How Does the Organization of Local Government Affect Preformance? Evidence from U.S. Metros and Post Offices

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Abstract

How should local government be organized? Are centralized governments concentrated in a few large units or decentralized governments consisting of many smaller units more efficient at providing public goods? The literature provides conflicting answers to these questions. On one hand, decentralization can promote competition between local governments, providing a market-like mechanism to obtain efficency. On the other, fiscal externalities and spillovers can cause competition to result in a race to the bottom. In this paper, I use local government employment data from the metropolitan statistical areas of the United States and an IV strategy to estimate the causal effect of local government centralization on two outcomes, metropolitan level population growth and total local government employment, which can help decipher between the two conflicting theories. My two instruments are derived from a complete history of post offices in the United States. The first instrument uses post office establishment dates to measure the length of time between an areas inhabitation and its local government incorporation. The second leverages a historical policy change, the implementation of Rural Free Delivery in 1902, to measure the presence of small communities and dispersed populations. Both instruments are shown to increase decentralization and are plausibly exogenous to modern outcomes. Using the variation induced by these instruments, I find that centralization causes local governments to have both higher population growth rates and total local government employment. I then argue that these findings point most strongly to competition between local governments being a race to the bottom.

1 Introduction

A classic question in economics asks: how should government be organized? Because no market type solution is thought possible (Musgrave 1939; Samuelson 1954), there are concerns that public goods are not supplied efficiently. Focus is paid to the organization of

government because a large literature, with foundational contributions by Oates (1972), Tiebout (1956), and Olson (1965), suggests that it is a major determinant of the relative efficiency of this process. Following Oates (1972), the debate is generally taken over the appropriate position on a spectrum of centralization. This framing permits a more concrete question: is it better to have a centralized government concentrated in a few large units or a decentralized government consisting of many smaller units? This question is not only an academic curiosity, but is seen in enacted policy and current debates regarding local government. Between the years 2008 and 2017, 15 European countries initiated large scale municipal reforms, which in general led towards higher centralization through the consolidation of political units (Swianiewicz 2018). In another example at the turn of the century, Japan centralized its local governments significantly by reducing its number of municipalities from 3232 to 1719 through merger (Miyasaki 2014). In the United States, voters have been asked to decide on questions regarding a specific type of local government merger, those between city and county governments, 166 times since 1815 (Hall et al. 2020), along with a countless number of smaller merger and annexation votes, whose adoption would lead to an increase in centralization.

Examining how voters may make decisions in these referenda motivates the empirical results found in this paper. On one hand, voters can seek out, or political leaders can promote, the empirical literature on previous local government mergers. However, taking this specific empirical path can be frustrating. While one study would suggest gains from consolidation (Reinewertz 2012), another would suggest losses (Miyasaki 2018), and yet another would suggest no effect at all (Blom-Hanson et al. 2016). Likely the strongest conclusion coming out of the empirical literature on local government mergers is that the effect of a merger is contingent on the specific institutional factors regarding that specific merger (Zheng, Sun, & De Witte 2023). A voter determined to base their vote solely on past mergers would be hard pressed to find enough relevant data to do so. On the other hand, a voter can make their determination based off the predictions of a theory of local government. By adopting a theory, the voter is able to compare the expected effects of a more centralized counterfactual local government against the relatively more decentralized status quo, essentially developing an internal structural model to guide their voting behavior. While this approach overcomes the issue stemming from the lack of appropriate data, it introduces a new question: what theory will best guide the voter? There are many theories of local government that a potential voter could adopt, many of which provide conflicting predictions on the effects of centralization. The empirical results I present in this paper concern the effect of local government centralization on two outcomes, population growth and local government employment, which can potentially lend credence to one theory over another.

To estimate these effects, I use the 379 metropolitan statistical areas (MSA) of the United States. There is significant variation in how these metropolitan areas are organized, leading to significant variation in centralization. To measure centralization in each MSA, I rely on the Annual Survey of Public Employment and Payroll. This data provides me with the total staffing numbers of every local government in the United States. My main measure of centralization is a Herfindahl–Hirschman index (HHI) calculated using each governmental units share of total MSA level local government employment, similar to how HHI is defined using the firm level shares of total industry quantity or revenue in the Industrial Organization

literature. I also investigate other measures of centralization common in the literature, such as the number of local governments or the population per government. Along with variation in each MSA's centralization measure, there is significant variation in each MSA's local government composition. Each governmental unit falls into one of three categories: city, county, or special district. One MSA may have the majority of their local government concentrated at the county level, while another at the city level, or at any conceivable mix between the three. Estimation of the causal effect of centralization requires controlling for these possibly confounding compositions, along with other plausible determinants of our outcomes.

The goal of the empirical exercises is to estimate the causal effect of centralization on both outcomes. I employ a battery of controls in order to try to replicate an all else equal condition, but in all likelihood, I have missed a control or an important determinant is not observable. To handle the possibility of endogeneity, I turn to an instrumental variables strategy. I construct two instruments using data on the complete history of post offices as found in Blevins (2021) and a history of city incorporation dates from Goodman (2023). The first instrument is derived from a historical policy change regarding post offices: the implementation of Rural Free Delivery in 1902. I argue that this legislation was a significant shock that disproportionately effected those post offices that were smaller or served a more dispersed customer base. By measuring the number of closures between 1902 and 1910, I indirectly measure the number of small communities and the dispersion of the population. I argue further that these two factors are correlated with increased decentralization and exogenous to the modern outcomes. The second instrument relies on the time difference between the establishment of post offices and the incorporation of cities in an MSA. As a general rule, post offices were established before the incorporation of cities. This time difference proxies for the length of time that the land was inhabited before its local government organization was crystallized into law. With a greater time difference, more individual communities had time to develop. With more individual communities at the start, the ultimate local government organization is likely to be more decentralized.

The two outcomes I investigate plausibly lend credence to one theory of local government over another. The economic view of population growth is simple, people move towards locations that they expect will offer them higher utility (Rosen 1979; Roback 1982). Population growth appears to be particularly important to political leaders. In March of 2024, Milwaukee Mayor Cavalier Johnson said "I've made no secret of my goal to grow Milwaukee's population." In November of that same year, outgoing mayor of Detroit Mike Duggan said "I wanted to be judged by one thing, is the population of Detroit increasing?" In the opening remarks of the 2026 budget, Mayor Wade Kapszukiewicz of Toldeo linked population growth to the performance of local government when he stated "To truly thrive, we must grow our population through sustained, strategic investments in jobs, safety, housing, parks, and our roads." If, all else equal, centralized local governments have higher population growth, then this highly intuitive view claims that it is caused by centralized local governments offering higher utility than their decentralized counterparts. This is corresponds to what is found in this paper. More centralized MSA are found to experience higher population growth. But population growth may not be decisive for a voter. For example, Parkhomenko (2023) estimates a model and finds that voters often choose to vote against policies that increase

growth. Potential voters may be interested in the mechanisms driving the positive effect of centralization on population growth.

The mechanism most often promoted by political leaders who advocate for consolidation are economies of scale brought about by centralization. It is claimed that by consolidating government services into a fewer government units, economies of scale allow for centralized local governments to either reduce tax burdens or expand local government provision, accounting for the increase in utility offered to residents. Under this banner, more centralized local governments are expected to have lower local government employment, holding population constant, than decentralized local governments. However, this is contrary to the results found. More centralized MSA are found to have higher local government employment levels.

If economies of scale are not the answer, how does centralization cause the increase in utility driving population growth? A large literature argues that on top of technical considerations, competition between local governments can effect the supply of public goods. Under the standard view of Tiebout (1956), greater competition between local government, which conceptually is found in more decentralized MSA, offers residents higher utility. But this goes against what is found empirically. As an alternative, the tax competition literature maintains the importance of competition between local governments, but flips on the welfare consequences of competition due to fiscal externalities. A plausible explanation of both empirical results is that because centralized local governments are better able to internalize spillovers, they are able to provide residents with higher utility accounting for the increased population growth. Because these spillovers also tend to result in an under-provision of public goods, their internalization accounts for the increase in local government employment as well.

This work is relevant to several literatures. Research on the effects of government centralization can be divided into two broad strands. The first, macro-level strand examines how cross-country variation in the degree of fiscal and political centralization between a country's central government and its sub-national governments affects economic and institutional outcomes (Barro 1991; Weingast 1995; Sala-I-Martin 1997; Davoodi & Zou 1998; Treisman 2000; Rodden 2004; Iimi 2005; Baskaran & Feld 2013). The second strand examines similar questions using within-country variation in centralization and governmental structure. Examples include Hoxby (2000) on educational performance; Stansel (2005) on population growth; Hatfield and Kosec (2013, 2019) on wage growth and pollution; Hatfield, Kosec, & Rodgers (2023) on housing prices; Hobbs et al. (2019) on economic development; and Bianchi et al. (2023) on labor market outcomes.

This work also speaks to the literature on theories of local government. The next section reviews this literature through the lens of a simple model and discusses the empirical evidence that would lend credence to competing theories. Theories discussed include those coming from public choice (Buchanan and Tullock 1962; Brennan and Buchanan 1980), tax competition (Wilson 1986; Zodrow & Mieszkowski 1986; Wildasin 1988), residential sorting and jurisdictional choice (Epple, Filimon, & Romer 1984; Epple & Romer 1991; Epple & Sieg 1999; Epple, Romano, & Sieg 2001), and optimal jurisdiction size (Alesina & Spolaore 1997,2003; Alesina, Baqir, and Hoxby 2004).

As stated, section two reviews the theoretical literature on local government in more depth.

Section three outlines the data on local government employment including how the centralization and composition measures are calculated. Section four covers MSA level population growth, local government employment levels, and the controls utilized. Section five discusses the empirical strategy, describes the instruments in more detail, and shows the causal estimates. Section six discusses these findings and concludes.

2 Theories of Local Government Organization

In this section I review the literature on local government organization. I argue for what empirical findings would lend credence to alternative theories presented. The sharp delineation between the theories, and the eventual selection of the tax competition theory, should not suggest that only one theory is at play, or that the empirical evidence provided in this paper is a refutation of other theories. It is also likely that different theories are more applicable in different locations.

The first section investigates three theories of local government behavior. The second section examines how model primitives, such as resident heterogeneity and economies of scale, shape the organization of local government. Theories of local government behavior are then added to the model primitives to investigate their effect on local government organization.

