

Small Towns, Big Differences: Administrative Capacity and Capital Spending in Municipal Governments

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Abstract

Administrative and financial capacity are inextricably linked to government size. As a result, municipal governments face inherently different financial decision-making conditions based on population size. These differences are especially pronounced in the smallest quartile of local governments, which vary widely in revenue sources, service mix, and reliance on debt, among other key factors. Despite these differences, the existing literature on municipal government finance offers little consideration for small local governments, and results are generally drawn from the largest cities in the US. This paper explores the impact of size and capacity differences on capital spending in Pennsylvania cities and towns. Using a 50-year dataset of financial records from local governments in the commonwealth, I examine financial factors that influence government capacity and their relationship with capital spending. I find that while large municipalities trend tightly together in most areas of analysis, variability increases significantly in smaller municipalities. This paper indicates that research on municipal government finance must consider size and capacity more thoroughly to serve governments of all sizes with meaningful results.

Introduction

In 2017, municipal governments in the United States spent over \$569B on capital projects, yet the nation's infrastructure is consistently criticized for its poor and worsening condition. 70% of this infrastructure is owned by governments below the state level, which have significantly stronger limitations on their planning ability, ranging from staff availability to funding structure. The capital management landscape in municipal governments is heterogeneous and complex, with no standard planning practice adopted across the United States, or even within most states themselves.

As a municipality grows, its administrative staff also grows, as does its revenue from taxes. This means larger cities can allocate more funding to staff support, technology, additional personnel, and other administrative resources. Small municipalities may not be able to afford these expenses, or may decide that they are an inefficient use of tax dollars. The result is increased administrative capacity in larger city governments, which enables better informed planning, regular evaluations of capital assets, and more advanced financing methods. While a city of 1 million people and a town of 100 may both maintain roads and sewers, they go about it in vastly different ways. Small municipalities face challenges that could be solved quickly with the resources of a large city. For example, an unexpected \$500,000 road repair may be inconvenient for a large city's budget, but is devastating to a municipality with a yearly budget half that amount. It makes sense, then, that there is no one-size-fits-all approach that meets the needs of large and small municipal governments. However, recommendations on capital management practices tend to favor large municipalities, leaving small local governments without actionable resources and widening the capacity gap.

Academic and professional support for small municipalities has been lacking to date. The existing literature on capital management in municipal governments focuses primarily on large cities, whether explicitly or by the composition of their data. A key reason for this is the lack of reliable data coverage of small municipal governments. Unfortunately, this embeds the assumption in their policy recommendations that a government will have access to the resources of a large municipality.

This paper seeks to bridge that gap by extending prior analysis of capacity and capital spending to a dataset that includes even the smallest municipalities in Pennsylvania in a 50-year panel. I explore how population relates to government capacity in order to highlight the need for further consideration, and extend traditional analyses of capital spending determinants to explicitly consider small municipal governments.

This paper contributes to the field of municipal capital finance in several meaningful ways. First, it is one of the few empirical studies to address determinants of capital spending in municipal government, and makes use of a panel dataset that is both longer

in time and more comprehensive in coverage. Second, this paper specifically considers government capacity and population size and independent determinants of capital spending, and demonstrates gaps in capacity between large and small municipalities. Third, the analyses in this paper contribute to our understanding of the financial and administrative factors that influence capital spending decisions, indicating a need for further work studying the unique financial conditions of small local governments.

The remainder of this paper proceeds as follows: I first review the relevant literature on municipal capital spending and measures of government capacity. I then describe the 50-year panel dataset used throughout this paper, and present the methods used to analyze these data in the context of my research questions. Next, I present the results of those analyses, followed by discussion of their relevance to research and practice. I conclude with limitations of this work and suggest promising avenues for future work in this area.

Literature Review

Capital spending represents a significant portion of municipal spending, and has a significant impact on the daily lives of local residents and businesses. Despite this, capital spending in municipal government is a relatively small component of the public administration Literature. Even within this narrow field, even less attention is directed toward small municipal governments, with the overwhelming majority focusing on the largest metropolitan areas in the US.

