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Independent Cities and Counties In Virginia: Substitute Jurisdictions?

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Abstract. Cities and counties are overlapping jurisdictions in most U.S. states. Virginia cities, however, are independent of counties, with separate tax bases and residents. This paper examines whether the Virginia system creates a horizontal relationship resembling that among cities in other states. It uses revealed preference axioms to compare spending patterns against competitive median voter benchmarks. The results show that cities and counties in metropolitan areas function like horizontal rivals in the Virginia system, in contrast with the vertical relationship imposed by the overlapping jurisdiction structure in other states.

Keywords: independent cities, median voter, homevoter hypothesis

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1. Introduction

Cities and counties are overlapping jurisdictions in most U.S. states. Counties share tax bases with the cities within their boundaries and provide services to city residents as well. This overlapping city-county jurisdiction structure has several consequences for the way the local public sector functions. For one, it leads to vertical demand relationships for city and county services that make fiscal behavior at the two levels interdependent (Turnbull and Djoundourian, 1993). For another, counties appear to be more distant from their constituents than are municipalities, hence less responsive to their residents (Turnbull and Mitias, 1999), which raises the possibility of stronger fiscal illusion and leviathan effects at the county level than at the municipal level (Campbell, 2004).

Virginia, however, is unique in this regard. It has both city and county governments, yet, unlike every other state with functioning county governments, cities are independent of counties in Virginia. They do not share tax bases and do not serve the same residents. Therefore, the vertical demand relationship that has been found to hold for cities and counties in other states simply does not exist in Virginia. In addition, when counties and cities are overlapping jurisdictions, county residents cannot exit their jurisdiction by moving into the nearest city; they must, instead, move to another county. In Virginia, on the other hand, county residents can exit their jurisdiction by moving into the nearest city. The threat of resident mobility is the crucial feature of Tiebout competition among local governments and the range of alternative local jurisdictions appears greater in the Virginia arrangement than in the more common overlapping jurisdiction city-county structure. The question is, do these differences matter and, if so,

in what way? In particular, is the vertical relationship between cities and counties replaced by a horizontal or Tiebout relationship resembling that among neighboring cities in other states? Or, do counties in Virginia function much like those in other states, as more distant governments on a higher tier than municipalities and therefore somewhat more removed from the direct influence of voters?

This paper takes a conceptually straightforward approach to answer these questions. The median voter hypothesis is the public choice competitive benchmark (Holcombe, 1989). This study compares the observed local government spending patterns with an equilibrium consistent with the competitive benchmark. Not surprisingly, the empirical results reject the notion that households generally treat independent cities and counties as substitute jurisdictions when pooled statewide. On the other hand, it turns out that cities and counties in metropolitan areas together replicate the competitive benchmark when pooled according to size. This is what we would expect when residents of large (small) cities view nearby large (small) counties as feasible substitute jurisdictions and vice versa for county residents: Metropolitan area cities and counties appear to be horizontally competitive within their respective size category. This conclusion, however, does not extend to small non-metropolitan or rural governments. Overall, then, cities and counties appear to behave as if they are competing jurisdictions when they are in the same labor market (defined as a given metropolitan area) and they do not when they are small jurisdictions in rural surroundings.

Fischel's (2001) homevoter hypothesis explains why the local political process sometimes yields Tiebout outcomes, identifying the factors expected to promote competitive median voter outcomes and factors that do not. Property ownership and

potential residential mobility together play the key role in Fischel's model. The threat of residential interjurisdictional mobility implies that the net advantages or disadvantages of local government fiscal behavior and zoning practices will be capitalized into property values. These capitalization effects mean that private property owners in the local jurisdiction cannot avoid the negative consequences of poor local government performance by fleeing the jurisdiction. Therefore, Fischel argues, property ownership provides a strong incentive for jurisdiction residents to influence their city government's tax, spending, and zoning decisions. Fischel's homevoter hypothesis implies that local governments are more likely to behave as if they are satisfying the preferences of the resident with the median home value when the jurisdiction is of modest size (population less than 100,000), alternative jurisdictions are readily available, and the locality controls local zoning regulations.

