DISCUSSION PAPERS IN ECONOMICS

Working Paper No. 07-08

Intrametropolitan Decentralization: Overlapping Jurisdictions and Efficient Local Public Good Provision

Stephen Billings
University of Colorado

November 15, 2007

Center for Economic Analysis
Department of Economics

University of Colorado at Boulder
Boulder, Colorado 80309

Intrametropolitan Decentralization: overlapping jurisdictions and efficient local public good provision

Stephen Billings*
University of Colorado

November 15, 2007

Abstract

A new methodological approach allows for an empirical test of the benefits of decentralizing the institutions of local government. Past research has been limited by the lack of variation in government structure within a country or region and the self-selection of areas that decentralize governments. This research overcomes these limitations by 1) examining the growth of special district governments in Colorado over the last 20 years and 2) adopting a spatial difference-in-difference estimator, which performs difference-in-difference estimation across space and time, to control for the self-selection of government structure. Specifically, a hedonic housing price framework estimates what impact the number of governments serving a home has on property values within the Denver-Boulder-Greeley CMSA. Results find negative impacts for forming special district governments. These impacts vary by functions decentralized and also the spatial characteristics of overlapping jurisdictions.

JEL Classification:
Keywords:..

Acknowledgements: This research would not have been possible without the astute advice and helpful conversations with my advisor, Charles de Bartolome; the assistance of Randy Walsh with empirical modeling, and the enthusiasm and insight of Jeffrey Zax. Also, conversations with Richard Arnott and Robert Inman were important in developing this research. Christine Martell's work with special districts in Colorado helped motivate this research. All errors are my own.

Preliminary Draft - please do not cite or circulate without permission.

*Department of Economics, University of Colorado, 256 UCB, Boulder, CO 80309. Phone: (720) 837-4017, Email: stephen.billings@colorado.edu

1 Introduction

Contemporary urban dwellers in the U.S. are now often governed by multiple local jurisdictions. In some U.S. states, the number of these local governments has grown substantially over the last two decades, ranging from a ten percent increase to a near 160% growth (Table 1). The most common of these new governments are special districts, created to provide specific services or functions and varying in size from less than a square mile to multiple counties. In addition, the number and types of these governments serving individual properties varies across a metropolitan area. This variation allows an empirical test of the impacts of institutional decentralization.[1]

	Number of Governments 1987	Growth in Number of Governments 1987-2002	Percent Growth 1987-2002
New Mexico	332	527	158.7%
Wyoming	425	298	70.1%
Connecticut	479	103	21.5%
Colorado	1,595	335	21.0%
Delaware	282	58	20.6%
Mississippi	855	147	17.2%
Arkansas	1,401	192	13.7%
Georgia	1,285	162	12.6%
Wisconsin	2,719	329	12.1%
Kentucky	1,307	136	10.4%

Source: 2002 Census of Governments
Note: Approximately 90% of new governments in these states are special districts and the remaining 10% are cities and towns.

Table 1: Top 10 States for Growth in Governments between 1987 and 2002

The federalism literature debates this form of decentralization, and Olson (1969) argues for a highly decentralized local government structure:

"There is a need for a separate government institution for every collective good within a unique boundary, so that there can be a match between those who receive the benefits of a collective good and those who pay for it."

[1] Institutional decentralization is shifting governmental responsibilities to an additional government with associated taxing and spending powers. There is some debate over the terminology used for the decentralization of government institutions. Institutional decentralization and structural decentralization are used interchangeably. As will be discussed, the scale of analysis in this research allows one to think about institutional decentralization as the creation of additional layers of government serving a resident.

This is contrasted with theoretical results from Hochman et al. (1995) who advocate for a centralized institutional structure of local governments:

".. decentralization requires an institutional system in which each local government supplies the whole range of LPGs (Local Public Goods) to the individuals residing in the territory under its control."

This research empirically tests this normative debate through a hedonic housing regression using property data on all single family homes sold within the Denver-Boulder-Greeley CMSA (Consolidated Metropolitan Statistical Area) between 2002 and 2004. Regressions incorporate two measures of institutional structure: the number of governments serving a home and a Herfindahl measure of how public expenditures are distributed between layers of government. To assign properties to their corresponding governments, this research employs a unique dataset of digitally encoded local government maps of Colorado. This assures an accurate determination of the number of governments serving a property and the spatial relationship between governments.

To control for the endogeneity of government structure, this paper performs difference in difference estimation across space and time. This estimation strategy, entitled *spatial difference-in-difference*, controls for time varying unobservables by matching observations in close proximity, but on opposite sides of a new jurisdiction's border.[2] Differencing repeat sales for a given property then removes pre-existing differences among border matched observations.

Overall results find a negative impact of institutional decentralization on property values. Functionally, decentralizing governments that provide fire and recreation services have positive impacts while water and sewer have negative impacts. Measures of jurisdictional characteristics find a positive impact of decentralizing to new governments that have greater income heterogeneity with existing governments. Also, new governments whose jurisdictions have greater overlap with existing special districts or cities have negative impacts on property values. Both jurisdictional characteristics find greater benefits for new governments that overlap heterogenous jurisdictions or serve an unique grouping of residents. These results support the Tiebout (1956) mechanism, where local governments are elastically supplied to serve diverse residents.

This paper begins by discussing the conceptual framework of institutional decentralization and

[2]Government refers to the public institution which has taxing and spending powers. Jurisdiction refers to the physical area and residents served by a government.

summarizing relevant literature. Section 3 provides the empirical methodology for using a hedonic housing price approach to estimate the impacts of institutional decentralization. Section 4 discusses measurements of institutional decentralization and the spatial distribution of governments. Section 5 gives estimation results for Ordinary Least Squares regressions. Spatial difference-in-difference estimation controls for factors that influence the formation of additional layers of government in Section 6. Finally, Section 7 summarizes results.

2 Conceptual Framework and Related Literature

Typically, decentralization involves the spreading of government functions and expenditures to successively smaller units of government. This results in a nested spatial distribution of jurisdictions between levels of government. The relationship between counties and states provides a clear example of this in the U.S. A more complicated spatial structure occurs with the decentralization of governments within a metropolitan area. In this structure, the overlapping of cities, special districts, school districts, and counties allows households to reside in different numbers and types of governments.

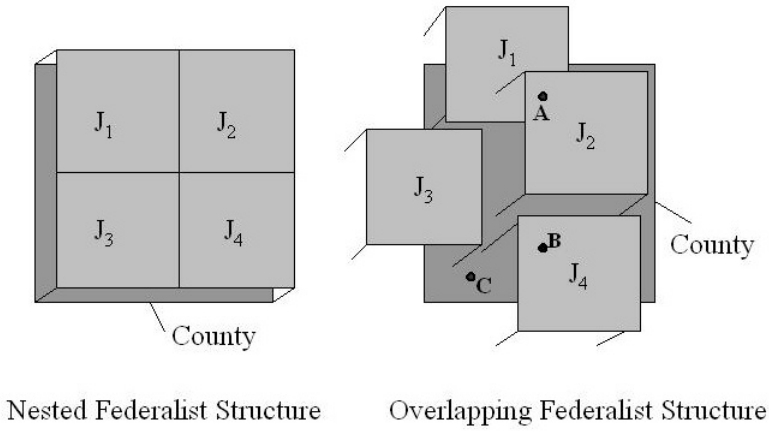

Figure 1: Two Federalist Structures

Figure 3 exemplifies the difference between nested and overlapping jurisdictions. Both Federalist structures illustrate four subcounty jurisdictions (J_1, J_2, J_3, J_4) overlapping a county government.

Three layers of government serve property A, two governments serve property B, and only the county government serves property C in the Overlapping Federalist Structure. Two governments serve all properties in the Nested Federalist Structure. These two spatial distributions contain the same number of governments per county, yet the number of governments serving a home and the relationships between overlapping governments differs.[3]

The growth of noncontiguous cities and special districts makes the Overlapping Federalist Structure more appropriate for modeling local government. An underlying assumption in thinking about overlapping governments is that every property receives basic local public goods (e.g. schools, fire, recreation, police, infrastructure, etc.). Therefore, overlapping governments provide complementary or unrelated services relative to each other for an individual property.[4] This assumption is confirmed by Turnbull and Djoundourian (1993), who find that overlapping cities and counties contain complementary general service expenditures and unrelated police and roads services. Campbell (2004) finds that city and county expenditures are complementary.

The spatial distribution of governments influences the scale and scope of local public good (LPG) provision, and relates to two fundamental tradeoffs in institutional decentralization. The benefits of institutional decentralization are due to the flexibility of varying the scale and grouping of residents by LPG. The costs of institutional decentralization are those associated with the creation and administration of another government institution. These costs also relate to a loss of economies of scope from providing multiple LPGs within a single government. The theoretical model in Appendix Section 9 formalizes this tradeoff in the context of one versus two governments providing two local public goods to a region.[5]

The empirical literature on fiscal federalism typically bundles institutional and fiscal decentral-

[3]Empirical papers using Census of Government data cannot distinguish between these two federalist structures within a metropolitan area. In 2002, the Census of Governments added additional spatial information. The dataset distinguishes if a jurisdiction overlaps multiple counties, overlaps a city, and if a jurisdiction is contained within a county. This information describes the general distribution of governments, but does not distinguish the amount of overlap between governments.

[4]In some cases, overlapping governments provide the same category of functions, but they are qualitatively different. An example is the county provision of highway police and an overlapping city's provision of urban police services.

[5]This model is similar in spirit to a number of models in the club literature of Buchanan (1965). Most of this literature models the tradeoffs in economies of scale and costs of heterogeneity in providing local public goods. Alesina and Spolaore (2003) provide an application to the optimal size of nations and Berglas and Pines (1981) to modeling the congestible local public good of transportation facilities.

ization in measuring the impacts of decentralization.[6] A number of papers provide cross-country or intra-country examinations of the impacts of a federalist structure. Iimi (2005), Akai and Sakata (2002), and Lin and Liu (2000) find positive impacts of decentralization on economic growth, while Davoodi and Zou (1998) and Zhang and Zou (1998) find negative impacts of decentralization on economic growth. A recent cross-country study by Arzaghi and Henderson (2005) finds that decentralization is positively influenced by economic growth, country size, and population. Baranky and Lockwood (2007) find that within Swiss regional governments, greater decentralization leads to higher educational attainment. The lack of papers that empirically disentangle institutional decentralization from fiscal decentralization limits the ability to attribute the impacts of decentralization to the structure of government or fiscal responsibilities between government tiers.

