Asymmetry in Muncipal Government Responses in Growing versus Shrinking Counties with Focus on Capital Spending

Biswa Das
Iowa State University

Mark Skidmore
Michigan State University

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Abstract

Aggregate spending by municipal governments in the United States increased by more than 250 percent between 1972 and 2012, faster than population growth and growth in median household income. Further, other socio-economic and institutional variables that are typically used to explain changes in local government spending do not fully account for the growth. Even places where population is in decline experienced significant growth in spending. Capital spending during the same period increased by 150 percent. It is documented that reinvestment in core infrastructure which is slowly crumbling is insufficient. This study examines the asymmetry in municipal revenue and expenditure responses with a focus on capital spending to changing economic, demographic, and institutional variables using detailed municipal finance data aggregated to the county level for the United States during 1972-2012. Regression analysis findings reveal asymmetry in capital spending between shrinking and growing places in response to economic, demographic, and institutional changes.

1 Introduction

Much of the growth and development that United States achieved over the last century was made possible due to its strong and reliable public infrastructure. Public investments in assets, which included highways, roads, bridges, public schools, institutions of higher education, water and sewer systems, ports, railways, airports, etc., enabled the free market economy to thrive by helping to create wealth, opportunities, and prosperity, thereby improving the quality of life of residents. With the passage of time, it is evident that public infrastructure is aging and there is a growing need for major investments to rehabilitate existing and create new infrastructure wherever necessary (ASCE, 2017). Public infrastructure not only empowers local governments in providing essential public services but also plays a critical role in enabling private farm and non-farm businesses to carry out their production and distribution activities (Mikesell, 2013). The benefits of an effective public infrastructure system, much of which is provided by municipal governments, includes among other things enhanced economic productivity and improved quality of life.

Given the significance of capital spending, it is crucial to understand not only the general trends but also the variables that influence capital outlay.[1] Is there a divergence in municipal government spending on operations and capital outlay between growing versus shrinking places? This study examines these issues using detailed municipal government financial data aggregated to the county level over the period 1972-2012. Municipal government spending in the United States increased by more than 250 percent between

[1]Capital spending refers to long-term investments made by municipalities on infrastructure and other assets that usually have a longer life-span. The threshold of what constitutes capital spending varies based on the size of a city and is usually determined by the city council.

1972 and 2012, much faster than growth in population and median income, which grew at 48 and 32 percent, respectively (US Census Bureau, 2017). Aggregate municipal spending in counties that experienced population decline over the period nearly doubled, for counties that experienced population increase it grew by 300 percent (US Census Bureau, 2017). During the same period, capital spending grew by 47 percent in declining counties and 219 percent in counties that experienced population increase. Of particular interest, this study seeks to improve understanding of why municipalities experiencing long-run population decline driven by structural changes in the regional economies tend not to reduce spending. While municipalities in growing counties are expected to have increased capital outlays to accommodate the growth, municipalities that experienced population decline continue to make significant long-term investments in capital improvements (US Census Bureau, 2017). To increase understanding of these patterns, we offer an evaluation of the long-run relationships between changing economic, demographic, and institutional factors and municipal spending growth, with emphasis on capital spending. Importantly, we examine these patterns in the context of growing and shrinking places.

As a prelude, the findings reveal asymmetries in the relationships between explanatory variables and municipal expenditure growth, where we pay particular attention to capital spending. The study findings shed new light on long-run changes in local government spending. While research demonstrates that public infrastructure is eroding, it is also true that capital outlays increased much faster than the growth in population and median income. Further, the costs of infrastructure replacement is often times much greater than building new infrastructure (Eidinger, 2007). This in part explains why capital outlay increased in places experiencing population decline.

The next section offers a review of the most relevant literature on local government spending growth and public infrastructure investment decisions. The subsequent sections describe the data and empirical approach used in the study, the findings of the empirical analysis, and the main conclusions drawn and discussion mainly focusing on the implications of the study findings.

2 Literature Review

Every four years the American Society for Civil Engineers (ASCE) report on the quality of the nations infrastructure; the latest report assigned a D+ grade to Americas infrastructure (American Society of Civil Engineers, 2017). Based on their estimates, the nation currently needs an approximate reinvestment of $3.6 trillion to bring the infrastructure into a good state. Approximately 90 percent of capital spending in the United States (U.S.) is incurred by state and local governments (Mikesell, 2013). At the local level, capital expenditures are usually funded through federal and state grants, borrowings via municipal bonds, property tax levies, sales and local option sales tax and sometimes with cash (Bartle et al., 2013). In addition to using own source funds, most local governments rely on state and federal funding by way of direct transfers, loans and grants. Capital spending is therefore likely to be highly dependent on economic cycles. In addition, grant funds are often directed at new infrastructure and not maintenance of existing capital; these incentives may encourage the expansion of infrastructure beyond what may be required and can be maintained.

Given the ongoing depreciation of critical public infrastructure and prevailing volatile economic conditions, this is an opportune time to examine the determinants of municipal capital expenditures, paying particular attention to differences between shrinking and growing places, which largely coincide with rural and urban areas, respectively. In order to offer a complete evaluation to capital spending, we also examine the determinants of annual municipal operating expenditures. We review two strands of literature – the first part covers the literature on the determinants of local government spending in general, and the second part provides a review of the research on local government capital spending. However, note that the body of research reviewed has primarily focused on large urban areas across the nation.

