Asymmetry in Municipal Government Responses in Growing vs. Shrinking Counties with Focus on Capital Spending

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Abstract

Spending by municipal governments in the United States increased by more than 250 percent between 1972 and 2012, faster than population growth (48 percent increase) and growth in median household income (32 percent increase). Further, other socioeconomic 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. Yet, reinvestment in core infrastructure in many places is insufficient and slowly crumbling. The purpose of this paper is to examine asymmetry in municipal revenue and expenditure responses to changing economic, demographic, and institutional variables using detailed municipal finance data aggregated to the county level for the United States over the 1972-2012 period. Regression analysis reveals asymmetry in shrinking and growing places in responses to economic, demographic, and institutional change.

Keywords: Municipal Finance, Asymmetry, Population, Decline

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Asymmetry in Municipal Government Responses in Growing vs. Shrinking Counties with Focus on Capital Spending

Introduction

Municipal government spending in the United States increased by more than 250 percent between 1972 and 2012, much faster than growth in population and median income (U.S. Census 2017). Municipal spending in counties that experienced population decline over this period nearly doubled (U.S. Census 2017). In this study, we offer an evaluation of the long-run relationships between changing economic, demographic, and institutional factors and municipal spending growth. Of particular interest, we seek to understand why municipalities experiencing long-run population decline driven by structural changes in the regional economies tend not to reduce spending. As a prelude, the findings reveal asymmetries in the relationships between explanatory variables and municipal revenue and expenditure growth, the dependent variables in the study. While the findings shed new light on long-run changes in local government finance, the study pays special attention to capital infrastructure spending. While it is well known that core public infrastructure is continually eroding, capital outlays increased much faster than the growth in population and median income. One important issue is that the costs of infrastructure replacement are often times much greater than building new infrastructure (Eidenger 2007). This in part explains why capital outlay may have nearly doubled in places experiencing population decline.

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

Literature Review

Much of the growth and development that the 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, helping to create wealth, opportunities, and prosperity which improved residents' quality of life. With passage of time, it is evident that public infrastructure is aging and there is a growing need for major investments to rehabilitate existing infrastructure and create new assets (ASCE 2017). Public infrastructure not only empowers local governments to facilitate the provision of essential services to residents, but also plays a critical role in enabling private farm and non-farm businesses to carry out their production and distribution activities (Mikesell 2012). The benefits of an effective public infrastructure system enhance economic productivity.

Every four years, the American Society for Civil Engineers (ASCE) reports on the quality of the nation's infrastructure; the latest report assigned a D+ grade to America's infrastructure (ASCE

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 is incurred by state and local governments (Mikesell 2012). At the local level, capital expenditures are usually funded through federal and state grants, borrowing via municipal bonds, property tax levies, sales and local option sales tax, and sometimes by cash (Bartle et al. 2010). In addition to using funds from operating budgets, 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 (ICMA 2013).

Given the ongoing depreciation of critical public infrastructure and prevailing volatile economic conditions, it 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 versus urban areas. In order to offer a more complete evaluation of capital spending, we also examine the determinants of municipal operating expenditures as well as own source and intergovernmental revenues. In the next section, we review two strands of literature. The first part covers the literature on the determinants of local government spending in general, whereas the second part provides a review of the research on local government capital spending. The latter body of research has primarily focused on large urban areas across the nation.

Growth in Local Government

The Median Voter Model is perhaps 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 studies examining government spending levels, growth, and priorities. In general, this body of research shows that changing community economic and demographic forces play an important role in changing government spending levels, patterns, and priorities.

Brennan and Buchanan (1980) propose a different framework for thinking about the 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.[1] Beginning in the 1970s, citizens have sought to introduce new tax and expenditure limitations on local governments.[2] 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, the work of

[1] See Mueller, chapter 21 (2003) and Oates (1989) for more detailed discussions.
[2] See Skidmore (1999) for a review of the literature on TELs

Blankenau and Skidmore (2002) shows that the imposition of tax and expenditure limits (TEL) also tends to coincide with school finance reform (SFR) activity. In fact, a number of new TELs 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 TELs as well as SFR that occurred during the period of analysis. In the case of municipalities, SFR shifted the burden to school funding to state governments and thus altered municipal government political and fiscal positions. 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 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.

Of interest is that the responsiveness of municipal government spending to changing socioeconomic forces may differ in shrinking and growing places. The work of Berry et al. (2012) documents the tendency for local governments to grow even in the face of declining population. Importantly, 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 socioeconomic 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.

Infrastructure Investment

With the significant role that infrastructure plays as an input in 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) recently examined the level of capital spending at the federal, state, and local levels by comparing pre- and post-recession spending 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 improved or created new public infrastructure.

Gamkhar (2000) investigated the degree to which state and local governments attempted to make up for the cuts in federal highway grants during the 1976-1990 period when large cuts occurred. The study identifies an asymmetrical relationship; when federal spending increases, the effect on state and local spending is negligible, but when federal spending is reduced there are 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 hypothesized that in the face of fiscal stress, municipalities would draw down on stabilization and excess general funds. Using data on all 351 municipalities from the

Massachusetts Division of Local Services, Gianakis found that municipalities did not adopt/use stabilization funds to deal with downturns—more popular solutions to deal with downturns were to delay expenditures on capital projects and maintenance, as well as to delay hiring new workers. Skidmore and Scorsone (2010) also found that 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 methods approach to determine how capital spending priorities changed during the Great Recession. His sources include 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 finds that while spending decreased during the recession, it would have been cut further without 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 that he terms "the boom." His hypothesis was that that capital spending should increase during boom periods. Pagano uses data from the Annual Fiscal Survey to show that the growth rate for capital spending grew substantially during the boom, where the increase in capital spending 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, the socioeconomic and demographic characteristics of voters, factors that limit budgets such as TELs 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, Wang and Hou 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 intergenerational equity, 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, generating 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 county socioeconomic and institutional variables to explain municipal revenue/expenditure growth, including median household income, household income of the top 10^{th} percentile, poverty rate, the proportion of adults with a bachelor's degree, the share of households that live in mobile homes, county population, the share of households with a single female head, the share of population over the age of 65 and under 18, and the share of population that is Caucasian. Based on the literature and the authors' understanding of the causality and interdependencies between the variables, our general hypotheses are as follows: rising median income and higher levels of educational attainment may lead to greater demand for municipal

services, and vice versa; increasing mobile home 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 population under the age of 18 is expected to be negatively related to municipal spending growth; 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 TELs and RTW laws will reduce municipal spending growth, whereas we have no a priori expectation regarding how SFR will affect municipal spending.

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

Data and Empirical Approach

Data on municipal government revenues and expenditures come from the United States Census of Governments. Municipal fiscal data on revenues and expenditures are aggregated to the county level and are collected every five years (1972, 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012). Two indicator variables are generated to examine asymmetry in the impacts of the explanatory variables on municipal revenues and 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 population growth (about 75 percent of counties). 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 we used municipal level data. Also, 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 to using different types of data; however, we believe that a county level analysis of municipal spending offers new insight into the dynamics of municipal spending in a panel data framework.

