{P}_t \right) \right] = \text{POP}
\]

where:

- \( V_c \): median value of owner-occupied housing
- \( V_t \): net equalized valuation of all property computed by dividing net assessed valuation by the assessment to sales ratio.
- \( P_c \): property taxes as a percent of total taxes
- \( Y_c \): median family income
- \( Y_t \): total income in the city measured by multiplying per capita income by population (POP).

The large term in brackets measures the total tax-share of a hypothetical homeowner with median property values and median family income. Multiplying total tax-share by population gives tax-price. This tax-price reflects the median homeowner’s cost of a $1 increase in municipal spending on each person in the city. The first term in parentheses measures the median homeowner’s property tax share. Most studies use this measure of tax-share but it is unsatisfactory here given that reliance on the property tax differs widely across the cities in the sample. The second term in parentheses, the income tax share, is based upon an assumption that city sales and income taxes are largely proportional taxes.

The median-homeowner’s share of intergovernmental aid (A) is calculated by multiplying the total tax-share in equation 7 by the total amount of federal and state aid to the city. Theoretically, this variable represents how much the median homeowner would receive from the city government if all aid was redistributed to taxpayers based upon relative tax contributions. As a result, the median homeowner could allocate the share of aid among various public and private goods in order to maximize her utility.

**EMPIRICAL RESULTS**

Demographic and regional dummy variables are specified in equation 6 to control for taxes (T) and other exogenous determinants of municipal expenditures. New England represents the default region. A capsule description of all variables can be found in Appendix A. Data sources are discussed in Appendix B. Table 1 shows the regression results where the estimated coefficients and the absolute value of their corresponding t-statistics, in parentheses, are shown opposite each explanatory variable. Columns 2 and 3 show the results for the relative and absolute measures of interjurisdictional competition, respectively.

The estimated coefficient on the variable representing the degree of interjurisdictional competition (COMP) is positive and highly significant in both regression equations. This result suggests that a higher-than-normal median level of public expenditures occurs in cities that are located in SMSAs with a relatively large number of competing municipalities. City expenditures are not very responsive to changes in competition, however. For example, the elasticity estimate on the competition variable in columns 2 indicates that a ten percent increase in the number of competing governments per person in the SMSA leads to a one percent increase in per capita city expenditures, other_par._

This direct relation between the number of competing jurisdictions and government spending conflicts with prior expectations based on the Leviathan theory. According to Oates [1983], a direct relation of this type may reflect the loss of administrative scale economies that result from excessive political fragmentation. This finding can also be interpreted as offering no evidence for a Leviathan-type government in city hall. Forbes and Zampelli [1990] draw a similar conclusion concerning the existence of Leviathan in county government. They find a direct relation between the number of competing counties and county government size.

Older city governments are associated with increased municipal spending, as the theoretical model predicts. The coefficient estimate on YEARS is positive and significant in both equations, and implies that a ten percent increase in the years of democratic stability causes per capita city expenditures to
increase by approximately 1.2 to 1.6 percent, ceteris paribus. Within an Olson [1982] framework, these
higher expenditures in older cities result from the rent-seeking activities of special interest groups. This
empirical result confirms the findings of Mueller and Murrell [1986] but disagrees with the results of
Walls and Oates [1988]. For a sample of counties, Mueller and Murrell find empirically that longer
periods of democratic stability directly affect the number of interest groups, which in turn, leads to a
larger public sector. Walls and Oates, on the other hand, find that younger rather than older states in
the U.S. are associated with a larger combined state and local government sector, ceteris paribus.

Of course, one might simply argue that older cities have higher expenditures because the cost of
providing my given level of public services is greater in older cities with an aged infrastructure and
capital stock. Following the logic of Walls and Oates [1988, p. 405], if the maintenance costs are less
than the cost of renovating and replacing the capital stock, these higher expenditures in older cities may
be optimal from the consumer-voters' perspective.

Finally, notice that most control variables possess coefficient estimates that are statistically
different from zero at conventional levels of significance. As anticipated, the demand for municipal
spending is inversely related to tax-price. Moreover, the level of municipal expenditures is directly
related to income and intergovernmental aid, as expected. The estimated coefficients on the two fiscal
variables possess their expected signs and are statistically significant. Increased municipal spending
occurs in cities with more state authorized fiscal discretion, as represented by lower values for the variable FUNC. Also, municipal spending is about 20 percent higher, ceteris paribus, in cities that are not served by an independent county government, as reflected by the estimated coefficient on
NICTY. The coefficient estimates on the demographic variables possess plausible values and most are
significantly different from zero.

