Exploring the Link between Fiscal Arrangements and the Quality of Public Services: Evidence from Major U.S. Urban Park Systems

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ABSTRACT

There is a longstanding debate about whether the fiscal and institutional arrangements for the provision of quality urban services should be more dispersed or concentrated. We contribute to the debate by exploring the link between fiscal arrangements and public service quality by compiling a unique panel dataset of the quality indicators for major U.S. urban park systems and their funding sources from different types of overlapping local jurisdictions. This article shows that a more dispersed fiscal arrangement among cities, counties, and special districts is negatively associated with the quality of urban park systems. We conclude the article by discussing possible mechanisms of why such a negative correlation between more dispersed fiscal arrangement and the quality of public services applies to shared amenities like urban parks services. The nature of public services seems to be the key to understanding this relationship.

Keywords: Fiscal arrangement, quality of public services, public service provision, overlapping local governments, urban park systems

INTRODUCTION

In the U.S. federal system, the provisions and production of urban good and services are often shared by multiple local jurisdictions. According to the 2012 U.S. Census of State and Local Governments, there are 3,034 counties, 19, 429 municipalities, 16, 504 townships, 13,506 school districts, and 35,052 special districts. The number of overlapping local jurisdictions is only one dimension of the complexity of U.S. local public service provision systems. The fiscal complexity presented by those overlapping jurisdictions is even more acute as these jurisdictions are often jointly involved in financing local public service provision. As a result, there is a longstanding scholarly interest as to how such systems work and the optimal fiscal arrangements of local public service provision.

Among many types of fiscal arrangements, public administration and management scholars diverge in terms of whether the fiscal arrangement for local public service provision should be more dispersed or concentrated (Hendrick, 2011; Boyne, 1992; Dolan, 1990; Oakerson, 1999; Foster, 1997). While the notion of a more dispersed and concentrated urban governance arrangements among overlapping local governments has been commonly defined as the horizontal dimension of local government fragmentation (e.g., Hendrick et al, 2011), this article chooses to use dispersed or concentrated funding sources of overlapping governments to describe the fiscal arrangement of public service provision. As Goodman (2019, p.135) pointed out, "a fragmented local government system can be highly concentrated (i.e., a large number of local government units but only a few of those units dominate the system)." Therefore, dispersion can be a more accurate term than fragmentation (same with concentration and consolidation) to describe the fiscal arrangements among overlapping jurisdictions in public service provision. In addition, in the public and nonprofit management literature, scholars have been concerned about

the relationship between funding diversification and program outcomes (e.g., Berrett & Holliday, 2018). However, there is less attention paid on whether a funding arrangement among overlapping jurisdictions in public service provision influences public service outcomes. We bridge these two lines of literature and contribute to a more nuanced understanding of the fiscal arrangements for public service provision.

We argue in this article that the benefits of a more dispersed local fiscal arrangements are often associated with the diversity of financial resources to produce and provide urban services. Important benefits of a dispersed fiscal arrangement are shared governance, interjurisdictional competition, and consequently, efficiency of public service production and provision (Ostrom, Tiebout, & Warren, 1961; Tiebout, 1956; Oates, 1972; Schwab & Oates, 1991; Berardo & Lubell, 2019). The concentrated fiscal arrangements, on the other hand, can be understood in terms of the funding source that is primarily provided by one type of local government entity. Scholars who support this form of local fiscal arrangement propose that an urban or metropolitan region should be governed by a unitary administrative entity – or a monocentric structure - because it can coordinate disparate units to perform governmental functions and to serve a wider community's interest (Carr & Feoick, 2002). Problems continue as there is little consensus and few empirical evidences in terms of which type of fiscal arrangement is superior in its ability to provide high quality public services.

This article fills in this knowledge gap by empirically examining the relationship between forms of fiscal arrangements and the quality of urban park services. It provides an empirical test of the above two major schools of thought about a more desirable fiscal arrangement for public park service provision at the local level within the context of major U.S. urban park systems. This article makes several theoretical and empirical contributions to the literature on public

service provision and local government management. First, this article provides one of the few empirical investigations of the relationship between fiscal arrangements and public service quality among major U.S. cities. Prior empirical studies tend to focus on organizational efficiencies and fiscal outcomes (e.g., organizational mortality, local government investment, or total expenditure) rather than the accessibility, amenities, and other objective measures of public service quality (Hendrick, Jimenez, & Lal 2011; Kim, Chung, & Eom, 2019; Mughan, 2019; Zabler, 2020). By including multiple quality indicators of urban park systems and constructing an overall service quality index, this article provides a better understanding of how different types of fiscal arrangements may contribute to the quality of public services.

Second, this article proposes the diversity of funding sources as one key indicator about the fiscal arrangements of public service provision. It also provides an alternative approach of addressing the measurement challenge of comparing a large number of overlapping local jurisdictions. With this spending diversification measure and a relatively large-N and longitudinal dataset of major U.S. urban park systems, this article answers the call for an empirical agenda to study two theoretical insights to urban governance (Aligica & Boettke, 2009). It finds that a more diverse and dispersed fiscal arrangement among cities, counties, and special districts is negatively associated with the quality of urban park systems in the United States.

Moreover, the research findings from this study in the context of urban park systems suggest that the nature of public services seems to be the key to understanding the relationship between fiscal arrangements and the quality of public services. Until now, shared amenities like urban park services may favor a more consolidated and fiscally concentrated public service provision system. For local jurisdictions, like central cities in the U.S, their parks services primarily serve

non-residents, which is likely to create stronger incentives for overlapping jurisdictions to free ride. This context-based understanding of fiscal arrangements provides an alternative theoretical framework to bridge and combine the two competing schools of thoughts. It extends the current debate in metropolitan or urban governance to the management of central cities. It also generates promising opportunities for theoretical development and empirical test in other public service subsectors for future studies.

FISCAL ARRANGEMENTS AND THE QUALITY OF PUBLIC SERVICES

There are divergent reviews in the literature about the fiscal arrangement by overlapping local governments and the quality of public services. Some scholars favoring a more dispersed fiscal arrangement while others advocate a more concentrated fiscal arrangement (Oates, 1972, 1999; Tiebout, 1956; Lowery, 2000; Feiock & Carr, 2001; Hendrick, 2011). Both schools of thoughts argue that their proposed fiscal arrangement is more superior to the other in term of their abilities in providing quality public services. Each of them challenges the assumptions made by the other school and finds corresponding empirical evidence to support their own claims. The debate between those two divergent views is not only relevant for urban policy and management but is also of great theoretical and empirical importance to political science, economics, public management, and policy sciences, especially on the institutional arrangement of urban public service provision.