History of Capital Spending

Pagano [2002] conducts one of the first historical analyses of municipal capital spending in cities over 50,000 people and found intuitive relationships between local economic growth and capital spending. Fisher and Wassmer [2015] extend this work into the 2000s for a comprehensive review of municipal capital spending trends, but only considers those governments in aggregate. Recently, Chen et al. [2019] used a 25-year panel dataset

of central cities to investigate the determinants of capital spending, a topic that has historically seen more attention.

Determinants and Impacts of Capital Spending

The research on capital spending is largely concerned with the factors that influence the decision to spend tax dollars on capital, and the economic effects of that spending.

Some of the earliest work in this area, such as [Bland and Nunn, 1992], shows that investments in capital lead to increased operating costs in the future, but only in capital-intensive areas such as roads and sewers. As capital spending slowed into the 2000s, research attention turned to the determinants of capital spending. Fisher and Wassmer [2015] establish a connection between traditional indicators of economic growth, such as median income and population growth, and capital spending. The positive correlation between intergovernmental revenues and capital spending is both intuitive and well-established, as these transfers are often restricted to fund infrastructure construction. Huckins et al. [1989] and Fisher and Wassmer [2015] both show that there is a strong positive relationship between federal transfers and capital spending in local government.

It is also of note that capital spending, and municipal government finance generally, vary significantly between states. Alm and Dronyk-Trosper [2021] and Zhang and Holzer [2020] show these differences clearly in recent empirical analyses. The variations are due to a number of factors including state-imposed TELs, differences in state intergovernmental transfer policies, and demographic differences. The impacts of these policies on government spending are significant, and require careful consideration in empirical analysis. To circumvent this issue, I only consider a single state in this paper. This circumvents the issue of state-specific impacts entirely, eliminating the need to estimate the impact of complex financial policy, an issue that is still actively discussed in the literature.

Chen et al. [2019] presents a valuable summary of the existing work, and empirically supports existing theory with a 25-year panel of 100 large cities. Chen et. al. also make the argument that several measures of government capacity¹ are significant explainers of

¹In their own words, Fiscal Capacity and Political and Fiscal Institutions

capital spending in municipal government. I turn next to review the literature concerning these measures of capacity.

Municipal Capacity

While intergovernmental transfers are a powerful driver of local capital spending, they have declined in the past 20 years, and do not offer a reliable method for small municipalities to finance their capital needs [Afonso, 2013]. Pagano [2002] shows that growth in own-source revenues are associated with increased capital spending in a sample of cities with a median population over 100,000. Pagano [2002] also argues that public debt was not a significant determinant of the increased capital spending during this period. Other authors have identified government capacity as a significant determinant of capital spending behavior through a number of financial and administrative mechanisms.

Chen et al. [2019] demonstrate empirically that municipal capital spending is significantly explained by administrative and financial capacity, as well as population demographics. This paper extends their work to consider the interplay of population size on these factors. There are countless recommendations to municipal finance managers to enhance their government's capacity, such as the best practices described in Ammar et al. [2001]. These recommendations are generally tailored toward well-equipped municipalities, and especially in small towns, the effective capital management practices as described in Ammar et al. [2001] may be out of reach.

In contrast to the additive resources of financing and management strategies, municipal capacity is also defined by the restrictions placed on their financial operations. Wang and Wu [2018] find that debt limits (such as the Pennsylvania Local Government Unit Debt Act) restrict the capital spending of local governments. Poterba [1995] shows that institutional characteristics such as formal capital budgeting have a significant impact on capital spending, and impacts on financial performance may also extend to the professionalization of key personnel [Whalley, 2013]. In keeping with both of these, I expect that the number or quality of municipal employees is a relevant factor of capacity. To that end, I use total government wages per capita, central staff spending per capita, and

financial administration spending per capita as measures of relative workforce size and skill within a municipality.

The research landscape supporting municipal government finance is relatively small. A significant reason for the lack of comprehensive research on municipal governments, especially those with small populations, is data availability and reliability. Small municipal governments are more difficult to collect and analyze data on because of how numerous and disconnected they are. Even analyzing the fiscal health of small municipalities presents a challenge, as many of the early measures of fiscal health² were designed for large cities in an era when they dominated the municipal landscape Hendrick [2004]. In the remainder of this paper, I address this shortcoming by leveraging a long-panel dataset of municipal finances that includes municipalities of all sizes, and analyze the impact of their size and capacity on capital spending.