A few studies provide empirical tests of U.S. local government structure. Nelson (1990) examines the determinants of local government structure by a regression of the number of governments per Metropolitan Statistical Area (MSA) on population heterogeneity and state laws regarding government structure. Results find positive effects for heterogeneity and negative effects for stricter laws regarding new jurisdiction formation. Foster (1996) finds a negative relationship between the number of special districts and income growth at the MSA level. Deller (1990) finds that the number of local jurisdictions positively relates to property values. Other studies of local government structure focus on school districts, and Brasington (2004) finds that school district consolidation has a negative impact on housing prices. A number of papers examine county or municipal governments and Stansel (2005) finds a positive relationship between the number of cities and counties and metropolitan area growth. Most of this literature assumes that government structure is exogenous. This assumption is problematic if unobservable characteristics or interdependence between governments is correlated with government structure.

Another strand of literature tests the relationship between government institutional structure and LPG expenditures. As discussed in Zax (1989) , Oates (1985), and Bates and Santerre (2006), the minimization of local government spending represents government efficiency. This research finds that competition between governments and the scale of providing a LPG impact local government

[6]Fiscal decentralization is the spreading of tax and expenditure responsibilities to lower tiers of government

expenditures. Baqir (2002) incorporates instrumental variables to control for the endogeneity of local government structure, and finds that more districts within a political jurisdiction positively impacts government spending. A concern with using government expenditures to measure the impacts of institutional decentralization is that highly decentralized areas typically contain higher LPG demand. Disentangling demand-based government expenditures from expenditures due to institutional structure is difficult.

This research overcomes three shortcomings in the literature. First, property level observations allows an explicit account of the spatial distribution of governments. Second, variation in institutional structure and local government expenditures within a metropolitan area allows a direct empirical test of institutional decentralization. Third, spatial difference-in-difference estimation controls for the endogeneity of government structure.

3 Empirical Methodology

The empirical strategy for estimating the impacts of institutional decentralization involves a modification of Rosen (1974)'s classic hedonic housing price model. This modification places local government expenditures in the context of overlapping jurisdictions. The use of property values as a test for institutional decentralization relates to Oates (1969) and Brueckner (1979)'s tests for the allocative efficiency of local governments. Since government structure impacts the efficient allocation of LPGs, this paper adopts a similar property value capitalization approach.

Hedonically measuring the impacts of institutional decentralization raises three issues. First, residents may have limited information about the structure of local government serving a property. This research assumes that the structure of local government will influence the benefits of a property's bundle of taxes and LPGs, and will be capitalized in property values. The impact of government structure on taxes and LPGs will hold even with limited information about local governments.

A second concern is that the variation in local government structure may be too small an impact to be capitalized into housing prices. This concern is addressed by Oates (1969), who finds small impacts by local government can result in larger impacts of property capitalization because they

represent the net present value of a stream of future tax payments and LPG benefits. Furthermore, Brasington (2001)'s study of capitalization and community size finds greater capitalization of community differences for smaller municipalities and school districts. This is beneficial for measuring capitalization for the numerous small special districts and cities in the Denver-Boulder-Greeley CMSA.

Third, decentralizing the institutions of local government entails two simultaneous effects: the change in LPG expenditures and functions due to an additional government and the change in the number and spatial distribution of governments. Therefore, estimation needs to account for both effects to determine if institutional decentralization is just a mechanism to change LPG levels or if the actual structure of providing LPGs make a difference. In order to disentangle these impacts, the housing price equation includes expenditures on local public goods by each type of government.

Equation 1 provides a hedonic housing price equation with measures of local government structure. P_h is sales price for property h, X_h represents all property characteristics (e.g. baths, lot size, age of structure, etc.), Z_h represents socio-economic and location characteristics in a property's neighborhood (e.g. distance to a commercial center, proximity to parks, and demographic variables related to age, housing stock, and ethnicity). DC_h represent measures of institutional decentralization. Also, estimation includes other jurisdictional characteristics related to functions and the spatial distribution of governments, A_h (e.g. the functions provided by a government, the physical size of governments, and the standard deviation of median household income between overlapping government). $Expend_{g,h}$ is the average LPG expenditure per housing unit for government type g.[7] Equation 1 excludes a measure of taxes because property tax rates are determined by the local government expenditures demanded by residents, and also by how the structure of local government influences the relationship between taxes and expenditures. Therefore, taxes are accounted for with measures of $Expend_{g,h}$, DC_h, and A_h.[8]

[7]The nine types of governments ($G = 9$) that serve residential properties in Colorado are counties, cities, school districts, and six classifications of special districts. Table 2 in Section 4 provides detailed information on all variables included in Equation 1.

[8]The use of expenditures without corresponding measures of taxes is commonly done in property value tests of allocative efficiency. See Brueckner (1979), Brueckner (1982), and Deller (1990). Additional factors that may influence the relationship between taxes and expenditures are intergovernmental transfers, debt financing, or the portion of government revenue due to user fees. In most cases, these factors are determined by the type of government and functions provided. Later estimation mentions unreported regression results for the inclusion of these additional

$$ln(P_h) = \alpha_1 X_h + \alpha_2 Z_h + \alpha_3 DC_h + \alpha_4 A_h + \sum_{g=1}^{G} \delta_{g,h} Expend_{g,h} + Y1_{g,h} + Y2_{g,h,t} + \varepsilon_P \qquad (1)$$

Equation 1 incorporates two types of unobserved variables. $Y1_{g,h}$ represents unobserved variables that are static over time. Examples include any neighborhood characteristic not controlled by other variables such as proximity to schools, mountain views, or access to highways. Another variable, $Y2_{g,h,t}$, represents time-varying unobservables. Examples include the residential development of a neighborhood, nearby commercial development, or crime. Initially, OLS (Ordinary Least Squares) estimation will assume that government structure is exogenous and there is no concern about the self-selection of areas that institutionally decentralize local government. Therefore, neighborhood fixed effects can control for $Y1_{g,h}$ and $Y2_{g,h,t}$. The next section details an econometric technique, spatial difference-in-difference, to control for the endogeneity of communities that decentralize local government.

3.1 Spatial Difference-in-Difference

Communities structure government according to local preferences and changing residential development. Therefore, communities with institutional decentralization may be fundamentally different than communities with a centralized institutional structure. Two examples of characteristics that influence which communities decentralize local governments are:

1. Community Characteristics – Socio-economic attributes, infrastructure (e.g. roads, parks, etc.), or residential development may influence the creation of a new government and/or the location of its boundaries.

2. Political Economy – Communities may be more or less organized and willing to create a new government to change levels of LPG provision. The rules for forming a special district or city allow for the inclusion of properties that may be hurt by a new government. This formation process also allows vocal property owners to block formation of new governments.

factors.

Either one of these variables could bias estimates in Equation 1 if they influence the adoption of a new government and also are capitalized into housing prices. To overcome this problem, a second set of estimation results will combine border matching with difference-in-difference estimation.[9] This methodology measures the marginal impact of an additional layer of government by differencing housing prices across space and time. First, repeat home sales prices creates a measure of housing price growth from before to after the formation of a new layer of government. This removes pre-existing conditions and time invariant unobserved variables.[10] Second, estimation only compares properties in close geographical proximity, but on opposite sides of the new jurisdiction's borders. The border matching of properties allows a means to control for time varying unobservables as indicated in 1) and 2) earlier.[11]

A border matching methodology relies on the idea that locations close together are more alike.[12] This idea is readily extrapolated to examining the growth in property sales around the borders of new governments because factors that vary over time, such as residential development trends, crime, and urban amenities are likely to be the same within a small area. The sales prices before the formation of a new government will capitalize any differences between properties that influence the location of a new government's borders. Therefore, a policy border allows a segmentation of properties into control and treatment groups. The control group is represented by the area just outside the new government border and the treatment group is the area just inside the new government border. In the end, identification results from examining the growth of property sales prices for homes on opposite sides of the border of a new jurisdiction. Figure 2 illustrates this methodology and highlights the matching of properties a and b with property sales in times t and $t-2$, and the formation of a new government between these property sales at time $t-1$.

[9] This technique is applied by S.Banzaf and Walsh (2007) in a test for the Tiebout mechanism.

[10] As noted by Cameron and Trivedi (2005), difference-in-difference estimation has an assumption of time invariant unobserved variables. The use of repeat property sales has been used to hedonically value historic landmark designation by Noonan (2007), distance from city centers by McMillen (2003), and access to commuter rail by Gatzlaff and Smith (1993).

[11] See Black (1999) and Billings (2007) for applications of the border matching methodology.

[12] This thought is well-established in the geography literature as Tobler's Law and forms the basis for spatial econometric models.

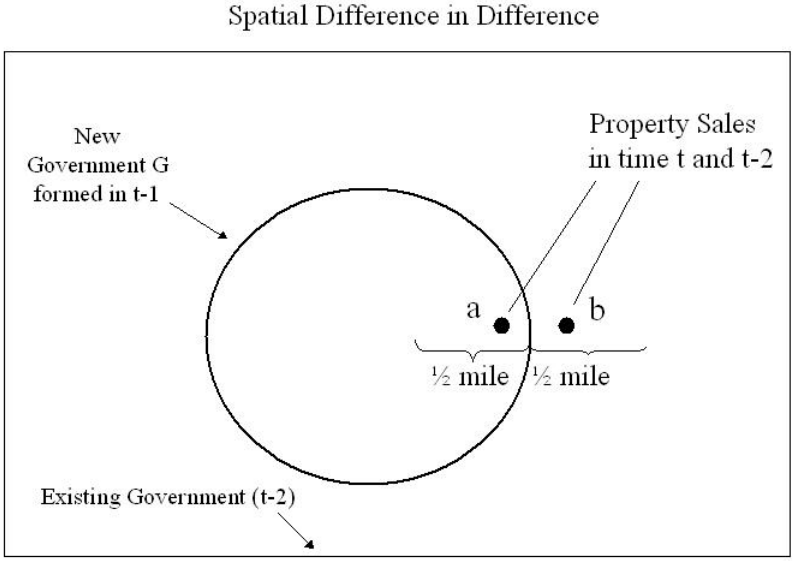

Figure 2: Spatial Difference-in-Difference

The econometric methodology for spatial difference-in-difference starts with Equation 1.

$$ln(P_h) = \alpha_1 X_h + \alpha_2 Z_h + \alpha_3 DC_h + \alpha_4 A_h + \sum_{g=1}^{G} \delta_{g,h} Expend_{g,h} + Y1_{g,h} + Y2_{g,h,t} + \varepsilon_P \quad (2)$$