2.1 Literature Review: Growth in Local Government

The Median Voter Model is the most common framework economists use for estimating the demand for government services. Starting with Bowen (1943) and Black (1958), economists asserted that under a majority rule the median of the individual demands determined a community's choice of public services.

That is, under certain conditions of majority rule, a political equilibrium emerges that reflects the preferences of the median voter. This framework was later used by Borcherding and Deacon (1972) and Bergstrom and Goodman (1973) and many others to show that a jurisdiction's public service demand depends upon the following variables: the income of the median voter, the median (tax) price of the public good, the preferences of the median voter, as well as other variables that capture the demand side of the political process. The Median Voter framework has been usefully applied to many empirical studies examining government spending levels, growth, and priorities. In general this body of research shows that changing community economic and demographic forces often play an important role in changing government spending levels, patterns, and priorities.

Brennan and James Buchanan (1980) proposed a different framework for thinking about growth of government, where government has "leviathan" powers, and thus citizens are compelled to call for limitations on government power to tax and issue debt.[2] Beginning in the 1970s, citizens sought to introduce new tax and expenditure limitations (TEL) on local governments.[3] A comprehensive analysis of local government spending would therefore include explanatory variables that capture the adoption of newly imposed constraints on local government spending. However, Blankenau and Skidmore (2004) show that the imposition of TEL also tend to coincide with school finance reform (SFR) activity. In fact, a number of new TEL applying to schools (and in a number of cases also applying to municipal governments) were imposed with the specific purpose of reducing local control over education taxes and spending. It is therefore important to incorporate information on TEL as well as SFR that occurred during the period of analysis. In the case of municipalities, SFR shifted the burden of school funding to state governments and thus altered municipal government political and fiscal position. SFR could very well lead to changes in municipal spending.

Related to the "leviathan" argument, public sector employees can potentially seek an increase in bargaining power over citizens through their support of strong public sector unions. In response, a number of states have weakened the power of public sector unions by enacting "Right to Work" (RTW) laws. State and local government employees are not required to pay union dues in RTW states (Reed, 2003). As discussed in the next section, our analysis of municipal government spending growth controls for these three institutional features.

Importantly, the responsiveness of municipal government spending to changing socio-economic forces may differ in shrinking and growing places. The study by Berry et al. (2012) documents the tendency for local governments to grow even in the face of declining population. Over time, dire fiscal conditions can emerge from such choices. One objective of the present research is to improve our understanding of why shrinking places often fail to reduce government spending. We are particularly interested in the responsiveness of capital spending to changing socio-economic and institutional factors. Before turning to a discussion of the data and empirical analysis, we first summarize the literature on the narrower topic of public infrastructure investment.

2.2 Literature Review: Infrastructure Investment

With the significant role that infrastructure plays as an input to the production of goods and services as well as enhancing the quality of life, numerous studies have examined the issue from different perspectives. Fisher and Wassmer (2015) examined the level of capital spending at the federal, state and local levels by comparing pre- and post-recession for the most recent recessions in 2001 and 2007-2009. A key result of their analysis is that per capita capital spending increased around the time of the recessions, which helped improve or create new public infrastructure.

Gamkhar (2000) investigated the degree to which state and local government attempted to make up for the cuts in federal highway grants during the 1976-1990 period when large cuts occurred. The study identified an asymmetrical relationship, when federal spending increased, the effect on state and local spending was negligible, but when federal spending was reduced there were also significant cuts by state and local governments. Gianakis and Snow (2007) studied the use of stabilization funds and fiscal slack in general funds by Massachusetts municipalities during periods of declining state intergovernmental assistance. They

[2]See Mueller (1989), Chapter 21 (1989) for more detailed discussions.
[3]See Skidmore (1999) for a review of the literature on TELs.

hypothesized that in the face of fiscal stress, municipalities would draw down on the stabilization and excess general funds. Using data on all 351 municipalities from the Massachusetts Division of Local Services, the authors observed that municipalities did not adopt/use stabilization funds to deal with downturnsmore popular solutions to deal with downturns were to delay expenditures on capital projects and maintenance, as well as hiring new workers. Skidmore and Scorsone (2011) also found the municipalities in Michigan reduced capital spending during the Great Recession. Marlowe (2012) also considered the impact the Great Recession had on capital spending priorities as well as the reforms needed to overcome inefficiencies in budgeting. He employed a mixed-method approach to determine how capital spending priorities changed during the Great Recession. His sources included state and local government spending reports from the National Income and Product Accounts, audited financial statements from different jurisdictions, and interviews with capital-budgeting staff. Marlowe observed that while spending decreased during the recession, it would have been cut further without the American Recovery and Reinvestment Act (ARRA) of 2009, widely referred to as federal stimulus funds.

Pagano (2002) focused on municipalities revenue raising and capital spending decisions from 1993-2007, an era characterized by high rates of economic growth he terms as the boom. His hypothesis was that that capital spending should increase during boom periods. Pagano (2002) used data from the Annual Fiscal Survey to show that the growth rate for capital spending grew substantially during the boom where capital spending growth is accounted for by growth in own-source revenues.