Data and Methods

Data

For my analysis, I rely on the U.S. Census Bureau’s Census of Governments Financial Datasets, supplemented by the Survey of Governments Financial Datasets (hereafter, “Census”). These data are self-reported from governments in the U.S. to the Census Bureau according to a standard reporting scheme, which has been relatively consistent in the period of analysis. In the cases where reporting methodology does change, I have derived a consistent structure from the Census Bureau’s official documentation of the data [of the Census, 2006]. A complete explanation of the Census dataset generation and cleaning is available in Rudy [2024]. I offer a summary of the principal details here.

The data span the 50-year period from 1972-2021, and is restricted to towns, townships, and cities for this paper³. Every 5 years starting in 1972, the data include all

²For a review of these measures, see [Burchell and Listokin, 1981],[Aronson, 1984], and [Ross and Greenfield, 1980]

³While there are some notable differences between these classifications in practice, Pennsylvania law makes little distinction between them with regard to government finance. I refer to this set of governments as “Municipalities” throughout the remainder of this paper.

municipalities, with a response rate of approximately 92%. In all other years, the Census takes a sample of governments of varying sizes across the country. While the sampling method is designed to be representative of the country as a whole when resampled every 5 years, it is not necessarily representative of Pennsylvania municipalities. As such, the panel data are necessarily unbalanced, and large municipalities have more consistent representation in the data. In each year a municipality reports to the Census, it includes population and annual revenue, expenses, transfers, debt, and account balances, with highly granular categories within each of these. Each spending category is further divided into nonconstruction capital, construction, and operating expenses. I maintain each of these amounts as disaggregated, constant-2022 dollar amounts, and calculate the following variables by government-year observation: total capital/operating spending, share of capital spending, debt to revenue ratio, total own-source revenue and its share of all revenue, total and share of state and federal transfers, and unreserved cash holdings as a share of annual operating expenses. Unless otherwise noted, all non-ratio variables are reported in per-capita dollars, following well-established precedent in the literature.

Preliminary Analysis

I first present basic relationships between several of these variables, especially focusing on how they relate to population size. These preliminary findings address my first hypothesis: H_1 : There are significant differences in municipal capacity between large and small municipalities. This section also highlights the fragmented and highly variable landscape of municipal finance and capacity within the state to justify further research on small municipalities. In this section, I also present a number of time-series graphs showing mean values for select variables in each of the quartiles.

To demonstrate the impact of capacity in municipal government, I divide the data into population quartiles, which are calculated in the years with comprehensive coverage. Where prior analyses have considered only the impact on the sample mean, I conduct each of the regressions separately by quartile. The summary statistics of key variables by quartile are included in Table 1. Notably, the bottom two quartiles cover only a very

small population range, due to Pennsylvania’s unusually high number of municipalities for its population density.

Quartile	Population	Mean Value (sd)		
		Annual Revenue per capita	Own-Source Percentage	Government Wages per capita
Q_1	459 (208)	384 (649)	63.1 (22.9)	109 (174)
Q_2	1253 (284)	355 (336)	67.3 (19.0)	106 (136)
Q_3	2698 (668)	396 (347)	75.9 (14.5)	121 (153)
Q_4	20391 (93069)	642 (518)	84.4 (10.5)	230 (171)

Table 1: Basic Summary Statistics

As previously stated, there is a lack of sociodemographic data that can be effectively matched to the Census panel. As such, I diverge from prior work in terms of control variables. Where prior work has identified and utilized a set of relevant controls including age distribution, median income, land area, etc., I have only population as a demographic control. To address this shortcoming, I include a number of proxies for traditional measures in my analyses, and include two-way fixed effects to isolate the impact of these variables on capital spending. I avoid the most significant variation (between states) that has been noted by prior authors by restricting the data to Pennsylvania municipalities. While this avoids confounding variation due to TELs and state policy, it also limits the degree to which these results can be generalized.