Repeat sales differences out property characteristics (X_h) and $Y1_{g,h}$. Since these variables will not vary over time, they are equal to zero in Equation 3.[13] Z_h is not removed in Equation 3 because neighborhood characteristics may change over time.

$$\Delta_t ln(P_h) = \alpha_2 \Delta_t Z_h + \alpha_3 \Delta_t DC_h + \alpha_4 \Delta_t A_h + \sum_{g=1}^{G} \delta_{g,h} \Delta_t Expend_{g,h} + \Delta_t Y2_{g,h,t} + \Delta_t \epsilon_{g,h} \quad (3)$$

Matching only establishments in close proximity, but on opposite sides of the border removes time-varying neighborhood characteristics ($\Delta_t Z_h$) and unobservables ($Y2_{g,h,t}$). Δ_g represents dif-

[13] In practice, some properties may be remodeled and therefore, X_h may change over time. Later discussion will address this concern.

ferencing across space or border matching for properties a and b in Figure 2. This results in Equation 4:

$$\Delta_g \Delta_t ln(P_h) = \Delta_t ln(P_{h=a}) - \Delta_t ln(P_{h=b}) = \tag{4}$$

$$\beta_1 \Delta_g \Delta_t DC_h + \beta_2 \Delta_g \Delta_t A_h + \beta_3 \Delta_g \Delta_t Expend_h + \Delta_g \Delta_t \epsilon_h$$

In Equation 4, β_1, β_2, and β_3 represent the impacts of changes in institutional structure, government characteristics, and expenditures due to a new government. These coefficients represent the impact of a new government on property value growth while controlling for pre-existing conditions regarding where a new government forms.

4 Measuring Government Structure

OLS and spatial difference-in-difference estimation require metrics that characterize the structure of local government in Colorado, and quantify institutional decentralization and the spatial distribution of governments. The structure of local government in the Denver-Boulder-Greeley CMSA is composed of counties, cities, school districts, and six classifications of special districts. While a county and a school district serve all properties, a property may be served by up to nine types of local government (a county, city, school district, and 6 types of special districts). In this context, full institutional decentralization would have nine governments serving a property and a fully centralized scenario would have only two governments serving a property.

The six functional classifications of special districts (SDs) are Recreation, Fire, Water, Sewer, Water-Sewer, or Metropolitan. Metropolitan special districts perform multiple functions and commonly provide police, recreation, water, sewer, and other services.[14] Special districts may be formed by residents, developers, or county governments and require fifty-percent approval of affected land owners for formation.[15]

[14] Other services for Metropolitan SDs include ambulance services, flood control, irrigation, medical, mosquito control, pest control, storm drainage, street, television, transportation, and weed control.

[15] State laws regarding formation of SDs and governance structure vary among states. See the Appendix for details on the formation process for special districts in Colorado.

Empirically, two variables represent institutional decentralization (DC_h) for properties in Equation 1. The first variable is a series of dummy variables for the number of governments serving a given property. The second variable is an Expenditure Herfindahl Index, which measures the distribution of expenditures across layers of government. This method weights the number of governments by the magnitude of LPGs provided by a given layer of government. In this context, the Expenditure Herfindahl Index (H_{exp}) is:

$$H_{exp} = \sum_{g=1}^{G} \left(\frac{Expend_{g,h}}{\sum_{g=1}^{G} Expend_{g,h}}\right)^2 \tag{5}$$

Correspondingly, H_{exp} decreases when more government types provide expenditures or expenditures becomes more evenly distributed across governments. Therefore, H_{exp} approaches one for homes served by only a single layer of local government and approaches zero for homes served by a large number of local governments.

A_h in Equation 1 includes four variables that measure the spatial distribution of governments and heterogeneity between overlapping governments. Theses variables measure the physical overlap between jurisdictions, the distance between governments of the same type, income heterogeneity between overlapping jurisdictions, and the physical size of governments. The overlap measure ($Overlap_{g,h}$) computes the portion of land area and therefore common resources shared by all overlapping cities or special districts. This measure is given in Figure 3 by the ratio of the overlap land area C to the total land area ($A + B + C$). The average distance to the nearest five governments of the same government type represents a measure of proximity to similar governments ($DistanceOtherGovts$). This metric involves distance calculations between the centroid of each jurisdiction and its five nearest neighbors. This is shown in Figure 3 by the average length of the five segments (a,b,c,d,e).

The standard deviation in median household incomes between overlapping jurisdictions provides a measure of heterogeneity. This variable is

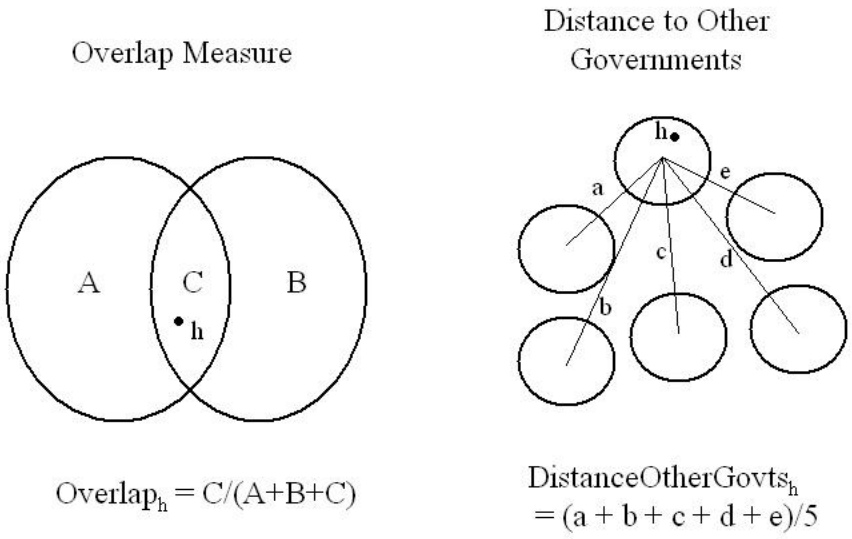

Figure 3: Two measures of jurisdictional spatial characteristics

$$IncomeDeviation_h = \sqrt{\sum\nolimits_{g \in G} (MedianIncome_{g,h} - \overline{MedianIncome}_h)^2 * \frac{1}{(G-1)}} \qquad (6)$$

The final spatial variable is the physical square mileage of a jurisdiction ($GovtSize$). Ordinary Least Squares (OLS) Regressions will incorporate averaged variables for overlap, distance to other governments, and government size variables ($AvgOverlap_h$, $AvgDistanceOtherGovts_h$, and $AvgGovtSize_h$). These variables represent average values across each overlapping government type g serving property h. In addition, A_h includes dummy variables that indicate the functions decentralized in cities and special districts.

4.1 Data

Estimating the impacts of institutional decentralization involves the incorporation of all local governments with property taxing power according to Colorado state law. The use of local government

Geographical Information Systems (GIS) maps allows assignment of properties to governments and the incorporation of the spatial relationship between governments. The accuracy of these maps is insured by Colorado State Statute 32-1-202, which requires all local governments to annually file an updated map of jurisdictional boundaries.

The scale of analysis, the Denver-Boulder-Greeley CMSA, is a metropolitan area that consists of the city/county of Denver, its bedroom communities, and nearby employment centers.[16] For all single family homes sold between 2002 and 2004 in the Boulder-Denver-Greeley CMSA, 14.4% are served by two governments; 38.9% by three; 18.3% by four; 23.1% by five; 4.7% by six; and 0.6% by seven or eight governments. There were 467 special districts (SD), 34 school districts, 69 cities, and 8 counties in the Denver-Boulder-Greeley CMSA in 2004.[17]

Local government structure within an urban area is influenced by several trends. As shown in the visualization of the distribution of governments in the Denver-Boulder-Greeley CMSA in Appendix Figure 4, there is a dichotomy in urban governance. Central Denver and outer suburban areas in the Denver-Boulder-Greeley CMSA contain relatively few governments, while inner suburban communities to the north, west, and south of Denver contain many governments. The fact that certain areas contain clusters of more centralized or more decentralized government structures indicates heterogeneity in benefits from decentralization within an urban area. Inner suburban residents likely benefit from a highly decentralized structure while central city and outer suburban residents benefit from a more centralized structure.

The property data is from each of the eight Denver-Boulder-Greeley CMSA county assessor's property records and compiled by a private company, Property Database Center.[18] The data for this research involves single-family homes sold between 2002 and 2004 in the Denver-Boulder-Greeley CMSA. Properties greater than 5 acres are excluded as ranch or agricultural properties. Also, all property sales transactions that were not arms length or involved a monetary transaction less than $\$10,000$ are excluded as property transfers or improperly recorded transactions. This

[16] Denver is both a city and a county, which is integrated into a single government institution. The Denver-Boulder-Greeley CMSA consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, and Weld counties.

[17] Of these 467 special districts, 203 are classified as metropolitan, 83 as water-sewer, 80 as fire, 42 as water, 33 as sewer, and 26 as recreation.

[18] This data was accessed from the Property Database Center website, http: www.myPDC.com , beginning 2/15/07.

research also removes properties with sales prices of more than $\$1,000,000$ and those containing no bathrooms. Census (2000a) geospatial data provides information about parks and Census block group boundaries. Denver, Boulder, the Denver Tech Center, and Golden are designated commercial centers and property characteristics include distance to the closest commercial center. Additionally, previously recorded sales transactions will allow later estimation to incorporate the change in prices between repeat sales of a home. The assessor's offices for the metropolitan area counties provides previous sales transactions consistently back to 1987. Table 2 provides a detailed explanation of all variables and their data source.

In order to determine the expenditures per housing unit for a jurisdiction, a government's total expenditures in a property's year of sale is divided by the estimated number of housing units within a jurisdiction.[19] The number of housing units in a jurisdiction is based on 2000 U.S. Census block level data. Estimates for jurisdictions that are not coterminous with census blocks are constructed by proportionally assigning housing unit counts to jurisdictions based on land area overlap between a census block and the government's jurisdiction.

Table 3 provides summary data for property characteristics, taxes, and expenditures by government type. Twenty percent of all properties sold between 2002 and 2004 are in a recreation SD, 51% in a fire SD, 32% in a SD that provides water or sewer, 24% in a metropolitan SD, and 70% in a city government. Table 3 highlights the breakdown of expenditures by Special Districts, County, Cities, and School Districts. For the subset of single-family homes served by special districts, total special district expenditures per home averaged approximately 25% of a property's total governmental expenditures.