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

$$\Delta \mathrm{Rev}_{itj} = Grow^{*}\,\Delta Econ_{it}\alpha_1 + Shrink^{*}\,\Delta Econ_{it}\alpha_2 + Grow^{*}\,\Delta Pop_{it}\alpha_3 + Shrink^{*}\,\Delta Pop_{it}\alpha_4 + Grow^{*}\,\Delta Inst_{it}\alpha_5 + Shrink^{*}\,\Delta Inst_{it}\alpha_6 + Grow^{*}\,t_t + Shrink^{*}\,t_t + c_i + e_{it}$$

where Δ*Rev* represents the change in the natural logarithm of municipal revenue (or expenditure) for county *i* between periods *t* and *t-5* for revenue (expenditure) category *j*, and Δ*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. Δ*Pop* 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 Δ*Inst* is a vector of institutional variables that includes variables that indicate change in RTW status, the change in the number of tax and expenditure limitations, and the change in number of school finance reform efforts. *t* is a vector of time indicator variables, 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/revenue categories and includes: total municipal expenditure/revenue from all overlying jurisdictions (table 4, column 1; and table 5, columns 1 and 2); own source revenue (table 4, column 2; and table 5, columns 3 and 4); intergovernmental transfers from state and federal governments (table 4, column 3; and table 5, columns 5 and 6); and operating expenditures and capital expenditures (table 4, columns 5 and 6; and table 6, columns 1-4).

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 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 TELs across the states and over time. The approach we use is to identify when new TELs are imposed on municipal governments in every state. Although the measure of TELs we used identifies all changes in the status of TELs over time, it does not capture the different TEL characteristics, thus our TEL variable measures the average effect of TELs on municipal revenue and 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; Yinger 2004). Therefore, this variable measures the average effect of SFR on municipal spending across the states and over time.

To assess the differences in the effects of the explanatory variables on municipal spending and revenues, 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 differ 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 specification used is convenient because the coefficients on the key variables can be interpreted as elasticities.

Tables 1-3 present summary statistics of all variables for each year included in our evaluation, where table 1 represents all counties, table 2 shrinking counties, and table 3 growing counties. It is evident that median income increased in both shrinking and growing counties until 2002, and then fell thereafter. Population decreased on average by about 28 percent in shrinking places and expanded by 69 percent in growing counties. Although population declined in the shrinking counties, table 2 shows that municipal revenues more than doubled. However, in growing counties (table 3), municipal revenues increased by more than 300 percent. Figures 1, 2, and 3 illustrate trends over time in municipal government revenue, own source revenue, intergovernmental transfers, median household income, top 10 percent income, and population. 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 graphs, it is evident that median household income grew more slowly across both growing and shrinking counties than did municipal revenues/expenditures. During the period of 1972-2012, median household income peaked and began to fall in both growing and shrinking counties in 2002, whereas top 10 percent income continued to trend upward. Growth in municipal revenue/spending expanded rapidly until 2007 and then slowed greatly between 2007 and 2012 in both shrinking and growing places. Figures 4-6 illustrate a spatial representation at the county level of changes in per capita total municipal revenue (figure 4), capital outlay (figure 5), and operating expenditures (figure 6) in shrinking (red) and growing (green) counties. 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. Except for California, Florida, Utah and a few of the small east coast states, shrinking counties exist in every state across the nation. Again, most shrinking counties experienced significant growth in municipal revenues and expenditures despite experiencing population reductions and modest growth in median income over the period. In fact, the maps show that growth in per capita municipal revenues and spending is greater in declining counties than in growing counties. This descriptive summary information provides context for understanding the estimates generated from our regression analyses, which are discussed below.

Empirical Analysis Findings

Findings of the regression model using the full set of counties without distinguishing which are growing and which are shrinking are presented in table 4. Tables 5 and 6 illustrate how the

changing socioeconomic and institutional factors affect municipal finances differently in shrinking and growing places.

Consider first the estimates presented in table 4, which include regressions for total municipal revenues, own source revenue, intergovernmental revenue, capital outlays, and operating expenditures for all counties. These regressions are typical in the sense that the elasticities are generated from all observations. Nevertheless, the estimates provide useful information. Of the economic variables, we observe that the median income and 'top 10 income growth' are positively associated with municipal revenue and expenditure growth. Change in the poverty rate and mobile home living are generally negatively associated with municipal revenues and 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 in column 1 is 0.83; that is, a 1 percent increase in population increases municipal spending by approximately one 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 percentage population that is under the age of 18, the other demographic variables are by and large statistically insignificant. Changes in percentage of population under the age of 18 are negatively associated with municipal revenues and spending.

Turning to the institutional variables, we observe that RTW, State TELs, Local TELs, and SFR are statistically significant in most of the regression models and negatively associated with municipal revenue and spending growth. Also of interest is that the coefficients on State TELs, Local TELs, and SFR are much larger in the capital outlay regression than in the operating expenditure regression; it appears that when local governments are faced with new constraints, capital spending is cut more so than operating expenditures.

While the regression models presented in table 4 are of interest and are presented as a baseline for comparison, we focus the rest of our discussion on the regression models in tables 5 and 6 which allow the coefficient estimates to differ across shrinking and growing counties. Consider first the coefficients on population, since this is our primary interest. The coefficient on population for growing counties is very similar to the coefficient using all counties. However, for declining counties the coefficient is more than a third smaller and statistically insignificant. These estimates suggest that when population is growing, municipal revenue expands at a similar rate but when population is in decline, municipal revenues generally do not experience a corresponding reduction. However, the imprecise estimate suggests that there is greater variability in municipal responses to population decline. This pattern is even more pronounced in the own source revenue regression, whereas responsiveness of intergovernmental revenue to population change is similar to the total revenue estimates. In table 6, we see that the population elasticity estimate in the capital outlay is greater than 1 for growing counties, and smaller for shrinking counties. However, the population elasticity estimates for growing and declining counties in the operating expenditures regression are similar. 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 revenue and spending to changes in median income is greater in shrinking than growing counties. TELs appear to have a much stronger negative effect on municipal revenues and spending in growing than shrinking counties, and this difference is most pronounced for capital spending. These findings suggest that TELs tend to serve as a binding constraint in places that are growing in population but not in places that are experiencing decline; TELs are nonbinding in places with no growth. Similarly, SFR seems to reduce municipal revenue and spending growth in places experiencing population growth. SFR often includes efforts to reduce local property tax reliance, and this effect is manifested in growing counties but not shrinking counties. There are some other differences across growing and shrinking counties; the interested reader can review the tables to identify these differences. We have highlighted the more notable asymmetries here.