Model Specifications

With the results from the preliminary analyses as a foundation, I then proceed to address the relevance of capacity differences on government finance through the lens of capital spending. To this end, I focus the analysis on my second hypothesis: H_2 : Government capacity has a significant impact on the capital spending decisions of municipal governments.

To begin, I estimate the determinants of capital spending in a panel regression with two-way fixed effects. This is consistent with the standard economic analysis of government spending under the Median Voter Model (see Borcherting and Deacon [1972],[Holcombe, 1989]). Because of the limitations in my dataset, I do not attempt to time-lag any of the financial variables. I first conduct this regression on total capital spending, then following Chen et al. [2019], I repeat this analysis on road capital spending only. Due to the number of small municipalities in Pennsylvania and their relatively basic service provision, I do not attempt to analyze any of the less-common capital spending areas.

In each of these regressions, I use measures of government capacity as independent variables to show their relative impact on governments of different population sizes. By separating the regressions by quartile, I will identify how measures of capacity vary in their impact between sizes of government. In keeping with the findings in Chen et al. [2019], I expect that municipalities with a larger share of own-source revenue will spend more on capital. I also expect that intergovernmental revenue will be a strong determinant of spending, a result that has been consistently reaffirmed with empirical results.

Results

The Municipal Capacity Landscape

Municipal governments within Pennsylvania are highly concentrated at very low population levels. In all 50 years of the data, the 75th percentile population is less than 4,500 people. While all but the largest three cities in Pennsylvania would be considered small by many researchers, there is significant variation in financial variables between the smallest three quartiles. These variations provide valuable insight to the role of government capacity, as even small absolute changes have large relative impacts. Table 2 presents a more complete list of summary statistics describing the financial variables of each quartile.

Table 2 confirms that there is much higher variation within the smallest quartile in almost all variables. It also shows that while the three smallest quartiles are relatively

Mean Value (sd)				
Variable	Q_1	Q_2	Q_3	Q_4
Revenue	384 (649)	355 (336)	396 (347)	642 (518)
Own-Source Percent- age	63.07 (22.94)	67.27 (18.95)	75.90 (14.49)	84.40 (10.46)
Long-Term Debt	139 (3046)	84 (364)	118 (410)	409 (866)
Cash Reserves	369 (1048)	224 (537)	220 (634)	281 (508)
State IGR	139 (296)	92 (98)	69 (77)	71 (85)
Federal IGR	16 (159)	10 (129)	7 (43)	21 (86)
Central Staff Spend- ing	37 (90)	28 (38)	29 (33)	35 (32)
Financial Administra- tion Spending	19 (73)	16 (34)	16 (26)	16 (19)
Taxes	170 (216)	183 (161)	213 (148)	342 (225)
Roads share of capital	80.50 (36.35)	78.90 (35.41)	71.18 (36.78)	49.85 (34.78)
Government Wages	109 (174)	106 (136)	121 (153)	230 (171)

Table 2: Financial Variables by Quartile

similar in revenue per capita, road share of capital spending, and government wages per capita, they vary significantly in other key areas. Cash reserves per capita are significantly higher in Q_1 than Q_2 or Q_3 , which aligns with prior work indicating growing reserves in small municipal governments. These savings are not clearly dedicated to any single purpose, but may serve as a substitute for other financial capacity. Municipalities in Q_1 also display higher debt per capita.

The fourth quartile has stark differences from the other three in most variables, but I highlight a few relevant points here. First, several variables decrease along the first three quartiles, then increase in the fourth: reserves, federal and state IGR, staff spending, and government wages. The last two may indicate diseconomies of scale in the largest municipalities, or the nonlinear growth of government services with population. Neither of these explain why central staff spending in the first and fourth quartiles are nearly

equal. Instead, this indicates that because central staff makes up a higher proportion of total government wages in Q_1 , these municipalities are spending relatively more to offer similar services to Q_2 and Q_3 . In other words, they are not benefiting from economies of scale.