To tie the discussion together, I employ a exchange theory of government attributed to Wicksell (1896) and developed in the Public Choice literature (Buchanan & Tullock 1962). To start the model, suppose there are two agent types that comprise a isolated economy. The first agent type is the market participant. Each market participant has an endowment of a good which other market participants value. Under these conditions, exchange between market participants creates a surplus. The economy consisting only of market participants is called the exchange economy. If public goods are provided, exchange yields additional surplus. However, due to the public nature of the public goods, they cannot be provided by market participants. The second agent type, the government agent, is able to provide the public good. Costs born by the government agent in providing the public good must be met by transfers from the market participants to the government agent. The economy with government agents active is called the public goods economy. To include a dimension of centralization, multiple government agents are available to the market participants. An economy with a single government agent is considered centralized, while an economy with many is decentralized. The empirical counterpart to the welfare of the market participants is population growth, while the behavior of the government agents is mapped to local government employment.

2.1 Local Government Behavior

The first theory I investigate is the Leviathan theory from Brennan & Buchanan (1980). This theory is most concerned with the incentive structure of local governments and holds that decentralized local governments offer residents higher utility. Under the theory, the incentives of government agents are not aligned with the incentives of market participants.

Centralization allows the government agent to act as a monopolist. In pursuing their own incentives, the government agent attempts to capture the additional surplus generated by exchange with public goods. Under full centralization, the government agent is able to extract the entirely of the additionally generated surplus, leaving the market participants indifferent between the exchange economy and the public goods economy.

Under decentralization, market participants have available substitutes. The ability to substitute sidesteps the problem of misaligned incentives by forcing government agents to behave similar to perfectly competitive firms. If the government agent were to attempt to take more surplus than required to cover costs, or if they supply the public good inefficiently, the market participants increase their welfare by substituting to a different government agent. Because centralized local governments fail to "constrain Leviathan" through competition, a voter adopting this theory would likely vote against consolidation. The theory predicts that centralized local governments will experience lower population growth. The theory also predicts higher local government employment in centralized governments based off institutional differences between firms and governments as emphasized in Niskanan (1971). As local governments face budget balance conditions, to match the additional captured surplus, costs must be artificially raised resulting in higher local government employment.

I now move on to the theory of Tiebout (1956). While the Leviathan theory focuses on government agents' incentives, Tiebout focuses on government agents' information. The Tiebout theory was most likely developed in response to Samuelson (1954)[1]. The main inefficiency explored in Samuelson (1954) is informational. In his model, the demand for public goods is not knowable by the government agent because free-riding provides the incentive for market participants to misreporting their demand for the public good, typically resulting in under-provision. The Tiebout theory suggests decentralization, and the mobility that it provides market participants, as a demand revelation device. When market participants leave a government agent, this generates demand information previously unknown. Market participants' mobility continues to generate demand information until the government agents are able to provide the public goods efficiently. The expected actions of a voter who adopts Tiebout's theory and the empirical predictions of the theory are the same as under the Leviathan model. Decentralization allows for public goods to be supplied efficiently accounting for the population growth, and overcoming the under-provision of public goods accounts for the higher local government employment.

In contrast to the Leviathan and Tiebout theories, a voter adopting a tax competition theory would likely vote in favor of a merger. In tax competition theories, government agents are assumed to maximize the welfare of their own market participants, while neglecting the welfare of others. Due to the presence of fiscal externalities, competition found in decentralized local governments results in the government agents supplying public goods inefficiently. Fiscal externalities are broadly classified into three main categories. Tax setting externalities exist because each government agent associates tax increases, at the margin, with a decrease in their tax base. They do not internalize that the tax base is not lost, but rather shifts to another government agent. Benefit spillovers occur when the provision of a public

[1]Tiebout's title "A Pure Theory of Local Expenditure" can be seen as a riff on Samuelson's "A Pure Theory of Public Expenditure"

good, such as a park, cannot be excluded from market participants from other government agents. Regulation externalities work in the same was as tax setting. If government agents set regulatory conditions, and market participants prefer lower regulatory conditions, then competition over regulatory conditions between government agents is liable to result in inefficiently low regulation. Centralization results in a decrease in competition, allowing for greater internalization of externalities and spillovers.

Issues from externalities and spillovers are likely most predominant in the local government setting. As competition between local governments is by definition spatially local, if externalities and spillover were to be prominent in any competitive system, they would likely be prominent between local governments. Second, as emphasized by Sinn (1991), governments operate under the selection principle. As in the exchange model, goods that are not efficiently supplied in the market are disproportionately supplied by government. Therefore, not only are the conditions likely for externalities and spillovers to be present, local governments are selectively driven into providing services marked by their presence. By internalizing externalizes and spillovers, centralized local governments increase market participants utility, leading to the empirical prediction of higher population growth. As the internalization overcomes the under-provision of public goods, local government employment is predicted to be higher under centralization.

2.2 Model Primitives and Local Government Behavior

This section investigates how primitives in models of local government effect the organization of local government. The primitives are then interacted with the various theories of local government behavior to investigate their effect on local government organization. Model primitives operate on a spectrum. On one end of the spectrum, they have no effect on the model, as if they were not present. On the other, the effect of the primitive fully drives the results, outweighing all other considerations.

The first primitive examined is economies of scale. In the exchange model, economies of scale assumes that the public good provided by government agents is non-rivalrous. The total transfer required by the government agent to provide the public good is fixed. In a fully centralized economy, an additional market participant is able to lower the transfer made by all market participants. Because the public good is non-rivalrous, surplus created in the exchange remains fixed, but the transfer made by each market participant decreases, leading to higher utility for market participants. All else equal, an increase in the effect of economies of scale tends towards increases in centralization.

The second primitive concerns market participant heterogeneity and is the focus of the residential sorting literature. Heterogeneity enters the exchange model through market participants preferences. A market participant prefers public good g_1 to g_2 if more surplus is created in exchange when a government agent provides g_1 than g_2. When market participants have homogeneous preferences, they prefer the same public good and local government organization is pushed towards centralization. As preferences become more heterogeneous, market participants gain more utility by matching with government agents providing their preferred public good, pushing the organization of local government towards decentralization.

The case with both economies of scale and heterogeneous preferences at play leads to the optimal jurisdictional size literature. Under these conditions, a trade off determines the optimal jurisdiction size and the organization of local government. From economies of scale, market participants are enticed to choose the same government agent and for centralization to prevail. This is counterpoised by market participants heterogeneity in preferences which, in the absence of economies of scale, entice market participants towards employing more government agents and decentralization. The organization of local government trades off between lower cost public goods found under centralization and public good specificity found under decentralization.

Theories of government behavior are typically absent in optimal jurisdiction size models. In order to focus on the two primitives, it is generally assumed that the incentives of government agents align with the market participants, that they have access to perfect information, and that they are able to fully internalize externalities and spillovers. If the local government behavior have measurable effects, failure to account for the effects biases empirical estimates of model primitives. If an inapplicable theory of local government behavior is imposed, estimates are similarly biased.

I look first at the interaction between economies of scale and local government behavior. Empirical estimates of economies of scale in local government tend to find U-shaped average cost curves (Gomez-Reino, Lago-Penas, & Martinez-Vazquez 2021). Technical properties of local government cost functions are said to account for the eventual upward swing in average costs, but they could also be the result of local government behavior. If larger local governments are correlated with increases in centralization, then larger local governments face less competition. If competition has an effect on the supply of public goods, then the estimates derived from comparisons between different sized local governments conflate the effect of economies of scale with the effects of competition.

A similar problem occurs in the interaction with heterogeneity. The degree of preference heterogeneity is often estimated from the equilibrium organization of local government. Fixing economies of scale, increased heterogeneity is implied from the presence of increased decentralization. But local government behavior can also alter the organization of local government. Under the Leviathan and Tiebout theories, the organization of local government is pushed towards decentralization not because of increased heterogeneity in market participants preferences, but in order to either introduce competition or improve information. Failure to account for local government behavior then tends to biases estimates towards higher levels of heterogeneity. On the other hand, the tax competition theories hold that increased centralization has benefits beyond economies of scale, pushing towards more centralized local governments, leading to a downward bias in estimates of heterogeneity.

3 Measuring Local Government Organization

3.1 Data

The main unit of analysis in this study, an observation in the regressions found in the empirical section, is the metropolitan statistical area (MSA) as defined by the OMB. MSA are defined as a collection of counties that have an urban core and significant economic ties as measured through commuting patterns. The median MSA consists of 2 counties, with 149 out of the 379 consisting of a single county. The maximum number of counties is found in the Atlanta-Sandy Springs-Roswell MSA with 29. As areas can become more or less urban, and as commuting patterns can change, the definition of an MSA can change throughout time as well. To handle this issue, I use the counties that define MSA in 2020 to create our historical variables. This allows me to speak of changes occurring in the same geographical location throughout time.

