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POLITICAL JURISDICTIONS IN HETEROGENEOUS COMMUNITIES

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ABSTRACT

We investigate how the number and size of local political jurisdictions in an area is determined. Our model focuses on the tradeoff between the benefits of economies of scale and the costs of a heterogeneous population. We consider heterogeneity in income, race, ethnicity, and religion, and we test the model using American school districts, school attendance areas, municipalities, and special districts. Using both cross-sectional and panel analysis, we find evidence of a significant tradeoff between economies of scale and racial heterogeneity. We find weaker tradeoffs between economies of scale and income or ethnic heterogeneity. That is, it appears that people are willing to sacrifice the most, in terms of economies of scale, in order to avoid racial heterogeneity in their jurisdiction.

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I. Introduction

The largest country in the world, China, has 1.203 billion inhabitants; the smallest, Palau, has 16,661.[1] The largest county in the United States (Los Angeles, California) has 8,863,164 inhabitants; the smallest (Loving, Texas) has 107.[2] The largest school district in the United States has 1.4 million school-aged children; the smallest has two. Given these enormous differences, a legitimate question is what determines the "optimal" size of political jurisdictions.

The answer may be different for different types of jurisdictions–countries, states, counties, school districts, *et cetera*. In all cases, however, there may be a tradeoff between the benefits of larger scale and the costs of a more heterogeneous population. Heterogeneity is costly if different individuals have different policy preferences, so that they must compromise in order to share a jurisdiction. Heterogeneity is also costly if individuals prefer to interact with people like themselves.

Consider, for example, the problem of dividing an area into school districts. Large districts have economies of scale because they can provide libraries, sports facilities, and administration on a district-wide basis. On the other hand, in large districts, many families have to mix their children and agree on common educational policies. If families in an area are homogeneous, an increase in size may be purely beneficial (up to the point where economies of scale become diseconomies). If, instead, an increase in size implies an increase in heterogeneity, there may be a tradeoff.

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[1] Source: CIA World Factbook 1996. The data refer to 1995. Palau is the smallest country with a full membership in the UN. Three others are smaller but do not have a UN seat.

[2] Source: 1990 Census of Population. Yellowstone National Park (which is a county) actually has the smallest population of any county in the United States, but its population is artificially limited.

We test whether a tradeoff between economies of scale and heterogeneity helps to explain the number and size of local jurisdictions in the United States. We concentrate on municipalities, special districts, school districts, and school attendance areas; and we consider heterogeneity in income, race, ethnicity, and religion. While other types of heterogeneity, such as age heterogeneity, may be relevant, we focus on the aforementioned types because they are the main fault lines of preferences and political conflict in the United States. We use counties as our basic areas because they almost never consolidate or break apart. Also, local jurisdictions rarely traverse county lines. Thus, a county may be divided into many or few jurisdictions, but it maintains its identity.

We focus on racial, ethnic, income, and religious heterogeneity because we believe that they are the main fault lines of preferences and political conflict in the United States. A vast sociological literature argues that race, ethnicity, and religion affect local politics. See, for instance, Wilson (1996), Hacker (1995), and Huckfeld and Kohfeld (1989). A particularly striking, recent example is the racial conflict over curriculum in the Oakland, California school district, described by Alesina, Baqir, and Easterly (1999). An additional (but not alternative) interpretation of preferences based on race, ethnicity, *et cetera* is that individuals do not want to share public goods with people from other groups, regardless of what the public good is like. The history of school desegregation suggests that such a interpretation is plausible, at least for racial groups. More recent evidence from Alesina and La Ferrara (2000) shows that a population's racial mix influences the degree to which its members participate in social activities.

People often find it hard to envision how local jurisdictions respond to heterogeneity because they can recall few if any jurisdictions being created in their area. It may be helpful to know, therefore, that refusal to consolidate is the main mechanism by which jurisdictions respond. Through consolidation, the number of local jurisdictions in the United States fell *twelve*-fold between 1900 and 2000. In most states, a heterogeneous area could end the twentieth century with a large number of jurisdictions simply by refusing to get on the consolidation bandwagon. Although consolidation is the main mechanism, the creation of new jurisdictions (particularly new special districts) does account for some response.

Our results suggest that the tradeoff between economies of scale and heterogeneity *is* an important force in the determination of jurisdictions. Furthermore, our results suggest that, racial heterogeneity is more important than income heterogeneity. In other words, people are willing to give up more, in terms of economies of scale, in order to avoid being in a racially heterogeneous jurisdiction than they are willing to give up to avoid being in a jurisdiction with diverse income. This result is striking because, in a jurisdiction, people with different incomes face different tax burdens but receive about the same level of local public goods.

We find a pattern of results that confirms that the trade-off is between heterogeneity and *economies of scale*. For instance, we find that heterogeneity has almost no effect on jurisdictional structure in counties with small populations. In such counties, economies of scale are the predominant factor and the population cannot afford to subdivide.

We are aware that, within a jurisdiction, individuals can sort themselves into groups that are more homogeneous than the overall population of the jurisdiction . For instance, individual schools can be relatively homogeneous even in a district that has a heterogeneous student population. Using school attendance areas, we explore the question of whether there is a tradeoff between economies of scale and heterogeneity *within* jurisdictions.