[19] One limitation of this data is the lack of detailed expenditure categories within multiple function special districts. This shortcoming is mitigated with the availability of the functions provided within these special districts and measures of total expenditures. Variation in functions and expenditures allow identification of functional and expenditure impacts within a multiple purpose special district.

Data Variables	**Description**
Dependent Variables	*Source: County Assessor's Data*
Sales price	Transacted sales price for single family homes sold between 2002 and 2004.
Previous Sales Price	Any previous transacted sales price between 1987 and 2002
Independent Variables	
Property Variables X_h	*Source: County Assessor's Data, CO Dept of Education, and author's calculations.*
Lot Size (acres)	Size of a housing unit's parcel
Baths	Number of Baths (0.5 increments)
Bedrooms	Number of Bedrooms
Living Area	Square feet of a building's living space
Age	Age of Structure (years)
Garage Dummy	0,1 for having a garage relative to no garage
Forced Air Heating Dummy	0,1 for forced air heating relative to other heating types
Fireplace Dummy	0,1 for having a fireplace relative to no fireplace
Distance to Commercial Center (Miles) (DistComm)	Distance to the nearest Commercial Center (Downtown Denver, Boulder, Golden, or Denver Tech Center)
Distance to Park (Miles)	Distance to closest park
CSAP Advanced (%)	Percent of school district's test scores on state standardized tests (CSAP) classified as Advanced.
CSAP Satisfactory (%)	Percent of school district's test scores on state standardized tests (CSAP) classified as Satisfactory.
Neighborhood Variables Z_h	*Source: Census 2000 Block Group data, Tigerline files*
Regressions control for neighborhood factors with Census Block Group Fixed Effects.	
Institutional Characteristics DC_h	
Number of Governments Dummy	Indicator for the number of governments serving a property.
Herfindahl Expenditure Index	Herfindahl measure between 0 and 1 for expenditure levels between layers of government.
Government Variables $A_{g,h}$	*Source: Dept. of Local Affairs, Colorado and author's calculations*
for governments g = County, School District, City; Metropolitan, Recreation, Fire, Water, Sewer, Water-Sewer SDs	
Functional Characteristics	
Multiple Function	Indicator for special district or city that provides multiple functions.
Functional Dummy	Indicator for a special district or city providing one of six functions (Recreation, Fire, Water, Sewer, Police, Other).
Spatial Characteristics	
AvgOverlap	Average (%) overlap between all noncontiguous government types for a property [0,1].
AvgDistanceOtherGovts	Average distance (miles) to five nearest jurisdictions within government type.
IncomeDeviation	Standard deviation of median household income ($000s) in 2000 between all government layers.
AvgGovtSize	Average land area for all governments serving a home (sqmi)
Expenditure Characteristics	
Total Expenditure per Housing Unit by type of government	Total Expenditures divided by the number of housing units per jurisdiction

Dept. of Local Affairs data was provided electronically from state employees.

Table 2: Data Information

Single Family Homes Sold 2002-2004 In Denver-Boulder-Greeley CMSA	**Mean**	**Std Dev**	**Min**	**Max**
Sales Price	277,094	*122,782*	15,000	1,000,000
Previous Sales Price (2)	206,037	*139,015*	10,000	999,100
Lot Size (acres)	0.27	*0.36*	0.01	5
Bath	2.33	*0.82*	1	9
Living Area (sqft)	1,790	*742*	200	9,282
Age (years)	27.63	*26.13*	0	120
Garage Dummy	0.80	*0.40*	0	1
Basement Dummy	0.80	*0.40*	0	1
Forced Air Heating Dummy	0.86	*0.35*	0	1
Fireplace Dummy	0.59	*0.49*	0	1
Distance to Commercial Center (miles)	7.72	*4.32*	0.10	47.6
Distance to Park (miles)	0.76	*1.36*	0	33.0
CSAP Test Scores Categorized as Advanced (%)	0.10	*0.05*	0.01	0.18
CSAP Test Scores Categorized as Satisfactory (%)	0.74	*0.05*	0.63	0.82
CSAP Test Scores Categorized as Unsatisfactory (%)	0.15	*0.05*	0.01	0.21
In recreation SD	0.20	*0.40*	0	1
In fire SD	0.51	*0.50*	0	1
In water SD	0.06	*0.23*	0	1
In sewer SD	0.05	*0.22*	0	1
In water-sewer SD	0.21	*0.41*	0	1
In metropolitan SD	0.24	*0.43*	0	1
In city	0.70	*0.46*	0	1
Total Expenditures per Home	11,155	*4,094*	998	57,854
School Expenditures per Home	5,206	*2,204*	2,504	26,563
County Expenditures per Home	3,172	*2,927*	959	9,024
Expenditures per Home for those in city or SD				
Recreation SD Expenditures per Home	465	*194*	92	1,961
Fire SD Expenditures per Home	267	*231*	19	2,583
Water SD Expenditures per Home	235	*246*	11	6,790
Sewer SD Expenditures per Home	92	*67*	9	619
Water-Sewer SD Expenditures per Home	1,347	*1,919*	14	5,191
Metro SD Expenditures per Home	2,298	*4,012*	101	25,960
City Expenditures per Home	2,435	*2,351*	123	46,325
Number of Governments	3.79	*1.19*	2	8
Herfindahl Expenditure Index	0.46	*0.11*	0.24	0.92
Percent of Land Overlap b/t Govt Types (1)	0.26	*0.21*	0	1
Average Distance to 5 nearest govts within type (miles)	5.9	*3.45*	0.5	29
Standard Deviation of Median Income between all Overlapping Governments serving a property	352	*333*	0	2,260
Average Land Area of Govts (SqMiles)	58.8	*83.9*	10	2,883
N	119,291			

SD = Special District. CSAP = Colorado Student Assessment Program.
(1) This variable only applies to SDs and cities.
(2) Previous sales price summary statistics only include observations with a recorded property sale between 1987 and 2001

Table 3: Summary Statistics

5 OLS Regression Results

Tables 4 provides fixed effects OLS estimation results for housing price equation 1.[20] Results across specifications provide impacts for two measures of decentralization and the spatial and functional characteristics of governmental layers. In order to control for other neighborhood factors ($Y1_{g,h}$, $Y2_{g,h,t}$) and for the importance of school districts in housing price hedonic studies, all regressions include Census block group fixed effects and variables for state standardized test scores.[21] The coefficients for property variables, location variables, and school test scores are unreported in Tables 4. These variables have predictable results. Larger houses, closer proximity to commercial centers, more bathrooms, and other structural amenities all positively impact housing prices. Appendix Tables 8 reports the coefficients for these variables.

Table 4 provides coefficients for functions provided in a special district or city, expenditures by layer of government, spatial characteristics of jurisdictions, and the two measures of decentralization.[22] These results represent the present value of the stream of benefits due to government structure. Column 1 finds negative impacts for recreation, fire, and water/sewer, but positive impacts for other functions. Column 2 includes measures of the spatial characteristics of jurisdictions, which are insignificant. Column 3 includes the Herfindahl measure of decentralization and finds that expenditures in more centralized government structures positively impacts property values. Column 4 includes government dummies, which highlight the greatest benefit at three or four layers of government.

For the full specification in Column 4, the coefficient on the dummy variable for four governments indicates that property values increase by 1.7% in going from two governments to four governments. The H_{exp} measure says that greater centralization of expenditures positively impacts property values. Coefficients for H_{exp} state that an increase of 0.10 represents a 0.43% increase

[20] The use of a logged dependent variable is common in hedonic housing price models and in this research provided a better fitting model for data estimation.

[21] Controls for Census block groups as well as measures of school districts are needed because school districts are not coterminous with census block groups.

[22] One concern with regression specifications in Table 4 is that the financial characteristics of a government may influence the impacts of government structure on property values. To address this concern, unreported regressions estimated Table 4 with additional financial variables for each government serving a property. The inclusion of variables for portion of total revenue from property taxes, portion of total revenue from intergovernmental transfers, and portion of total expenses used for debt expenditures did not change results.

Dep Var = Ln(sales price)	(1)	(2)	(3)	(4)
Recreation SD Expenditures(000s$)	0.0114	0.0098	0.0125*	0.0284***
	(0.0071)	(0.0073)	(0.0074)	(0.0082)
Fire SD Expenditures(000s$)	0.0065	0.0069	0.0120**	0.0156***
	(0.0046)	(0.0047)	(0.0048)	(0.0049)
Water SD Expenditures(000s$)	0.1240***	0.1263***	0.1316***	0.1402***
	(0.0103)	(0.0105)	(0.0106)	(0.0107)
Sewer SD Expend(000s$)	0.1241***	0.1191***	0.1152***	0.1396***
	(0.0404)	(0.0405)	(0.0405)	(0.0437)
Water-Sewer SD Expenditures(000s$)	0.0042***	0.0039**	0.0066***	0.0082***
	(0.0018)	(0.0019)	(0.0020)	(0.0020)
Metro SD Expenditures(000s$)	0.0003	0.0006	0.0003	0.0003
	(0.003)	(0.0032)	(0.0003)	(0.0003)
City Expenditures(000s$)	-0.0023***	-0.0024***	-0.0024***	-0.0020***
	(0.0003)	(0.0003)	(0.0003)	(0.0004)
School District Expenditures(000s$)	-0.0048***	-0.0047***	-0.0064***	-0.0055***
	(0.0014)	(0.00014)	(0.0014)	(0.0015)
County Expenditures(000s$)	-0.0049	-0.0050	-0.0045	-0.0043
	(0.0035)	(0.0036)	(0.0036)	(0.0036)
Recreation Decentralized	-0.0118***	-0.0129***	-0.0094***	-0.0085**
	(0.0033)	(0.0034)	(0.0035)	(0.0037)
Fire Decentralized	-0.0106***	-0.0112***	-0.0091***	-0.0130***
	(0.0026)	(0.0031)	(0.0031)	(0.0038)
Water or Sewer Decentralized	-0.0113***	-0.0109***	-0.0100**	-0.0069
	(0.0041)	(0.0041)	(0.0042)	(0.0043)
Police Decentralized	0.0042	0.0041	0.0064**	0.0064*
	(0.0032)	(0.0032)	(0.0033)	(0.0033)
Other Decentralized	0.0080**	0.0075*	0.0128***	0.0082*
	(0.0040)	(0.0041)	(0.0042)	(0.0043)
Multiple Function SD or City	0.0331***	0.0333***	0.0319***	0.0324***
	(0.0046)	(0.0048)	(0.0047)	(0.0049)
AvgOverlap (%)		0.0052	0.0088	-0.0008
		(0.0071)	(0.0080)	(0.0096)
AvgDistanceOtherGovts (Miles)		0.0008	-0.0072	-0.0051***
		(0.0026)	(0.0139)	(0.0017)
IncomeDeviation (000s$)		-0.0035	-0.0046	0.0011
		(0.0035)	(0.0035)	(0.0038)
AvgGovtSize(SqMiles)		-0.0017	-0.0009	-0.0023
		(0.0013)	(0.0012)	(0.0017)
H_{exp}			0.0691***	0.0430***
			(0.0151)	(0.0157)
Governments=3				0.0213***
				(0.0074)
Governments=4				0.0171**
				(0.0087)
Governments=5				-0.0004
				(0.0103)
Governments=6				0.0007
				(0.0120)
Governments=7 or 8				-0.0049
				(0.0153)
Property, School Test Score Variables	Yes	Yes	Yes	Yes
Sale Year/Quarter Dummies	Yes	Yes	Yes	Yes
Block Group Fixed Effects	Yes	Yes	Yes	Yes
R Squared	0.63	0.64	0.64	0.64
Observations	119,291	119,291	119,291	119,291