Wang et al. (2007) investigated pay-as-you-go financing and the factors that determine its use by states. These factors include political composition, position in the electoral cycle, and the socioeconomic and demographic characteristics of voters, factors that limit budgets such as TEL and balanced budget requirements; and intergovernmental aid. The findings suggested that pay-go financing is used by states with more volatile business cycles, where debt limits and balanced budget requirements are in place, and where a Democratic majority exists or legislatures are highly divided between parties. Wang and Hou (2009) also considered the effects of pay-as-you-go financing (cash) for capital projects. Specifically, they developed a model to illustrate the effects of pay-use and pay-go financing on the cyclical stability of capital spending, hypothesizing that in the long-run pay-go will bring greater stability to capital spending. In the short-run, however, they expect the opposite. The authors observed that while pay-use financing extends capital spending over a greater period of time, which stabilizes taxes and addresses intergenerational equity aspect, there is also room for states to rely more heavily on pay-go financing. Their policy recommendation is that during years of economic growth, states should use pay-go to complement pay-use to generate greater stability in capital spending.

The present work is informed by the literature on local government spending growth in general and capital spending more specifically. Consistent with these two strands of research, we consider a wide range of socio-economic and institutional variables to explain municipal expenditure growth, including county median household income, county household income of the top 10th percentile, county poverty rate, the proportion of adults with a bachelors degree, the share of county households that live in mobile homes, county population, the share of county households with a single female head, the share of county population over the age of 65 and under 18, and the share of county population that is white/Caucasian. Based on the literature and the authors understanding of the causality and interdependencies between the variables, our general expectations or hypotheses are as follows: rising median income and higher levels of educational attainment lead to greater demand for municipal services, and vice versa; increasing mobile home occupancy rates, poverty, and single female-headed households are expected to reduce municipal spending growth; population change as well as the share of the population over the age of 65 is expected to be positively related to municipal spending growth, whereas the share of the population under the age of 18 is expected to be negatively related to municipal spending growth because a greater number of school age children increases demand for education spending and thus may pull limited property tax resources away from municipal governments. We have no a priori expectation regarding how the share of the population that is Caucasian is related to spending once we control for other factors. Finally, we expect that the imposition of TEL and RTW laws will reduce municipal spending growth, whereas we have no a priori expectation regarding how SFR will affect municipal spending.

Also of interest are differences in the coefficient estimates across declining and growing places. We are especially interested in differences in the coefficients for population where we expect the coefficients to be larger in absolute magnitude in growing counties than in shrinking counties, and especially so for capital

spending. However, cost of capital in places where population is in decline are likely to be higher than in places were population is growing. These higher costs are driven by the fact that the costs of infrastructure replacement are often higher than placing new infrastructure. For example, Eidinger (2007) indicates that costs of water pipe replacement is roughly four times the costs of installing new pipe in "virgin" streets. Overall, we are agnostic in our expectations of differences in the other coefficients across growing and shrinking counties, but the flexible empirical model specification allows for any differences to be revealed.

3 Data and Empirical Approach

Data on municipal government expenditures were obtained from the United States Census of Governments. Municipal fiscal data on expenditures are aggregated to the county level and are collected every five-years beginning in 1972 and ending in 2012. Two indicator variables are generated to examine asymmetry in the impacts of the explanatory variables on municipal expenditures: The variable 'Shrink' identifies counties with declining population over the 1972-2012 period (about 25 percent of counties); and the variable 'Grow' identifies counties with positive population growth (about 75percent of counties). All counties that had between -5 percent and +5 percent growth were omitted resulting in 146 fewer declining units and 157 fewer growing units. These counties were omitted in order to focus on differences between places that were clearly shrinking and those that were growing. Note, however, that the estimates presented in the paper using this subset were similar to estimates using all observations.[4] The explanatory variables are interacted with these indicator variables to allow for differential effects in declining and growing places. Data aggregated to the county level does not capture within-county variation in municipal spending across municipalities. An advantage, however, is that the examination is nationwide in nature. Further, we are able to include a wide range of explanatory variables in a panel data context that are not available if municipal level data are used. Further, county boundaries typically do not change over time, whereas annexations mean the municipal boundaries change substantially over a 40 year period; use of county level data avoids challenges associated with changing land areas due to shifting boundaries over time. There are trade-offs with the use of different types of data; however, we believe that a county level analysis of municipal spending offers new insight on the dynamics of municipal spending in a panel data framework.

The logarithmic model specifications used in the analysis are based on the following equation:

$$\begin{aligned}\Delta Exp_{itj} = Grow * \Delta Econ_{it}\alpha_1 + Shrink * \Delta Econ_{it}\alpha_2 + Grow * \Delta Pop_{it}\alpha_3 + Shrink * \Delta Pop_{it}\alpha_4 \\ + Grow * \Delta Inst_{it}\alpha_5 + Shrink * \Delta Inst_{it}\alpha_6 + Grow * t_t + Shrink * t_t + c_i + e_{it}\end{aligned} \quad (1)$$

ΔExp represents the change in the natural logarithm of municipal expenditure for county i between periods t and $t-5$ for expenditure category j, $\Delta Econ$ represents a vector of economic variables that include the change in natural logarithm of median household income, the change in the natural logarithm of the income of the top 10 percent of households, the change in the poverty rate, and the change in the share of population that lives in a mobile home. ΔPop represents a vector of demographic characteristics, including the change in the natural logarithm of total population, the change in the share of households headed by a single female, the change in the share of the population over the age of 65, the change in the share of population under the age of 18, the change in the share of the population that is Caucasian, and $\Delta Inst$ is a vector of institutional variables that includes variables that indicate change in RTW status, the change in the number of TELs and the change in number of SFR efforts. The vector of time indicator variables is represented by t, and c represents a vector of county fixed effects, which accounts for unobserved county trends that affect municipal spending. The first-difference specification controls for county trends with county fixed effects as well as national trends with time indicator variables. In the model j refers to municipal expenditure categories and includes total municipal expenditures from all overlying jurisdictions; and operating expenditures and capital expenditures.