Conclusions and Implications

In this study, we conducted a detailed examination of municipal revenues and spending over the 1972-2012 period using fiscal data for all counties in the United States. Our analysis offers a new perspective on the long-run relationships between economic, demographic, and institutional factors on municipal revenue and spending patterns. We are particularly interested in assessing potential asymmetry in responses to population growth and decline. About 25 percent of the counties experienced population decline over the period of analysis. Our analysis shows that municipal spending is more responsive to population growth than decline, and the effect is most pronounced for capital spending. TELs, on the other hand, inhibit revenue and spending increases in growing counties but not shrinking counties, and again the effect is more pronounced in growing counties. Similarly, SFR tends to reduce municipal revenue and spending more so in growing counties than shrinking counties. Overall, the analysis provides a new approach that helps us understand the growth patterns of municipal finances. In the context of capital spending, it seems that capital spending tends to be more responsive to population growth than decline. This in part may be explained by the fact that areas experiencing population decline are primarily focusing on capital upkeep and replacement where replacing depreciating capital is often times far more expensive than installing new capital. As infrastructure continues to depreciate, capital reinvestment will increasingly place pressure on municipal budgets in the coming years. Municipal spending has increased much more rapidly than population and median income growth, and this is especially true of capital spending. Capital outlay nearly doubled in counties experiencing population decline. Nevertheless, the current state of infrastructure in the United States suggests that capital outlay has been insufficient (ASCE 2017). A challenge will concern how to allocate limited resources in ways that maximize productivity and quality of life across the nation that are relatively equitable across space and time.

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 large 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 paper, evidence suggests that it is more expensive to maintain capital

assets than it is to install new infrastructure. The drinking water contamination crisis in Flint, Michigan is one example where water infrastructure systems have not been maintained in a depopulating community. Growing communities, on the other hand, would 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 beyond the control of city leaders, some cities have far more public infrastructure than their existing population and economies can support. And yet, without maintaining public infrastructure, the downward cycle is exacerbated. However, raising tax burdens to maintain unneeded infrastructure is also detrimental to future growth. 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. On the other hand, postponing capital improvement of essential infrastructure will make it costlier in the future and impose a greater burden on the posterity. Based on our findings, the key question for communities is: will regions with declining populations be able to reinvest in essential infrastructure to maintain quality of the quality of life for existing residents and position themselves for a potential renaissance in the future?

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Tables and Figures

Table 1: Summary Statistics for Dependent and Independent Variables

	1972	1977	1982	1987	1992	1997	2002	2007	2012
Revenue									
Total Revenue	31,524	39,929	45,209	59,103	66,804	78,342	87,139	112,716	111,260
	(536,045)	(606,049)	(542,008)	(741,906)	(880,138)	(954,941)	(925,949)	(1,387,526)	(1,244,570)
Own-Source	23,306	27,178	33,178	46,371	52,414	60,897	65,369	89,140	86,705
	(327,664)	(358,734)	(358,252)	(529,965)	(617,621)	(674,661)	(587,459)	(1,024,837)	(874,957)
Intergovernmental	8,218	12,750	12,030	12,731	14,388	17,354	21,769	23,575	24,544
	(212,973)	(252,224)	(191,026)	(219,463)	(272,190)	(291,126)	(255,923)	(381,132)	(387,931)
Total Capital	7,588	7,721	8,976	10,281	11,269	12,533	16,361	19,477	18,998
	(74,527)	(52,086)	(72,357)	(78,323)	(108,127)	(116,746)	(152,269)	(180,273)	(211,051)
Total Current	21,804	26,998	30,952	38,155	45,447	51,986	64,663	75,967	81,036
	(388,860)	(385,303)	(362,009)	(448,082)	(534,397)	(568,024)	(734,374)	(789,408)	(868,527)
Economic									
Median Income	32,589	34,961	37,508	40,317	43,798	48,285	49,402	45,450	43,078
	(8,318)	(7,982)	(8,593)	(10,074)	(11,365)	(12,042)	(11,897)	(10,965)	(10,995)
Top Ten Income	66,800	69,134	73,501	80,916	90,336	102,737	115,938	130,521	125,572
	(12,383)	(11,298)	(11,854)	(14,230)	(17,396)	(21,302)	(21,920)	(18,336)	(1,364,816)
Poverty Rate	0.163	0.139	0.126	0.129	0.126	0.144	0.119	0.149	0.168
	(0.089)	(0.071)	(0.062)	(0.065)	(0.066)	(0.060)	(0.057)	(0.059)	(0.062)
% BA Degree	0.080	0.100	0.116	0.126	0.138	0.153	0.168	0.182	0.191
	(0.040)	(0.047)	(0.054)	(0.059)	(0.065)	(0.071)	(0.077)	(0.083)	(0.084)
Mobile Home	0.057	0.071	0.085	0.102	0.0114	0.119	0.122	0.126	0.133
	(0.038)	(0.042)	(0.049)	(0.060)	(0.070)	(0.076)	(0.083)	(0.085)	(0.094)
Demographic									
Population	66,738	70,492	74,160	77,695	81,917	87,166	92,094	96,468	99,107
	(260,062)	(260,672)	(266,738)	(280,204)	(294,667)	(309,971)	(323,254)	(333,243)	(339,563)
Female HH	0.074	0.080	0.085	0.092	0.098	0.102	0.106	0.110	0.118
	(0.026)	(0.029)	(0.032)	(0.036)	(0.038)	(0.039)	(0.040)	(0.041)	(0.045)
% Over 65	0.113	0.119	0.126	0.135	0.140	0.139	0.141	0.146	0.149
	(0.036)	(0.037)	(0.039)	(0.040)	(0.040)	(0.039)	(0.039)	(0.038)	(0.039)
% Under 18	0.338	0.311	0.290	0.276	0.266	0.259	0.251	0.240	0.234
	(0.038)	(0.035)	(0.033)	(0.033)	(0.032)	(0.031)	(0.031)	(0.031)	(0.032)
% White	0.896	0.890	0.884	0.880	0.872	0.858	0.848	0.841	0.836
	(0.151)	(0.148)	(0.148)	(0.149)	(0.151)	(0.155)	(0.158)	(0.159)	(0.161)
Institutions									
Right to Work	0.535	0.555	0.555	0.570	0.570	0.570	0.596	0.596	0.623
	(0.499)	(0.496)	(0.496)	(0.495)	(0.495)	(0.495)	(0.490)	(0.490)	(0.484)
State TEL	0	0	0.209	0.291	0.387	0.501	0.560	0.634	0.634
	-	-	(0.408)	(0.506)	(0.577)	(0.631)	(0.646)	(0.778)	(0.778)
Local TEL	0.967	1.199	1.831	1.894	2.118	2.331	2.375	2.376	2.376
	(0.707)	(0.0677)	(1.422)	(1.488)	(1.517)	(2.072)	(2.086)	(2.087)	(2.088)
SFR	0.127	0.501	0.620	0.836	1.365	1.809	2.062	2.373	2.454
	(0.333)	(0.658)	(0.700)	(0.696)	(1.168)	(1.122)	(1.225)	(1.355)	(1.393)

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

Table 2: Declining Jurisdictions: Summary Statistics for Dependent and Independent Variables