Absolute value of standard error in parentheses. SD = Special District.
To account for heteroscedasticity, all regressions include White (1980) robust standard errors.
* < 0.1 ** < 0.05 *** < 0.01

Table 4: Hedonic Housing Price Regressions

in property values. These results appear somewhat contradictory, but indicate that impacts of institutional decentralization are influenced by the distribution of expenditures between overlapping governments. The provision of recreation and fire in cities or special districts negatively impacts property values and functions classified as police and other positively impact property values.[23] Providing multiple functions in an additional government creates a positive impact. Spatial variables in Column 4 find that governments that are further away from other governments of the same type have a negative impact on property values.

The expenditure by layer of government provides impacts for the fiscal decentralization that accompanies institutional decentralization. Following Oates (1969) and Brueckner (1979), the coefficients on expenditures represents a measure of allocative efficiency. A positive coefficient on expenditures variables represents underprovision of LPGs; a negative coefficient represents overprovision of LPGs; and an insignificant coefficient represents efficient provision. In the context of Equation 1, coefficients on expenditures for each government type indicate the impact on property values of increasing expenditures and associated tax liabilities by $\$1,000$. Results for government expenditures by type of government in Column 4 find that water, sewer, water-sewer, recreation, and fire SDs underprovide LPGs. Metropolitan SDs and counties efficiently provide LPGs. City and school districts overprovide LPGs. The resulting interpretation for institutional decentralization is that certain types of governments are beneficial for allocative efficiency while others are allocatively inefficient.

Results that merit concern are that the provision of fire and recreation in separate governments provides negative impacts and these governments are disproportionately located in sparsely populated areas. The demand for supplemental recreation and fire services is likely greater for residents near open space areas or for homes near wildfire areas. This generates a self-selection problem of limited properties near open space or wildfire risk, but not in a fire or recreation SD. In general, the greater usage of special districts in suburban locations merits concern that areas that institutionally decentralize are fundamentally different than other areas. The next section controls for

[23] One possible concern is that certain functions are always decentralized in the same number of governments. For example, fire may typically be in the third government serving a property or recreation in the fourth government. The consistency of functional coefficients with and without number of government dummies in Table 4 demonstrates that this is not a concern.

this problem with estimation results for the spatial difference-in-difference methodology.

6 Spatial Difference-in-Difference

Spatial difference-in-difference estimation requires only properties with multiple sales transactions close to the border of a new government. First, estimation only uses properties from OLS estimation with repeat sales transactions. Border matching further limits observations to those within 1/2 mile of the border of a government that forms between repeat sales for a property. To facilitate observations across sales transaction time periods, regressions include dummy variables for sales year and quarter. Since county assessor's data limits sales transactions data from earlier time periods, estimation results only include observations that contain a previous sales price after 1986.

Three hundred and twenty-four special districts, three cities, and one county formed between 1987 and 2004 in the Denver-Boulder-Greeley CMSA. Of these new governments, 154 contained properties with a sales price and a previous sales price before and after their formation. This number decreases to 110 governments with observations within 1/2 mile of the jurisdiction's border.[24] In the end, special districts represent all the new governments used for spatial difference-in-difference analysis.

As shown by Table 5, the matching of properties around the border of where a new government will form provides controls for a number of observable characteristics. Also, this table provides summary measures for the 110 new governments. Comparing the summary statistics with Table 3 highlights that this subset of data is similar to all single family homes sold between 2002 and 2004. One issue highlighted in Table 5 is the disproportionate representation of higher previous sales prices for properties within a new government, which could bias estimates if shown to influence property values growth or property improvement/investment. To mitigate this problem, regressions include a measure of previous sales price. This measure is based on dummy variables that categorize previous sales prices into quintiles relative to other previous sales prices in the spatial difference-in-difference dataset.

[24] In a few cases, border matching included properties that were served by different governments before the formation of the new government or by multiple new governments between property sales. These observations totaling 521 observations were excluded from estimation.

Single Family Homes within 1/2 mile of the border of a new government	New Government		No New Government	
	Mean	**Std Dev**	**Mean**	**Std Dev**
Previous Sales Price	202,948	*114,655*	169,108	*82,002*
Year of Previous Sales	1995.1	*4.2*	1995.7	*3.9*
Lot Size (acres)	0.33	*0.36*	0.33	*0.32*
bath	2.41	*0.73*	2.35	*0.74*
bed	3.54	*0.91*	3.16	*0.74*
Living Area (sqft)	1,790	*632*	1,705	*580*
age (years)	25.6	*22.1*	24.4	*19.4*
Garage Dummy	0.79	*0.32*	0.83	*0.31*
Basement Dummy	0.82	*0.38*	0.81	*0.39*
Forced Air Heat Dummy	0.78	*0.41*	0.89	*0.31*
Fireplace Dummy	0.71	*0.44*	0.62	*0.51*
Distance to Commercial Center (miles)	7.70	*3.87*	8.03	*3.46*
Distance to Park (miles)	0.60	*0.72*	0.54	*0.48*
Number of Governments before New Government	3.69	*1.19*	3.54	*1.15*
N	5,403		5,759	
New Government Variables				
Expenditure Variables				
Recreation SD Expenditures	474	*1,288*		
Fire SD Expenditures	832	*1,923*		
Water SD Expenditures	249	*1,253*		
Sewer SD Expend	257	*1,248*		
Water-Sewer SD Expenditures	730	*1,939*		
Metro SD Expenditures	731	*1,939*		
Spatial Variables				
New Government Overlap with Existing Govts	0.41	*0.23*		
New Government Distance to 5 nearest govts within type (miles)	5.8	*3.0*		
New Government Income Deviation with Existing Govts	12,454	*20,269*		
New Government Land Area(SqMiles)	27.5	*37.4*		

SD = Special District.

Table 5: Summary Statistics

Using repeat home sales data in measuring the impacts of institutional decentralization creates several concerns. First, the use of repeat sales property data allows for property improvement, an issue, though, only if the likelihood of property improvement correlates with the structure of local government. A priori there is no reason to expect that the formation of a new jurisdiction relates to property improvement. To mitigate this possible influence, any house with an average annual property value growth rate of more than 30% is removed from estimation.[25] Therefore, 455 observations were removed from the dataset.

A second concern with the spatial difference-in-difference methodology is that households anticipate the formation of a new government. If there is full capitalization into housing prices, then previous sale border comparisons incorporate the expected impact of a new government and current sale border comparisons give the same result. If not, then any difference represents uncapitalized impacts of a new jurisdiction. To control for this potential issue, spatial difference-in-difference analysis only includes properties with previous sales that occurred at least 2 years prior to the formation of a new government.[26]

A final concern with differencing across space (or border matching) in larger jurisdictions is the matching of properties within 1/2 mile of the border, but near different regions of the jurisdiction.[27] An additional set of control variables, border segment fixed effects, limits border matching to a small geographic area. The border segment fixed effect is created by segmenting a jurisdiction's border into intervals of 1/2 of a mile. Here, a lattice of one-half mile wide squares were overlaid onto a digital map of the state of Colorado. This lattice segmented new government borders into approximately 1/2 mile segments. The assignment of individual properties to their nearest border segment creates the border segment fixed effect.[28] All spatial difference-in-difference regressions

[25] This value is chosen because the average annual property value growth rate for all single family homes in this dataset was 5.1%. Therefore, annual growth rates of more than 5 times the average growth rate likely represent property improvement.

[26] A home buyer is unlikely to have information about a new jurisdiction forming two years into the future. Given the state statute for Special Districts dictates the approval timeline, two years is sufficient time to ensure that the anticipation of special district formation is unlikely.

[27] An example is matching a property just inside the western border of a jurisdiction with another property just outside the eastern border of the same jurisdiction. For large jurisdictions, this would involve border matching over a much larger distance than 1/2 of a mile.

[28] See Billings (2007) for a visualization and application of this technique to estimating the impact of Enterprise Zone tax credits.

adopt these fixed effects.

6.1 Spatial Difference-in-Difference Results

Table 6 provides spatial difference-in-difference estimation results. Regression coefficients on *in New Govt* represent the percentage of total growth in housing prices due to a new government. Other variables test the impact of a new government's expenditures, functions, or spatial characteristics on housing prices. By differencing across space and time, all variables apply to the new government and are relative to existing governments. Results are robust to the specifications in Table 6 for border distances of 1/3 or 2/3 of a mile. Smaller distances eliminated too many new jurisdictions and larger distances provide weaker controls for unobservables.

Column one finds that being in a new government (*in New Govt*) decreases the amount of property value change by 2.6%. The negative impact of forming a new government is surprising given that Colorado state laws dictates a 50% approval by affected landowners for the formation of any special district. The negative impact under majority approval highlights that the laws for forming new governments in Colorado may hurt residents. Given that this methodology controls for all locational attributes, results are generalizable in that a simple majority approval does not limit the formation of new governments to only beneficial institutions for residents.

A number of variables differ from earlier regression results and highlight the self-selection of communities biasing OLS estimates. Contrary to earlier results, functional dummies find positive benefits for the institutional decentralization of recreation and fire. The coefficients in regression four represent that the decentralization of these functions contributed to 7.3% and 5.9% of the total change in property values respectively. Another issue highlighted by the impacts of functions decentralized, and discussed by Marlow (1995) and Nunn and Schoedel (1997) is the limited oversight and Leviathan potential of special districts. The negative impacts of water and sewer supports this issue. These functions are infrastructure based and typically have higher debt financing and lower visibility than other government functions.