Because this is a first-difference estimation, the coefficient estimates are formed by the within county variation in the independent variables. That is, the coefficients are generated by the within county changes

[4]For robustness, we also conducted analysis omitting counties between -10 and +10 percent. These estimates are again qualitatively similar to those presented here.

in the independent variables net of county trends. In the case of the institutional variables, the changes in the status of these variables are used to generate the coefficients; there are many changes in RTW, TEL, and SFR over time, and the nature of TELs and SFR differ considerably across the states. For TELs, Amiel et al. (2009) and Mullins and Wallin (2004) identify the major characteristics of TEL across the states and over time. The approach we use is to identify when new TELs were imposed on municipal governments in every state. Although the measure of TELs we used identify all changes in the status to TELs over time, it does not capture the different TEL characteristics, thus our TEL variable measures the average effect of TELs on municipal spending growth. We do, however, split TELs into those that apply to state governments (State TELs) and those that apply to municipal governments (Local TELs). In a similar way, SFR includes all court ordered and legislative changes in SFR status, but it does not capture the differences across states in SFR characteristics as identified in existing studies (Hoxby, 2001; Duncombe and Yinger, 2004). Therefore, this variable measures the average effect of SFR on municipal spending across the states and over time.

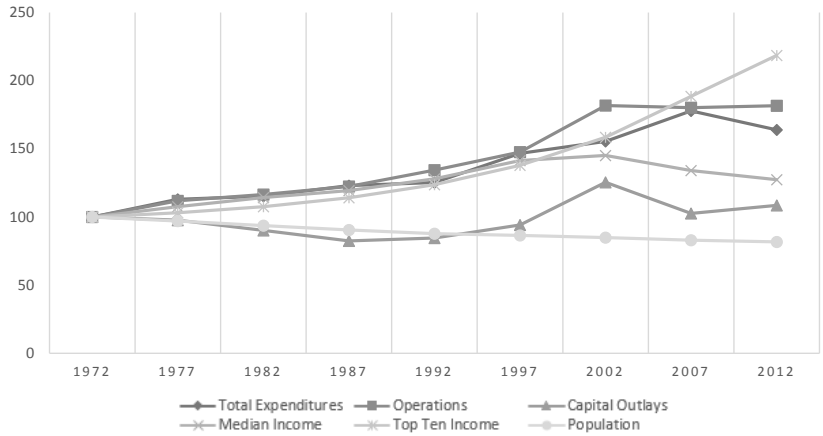

Figure 1: Index of growth in key variables – shrinking counties

To assess the differences in the effects of the explanatory variables on municipal spending, we interact each explanatory variable with the Grow and Shrink indicator variables. Grow is an indicator equal to 1 if the county experienced positive population growth over the period of analysis and zero otherwise, and Shrink is an indicator equal to 1 if the county experienced population decline over the period of analysis and zero otherwise. This framework enables one to determine whether the coefficients for each explanatory variable differs across growing and shrinking counties. All the regression models are estimated using a technique where the standard errors are clustered at the county level to address temporal autocorrelation. Clustered-standard errors perform well when the number of clusters is reasonably large (Bertrand et al., 2004; Kezdi, 2004). The model specification used is convenient because the coefficients on the key variables can be interpreted as elasticities.

Appendix Tables A1 and A2 present the summary statistics of declining and growing jurisdictions (using the population metrics discussed earlier) of all variables from 1972-2012, in 10 year intervals that are included in our evaluation. While overall population increased 48 percent nationwide, it decreased by about 28 percent in shrinking places and expanded by 69 percent in growing places. Although population declined in the shrinking counties, inflation adjusted municipal expenditures doubled in these places. However, in growing counties municipal spending increased by more than 300 percent.

Figures 1 and 2 illustrate trends over time in municipal government expenditure, operations expenditure, capital spending, median household income, top 10 percent income, and population, respectively. All the variables are indexed to 100 for the year 1972 and the trend lines represent the percentage change over the next 40 years for each of the variables. From the graph, it is evident that median household income grew at a lower rate across both growing and shrinking counties than did municipal expenditures. During the time period of 1972-2012, median household income peaked and began to fall in both growing and shrinking

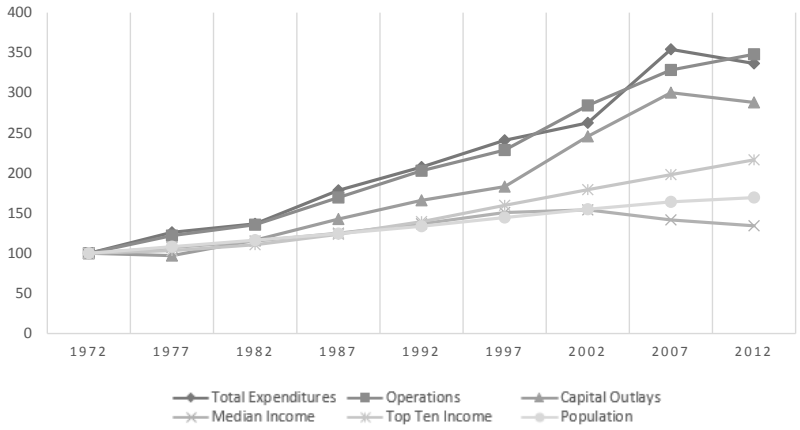

Figure 2: Index of growth in key variables – growing counties

counties in 2002, whereas top 10 percent income continued to trend upward. Growth in municipal spending expanded rapidly until 2007 and then slowed greatly until 2012, and this is true in both shrinking and growing places.