	1972	1977	1982	1987	1992	1997	2002	2007	2012
Revenue									
Total Revenue	25,369	29,835	32,925	37,244	39,385	45,939	48,084	55,629	53,464
	(208,899)	(235,832)	(261,701)	(291,116)	(326,452)	(384,372)	(384,570)	(472,087)	(431,623)
Own-Source	18,400	18,820	21,875	27,234	28,288	32,680	31,559	39,263	36,876
	(153,793)	(153,546)	(175,130)	(218,254)	(239,331)	(275,270)	(245,297)	(343,928)	(303,126)
Intergovernmental	6,986	11,014	11,050	10,008	11,096	13,258	16,524	16,363	16,587
	(63,427)	(89,384)	(93,206)	(79,814)	(96,699)	(119,677)	(150,329)	(144,329)	(145,868)
Total Capital	5,496	5,487	5,511	5,552	6,148	7,045	9,469	8,357	8,111
	(39,268)	(37,313)	(40,038)	(46,407)	(51,641)	(64,255)	(93,306)	(81,754)	(67,093)
Total Current	17,726	20,489	22,509	24,871	27,208	30,803	36,753	38,577	39,886
	(148,121)	(159,722)	(173,980)	(190,824)	(211,292)	(239,200)	(302,397)	(306,954)	(309,551)
Economic									
Median Income	30,740	33,098	35,152	36,751	39,366	43,506	44,638	41,258	39,230
	(7,211)	(6,673)	(6,538)	(6,679)	(7,033)	(7,385)	(7,383)	(7,020)	(7,246)
Top Ten Income	65,332	67,385	70,385	74,805	81,253	90,742	104,098	123,253	142,408
	(11,813)	(9,794)	(9,507)	(10,289)	(11,822)	(13,917)	(14,441)	(14,344)	(18,299)
Poverty Rate	0.167	0.148	0.138	0.142	0.139	0.125	0.127	0.153	0.168
	(0.096)	(0.077)	(0.069)	(0.071)	(0.072)	(0.066)	(0.063)	(0.064)	(0.066)
% BA Degree	0.071	0.089	0.103	0.112	0.122	0.135	0.149	0.162	0.171
	(0.023)	(0.026)	(0.029)	(0.031)	(0.034)	(0.038)	(0.044)	(0.051)	(0.054)
Mobile Home	0.045	0.058	0.069	0.081	0.089	0.092	0.095	0.100	0.107
	(0.029)	(0.033)	(0.039)	(0.048)	(0.056)	(0.062)	(0.070)	(0.071)	(0.079)
Demographic									
Population	48,575	47,708	46,630	45,234	44,365	44,286	43,910	43,088	42,595
	(246,942)	(238,871)	(232,161)	(227,412)	(225,892)	(229,206)	(229,363)	(224,747)	(222,006)
Female HH	0.067	0.071	0.076	0.082	0.088	0.092	0.097	0.100	0.105
	(0.031)	(0.035)	(0.039)	(0.045)	(0.049)	(0.050)	(0.051)	(0.052)	(0.056)
% Over 65	0.131	0.141	0.151	0.163	0.170	0.171	0.172	0.174	0.176
	(0.037)	(0.037)	(0.038)	(0.038)	(0.038)	(0.036)	(0.035)	(0.035)	(0.035)
% Under 18	0.337	0.309	0.287	0.277	0.267	0.259	0.249	0.237	0.230
	(0.039)	(0.035)	(0.032)	(0.031)	(0.029)	(0.027)	(0.026)	(0.026)	(0.027)
% White	0.915	0.908	0.902	0.898	0.891	0.880	0.871	0.866	0.862
	(0.164)	(0.164)	(0.166)	(0.168)	(0.171)	(0.174)	(0.177)	(0.178)	(0.179)
Institutions									
Right to Work	0.584	0.605	0.605	0.613	0.613	0.613	0.640	0.640	0.657
	(0.493)	(0.489)	(0.489)	(0.487)	(0.487)	(0.487)	(0.480)	(0.480)	(0.475)
State TEL	0	0	0.144	0.225	0.259	0.392	0.402	0.456	0.456
	-	-	(0.352)	(0.476)	(0.523)	(0.611)	(0.620)	(0.732)	(0.732)
Local TEL	1.024	1.169	1.646	1.783	2.033	2.212	2.153	2.153	2.153
	(0.533)	(0.518)	(0.657)	(0.733)	(0.907)	(1.066)	(1.082)	(1.081)	(1.081)
SFR	0.171	0.400	0.537	0.699	1.327	1.704	1.932	2.269	2.363
	(0.377)	(0.513)	(0.641)	(0.664)	(1.096)	(1.057)	(1.178)	(1.313)	(1.368)

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

Table 3: Growing Jurisdictions: Summary Statistics for Control Variables

	1972	1977	1982	1987	1992	1997	2002	2007	2012
Revenue									
Total Revenue	33,820	44,065	50,496	68,391	78,488	92,159	103,769	136,917	135,623
	(614,827)	(698,326)	(618,849)	(858,022)	(1,021,489)	(1,105,205)	(1,070,517)	(1,618,225)	(1,451,167)
Own-Source	25,135	30,555	37,939	54,469	62,582	72,963	79,602	110,136	107,627
	(372,164)	(411,476)	(408,657)	(611,523)	(715,467)	(780,235)	(678,766)	(1,195,575)	(1,020,012)
Intergovernmental	8,684	13,508	12,556	13,291	15,905	19,195	24,166	26,780	27,996
	(246,448)	(291,698)	(217,973)	(254,560)	(316,450)	(336,653)	(411,293)	(442,920)	(451,143)
Total Capital	8,368	8,602	10,389	12,256	13,389	14,730	19,248	24,001	23,388
	(83,937)	(56,835)	(81,699)	(87,994)	(123,839)	(132,207)	(170,837)	(207,256)	(246,438)
Total Current	23,325	29,687	34,594	43,878	53,247	61,064	76,672	91,886	98,548
	(446,438)	(442,689)	(413,456)	(516,229)	(618,569)	(655,960)	(849,470)	(916,032)	(1,011,805)
Economic									
Median Income	33,043	35,411	38,094	41,253	45,010	49,664	50,780	46,716	44,277
	(8,450)	(7,896)	(8,240)	(9,656)	(10,964)	(11,773)	(11,890)	(11,369)	(11,503)
Top Ten Income	67,338	69,775	74,651	83,171	93,684	107,191	120,359	133,271	146,166
	(12,545)	(11,738)	(12,407)	(14,803)	(17,915)	(21,821)	(22,554)	(18,851)	(17,388)
Poverty Rate	0.162	0.136	0.122	0.124	0.121	0.110	0.116	0.148	0.168
	(0.087)	(0.068)	(0.059)	(0.063)	(0.063)	(0.057)	(0.054)	(0.057)	(0.060)
% BA Degree	0.084	0.105	0.122	0.132	0.145	0.160	0.175	0.190	0.199
	(0.045)	(0.053)	(0.060)	(0.066)	(0.073)	(0.079)	(0.085)	(0.092)	(0.092)
Mobile Home	0.063	0.078	0.094	0.113	0.126	0.132	0.136	0.139	0.147
	(0.036)	(0.043)	(0.051)	(0.062)	(0.071)	(0.078)	(0.085)	(0.087)	(0.096)
Demographic									
Population	65,186	70,946	76,596	81,887	87,944	94,966	100,363	106,437	110,383
	(203,921)	(215,676)	(231,462)	(252,650)	(272,542)	(290,280)	(305,225)	(319,674)	(328,984)
Female HH	0.078	0.083	0.088	0.096	0.101	0.105	0.108	0.113	0.122
	(0.025)	(0.026)	(0.028)	(0.031)	(0.032)	(0.033)	(0.034)	(0.035)	(0.039)
% Over 65	0.107	0.112	0.118	0.125	0.129	0.129	0.131	0.137	0.140
	(0.035)	(0.035)	(0.035)	(0.036)	(0.036)	(0.034)	(0.034)	(0.035)	(0.036)
% Under 18	0.339	0.313	0.291	0.277	0.266	0.260	0.252	0.242	0.236
	(0.038)	(0.035)	(0.034)	(0.034)	(0.034)	(0.032)	(0.032)	(0.033)	(0.034)
% White	0.889	0.884	0.878	0.874	0.866	0.852	0.841	0.833	0.828
	(0.146)	(0.142)	(0.141)	(0.142)	(0.143)	(0.146)	(0.148)	(0.149)	(0.151)
Institutions									
Right to Work	0.517	0.538	0.538	0.555	0.555	0.554	0.580	0.580	0.611
	(0.500)	(0.499)	(0.499)	(0.497)	(0.497)	(0.497)	(0.494)	(0.494)	(0.488)
State TEL	0	0	0.235	0.317	0.435	0.541	0.617	0.698	0.699
	-	-	(0.434)	(0.515)	(0.588)	(0.633)	(0.646)	(0.785)	(0.785)
Local TEL	0.739	1.007	1.563	1.710	1.925	2.040	2.080	2.081	2.081
	(0.663)	(0.710)	(0.928)	(1.053)	(1.105)	(1.213)	(1.256)	(1.255)	(1.255)
SFR	0.064	0.453	0.584	0.847	1.363	1.776	2.024	2.318	2.408
	(0.245)	(0.627)	(0.666)	(0.670)	(1.178)	(1.152)	(1.230)	(1.428)	(1.470)