As one may expect, own-source revenue share increases with population size, and variance decreases in step. This is an important link between population size and own-source revenue, which has been argued as a significant indicator of government capacity. To specifically focus on the issue of own-source revenue, Figure 1 shows own-source revenue as a function of population over the entire dataset. It should be expected that larger municipalities generate a higher proportion of their revenue through taxes and fees, but the variation in the three smallest quartiles is very pronounced. Figure 1 also has interesting

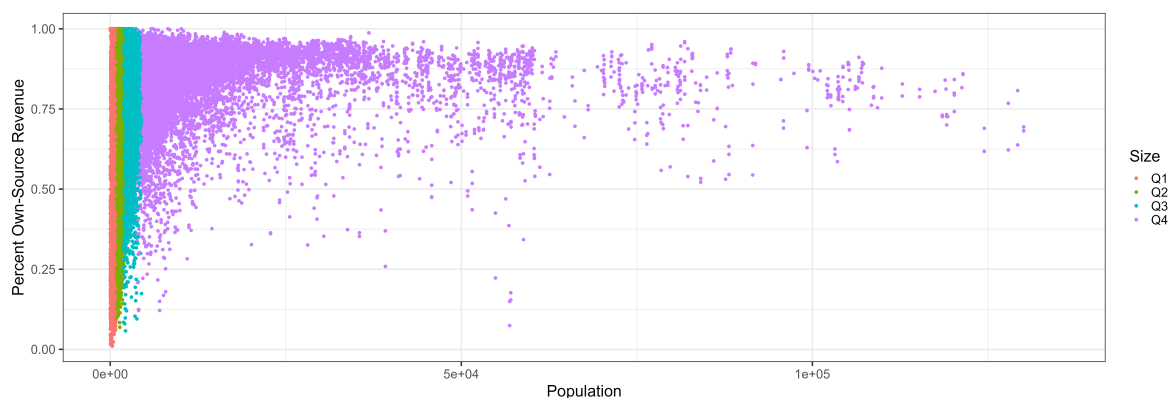


Figure 1: Own-Source revenue as a percentage of total revenue by population

implications for the existing research base in government capacity. Prior work examining own-source revenue as an indicator of capacity has largely focused on cities over 50,000 people, the tail end of Q_4 , where variation is at its lowest and capacity is relatively high. The figure indicates an inflection point in the trend around 12,500 residents, so this may be a promising boundary to examine in future research.

Determinants of Total Municipal Capital Spending

With the preliminary results in hand, I turn now to the determinants of capital spending. I first consider the determinants of total capital spending, and after presenting its results, consider determinants of the largest single category of capital: roads.

Covariates of Total Capital Spending Per Capita				
	Government Size Class			
	Q1	Q2	Q3	Q4
Cash Reserves	.015**	.002	.031***	.015***
Long-Term Debt	−.009†	.013*	.003	.022***
Government Wages	−.010	1.304***	.091***	.012
State IGR	.288***	.348***	.391***	.365***
Fed. IGR	.574***	.063***	.677***	.682***
Central Staff Ops.	−.097	−.028	.116†	.219***
Finance Operations	.033	−.191***	−.803	.062
Taxes	.043†	−.089***	−.049*	.0002***
Location Control	Unit	Unit	Unit	Unit
Year Control	Yes	Yes	Yes	Yes
R^2	.217	.509	.092	.175
N	9822	10831	11578	15773

*** Significant at the .1% level

** Significant at the 1% level

* Significant at the 5% level

† Significant at the 10% level

Table 3: Determinants of Total Capital Spending

Table 3 provides valuable insight to the impacts of government capacity on capital spending at different population sizes. The results of this model lends support to my second hypothesis, as the covariates of capital spending are significantly different between the quartiles. Most notably, it appears that small municipalities have fewer tools to support capital spending decisions, and rely largely on transfers from the state and federal government to fund these expenses.

Municipalities in each of the quartiles have a highly significant relationship between transfers and capital spending, but the three largest classes also have significant relationships with other variables. This supports prior work that has consistently found strong correlations between intergovernmental transfers and spending in municipal government. The results here extend those findings to capital specifically, and refine them into state and federal components, as well as considering them separately by population size. Across all of the quartiles, each dollar of intergovernmental revenue from the state has a relatively consistent impact on capital spending, from 28.5 cents in Q_1 to 47.4 cents in Q_3 .