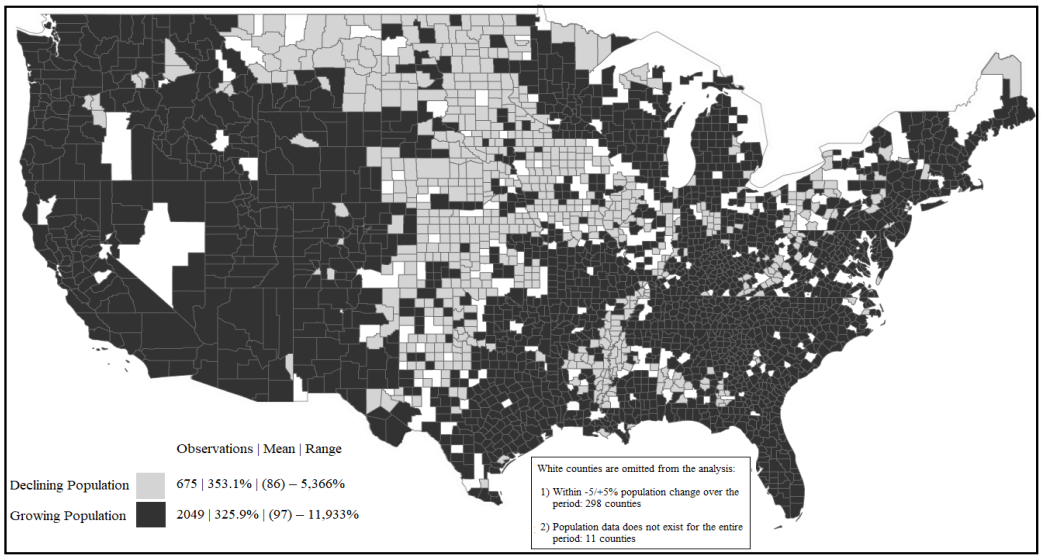

Figure 3: Percentage change in per capita municipal expenditure for growing and shrinking counties, 1972–2012

Figure 3 illustrates a spatial representation at the county level of per capita growth in municipal expenditures. Most of the shrinking counties are found in the mid-section of the country, whereas the growing counties are located in the south and along the coasts. With the exception of California, Florida, Utah and a few of the small east coast states, shrinking counties exist in every state across the nation. It is evident that most shrinking counties experienced significant growth in municipal expenditures despite experiencing population reductions and modest growth in median income over the period. This descriptive summary information provides context for understanding the estimates generated from our regression analyses, which are discussed next.

4 Empirical Analysis

Findings of the regression model using the full set of counties without distinguishing which are growing and which are shrinking are presented in Table 1. Table 2 illustrates how the changing socio-economic, and institutional factors affect municipal finances differently in shrinking and growing places.

Table 1: Regression results for all units

All Units	Total Expenditure	Capital Outlays	Current Operations
ln(Median Income)	0.230**	0.103	0.237***
	(2.272)	(0.466)	(2.635)
ln(Top Ten Income)	0.151*	0.354**	0.0641
	(1.853)	(2.072)	(0.828)
Poverty Rate	-0.0333	-2.302***	0.0265
	(-0.088)	(-2.748)	(0.074)
Pct BA Degree	0.133	0.218	-0.19
	(0.564)	(0.480)	(-0.785)
Mobile Home Rate	-0.442	0.378	-0.830**
	(-1.282)	(0.523)	(-2.355)
ln(Population)	0.829***	1.559***	0.811***
	(5.803)	(5.772)	(5.587)
Female HH Rate	-0.0227	-0.489**	-0.0965
	(-0.122)	(-2.214)	(-0.464)
Pct Over 65	-0.845	-3.038*	-0.103
	(-0.995)	(-1.830)	(-0.115)
Pct Under 18	-1.561**	-6.038***	-1.210*
	(-2.438)	(-4.815)	(-1.857)
Pct White	0.298	0.256	0.00231
	(0.848)	(0.377)	(0.007)
Right to Work	-0.217***	-0.129	-0.205***
	(-5.760)	(-1.610)	(-5.052)
State TELs	-0.0506***	-0.0754**	-0.0436**
	(-2.944)	(-2.425)	(-2.531)
Local TELs	-0.0249**	-0.0579***	-0.0185*
	(-2.506)	(-2.744)	(-1.863)
SFR	-0.0160**	-0.0527***	-0.0085
	(-2.113)	(-3.136)	(-1.096)
Constant	0.351***	-0.133**	0.435***
	(13.050)	(-2.405)	(16.260)
Observations	21,797	21,790	20,382
R-squared	0.024	0.006	0.026
Number of Units	2,728	2,728	2,716

Notes: Dependent variables in log form. Cluster-robust standard errors. T-score in parentheses. Time and county fixed effects included. $***p < 0.01$, $**p < 0.05$, $*p < 0.1$.