Our paper stands at the crossroads of four strands of literature. One is recent work on the endogenous formation of political jurisdictions. In particular, Alesina and Spolaore (1997) and Alesina, Spolaore, and Wacziarg (2000) discuss the tradeoff between size and heterogeneity as an explanation of the number and size of nations. The second strand of literature studies the effects of racial heterogeneity on local policies. Alesina, Baqir, and Easterly (1999, 2000) argue that, in racially fragmented areas, individuals are less willing to pool their fiscal resources to provide public goods. Cutler, Elmendorf, and Zeckhauser (1993), Poterba (1996), Luttmer (1997), and Goldin and Katz (1998) find that racial heterogeneity affects local policies like education and welfare. Glaeser, Scheinkman, and Shleifer (1995) provide evidence that racial heterogeneity affects city growth. The third strand is the political science literature on the formation of local governments in the United States. Burns (1996), for instance, describes the importance of land developers in the creation of jurisdictions. Finally, our paper can be seen as an unusual test of the Tiebout (1956) model, in which households sort themselves among local jurisdictions according their preferences for local public goods and taxes. Typical tests of the Tiebout model take the number of jurisdictions as given, but this is a restriction not envisioned by Tiebout, who assumed that adjustment would occur both through household mobility and through endogenous jurisdiction formation.

The paper is organized as follows. In Section 2, we model the hypothesis that there is a tradeoff between economies of scale and heterogeneity. Our empirical strategy and data are described in Sections 3 and 4. In Section 5, we presents our results on school districts and attendance areas. Section 6 contains results on municipalities and special districts. The last section concludes.

II. A Simple Model

We describe our key hypotheses by extending Alesina and Spolaore's model of endogenous formation of jurisdictions. We present the model primarily in order to motivate the empirical analysis, so we keep it simple.

A. The Basic Model

Consider a political jurisdiction that has a population of size T, an even integer. With an eye to the empirical work that follows, let us call this jurisdiction a "county." Citizens of the county are arranged on a segment of length hT, and each individual is located at a distance h from his neighbor. The left-most and right-most individuals are located at a distance of h/2 from the borders of the county; this is not restrictive. We give the county only one spatial dimension in order to keep the intuition clear. As a result, we interpret the distance between individuals as a *general* measure of their difference--which may be ideological, geographic, taste-based, or income-based. Individuals actually differ on multiple dimensions simultaneously, but partial analysis of a single dimension of a multidimensional model would yield similar results.[3] In our empirical work, we consider the partial effect of each of several types of heterogeneity. For now, one should think of a single dimension or highly correlated dimensions (individuals who live close to one another have similar tastes, and so on).

The assumption that each individual's location is fixed is natural if location represents tastes, ideology, or income. It is less natural if location represents geography because individuals can move in response to changes in jurisdictional boundaries. In our empirical work,

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[3] See, for instance, Epple and Platt (1998). Researchers have used a few approaches to maintain clarity: unidimensional heterogeneity (most common), partial analysis of single dimensions in multidimensional models, or strong restrictions on the correlations among variables on which people differ. Calibrated computational models are useful for prediction, but do not yield clear intuition.

we consider such mobility. For now, we maintain the assumption of fixed location.

Each individual has utility given by:

$$U_i = g(A - al_i) + y - t_i, \qquad g>0,\ a>0,\ A>0\ . \tag{1}$$

In equation (1), l_i is the distance of individual i from the public good, y is income, and t_i is the tax is the tax paid by individual i. Thus, y-t_i is private consumption.[4] Equation (1) shows that the utility an individual derives from the public good is decreasing with his distance from it.[5] For example, a county might contain a white population that prefers a traditional school located in the suburban area, an Hispanic population that prefers a school with bilingual education that is located in urban area, and a black population that prefers a school that teaches black history and is located in the urban area.

We are interested in the number of school districts, say, into which this county splits. Each school district provides a public school, and residents of a district attend the school and pay taxes to finance it.[6] Thus, a school and two borders characterize a school district.[7] (Below, we discuss the possibility of multiple schools in a district.) The cost of each school is given by:

$$k=\bar{k}+k_1 S\ , \tag{2}$$

where k is cost, $\bar{k}$ is fixed cost, k_1 is variable cost, and S is the population of the school district ($S \leq T$). Since there is a fixed cost, average costs are decreasing in the district's size. This is a

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[4] The utility function is linear for convenience; the linearity does not affect the qualitative nature of the results.

[5] The individual who is located at the public good has utility equal to gA. The farthest possible individual has utility equal to g (A-a [h (T - 1/2)].

[6] For simplicity, assume that each household uses the school to the same degree. For instance, assume that each household has a child.