CONCLUSION

Using a sample of 168 large cities in the U.S., this paper empirically tests the Leviathan theory.
Unlike previous studies, the empirical test is well-grounded within a median-voter framework and
focuses on the city government behavior. In general, the findings suggest that the median or representative
voter plays a pivotal role in determining city expenditures. Measures of tax-price, income and share of
aid are shown to be important determinants of city spending. The empirical results concerning the
Leviathan theory are mixed, however. On the one hand, city expenditures are found to be higher rather
than lower in SMSAs with more intense competition. This result conflicts with the prediction of the
Leviathan theory, but agrees with the recent findings of Forbes and Zampelli [1989]. They [p. 376] cite
the "losses of administrative scale economies and the empowerment of government with a broader
range of functions when government is decentralized" as reasons for their findings of a direct relation
between the number of competing counties and county government size.

On the other hand, longer periods of democratic stability, measured by uninterrupted years of
incorporation as a city, are associated with increased public expenditures, as a Leviathan-type model
predicts. The weight of the evidence, however, leans toward the conclusion that Leviathan does not run
city hall. Given the finding that greater political fragmentation leads to increased per capita city
spending and the inability to directly control for interest group activity, this seems the proper conclusion
to draw from the empirical evidence. As mentioned above, uninterrupted years of incorporation as a
city might merely capture the physical age of the city. Given lower maintenance costs and hence lower
operating costs, older cities might operate efficiently with an aged capital infrastructure and therefore possess
higher operating costs.

Hopefully, this study will motivate future researchers to find and use a more direct measure of
special interest group activity at the city level to disentangle these two equally plausible explanations
for the higher public expenditures in older cities. Nevertheless, this paper seriously questions the generality
of the inverse relationship between government age and size, founded by Walls and Oates [1988], in their
study involving the 48 contiguous states of the U.S. Moreover, this paper raises serious doubt about the
existence of a Leviathan-type government in city hall.

### Table 1

Regression Results for City Spending

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficient Measured in Relative Terms</th>
<th>Coefficient Measured in Absolute Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.28</td>
<td>0.072</td>
</tr>
<tr>
<td>COMP (C)</td>
<td>0.009***</td>
<td>0.056**</td>
</tr>
<tr>
<td>(2.34)</td>
<td>(2.53)</td>
<td>(1.89)</td>
</tr>
<tr>
<td>YEARS (proxy for N)</td>
<td>0.119***</td>
<td>0.156***</td>
</tr>
<tr>
<td>(2.93)</td>
<td>(2.34)</td>
<td>(2.83)</td>
</tr>
<tr>
<td>TAX-PRISE (P)</td>
<td>-0.322***</td>
<td>-0.343***</td>
</tr>
<tr>
<td>(4.41)</td>
<td>(4.68)</td>
<td>(4.05)</td>
</tr>
<tr>
<td>INCOME (Y)</td>
<td>0.648***</td>
<td>0.654***</td>
</tr>
<tr>
<td>(3.19)</td>
<td>(3.40)</td>
<td>(2.46)</td>
</tr>
<tr>
<td>AID (A)</td>
<td>0.220***</td>
<td>0.220***</td>
</tr>
<tr>
<td>(9.46)</td>
<td>(9.17)</td>
<td>(9.17)</td>
</tr>
<tr>
<td>FUNC</td>
<td>-0.015**</td>
<td>-0.015**</td>
</tr>
<tr>
<td>(2.58)</td>
<td>(2.70)</td>
<td>(2.82)</td>
</tr>
<tr>
<td>NICTY</td>
<td>0.196***</td>
<td>0.185***</td>
</tr>
<tr>
<td>(3.37)</td>
<td>(3.13)</td>
<td>(2.74)</td>
</tr>
<tr>
<td>POP</td>
<td>0.056**</td>
<td>0.021</td>
</tr>
<tr>
<td>(2.15)</td>
<td>(2.15)</td>
<td>(2.37)</td>
</tr>
<tr>
<td>AGE</td>
<td>0.709***</td>
<td>0.605**</td>
</tr>
<tr>
<td>(3.03)</td>
<td>(2.46)</td>
<td>(2.46)</td>
</tr>
<tr>
<td>WHITE</td>
<td>-0.234</td>
<td>-0.234</td>
</tr>
<tr>
<td>(2.45)</td>
<td>(2.45)</td>
<td>(2.45)</td>
</tr>
<tr>
<td>OWN</td>
<td>-0.450***</td>
<td>-0.472***</td>
</tr>
<tr>
<td>(2.22)</td>
<td>(3.95)</td>
<td>(3.95)</td>
</tr>
<tr>
<td>DENS</td>
<td>-0.070*</td>
<td>-0.103***</td>
</tr>
<tr>
<td>(1.96)</td>
<td>(2.76)</td>
<td>(2.76)</td>
</tr>
<tr>
<td>MA</td>
<td>0.192*</td>
<td>0.209*</td>
</tr>
<tr>
<td>(1.82)</td>
<td>(1.90)</td>
<td>(1.90)</td>
</tr>
<tr>
<td>SA</td>
<td>0.004</td>
<td>0.004</td>
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<tr>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
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<tr>
<td>ENC</td>
<td>0.174*</td>
<td>0.190*</td>
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<tr>
<td>(1.69)</td>
<td>(1.95)</td>
<td>(1.95)</td>
</tr>
<tr>
<td>WNC</td>
<td>0.199*</td>
<td>0.224*</td>
</tr>
<tr>
<td>(1.81)</td>
<td>(2.08)</td>
<td>(2.08)</td>
</tr>
<tr>
<td>WSC</td>
<td>0.250**</td>
<td>0.288**</td>
</tr>
<tr>
<td>(2.24)</td>
<td>(2.46)</td>
<td>(2.46)</td>
</tr>
<tr>
<td>FSC</td>
<td>0.144</td>
<td>0.155</td>
</tr>
<tr>
<td>(1.33)</td>
<td>(1.35)</td>
<td>(1.35)</td>
</tr>
<tr>
<td>MT</td>
<td>0.455***</td>
<td>-0.049***</td>
</tr>
<tr>
<td>(3.56)</td>
<td>(5.20)</td>
<td>(5.20)</td>
</tr>
<tr>
<td>P</td>
<td>0.300**</td>
<td>0.230***</td>
</tr>
<tr>
<td>(2.64)</td>
<td>(2.19)</td>
<td>(2.19)</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.888</td>
<td>0.678</td>
</tr>
</tbody>
</table>