The Virginia system makes cities and counties into alternative locations for their respective residents, unlike the usual overlapping city-county relationship found elsewhere. The Fischel-Tiebout model suggests that cities in the Virginia system can function as alternative jurisdictions to counties, yielding greater threatened residential mobility and thereby reinforcing competitive behavior among county governments as well. The model predicts that the horizontal substitute relationship between cities and counties is strongest within metropolitan areas and weakest in rural areas of the state--precisely the pattern observed in this paper. Thus, when viewed from this perspective, cities and counties function like horizontal or substitute jurisdictions in the Virginia system, in contrast with the more subtle vertical relationship imposed by the overlapping jurisdiction structure in other states.

The paper is organized as follows. The notion of independent cities is unusual in the U.S., so Section 2 explains the relationships between independent cities and counties defined by the Virginia constitution. Section 3 explains the empirical revealed preference method and how it is applied in the public choice environment. Section 4 applies the revealed preference technique to test whether or not cities and counties are close enough substitute jurisdictions to support a competitive median voter equilibrium. Section 5 concludes.

2. Virginia Cities and Counties

Article VII of the Virginia constitution defines local government powers and duties. This article establishes the right of a local government to autonomy, including the city-county separation that in effect leaves a city independent of the surrounding county. More specifically, a county will contain everything else within its border including towns and unincorporated areas, just not the independent cities. A city must have a population of 5,000 or more and be approved as such by the general assembly of the state. The process of establishing an independent city is not effortless and towns applying for independence or pursuing annexation of county territory often experience fierce opposition from the relevant county (Johnson, 1985). It is common for cities to pay reparations to the affected county in annexation cases. Nonetheless, the county stands to lose a significant amount of tax base and must realign its public services, since it will no longer provide them to the independent city. Currently there is a moratorium on city establishment and annexation until 2010.

Clearly, one of the major implications of city-county separation is how it directly affects each local government's tax and spending capabilities. A government can only levy taxes within its jurisdictional boundaries and in Virginia; a county's tax jurisdiction begins where the boundary of an independent city's ends. Public services are also limited by the same jurisdictional boundaries, although interstate and primary highways are constructed and maintained by the state, each local jurisdiction is responsible for constructing and maintaining the streets and secondary highways within its boundary. Both cities and counties are not limited with respect to the power to issue revenue bonds, although counties are permitted to issue general obligation bonds without restriction as long as they are approved by referendum, while cities are limited to ten percent of the assessed value of taxable real property, with no referendum required.

Even though it appears that the interests of cities and counties are only competing with one another, there are cases where the sharing of public services is both allowed and encouraged. For example, it is common for cities and counties to share jails in Virginia. Albemarle County and the City of Charlottesville share a portion of the county tax base; this is a special case and is discussed in more detail later. On the other hand, both independent cities with populations of 10,000 or more and counties are responsible for providing circuit courts—normally an exclusive duty of counties in other states. Cities of the second-class (population of 5,000 -- 9,999) are served by the circuit court of the surrounding county. Similarly, towns do not maintain circuit courts.

In sum, despite the fact that there are some differences in how cities and counties perform their duties, independent cities in Virginia have many of the same powers and responsibilities that counties have. The question relevant to our study is whether the

similarities in powers and responsibilities are sufficiently close for residents to view the two types of local governments as substitute jurisdictions in the Fischel-Tiebout sense.

3. Revealed Preference and Public Spending

The literature takes a variety of approaches to examining the extent to which observed local public spending is consistent with the median voter hypothesis. One approach begins by assuming a specific functional form for the median voter's utility function to derive demand functions or a specific functional form for the demands and then estimating the demand function, testing the parameter estimates to see if they are consistent with theory. This literature is voluminous and stems from the seminal work by Borcherding and Deacon (1972) and Bergstrom and Goodman (1973).[1] Another approach relies on specification tests to evaluate the predictive performance or explanatory power of empirical median voter models (Turnbull and Djoundourian, 1994; Turnbull and Mitias, 1999). A more direct approach attempts to estimate a specific median voter utility function (Holsey, 1993). All of these approaches, however, are really joint tests of both the median voter hypothesis and the assumed functional form. In these studies, the decision to reject the median voter hypothesis means that the median voter utility maximization hypothesis does not hold, the assumed utility function or demand function is not correct, or both. In contrast, the axiomatic nonparametric approach taken here assumes no specific functional forms. Nonparametric tests of this sort indicate either that the data can be derived as a constrained optimization result or that they cannot. The revealed preference approach has been applied to answer questions ranging from agricultural to monetary economics (Chavas and Cox, 1988; Swofford, 1995). DeBoer

(1986) and Chang and Turnbull (2002) use revealed preference to study the employment decisions of public sector bureaucracies. Turnbull and Chang (1998) extend the empirical method to deal with complications associated with constable local public goods in the community demand context.