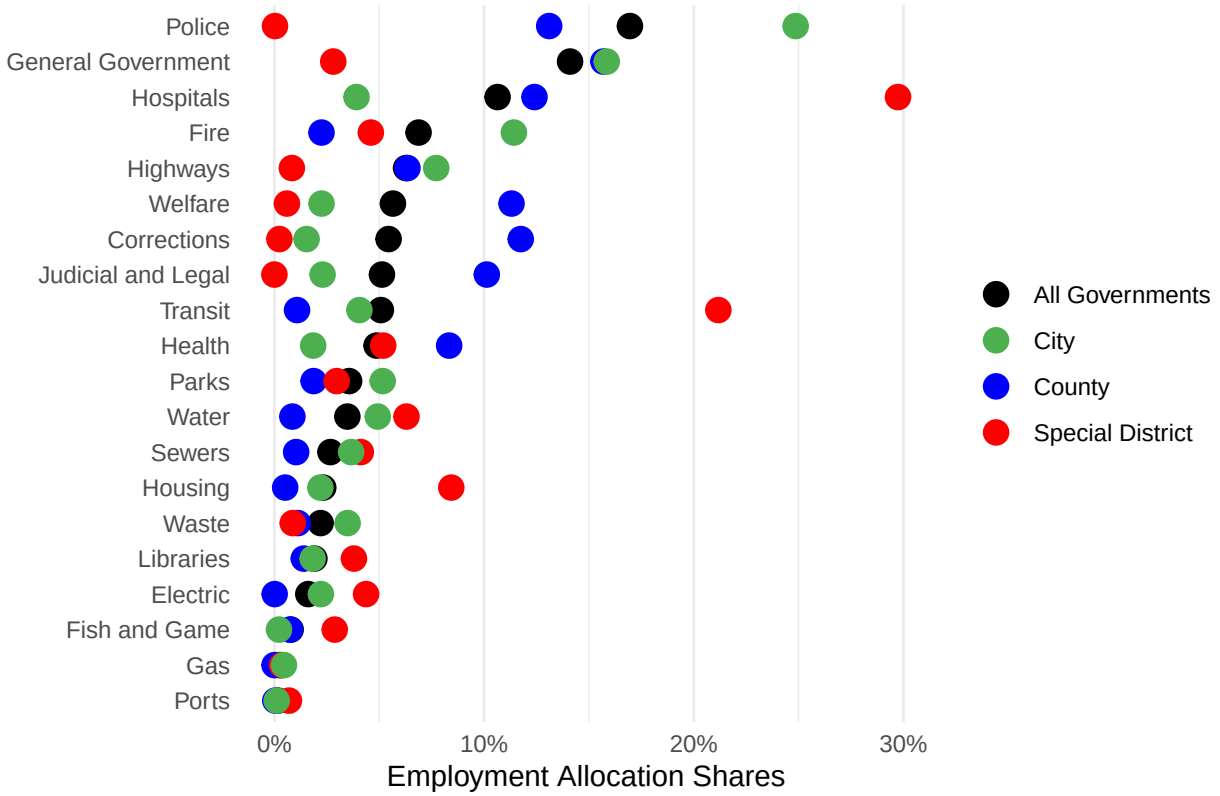
Roughly ~85% of the United States population lives in a MSA. These MSA vary significantly by size. The smallest MSA in our sample has roughly 50,000 people, corresponding to the population cutoff set by the OMB. The largest, the New York-Newark-Jersey City MSA, is home to over 20 million people. However, less than 15% of all MSA have more than 1 million residents, with the median MSA consisting of roughly 235,000 people.

The focus of this study is on local government in these MSA. The main data source I use to measure local government is the 2007 Annual Survey of Public Employment and Payroll (ASPEP). Ideally, data from the year 2000 would be used to match the base year of the population data. However, this is not feasible for two reasons. First, a full census of all individual local government units only taken every 5 years, landing on those years that end in either 2 or 7 (1997,2002,2007,...). Given this constraint, using either the 1997 or the 2002 data would be preferable, but I find that there is still significant under-reporting and aggregation up until the 2007 release.

The ASPEP data provides the number of employees and payroll totals for up to 32 employment classifications such as financial administration, police, or parks and recreation for every government unit in the United States. Each governmental unit is initially assigned to one of five type classifications: county, municipality, township, school district, or special district. While differences do exist, both municipalities and townships are sub-county government structures and distinctions between the two are largely the result of different naming conventions between states. These two categories are combined into a single category called city. I drop all schools districts, as they provide a service, education, that is very different from the general purpose governance provided by the other government units. To standardize differences in educational organization across MSA, I remove all employment classified into education from the other type classifications as well. The sample contains over 21 thousand local government units that employ over 4.2 million people, classified into three types: county, special district, and city. Figure 3.1 shows how employment is allocated across local government functions across these three classifications. Employment functions are sorted by decreasing share of total employment. The black points represent the share allocated across all governments, while the green, blue, and red points show the specific allocation with cities,

counties, and special districts respectively.

Figure 3.1: Employment Allocation Shares



The figure shows that policing accounts for the largest employment share in local government, and is most typically handled at the city level. This same pattern is true for firefighting, which is the fourth largest employment share. The second largest share is general government mainly responsible for the administration. The third largest share, hospitals, are administered largely by counties and special districts, with a larger of the share going to special districts. This is mostly a localized effect, with only a few special districts operating large scale hospitals. A similar finding is true for both transit and housing as well. Further employment shares constitute a much smaller share of total employment, and they do not seem to display any striking differences between the three classifications. As the unit of analysis is the MSA, this aspect of the data is mostly unused with the exception of two controls. First, total employment in policing and firefighting are combined to control for the percentage of employment dedicated to safety in the MSA. Second, I create a dummy variable that indicates if a MSA has more than 10% of its employment in a hospital.

3.2 Local Government Compositions

After deriving these two controls, the data is collapsed and only total employment and government type is considered for each government unit. As discussed in the introduction, a MSA may concentrate its employment in a specific government type, such as at the county level or at the city level. Where employment is located may be a significant determinant on

the effect of centralization. To control for this, I measure the composition of local government in each MSA with the percentage of employment in each of the three government types. Figure 3.2 shows these compositions in a ternary graph. Ignoring the coloring scheme for now, each point on this graph represents a MSA. A hypothetical point in the bottom right corner would signify that a MSA had the entirety of its employment at the county level. Similarly, a hypothetical point in the top corner would signify that the MSA placed the entirety of its employment at the special district level. Points along the bottom edge report that a MSA has no employment in special districts, and the distance between the two corners report the share of employment between county on the left and city on the right. Starting from any point on the bottom edge, points directly above that point share the same composition between city and county governance, but include special district employment. For example, the center of the bottom edge reports that a MSA has 50% of its employment at the county level and 50% at the city level. A pure vertical shift of 20% would correspond to a MSA with 40% of its employment at both the county and city level and 20% at the special district level.

Figure 3.2: Local Government Compositions

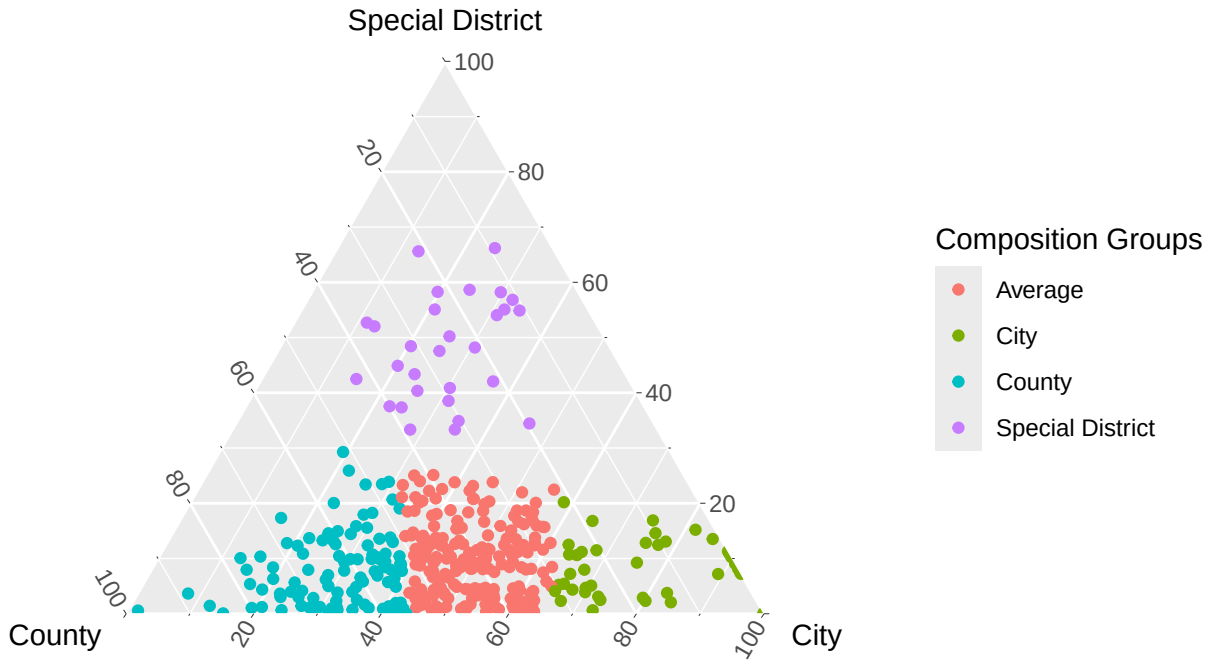


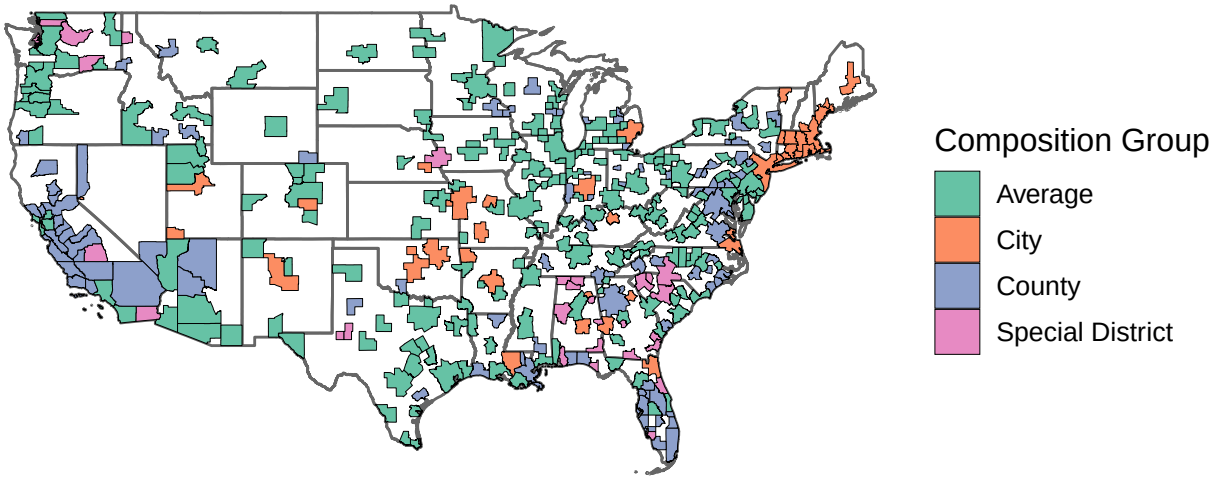
Figure 3.2 shows that there is significant variation in the composition of local government across MSA. To capture this heterogeneity, I run a K-means clustering algorithm on the compositions, establishing four composition groups. These groups are indicated by the coloring in the figure. The clustering seems to be natural. Choosing three clusters results in the special district group merging with the average group. Choosing five clusters partitions the average group into two separate clusters. The *average* group, colored in red, corresponds

to the the largest concentration of MSA. Membership in one of the three other composition groups signify that the MSA has more of its employment in the designated government type than the average MSA.

Clustering MSA based upon their composition allows me to control for this heterogeneity in subsequent regressions. The alternative would be to include raw shares, which are difficult to interpret as a marginal increase in the percentage of employment in one government type must be offset with a reduction in the others, and it impossible to know from which of the two the reduction would be drawn from.