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

Table 4: Regressions for All Units

All Units	Total Revenue	Own-Source Revenue	Intergovernmental Revenue	Capital Outlays	Current Operations
ln(Median Income)	0.230**	0.0746	0.354***	0.103	0.237***
	(2.272)	(0.549)	(2.821)	(0.466)	(2.635)
ln(Top Ten Income)	0.151*	0.396***	0.0482	0.354**	0.0641
	(1.853)	(3.228)	(0.569)	(2.072)	(0.828)
Poverty Rate	-0.0333	-1.145**	0.202	-2.302***	0.0265
	(-0.0886)	(-2.135)	(0.518)	(-2.748)	(0.0744)
% BA Degree	0.133	-0.126	-0.124	0.218	-0.190
	(0.564)	(-0.428)	(-0.646)	(0.480)	(-0.785)
Mobile Home Rate	-0.442	-0.212	-0.276	0.378	-0.830**
	(-1.282)	(-0.416)	(-0.773)	(0.523)	(-2.355)
ln(Population)	0.829***	0.635***	1.029***	1.559***	0.811***
	(5.803)	(2.941)	(7.375)	(5.772)	(5.587)
Female HH Rate	-0.0227	0.164	-0.180	-0.489**	-0.0965
	(-0.122)	(0.592)	(-1.531)	(-2.214)	(-0.464)
% Over 65	-0.845	-0.0846	-0.0507	-3.038*	-0.103
	(-0.995)	(-0.0659)	(-0.0579)	(-1.830)	(-0.115)
% Under 18	-1.561**	-0.888	-1.619**	-6.038***	-1.210*
	(-2.438)	(-0.905)	(-2.433)	(-4.815)	(-1.857)
%White	0.298	-0.810	0.294	0.256	0.00231
	(0.848)	(-1.508)	(0.898)	(0.377)	(0.00673)
Right to Work	-0.217***	-0.0421	-0.211***	-0.129	-0.205***
	(-5.760)	(-0.858)	(-5.692)	(-1.610)	(-5.052)
State TELs	-0.0506***	-0.0774***	-0.0543***	-0.0754**	-0.0436**
	(-2.944)	(-3.475)	(-3.117)	(-2.425)	(-2.531)
Local TELs	-0.0249**	-0.0108	-0.0205**	-0.0579***	-0.0185*
	(-2.506)	(-0.658)	(-2.075)	(-2.744)	(-1.863)
SFR	-0.0160**	-0.0407***	-0.0190**	-0.0527***	-0.00850
	(-2.113)	(-3.085)	(-2.406)	(-3.136)	(-1.096)
Constant	0.351***	0.709***	0.221***	-0.133**	0.435***
	(13.05)	(17.44)	(8.017)	(-2.405)	(16.26)
Observations	47,122	43,562	46,359	40,129	46,884
R-squared	0.024	0.039	0.019	0.006	0.026
Number of Units	6,063	6,018	6,045	5,889	6,059

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.

Table 5: Asymmetric Regressions (Revenues)

Total Revenue			Own-Source Revenue		Intergovernmental Revenue	
	Declining	Growing	Declining	Growing	Declining	Growing
ln(Median Income)	0.589**	0.219*	1.219***	-0.00423	0.540**	0.364***
	(2.273)	(1.951)	(3.258)	(-0.0305)	(2.035)	(2.626)
ln(Top Ten Income)	-0.0265	-0.0205	0.0305	0.171***	-0.0577	-0.0608
	(-0.461)	(-0.500)	(0.363)	(2.776)	(-0.961)	(-1.408)
Poverty Rate	0.334	-0.103	0.811	-1.737***	0.422	0.159
	(0.483)	(-0.219)	(0.754)	(-2.692)	(0.585)	(0.327)
% BA Degree	-0.447	0.291	-1.427*	0.184	0.0817	-0.177
	(-1.021)	(1.006)	(-1.914)	(0.562)	(0.202)	(-0.817)
Mobile Home Rate	0.700	-0.696*	0.429	-0.0858	1.209	-0.596
	(0.998)	(-1.738)	(0.392)	(-0.145)	(1.613)	(-1.467)
ln(Population)	0.491	0.763***	0.0937	0.670***	0.402	0.925***
	(1.255)	(4.797)	(0.152)	(2.823)	(0.990)	(6.022)
Female HH Rate	-0.0554	-0.0433	0.208	0.155	-2.228	-0.130
	(-0.0338)	(-0.237)	(0.0892)	(0.626)	(-1.416)	(-0.822)
% Over 65	1.156	-1.810	-2.813	0.259	3.062**	-1.422
	(0.796)	(-1.641)	(-1.266)	(0.156)	(2.050)	(-1.250)
% Under 18	-0.915	-1.348*	1.483	-1.980*	-1.017	-1.109
	(-0.728)	(-1.764)	(0.730)	(-1.734)	(-0.768)	(-1.410)
% White	0.728	0.255	-0.711	-0.960*	-0.223	0.542
	(0.783)	(0.703)	(-0.516)	(-1.668)	(-0.269)	(1.559)
Right to Work	-0.164**	-0.226***	0.112	-0.0793	-0.162**	-0.224***
	(-2.179)	(-5.168)	(1.075)	(-1.428)	(-2.035)	(-5.302)
State TELs	-0.00903	-0.0732***	-0.132***	-0.0692***	-0.0180	-0.0750***
	(-0.221)	(-3.931)	(-2.673)	(-2.808)	(-0.422)	(-3.980)
Local TELs	-0.00581	-0.00220	0.0185	0.00505	0.0155	-0.00199
	(-0.435)	(-0.327)	(0.828)	(0.447)	(1.078)	(-0.295)
SFR	-0.00155	-0.0200**	-0.0321	-0.0455***	-0.00521	-0.0245***
	(-0.0946)	(-2.331)	(-1.129)	(-3.036)	(-0.308)	(-2.734)
Constant		0.355***		0.685***		0.234***
		(13.31)		(16.78)		(8.646)
Observations		47,122		43,562		46,359
R-squared		0.024		0.040		0.019
Number of Units		6,063		6,018		6,045

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.