Arguments Favoring a More Dispersed Fiscal Arrangement

The arguments for a more dispersed fiscal arrangement are strongly influenced by the public choice theorical argument and the polycentric argument. The Ostroms pioneered the

investigation of overlapping local governments by applying the public choice theory to explain the importance of complex and multilevel urban governance systems in democratic societies (Boettke, Lemke, & Palagashvili, 2016; McGinnis & Ostrom, 2012; Ostrom, 1999). This public choice argument is built on the Tiebout model of "voting by the feet" which argues for the benefits of inter-jurisdictional competition for public service provision (Tiebout, 1956; Ostrom, Tiebout, & Warren, 1961). Many empirical studies on overlapping local governments are built upon this model.

Overlapping local governments represents a polycentric governance system where no single entity has a monopoly authority and they are jointly involved in public service provision. Oakerson and Parks (2011) describe a polycentric system in major metropolitan regions in the U.S. as "a process of decision making where multiple independent actors interact to produce an outcome that is commonly valued. It contrasts to monocentricity, a model in which a single actor (or cohesive set of actors) provides direction to others" (p.153). The concept of polycentricity has also been defined as a structural feature of social systems of decision centers having limited and autonomous prerogatives and operating under an overarching set of rules (Ostrom, 1999). It "connotes many centers of decision-making which are formally independent of each other" (Ostrom, Tiebout, & Warren. 1961, p. 831). A central question following this is that: Why will such a fiscal arrangement in the urban governance system produce better public services compared with that is dominated by one single entity?

First, a more dispersed fiscal arrangement among overlapping governments may stimulate competition, which is likely to generate better public services. The Tiebout (1956) model - which describes individuals' preferences to "voting by their feet" - can also apply to services in the same jurisdictions even though residents may not move to other jurisdictions because of

interjurisdictional competition. For example, in a city where there are different types of public parks, which are primarily funded by either city government, county government, or special district governments, these parks will compete with each other to attract visitors even though these visitors may not move to another jurisdictions just because of the quality of their park systems (e.g., their future financial resources may be closely tied to the number of visitors in their parks and the satisfaction levels of their visits).

As these different types of overlapping local governments provide a similar form of public services and they often draw from the same pool of residents for revenue, they have strong incentives to outperform each other to demonstrate their legitimacy with their taxpayers. The competition effects incentivize local governments to produce high-quality public services. Similar to the behavior of private firms, local governments operating in amore dispersed fiscal arrangement often generate a higher level of competition, therefore driving up the average quality of public services in that region (Ostrom, Tiebout, & Warren, 1961). In addition, it is necessary to highlight that multiplicity does not necessarily mean duplication. Even with overlapping local governments funding the similar type of public services, the specific public service units they fund are typically not duplicated. For example, Ostrom, Bish and Ostrom (1998) find service producers in police services "usually divide service delivery among themselves systematically, rather than duplicating each other's activities" (p.140). This systematical division of labor typically takes place in the form of alternation in time (e.g., small municipal police department patrol the streets during the day while county sheriff's department patrols the municipality after the midnight) and space (e.g., park and university police patrols).

A dispersed fiscal arrangement among overlapping local jurisdictions may also represent a governance structure that is characterized by shared authority and responsibility, therefore

presenting more open collaborative opportunities to improve public service provision. While local governments each retain the ownership of resources and regulatory control over a certain type of public service provision, their collective spending efforts allow them to work with other funders and each other on a wider range of services. A more dispersed fiscal arrangement also gives each local government more discretion over resource allocation, which is positively related to perceived performance management success (Ammons & Roenigk, 2020). This variety of service provision enables residents to exert great influence on how local public service provision can be or should be managed, i.e., various types of interlocal agreements (Andrew 2009; Feiock, 2013). These interlocal or intralocal collaboration opportunities and other forms of self-governance mechanism among overlapping local governments encourage innovation and promote urban governance systems with a more dispersed fiscal arrangement to produce better public services (Andrew 2009; Feiock, 2009).

Moreover, a more dispersed fiscal arrangement among overlapping local governments may create a greater stability in the overall funding environment, thus helping local governments produce better services. In the nonprofit and business management literature, research has demonstrated the positive effect of revenue diversification on organizations' financial health and performance (Berrett & Holliday, 2018; Carroll & Stater, 2009; Hung & Hager, 2019). For example, in a meta-analysis of 40 empirical studies, Hung and Hager (2019) demonstrate a positive association between revenue diversification and nonprofit financial health. Using data from the local sites of Habitat of Humanity, Berrett and Holliday (2018) find a positive correlation between revenue diversification and organizational outputs. Carroll and Stater (2009) show that nonprofit organizations can reduce revenue volatility through diversifying their revenue. This greater revenue stability is essential for the quality of service they provide. These

findings about nonprofit organizations can be applied to the fiscal arrangements of overlapping local governments. For example, Pitas et al (2017) find that the budgets of city parks and recreation departments were among the first places to be cut after the 2008 financial crisis. A more diverse and dispersed fiscal arrangement makes local governments less vulnerable to external shock and gives them more choices to cover their expenses from various revenue sources, thus allowing public managers to provide better services.

Arguments Favoring a More Concentrated Fiscal Arrangement

Despite strong arguments for dispersed fiscal arrangements among overlapping local governments, many scholars and practitioners cast doubt for a dispersed fiscal arrangement in the production and provision of public goods and services. For example, by surveying local residents in both fragmented and consolidated local government systems, Lyons and Lowery (1989) fail to provide consistent evidence to support the propositions informed by the public choice model. Directly targeted at the competition argument by the public choice school, Lowery (1998) points out that multiple forms of institutional failure undermine the validity of the polycentric model of governance. These include the failure in quasi-market formation - whether there are sufficient levels of jurisdictions to facilitate consumer sovereignty (p.142), the failure by preference error – consumers might lack sufficient knowledge to sort their preferences (p.147), and the failure by preference substitution – the separation of production consumers and provision consumers makes it challenging to generate consistent preference for public service provision (p.158). Similarly, McGinnis (2015a) develops six traps of polycentric governance to denote why the aspirations of polycentric governance may fall short in reality. These six traps include structural inequalities, incremental bias, high levels of complexity, structural fissures, coordination failures, and a lack

of normative clarity. These arguments challenge the assumption that a more fragmented and dispersed fiscal arrangement may stimulate interjurisdictional competition.