Another possible source of heterogeneity is geographic. Different regions of the United States may tend to structure their local governments in different ways. Figure 3.3 investigates this possibility. All MSA in the sample are displayed on a map, and their color corresponds to their composition group.

Figure 3.3: Geographic Distribution of MSA Group Compositions



The figure shows that local government compositions are in some degree correlated with geography. Average compositions are found throughout the United States. MSA with higher concentration in cities are mostly found in the Northeastern portion of the country. Special district heavy MSA are found mostly in the Southeast, along with a few instances in California and the Pacific Northwest. MSA with heavy employment in counties are found in predominantly in California and down the Atlantic coastline.

3.3 Local Government Centralization

In this study, the main variable of interest is the degree of centralization in a MSA. By consolidating governmental units, local government mergers tend to increase centralization. An example motivates the centralization measure, and shows how it differs from the composition measure. Suppose that two MSA, X and Y, each have 1000 local government employees. These MSA have identical compositions, with 450 employees at the county level, 450, at the city level, and 100 at the special district level. Now suppose that in MSA X, there is 1 county, 5 cities, and 4 special districts while in MSA Y there are 5 counties, 50 cities, and 20 special districts. Intuitively, MSA X is more centralized than MSA Y as it is local government employment is concentrated into a fewer government units. As the compositions of these MSA are identical, centralization is distinct from composition.

To measure this difference, I use a Herfindahl-Hirschman Index (HHI) based on local government employment. The formula for the MSA HHI is given below where MSA are indexed by m, employment in individual government units is given by EMP_{im}, and the total number of government units in MSA m is M_m.

$$HHI_m = 10,000 \cdot \sum_{i=1}^{M_m} \left(\frac{EMP_{im}}{\sum_i^{M_m} EMP_{im}} \right)^2$$

In a more standard industrial organization setting where this measure originates, the term in parenthesis represents a firms market share, but here it represents a government units share of total MSA level employment. The index is calculated by squaring each share, taking the sum throughout the MSA, and then multiplying by 10,000. If the MSA is close to full centralization with only a few large units, the HHI approaches 10,000. As a MSA approaches full decentralization, each government unit accounts for a very small share of total employment and the HHI approaches 0. This is reflected in the example. Assuming that the 1000 employees are evenly distributed across the government units, the more centralized MSA X obtains a HHI of 2455 while the more decentralized MSA Y obtains a score of 450.5.

Figure 3.4 shows the distribution of HHI across the MSA in our sample. The solid red line shows the mean HHI across all MSA, while the two dashed red lines show a standard deviation away from the mean in both directions.

The figure shows that there is significant variation in HHI across the MSA in the sample, corresponding to significant variation in centralization. HHI increases from left to right which is to be interpreted as increased centralization. Looking ahead towards estimation, a standard deviation, possibly even two standard deviations, is well within sample. For that reason, the regressions reported later scale the HHI measure such that the coefficient on MSA HHI represents the effect of a one standard deviation increase.

Figure 3.4: Distribution of MSA HHI

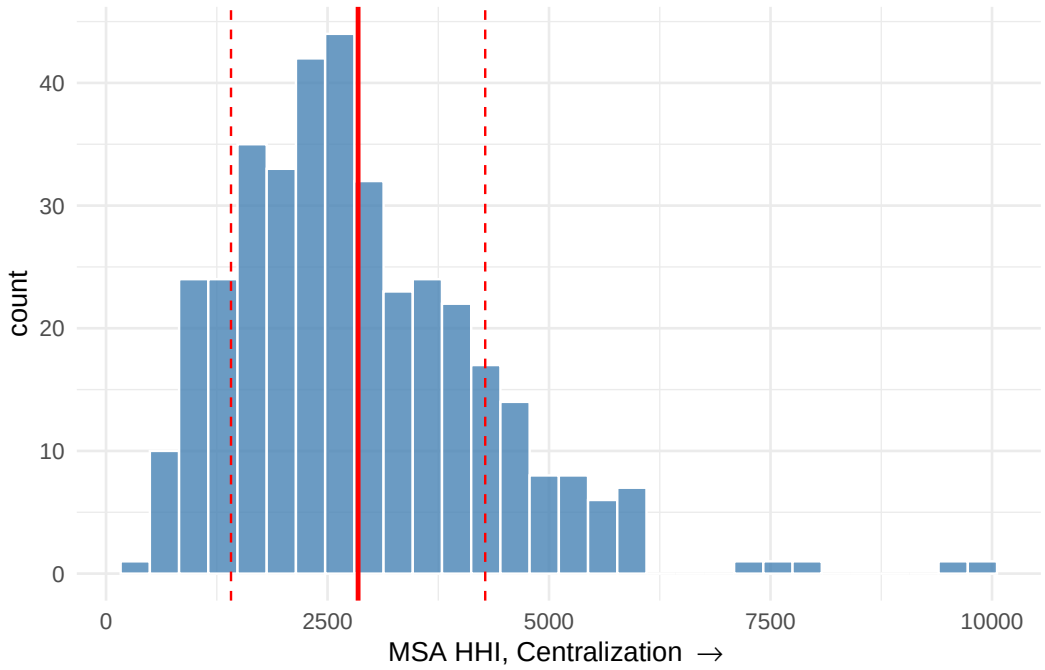
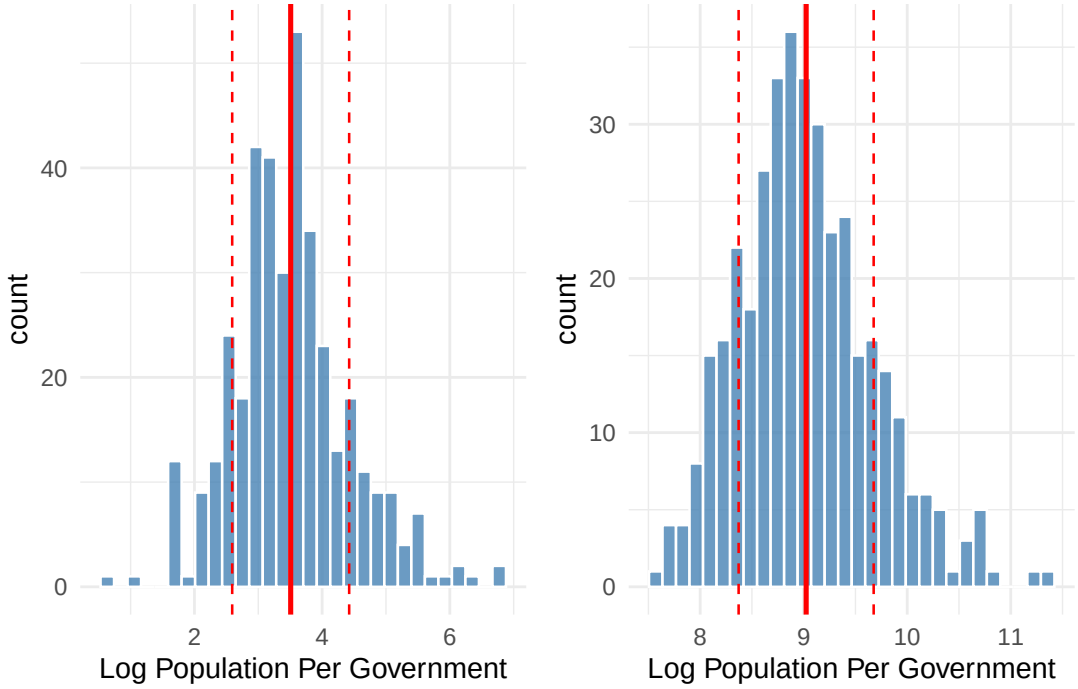


Figure 3.5: Existing Measures of MSA Centralization



I also report effects from existing measures of centralization in this literature. The first is population per government unit. To create this variable, total population in the MSA is divided by the number of governmental units. A MSA with a higher population per government measure is said to be more centralized, as its population is concentrated into a

fewer government units. The second measure counts the number of governmental units. The interpretation in regards to centralization flips with this measure. Centralization corresponds to fewer government units. The population per government and number of government measures are mechanically linked. After controlling for population, there is no informational difference between the two measures. This is seen in the regressions below where the two measures obtain different point estimates, but the diagnostics such as R^2 and the F-Statistic are identical between regressions that swap out the two measures.

Figure 3.5 displays these two additional measures. As before, the red lines represent the the mean and standard deviation within the sample, and these measures are scaled to represent standard deviation changes in the regressions.

3.4 Correlation Between Measures

The proceeding sections developed the composition and centralization measures. These measures are related. Table 3.1 regresses the measures of centralization on the composition groups. As these compositions are fixed effects, the reported coefficients can be interpreted as group deviations. The constant is the mean of the centralization measure in the average composition group. Column 1 regresses the main centralization measure, MSA HHI, on the composition groups, and columns 2 and 3 report the same regression for the other two measures of centralization.

Table 3.1: Correlations between Compositions and Centralization

	Dependent variable:		
	MSA HHI	Pop. Per Government	Number of Governments
	(1)	(2)	(3)
Composition Group: City	115.917	0.182	0.306**
	(219.345)	(0.111)	(0.153)
Composition Group: County	1,477.170***	0.121	−0.354***
	(154.786)	(0.078)	(0.108)
Composition Group: Special District	−27.418	−0.067	−0.276
	(254.394)	(0.129)	(0.178)
Constant	2,433.102***	8.976***	3.592***
	(89.366)	(0.045)	(0.062)
Observations	379	379	379
R^2	0.207	0.013	0.051
Adjusted R^2	0.201	0.005	0.044
F Statistic (df = 3; 375)	32.626***	1.692	6.769***
Note:			*p<0.1; **p<0.05; ***p<0.01

Column 1 of the table shows that the city and special district composition groups do not differ significantly from baseline. However, MSA with significant employment at the county

level tend to be more centralized. The coefficient reports that the average member of the county composition group has roughly a standard deviation higher MSA HHI. Column 2 does not show any significant deviations based on composition groups in terms of population per government. Column 3 shows an interesting result that may shed light onto the results from column 1. MSA with a higher proportion of employment in cities are found to have a higher number of governments while those with higher employment in counties have a lower number of governments. There is no significant effect for special districts. One interpretation of this result is that county and city governance are substitutes. Residents of MSA with strong county level governance may be able to get local government services from the county rather than through the incorporation of a city. Those MSA with weaker county governments may require additional city government incorporation in order to have these services provided.