Government wages have an exceptionally large impact in the second quartile, lending further support to the idea that internal capacity-building has positive effects on a municipality’s ability to finance capital assets. The smaller significant coefficient in the third quartile and lack of significance in the fourth indicate that the impact from a larger municipal workforce may be both realized and diminished quickly. At the same time, spending on central staff has a positive impact on capital spending in the two upper quartiles, and the impact is both more pronounced and more significant in the fourth quartile. Where overall spending on government wages may not be an effective mechanism to promote capital spending, investments in central staff may be a necessary component of effectively managing capital in larger municipalities. Apart from the size of the workforce, these may also indicate differences in pay rates for employees. The second quartile presents several inconsistencies with the other results in Table 3. This is likely due to the dominating effects of government wages on capital spending, as shown by its unusually large coefficient in this quartile.

Across each of the regression models, R^2 is relatively low, which should be expected given the lack of controls included in this dataset. Nonetheless, the explanatory power is highest in Q_1 and Q_2 , which adds color to the existing research landscape on municipal capital finance, which has generally covered the largest municipalities in the US.

Determinants of Road Capital Spending

Next, I present the results of the model that considers capital spending on roads and highways as the dependent variable. This model uses the same set of independent variables and source data.

The regression results in Table 4 show that while many of the capacity measures are significant across quartiles, their magnitudes are generally smaller. This is an intuitive result, given that roads are just one component of a municipality’s service mix, especially in larger cities that directly offer a wider array of services.

The regression results for capital spending on roads and highways includes several results that deviate from the total capital spending model. First, this model has signif-

Covariates of Roads & Highways Capital Spending Per Capita

	Government Size Class			
	Q1	Q2	Q3	Q4
Cash Reserves	−.014***	−.009*	.004**	.001
Long-Term Debt	−.006***	.016***	.003**	−.001
Government Wages	.077***	1.298***	.064***	.007
State IGR	.092***	.035*	.047***	.101***
Fed. IGR	.452***	.022*	.141***	.088***
Central Staff Ops.	−.065**	.048	.073**	.070***
Finance Operations	−.005	−.233***	.063*	.046
Taxes	.031*	−.168***	.005	.027***
Location Control	Unit	Unit	Unit	Unit
Year Control	Yes	Yes	Yes	Yes
R^2	.230	.590	.034	.038
N	9822	10831	11578	15773

*** Significant at the .1% level

** Significant at the 1% level

* Significant at the 5% level

† Significant at the 10% level

Table 4: Determinants of Roads Capital Spending

icantly lower explanatory power in the top two quartiles, indicating that these common financial and administrative capacity measures only account for less than 4% of the changes in capital spending in these governments. In the smallest quartiles, this model has a higher R^2 than total capital spending, and the coefficients are similar with one notable exception. In all four quartiles, State IGR takes a drastically lower (but still positive) value and remains highly significant. The same can be said for federal transfers in all but the smallest quartile. This lends support to prior work that claims small municipalities have become reliant on transfers from the federal government to fund necessary infrastructure.

In the total capital model, cash reserves had a small positive relationship in three of the quartiles. In the roads model, the two smallest quartiles have a negative coefficient on this variable, indicating that while the small half of municipalities use reserves to finance capital, it generally is not being used on roads.

Discussion

Financing capital infrastructure is a significant budgetary challenge for municipal governments of any size. Municipalities have far fewer financial resources to leverage, and have strict tax and expenditure limitations that restrict their ability to make quick adjustments. Differences in capacity further complicate this by making the municipal finance landscape highly heterogeneous, even within a single state. Measures of capacity have been advanced and tested in prior work as an explanation for these differences, but this research is largely limited to large cities. This study expands upon those findings by focusing on the impact of capacity within a group of relatively small governments.