The other main argument for concentrated fiscal arrangements centers on the issue of accountability. Lowery (2000) argues that service provision by overlapping local governments undercuts accountability, thus making it harder for local residents to voice their opinions and hold governmental units accountable in the deliveries of urban services. He also suggests that a governance system with multiple overlapping governments provides the same services and tends to generate a higher level of income and racial segregation (Lowery, 2000). Because of these quasi-market failures, a governance system featuring a single or dominant actor in providing public services may be necessary for improving the quality of public services (Lowery, 2000).

Moreover, service provision based on collaboration and coordination among overlapping local governments create incentives for free rides, thus compromising the quality of public services they provide (Negoita, 2018). A more concentrated fiscal arrangement, instead, may help local governments overcome these collective action dilemmas as the power is concentrated in the hands of few authorities. Those dominant entities may also be in a better position to capture the economy of scale for public service provision. Feiock (2013, p.412) uses the institutional collective action (ICA) dilemmas to describe the challenges of fragmented governance systems and argues that such governance systems create incentives for local jurisdictions to oversupply the negative externalities or undersupply the positive ones. For example, although both the Allegheny County Parks Department and the Pittsburgh Parks & Recreation Department fund urban park provision in Pittsburgh, their funding priorities are different (the county prioritizes large nature-based regional parks while the city prioritizes recreation-based neighborhood parks in vulnerable communities). Due to these divergent goals,

high transaction costs of coordination negotiation and enforcement often prevent localities from forming successful interlocal collaboration and regional governance regimes, thus undermining the quality of public service provision (Lowery, 2000). Therefore, a more concentrated fiscal arrangements among overlapping jurisdictions in public service provision may be able to generate better service outcomes.

CONTEXT AND HYPOTHESES

This study conducts an empirical test of the above two divergent arguments about fiscal arrangement and public service quality in the context of major U.S. urban park systems. Public parks, for the most part, are available for all – making services provision and production associated with park systems non-excludable. Users of public parks may not have the incentive to contribute to the maintenance of public parks, although they receive the benefits of services that are provided by the locality. Non-users, on the other hand, may pay for the services through local taxes. The notion of "psychic benefits"-knowing the benefits produced by public goods even though they might not use the services-suggests that some citizens (including conservation groups) will attempt to create demand for public parks. In other words, public parks in urban or metropolitan regions are "public goods" with non-excludable and none-rivalry features. A big challenge of governing and managing urban park systems is related to their fiscal arrangement as local parks and recreations services are often underfunded and face significant pressure to secure adequate and reliable funding, especially compared with those more "essential" services such as public safety and human services (Joassart-Marcelli, 2010; Kaczynski & Crompton, 2006; Pitas, Barrett, & Mowen, 2017). It is necessary to find these major actors who are providing and

producing parks services in the populated urban core when the funding authority is shared among various types of local jurisdictions.

To better understand these governmental entities involved in the shared governance and fiscal authority and their resource percentage share, this article conducts a descriptive analysis. Table 1 shows the percentage share of spending from each local government entity for our sample cities in the year of 2015. According to Table 1, most of the spending comes from cities but not every urban park system relies on 100% of spending from city itself. As of 2015, the percentage of spending from city, county and special districts in Toledo (OH) accounts for 18.71%, 50.59%, 30.69%, while it accounts for 33.72%, 0.00%, and 66.28% in St. Louis. Park districts in the City of Chicago take the full-service responsibility (100%), while county government takes on most of the spending responsibilities in the City of Milwaukee (81.14%). Bearing this in mind, this paper uses the diversity of the funding sources in urban park systems as an approach to examine the relationships between different types of fiscal arrangements and the quality of parks services.

<Table 1>

The review of the core arguments with regards to the relationship between fiscal arrangements and the quality of public services in the context of urban park systems is unclear in the existing literature. Theoretically, the relationship can go either direction for the context of urban parks. A more concentrated fiscal arrangement among overlapping local governments in public park service provision may generate stronger accountability and reduce free rides among these governments, therefore outperforming a more dispersed fiscal arrangement. However, a more dispersed fiscal arrangement among overlapping local governments may have the advantage over a more concentrated fiscal arrangement in terms of its ability to creating a more

stable funding environment and facilitate interlocal competition and cooperation. This article, therefore, proposes the following two competing hypotheses.

Hypothesis 1a: Everything else being equal, a more dispersed fiscal arrangement among cities, counties, and special districts is positively associated with the quality of urban park systems.

Hypothesis 1b: Everything else being equal, a more dispersed fiscal arrangement among cities, counties, and special districts is negatively associated with the quality of urban park systems.

DATA, VARIABLES, AND METHOD

Data Source and Sample

This study draws on several primary data sources that span from urban park system characteristics, government finance, to community characteristics. The primary data come from the annual urban park facts report issued by the Trust for Public Land, which includes park quality data on 100 major U.S. urban park systems from 2012 to 2017. The second source is the Lincoln Institute's Fiscally Standardized Cities (FiSCs) database, which contains different categories of revenues, expenditures, and debt for the 150 largest U.S. cities from 1977 to 2015. The key advantage of the FiSCs database is that it captures public spending of overlying governments in a given jurisdiction on various public functions, thus making fiscal comparisons across jurisdictions possible (Langley, Reschovsky, & Chernick, 2017).

The third source is the National Center on Charitable Statistics (NCCS) Core PC files, which provides information about the expenses and revenues of registered and reporting public charities in the U.S. The fourth source is the U.S. Census' American Community Survey (ACS) which contains community-level characteristics. It can be used to capturing citizens' general preferences of parks, such as race, median income, and education levels. All these different data sources are merged to build a final dataset for empirical analysis, which includes information of nearly 83 major U.S. urban parks system from 2012 to 2017 (see Map 1 in the appendix).

This sample data includes major U.S cities which represent the municipal sector across states so that they can provide certain levels of variations in terms of population size, revenue-generating capacities, community wealth, homeownership and nonprofit financial support. Given that, this city-level analysis can more effectively control for variations in the fiscal, community, and socio-demographic factors that may have different localized effects.