This section outlines how the empirical revealed preference method can be adapted to testing whether or not observed public spending data satisfy the median voter hypothesis, following Turnbull and Chang (1998). Consider the voter with the median income in local jurisdiction *i*. Assume that the voter's private consumption is y_i and his consumption of the public good is g_i. Both y_i and g_i are composite commodities. Private consumption is the numeraire and the median voter's tax price of an additional unit of public good consumption is t_i. Using this notation, the voter's consumption vector is $\mathbf{x}^i = [y_i \; g_i]$, the price vector is $\mathbf{p}^i = [1 \; t_i]$ and total consumption spending is $\mathbf{p}^i\mathbf{x}^i$. The vector $\mathbf{x}^i$ denotes the voter's chosen consumption bundle when the price vector is $\mathbf{p}^i$.

There are two complications that must be overcome in order to apply the revealed preference model in the public choice context. First, the total service level provided by the local government is not directly observable. This complicates parametric expenditure studies, too, so we follow the standard approach taken in that literature by measuring the governmental goods as expenditures, which are observable. Second, government goods and services may exhibit some degree of publicness or consumption congestion. In order to take care of this second difficulty, we follow Borcherding and Deacon (1972) and Bergstrom and Goodman (1973) and an extensive subsequent literature and assume that the median voter's public good consumption *g* is a function of the services provided by the government, *G*, and jurisdiction population, *n*:

$$g = Gn^{-\pi} \quad (1)$$

where π is the consumption congestion parameter reflecting the degree of publicness, with $0 \leq \pi \leq 1$ and the extremes indicating purely public and private goods, respectively. Other consumption congestion specifications have been used in the parametric econometric literature, but this specification is both popular and turns out to work well within the revealed preference methodology.

The government budget constraint provides the median voter's price vector in equilibrium. Denote the amount of lump-sum intergovernmental aid received by the locale as A_i. Given this aid, the local government must raise $G_i - A_i$ taxes to balance its budget. Following most empirical applications of the median voter model to local governments, we assume that all local revenues are raised from the property tax.[2] Structure-induced equilibrium provides one explanation for why multidimensional community decisions, like those associated with multiple tax bases, may produce median voter equilibria based on the assumption of a single tax base (Niemi, 1983; Shepsle and Weingast, 1981). Fischel (2001) provides a less formal but nonetheless compelling explanation for why introducing a variety of revenue sources need not disrupt the characterization of local government fiscal behavior as a median voter equilibrium. The empirical study by Turnbull and Djoundourian (1994) supports this view, showing that municipal governments that rely more heavily on multiple tax sources are not more likely to diverge from the median voter model outcome than those that more closely adhere to the single-tax assumption. In any event, whether or not the single tax base assumption is adequate as a practical simplification will be revealed in the empirical tests below.

Denoting the pivotal voter's share of the property tax base in jurisdiction i by s_i, the median voter's share of local taxes is $s_i(G_i - A_i)$. With income M_i and private consumption spending y_i, the voter's budget constraint is $M_i = y_i + s_i (G_i - A_i)$, so that

$$y_i = M_i - s_i (G_i - A_i) \tag{2}$$

Solving (1) for G_i, substituting the result into the voter's share of the local taxes and then differentiating the result with respect to g yields the median voter's marginal tax price $t_i = s_i n_i^{\pi}$. Summarizing these results, we have

$$\mathbf{p}^{\boldsymbol{i}} = [1 \;\; s_i n_i^{\pi}] \tag{3}$$

$$\mathbf{x}^{\boldsymbol{i}} = [M_i - s_i (G_i - A_i) \;\; G_i n_i^{-\pi}] \tag{4}$$

where $\mathbf{p}^{\boldsymbol{i}}\mathbf{x}^{\boldsymbol{i}} = M_i + s_i A_i$.