Consider first the estimates presented in Table 1, which include regressions for total municipal expenditures, capital outlays and operating expenditures for all counties. These regressions are typical in sense that the elasticities are generated from all observations. First, note that the R^2 is low. However, this is not uncommon in this type of regression model. The data are first differenced and then estimated using the fixed effects technique so that average growth (decline) in each county is captured with the county fixed effects. This means that the variables in the regression are capturing the remaining variation in growth (decline), thus generating a low adjusted R^2. However, this method offers very robust coefficient estimates that are unlikely to be biased by omitted factors or spurious correlations. Of the economic variables, we observe that median income as well as 'top 10 income growth' are positively associated with municipal expenditure growth. Changes in the poverty rate and mobile home living are generally negatively associated with municipal expenditures, but in most cases do not reach the threshold of statistical significance.

Our primary variable of interest, population change, is positively associated with municipal spending growth. The elasticity is 0.83; that is, a 1 percent increase in population will increase municipal spending by almost 1 percent. Note, however, that the coefficient on population in the capital outlay is much larger

at 1.56, indicating that capital spending is much more responsive to changes in population. With the exception of the variable, population that is under the age of 18, the other demographic variables are mostly statistically insignificant. Changes in percentage of population under the age of 18 is negatively associated with municipal spending, especially capital outlay.

Consider the institutional variables in the models including all counties (Table 1). Here, the RTW variable is statistically significant in the total expenditure and current operations regressions, but not in the capital spending regression. This is to be expected as capital spending is more long-term in nature and is thus less likely to be influenced by changes in RTW laws, whereas wages and benefits are part of the total and current operation expenses and thus more directly affected. Similarly, local TELs and SFR variables are statistically significant in the total expenditure and capital spending models as expected. The coefficient estimates are similar, indicating that the impacts of TELs and SFR on municipal spending are roughly equivalent. Finally, as expected state TELs are statistically significant in the three regressions presented in Table 3 where magnitudes of the coefficient estimates are similar across all three spending categories.

Table 2: Regression results treating shrinking and growing units separately

	Total Expenditure		Operating Expenditures		Capital Outlays	
	Declining	Growing	Declining	Growing	Declining	Growing
ln(Median Income)	0.460**	0.159**	0.227	0.168***	1.017	0.099
	(0.216)	(0.062)	(0.196)	(0.060)	(0.775)	(0.208)
ln(Top Ten Income)	0.296**	0.0501	0.155	0.00947	0.814*	0.686***
	(0.148)	(0.068)	(0.126)	(0.065)	(0.456)	(0.236)
Poverty Rate	-0.308	-1.189***	0.139	-0.970***	0.856	-3.121***
	(0.696)	(0.308)	(0.528)	(0.282)	(2.137)	(0.968)
Pct BA Degree	0.132	0.101	-0.156	0.0683	-0.164	0.601
	(0.402)	(0.150)	(0.353)	(0.185)	(1.243)	(0.518)
Mobile Home Rate	-0.107	0.0362	-0.42	-0.136	1.847	1.164
	(0.689)	(0.269)	(0.565)	(0.251)	(2.370)	(0.835)
ln(Population)	0.441	0.983***	0.556	0.749***	-0.961	1.758***
	(0.484)	(0.091)	(0.355)	(0.087)	(1.115)	(0.312)
Female HH Rate	-2.138	-0.212**	-1.554	-0.198***	-13.60***	-0.441***
	(1.621)	(0.085)	(1.322)	(0.072)	(5.143)	(0.170)
Pct Over 65	-1.654	-0.657	0.368	0.0191	-6.991*	0.502
	(1.174)	(0.674)	(1.133)	(0.662)	(3.933)	(2.198)
Pct Under 18	-1.012	1.272***	-0.37	1.266***	-3.86	-0.486
	(1.110)	(0.481)	(0.902)	(0.440)	(3.636)	(1.555)
Pct White	-0.265	0.581**	-0.1	0.166	-0.855	0.356
	(0.575)	(0.226)	(0.743)	(0.206)	(1.917)	(0.751)
Right to Work	-0.0265	-0.0409*	-0.0497	0.0136	-0.196	-0.234**
	(0.069)	(0.024)	(0.065)	(0.023)	(0.289)	(0.099)
State TELs	0.0142	0.00608	0.00505	0.0266**	0.108	-0.0866**
	(0.030)	(0.011)	(0.025)	(0.011)	(0.087)	(0.038)
Local TELs	0.0176	-0.0108	0.00111	-0.00126	0.122**	-0.0172
	(0.019)	(0.008)	(0.018)	(0.007)	(0.054)	(0.029)
School Finance Reform	-0.017	-0.0233***	-0.0155	-0.0161***	-0.0128	-0.0638***
	(0.014)	(0.006)	(0.016)	(0.006)	(0.050)	(0.022)
Constant		0.274***		0.309***		0.0326
		(0.020)		(0.018)		(0.065)
Observations		21,797		21,790		20,382
R-squared		0.071		0.065		0.014
Number of Units		2,728		2,728		2,716

Notes: Dependent variables in log form. Cluster-robust standard errors. T-score in parentheses. Time and county fixed effects included. $***p < 0.01$, $**p < 0.05$, $*p < 0.1$.