4 Outcomes and Controls

4.1 Controls

The role of controls here is two-fold. First, the ideal way to measure the effect of centralization would be to examine MSA that were identical in every regard except for their degree of centralization. Because all else was equal, any differences measured in outcomes between the MSA could be attributed solely as the effect centralization. If I were able to perfectly measure and model every determinant of the outcomes, I could replicate this all else equal condition and the estimates found through OLS would match those found in the ideal. Second, if centralization is correlated with a determinant of the outcomes, and this determinant is omitted from the regression, the effect produced by OLS is biased. The reported estimate conflates the effect of centralization with the effect of the missing determinant. I deal with unobservable determinants with an IV strategy discussed in the next section, and attempt to control for as many observable determinants as possible here.

I employ the same controls for both outcomes. All measurements, unless otherwise noted, come from the base year of 2000. Table 4.1 displays summary statistics for the controls, along with summary statistics of the outcome variables.

The first two entries in the table are the two outcomes and are discussed in detail in the following subsections. The next three are the centralization measures discussed above. Population in 2000 and 2020 are used to create the growth rate outcome, and population in 2000 is included as a control. Median year of incorporation looks at the incorporation date of each city in an MSA and reports the median year. The table reports summary statistics on these medians across MSA. The variable is used as both a control and in the construction of one of the instruments employed later. The percentage of local government employment in safety and high hospital share are discussed in the data section.

The next seven variables capture economic differences across MSA. Migration between MSA behind population growth can be driven by better employment opportunities and higher wages, but this migration may be thwarted by higher costs housing costs. The poverty rate

and labor force participation rate may effect local government employment if the requirements of those in poverty or those outside the labor force require additional services. Percent manufacturing and technology employment measure the amount of private employment in those fields. It has been documented elsewhere that those places with a high share of manufacturing employment have seen population losses while those places with a high share of employment in technology fields have seen population growth. The next set of controls capture demographic difference across MSA. Finally, the mean temperature in the MSA is included to control for both geographic difference in MSA and potential unobserved amenity differences. In addition, the composition group fixed effects are included as controls as well.

Table 4.1: Summary Statistics

Statistic	Mean	St. Dev.	Min	Max	Median
Population Growth Rate	0.17	0.15	−0.20	0.89	0.15
Local Government Employment	10,386.93	29,229.81	358	421,727	3,352
MSA HHI	2,844.99	1,434.61	409.00	9,970.97	2,629.45
Population Per Government	10,533.42	9,328.14	1,951.60	85,985.31	7,854.84
Number of Governments	55.41	90.57	2	927	32
Log Population 2000	12.53	1.06	10.87	16.76	12.21
Log Population 2020	12.70	1.09	10.98	16.85	12.40
Log Population Density	4.13	0.92	0.88	6.89	4.14
Median Year of Incorporation	1,901.35	31.29	1,712.00	1,989.00	1,899.00
Percent Local Gov't Employment: Safety	23.94	6.74	3.80	45.78	24.02
High Hospital Share	0.23	0.42	0	1	0
Median House Price (1000's)	104.41	43.14	42.80	418.35	94.12
Median Income (1000's)	39.66	6.66	24.86	73.82	38.71
GDP Per Capita	44.40	10.29	19.32	96.65	43.26
Poverty Rate	12.30	4.10	4.38	35.45	11.57
Percent Unemployed	5.89	1.87	2.64	13.57	5.57
Labor Force Participation Rate	48.66	4.72	29.75	59.19	49.28
Percent Manufactoring Employment	15.89	8.22	1.98	51.82	14.98
Percent Technology Employment	8.25	3.76	1.93	30.20	7.38
Median Age	35.32	3.88	23.37	54.30	35.51
Percent Renters	31.86	5.82	13.51	49.03	31.19
Percent College Education	13.16	2.55	6.13	21.47	13.11
Mean Temperature	54.81	8.49	37.87	73.90	53.63

4.2 Population Growth

Population growth is measured using log growth rates as is standard in the literature. The growth rates are calculated as log population in 2020 divided by log population in 2000. Log growth rates can be interpreted as percentage growth rates generally for rates under .2, but can deviate at the extremes. For example, the mean growth rate in the sample is .17 which corresponds to a 18% growth rate, but the largest log growth rate of .89 corresponds to a 144% growth rate.

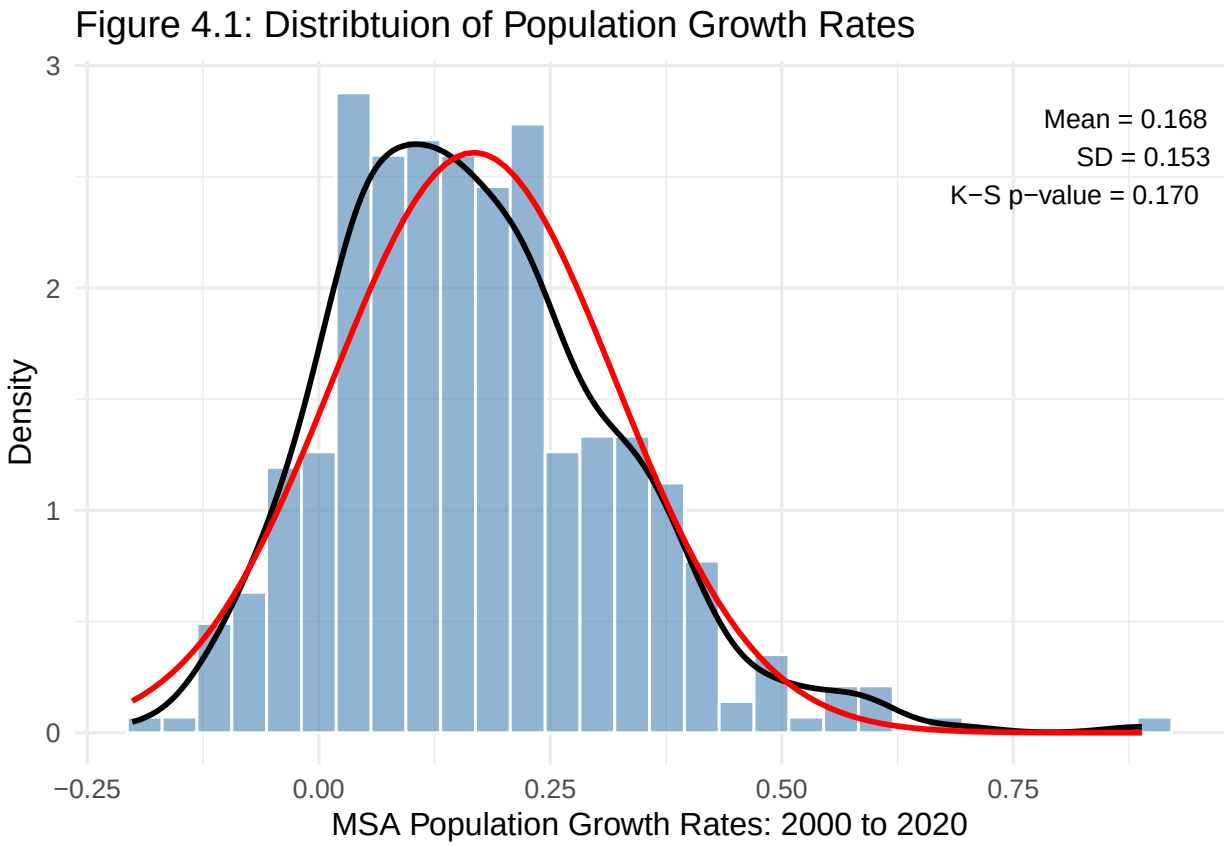
A potential question regards the appropriateness of the time frame employed. The end year of 2020 can be defended because subsequent years included the initial effect and recovery from

the Covid-19 pandemic. The start year of 2000 is the true limitation. An earlier start year is preferable, but the availability of detailed ASPEP data to construct the centralization and composition measures constitute the decisive limitation. The question regarding the appropriateness of the twenty year time frame can be discussed in terms of an alternative empirical strategy. One way to estimate the causal effect of centralization is through a randomized control trial. In this hypothetical, a random subset of MSA would be forced to adopt a more centralized organization of local government. The question is then how long should the experimenter wait until the population growth measurements are taken? To stress the point, the measurements cannot be taken in the next day, month, or likely even year. Time is required for a the new local government to settle and for migration patterns to recognize the effects of centralization.

The question of how much time to wait cannot be answered without the establishment of a goal post. While any goal post is artificial, possibly the most grounded frame is an appeal to Gibrat's Law. Gibrat's Law comes from a model of population growth that holds that log population in period t is equal to the log population in period $t-1$ plus an idiosyncratic shock, corresponding to a multiplicative process of population growth. An important property derived from this law is that growth rates in a population tend towards a normal distribution as time progresses. Using this metric, a benchmark can be created that tells the experimenter when to calculate the effect of centralization. In each period, population growth can be measured, and the empirical distribution of growth rates can be compared to the theoretical normal distribution with mean and standard deviation corresponding to the sample. A Kolmogorov–Smirnov test can then be preformed, the test can conclude and the effect of centralization measured when the test statistic passes a threshold corresponding to acceptable normality.

Figure 4.1 shows the growth rates for all MSA in the sample. The black line is the empirical density and the red line is the theoretical normal distribution with mean and standard deviation corresponding to the sample. The mean, standard deviation, and p-value of a Kolmogorov–Smirnov test are reported in the upper right hand corner.

The null hypothesis of the Kolmogorov–Smirnov test is that the empirical distribution is a normal distribution. The p-value of .17 found in the data suggests that the null hypothesis cannot be rejected which leads to the conclusion and that the distribution of population growth rates is likely normal. Relating this to problem faced by the hypothetical experimenter, the data used here would correspond to the experimenter choosing a test statistic for the K-S test corresponding to a p-value of .17. If the experimenter choose a stricter threshold, the data would not be considered reliable. If they choose a more lenient threshold, then then the data would be deemed reliable.