<Map 1 in the Appendix>

Dependent Variables: The Quality of Urban Park Systems

The dependent variable – the quality of urban park systems - is measured by multiple indicators developed by the Trust of Public Land. These measures are (1) *access*: public access to urban parks, which is measured by the proportion of city resident that live within ½ mile of an urban park (an estimated ten-minute walk); (2) *playground*: a facility measure in terms of the average of per-capita provision of playgrounds in parks; (3) *parkland*: the percentage of parkland of total city area; and (4) *park score index* (Trust of Public Land, 2019). Rigolon, Browning, and Jennings (2018, 160) show that the indicators developed by the Trust of Public Land have a high

level of validity and reliability to measure the quality of urban park systems. The Trust for Public Land's ranking report for U.S. city park systems, which is based on the indicators discussed below, is regarded as one of the most important performance benchmark reports in the field.

Access: The variable captures the importance of providing easy access to a public park within a 10-minute walk from home. A public park includes publicly owned parks or open-space. Privately-owned park that are managed by public entities and fully use by the public as well as school parks with joint agreements with municipalities are also included in this measure. Public park owned by homeowner associations or gated communities, golf-course, and cemeteries are not included (Trust of Public Land, 2019).

Playground: The Trust for Public Land (2019) chooses six key park amenities including playgrounds, basketball hoops, off-leash dog parks, recreation and senior centers, restrooms and splashpads and spray grounds to measure facility quality. This study only includes playground because data on the type of amenity has been collected since 2012 and its data is available every year from 2012 to 2017. Studies have shown that there is an association between quality of park amenities and playground use by children. Playground can encourage physical activities and opportunity to increase park usage (Hunter et al., 2015).

Parklands: Increasing the size of urban parkland is important for local communities. Cities can use redevelopment to increase the size of their urban parkland and thus improving the quality of urban park systems. For example, New York converted traffic triangles and paved medians into parks. Chicago developed a "CitySpace Plan" to acquire additional land by different approaches, such as converting schoolyards, create trails, greenways, turning private lots into community gardens, redeveloping abandoned factories into parkland, and building parks on decks over railyards (The Trust for Public Land, 2003).

Park Score Index: Results for the Park Score Index and each of the individual park indicators are presented in subsequent regression analyses to provide a more nuanced understanding of the quality of urban park systems. We employed an exploratory factor analysis to identify whether the first three indicators can be grouped into a smaller number of factor scores. This technique also allows us to measure the Park Score Index as a composite, which is the overall quality of urban park systems[1]. Our analysis shows that all these three indicators load on a single underlying factor. We omit park spending, which is a dimension of the park score developed by the Trust of Public Land, because park spending is likely to be highly correlated with the spending variable that we constructed to measure fiscal arrangements.

The highest Park Score index is 4.072 for Anchorage, AK in 2015; while the lowest is -2.018 for Charlotte, NC in 2012. We examine the analysis further to understand both cases. Anchorage has relatively high scores on access, parklands, and playground. In 2016, the City of Anchorage has 228 parks and 7.5 parks per 1,000 residents. About 216,990 residents were within ½ miles of a park or about 71% of population with walkable access to a park within 10 minutes. On the other hand, the City of Charlotte, NC has one of the lowest Park Score Index. The city has 243 parks in 2016. Only 27% of population has access to a park within a half a mile walking distance. In 2019, only 5% of land in Charlotte is considered a public park (Trust in Public Land 2017, 2020). The park Score Index captures the important dimensions related to the quality of urban park systems in terms of walkable access to a park, the number of parkland per 1,000, and playground.

[1] The overall variation in the dependent variables are mainly dominated by the between-city variation. For example, the between-variation and the within-variation of *access* is 0.183 and 0.020, while the between-variation and the within-variation of *parkland* is 0.103 and 0.008. Even though the within-variation of parkland is low, this does not mean that cities did not take strategies to increase their parkland.

Key Independent Variable: Spending Diversification Index

Our key independent variable, fiscal arrangement of an urban park system, is operationalized as the level of dispersion among sources of public spending on urban park systems. For example, urban parks located within the city boundaries can be funded and/or managed by city government, county government, and special park districts. This study uses the Fiscally Standardized Cities (FiSC) database to construct our key fiscal arrangement variable. In FiSC, overlapping county and special district governments are weighted based on the city's share of the county's population. For example, if a city accounts for 30 percent of the county's population, then 30 percent of revenues and expenditures for the county government will be allocated to the FiSC as county government spending on the central city. Instead of measuring jurisdiction overlap (e.g., Berry, 2008) or spatial overlap (e.g., Hendrick et al., 2012; Hendrick & Shi, 2015), the focus of this study is on the population overlap which may be a better indicator of park usership.

This study uses spending composition of urban parks systems among city, county and special district governments to measure local fiscal arrangements on park provision across overlapping local jurisdictions. Specifically, the measurement of the spending composition of urban parks systems is based on the Hirschman-Herfindahl Index (HHI) of Concentration. That is, the sum of individual sources of spending on parks squared divided by the square of total spending on parks. Compared with conventional fragmentation measures such as the number of local government units (*see* Hendrick & Shi, 2015), which assumes equal dominance of local governments in the system, the SDI focuses on the fiscal dimension of the fragmentation of local public service systems and measures the fiscal dominance of the units in such systems (Goodman, 2019). The

SDI is, therefore, a more accurate description of the structure of the local public service provision system.

The equation for the SDI is shown below, where E_j is the fraction of spending generated by each spending source:

$$SDI_{it} = 1 - \sum_{j=1}^{3} E_j^2$$

A value closer to 1 of SDI indicates the maximum degree of the fiscally fragmented model of governance, suggesting that an urban park system has a more diverse and dispersed fiscal arrangements. In addition, three types of SDI are created based on different classifications of expenditures. They are SDI of total expenditure (SDI), SDI of operational expenditure (operational SDI), and SDI of capital expenditure (capital SDI). Operational expenditure is mainly used for general administration and daily operations, while capital expenditure is the money used for purchasing, maintaining and improving fixed assets such as buildings, equipment or land.

Control Variables

The fiscal arrangement of overlapping local governments is one of certain factors that may shape the quality of urban park systems. We include other variables in the model to control other factors that may be related to the quality of public services, including nonprofit financial support for parks services, percentage of own-source revenues, and the community's socioeconomic characteristics. Nonprofit financial support for urban parks is operationalized as per capita total spending of park-supporting charities in cities. Park-supporting charities are identified through a combination of keyword search and the National Taxonomy of Exempt Entities (NTEE) codes.