We denote the direct revealed preference relation as R and strict revealed preference as P. The Weak Axiom of Revealed Preference (WARP) maintains that $\mathbf{x}^{\boldsymbol{i}} R \mathbf{x}^{\boldsymbol{j}}$ implies $\sim \mathbf{x}^{\boldsymbol{j}} R \mathbf{x}^{\boldsymbol{i}}$ for any pair of observations, which requires

$$\mathbf{p}^{\boldsymbol{i}}\mathbf{x}^{\boldsymbol{i}} \geq \mathbf{p}^{\boldsymbol{i}}\mathbf{x}^{\boldsymbol{j}} \Rightarrow \mathbf{p}^{\boldsymbol{j}}\mathbf{x}^{\boldsymbol{j}} < \mathbf{p}^{\boldsymbol{j}}\mathbf{x}^{\boldsymbol{i}} \tag{5}$$

WARP can also be expressed in terms of the voter's income, tax share and government spending and intergovernmental aid as

$$\begin{aligned} M_{\mathrm{i}} + s_{\mathrm{i}} A_{\mathrm{i}} \;&=\; M_{\mathrm{j}} + s_{\mathrm{j}} A_{\mathrm{j}} + G_{\mathrm{j}} \left(s_{\mathrm{i}} \left(\frac{n_i}{n_j} \right)^{\pi} - s_j \right) \\ \Rightarrow M_{\mathrm{j}} + s_{\mathrm{j}} A_{\mathrm{j}} &< M_{\mathrm{i}} + s_{\mathrm{i}} A_{\mathrm{i}} + G_{\mathrm{i}} \left(s_i \left(\frac{n_j}{n_i} \right)^{\pi} - s_i \right) \end{aligned} \tag{6}$$

The Generalized Axiom of Revealed Preference (GARP) represents a transitive closure of the direct relation R in the following sense. Under GARP, for all sequences of

consumption bundles $\boldsymbol{x}^i$, $\boldsymbol{x}^j$, $\boldsymbol{x}^k$,..., $\boldsymbol{x}^l$, $\boldsymbol{x}^m$ such that $\boldsymbol{x}^i R \boldsymbol{x}^j$, $\boldsymbol{x}^j R \boldsymbol{x}^k$,..., $\boldsymbol{x}^l R \boldsymbol{x}^m$ then it must be true that $\sim \boldsymbol{x}^m P \boldsymbol{x}^i$, or algebraically

$$\mathbf{p}^i\mathbf{x}^i \geq \mathbf{p}^i\mathbf{x}^j,\ \mathbf{p}^j\mathbf{x}^j \geq \mathbf{p}^j\mathbf{x}^k,\ldots,\ \mathbf{p}^l\mathbf{x}^l \geq \mathbf{p}^l\mathbf{x}^m, \Rightarrow\ \mathbf{p}^m\mathbf{x}^m < \mathbf{p}^m\mathbf{x}^i \tag{7}$$

Performing the vector multiplications for the public spending model and simplifying, these GARP inequalities become

$$\begin{aligned} &M_{\mathrm{i}} + s_{\mathrm{i}} A_{\mathrm{i}} \geq M_{\mathrm{j}} + s_{\mathrm{j}} A_{\mathrm{j}} + G_{\mathrm{j}} \left(\mathrm{s}_{\mathrm{i}} \left(\frac{n_i}{n_j} \right)^{\pi} - s_j \right), \ldots, \\ &M_{\mathrm{l}} + s_{\mathrm{l}} A_{\mathrm{l}} \geq M_{\mathrm{m}} + s_{\mathrm{m}} A_{\mathrm{m}} + G_{\mathrm{m}} \left(\mathrm{s}_{\mathrm{l}} \left(\frac{n_l}{n_m} \right)^{\pi} - s_m \right) \\ &\qquad \Rightarrow M_{\mathrm{m}} + s_{\mathrm{m}} A_{\mathrm{m}} \leq M_{\mathrm{i}} + s_{\mathrm{i}} A_{\mathrm{i}} + G_{\mathrm{i}} \left(s_m \left(\frac{n_m}{n_i} \right)^{\pi} - s_i \right) \end{aligned} \tag{8}$$

All of the variables in inequalities (6) and (8) are observable except for the consumption congestion parameter π. Following Turnbull and Chang (1998), the relevant π is that which minimizes the number of GARP violations. In our application, the procedure often leads to multiple values of π that minimize the number of violations. In these situations, our preferred parameter value is that which minimizes Varian's violation index, a measure of how close the GARP transitive closure violations in the data are to satisfying the transitivity condition.[3]

It turns out that any finite number of {**p**,**x**} observations satisfying GARP in the form of inequalities (7) can be rationalized by an increasing concave utility function (Afriat, 1967; Varian, 1982). For our application this means that any set of local spending observations satisfying GARP can be generated by maximizing a well-behaved neoclassical utility function subject to the median voter's budget constraint. Therefore, in

principle, the answer to our question whether or not city and county governments are satisfying their voters reduces to whether or not their observed spending satisfies or violates the inequalities (5) and (7). Simply put, any finite number of observations satisfying (6) and (8) also satisfies the median voter hypothesis; conversely, any finite number of observations that include violations of these inequalities does not.