4.3 Local Government Employment

Figure 4.2 shows the relationship between the log population of an MSA in 2000 and its total local government employment. The strong log linear relationships suggests an exponential statistical relationship between population and population size given by

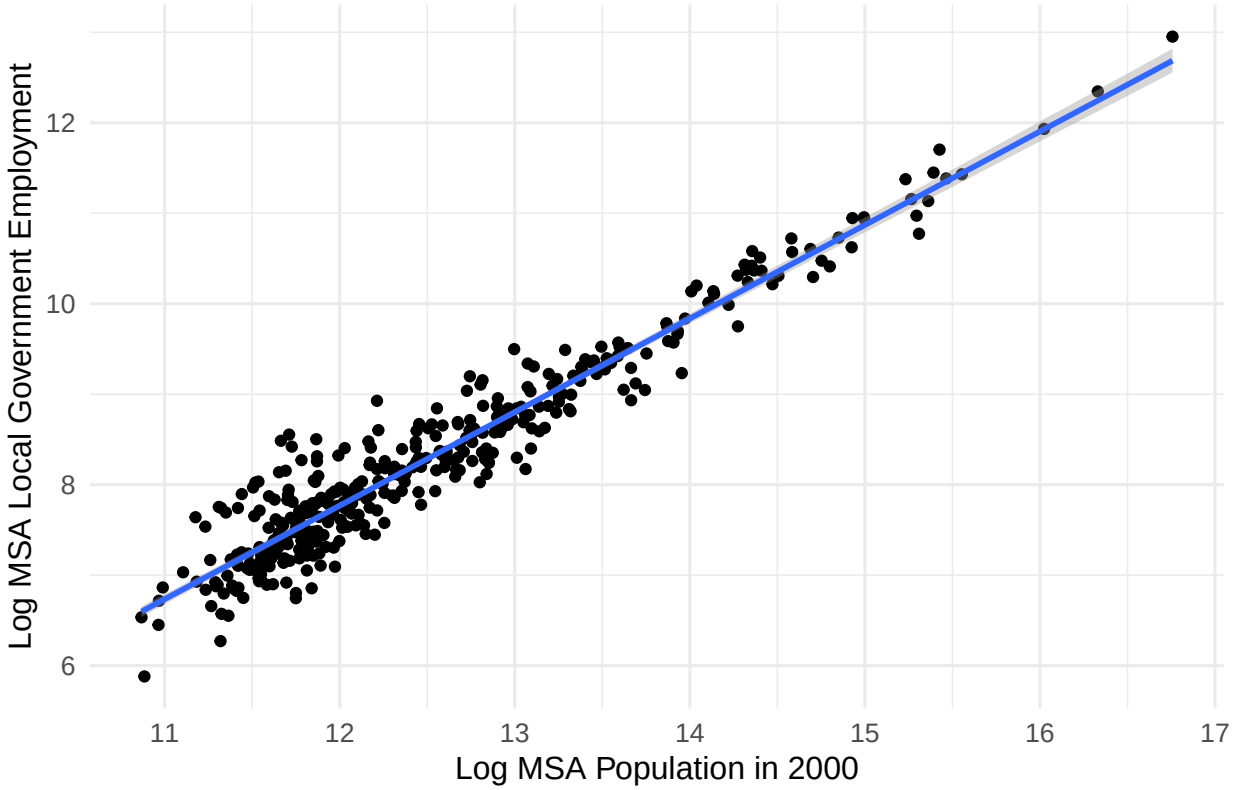
$$\text{Local Government Employment}_i = \alpha \text{Population}_i^{\beta} \cdot \epsilon_i$$

.

If the statistical relationship between the two variables is valid and if population is the sole determinant of the level of local government employment, the existence of economies of scale in population can determined through the estimation of β. If $\hat{\beta}$ is found to be less than 1, this suggests that fewer local government employees are required as population increases. Economies of scale in population is distinct from the effect of centralization. Centralized governments are found in both high and low population MSA. A potential link between the two concepts is that centralized MSA have larger governmental units, and that these larger governmental units have access to economies of scale. But this is separate from the question of economies of scale operating at the MSA level. The IV regression employed later does include population as a control and therefore provides an estimate of β. But as population is likely endogenous, the excluded variable is the centralization measure, and the instruments

employed are thought to shift centralization, the estimates reported below and further down in the empirical section should not be used as evidence for the existence of economies of scale in population.

Figure 4.2: Log Local Government Employment on Log Population



4.4 OLS Results

Table 4.2 reports the results of OLS regressions. Columns 1 through 3 report the effects of the three different centralization measures on log local government employment. Columns 4 through 6 report the effects of population growth rates. Due to the large number of controls, only a select few are reported in the table, but the coefficients presented come from a regression with all controls present. The full regression table is available in the appendix.

In terms of model diagnostics, the precision of the regressions concerning local government employment are very high. More than 96% of the variance in local government employment is explained. As evidenced in Figure 4.2, the relationship between local government employment and population is already very strong, with a regression of local government employment on only population accounting for roughly 92% of the variation already. The inclusion of additional controls can only improve this fit. In regards to the regressions on population growth, the regressions explain about 40% of the variation.

Table 4.2: OLS Regression Results

	Dependent variable:					
	Log Local Government Employment			MSA Growth Rates		
	(1)	(2)	(3)	(4)	(5)	(6)
MSA HHI	0.055***			0.015*		
	(0.015)			(0.009)		
Population Per Government		0.030*			0.028***	
		(0.016)			(0.009)	
Number of Governments			−0.042*			−0.040***
			(0.023)			(0.013)
Composition Group: City	−0.023	−0.001	−0.001	0.027	0.036	0.036
	(0.040)	(0.041)	(0.041)	(0.023)	(0.023)	(0.023)
Composition Group: County	0.057*	0.088***	0.088***	0.003	0.007	0.007
	(0.032)	(0.031)	(0.031)	(0.018)	(0.017)	(0.017)
Composition Group: Special District	0.255***	0.224***	0.224***	0.077**	0.073**	0.073**
	(0.052)	(0.052)	(0.052)	(0.030)	(0.029)	(0.029)
Log Population 2000	1.067***	1.026***	1.071***	0.025**	0.011	0.054***
	(0.020)	(0.017)	(0.029)	(0.011)	(0.010)	(0.016)
Percent Local Gov't Employment: Safety	−0.011***	−0.013***	−0.013***	−0.001	−0.002	−0.002
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
High Hospital Share	0.195***	0.207***	0.207***	−0.014	−0.015	−0.015
	(0.033)	(0.034)	(0.034)	(0.019)	(0.019)	(0.019)
Poverty Rate	0.012*	0.013*	0.013*	−0.007*	−0.008*	−0.008*
	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)
Percent Manufactoring Employment	0.001	0.0003	0.0003	−0.002**	−0.002**	−0.002**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Median Age	0.015***	0.018***	0.018***	−0.016***	−0.014***	−0.014***
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Percent Renters	0.008**	0.010***	0.010***	−0.005***	−0.005**	−0.005**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Percent College Education	0.030***	0.028***	0.028***	0.011**	0.009**	0.009**
	(0.008)	(0.008)	(0.008)	(0.004)	(0.005)	(0.005)
Mean Temperature	0.011***	0.010***	0.010***	0.008***	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Constant	−7.786***	−7.556***	−8.125***	−0.988*	−0.772	−1.317**
	(0.882)	(0.904)	(0.915)	(0.508)	(0.508)	(0.515)
Observations	379	379	379	379	379	379
R^2	0.969	0.969	0.969	0.432	0.442	0.442
Adjusted R^2	0.968	0.967	0.967	0.399	0.409	0.409
Residual Std. Error (df = 357)	0.206	0.209	0.209	0.119	0.118	0.118
F Statistic (df = 21; 357)	539.069***	523.811***	523.811***	12.934***	13.473***	13.473***

Note: *p<0.1; **p<0.05; ***p<0.01

Regressions were preformed with additional variables not included in the table.

Starting with the centralization measures, all are statistically significant and carry the expected sign. An increase in MSA HHI and population per government represents an increase in centralization while an increase in the number of governments represents a decrease. The positive coefficients on the first two measures and the negative coefficient on the third across both outcomes suggest that centralization leads to higher local government employment and population growth. To interpret the coefficient corresponding to the partial correlation between MSA HHI and local government employment, note that the dependent variable is logged and the MSA HHI measure has been standardized. The coefficient reports that a standard deviation increase in a MSA's HHI is associated with a 5.5% increase in local government employment. The coefficient regarding MSA HHI on growth rates reports that a standard deviation increase in HHI is associated with an additional 1.5% increase in the MSA's growth rate, which from a base of .17, represents roughly a .25% increase.

The results also find that MSA with more of their employment at the city level do not have statistically different local government employment levels or population growth than the average composition group. Further, those MSA in the county composition group are associated with higher local government employment but not higher population growth. The special district group tends to have both higher local government employment and growth rates. Those MSA with a significant amount of employment in hospitals had higher employment but no effect on growth is found. MSA that focus their employment in policing and fire had lower local government employment but no changes in growth.

The coefficient on population in regards to local government employment is significant and greater than one. As mentioned before, this could be seen as suggestive that there are no economies of scale in population, but this partial correlation cannot establish that fact fully. The coefficient on population in regards to growth rate is found to be statistically significant and positive in the regressions where the MSA HHI and number of governments centralization measures are used, suggesting that initially larger MSA grew faster during this period. This finding does not hold when the population per government centralization measure is used.

The other results in the table show that higher poverty rates are associated with higher local government employment, but not with growth. MSA with greater a greater share of their employment in manufacturing are found to have lower growth rates. MSA with older populations are associated with higher local government employment and with lower growth rates. A high share of renters tends to increase the level of local government employment and decrease population growth. The MSA where residents have higher education levels are found to have higher local government employment, and only slight evidence that they experience higher population growth. Finally, MSA with higher mean temperatures are found to have both higher local government employment and population growth.