[7] We do not assume that districts cannot be disjoint, but it is immediate to show that disjoint school districts would not be equilibrium.

simple way of introducing economies of scale.[8] By the budget constraint of each school district we have:

$$\int_S t_i = \bar{k} + k_1 S \ . \tag{3}$$

Proposition One:

A social planner maximizing the sum of individual utilities would locate the school in the middle of each school district and would choose the following number of equally sized school districts:[9]

$$N = \frac{T}{2}\sqrt{\frac{gah}{\bar{k}}} \quad if \quad \frac{T}{2}\sqrt{\frac{gah}{\bar{k}}} > 1, \qquad N = 1 \ \ otherwise \ . \tag{4}$$

In practice, the number of jurisdictions must not be greater than or equal to one, but must also be an integer, so an empirically testable version of the equation is:

$$N = \max\left[1,\ R\left(\frac{T}{2}\sqrt{\frac{gah}{\bar{k}}}\right)\right], \tag{5}$$

where the function *R(.)* rounds to the nearest integer.

Obviously, the fact that all the districts end up being the same both in terms of land area and population depends on the linearity of the distribution of people and their equidistance. If

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[8] In practice, diseconomies of scale do set in for districts of very large size. We have not provided for such diseconomies. Otherwise, the linearity of equation (2) does not affect the qualitative nature of the results.

[9] See Alesina and Spolaore (1997), of whose proof this result is a straightforward extension. We abstract from integer problems; as far as the theory is concerned this is not a problem, but we need to consider this issue in our empirical analysis.

individuals were closer together in one part of the county and farther apart in another, the optimal size of districts would be different in the two parts. [10]

Several comments are in order.

(1) The optimal number of school districts is increasing in the benefits of the public good (captured by the parameter g). In more colorful terms, the more people like schooling, the more they are willing to pay to avoid having a school that is far away, in terms of distance or tastes.

(2) The optimal number of school districts is increasing in the disutility of distance (captured by the parameter a). That is, the more people dislike sharing the same public goods with others who have different preferences, the larger the optimal number of jurisdictions and the smaller their size.

(3) The higher is $\bar{k}$ (which captures the importance of economies of scale), the lower is the optimal number of jurisdictions and the larger their size. Each additional person makes per-person costs fall greatly in a jurisdiction with a small population, but an additional person has little effect on per-person costs in a jurisdiction with a large population. More precisely, the importance of economies of scale declines with the population of a jurisdiction, and the decline is nonlinear in the population.

(4) The higher is heterogeneity (captured by the parameter h), the larger is the number of school districts. That is, the more heterogeneous are the ideologies or tastes of a given

[10] Since individuals have linear utilities, the social planner is indifferent to the distribution of taxes. The average tax paid by an individual is given by:

$$t = \bar{k}\sqrt{\frac{gah}{4\bar{k}}} + k_1$$

Note that in order to equalize utilities amongst individuals, the social planner would choose to draw the borders of the school district between two adjacent individuals; this also implies that every individual strictly belongs to one and only one school district.

population, the larger is the number of districts. If one interprets h as a measure of distance, then the greater is the geographic diffusion of the population, the larger is the number of districts.

(5) *Ceteris paribus*, the larger is the total population of a county, the larger is the number of districts.

(6) Consider the case in which the parameter values are such that the county has only one school district. Suppose that heterogeneity increases. The optimal number of school districts may still be one. This is, of course, because the change in parameter values may be insufficient to push the county past the threshold that makes two school districts optimal. The integer problem is similar. The smaller is the population of a county, the less likely is a given change in heterogeneity to pass the threshold where creating a new district is optimal.[11]

B. Extensions

B.1. More than One School in a District

So far, we have identified a school with a school district. This is unrealistic because, if heterogeneity increases, households can build another school within their district. Building a new school and creating a new district are very different choices; the former choice is "cheaper," in terms of institutional transaction costs, but it does not allow different groups of people in the district to independently control or finance their schools. Legally, all schools in a district must have the same contract with teachers, the same per-pupil spending, and so on. How do we extend

[11] An interesting question is whether Proposition 1 is reproduced by a decentralized equilibrium, in which households choose how many districts to have in their county without the help of a social planner. The answer depends on voting rules and on the availability of interpersonal transfers. Because our purpose is mainly empirical, this issue is not critical. Alesina and Spolaore (1997) show, however, that even if the optimal number of jurisdictions cannot be sustained by a voting mechanism, the equilibrium number of jurisdictions has the comparative statics discussed above.

the model to allow a district to have multiple schools? Building a new school should have a lower fixed cost than creating a new school district, but building a new school limits the diversification among different groups (compared to creating a new district). If we interpret the line of the model as an ideological spectrum, we can capture these phenomena by assuming that two schools in the same district cannot be too far from each other. That is, multiple schools in a district have to closer to the ideological middle than they would optimally be if they were schools in separate districts. In short, if heterogeneity increases, residents have two choices: the more radical (but more expensive) choice of creating a new district and the less independent (but cheaper) choice of building a new school. We examine both choices in our empirical analysis.

B.2. Multiple Public Goods

A school district or special district provides only one type of public good, but municipalities typically provide several public goods, such as policing, fire protection, and roads. The model captures the determination of municipalities if the public good is interpreted as a *bundle* of local goods and services. The mere fact that municipalities provide multiple public goods suggests that there is a tradeoff between economies of scope and heterogeneity that is similar to the tradeoff between economies of scale and heterogeneity. If there were no economies of scope, it would be optimal to have a special district for each local public good. Bundled public goods force people to tolerate more variation (compared to a special district) in their fellow residents' preferred policing in order to obtain less variation (compared to a special district) in their fellow residents' preferred fire services.