4. Empirical Results

The data set comprises all 95 counties and 41 independent cities in Virginia, focusing on city and county spending behavior in 1990. This is the most recent year for which we have complete data for both city and county governments (the Census of Governments discontinued collecting county tax base data in 1997). The total property tax base, government general expenditure and state and federal aid receipts for 1990 are drawn from the 1992 Census of Governments and the 1994 County and City Data Book. The data for median house value, median household income and population are from the 1994 County and City Data Book. Table 1 presents summary statistics for these variables.

The variables used in the inequalities (6) and (8) when conducting the revealed preference tests are defined as follows: M_i = median household income in jurisdiction i; s_i = median value house divided by the property tax base of jurisdiction i; A_i = intergovernmental aid receipts of jurisdiction i; G_i = jurisdiction i general expenditures; and n_i = population of jurisdiction i.

While additional ad hoc socioeconomic variables are sometimes included in parametric public spending models, the nature of this nonparametric test used here does not allow for their inclusion. This is not problematic. If the additional socio-economic

variables that are not included are key factors driving local public spending then we should expect our GARP tests to reflect their omission by rejecting the maintained optimization hypothesis. In any event, the existing literature for cities and counties tends to find little or no empirical role for these variables as determinants of local fiscal behavior once the structural variables implied by theory are included in the estimating equations (Campbell, 2004). The procedure allows for possible differences in voter preferences or in government behavior by partitioning the sample into sub-samples and then individually testing each for GARP violations. Spending differences induced by regional variation in climate, culture, etc., can be similarly addressed, although, our expectation–born out by the empirical results–is that restricting our attention to one state minimizes variation in these influences.

Tables 2 and 3 report the revealed preference test results. The empirical analysis is computed in the SAS environment using the public choice version of Varian's (1982) algorithm implemented by Turnbull and Chang (1998). We estimate the consumption congestion parameter π by repeating the reveal preference tests for all π values over the interval [0.00, 1.00] in increments of 0.01. The values that minimize GARP violations are reported in the second columns of tables 2 and 3.

Any break in the line of transitivity is recorded as a GARP violation. Since it often turns out that rather wide ranges of values for the congestion parameter π yield the same number of such violations. Therefore, we also identify the π values that come the closest to completing the GARP transitive closure (7). We report these estimates in the last columns of tables 2 and 3 as the consumption congestion parameter values that minimize Varian's violation index.

4.1 Cities, counties and median voters

As reported in the first row of table 2, the pooled sample of all of the cities and counties yields about 13% of the local governments violating WARP and 18% violating GARP. The congestion parameter that minimizes the number of violations ranges from 0.09 to 0.10, indicating a high degree of publicness in consumption. The 56 GARP violations imply that the observed spending patterns in the pooled sample cannot be generated by a median voter equilibrium. These results might indicate that cities and counties do not meet their respective median voters' demands or that they meet their respective voters' demands but their respective voters' preferences fundamentally differ. We apply the revealed preference test to partitioned samples of the local governments to sort out which of these possibilities pertains.

As a first step, we examine cities and counties separately. Doing so, the second and third rows in table 2 show that cities as a whole exhibit median voter hypothesis equilibria but that counties do not. Although having 2% of the Virginia counties violating WARP and transitivity is not overwhelming, technically even one violation of GARP rejects the hypothesis that spending corresponds to a median voter equilibrium. A closer examination of the counties is needed.

There are several reasons to expect that counties in Metropolitan Statistical Areas (MSA's) might behave differently than counties that are not. For example, it is possible that counties may serve a different role for metropolitan residents than rural residents. In the revealed preference model, different mixes of county services in the composite commodity public spending variable can function much like differences in voter

preferences for the county spending composite commodity or be reflected in divergent consumption congestion parameter values. Either of these can lead to WARP or GARP violations. While this argument does not imply that either metropolitan or rural counties should adhere more closely to the median voter hypothesis, it nonetheless does imply that the two types of counties might exhibit behavior best explained by two different revealed preference structures. This calls for testing the two types of counties separately.