**Significant at the 1% level or better.
***Significant at the 5% level.

Note: All variables, except dummy variables, have been expressed in log form. Absolute value of the t-statistics
down in parentheses.
data for this variable have been collected from Moody's Municipal and Government Manual, Websters Geographical Dictionary, the Texas Municipal League, the California Municipal League and several cities were also consulted to obtain data of incorporation for about 27 of the 168 cities. Data for functional discretion come from Zimmermann [1981]. Complete sources are listed in the references.

NOTES

1. As excellent review of these and other studies can be found in Oates [1980].
2. Spatari [1982] examines the impact of intergovernmental competition on city expenditures within a median-voter framework and finds an income relation between the degree of competition and municipal spending for a relatively small sample of forty-eight southern cities. This paper, however, uses a much larger national data set, more recent data and controls for many other determinants of city spending. Also, his paper is not concerned with testing the Leviathan theory but instead a model of strategic behavior on the part of the median-voter.
3. Many researchers object to the median-voter model based on theoretical and empirical grounds (e.g., Romer and Rosemont [1979]). While some of their objections may be valid, a good alternative theory for the Leviathan model is unavailable, especially one that is capable of being tested to some degree. These strongly opposed to the median-voter model may wish to replace the median-voter with a "representative voter" in the discussion that follows. The general thrust of the argument remains the same in either case.
4. See Brett and Goodstein [1975] for the derivation.
5. See Fishman, Romer and Rosemont [1982] for further details concerning revenue budgeting.
6. These are based on public goods expenditures when the number of competing jurisdictions is relatively few. On the other hand, more metropolitan research concerning the alternative fiscal packages offered by other municipalities in the SMSA will be provided by metropolitan developers, real estate agents and the Chamber of Commerce (local business association) when a larger number of municipalities exists in the area. This relatively free information helps overcome the national voter ignorance problem to some degree.
7. A complete description of the various variables can be found in Appendix A.
8. In order to differentiate in functional responsibilities across observations, many studies use expenditures on a few common public functions as the dependent variable (e.g., the sum of police, parks and without expenditures). Within a Leviathan framework, however, even expenditures might arise from increased spending on existing functions or the creation of new functions as Leviathan type governments or special interest groups attempt to broaden their sphere of influence. Also, substitutability among public goods creates a problem when using expenditures on a few common functions to compare public spending levels across observations. Varieties of educational spending across regimes are not examined in this paper because independent school districts administer public education in a relatively large number of states.
9. Similar indices were derived by Zimmerman [1983] to determine the amount of discretion that various local governments have with respect to personnel, finances and governmental structure. These other indices have no significant impact on city spending, except perhaps. These results will be supplied on request by the author.
10. I also controlled for the municipal share of all state and local expenditures across states in another measure of functional responsibility. This variable proved to be highly insignificant and statistically related to the regional dummy variables. These results will be supplied on request by the author.
11. Townships are also treated as municipal or general purpose governments for New England, Pennsylvania and New Jersey counties.
12. While some cities change their charters after incorporating, perhaps altering the distribution of political and economic power, the costs of obtaining this information are high. Even if this information could be obtained accurately, it would not be unambiguously clear whether the charter revisions or amendments represented a substantial change. For example, some cities revise their charter to adjust the number of members on the planning and zoning board, a relatively incidental change in the political structure. On the other hand, more substantive changes in the relative distribution of power and democratic stability may result from replacing a mayor-council with a council-manager form of government. Indeed, it should be noted that charter amendments may be influenced by opportunist behavior and therefore are not a good benchmark to describe political stability.
13. A measure such as the number of various interest groups would be a more direct and preferable measure of special interest group activity. But unfortunately, data of this kind are unavailable at the city level. As a result, the percent of incorporation must be used as an indirect proxy for interest groups. Admittedly, this age variable may also capture other age-related influences on city spending, as well. (See the discussion above in the text.)
14. For example, the median-voter is assumed to be a non-triangularity of property and income taxes.
15. As geography was being redefined, a high degree of correlation exists between the two tandacates. For the 168 cities in the sample, the simple correlation between the property tax and income tax shares is approximately 0.72. On average, the income tax share of 0.3000 is higher than the property tax share of 0.3000.