B.3. Heterogeneous Income

In the model people have different preferences, which we, in the empirical part of the paper, relate to race, ethnicity, religion, and income. However, income differs from the other fault lines because, even if there were no correlation between income and preferences, income would affect a household's willingness to share a jurisdiction with other households. A local jurisdiction that does no explicit redistribution through transfers is nevertheless likely to redistribute among households of different incomes through the public goods it supplies and the way it finances them. High-income individuals have an incentive to isolate themselves in order to avoid redistributing to others through local public goods. The more diverse is the distribution of income in a county, the stronger are the incentives for high-income people to live in separate jurisdictions from low-income people.[12]

B.4. Diseconomies of Scale

In the model, there are no diseconomies of scale, but anecdotal evidence suggests that jurisdictions with very large populations are unwieldy and do suffer from diseconomies. Simply to avoid diseconomies associated with very large scale, a very populous county may be divided into local jurisdictions that can accommodate an increase in racial heterogeneity without any individual jurisdiction becoming more heterogeneous. Thus, racial heterogeneity may have no effect on jurisdictional structure in very populous counties.

This argument really applies only to racial heterogeneity. The number of races is small, so a county can have an "excess supply" of jurisdictions so far as its need to cope with racial heterogeneity is concerned. The argument does not work well for income, because it is a continuous variable, or for ethnicity and religion, which are variables with many categories.

III. Empirical Strategy

[12] Bolton and Roland (1997) discuss how the threat of secessions limits the extent to which certain groups can tax others in order to redistribute in their favor.

A. In General

Essentially, we want to test whether there are more jurisdictions in areas that have more heterogeneous populations, all else equal. We also want to look for evidence that the tradeoff is between heterogeneity and *economies of scale*. The best evidence for economies of scale will come from the *pattern* of effects of heterogeneity. Does heterogeneity have little or no effect in non-populous counties but a significant effect in counties with medium to large populations? Does racial heterogeneity have no effect in counties with very large populations? Finally, we want to present at least some suggestive evidence about the mechanisms by which the tradeoff operates.

We first present cross-sectional evidence because, if the tradeoff exists, we should be able to identify it in a cross-section of counties. Since jurisdictions are slow to change, the tradeoff is likely to evince itself over a long period of time. Thus, if the tradeoff does not appear in a cross-section of counties, it probably does not exist. In contrast, if the tradeoff does not appear in panel data, it is possible that it does exist but that the period over which we observe the data is too short.

We have presented the model as though an area's population is exogenously determined and the number of jurisdictions responds endogenously. The model, however, really only says that a certain number of jurisdictions is optimal, given a population's heterogeneity. So, if the model were correct *and* households were mobile across areas, households might move to areas that were divided up more optimally. Such endogenous mobility would not be a problem for the model, but it would affect how one thought about the mechanism through which the tradeoff worked. We do not think, however, that endogenous mobility is likely to be the mechanism behind the tradeoff because there is no guarantee that an area with a large number of jurisdictions would attract migrants who have the "right" mix of heterogeneity for the number of jurisdictions. For instance, an area with many jurisdictions might appeal disproportionately to high income households or white households, but their migration decisions would probably make the area less heterogeneous. In any case, panel evidence can clarify the issue. If the number of jurisdictions really does not respond to population heterogeneity (the tradeoff works through the endogenous mobility), then we should not observe jurisdictions changing systemically with an area's initial population heterogeneity.

It is possible that mere coincidence could generate a cross-sectional relationship between population heterogeneity and the number of jurisdictions. Some areas of the United States might just happen to have a large number of jurisdictions and heterogeneous populations. A coincidence is not wholly implausible because, although there are more than 3000 counties, counties within the same state tend to have rather similar jurisdictional structures. Thus, a coincidence at the state level might show up at the county level. We address this issue in two ways. First, panel evidence provides useful clarification. If the relationship is purely coincidental, then changes in the number of jurisdictions in a county should not be related to changes in the population heterogeneity of a county. Second, all of our evidence is based on estimating equations that contain state effects. In other words, we look for evidence of the tradeoff *within* states, not just between states.

B. The Specifics

The major result of the model is the tradeoff between economies of scale and heterogeneity, given by equation (5). We take equation (5) seriously, but we want to test for more complex relationships than we allowed in our consciously simplified model. Thus, we test *multiple* dimensions of population heterogeneity, we do not use the exact functional form of equation (5) since the exact form depends on restrictions that we imposed for the sake of clarity.