Each organization identified in the NCCS dataset is then verified through the information on their website to make sure that the primary purpose of these charities is to support an urban park. Each identified and verified park-support charities in 2013 and 2015 is then linked to the historical NCCS dataset to construct the full panel dataset of park-supporting charities in these cities.

Spending of these park-supporting charities is aggregated at the city level by years to construct total nonprofit support for urban parks in a city. Per capita measure is taken to standardize and rescale the nonprofit support measurement. The total spending of park-supporting charities in cities per 1,000 population ranges from a minimum value of 0 and a maximum of 0.084, which roughly estimated to be around $84 per resident per year. The estimated value is close to the estimated amount reported by the National Recreation and Park Association (NRPA) (2018), i.e., park recreational agency's operating expenditure of $78.26 per capita per year.

The percentage of own-source revenues for the city government is included in the model to control for the revenue-generating capacities of local governments. Multiple community characteristics are also included in the model as control variables to capture citizens' general preferences of parks, such as community wealth, population component, and homeownership. An indicator of community wealth is included in the empirical model to find how community wealth affects urban park performance. Homsy and Warner (2015) use homeownership rate to measure internal drivers in a polycentric framework, thus a control variable of homeownership rate is included in the empirical model.

Payne, Mowen, and Orsega-Smith (2002) argue that the role of race is a significant predictor of park and recreation preferences and behaviors. They find that blacks are more likely to

indicate an increased demand for additional parkland than whites. Thus, we include a percentage of the white population as one demographic variable. Meanwhile, variables like city area and city population are added to explore their impacts on the quality of urban park systems. Descriptive statistics regarding these variables are shown in Table 2.

<Table 2>

Estimation Method

Regarding to the estimation methods, this paper uses both fixed effects (FE) and random effects (RE) models. These models have different assumptions. The FE model allows for correlation between the unobserved effects and other explanatory variables, while the RE model treats them as random and as part of error term (Wooldridge, 2012). The FE models generally require sufficient within-unit variation in the explanatory variables over time and thus are less efficient than the RE models. However, the Hausman test (P-value is smaller than 0.001) confirms that the FE model is preferred in this setting over the RE model. Given this, this study presents both the FE and RE regression results here.

The FE models include year fixed effects to control for all factors that are constant across municipalities in a specific year and city fixed effects to control for all factors that are constant within a city over time. The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity shows that the estimated residuals are not heteroskedastic. All standard errors are heteroskedasticity robust. All independent variables are lagged by one-year to avoid potential endogenous controls in the models. In addition, we test for multicollinearity with the mean-variance inflator factor (VIF) and use the pairwise correlations among the regressors to ensure that a high degree of correlation does not exist between independent variables.

EMPIRICAL FINDINGS AND RESULTS

Tables 3, 4 and 5 show the estimation results for four dependent variables when all spending, operational spending, and capital spending are accounted in the spending diversification index respectively in the fixed effects (FE) and the random effects (RE) analyses. Regarding the relationship between the spending diversification index and park score index, the specification 1 in all three tables shows that the urban park score index is lower when the urban park system has a more diverse and dispersed fiscal arrangement. For example, the statistically significant and negative coefficient of -0.841 on spending diversification index in the model 1 of Table 4 shows that a one-unit increase in the index is predicted to decrease urban park score index by about 0.841 percentage points, all else being constant. Similarly, we find negative and statistically significant coefficients for the variables of spending diversification index for operational spending and capital spending in FE and RE models of Table 4 and Table 5.

<Table 3>

Among other three dependent variables of urban park systems, a general pattern is that the spending diversification index has a statistically significant and negative relationship with the quality of urban park systems. We do not find that any spending diversification index has a statistically significant relationship with public access to urban parks which is measured by the proportion of city resident that live within ½ mile of an urban park in the FE and RE models of three tables. Nevertheless, the results show that cities with wealthier communities and larger land areas have more access to urban parks in the RE model across the three tables.

Results for park playground per 100,000 residents in a city show a consistently negative and statistically significant relationship between SDI (including total, operational and capital SDI) and playground in the FE models of the three tables. For example, the statistically significant and

negative coefficient of -1.368 on spending diversification index in the model 5 of Table 3 shows that a one-unit increase in the diversification of local spending is predicted to decrease the access to park playground per 100,000 residents by approximately 1.368 percentage points, all else being constant. This result about the playground access in the urban parks suggests that public access to playgrounds has not been increased under a more dispersed park system.

<Table 4>

The last park service quality indicator in the categories of parkland as a percent of the city area, does show statistically significant and negative relationships with multiple spending diversification indices in the three tables except the FE model in the Table 4. For example, the result of model 7 in the Table 3 shows that a one-unit increase in the spending diversification index is predicted to decrease the parkland as a percent of city area by approximately 0.730 percentage points, all else being constant. Overall, these empirical results show that a more diverse and dispersed fiscal arrangements is negatively associated with the quality of public services in the case of urban parks services. These empirical evidences support the hypothesis 1b.

<Table 5>

Our study also tests the influence of nonprofit financial support for parks on the quality of urban parks systems, there seems to be a lack of relationship between per capita total nonprofit spending on parks and park score index. Previous study suggests that the quality of public services may be determined by how well park-supporting nonprofits function as a cushion of government budget cuts (Cheng & Yang, 2019). However, our study suggests that there is little support for the negative relationship between nonprofit financial support and the quality of urban park systems. The finding is that nonprofit financial support has a negative and statistically

significant relationship (if $p<0.10$) with the park score index in the FE models. Given the growth and prevalence of nonprofits in financing the provision of parks services (Gazley, Cheng, & LaFontant, 2018), we call for continued monitor the impact of park-supporting nonprofits on the quality of public services in future studies.

All specifications include variables to control for fiscal, socio-economic and demographical factors, including own source revenue-generating capacities of local governments, community wealth, homeownership, city land area, and certain population variables. However, not many of these control variables show significant relationships with dependent variables in the FE models. With regards to some RE models, we find that the white population has a positive and statistically significant relationship with park score index, access, and parkland. For example, the statistically significant and positive coefficient of 1.205 on white population in the model 2 of Table 3 shows that a one-unit increase in the percentage of white population is predicted to increase the access to park playground per 100,000 residents by approximately 1.205 percentage points, all else being constant. This may suggest that different population groups have different interests in public parks and confirms the findings from previous research (Payne, Mowen, & Orsega-Smith, 2002). We also find that community wealth has a statistically significant and positive relationship with dependent variables such as park score index, access, and park land in the RE models.