While the regression models presented in Table 1 are of interest and are presented as a baseline for comparison, we focus the rest of our discussion on the regression models in Table 2 which allow the coefficient estimates to differ across shrinking and growing counties. Consider first the coefficients on the population variable in the model with total expenditure as the dependent variable. Here, the coefficient on population for growing counties is very similar to the coefficient using all counties (Table 1). However, for declining counties the coefficient is relatively smaller and statistically insignificant. These estimates suggest that when

population is growing, municipal spending expands at a similar rate, but when population is in decline spending generally does not experience a corresponding reduction. However, the imprecise estimate also suggests that there is greater variability in municipal responses to population decline. We observe that the population elasticity estimate in the capital outlay model is greater than 1 for growing counties, but the coefficient on population is statistically insignificant for shrinking counties. This elastic response to population growth in growing places could be interpreted as a proactive response in growing places to develop new or expand infrastructure to meet the needs of a growing population. Similarly, for shrinking counties, insignificant coefficient on population could be interpreted as being the result of the ongoing need to maintain and upgrade capital expenditure in order to maintain quality of life.

However, the population elasticity estimates for growing and declining counties in the operating expenditures regression are similar, though the elasticity estimate for shrinking places is smaller and statistically insignificant. While it is to be expected that growing places experience increases in operating expenditures, these estimates indicate that operating expenditures tend not to shrink as quickly as population decline in shrinking places. This result could be partially attributed to a general increase in the cost of providing services in shrinking places, additional types of services that local governments could be providing given that it is often not feasible for private entities to cater to needs in places where population numbers continue to dwindle. Taken together, these estimates suggest that spending, especially capital spending, grows more rapidly during periods of population growth than spending falls during population decline.

There are also differences in the coefficients across growing and shrinking counties for several other variables; we highlight several notable differences here. Responsiveness of municipal spending to changes in median income is greater in shrinking than growing counties. Presence of SFR reduces municipal spending growth in places experiencing population growth more so than in places that are shrinking. In addition, poverty and the percent of the population that is school age have much larger impacts in growing places (in absolute magnitude) than shrinking places.

5 Conclusions and Implications

Based on our study findings, we offer a new perspective on the long-run relationships between economic, demographic and institutional factors on municipal spending patterns. Our analysis reveals that municipal spending is more responsive to population growth than decline, and the effect is most pronounced for capital spending. The findings also show that SFR tends to reduce municipal spending more in growing counties than in shrinking counties as do the variables of poverty and the percent of population that is school aged. Overall, the analysis provides a new approach that helps to understand the growth patterns of municipal finances, in growing versus declining communities. We further observe that capital spending tends to be more responsive to population growth than decline. Municipal spending has increased much more rapidly than population and median income growth, and this is especially true of capital spending. Even though capital outlay nearly doubled in counties experiencing population decline, given the current state of eroding infrastructure in the United States, capital outlay has been insufficient (American Society of Civil Engineers, 2017). A critical policy challenge is determining how best to allocate limited resources in ways that maximize productivity and quality of life across the nation and do so in a way that is relatively equitable across space and time.

In shrinking places, community leaders struggle with balancing dividing limited resources across operations and the needed investment in infrastructure. In counties where population is shrinking, resource constraints make it more difficult to maintain infrastructure. When places fall into a period of depopulation and declining community fortunes, making significant investments on community infrastructure is often not financially feasible, which further contributes to declining living standards, thus triggering further population decline. As highlighted earlier in the article, evidence suggests that it is more expensive to maintain capital assets than it is to install new infrastructure. Recent events like the drinking water contamination crisis in Flint, Michigan is one example of how maintaining water infrastructure systems in depopulating communities has not occurred. Growing communities, on the other hand, do well to be strategic about expanding infrastructure with an eye toward resilience and sustainability over the long-run. The choices confronting municipalities are therefore different depending on community characteristics and location.

One of the challenges highlighted in our analysis is that sometimes structural changes in an economy can lead to significant outflows of population and economic activity. In this context, due to forces that are sometimes beyond the control of elected officials, some cities have far more public infrastructure than its existing population and economy can support. Yet without maintaining public infrastructure, the downward cycle is exacerbated. However, raising tax burdens to maintain unneeded infrastructure is also detrimental to future growth and is unpopular with tax payers. These places are forced to take a hard look at existing infrastructure and make strategic decisions about what requires reinvestment and what infrastructure does not yield positive net returns to the community; this infrastructure should be allowed to depreciate.

The relatively high elasticity on the population variable with respect to capital outlay especially in growing counties lends support to the idea that the intergovernmental grant incentives may drive communities to invest in new infrastructure more so than maintain existing capital. These incentives coupled with structural changes in regional economies that result in declining populations means that many places have more public infrastructure than they can affordably maintain. In the coming years, the challenge will be in making wise decisions on what infrastructure yields the greatest public value and develop infrastructure reinvestment priorities based on this assessment.

From a policy perspective, this study provides useful information for state and local leadership. With regard to places that anticipate population growth, policymakers do well to carefully gauge infrastructure investment decisions to ensure that such capital can be sustainably maintained over time. For declining places, leaders must balance potentially increasing tax burdens associated with maintaining infrastructure with focusing reinvestments on the infrastructure that yield the highest return on investment for the community. Leaders may even have to allow some less useful infrastructure fully depreciate. More generally, the study also enables state lawmakers and citizens to better understand the consequences of TELs, SFRs and RTW laws prevalent in their states. While municipal government fiscal challenges will continue with less or more severity, the results of this present study offer insight to community leaders as they strive to sustainably manage their finances.