Our basic estimating equation is a linearized version of equation (5):

$$N_{ij} = \max [\, 1,\; R(\, \beta_1 T_{ij} + \boldsymbol{g}_{ij}\beta_2 + \boldsymbol{h}_{ij}\beta_3 + \bar{\boldsymbol{k}}_{ij}\beta_4 + \boldsymbol{I}_j\beta_5 + \epsilon_{ij})] \,. \tag{6}$$

[13]

Recall that we use counties as our "areas" because they are stable. Thus, an observation in equation (6) is a county i in state j. We have measures of the number of jurisdictions in a county (N_{ij}) and the population of a county (T_{ij}). We proxy dispersion in location with measures of land area and population density. We proxy heterogeneity in preferences with indices of racial, ethnic, income, and religious heterogeneity. In equation (6), the proxies for heterogeneity in location and preferences are represented by the vector $\boldsymbol{h}_{ij}$.[14] We use measures of natural boundaries (rivers and streams) and local demographics (the share of the population over age 65, with college education, and so on) to proxy for fixed costs, which are determined by local geography and the structure of local politics. For instance, we know that areas with more natural boundaries such as streams had more local jurisdictions initially, all else equal.[15] In equation (6), the proxies for fixed costs are represented by the vector $\bar{\boldsymbol{k}}_{ij}$. Fixed costs are also represented by

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[13] We did consider estimating non-linear versions of equation (5). A log-log specification cannot be estimated because we need additive state effects. Nonlinear least squares combined with interval estimation (see below) proved to be impractical. The state effects must be additive (not multiplicative) because states that, say, created few initial jurisdictions did so by setting the local jurisdictions per county equal to, say, three, not equal to, say, 80 percent fewer than otherwise.

[14] We do not show both h and a in equation (6) only because it is difficult to find proxies that distinguish between distances between people's location and preferences (h) and the degree to which people dislike distances (a).

[15] See Hoxby (2000).

the vector of state indicator variables, $\boldsymbol{I}_j$. Finally, local demographic variables–especially, mean household income–proxy for the benefit from local public goods, which is represented by the vector $\boldsymbol{g}_{ij}$.

Equation (6) is only our basic estimating equation. As described above, we also estimate panel versions of it, versions in which the heterogeneity variables are interacted with the county's population, and so on.

We use interval estimation because the dependent variable is left-censored (a county must contain at least one school district, zero municipalities, and zero special districts). Interval estimation also accounts for the fact that the number of jurisdictions must be an integer. Interval estimation uses the familiar Tobit assumptions to account for left-censoring, and assumes that non-integer latent values of the dependent variable are rounded to the nearest integer. We obtained similar results from alternative econometric methods of dealing with the left-censoring and integer nature of the data.[16]

IV. Data

We consider three types of jurisdictions: school districts, municipalities, and special districts. We also consider school attendance areas within districts. For the most part, our variables are measured at the county level. Our dependent variables are the numbers of jurisdictions (of a given type) in a county.

Table 1 lists our variables and their sources. The only variables that are not

[16] See Breen (1996) or Maddala (1986) for a description of interval estimation. We found that it was especially important to account for left-censoring and for integers below ten. We did not, however, find that the results were sensitive to the exact method that we used to account for these phenomena. For instance, the results are not sensitive to whether the data are treated as count data.

straightforward are the indices of heterogeneity. We use the Gini coefficient to measure income heterogeneity. We define an index of racial heterogeneity to be the probability that two randomly drawn individuals in a county belong to different races, where the races are the five categories used in the 1990 Census of Population. Formally:

$$Racial\ Heterogeneity\ Index_{ij} = 1 - \sum_{race=white}^{Hispanic} (share_{ij}^{race})^2 , \tag{7}$$

where *race={white non-Hispanic, black non-Hispanic, Asian and Pacific Islander, Native American, Hispanic}* and $share_{ij}^{race}$ denotes the share of the population in county i in state j who identify themselves as a given race. We define analogous indices of ethnic heterogeneity within the white and Hispanic populations of the United States. (Ethnic groups within the black, Asian, and Native American populations are too small to be useable.) Specifically, we define an index of white (Hispanic) ethnic heterogeneity as the probability that two randomly drawn white (Hispanic) individuals in a county belong to different primary ancestry groups.[17] We aggregate some ancestry groups within the white and Hispanic populations based on language and geographic proximity of the mother countries. For instance, the English and Scottish are aggregated into the British. Finally, we define analogous indices of religious heterogeneity using data on adherence to 17 major Judeo-Christian denominations.[18]

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[17] Individuals are classified by their primary ancestry. We use the following ancestry/ethnic groups for whites: British, Irish, French, Italian, German, Greek, Portuguese, Swiss/Austrian, Benelux (Belgian, Dutch, Luxembourgian), Scandinavian, Russian/Ukrainian, Hungarian, Polish, other Eastern European, Arab, and other white. We use the following ancestry/ethnic groups for Hispanics: Mexican, Cuban, Puerto Rican, South American, and other Central American.

[18] Baptist, Catholic, Christian Scientist, Eastern/Byzantine Rite Catholic, Congregationalist/related Reformed Christian, Episcopalian, Friends, Jewish, Lutheran, Mennonite/Amish, Methodist, Mormon, Orthodox, Presbyterian, Seventh Day Adventists,

Because there is no one best way to measure heterogeneity, we experimented with other indices than the ones described above. We found that alternative indices–such as the Theil index of income heterogeneity–tended to produce similar results, so we do not think that our particular choice of heterogeneity measures is crucial. In particular, we tried replacing the racial heterogeneity index with separate percent black and percent Hispanic variables. We found that percent black and percent Hispanic (which are the major sources of variation in the racial heterogeneity index) both matter and that their effects are sufficiently similar that we lose little information by using a single index of racial heterogeneity.