DISCUSSION AND CONCLUSION

This article seeks to build an understanding of the linkage between fiscal arrangements and the quality of public services, using evidence from U.S. major urban park systems. It shows that a more dispersed fiscal arrangement among cities, counties, and special districts, are negatively

associated with the quality of public services in the case of urban park systems, which supports hypothesis 1b and more concentrated fiscal arrangement for public service provision. Our findings indicate that in the context of parks services, policymakers and public managers need to be aware of the potential for polycentric governance failures (McGinnis, 2015b) or quasi-market failures (Lowery, 2000), and designate one dominant local government as the main provider of those services.

Compared with policy contexts (e.g. urban police forces) where scholars have documented the success of a more fiscally dispersed form of governance (Ostrom, Parks, & Whitaker, 1973), the contrast of findings deserves some discussion. This article argues that the nature of public services seems to be a key factor in determining the fiscal arrangement – quality of public service relationship. For example, based on the Tiebout model, the benefits of the public services should be fully captured by residents in the jurisdiction for "voting with the feet" to work. Public services like public education are one type of such services where only residents living in certain neighborhood are able to enjoy the benefits of corresponding public schools. However, for urban parks services, even though people who live close to the park are more likely to enjoy the benefits of the park, people living in other neighborhoods or jurisdictions can also travel to enjoy such benefits. This is especially true for central cities where parks often serve non-residents. Shared amenities such as public parks may, therefore, not be able to benefit from a more dispersed fiscal arrangement. Moreover, compared to public services like public education or public safety, public parks may not be as crucial a factor for citizens to move to other neighborhoods or jurisdictions. All these factors add nuances to our understanding to the relationship between fiscal arrangements and the quality of public services. Comparative

analyses across different public service contexts are promising future research directions to empirically test these propositions.

Although this study finds little supportive evidence about the relationship between nonprofit support and the performance of urban park systems, this trend of an increasing reliance on philanthropy and non-governmental actors for financing public service provision should be noticed and continuously monitored. The result of this article indicates that the level of nonprofit support for public parks is relatively low for most cities. As governments suffer from increasing fiscal pressure and public-nonprofit partnerships become more prevalent in city park management, the impact of these park-supporting charities may become more salient over time (Walls, 2014; Cheng, 2019a and 2019b).

We acknowledge that there are some limitations in this study. First, because of the constraints of data availability, this study is only able to track the indicators of urban park system service quality from 2012 to 2017 for some major U.S. cities each year. For some of the park system quality indicators measured in this article, this 5-year window may not allow sufficient variation over time. Tracking longer-term changes in the quality of public services will improve the robustness and validity of this article. Despite our efforts in finding the best available data and measures for the quality of urban park systems in major U.S. cities, we acknowledge that indicators used in this article focus on the scale of public service provision (e.g., number of playgrounds and parkland) but may fail to capture quality indicators that are directly related to user interactions and experiences. With the availability of social media data to directly measure visitation and user experiences (Donahue et al., 2018), future research could extend this study by examining the linkage between different types of fiscal and institutional arrangements and user experiences in public service provision.

While SDI can be considered a simple and comparable measure of the fiscal arrangement (i.e., dispersed or concentrated), we acknowledge that it is not the most comprehensive measure. For instance, it cannot evaluate well a complete description of polycentric governance by Vincent and Elinor Ostrom and other scholars working in this tradition. This measure has few descriptions regarding the process. That is, multiple jurisdictions interact with each other through the process of mutual adjustment, formal collaborations, or informal commitments. It is likely that governance of urban park service provision systems goes beyond the fiscal arrangements and may encompass different types of linkages and ties of local governments and non-governmental organizations (McGinnis, 2015b; Ostrom, 1999). With the advancement of network analysis methodology in studying multilevel and complex governance systems (Scott & Ulibarri, 2019), future studies can better visualize and explain the structure, process, and performance of urban parks service provision systems. Additional in-depth interviews and qualitative case studies should be conducted in the future to improve the understanding of the coordination, collaboration, and competition mechanisms for participants in urban governance systems.

In conclusion, this article contributes to the literature of local government management, public service provision, and public finance as the first few empirical studies exploring the relationship between fiscal arrangements and the quality of public services. The findings and empirical strategies used in this study can be applied to other local government studies and public management contexts to promote a better understanding of public service provision under a governance system in which overlapping government actors and nonprofits are jointly involved in public service provision. The policy and management implications of this study are important because governments at all levels seek alternative institutional and fiscal arrangements for public

service provision. There are inherent dilemmas public managers may face when designing the optimal fiscal arrangements for public service provision. Critically assessing the nature of the services local governments provide and the tradeoffs among different forms of fiscal arrangements seem to be key.

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TABLE 1. Percentage share of spending from different local governmental entities, 2015.

City names	States	City spending%	County spending%	Special district spending%	Which governmental entity provides the majority of spending?
Albuquerque	NM	91.95%	8.05%	0.00%	City
Anaheim	CA	87.62%	12.00%	0.38%	City
Anchorage	AK	100.00%	0.00%	0.00%	City
Arlington	TX	99.99%	0.00%	0.01%	City
Atlanta	GA	97.70%	2.30%	0.00%	City
Aurora	CO	37.52%	13.38%	49.10%	Special district & City
Austin	TX	85.19%	13.50%	1.31%	City
Bakersfield	CA	68.61%	10.98%	20.40%	City
Baltimore	MD	100.00%	0.00%	0.00%	City
Baton Rouge	LA	19.74%	0.00%	76.91%	Special district
Boise	ID	87.67%	1.12%	11.21%	City
Boston	MA	100.00%	0.00%	0.00%	City
Buffalo	NY	47.60%	52.40%	0.00%	County & City
Charlotte	NC	69.16%	30.85%	0.00%	City & County
Chesapeake	VA	100.00%	0.00%	0.00%	City
Chicago	IL	3.87%	7.77%	88.36%	Park district
Cincinnati	OH	61.39%	24.90%	13.71%	City
Cleveland	OH	57.41%	0.00%	42.59%	City & Special district
Colorado Springs	CO	82.25%	6.18%	11.60%	City
Columbus	OH	66.92%	12.41%	20.67%	City
Corpus Christi	TX	87.90%	11.99%	0.11%	City
Dallas	TX	99.54%	0.45%	0.01%	City
Denver	CO	99.39%	0.00%	0.61%	City
Detroit	MI	64.26%	2.21%	33.53%	City
Durham	NC	91.05%	8.94%	0.00%	City
El Paso	TX	95.12%	4.88%	0.00%	City
Fort Wayne	IN	73.72%	23.65%	2.63%	City
Fort Worth	TX	99.99%	0.01%	0.01%	City
Fremont	CA	45.90%	0.17%	53.93%	Special district & City
Fresno	CA	92.53%	3.94%	3.53%	City
Garland	TX	98.85%	1.14%	0.02%	City
Greensboro	NC	94.47%	5.53%	0.00%	City
Hialeah	FL	33.04%	66.87%	0.09%	County
Houston	TX	85.15%	8.72%	6.13%	City
Indianapolis	IN	97.33%	0.00%	0.00%	City
Jacksonville	FL	92.59%	0.00%	1.61%	City
Kansas City	MO	79.33%	18.49%	2.17%	City
Las Vegas	NV	36.55%	63.45%	0.00%	County
Lexington	KY	100.00%	0.00%	0.00%	City