Another argument for separating the counties arises from the observation that, by definition, counties in the same MSA lie within a single labor market. This makes these counties better substitute jurisdictions in the eyes of their residents who are constrained to live within reach of their jobs. This is, of course, Fischel's (2001) homevoter hypothesis applied to counties: the threat of residential mobility across jurisdiction boundaries ups the ante for residents, increasing their incentives to keep control of their local governments and thereby putting additional pressure on local governments to do a better job offering desirable tax-service bundles. Since this kind of horizontal competition is missing or attenuated among rural counties, we expect urban and rural county fiscal behavior to diverge, with MSA counties more likely to satisfy the median voter hypothesis than their rural counterparts.

Finally, counties in the same labor market also represent alternative locations for businesses, particularly those engaged in the export base activities of the urban area. Many of these firms will be more mobile within their metropolitan area than across metropolitan areas, leading to greater nonresidential tax competition effects among counties in MSA's than among counties outside of MSA's. A different degree of firms'

mobility among counties in urban and rural settings by itself leads to different median voter equilibria for MSA and non-MSA counties (Turnbull and Niho, 1986).

The fourth and fifth rows in table 2 report the results when we partition counties into MSA and non-MSA samples. This partition yields zero violations for both samples. In addition, the ranges of congestion parameter estimates for each partitioned sample differ, which is consistent with either different voter preferences or different mixes of individual services in the government spending composite commodity.

The city results found here are not surprising given the growing body of supporting econometric evidence for municipalities (Fischel, 2001, pp. 88-92; Turnbull and Djoundourian, 1994). The conclusion that both urban and rural county spending replicate median voter equilibria once the differences between MSA and non-MSA counties are taken into account, however, is somewhat surprising in light of existing empirical evidence for other states. Turnbull and Mitias (1999) reject the median voter model for county spending behavior in five Midwest states using parametric econometric tests. Turnbull and Geon (2007) similarly reject the median voter hypothesis for counties in 29 out of 38 individual states with overlapping city and county jurisdictions when pooling urban and rural counties. When partitioning the samples, the study finds that urban counties replicate median voter equilibria in 25 of 36 states while rural counties replicate median voter equilibria in only 11 of 37 states tested. When compared to what we find here, there appears to be something different going on in the counties in Virginia.

The revealed preference analysis thus far reveals that independent cities, urban counties, and rural counties each replicate median voter equilibria. Urban and rural counties, however, behave differently from each other. The question at hand, however, is

whether cities and counties are viewed by taxpayers as substitute jurisdictions when they do not overlap. Further testing sheds some light on the answer to this question.

4.2 Are independent cities and counties substitutes?

To answer the question of whether or not cities and counties are substitutes in Virginia, we partition the entire sample into mixed samples of cities and counties and test to see whether the mixed city-county samples replicate median voter equilibria. Table 3 reports the results of these tests.

The first two rows in the table pertain to jurisdiction size effects. Both the larger (populations greater than 10,000) and smaller cities and counties reject the median voter hypothesis; cities and counties are not close substitute jurisdictions when partitioned by size alone. Drawing from the rationales offered earlier, there are reasons to expect differences in metropolitan and rural local governments. Rows 3 and 6 in table 3 report the nonparametric test results for MSA and non-MSA governments, respectively. Once again, we see that cities and counties are not substitute jurisdictions when controlling for urban or rural contexts. Controlling for both urban and rural settings as well as relative size effects, however, changes the conclusions. The results for the samples partitioned in these two dimensions can be seen in rows 4, 5, 7 and 8. Rows 4 and 5 reveal that the larger metropolitan cities and counties are sufficiently strong substitute jurisdictions for the disciplining mechanism envisioned in Fischel's homevoter hypothesis to work; these local governments replicate median voter equilibria. Similarly for small cities and counties in rows 7 and 8.

Turning to non-MSA governments, the results in the last two rows in table 3 reveal that the larger cities and counties as a group replicate median voter equilibria. This implies that the larger cities and counties outside MSA's are close enough substitute jurisdictions to ensure that the capitalization mechanism works as envisioned in Fischel's homevoter hypothesis. Comparing row 8 in table 3 with row 4 in table 2, however, reveals that the horizontal relationship between small cities and counties is not strong enough to drive small city and county spending patterns to replicate the same median voter benchmark.