Our 1990 demographic data are mainly from the Census of Population. The exception is the data on religious adherence, which are from the 1990 Survey of Churches and Church Membership. Our 1990 data on school districts and schools come from the School District Data Book, which combines administrative data from the United States Department of Education with a school district-level tabulation of the 1990 Census of Population.

Our 1992 municipality and special district data come from the Census of Governments, which contains the number of municipal governments and special districts in each county. Municipalities are general purpose governments; they include cities and most towns, boroughs, and villages.[19] Special district governments are units that have substantial administrative and fiscal independence from general-purpose local governments. Most special districts perform a

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Unitarian/Universalist, miscellaneous conservative, evangelical Christian.

[19] According to the Bureau of the Census, municipalities are "political subdivisions within which a municipal corporation has been established to provide general local government for a specific population concentration in a defined area."

single function or a very limited number of functions.[20] Examples include fire protection, housing development, water supply, drainage, and flood control. It is worth noting that the procedures for creating a special district are considerably less demanding than those for creating a municipality or school district.

For panel analysis, we chose 1960 as the year to compare with 1990. A period of 30 years is sufficient for jurisdictions to have changed, and it is possible to get data from 1960 that corresponds well to our 1990 data. We use data from 1960 Census of Population, the 1962 Census of Governments (which includes data on school districts), and the 1950 Survey of Churches and Church Membership (there is no 1960 church membership survey). The 1960 data do have limitations. In 1960, the white, black, and Native American racial groups were similarly defined, but only people of Japanese, Chinese, or Filipino descent were classified as Asians. Asians of other ancestries were often classified as "other race," and we know their ancestry only if there they were foreign-born. Only Hispanics who were foreign-born can be classified as Hispanic. So, racial heterogeneity indices for 1960 under-represent heterogeneity generated by Hispanics and slightly under-represent heterogeneity generated by Asians.[21]

V. School Districts and School Attendance Areas

A. Basic Results

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[20] Of the 31,555 special districts reported in 1992, 92 percent performed a single function. School districts are not included in special districts.

[21] In addition, only one measure of educational attainment is available (rather than two). It is the percent of adult population with at least 12 years of schooling. Some of the 1960 industries are more aggregated—for instance, wholesale and retail trade are combined into one trade industry in 1960. In addition, the income categories for calculating the Gini coefficients are more aggregated. We do not have administrative data *within* school districts for 1960, so all of the panel analysis is at the county level.

Table 2 displays our basic results on the number of school districts in each county. The table is structured so that the two left-hand columns use heterogeneity indices based upon the entire population of each county, while the remaining columns use heterogeneity indices based on the school aged population. The latter is important because it is determines whom a student actually meets at school.[22] The four left-hand columns include our parsimonious set of variables—that is, the variables that the model clearly requires. The two right-hand columns include additional variables such as land area and some variables that are potential proxies for g.[23] Finally, half of the columns include the racial heterogeneity index, a measure of income heterogeneity, and the religious heterogeneity index. The other half of the columns also include the white and Hispanic ethnic heterogeneity indices.

The measure of racial heterogeneity has a statistically significant effect on the number of school districts (the p values range from 0.01 to 0.07). The counties with racial heterogeneity at the 99th percentile have indices that are 0.7 higher than the counties with racial heterogeneity at the first percentile. Thus, the coefficient in the left-hand column implies that a county with near maximum racial heterogeneity has 1.8 more districts ($2.509 \cdot 0.7$) than an otherwise similar county with near minimum racial heterogeneity. The coefficient in the column that is third from the left implies that the county with near maximum heterogeneity of its *school-aged* population

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[22] The composition of a county's school-aged children may differ from that of its entire population if the county systematically attracts or repels families with school aged children or has a composition that is shifting over time. For instance, very urban and very rural counties tend to repel families with school-aged children, presumably because amenities for children are low.

[23] Land area is the interaction between population and population density. Interpreting the partial effects of population density is difficult when land area and population are also in the equation. As a convenience to readers, we therefore exclude land area from the left-hand columns.

has 2.5 more districts (3.506·0.7) than the county with near minimum heterogeneity of its *school-aged* population. Although the point estimates for the entire and school-aged population are not statistically significantly different, they nevertheless provide suggestive evidence that racial heterogeneity among school-aged children has a stronger effect than racial heterogeneity in the entire population. That is, it appears that some adults prefer not to have their children share a school with children of other races, above and beyond their willingness to choose public goods jointly with adults of other races.