Lincoln	NE	100.00%	0.00%	0.00%	City
Long Beach	CA	89.47%	8.03%	2.50%	City
Los Angeles	CA	73.43%	20.25%	6.32%	City
Louisville	KY	88.46%	0.00%	0.00%	City
Lubbock	TX	97.53%	2.47%	0.00%	City
Madison	WI	73.81%	26.19%	0.00%	City
Memphis	TN	96.57%	3.43%	0.00%	City
Mesa	AZ	97.14%	2.86%	0.00%	City
Miami	FL	57.96%	41.98%	0.06%	City & County
Milwaukee	WI	3.05%	81.14%	15.81%	City
Minneapolis	MN	86.71%	0.51%	12.79%	City
Nashville	TN	98.97%	0.00%	0.07%	City
New Orleans	LA	100.00%	0.00%	0.00%	City
New York	NY	100.00%	0.00%	0.00%	City
Norfolk	VA	100.00%	0.00%	0.00%	City
Oakland	CA	46.26%	0.16%	53.58%	Special district & City
Oklahoma City	OK	99.96%	0.04%	0.00%	City
Omaha	NE	90.96%	8.19%	0.86%	City
Orlando	FL	91.28%	8.72%	0.00%	City
Philadelphia	PA	100.00%	0.00%	0.00%	City
Phoenix	AZ	96.59%	3.41%	0.00%	City
Pittsburgh	PA	55.01%	26.42%	18.57%	City
Portland	OR	71.81%	0.02%	28.17%	City
Raleigh	NC	95.16%	2.58%	2.26%	City
Reno	NV	32.23%	42.32%	25.46%	County & City
Richmond	VA	100.00%	0.00%	0.00%	City
Riverside	CA	77.04%	8.49%	14.47%	City
Sacramento	CA	77.70%	11.04%	11.26%	City
San Antonio	TX	82.90%	16.83%	0.27%	City
San Diego	CA	95.31%	4.46%	0.23%	City
San Francisco	CA	99.89%	0.00%	0.10%	City
San Jose	CA	79.67%	13.27%	7.06%	City
Santa Ana	CA	66.28%	32.69%	1.04%	City
Seattle	WA	85.43%	13.79%	0.79%	City
St. Louis	MO	33.72%	0.00%	66.28%	Special district
St. Paul	MN	81.12%	18.88%	0.00%	City
St. Petersburg	FL	90.70%	9.30%	0.00%	City
Stockton	CA	89.34%	10.66%	0.00%	City
Tampa	FL	68.30%	19.84%	11.85%	City
Toledo	OH	18.71%	50.59%	30.69%	County & Special district
Tucson	AZ	69.59%	30.41%	0.00%	City
Tulsa	OK	86.81%	13.19%	0.00%	City
Virginia Beach	VA	100.00%	0.00%	0.00%	City
Wichita	KS	79.45%	20.19%	0.35%	City

TABLE 2. Descriptive Statistics for Variables in the Analysis

Variables	Obs.	Mean	Std.Dev.	Min.	Max.
Dependent variables					
Park score index	317	0.000	1.000	-2.018	4.072
Access	317	0.648	0.195	0.260	0.990
Playground	317	2.400	0.989	0.500	7.300
Park land	317	0.110	0.085	0.010	0.846
Independent variables					
Spending diversification index (SDI)	415	0.238	0.193	0.000	0.652
Operational SDI	414	0.237	0.193	0.000	0.664
Capital SDI	413	0.182	0.192	0.000	0.646
Nonprofit financial support	415	3.821	8.179	0.000	83.883
Own-source revenue (OSR) capacity	415	0.634	0.099	0.377	0.849
Community wealth	481	0.000	1.000	-2.015	3.225
City area (ln)	411	-5.889	1.066	-8.487	-3.831
City population (ln)	415	13.103	0.684	12.226	15.952
White population	481	0.653	0.139	0.213	0.957
Homeownership	481	0.554	0.077	0.219	0.693

Notes: For quite a few cities in the *Trust for Public Land* city park facts dataset, the data on park access is missing, thus leading to a drop of observations.

TABLE 3. Fixed and Random Effects Models Results of Total Spending Diversification Index

Variables	Park Score Index		Access		Playground		Park land	
	FE (1)	RE (2)	FE (3)	RE (4)	FE (5)	RE (6)	FE (7)	RE (8)
Spending diversification index	-0.841***	-0.541*	-0.028	0.008	-1.368**	-0.030	-0.730**	-0.028**
	(0.260)	(0.281)	(0.026)	(0.024)	(0.561)	(0.498)	(0.013)	(0.013)
Nonprofit financial support	-0.002*	-0.001	-0.0002	-0.0001	-0.004	0.000	-0.002	0.00008
	(0.001)	(0.002)	(0.0001)	(0.0001)	(0.003)	(0.004)	(0.000)	(0.00007)
OSR capacity	0.267	-1.122	-0.019	-0.177**	0.633	0.008	-0.542	-0.028
	(0.838)	(0.777)	(0.087)	(0.094)	(1.662)	(1.076)	(0.034)	(0.032)
Community wealth	-0.215	0.208*	0.009	0.038***	-0.596	0.004	-0.079	0.019**
	(0.218)	(0.111)	(0.013)	(0.023)	(0.376)	(0.124)	(0.008)	(0.008)
City area (ln)	9.974	0.241	0.916	0.074***	13.013	0.292	0.134*	-0.001
	(5.997)	(0.147)	(0.016)	(0.830)	(8.083)	(0.122)	(0.159)	(0.018)
City population (ln)	2.999	-0.138	0.142	0.007	4.520	0.114*	-0.368*	0.010
	(1.862)	(0.215)	(0.031)	(0.220)	(3.362)	(0.196)	(0.061)	(0.020)
White population	1.252	1.205*	0.206	0.236*	-0.119	0.136	0.926	0.100*
	(0.775)	(0.685)	(0.133)	(0.167)	(1.411)	(0.917)	(0.065)	(0.054)
Homeownership	-0.159	-1.271	-0.197	-0.383	1.280	-0.027	0.784	-0.067
	(1.697)	(1.182)	(0.162)	(0.197)	(3.035)	(1.602)	(0.094)	(0.086)
N (observations)	297	297	297	297	297	297	297	297
Within R^2	0.275	0.217	0.317	0.290	0.109	0.061	0.302	0.276