5 Empirics

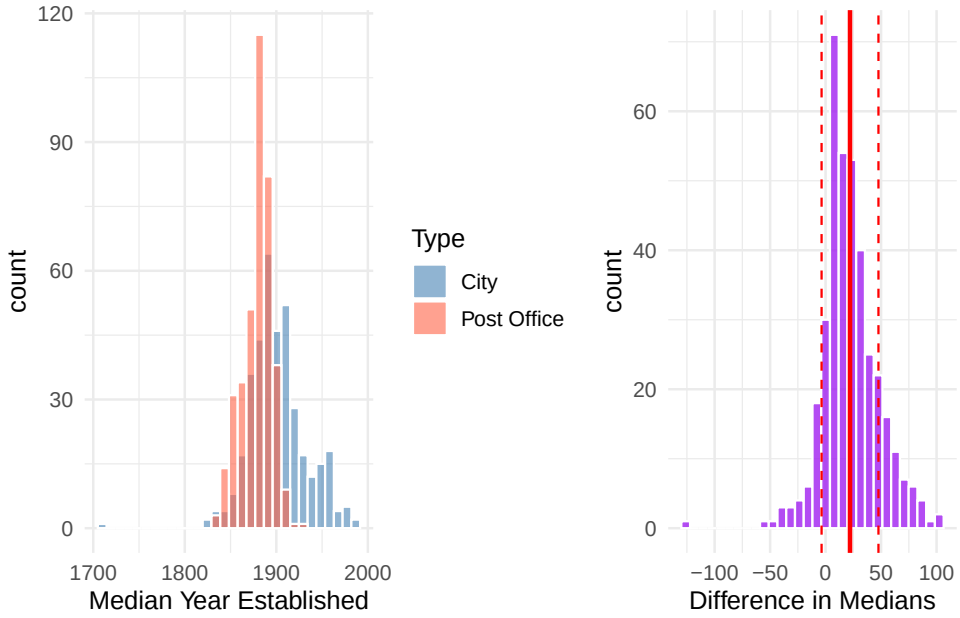
This section discusses the estimation of the causal effect of local government centralization, as defined by our measures, on MSA level population growth and local government employment. The causal effect is of interest if the goal is to inform a potential voter. If there is an unobserved determinant of the outcomes that is correlated with the centralization measure, then partial correlations reported by OLS will conflate the effect of centralization with the effect of the unobserved determinant. If this estimate was reported to the potential voter and they used that information to vote yes on a consolidation, they may become disappointed. The consolidation would certainly change the the degree of centralization, but it is not guaranteed that it would change the unobserved determinant. The result is that a change in centralization could have effects very different from that which was suggested by the partial correlation. To estimate the causal effect, I employ an instrumental variables strategy.

5.1 Instruments and First Stage Estimates

I employ two instruments. Both instruments are derived from a complete history of post offices in the United States from Blevins (2021), supplemented with a history of city incorporation dates from Goodman (2023). The first instrument measures the difference in years between the date the median post office was established in an MSA and the date the median city was incorporated. As shown in Figure 5.1, post offices were in general established before cities incorporated. This is partly due to the Postal Service's agency model which made the establishment of a post office an easy endeavor. The general pattern was that a shopkeeper, or another professional with a shop central to a community, would petition a central administrative post office for the creation of a new local post office. The petitioner often did not become a full-time postmaster, but merely supplemented their income by hosting the post office duties within their existing space. Due to the ease of the process, even small communities were able to establish their own post office, a point of pride for the Post Office corresponding to a general desire to boost the esteem of the Federal government according to Blevins (2021). The instrument proxies for the length of time between people inhabiting an area and the eventual crystallization of their organization of local government in law. With a longer length of time, more individual communities could be developed. When time came to incorporate, these individual communities were more likely to incorporate into their own city, increasing decentralization.

This instrument fails the exogeneity requirement if there exists a correlation between the length of time an area was inhabited before it was incorporated and an unobserved determinant of our outcomes. A reasonable requirement for this unobserved determinant is that persistent through time. To be correlated with measures taken at the turn of the twentieth and the early twenty-first centuries, it must be that the unobserved determinant was present in both time periods. It unlikely that if the unobserved determinant was transient that it would have been present in both time periods across all MSA. The known long-run determinant of the outcomes are controlled for to the best of my ability, leaving arguments against exogeneity to rely on those long-run determinants that are not observable or were missed.

Figure 5.1: Post Office Establishment and City Incorporation



The second instrument measures the (log) number of post office closures between the years 1902 and 1910. In 1893, the 53rd United States Congress passed legislation regarding "Rural Free Delivery". This law required that post offices refrain from charging fees for the delivery of mail. Before, mail could be collected for free at a local post office, but a charge could be levied for delivery to a residence or business. With the full implementation of Rural Free Delivery accomplished in 1902, post offices were required to deliver mail to every mailbox free of charge. From the perspective of an individual post office, this potentially created a large reduction in revenue without a symmetric reduction in costs. Post offices that were previously marginally sustainable likely became unsustainable. The most negatively effected post offices were likely smaller and served a more dispersed population. This means that the number of closures in an MSA between 1902 and 1910 indirectly measures the previous concentration of small post offices and population dispersion. Both of these factors contribute towards a greater degree of decentralization. Smaller post offices tended to be found where a small number of people took up residence. These small hamlets were then more likely to incorporate into their own cities at a later date, leading toward decentralization. The effect is the same for a more dispersed population. Dispersed populations were less able to receive essential public services from the central city, and in order to obtain these services, they would need to incorporate into cities, again increasing the degree of decentralization. The conditions for exogeneity are the same as for the first instrument. For this instrument to fail, there must be an unobserved or missed determinant of both a higher number of closures immediately after the implementation of Rural Free Delivery and either of our two outcomes.

The results of the first stage of the 2SLS estimator are reported below. Columns 1 through 3 report the effect of both instruments, the Rural Free Delivery instrument alone, and the Time Difference instrument alone, on MSA HHI. Columns 4 through 6, and columns 7 through 9 report the same effects but for the other two centralization measures. All regressions are

conditioned on the controls detailed in the previous sections.

Table 5.1: First Stage Estimates

	Dependent variable:								
	MSA HHI			Pop. Per Government			Number of Governments		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Time Difference	−19.184***	−21.093***		−0.011***	−0.012***		0.011***	0.012***	
	(5.249)	(5.287)		(0.002)	(0.002)		(0.002)	(0.002)	
Rural Free Delivery	−236.211***		−265.355***	−0.079***		−0.096***	0.079***		0.096***
	(71.954)		(72.738)	(0.030)		(0.031)	(0.030)		(0.031)
Controls	Yes	Yes	Yes	Yes	Yes	Yes			
Observations	379	379	379	379	379	379	379	379	379
R^2	0.534	0.520	0.516	0.614	0.607	0.587	0.804	0.801	0.791
Adjusted R^2	0.505	0.492	0.488	0.590	0.583	0.563	0.792	0.789	0.778
Note:									*p<0.1; **p<0.05; ***p<0.01

The instruments are all strongly statistically significant and their coefficients all have the expected signs. A greater time difference between the establishment of post offices and the incorporation of cities is thought to increase decentralization, and this increase in decentralization is associated with lower HHI, lower population per government, and a higher number of local governments. The number of closures after the implementation of Rural Free Delivery is thought to operate in the same way. These results hold in specifications where the instruments are used together and when they are used alone. The F statistics for these specifications are reported below in the main results.

5.2 Empirical Results

This section reports the estimated effects of centralization on local government employment and population growth as found through the IV strategy and instruments discussed above. Table 5.2 reports the effects of the centralization measures on local government employment. Columns 1 through 3 report the effect for the MSA HHI measure using both instruments, and then each alone. Columns 4 through 6 and columns 7 through 9 report the same regressions for the other measures of centralization.

In terms of model diagnostics, the table reports the weak instrument F statistics (Staiger & Stock 1997), which are found to be modest but above traditional thresholds. Columns 1, 4, and 7 contain both instruments, facilitating the use of a Sargan J over-identification test (Sargan 1958; Hansen 1982). The table reports the p-values for these test, all of which are above the standard cutoffs, suggesting that the model fails to reject the null hypothesis that all instruments are valid. The relative stability of estimates across the three specification also suggests that the model is operating well.

Table 5.2: IV Estimates of Local Government Employment on Centralization

	Dependent variable:								
	Log MSA Local Government Employment								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MSA HHI	0.138**	0.132*	0.145*						
	(0.059)	(0.075)	(0.083)						
Pop. Per Government				0.127**	0.110*	0.182			
				(0.057)	(0.063)	(0.112)			
Number of Governments							−0.179**	−0.154*	−0.256
							(0.080)	(0.089)	(0.158)
IV: Time Difference	X	X		X	X		X	X	
IV: Rural Free Delivery	X		X	X		X	X		X
Weak Instrument F Stat	13.56	15.92	13.31	17.84	28.11	9.82	17.84	28.11	9.82
Sargan J: p-value	0.9	-	-	0.52	-	-	0.52	-	-
Observations	379	379	379	379	379	379	379	379	379
Note:									*p<0.1; **p<0.05; ***p<0.01

The main measure of centralization, MSA HHI, is found to be statistically significant and positive. The coefficients report that a standard deviation increase in centralization is expected to cause local government employment to increase by over 10%. Assuming these estimates are valid, comparison to the OLS estimates suggest that any unobserved determinants of local government employment that were correlated with the centralization measure tended to decrease local government employment, suppressing the effect of found using OLS.

Similar findings are found for the other two measures of centralization. A increase in centralization as measured by population per government is found to cause higher local government employment, and an increase in the number of governments, associated with a decrease in centralization, is found to cause lower local government employment. The coefficients corresponding to the specification only using the Rural Free Delivery instrument are not significant, and the point estimates differ more from the other two specifications using the same centralization measure. This may be due to the decreased relevance of the Rural Free Delivery instruments for these measures as evidenced by the lower F statistic.

Table 5.3 replicates Table 5.2 but with MSA level population growth between 2000 and 2020 as the dependent variable. Because only the dependent variable has changed between Table 5.2 and 5.3, the F-Statistics reported are identical. The p-values for the Sargan J test reported in columns 1, 4, and 7 do vary, and they are above traditional cutoffs as well.

Table 5.3: IV Estimates of Population Growth on Centralization

	Dependent variable:								
	MSA Growth Rates								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MSA HHI	0.099***	0.121**	0.073						
	(0.036)	(0.050)	(0.048)						
Pop. Per Government				0.098***	0.100***	0.092			
				(0.033)	(0.037)	(0.060)			
Number of Governments							−0.138***	−0.141***	−0.129
							(0.046)	(0.052)	(0.085)
IV: Time Difference	X	X		X	X		X	X	
IV: Rural Free Delivery	X		X	X		X	X		X
Weak Instrument F Stat	13.56	15.92	13.31	17.84	28.11	9.82	17.84	28.11	9.82
Sargan J: p-value	0.46	-	-	0.9	-	-	0.9	-	-
Observations	379	379	379	379	379	379	379	379	379
Note:									*p<0.1; **p<0.05; ***p<0.01

The table reports that a standard deviation increase in centralization as measured by MSA HHI is expected to cause roughly a 10% increase population growth rates, which off a .17 baseline represents a 1.7% increase. This finding is stable across all three specifications, but as was also found in the regressions concerning local government employment, the model consisting of only the Rural Free Delivery instrument is not statistically significant. The same conclusion can be drawn from the other two measures of centralization. Increases in population per government are expected to cause an increase in growth rates, and increase in the number of governments, corresponding to increases in decentralization, are expected to result in decreases in population growth. The point estimates reported for columns 3, 6, and 9, are insignificant, but are largely inline with the point estimates reported in the other model specifications. Similar to the effect on local government employment, the effects reported in the table suggest that any unobserved determinants of the growth rates tended to limit population growth.