Table 6: Asymmetric Regressions (Expenditures)

Capital Outlays			Current Operations	
	Declining	Growing	Declining	Growing
ln(Median Income)	1.119**	-0.0295	0.469*	0.180**
	(2.021)	(-0.144)	(1.797)	(2.040)
ln(Top Ten Income)	0.132	0.126	0.000176	-0.0343
	(1.136)	(1.433)	(0.00292)	(-0.845)
Poverty Rate	0.141	-3.273***	0.497	-0.195
	(0.0847)	(-3.319)	(0.692)	(-0.457)
% BA Degree	-0.940	0.593	-0.996**	0.0921
	(-0.881)	(1.203)	(-2.235)	(0.316)
Mobile Home Rate	2.027	0.228	-0.394	-0.966**
	(1.170)	(0.283)	(-0.557)	(-2.327)
ln(Population)	0.951	1.441***	0.670*	0.768***
	(1.097)	(4.995)	(1.737)	(4.695)
Female HH Rate	-5.732	-0.342*	-1.467	-0.0533
	(-1.531)	(-1.926)	(-0.968)	(-0.216)
% Over 65	-2.419	-4.964**	1.367	-0.424
	(-0.746)	(-2.419)	(0.887)	(-0.365)
% Under 18	-7.249**	-5.275***	-1.154	-0.289
	(-2.485)	(-3.729)	(-0.922)	(-0.372)
%White	-0.287	0.410	-0.384	0.250
	(-0.172)	(0.547)	(-0.379)	(0.750)
Right to Work	0.0786	-0.165*	-0.181**	-0.212***
	(0.396)	(-1.909)	(-2.313)	(-4.469)
State TELs	-0.00138	-0.111***	-0.0223	-0.0631***
	(-0.0174)	(-3.306)	(-0.541)	(-3.385)
Local TELs	-0.0124	-0.00439	-0.0110	-0.00109
	(-0.376)	(-0.293)	(-0.762)	(-0.162)
SFR	0.0216	-0.0733***	-0.00154	-0.00800
	(0.557)	(-3.915)	(-0.0894)	(-0.923)
Constant		-0.132**		0.447***
		(-2.391)		(16.75)
Observations		40,129		46,884
R-squared		0.007		0.027
Number of Units		5,889		6,059

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.