The preliminary analyses confirm the intuitive idea that very small municipalities vary widely in both measures of capacity and financial outcomes. Despite a difference in mean population of just 800 people, the two smallest groups analyzed here exhibit wildly different sources of revenue, spending on staff, debt, and reserves on a per-capita basis. These differences continue still into the third and fourth quartiles, showing that population size is an essential factor to consider in any discussion of government capacity, and cannot be dispensed with through simple per-capita measures. While the smallest and largest municipalities appear similar in their staff spending, intergovernmental transfers, and reserves, the means mask important changes that occur in the middle two quartiles. The trend in the three smallest quartiles indicates that Q_1 and Q_4 appear similar, but for very different reasons. Where large cities receive transfers for major programs and initiatives with statewide relevance, small towns receive large transfers per capita to keep infrastructure in working order and support operations. This explanation is further supported by the 21 percentage point gap in own-source revenue share between these two classes. Own-source revenue shows a distinct pattern with respect to population, where municipalities above 15,000 residents have relatively similar revenue sources, those below this threshold vary significantly. This adds support to the existing theory that own-source revenue is a strong measure of government capacity.

The results from the preliminary analyses support my first hypothesis, that large and small municipalities vary significantly in government capacity. They show clear differ-

ences in service mix, revenue streams, and use of debt. Each of these is a driver of capital spending differences as identified in prior work, and if there is a causal relationship between government capacity and capital spending, there should also be meaningful differences in their capital spending behavior.

This is the assumption I test in the regression analyses, in order to address my second hypothesis: Government capacity has a significant impact on the capital spending decisions of municipal governments. The regression models in Tables 3 and 4 follow a similar structure to prior empirical work on the determinants of capital spending, although they lack valuable control variables. Despite this shortcoming, these models show significant relationships between the determinants of spending examined in the prior section and total capital spending. Table 4 also shows their specific relationship to capital spending on roads, which accounts for over 70% of all capital spending in the three smallest quartiles, and nearly 50% in the largest. Both models indicate significant relationships between the capacity measures and capital spending. At the most basic level, this supports my second hypothesis, but the design of these analyses allows for a more nuanced discussion of the results. Because roads and highways make up approximately 80% of capital spending in the bottom half of Pennsylvania municipalities in the past 50 years, the determinants of road spending show stronger explanatory power than determinants of total capital spending. These results indicate that intergovernmental transfers are a reliable determinant of capital spending, and transfers from state or federal government are an effective policy mechanism to increase roadway spending. In the second quartile, total government wages dominate the results, indicating that investments in staff in very small governments has an outsized impact on road management capacity. This is further supported by the decreasing marginal cost of government employees between the first and second quartiles.

The results also show that the determinants of capital spending vary based on population size. This should be expected, given the numerous other differences in government activities. The empirical results presented here warrant further consideration of government capacity in small local governments. As a first step, I conclude this section by

noting areas of agreement and disagreement with prior work, and considering how these differences impact the policy landscape of municipal finance.

Connections to Existing Work

Many of the results I present in this paper have been discussed in prior research, with varying similarities. This study expands upon that work by focusing on the differential impacts of government capacity on capital spending, and expanding the analysis to a 50-year panel of Pennsylvania governments.

In agreement with several prior authors, I find large positive impacts of intergovernmental revenue on municipal capital spending. Federal transfers generally have a much larger impact, which is intuitive when considering that Pennsylvania has a number of revenue passthrough programs such as the liquid fuels tax that make state transfers less variable, and so, less correlated with capital spending than the infrastructure-focused federal dollars.

My results on debt per capita as a determinant of capital spending differ from those of Pagano [2002], who identified no significant impact of debt. In Table 3, I find a small but significant positive impact in the second and fourth quartiles. They indicate an additional capital spending of 1.3 and 2.2 cents per dollar of debt, respectively. These values are small enough that they may not have practical relevance, but this discrepancy is worth noting. There are even smaller impacts on highway capital spending, and the first quartile has a small negative relationship in both cases. Given the magnitude and varying signs of these results, I am inclined to agree with the result presented in Pagano [2002] and conclude that debt has a practically insignificant impact on capital spending in municipal government.

Own-source revenue share presents the most compelling relationship with population size, and while I do not test it directly due to collinearity with the other financial variables included, the sum of my results seems to agree with Chen et al. [2019]. Own-source revenue seems to be a strong determinant of municipal capacity, and by extension, capital spending.