Spatial variable coefficients find that the average distance from a new government to its nearest five neighborhoods within government type negatively impacts property value change by 0.8% per

Dep Var: ln(Sales Price) - ln(Previous Sales Price)	(1)	(2)	(3)	(4)
in New Govt	-0.0258**	-0.0531***	0.0245	
	(0.0106)	(0.0185)	(0.0487)	
New Recreation SD Expenditures($000s)	0.0114	0.0397***	0.0499***	0.0627***
	(0.0071)	(0.0106)	(0.0128)	(0.0154)
New Fire SD Expenditures($000s)	0.0065	-0.0035	0.0036	0.0122
	(0.0046)	(0.0087)	(0.0107)	(0.0100)
New Water SD Expenditures($000s)	-0.0010	-0.0123	-0.0131	-0.0009
	(0.0099)	(0.0099)	(0.0101)	(0.0107)
New Sewer SD Expenditures($000s)	0.0041	-0.0218***	-0.0205**	0.0356***
	(0.0099)	(0.0089)	(0.0086)	(0.0134)
New Water-Sewer SD Expenditures($000s)	0.0027	-0.0321***	-0.0321***	-0.0104
	(0.0103)	(0.0105)	(0.0112)	(0.0125)
New Metro SD Expenditures($000s)	0.0039	0.0029	-0.0018	-0.0123
	(0.0093)	(0.0065)	(0.0119)	(0.0118)
New Govt provides Recreation		0.0744***	0.0684***	0.0730***
		(0.0208)	(0.0218)	(0.0224)
New Govt provides Fire		0.0663***	0.0606***	0.0587***
		(0.0124)	(0.0121)	(0.0122)
New Govt provides Water or Sewer		-0.0619***	-0.0457***	-0.0547**
		(0.0253)	(0.0271)	(0.0275)
New Govt provides Police		0.0142	-0.0247	-0.0117
		(0.0283)	(0.0395)	(0.0390)
New Govt provides Other Functions		-0.0141	-0.0126	-0.0100
		(0.0283)	(0.0243)	(0.0254)
New Govt provides Multiple Functions		0.0011	0.0018	-0.0007
		(0.0316)	(0.0318)	(0.0323)
New Govt Overlap			-0.0901**	-0.1168***
			(0.0449)	(0.0438)
New Govt Distance to Other Govts (miles)			-0.0085*	-0.0081**
			(0.0045)	(0.0041)
New Govt Income Deviation ($000s)			0.0010***	0.0010***
			(0.0003)	(0.0003)
New Govt Size (square miles)			0.0913	0.1254
			(0.3240)	(0.2879)
New Govt is 3rd Govt				0.0629
				(0.0531)
New Govt is 4th Govt				0.0208
				(0.0424)
New Govt is 5th Govt				0.0434
				(0.0451)
New Govt is 6th Govt				0.0354
				(0.0484)
New Govt is 7th Govt				-0.0862*
				(0.0484)
Year and Quarter of Property Sale Fixed Effects	Yes	Yes	Yes	Yes
Previous Price Quintile Fixed Effects	Yes	Yes	Yes	Yes
1/2 mile border segment fixed effects	Yes	Yes	Yes	Yes
R-squared	0.61	0.61	0.61	0.61
N	11,162	11,162	11,162	11,162

To account for heteroscedasticity, all regressions include White (1980) robust standard errors.
Note: No properties in this dataset are served by 8 governments.
in New Govt indicates that the property is served by a newly formed special district.

Table 6: Spatial Difference-in-Difference Regressions

mile increase. This is consistent with less horizontal competition and greater productive inefficiency discussed in the Leviathan literature (see Zax (1989), Oates (1985), and Bates and Santerre (2006)). This literature highlights that the competition of governments for mobile residents limits overspending and inefficiencies in governments. Table 6 shows that increasing how much a new government's jurisdiction overlaps existing governments by 10% generates a negative impact of 1.2%. The amount of overlap between governments proxies for a common resource base between overlapping governments, and the benefits of jurisdictions scaled by LPG. The negative impact of this variable indicates inefficient allocation or coordination of LPGs between overlapping governments, or small benefits in scaling jurisdictions by LPG. Estimates find a positive property impact of 0.1% for every $\$1,000$ difference in median household income between the new government and existing governments ($NewGovtIncomeDeviation$). The benefits of forming new governments should be greater for a heterogenous jurisdiction. This follows from the use of new governments to group homogenous residents and is consistent with a Tiebout model of local governments. A new government can decrease the costs of existing heterogeneity and improve allocative efficiency.[29]

The spatial characteristics of governments have significant impacts, and show that coordination between overlapping jurisdictions and the use of shared resources impacts efficient LPG provision. One political issue, supported by the negative coefficient on the overlap measure, is the possibility that an existing government would alter LPG provision for those of its residents that form new governments. For example, if a neighborhood forms a special district with police services, then the existing county government could decrease police patrolling within the special district. This heterogenous provision of services within a jurisdiction would decrease the benefits of a new government.

The coefficients on spatial difference-in-difference regression provide the impacts for functions, expenditures, and spatial characteristics of institutional decentralization. Table 7 provides the monetary impact of institutionally decentralizing different functions. Impacts are given at the mean values of expenditures and spatial characteristics for the 110 new governments estimated in Table 6. These values represent the mean impact on property value change for the average annual

[29]The theoretical model detailed in the Appendix highlights the positive relationship between heterogeneity in benefits from LPGs and the benefits of institutional decentralization.

property value change of $13,882. The expenditure impacts quantify the change in property values attributed to the expenditures of a new government. This impact can vary by the type of new government. The functional impacts provide a measure of the average impacts due to the overall provision of a given function by a special district. Finally, the spatial variable impacts quantify impacts for the mean values of the three significant spatial variables in Table 6 (*New Govt Overlap*, *New Govt Distance to Other Govts*, and *New Govt Income Deviation*). These three variables contributed −$641, −$492, and $167 respectively to the Spatial Variable Impacts in Table 7. Even though impacts are a small portion of overall property value growth, the total community impacts can be substantial for governments serving a large number of homes.

As a policy experiment, the bottom portion of Table 7 provides the spatial variable impacts of a new special district that has the most desirable characteristics among the 110 new governments incorporated into spatial difference-in-difference estimation. These impacts highlight that policies that promote favorable spatial characteristics for new governments can create positive impacts for special districts.

Functions Decentralized	**Expenditure Impacts**	**Functional Impacts**	**Spatial Variable Impacts**	**Total Annual Impacts**
In Special Districts that provide				
Recreation	$390	$977	-$965	$402
Fire	$0	$786	-$965	-$179
Water or Sewer	$0 to $34	-$732	-$965	-$1,797 to -$1,763
Police	$0	$0	-$965	-$965
Other	$0	$0	-$965	-$965
Any Function (1)				-$345

Note: all impacts are based on mean variable values given in Table 5.

Policy Experiment for Most Favorable Spatial Variable Characteristics

New Govt Overlap	New Govt Distance to Other Govts	New Govt Income Deviation	Total Spatial Variable Impacts
$0	-$118	$1,397	$1,279

(1) Total annual impacts based on regression coefficients for *inNewGovt* in column 1 of Table 6.
(2) Policy Impact given for New Govt Overlap = 0 ; New Govt Distance to Other Govts = 1.1; New Govt Income Deviation = $104,383.

Table 7: Property Value Impacts Based on Regression Coefficients for Column (4) in Table 6

7 Conclusions

Examining the spatial variation of local governments within a metropolitan area provides an unique test of institutional decentralization and allows for new methods to control for the endogeneity of local government structure. Overall results find a negative impact of institutional decentralization on property values. This result is influenced by the functions of new local governments, with recreation and fire entities benefiting properties the most. The analysis of spatial characteristics of jurisdictions shows that greater overlap between jurisdictions and further distance from other governments both negatively impact property values. Yet, greater income heterogeneity between overlapping governments positively impacts property values.

Results are generalizable in three ways. First, the overall negative impact of forming a special district merits concern about how state laws dictate the approval of new governments by residents. Second, results for the spatial characteristics of jurisdictions support the benefits of forming new governments within a Tiebout framework. Third, heterogeneity in benefits due to the function and spatial characteristics of governments show that the types of LPGs provided and the structure of existing governments influence the impacts of institutional decentralization.

Finally, the location of governments within the Denver-Boulder-Greeley CMSA highlight a dichotomy in urban governance between the highly decentralized inner suburban areas and the centralized central city and outer suburban areas. This pattern highlights that flexibility in altering local government structure may be beneficial for serving diverse residents and meeting LPG demand conditions within an urban area.

References

Akai, N. and Sakata, M.: 2002, Fiscal decentralization contributes to economic growth: evidence from state-level cross-sectional data for the united states, *Journal of Urban Economics* **52**, 93–108.

Alesina, A. and Spolaore, E.: 2003, *The size of nations*, MIT Press, Cambridge and London.

Arzaghi, M. and Henderson, J. V.: 2005, Why countries are fiscally decentralizing, *Journal of Public Economics* **89**(7), 1157–1189.

Baqir, R.: 2002, Districting and government overspending, *Journal of Political Economy* **110**(6), 1318–1354.

Baranky, I. and Lockwood, B.: 2007, Decentralization and the productive efficiency of government: Evidence from swiss cantons, *Journal of Public Economics* **91**(5-6), 1197–1218.

Bates, L. J. and Santerre, R. E.: 2006, Leviathan in the crosshairs, *Public Choice* **127**(1-2), 133–145.

Berglas, E. and Pines, D.: 1981, Clubs, local public goods and transportation models: A synthesis, *Journal of Public Economics* **15**(2), 141–162.

Billings, S.: 2007, Do enterprise zones work: an analysis at the borders, *unpublished manuscript* .

Black, S. E.: 1999, Do better schools matter? parental valuation of elementary education, *Quarterly Journal of Economics* **114**(2), 577–599.

Brasington, D. M.: 2001, Capitalization and community size, *Journal of Urban Economics* **50**(3), 385–395.

Brasington, D. M.: 2004, House prices and the structure of local government: An application of spatial statistics, *Journal of Real Estate Finance and Economics* **29**(2), 211–231.

Brueckner, J. K.: 1979, Property values, local public expenditure and economic efficiency, *Journal of Public Economics* **11**(2), 223–245.