Figure 1: Change in Key Variables

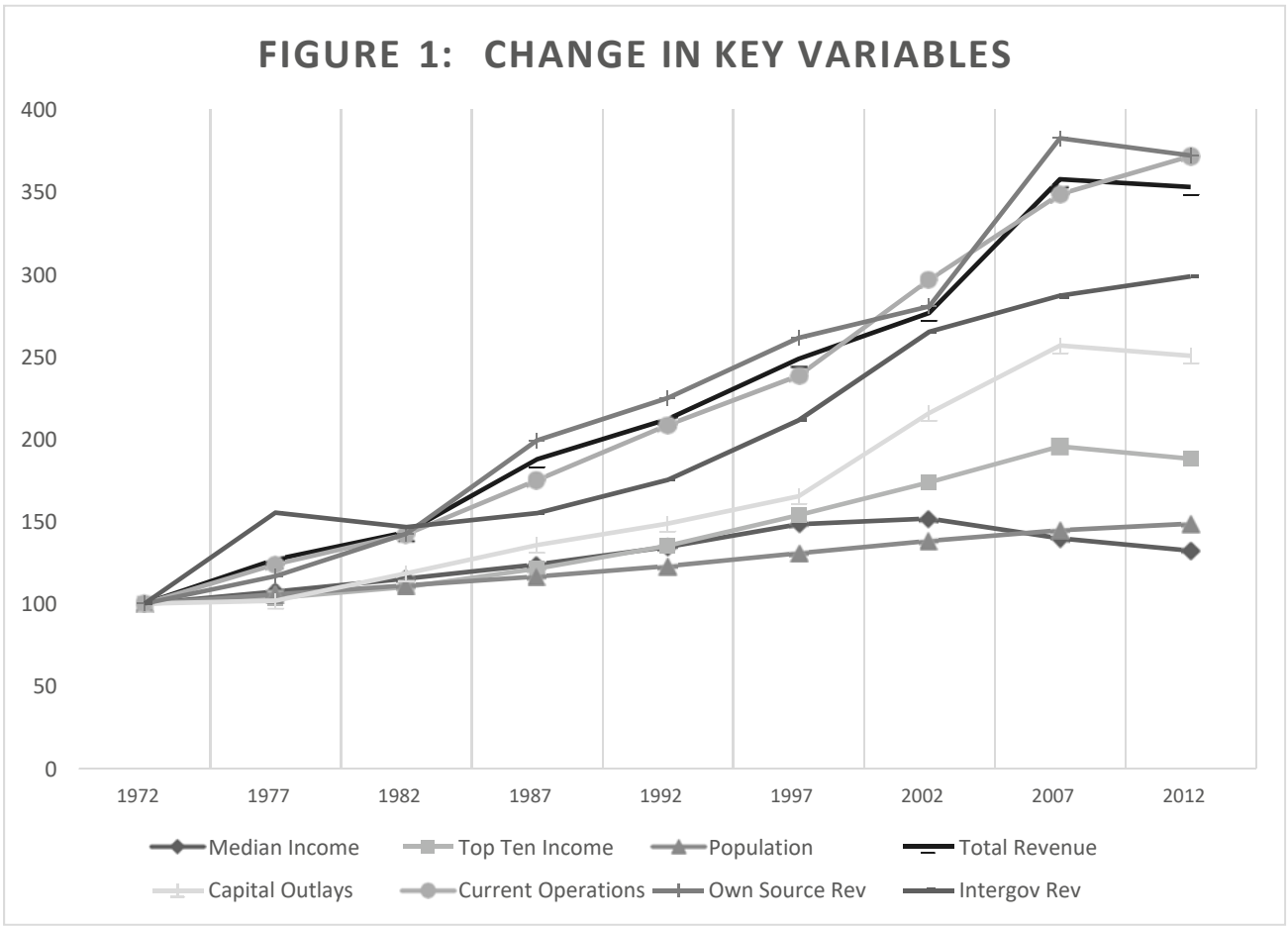

Figure 2: Change in Key Variables – Declining Areas

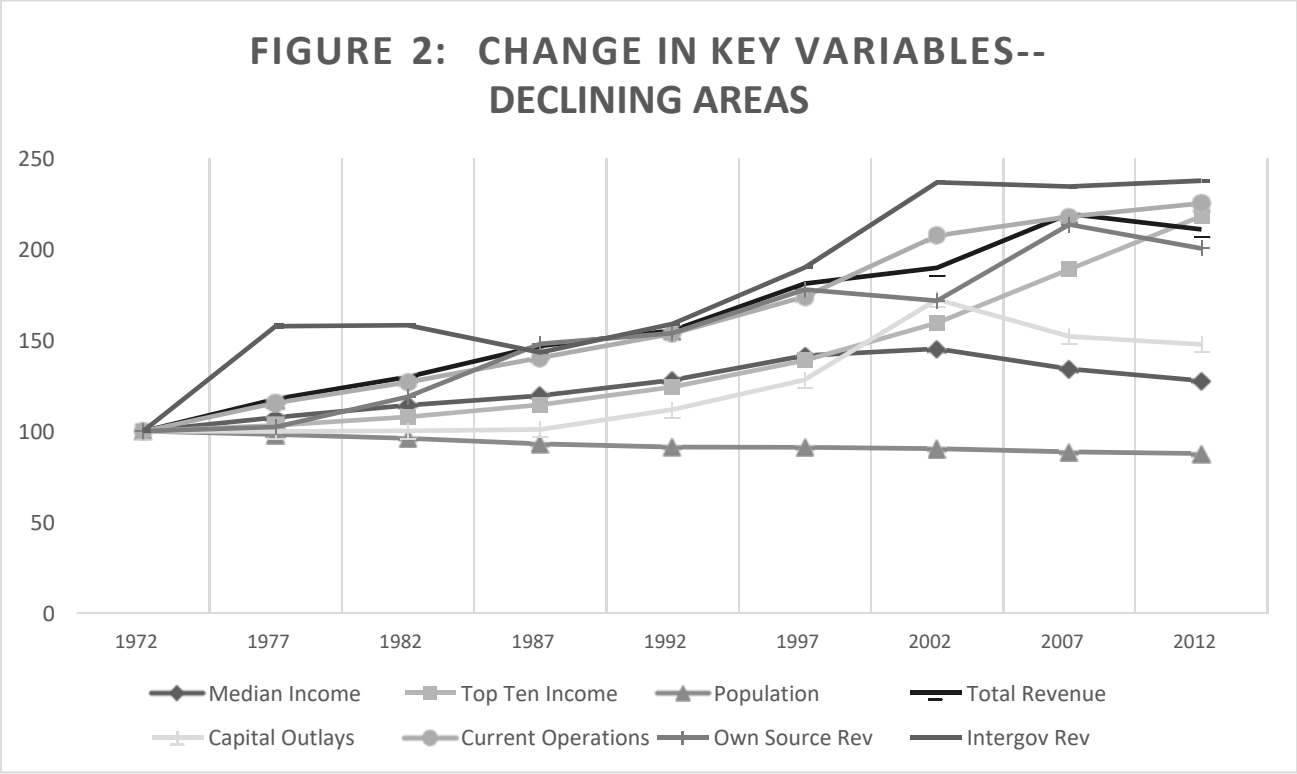

Figure 3: Change in Key Variables – Growing Areas

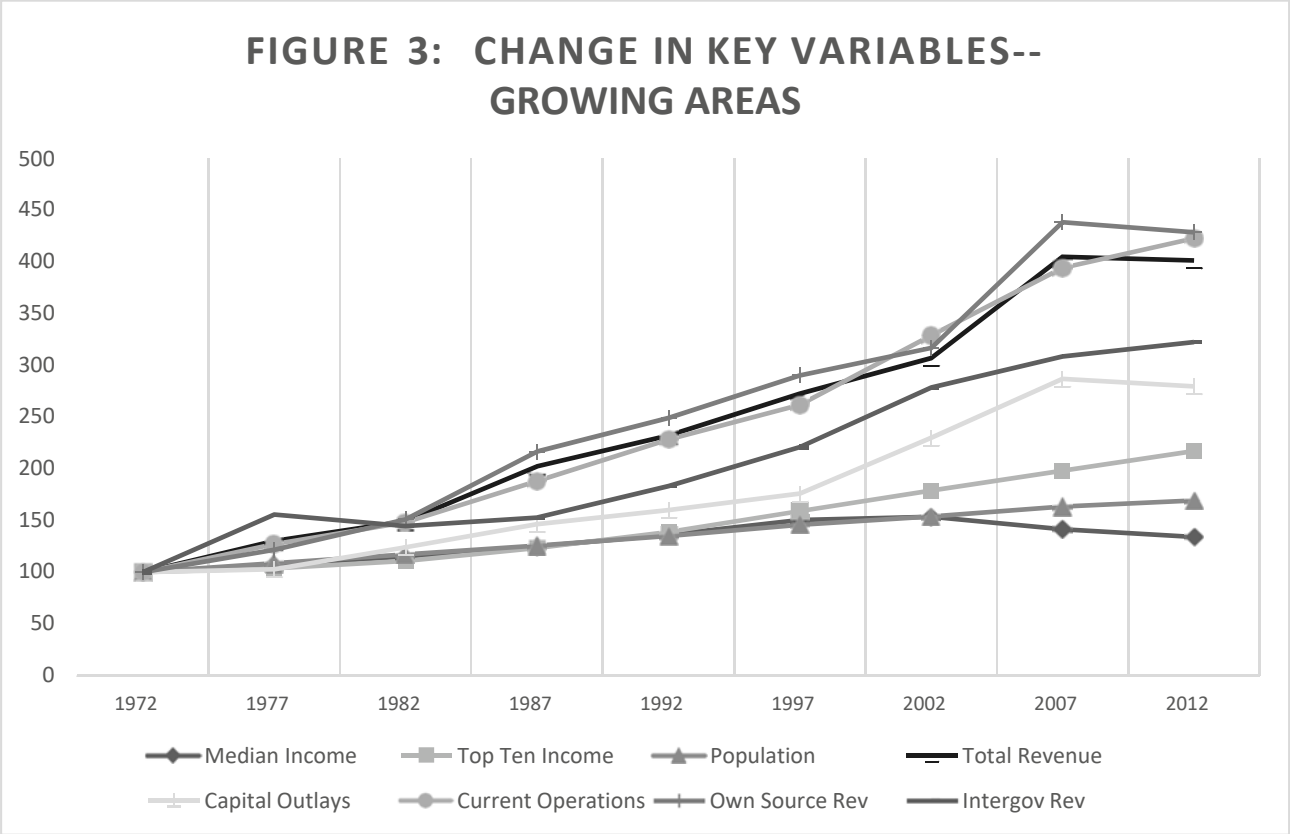

Figure 4: Percentage Change in Inflation-Adjusted Total Municipal Revenues in Growing and Declining Counties