Impacts for Practitioners

In the smallest municipalities, policy decisions regarding government finance, and especially capital, should not be expected to follow any standard rule. Where research can draw generalities about large metropolitan areas that all rely on the same best practices, training, and pool of employees, the same cannot be said for Pennsylvania's smallest quartile of municipalities. With an average population of just 459, decision-making in these towns is likely to depend more on the ability of government leaders and accessibility of resources. It seems natural, then, that practitioners in these smallest municipalities have few tools to impact capital spending. Transfers from the state and federal government are a lifeline for infrastructure construction and maintenance that cannot be supplanted by any level of staff spending or tax adjustment. With exceptionally small populations, incremental changes to the budget are unlikely to produce enough excess revenue to finance major construction. This provides an interesting justification for the growth in small government savings in the past 20 years, even as a share of annual spending. It's possible that without other viable avenues to finance capital, and with intergovernmental transfers irregular and decreasing, these municipalities are accumulating larger reserves in anticipation of future capital expenses.

The findings for large municipalities (in the Pennsylvania context) are consistent with the existing research on municipal government capital finance, and as a result, present little practical advancements worth noting. In stark contrast to Q_1 , the cities in Q_4 have a broad range of tools at their disposal to finance their capital needs. With higher populations, even small changes in taxes collected or debt issued can provide the necessary funding for new infrastructure, and the data show that this has been the case in the past 50 years.

Intergovernmental transfers seem to be a strong equalizer in municipal capital spending, but these transfers have also been on a steady decline over the past 50 years, especially from the federal government. Indeed, the end of general revenue sharing in 1986 and limitations placed on intergovernmental grant programs under the Reagan administration may be a significant factor in the nation's declining infrastructure quality. A significant

portion of road infrastructure was financed by the federal government in the 1970s and 1980s, but as time has passed, more of these roads are under local jurisdiction, and the funding to support their maintenance has dried up. This has left thousands of municipalities within Pennsylvania with capital backlogs that will remain untenable without state or federal intervention.

Conclusions

In conclusion, this paper finds that there are significant differences in capacity between municipal governments with respect to population size. These differences pervade revenues, expenses, and financing mechanisms, all of which have significant impacts on capital spending. In sum, the capital spending behavior of large municipalities is notably different from medium- to small-sized municipalities. This presents some concern for the existing body of research regarding municipal government capacity and finance. Almost all of the existing work only considers large municipalities, and draws general conclusions from those results. As more recent work identifies the significant impacts of government capacity, researchers seem more sensitive to the generalizability of those results, but further work is needed to clarify their scope. Small municipalities face inherently different financial decision-making environments, and the body of research offering policy recommendations to leaders of small municipalities is especially thin. This paper identifies several specific areas where these variations are most pronounced with respect to capital spending, and indicates a need for further work moving forward.

Limitations of This Study

This study has several clear limitations that may be addressed in future work and explained by studies using other data. The most obvious of which is that this paper only considers municipalities within the state of Pennsylvania, with no attempt to generalize the results. While this is valuable in limiting error from significant interstate differences in municipal finance, it threatens the external validity of the results outside Pennsylvania.

Second, my analyses do not include traditional control variables such as median income, land area, etc.. While this study provides a valuable snapshot of capital spending behavior in municipalities across the state, a smaller sample with more robust controls would likely produce more precise results.

Future Work

This paper, along with other recent work in local capital finance, points to a need for further study of capital finance in municipal governments. There is clear evidence that government capacity, as measured by a number of financial and administrative variables, has a significant impact on capital spending behavior. While some work exists showing the impact of state-specific regulations on municipal spending, their consideration with regard to capital spending is relatively light and general. Additionally, this paper points specifically to a need for more rigorous study of small municipal governments and the policy decisions that influence their spending. With the exception of intergovernmental transfers and cash reserves, none of the determinants of spending in prior work are significant in the smallest municipalities. Speaking generally, this paper calls for additional work considering population size as a determinant of government capacity, in order to produce more accurate research and more relevant policy recommendations.

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