Notes: Significance levels indicated by: *p<.10, **p<.05, ***p<.01; two-tailed tests. Robust standard errors in parentheses.
All specifications have (a) year fixed effects (b) city fixed effects (c) cluster at city level. All independent variables are lagged by one year.

TABLE 4. Fixed and Random Effects Models Results of Operational Spending Diversification Index (SDI)

Variables	Park Score Index		Access		Playground		Park land	
	FE (1)	RE (2)	FE (3)	RE (4)	FE (5)	RE (6)	FE (7)	RE (8)
Operational SDI	-0.812***	-0.312*	0.005	0.044	-1.646***	-0.949*	-0.019	-0.023**
	(0.263)	(0.095)	(0.033)	(0.036)	(0.560)	(0.516)	(0.012)	(0.011)
Nonprofit financial support	-0.002*	-0.003	-0.0002	-0.0001	-0.005	-0.002	0.0001	0.0001
	(0.001)	(0.001)	(0.0001)	(0.0001)	(0.003)	(0.004)	(0.0001)	(0.0001)
OSR capacity	0.260	-0.131	-0.027	-0.181**	0.701	-0.540	0.006	-0.026
	(0.856)	(0.825)	(0.099)	(0.087)	(1.693)	(1.050)	(0.034)	(0.032)
Community wealth	-0.216	-0.150*	0.012	0.039***	-0.626	-0.089	0.005	0.019**
	(0.218)	(0.197)	(0.023)	(0.013)	(0.384)	(0.125)	(0.007)	(0.008)
City area (ln)	9.016	9.064	0.856	0.076***	11.732	0.122	0.250	-0.001
	(5.792)	(5.982)	(0.816)	(0.016)	(7.664)	(0.121)	(0.159)	(0.018)
City population (ln)	2.106	2.865	0.119	0.010	2.991	-0.399*	0.084	0.008
	(1.811)	(1.928)	(0.216)	(0.030)	(3.138)	(0.196)	(0.066)	(0.021)
White population	1.279	1.585*	0.225	0.250*	-0.257	0.871	0.143**	0.102*
	(0.788)	(1.011)	(0.182)	(0.137)	(1.239)	(0.880)	(0.067)	(0.055)
Homeownership	-0.075	-0.168	-0.206	-0.390	1.532	0.760	-0.028	-0.068
	(1.784)	(1.709)	(0.207)	(0.165)	(3.130)	(1.574)	(0.095)	(0.086)
N (observations)	297	297	297	297	297	297	297	297
Within R^2	0.265	0.215	0.314	0.290	0.115	0.073	0.289	0.268

Notes: Significance levels indicated by: *p<.10, **p<.05, ***p<.01; two-tailed tests. Robust standard errors in parentheses.
All specifications have (a) year fixed effects (b) city fixed effects (c) cluster at city level. All independent variables are lagged by one year.

TABLE 5. Fixed and Random Effects Models Results of Capital Spending Diversification Index

Variables	Park Score Index		Access		Playground		Park land	
	FE (1)	RE (2)	FE (3)	RE (4)	FE (5)	RE (6)	FE (7)	RE (8)
Capital SDI	-0.312***	-0.252***	-0.024	-0.019	-0.319*	-0.172	-0.020**	-0.019*
	(0.095)	(0.090)	(0.015)	(0.015)	(0.173)	(0.169)	(0.010)	(0.010)
Nonprofit financial support	-0.003*	-0.002	-0.0003*	-0.0001	-0.005*	-0.002	0.00003	0.00005
	(0.001)	(0.002)	(0.0001)	(0.0001)	(0.003)	(0.004)	(0.0001)	(0.0001)
OSR capacity	-0.131	-1.243	-0.041	-0.188**	0.103	-0.470	-0.011	-0.043
	(0.825)	(0.773)	(0.097)	(0.090)	(1.667)	(1.060)	(0.037)	(0.036)
Community wealth	-0.150	0.222**	0.011	0.038***	-0.485	-0.075	0.006	0.021***
	(0.197)	(0.112)	(0.022)	(0.012)	(0.348)	(0.125)	(0.007)	(0.008)
City area (ln)	9.064	0.256*	0.917	0.074***	11.090	0.151	0.280*	0.001
	(5.982)	(0.152)	(0.816)	(0.016)	(7.986)	(0.125)	(0.165)	(0.018)
City population (ln)	2.865	-0.100	0.161	0.007	3.959	-0.331	0.125**	0.013
	(1.928)	(0.220)	(0.210)	(0.030)	(3.556)	(0.206)	(0.059)	(0.020)
White population	1.585	1.304	0.212	0.226*	0.512	0.998	0.144**	0.109**
	(1.011)	(0.764)	(0.166)	(0.134)	(1.864)	(0.971)	(0.066)	(0.055)
Homeownership	-0.168	-1.231	-0.189	-0.366**	1.146	0.673	-0.022	-0.058
	(1.709)	(1.171)	(0.188)	(0.155)	(3.078)	(1.550)	(0.100)	(0.092)
N (observations)	297	297	297	297	297	297	297	297
Within R^2	0.262	0.213	0.324	0.299	0.078	0.044	0.323	0.298

Notes: Significance levels indicated by: *p<.10, **p<.05, ***p<.01; two-tailed tests. Robust standard errors in parentheses. All specifications have (a) year fixed effects (b) city fixed effects (c) cluster at city level. All independent variables are lagged by one year.

Appendix:

MAP 1. Sample U.S. cities in the 2015 dataset.