4.3 Tax base sharing in Albemarle and Charlottesville

The unique relationship between cities and counties in Virginia creates an incentive for rivalry over the property tax base. Cities have fiscal incentives to annex surrounding unincorporated land to capture the growing property tax base on the fringe of urban areas. Counties lose the annexed tax base and are therefore motivated to fight annexation. Virginia counties found that the only feasible venue for resisting annexation is the courts and annexation fights have proven costly to their taxpayers.[4] In order to reduce these costly legal battles, the state passed legislation in 1979 that provided financial aid to cities and also allowed cities and counties to establish tax base sharing agreements in order to reduce city incentives to annex county land. Albemarle County and the City of Charlottesville took advantage of this opportunity and established a tax base sharing agreement.[5] In return for sharing the tax base for a designated area in the county, Charlottesville agreed to forego further annexation attempts.

The important aspect of this tax base sharing agreement for our study is that it effectively creates the same type of vertical taxing relationship common to cities and counties with overlapping jurisdictional boundaries. Interestingly, though, neither Albemarle County nor the City of Charlottesville are involved in GARP violations in the data. Whatever the effect of the vertical relationship between these two governments, it is not strong enough to significantly change their fiscal behavior relative to their vertically independent counterparts in the sample.

5. Conclusion

Virginia's local government structure is unique in the U.S. While almost all cities and counties are overlapping jurisdictions in the other states with functioning county governments, cities and counties are independent governments in Virginia. This paper examined one consequence of the Virginia arrangement, whether making cities and counties into non-overlapping jurisdictions also places them on the same horizontal tier in the federalist structure in the sense that residents treat each as a substitute jurisdiction for the other. The Fischel-Tiebout homevoter hypothesis implies that a competitive median voter equilibrium is more likely when both types of government are viewed by residents as substitute jurisdictions than when they are viewed as dissimilar alternatives (Fischel, 2001). Drawing on this connection, this paper used the revealed preference axioms to test whether or not the observed spending patterns of pooled samples of cities and counties in Virginia can be replicated by competitive median voter equilibria.

We found that cities and counties are substitute jurisdictions in the metropolitan areas of Virginia when also controlling for differences in size. Metropolitan area cities

and counties therefore appear to be horizontal rivals in the Fischel-Tiebout sense. Some differences do arise outside the metropolitan areas. In non-metropolitan areas, larger cities and counties are sufficiently close substitutes to ensure they meet the competitive benchmark while smaller cities and counties fall short in this regard. The unusual Virginia institutional arrangement fundamentally affects the local public sector performance. Our results reinforce the notion that institutional structure affects governmental behavior while casting much needed light into a previously neglected corner of the state and local public sector.

For a long time the economics literature virtually ignored the role of county governments in the federalist structure. Sandwiched between state governments and the municipalities and local school districts that have been the subject of much attention over the past decades, counties have been widely regarded as arcane institutional features in the public finance landscape, features safely ignored. Turnbull and Djoundourian (1993) offer a theory of how the overlapping jurisdictional structure of counties and cities leads to vertical fiscal relationships that are tied through their respective voters' demands for their public services. Campbell (2004) provides additional empirical evidence of the vertical relationship between overlapping cities and counties. In this view, ubiquitous counties affect the fiscal behavior of municipal governments in predictable ways. The results presented here complement this evidence. They show that the presence of non-ubiquitous counties can also systematically affect the behavior of cities, but in the manner that the Fischel-Tiebout model associates with how the proximity of nearby cities affect each other's taxing and spending behavior rather than the vertical relationship envisioned in the Turnbull-Djoundourian model.

The empirical evidence shows that the absence of the vertical demand relationships created by an overlapping jurisdiction structure makes Virginia counties fundamentally different types of local governments than found in most other states. One practical implication of this study for researchers focusing on the municipal sector is that, for all practical purposes, it is reasonable to treat Virginia independent cities and counties in MSA's symmetrically. When focusing on the county sector, however, our caveat applies; the presence of independent cities ensures that Virginia counties are subjected to different interjurisdictional economic influences than are counties in other states.

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Table 1. Sample Summary Statistics

Variable Name	*Mean*	*Standard Deviation*
Counties		
Median Household Income*	$ 28,293	$ 8,352
Median House Value*	$ 71,046	$ 33,871
Property Tax Base**	$ 2,380,654,853	$ 8,294,563,653
Intergovernmental Aid Receipts*	$ 17,940,484	$ 30,787,859
General Expenditures*	$ 46,508,968	$ 138,368,448
Population*	41,431	90,199
Cities		
Median Household Income*	$ 24,470	$ 8,813
Median House Value*	$ 81,158	$ 44,907
Property Tax Base**	$ 2,350,377,659	$ 3,696,596,293
Intergovernmental Aid Receipts*	$ 30,061,659	$ 46,406,553
General Expenditures*	$ 85,194,073	$ 136,411,173
Population*	54,912	81,025

Data sources:

* 1994 County and City Data Book

**1992 Census of Governments

Table 2. GARP Test Results for Separate City and County Samples.