Brueckner, J. K.: 1982, A test for allocative efficiency in the local public sector, *Journal of Public Economics* **19**(3), 311–331.

Buchanan, J.: 1965, An economic theory of clubs, *Economica* **32**, 1–14.

Cameron, A. and Trivedi, P.: 2005, *Microeconmetric: Methods and Applications*, Campbridge University Press.

Campbell, R. J.: 2004, Leviathan and fiscal illusion in local government overlapping jurisdictions, *Public Choice* **120**(3-4), 301–329.

Census: 2000a. Census 2000 Tiger/Line Files. http://www.census.gov/geo/www/tiger.

Census: 2000b. American FactFinder Summary File 3. http://www.census.gov.

Davoodi, H. and Zou, H.: 1998, Fiscal decentralization and economic growth: a cross-country study, *Journal of Urban Economics* **43**, 244–257.

Deller, S. C.: 1990, An application of a test for allocative efficiency in the local public sector, *Regional Science and Urban Economics* **20**(3), 395–406.

Foster, K.: 1996, Specialization in government - the uneven use of special districts in metropolitan areas, *Urban Affairs Review* **31**(3), 283–313.

Gatzlaff, D. H. and Smith, M. T.: 1993, The impact of the miami metrorail on the value of residences near station locations, *Land Economics* **69**(1), 54–66.

Hochman, O., Pines, D. and Thisse, J.-F.: 1995, On the optimal structure of local governments, *American Economic Review* **85**(5), 1224–1240.

Iimi, A.: 2005, Decentralization and economic growth revisited: an empirical note, *Journal of Urban Economics* **57**, 449–461.

Lin, J. and Liu, Z.: 2000, Fiscal decentralization and economic growth in china, *Economic Development and Cultural Change* **49**, 1–21.

Marlow, M. L.: 1995, The influence of special district governments on public spending and debt, *Applied Economics* **27**(7), 569–573.

McMillen, D. P.: 2003, The return of centralization to chicago: Using repeat sales to identify changes in house price distance gradients, *Regional Science and Urban Economics* **33**(3), 287–304.

Nelson, M. A.: 1990, Decentralization of the subnational public sector: An empirical analysis of the determinants of local government structure in metropolitan areas in the u.s, *Southern Economic Journal* **57**(2), 443–457.

Noonan, D. S.: 2007, Finding an impact of preservation policies: Price effects of historic landmarks on attached homes in chicago, 1990-1999, *Economic Development Quarterly* **21**(1), 17–33.

Nunn, S. and Schoedel, C.: 1997, Special districts, city governments, and infrastructure: Spending in 105 us metropolitan areas, *Journal of Urban Affairs* **19**(1), 59–72.

Oates, W. E.: 1969, The effects of property taxes and local public spending on property values: An empirical study of tax capitalization and the tiebout hypothesis, *Journal of Political Economy* **77**(6), 957–971.

Oates, W. E.: 1985, Searching for leviathan: An empirical study, *American Economic Review* **75**(4), 748–757.

Olson, M.: 1969, The principle of "fiscal equivalence": The division of responsibilities among different levels of government, *American Economic Review* **59**(2), 479–487.

Rosen, S.: 1974, Hedonic prices and implicit markets: Product differentiation in pure competition, *Journal of Political Economy* **82**(1), 34–55.

S.Banzaf, H. and Walsh, R. P.: 2007, Do people vote with their feet? an empirical test of tiebout's mechanism, *forthcoming in American Economic Review* .

Stansel, D.: 2005, Local decentralization and local economic growth: A cross-sectional examination of us metropolitan areas, *Journal of Urban Economics* **57**(1), 55–72.

Tiebout, C. M.: 1956, A pure theory of local expenditures, *Journal of Political Economy* **64**, 416–424.

Turnbull, G. K. and Djoundourian, S. S.: 1993, Overlapping jurisdictions: Substitutes or complements?, *Public Choice* **75**(3), 231–245.

White, H.: 1980, A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity, *Econometrica* **48**, 817–830.

Zax, J. S.: 1989, Is there a leviathan in your neighborhood?, *American Economic Review* **79**(3), 560–567.

Zhang, T. and Zou, H.: 1998, Fiscal decentralization, public spending, and economic growth in china, *Journal of Public Economics* **67**, 221–240.

8 Appendix I - Special District Formation

According to Colorado State Statutes 32-1-202 through 32-1-208, the organizers of a special district may consist of residents, developers, or local government officials. Interested parties petition for the formation of a special district with the county. The special district proposal requires a detailed service plan outlining costs, a map of the service area, and an estimate of population and valuation for assessment. A minimum of thirty percent of proposed taxpayers must petition for special district formation and public hearings allow for protests against special district formation. Finally, a majority vote in the affirmative by affected landowners establishes the special district. Any subsequent changes in boundaries requires a filing with the county commissioner and requires approval from newly included or excluded properties.

While special district formation is similar to city formation in Colorado, cities require a more complicated organizational structure for governmental representation and incur some restrictions on how services are provided. These differences explain the increase in the amount of special districts formed instead of cities over the last several decades. See Colorado State Statute Title 31 Arts. 2,3, and 4 for a complete description of regulations on forming new cities.

9 Appendix II - Theory Model

In order to formalize the tradeoffs inherent in institutional decentralization, a simple model highlights the choice between a single, multipurpose local government and multiple single-purpose

governments in the provision of two local public goods in a metropolitan area. The model is based on a three stage decision process. First, an economic agent determines the structure of local government to provide LPGs. In this model, two local public goods can be provided either by creating a jurisdiction for each local public good (two single-purpose (SP) governments) or by structuring a single government to provide both LPGs (a multi-purpose (MP) government). Examples of SP governments include school districts or single function special districts (recreation, fire, water, or sewer). MP governments include cities or metropolitan special districts. Second, an economic agent determines the size of the jurisdiction, N_j given the structure of local government.[30] Finally, a representative household determines the levels of local public goods, z_i for $i = 1, 2$.

This three stage decision process is:

1. The type of local government structure is determined (MP or SP) by a representative household or government agent.
2. The size of a government's jurisdiction is chosen by a representative household or government agent.
3. A representative household decides on the level of each LPG provided in their jurisdiction.

9.1 Level of LPG

The solution to this model is based on backwards induction and first the level of LPGs is chosen by a representative household. The household, which represents the majority of households in a given jurisdiction of size N_j, chooses the level of two public goods given the structure of local government. A simplifying assumption is that all households in the majority of a government have identical tastes for a LPG. The level of z_i for $i = 1, 2$ under two SP governments and then for a single MP government provide results under differing amounts of institutional decentralization.

The first case with two SP governments begins with the utility maximization problem of a representative household in Equation 7. y represents a household's endowment, α_i is a cost parameter for a given LPG, and θ_i is a benefit parameter for a given LPG. F_i represents the fixed costs associated with the provision of LPG z_i. The cost of producing z_i is based on a convex cost structure

[30] Size (N_j) takes into account land area, population size; and assumes larger jurisdictions must include more heterogenous households than smaller jurisdictions.

which highlights the presence of an efficient scale of producing a LPG. This cost structure takes into account differences in the scale of production for different LPGs and the role of increasing costs of heterogeneity as a jurisdiction includes more households.[31] Correspondingly, $TC(z_i) = \alpha_i N_i^2 z_i + F_i$ and the tax payment per household is $T = \frac{\alpha_i N_i^2 z_i + F_i}{N_i}$. Substituting the tax payment specification into Equation 7, and optimizing for z_i results in $z_1^{SP} = \frac{\theta_1}{\alpha_1 N_1}$ and $z_2^{SP} = \frac{\theta_2}{\alpha_2 N_2}$ for the SP government structure.

$$Max_{z_1,z_2} \quad U = x + \theta_1 ln(z_1) + \theta_2 ln(z_2) \; s.t. \; x + T \leq y \tag{7}$$

$$\frac{\partial U}{\partial z_i} : \; -\alpha_i N_i + \frac{\theta_i}{z_i} = 0 \rightarrow z_i^{SP} = \frac{\theta_i}{\alpha_i N_i} \text{ for i} = 1, 2$$

This setup varies for a MP government with $TC(z_1, z_2) = \alpha_1 N_3^2 z_1 + \alpha_2 N_3^2 z_2 + F_i$ and the tax payment per household is $T = \frac{\alpha_1 N_3^2 z_1 + \alpha_2 N_3^2 z_2 + F_3}{N_3}$. The difference in this setup is that the jurisdiction size (N_3) has to be the same for both LPGs; and there can be savings to fixed costs (F_3) in providing two LPGs within the same jurisdiction.

$$Max_{z_i} \quad U = x + \theta_1 ln(z_1) + \theta_2 ln(z_2) \; s.t. \; x + T = y \tag{8}$$

$$\frac{\partial U}{\partial z_1} : \; -\alpha N_3 + \frac{\theta}{z_1} = 0 \rightarrow z_1^{MP} = \frac{\theta_1}{\alpha_1 N_3} \tag{9}$$

$$\frac{\partial U}{\partial z_2} : \; -\alpha N_3 + \frac{\theta}{z_2} = 0 \rightarrow z_2^{MP} = \frac{\theta_2}{\alpha_2 N_3} \tag{10}$$

This local government structure results in $z_1^{MP} = \frac{\theta_1}{\alpha_1 N_3}$ and $z_2^{MP} = \frac{\theta_2}{\alpha_2 N_3}$.