The counties at the 99th and first percentiles of white ethnic heterogeneity have a 0.8 difference in their indices, so the coefficient in the second column implies that the county with near maximum white ethnic heterogeneity has 3.0 more districts (3.829·0.8) than the county with near minimum heterogeneity. The corresponding number is 4.0 (more districts) for white ethnic heterogeneity number among school-aged children. Hispanic ethnic heterogeneity is much less powerful.[24]

Our measure of income inequality (the Gini coefficient) has a positive effect on the number of districts if we control for mean income, adult educational attainment, and some other demographic variables. For instance, the difference between counties with Gini coefficients at the 99th and first percentile is 0.15, so the coefficients in the two right-hand columns suggest that a county with near maximum income inequality has 2.2 more districts that a county with near minimum income inequality. The estimated effect of the Gini coefficient is, however, very sensitive to the inclusion or exclusion of demographic variables, particularly the mean income of

[24] The counties with the observed minimum and maximum Hispanic ethnic heterogeneity have a 0.7 difference in their indices, so the coefficients in the second and fourth columns suggest that the difference between the counties with minimum and maximum Hispanic ethnic heterogeneity is about 0.7 school districts.

the county. The effect of the Gini coefficient is estimated to be *negative* and statistically significant in the first four columns of the table, which show results of the parsimonious specification. We tried other measures of income inequality, such as the log 90- log 10 difference (the difference between the log of income at the 90th percentile and the log of income at the 10th percentile), the log 80-log 20 difference, and the standardized Theil index. We were unable to find a measure of income inequality that produced results that were more informative than the results produced by the Gini coefficient.[25]

The index of religious heterogeneity is never statistically significantly different from zero. However, the coefficient on religious heterogeneity falls whenever white ethnic heterogeneity is included in the regression. This suggests that observed differences in preferences among denominations may be largely the result of ethnic differences. In other words, many people choose their denomination based on their ethnicity.

Looking at the other variables for which the model has predictions, we note that population has strong, positive relationship with the number of school districts in a county. For instance, there are 0.6 more districts for every additional 10,000 school-aged children. Also, counties with more streams have more districts, since streams affected how a county was initially divided into districts. The coefficient on population density is consistently negative and statistically significant, which is surprising if one thinks of it as a proxy for households' diffuse locations. When, however, we add the land area variable, another proxy for diffuse location, the fifth and sixth columns, the coefficient on land area is positive and significant. For example, the

[25] For example, the coefficients (standard errors) on the log 90-log 10 difference for equations like those in Table 2 are 0.292 (0.495), 0.333 (0.504), 0.189 (0.494), 0.450 (0.516), 0.632 (0.496), and 0.704 (0.519).

estimates in the fifth column suggest that if there two counties with 30,000 people and the first had 3000 square miles and the second had 30 square miles, the first county would have approximately one more district than the second. If there were a third county with 3000 square miles and a population of only 10,000, it would have about 0.5 fewer districts than the first county.

The remaining demographic variables are either proxies for g (indicators of how much people desire the local public good) or variables that are intended to reduce the possibility of omitted variables bias. Mean household income is positively associated with the number of school districts. Our interpretation is that higher income families are willing to pay the extra cost associated with having more districts in order to have districts that are more local. Two variables, the share of adults with at least a high school education and the share of the population aged 65 or older, are insignificant. The share of adults with at least college education has a statistically significant but small negative effect. This variable is highly correlated with mean household income so its negative coefficient does not disturb us excessively. Finally, the state fixed effects are *highly* significant statistically.

We performed a number of checks to confirm that the results presented in Table 2 were robust to reasonable variations in the specification. In addition to the checks we have already discussed, we (1) included higher powers of population and land area, (2) included more interactions between powers of population and powers of land area, (3) used a log-log specification, (4) included only metropolitan counties, (5) excluded outliers.

B. Size and heterogeneity

The pattern of the effects of heterogeneity may reveal whether *economies of scale* are really what is traded off against heterogeneity. In order to investigate the pattern, we ran regressions like those in Table 2, except that we included indicator variables for the 10 deciles of the distribution of county population and interactions between these indicator variables and our measures of population heterogeneity. In Figures 1 and 2, we plot the point estimates of the coefficients on the population heterogeneity variables against the size of the county. Figure 1 clearly shows an inverted U pattern for the coefficient on racial heterogeneity. The effect of racial heterogeneity on the number of school districts peaks for counties in the seventh decile (population between 30,707 and 42,613). The effect of racial heterogeneity is not statistically significantly different from zero in the first, second, third, and tenth deciles (county population below 16,549 and above 149,838). This pattern suggests that economies of scale are the dominant factor in counties with small populations so that people tolerate a range of levels of racial heterogeneity; that heterogeneity affects jurisdictional structure in counties with medium-sized populations; and that counties with very large populations have an excess supply of jurisdictions (for the purpose of dealing with racial heterogeneity).

Figure 2 shows that the coefficients on the other heterogeneity variables increase for the first few deciles and then plateau. Again, small counties appear to be dominated by economies of scale; but even very populous counties are under pressure to have more districts if they have ethnic, income, or religious heterogeneity.

C. Within-District Results

Increasing the number of districts is costly. A demand for separation may be partially satisfied by increasing the number of school attendance areas. One way to test this hypothesis is to run regressions that are like those in Table 2, *except* that the dependent variable is the number of school attendance areas in the county instead of the number of districts. When we do this, we obtain results that are very similar to those in Table 2.[26]

A more interesting test comes from estimating equations like those in Table 2, *except* that the observations are the 14,794 school districts of the United States. These within-district results are shown in Table 3. All of the explanatory variables in Table 3 are measured at the district level.[27] We find that racial, ethnic, and income heterogeneity within a district are strong predictors of the number of school attendance areas within the district, even after we have accounted for the effect of population, land area, demographic variables, and state indicator variables. The districts with racial heterogeneity at the 99th and first percentiles have a 0.7 difference in their indices, so the coefficient in the left-hand column implies that a district with near maximum racial heterogeneity has 4.0 more school attendance areas ($5.736 \cdot 0.7$) than district with near minimum heterogeneity has. When we control for the full set of demographic variables and base the heterogeneity indices on school-aged children (the right-hand column), we estimate that a district with near maximum racial heterogeneity has 1.6 more school attendance areas than a district with near minimum racial heterogeneity.