Sample	Number of Observations	Congestion Parameter π	Possible WARP Violations	Actual WARP Violations	Number of Observations in WARP Violations	Possible GARP Violations	Actual GARP Violations	Number of Observations in GARP Violations	Varian's Violation Index*
Pooled	136	0.09 – 0.10	9,180	12	18/ 136 = 13.2%	2,515,456	56	24/136 = 17.7%	0.5666 *π=0.09*
Cities	41	0.65 – 0.79	820	0	0.0%	68,921	0	0.0%	0.0000
Counties	95	0.28 - 0.29, 0.91, 0.99	4,465	1	2/95 = 2.1%	857,375	2	2/95 = 2.1%	0.0008 *π=0.99*
- Non-MSA	59	0.91, 0.99, 1.00	1,711	0	0.0%	205,379	0	0.0%	0.0000
- MSA	36	0.00 – 0.48, 0.83 – 0.94	630	0	0.0%	46,656	0	0.0%	0.0000

* The value of π reported in this column is that which corresponds to the minimum of Varian's violation index.

Table 3. GARP Test Results for Pooled City and County Samples.

Sample	Number of Observations	Congestion Parameter π	Possible WARP Violations	Actual WARP Violations	Number of Observations in WARP Violations	Possible GARP Violations	Actual GARP Violations	Number of Observations in GARP Violations	Varian's Violation Index*
LARGE City & County	109	0.32	5,886	8	12/109 = 11.0%	1,295,029	36	17/109 = 15.6%	0.4071 *π=0.32*
SMALL City & County	27	0.00 – 0.25, 0.34 – 0.41, 0.61 – 0.72, 0.92 – 1.00	351	1	2/27 = 7.4%	19,683	2	2/27 = 7.4%	0.0022 *π=0.00*
MSA City & County	62	0.00 – 0.13, 0.70 – 0.71, 0.76, 0.91 – 0.92	1,891	1	2/62 = 3.2%	238,328	2	2/62 = 3.2%	0.0025 *π=0.76*
- Large	57	0.91 – 0.92	1,596	0	0.0%	185,193	0	0.0%	0.0000
- Small	5	0.00 – 1.00	10	0	0.0%	75	0	0.0%	0.0000
NON-MSA City & County	74	.28, 0.34 – 0.36	2,701	4	5/74 = 6.8%	405,.244	8	5/74 = 6.8%	0.0421 *π=0.28*
- Large	52	0.99 – 1.00	1,326	0	0.0%	140,608	0	0.0%	0.0000
- Small	22	0.00 – 0.25, 0.34 – 0.41, 0.61 – 0.72, 0.92 – 1.00	231	1	2/22 = 9.1%	10,648	2	2/22 = 9.1%	0.0022 *π=0.00*

* The value of π reported in this column is that which corresponds to the minimum of Varian's violation index.

Footnotes

[1] See Holcombe (1989), Turnbull and Djoundourian (1994), or Fischel (2001, pp. 87-93) for summaries of this literature.

[2] Virginia counties and independent cities raise about 69% of own tax revenues from property taxes, which compares with about 74% for the average U.S. county.

[3] Intuitively, Varian's (1982) violation index can be envisioned as follows. The shortest transitivity path from A to D is A to D directly. However, if this direct path does not exist in the data, then a wide range of possibilities must be examined. For example, one path that travels from A to B to C to D will end up at D. But consider the case where there also exists a path from A to C to D. This second path is more direct and in that sense, less costly. Varian's violation index assigns a value to each possible path and then chooses the least cost path. Therefore, when comparing two different π values that yield the same number of GARP violations, the π value that yields a lower violation index is also the congestion parameter value that comes closest to fully satisfying the transitivity requirements of GARP.

[4] According to Johnson (1985) annexation litigation costs were an average of $7 million per case during 1965-71.

[5] As noted earlier, the state moratorium on annexations until 2010 was imposed after Albemarle and Charlotte struck their tax base sharing agreement.