9.2 The Size of a Jurisdiction

The size of the jurisdictions to provide the two LPGs will vary based on two SP governments or one MP government. A representative household determines the size of the government(s) and in practice most states allow new jurisdiction formation with a simple majority of households or

[31] The use of increasing cost of heterogeneity as a jurisdiction increases in size is used in a number of theoretical models. Alesina and Spolaore (2003) provides a good example of modeling jurisdictional size.

approval by county officials. Taking the utility specified in Equation 7, the agent optimizes the following problem for N_i, given a SP or MP government structure. For the SP governments, the agent solves Equation 11

$$Max_{N_i} \quad U = y - \alpha_1 N_1(z_1^{SP}) - \frac{F_1}{N_1} + \theta_1 ln(\frac{\theta_1}{\alpha_1 N_1}) - \alpha_2 N_2(z_2^{SP}) - \frac{F_2}{N_2} + \theta_2 ln(\frac{\theta_2}{\alpha_2 N_2}) \tag{11}$$

$$\frac{\partial U}{\partial N_i} : \ \frac{F_i}{N_i^2} - \frac{\theta_i}{N_i} = 0 \rightarrow N_i = \frac{F_i}{\theta_i} \text{ for i} = 1, 2 \tag{12}$$

This results in $N_1 = \frac{F_1}{\theta_1}$ and $N_2 = \frac{F_2}{\theta_2}$ for the SP government structure. This setup varies for a MP government and becomes equation 13.

$$Max_{N_3} \quad U = y - \alpha_1 N_3(z_1^{MP}) - \alpha_2 N_3(z_2^{MP}) - \frac{F_3}{N_3} - \theta_1 ln(\frac{\theta_1}{\alpha_1 N_3}) - \theta_2 ln(\frac{\theta_2}{\alpha_2 N_3}) \tag{13}$$

$$\frac{\partial U}{\partial N_3} : \ \frac{F_3}{N_3^2} - \frac{\theta_1}{N_3} - \frac{\theta_2}{N_3} = 0 \rightarrow N_3 = \frac{F_3}{\theta_1 + \theta_2} \tag{14}$$

This results in $N_3 = \frac{F_3}{\theta_1 + \theta_2}$ for the MP government structure.

9.3 The Type of Government

The first stage of this equilibrium relates to legislated rules governing the structure of local government. This model uses both SP and MP government structures. Government agents decide between the two structures based on which maximizes utility for the representative household: the joint utility of the SP governments compared to the utility associated with the MP government. This is calculated based on the optimized utility of Equation 7 versus the optimized utility for Equation 8.

$$U(SP) = y - \theta_1 - \theta_2 - \frac{F_1}{N_1} - \frac{F_2}{N_2} + \theta_1 ln(\theta_1) + \theta_2 ln(\theta_2) - \theta_1 ln(\alpha_1 N_1) - \theta_2 ln(\alpha_2 N_2) \tag{15}$$

$$U(MP) = y - \theta_1 - \theta_2 - \frac{F_3}{N_3} + \theta_1 ln(\theta_1) + \theta_2 ln(\theta_2) - \theta_1 ln(\alpha_1 N_3) - \theta_2 ln(\alpha_2 N_3) \tag{16}$$

The decision rule, Equation 17, is based on the difference between Equation 15 and Equation 16 and highlights the factors that influence the tradeoffs between structures.

$$\Delta U = U(MP) - U(SP) = \theta_1 [ln(\frac{F_1}{\theta_1}) - ln(\frac{F_3}{\theta_1 + \theta_2})] \tag{17}$$

$$+ \theta_2 [ln(\frac{F_2}{\theta_2}) - ln(\frac{F_3}{\theta_1 + \theta_2})]$$

The resulting interpretation is that if Equation 17 is positive, the MP government structure is preferred, and if this equation is negative, the SP government would be the better structure.

Proposition 9.3.1 *Lower fixed costs in combining functions within one government increases the benefits of a MP government structure.*

$$\frac{\partial \Delta U}{\partial F_3} = -[\frac{\theta_1 + \theta_2}{F_3}] \ < 0 \tag{18}$$

Proposition 9.3.2 *Increasing the difference in the marginal benefits* ($|\theta_1 - \theta_2|$) *between the two LPGs provided in the metropolitan area increases the benefits of more governments.*

Proof: Let $\theta_1 = 1$, $\alpha_1 = 1$, $\alpha_2 = 1$, and $F_3 > F_2$.

$$\frac{\partial \Delta U}{\partial \theta_2} = -[ln(F_2) - ln(\theta_2) + ln(1 + \theta_2) - ln(F_3)] \rightarrow ln(F_2) - ln(F_3) < 0 \text{ as } \theta_2 \rightarrow \infty \tag{19}$$

By symmetry, this holds for changes in θ_1, and if $\theta_2 = 1$ and $F_3 > F_1$.

Results from this theoretical model demonstrate that fixed costs and heterogeneity in benefits from different LPGs impact when decentralization is beneficial to residents. The benefits of decentralization in this model are due to the fundamental tradeoff between economies of scope in providing multiple LPGs in one government and allowing LPGs to be provided in differently scaled jurisdictions.

Dep Var = Ln(Sales Price)	(1)	(2)	(3)	(4)
acres	0.1113***	0.1131***	0.1119***	0.1122***
	(0.0026)	(0.0026)	(0.0026)	(0.0026
bath	0.0257***	0.0257***	0.0255***	0.0256***
	(0.0009)	(0.0009)	(0.0009)	(0.0009)
sqft (000s)	0.2713**	0.2745***	0.2746***	0.2747***
	(0.0029)	(0.0029)	(0.0029)	(0.0029)
sqft squared (000s)	-0.0200***	-0.0207***	-0.0211***	-0.0212***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
age	-0.0035***	-0.0035***	-0.0034***	-0.0034***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
age squared (00s)	0.0316***	0.0312***	0.0299***	0.0315***
	(0.0037)	(0.0037)	(0.0037)	(0.0038)
age cubed (00000s)	-0.0911***	-0.0900***	-0.0841***	-0.0842***
	(0.0213)	(0.0212)	(0.0213)	(0.0213)
Garage Dummy	0.0140***	0.0142***	0.0142***	0.0141***
	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Basement Dummy	0.0899***	0.0901***	0.0898***	0.0899***
	(0.0014)	(0.0014)	(0.0014)	(0.0014)
ForcedAir Heat Dummy	-0.0095***	-0.0095***	-0.0093***	-0.0092***
	(0.0021)	(0.0021)	(0.0021)	(0.0020)
Fireplace Dummy	0.0191***	0.0190***	0.0189***	0.0188***
	(0.0011)	(0.0011)	(0.0011)	(0.0011)
Ln(DistComm) (miles)	-0.0195**	-0.0234***	-0.0215***	-0.0225***
	(0.0062)	(0.0065)	(0.0063)	(0.0064)
Distance to Park (miles)	-0.0042***	-0.0045***	-0.0054***	-0.0052***
	(0.0014)	(0.0014)	(0.0014)	(0.0013)
CSAP school test scores Advanced (%)	0.5147***	0.5109***	0.5289***	0.5189***
	(0.1441)	(0.1443)	(0.1442)	(0.1441)
CSAP school test scores Satisfactory (%)	0.3346***	0.3216***	0.3172***	0.3101***
	(0.0995)	(0.0.994)	(0.0996)	(0.0999)

Absolute value of standard deviation in parentheses; * < 0.1 ** < 0.05 *** < 0.01
All regressions include White (1980) robust standard errors
Bedrooms are excluded from regressions because other property variables make it insignificant

Table 8: Property Variables, School Test Scores for Table 4

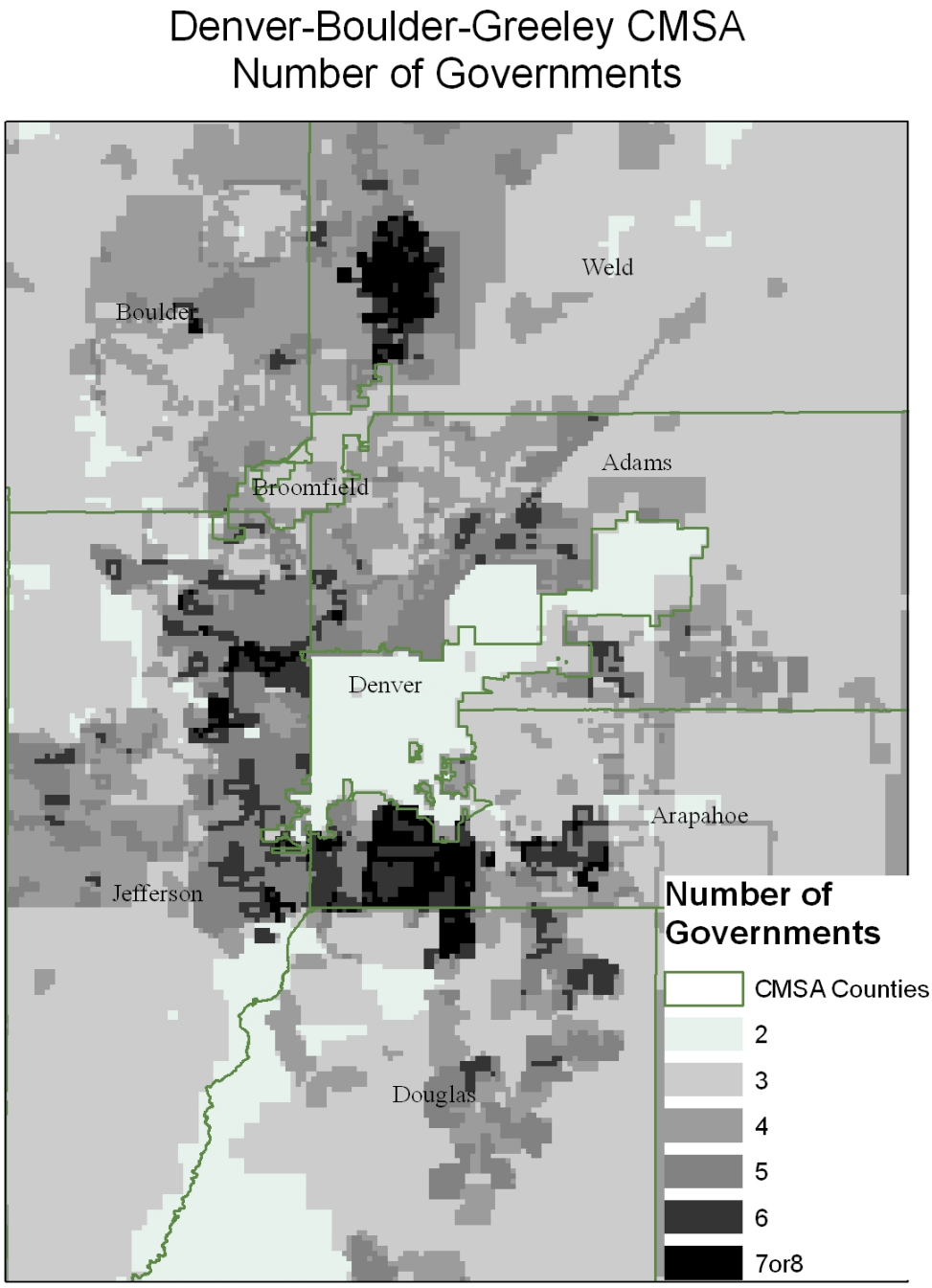

Figure 4: Denver-Boulder-Greeley CMSA: Number of Governments