APPENDIX B

Data Sources

The empirical analysis examines the determinants of city expenditures during 1981. Therefore, 1980 Census data for population, median value of housing, median family income, age, percent white, percent owner-occupied and density provide measurement for the relevant explanatory variables in section 6. Data regarding municipal expenditures, net equalized valuation and intergovernmental aid are figures for 1981. Most data come from the 1980 County and City Databook except for net equalized data for the number of municipal governments and metropolitan population come from Local Governments in Metropolitan Areas. Data for the year of incorporation come from several sources. Most
16. For example, the regional dummy variables may capture differences in climatic, political and social conditions across the regions of the United States.

17. It should be noted that the number of single purpose governments other than school districts was also specified in the regression equation but had no significant impact on city expenditures. Also, let me note that the regression results are quite robust with respect to the inclusion and exclusion of the regional dummy variables. The findings concerning the Leviathan hypothesis are also the same if the dependent variable is expressed as a fraction of community income. These regression results will be supplied by the author on request.

REFERENCES


INTRODUCTION

Many important economic relationships take the form of functions involving two variables. The empirical counterpart of these functions often is expressed conveniently by linear statistical equations. It is well known that the slope coefficient estimated by the least squares method will vary, depending on which of the two variables is chosen as the usually independent variable.

Take, for example, Okun’s Law, which relates the change in the unemployment rate to the percentage change in output. Typically, when output is the independent variable, Okun’s coefficient is significantly lower and the implied output gap is notably higher than when unemployment is the independent variable. Summers, Presser and Schwartz claim that the "correct estimate" arises when unemployment is the independent variable, but Okun insisted that the correct specification makes output the independent variable. This argument remains unresolved.

A similar argument arose in the case of the Verdoorn law, which relates manufacturing productivity growth to manufacturing output growth. Typically, when output is the independent variable the Verdoorn coefficient is significantly higher than when employment growth (identical to output growth minus productivity growth) is the independent variable. The differences in the values of the estimates typically are large enough to have economic significance, with the former specification implying increasing returns to scale and the latter constant returns to scale.

This paper explains the sort of statistical issues involved in these arguments over specification, using the Verdoorn law as an example.

THE GENERAL STATISTICAL ISSUE

Let us generalize the Verdoorn law problem to the case of any observational identity, where

\[ X_k = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \ldots + \alpha_K X_K \]

Then, the following two equations are logically equivalent:

\[ X_k = \alpha_1 + \beta_1 X_1 + \ldots + \beta_K X_K \]

where \( u_k \) are independently and identically normally distributed with mean 0 and variance \( \sigma^2 \), and

\[ X_k = \alpha_1 + \beta_1 X_1 + \ldots + \beta_K X_K \]

where \( u_k \) are independently and identically normally distributed with mean 0 and variance \( \sigma^2 \), and has been pointed out that:

\[ \begin{align*}
(\alpha) & = \beta_1 (1 - \beta_k) \\
(\beta) & = \beta_1 (1 - \beta_k)
\end{align*} \]

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