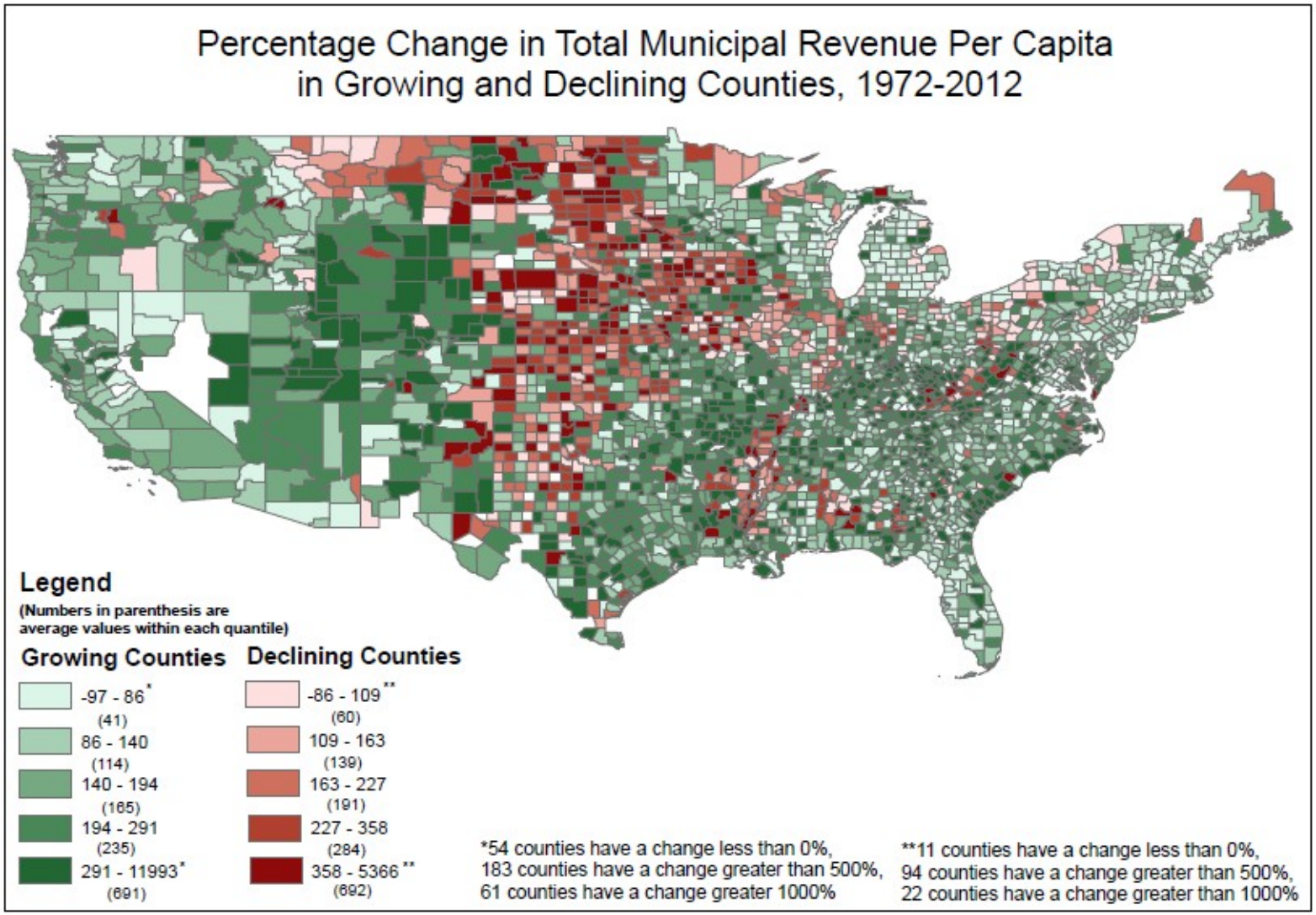

Figure 5: Percentage Change in Inflation-Adjusted Municipal Capital Outlay in Growing and Declining Counties

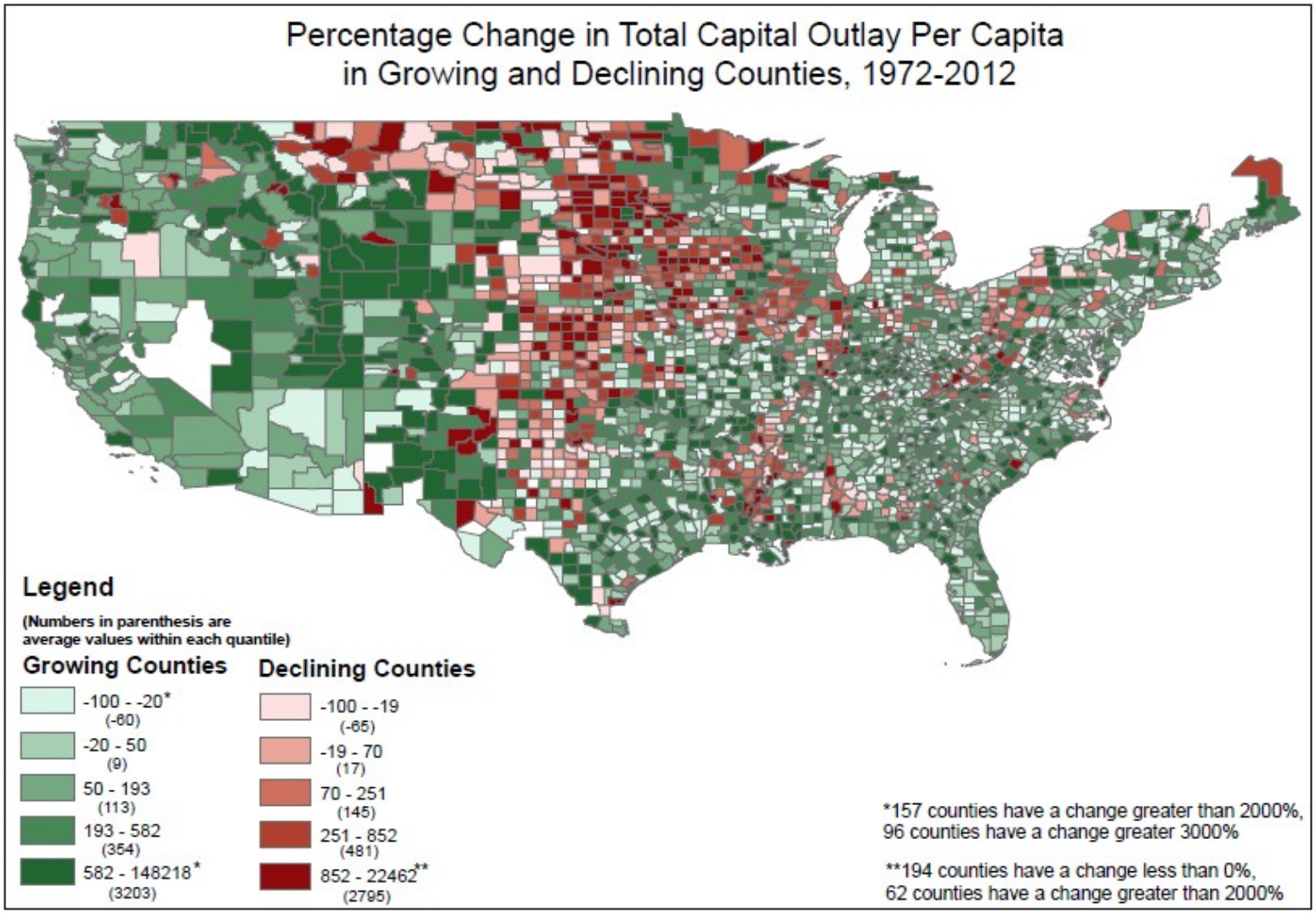

Figure 6: Percentage Change in Inflation-Adjusted Operating Expenditure in Growing and Declining Counties