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Appendix

Table A1: Shrinking jurisdictions – summary statistics for all variables

	1972	1982	1992	2002	2012
Expenditures					
Total Expenditures	40,514	46,672	50,749	62,965	66,427
	(251,143)	(289,641)	(302,471)	(397,649)	(405,503)
Operating Expenditures	28,233	32,883	37,947	51,319	51,269
	(172,587)	(200,513)	(225,215)	(337,907)	(298,478)
Capital Outlay Expenditures	7,797	7,033	6,589	9,782	8,462
	(47,456)	(40,205)	(38,688)	(72,283)	(39,476)
Economic					
Median Income	30,451	34,788	38,956	44,205	38,766
	(6,908)	(6,303)	(6,615)	(6,987)	(6,737)
Top Ten Income	64,932	69,816	80,320	102,956	141,916
	(10,163)	(8,513)	(11,123)	(13,552)	(18,556)
Poverty Rate	0.167	0.141	0.14	0.129	0.17
	(0.094)	(0.069)	(0.072)	(0.064)	(0.068)
Pct BA Degree	0.071	0.104	0.123	0.15	0.173
	(0.024)	(0.029)	(0.035)	(0.046)	(0.056)
Mobile Home Rate	0.042	0.066	0.083	0.088	0.099
	(0.027)	(0.037)	(0.053)	(0.067)	(0.076)
Demographic					
Population	46,739	43,801	41,012	38,716	38,210
	(182,400)	(163,741)	(153,013)	(148,886)	(142,282)
Female HH Rate	0.067	0.075	0.087	0.096	0.104
	(0.033)	(0.041)	(0.052)	(0.054)	(0.059)
Pct Over 65	0.133	0.155	0.174	0.176	0.179
	(0.036)	(0.037)	(0.038)	(0.037)	(0.036)
Pct Under 18	0.336	0.285	0.265	0.247	0.228
	(0.039)	(0.032)	(0.029)	(0.026)	(0.027)
Pct White	0.913	0.899	0.888	0.869	0.859
	(0.168)	(0.174)	(0.181)	(0.188)	(0.190)
Institutions					
Right to Work	0.617	0.637	0.64	0.665	0.675
	(0.486)	(0.481)	(0.480)	(0.472)	(0.468)
State TELs	0	0.122	0.24	0.379	0.433
	-	(0.328)	(0.516)	(0.617)	(0.745)
Local TELs	1.029	1.635	2.023	2.148	2.148
	(0.525)	(0.619)	(0.895)	(1.081)	(1.081)
School Finance Reform	0.202	0.533	1.327	1.902	2.323
	(0.402)	(0.642)	(1.089)	(1.159)	(1.342)

Notes: Standard deviation in parentheses. Adjusted to 2009 dollars, in thousands, for revenue; adjusted to 2009 dollars for income.

Table A2: Growing jurisdictions – summary statistics for all variables

	1972	1982	1992	2002	2012
Expenditures					
Total Expenditures	57,974	79,217	120,345	152,284	195,112
	(891,468)	(887,321)	(1,461,549)	(1,520,917)	(2,059,012)
Operating Expenditures	40,802	55,345	82,740	115,942	142,021
	(647,726)	(593,228)	(885,018)	(1,213,488)	(1,434,896)
Capital Outlay Expenditures	11,504	13,382	19,087	28,267	33,147
	(114,007)	(88,336)	(168,018)	(238,322)	(342,154)
Economic					
Median Income	33,264	38,346	45,447	51,289	44,637
	(8,564)	(9,148)	(12,183)	(12,716)	(11,555)
Top Ten Income	67,729	75,000	94,425	121,435	146,639
	(12,762)	(12,531)	(17,998)	(22,557)	(16,985)
Poverty Rate	0.16	0.121	0.12	0.116	0.167
	(0.086)	(0.059)	(0.062)	(0.053)	(0.059)
Pct BA Degree	0.085	0.124	0.148	0.179	0.204
	(0.046)	(0.062)	(0.075)	(0.088)	(0.094)
Mobile Home Rate	0.063	0.094	0.126	0.135	0.146
	(0.039)	(0.050)	(0.071)	(0.086)	(0.097)
Demographic					
Population	72,994	85,038	97,589	112,971	123,969
	(271,646)	(286,812)	(327,067)	(363,951)	(386,725)
Female HH Rate	0.077	0.089	0.101	0.108	0.123
	(0.061)	(0.027)	(0.032)	(0.034)	(0.039)
Pct Over 65	0.106	0.117	0.128	0.129	0.138
	(0.035)	(0.035)	(0.036)	(0.035)	(0.036)
Pct Under 18	0.338	0.29	0.265	0.252	0.238
	(0.038)	(0.036)	(0.035)	(0.033)	(0.034)
Pct White	0.89	0.879	0.866	0.839	0.826
	(0.140)	(0.137)	(0.140)	(0.146)	(0.149)
Institutions					
Right to Work	0.522	0.541	0.559	0.584	0.614
	(0.499)	(0.498)	(0.496)	(0.493)	(0.487)
State TELs	0	0.241	0.442	0.627	0.708
	-	(0.427)	(0.591)	(0.648)	(0.794)
Local TELs	0.723	1.553	1.911	2.066	2.065
	(0.669)	(0.939)	(1.109)	(1.261)	(1.260)
School Finance Reform	0.093	0.627	1.352	2.091	2.475
	(0.290)	(0.700)	(1.182)	(1.238)	(1.407)

Notes: Standard deviation in parentheses. Adjusted to 2009 dollars, in thousands, for revenue; adjusted to 2009 dollars for income.