Additional robustness checks are found in the appendix. The results are remain consistent when the data is windsored on the centralization measures and on the two outcomes.

5.3 Discussion and Conclusion

The point estimates reported in the previous section should be considered with a fair degree of caution and skepticism for use. As causal estimates, they represent the expected result from an increase in centralization, but in practice the outcomes of a local government merger are more than likely to deviate from these estimates. Centralization is not the only factor that is effected by a merger. However, the results do seem to suggest confidence in the

sign or direction of the effects of centralization on population growth and local government employment, which is useful for distinguishing between various theory of local government.

Together, these two results point most strongly to the theory of tax competition as being the theory that would best guide a potential voter. The tax competition theory holds that competition between local governments can decrease efficiency in the provision of public goods due to externalities. Because centralized local governments face less competition, spillovers are better internalized, and public goods are provided more efficiently. This higher efficiency results in more utility being offered in centralized local governments than in their decentralized counterparts, which accounts for the higher population growth rates. Further, because these spillovers result in the under-provision of public goods, centralized governments that internalize spillovers can offer relatively higher provision, accounting for the finding that centralized local governments have higher employment levels.

These results also bring about other interesting applications and questions. They can be used to guide local government design outside of merger policy. If local governments were looking to improve the efficiency of public provision, these results suggest that policies that promote more cohesion in tax and policy decisions would likely be beneficial. As MSA are statistical construction of the OMB, they do not have an overarching government uniting the different units. It is possible that this could be an avenue worth exploring.

Another area where these results could be of use is in regards to local government and the construction of data centers. If the tax competition theories are to be relied on, the expectation is that these data centers will be under-regulated in more decentralized MSA. An interesting question is if the firms behind the construction of the data centers act on this information and disproportionately target decentralized MSA.

A final question is in regards to what these results say about competition between higher levels of government. The bidding for firms literature (Black & Hoyt 1989; Bartik 1991; Glaeser 2001; Garcia-Mila & McGuire 2002; Greenstone & Moretti 2004; Kim 2025; Ferrari & Ossa 2023; Slattery 2025) considers subsidy competition for firms between MSA. Similar to the case within MSA, there is significant discussion on the welfare consequences of this competition. One interpretation of the results found here is that within MSA, the negative effects of spillovers and externalities outweigh the traditional benefits of competition. However, when the question is broadened to competition between MSA, it is entirely possible that relevant magnitudes flip, and competition becomes welfare increasing. Additional study is required to answer this question.

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7 Appendix

7.1 Local Government Employment IV: Windsor Centralization

	Dependent variable:								
	Log MSA Local Government Employment								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MSA HHI	0.158**	0.258*	0.114						
	(0.076)	(0.142)	(0.085)						
Pop. Per Government				0.176**	0.125	0.381*			
				(0.085)	(0.089)	(0.221)			
Number of Governments							−0.291**	−0.285**	−0.324
							(0.114)	(0.122)	(0.263)
IV: Time Difference	X	X		X	X		X	X	
IV: Rural Free Delivery	X		X	X		X	X		X
Weak Instrument F Stat	10.46	7.24	15.39	11.39	18.93	5.25	11.07	18.91	4.19
Sargan J: p-value	0.31	-	-	0.16	-	-	0.88	-	-
Observations	341	341	341	341	341	341	341	341	341
Note:									*p<0.1; **p<0.05; ***p<0.01

7.2 Local Government Employment IV: Windsor Local Government Emplyoment

	Dependent variable:								
	Log MSA Local Government Employment								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MSA HHI	0.103	0.186*	0.051						
	(0.063)	(0.102)	(0.076)						
Pop. Per Government				0.103*	0.116*	0.063			
				(0.054)	(0.061)	(0.095)			
Number of Governments							−0.144*	−0.163*	−0.089
							(0.076)	(0.086)	(0.133)
IV: Time Difference	X	X		X	X		X	X	
IV: Rural Free Delivery	X		X	X		X	X		X
Weak Instrument F Stat	11.14	9.51	14.74	16.14	25.18	9.41	16.14	25.18	9.41
Sargan J: p-value	0.22	-	-	0.61	-	-	0.61	-	-
Observations	341	341	341	341	341	341	341	341	341
Note:									*p<0.1; **p<0.05; ***p<0.01

7.3 Population Growth IV: Windsor Centralization

	Dependent variable:								
	MSA Growth Rates								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MSA HHI	0.108**	0.194*	0.070						
	(0.050)	(0.102)	(0.054)						
Pop. Per Government				0.148***	0.144**	0.165			
				(0.052)	(0.056)	(0.110)			
Number of Governments							−0.194***	−0.198***	−0.174
							(0.068)	(0.074)	(0.147)
IV: Time Difference	X	X		X	X		X	X	
IV: Rural Free Delivery	X		X	X		X	X		X
Weak Instrument F Stat	10.46	7.24	15.39	11.39	18.93	5.25	11.07	18.91	4.19
Sargan J: p-value	0.18	-	-	0.85	-	-	0.88	-	-
Observations	341	341	341	341	341	341	341	341	341
Note:									*p<0.1; **p<0.05; ***p<0.01

7.4 Population Growth IV: Windsor Population Growth

	Dependent variable:								
	MSA Growth Rates								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MSA HHI	0.099***	0.125***	0.050						
	(0.030)	(0.039)	(0.042)						
Pop. Per Government				0.094***	0.104***	0.056			
				(0.026)	(0.029)	(0.047)			
Number of Governments							−0.133***	−0.147***	−0.078
							(0.036)	(0.040)	(0.066)
IV: Time Difference	X	X		X	X		X	X	
IV: Rural Free Delivery	X		X	X		X	X		X
Weak Instrument F Stat	13.33	18.56	10.22	20.75	34.1	9.86	20.75	34.1	9.86
Sargan J: p-value	0.16	-	-	0.36	-	-	0.36	-	-
Observations	341	341	341	341	341	341	341	341	341
Note:									*p<0.1; **p<0.05; ***p<0.01

7.5 Full OLS Regression Table

	Dependent variable:					
	Log Local Government Employment			MSA Growth Rates		
	(1)	(2)	(3)	(4)	(5)	(6)
MSA HHI	0.055***			0.015*		
	(0.015)			(0.009)		
Population Per Government		0.030*			0.028***	
		(0.016)			(0.009)	
Number of Governments			−0.042*			−0.040***
			(0.023)			(0.013)
Composition Group: City	−0.023	−0.001	−0.001	0.027	0.036	0.036
	(0.040)	(0.041)	(0.041)	(0.023)	(0.023)	(0.023)
Composition Group: County	0.057*	0.088***	0.088***	0.003	0.007	0.007
	(0.032)	(0.031)	(0.031)	(0.018)	(0.017)	(0.017)
Composition Group: Special District	0.255***	0.224***	0.224***	0.077**	0.073**	0.073**
	(0.052)	(0.052)	(0.052)	(0.030)	(0.029)	(0.029)
Log Population 2000	1.067***	1.026***	1.071***	0.025**	0.011	0.054***
	(0.020)	(0.017)	(0.029)	(0.011)	(0.010)	(0.016)
Log Density	−0.066***	−0.068***	−0.068***	−0.043***	−0.048***	−0.048***
	(0.019)	(0.020)	(0.020)	(0.011)	(0.011)	(0.011)
Median City Establishment Year	0.0002	0.0003	0.0003	0.001***	0.001***	0.001***
	(0.0004)	(0.0004)	(0.0004)	(0.0002)	(0.0002)	(0.0002)
Percent Local Gov't Employment: Safety	−0.011***	−0.013***	−0.013***	−0.001	−0.002	−0.002
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
High Hospital Share	0.195***	0.207***	0.207***	−0.014	−0.015	−0.015
	(0.033)	(0.034)	(0.034)	(0.019)	(0.019)	(0.019)
Median House Price	−0.001*	−0.001*	−0.001*	0.0004	0.0003	0.0003
	(0.001)	(0.001)	(0.001)	(0.0003)	(0.0003)	(0.0003)
Median Income	0.003	0.005	0.005	0.001	0.001	0.001
	(0.005)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)
GDP Per Capita	0.006***	0.005***	0.005***	−0.003***	−0.003***	−0.003***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Poverty Rate	0.012*	0.013*	0.013*	−0.007*	−0.008*	−0.008*
	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)
Unemployment Rate	0.018*	0.018	0.018	−0.010	−0.009	−0.009
	(0.011)	(0.011)	(0.011)	(0.006)	(0.006)	(0.006)
Labor Force Participation Rate	0.010**	0.010**	0.010**	0.003	0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.002)	(0.003)	(0.003)
Percent Manufactoring Employment	0.001	0.0003	0.0003	−0.002**	−0.002**	−0.002**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Percent Technology Employment	−0.008*	−0.006	−0.006	−0.0002	−0.00002	−0.00002
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Median Age	0.015***	0.018***	0.018***	−0.016***	−0.014***	−0.014***
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Percent Renters	0.008**	0.010***	0.010***	−0.005***	−0.005**	−0.005**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Percent College Education	0.030***	0.028***	0.028***	0.011**	0.009**	0.009**
	(0.008)	(0.008)	(0.008)	(0.004)	(0.005)	(0.005)
Mean Temperature	0.011***	0.010***	0.010***	0.008***	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Constant	−7.786***	−7.556***	−8.125***	−0.988*	−0.772	−1.317**
	(0.882)	(0.904)	(0.915)	(0.508)	(0.508)	(0.515)
Observations	379	379	379	379	379	379
R^2	0.969	0.969	0.969	0.432	0.442	0.442
Adjusted R^2	0.968	0.967	0.967	0.399	0.409	0.409
Residual Std. Error (df = 357)	0.206	0.209	0.209	0.119	0.118	0.118
F Statistic (df = 21; 357)	539.069***	523.811***	523.811***	12.934***	13.473***	13.473***
Note:						*p<0.1; **p<0.05; ***p<0.01