The coefficients on white ethnic heterogeneity imply that a district with near maximum white ethnic heterogeneity has 1.5 to 2.9 more school attendance areas than a district with near minimum heterogeneity. The third row of Table 3 indicates that a district with near maximum Hispanic ethnic heterogeneity has between 1.9 and 2.8 more school attendance areas than a district with near minimum. The Gini coefficient is consistently positive and significant. Districts with near-maximum income inequality have between 1.8 and 4.3 more school

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[26] These results are available from the authors.

[27] We could not include the two stream variables and the religious heterogeneity variable because these variables are not available at the district level.

attendance areas than districts with near-minimum income inequality. The other control variables have coefficients that are consistent with our priors.[28]

In short, it appears that not only racial heterogeneity, but also ethnic and income heterogeneity have important effects on the number of school attendance areas *within* a district. This result differs somewhat from the results shown in Table 2, which suggests that racial heterogeneity affects districting but that Hispanic ethnic and income heterogeneity have little or no effect. We suspect that differences in preferences and/or unwillingness to share local public goods along racial lines are significant enough to affect districting. It is much less expensive to change school attendance areas than to change districts, however, so pressures from ethnic and income heterogeneity may be sufficient to affect attendance areas even when they are insufficient to affect districting.

D. Changes Over Time in the Number of School Districts

We now examine changes in the number of school districts between 1960 and 1990. Over this period, *increases* in the number of school districts in a county were extremely rare. Consolidations and secessions are legally easy only when they benefit both potential jurisdictions. Thus, many districts can find a district to be a partner and share fixed costs, but few parts of districts that would want to secede can secede, since secessions would usually hurt at least a substantial minority of the population of the area that would be seceded from. What we mainly test, therefore, is whether consolidation was slower in counties that were more

[28] For instance, the size of the school aged population has a strongly significant, positive effect. Districts whose populations are disproportionately elderly have fewer schools. Similarly, districts whose households have disproportionately high incomes have fewer schools because well-off households who intend to send their children to private schools are disproportionately attracted to districts with a large supply of private schooling.

heterogeneous.

There are a few ways to use panel data from 1960 and 1990. First, one might question whether counties that appeared to have "too many" districts in 1960 (based on their characteristics then) experienced more consolidation between 1960 and 1990. The answer to this question is a resounding "yes." We ran the regressions shown in Table 2 with 1960 cross-section data and obtained residuals. We then regressed each county's change in its number of districts between 1960 to 1990 on the residuals. We obtained coefficients of about -0.74 with p-values less than 0.001. In other words, for each "extra" district that a county had in 1960, it was likely to lose about 0.7 districts between 1960 and 1990.[29]

A second way of using panel data is shown in Table 4, which shows estimates of the effect of 1960 county characteristics on the change in the number of districts between 1960 and 1990. Specifically, the left-hand panel of the table shows the results of interval regressions where the dependent variable is the change in the number of districts between 1960 and 1990 and the independent variables are 1960 values of the explanatory variables from Tables 2 through 4. The estimates shown in this panel are *underestimates* of the effect of 1960 population characteristics, since the number of districts in 1960 would have already incorporated much of the pressure from heterogeneity in the population. The estimates are likely to be biased *against* finding effects of 1960 population heterogeneity.

Note that this specification tests whether jurisdictional structure responds to population heterogeneity or whether heterogeneous populations seek out areas with optimal jurisdictional

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[29] The change in the number of districts is a left-censored variable because no county could end up with fewer than one district. We use interval regression to account for this censoring, and we also use interval regression to account for the censoring in the 1960 versions of the regressions in Table 2.

structure. Only the former phenomenon will show up in the results for this specification.

Consider the results shown in the left-hand panel of Table 4. The coefficient on the 1960 racial heterogeneity is 3.3 or 4.7, depending on whether we control for changes in white and Hispanic ethnic heterogeneity. This implies that counties with near minimum racial heterogeneity lost 1.7 to 2.4 more districts between 1960 and 1990 than counties with near maximum racial heterogeneity. White and Hispanic ethnic heterogeneity in 1960 do not have statistically significant effects on the change in districts between 1960 and 1990. This is not surprising for Hispanic ethnic heterogeneity, which does not have a statistically significant effect in the 1990 cross-section (Table 2) or the 1960 cross-section (not shown). White ethnic heterogeneity does, however, have statistically significant effect in both the 1990 cross-section (Table 2) and 1960 cross-section (not shown). This combination of evidence suggests that white ethnic individuals quickly become "Americanized," so that only white ethnic heterogeneity of recent origin (that is, generated by recent immigration a few decades ago) generates resistance to consolidation.

The 1960 levels of the Gini coefficient and religious heterogeneity do not affect the change in districts from 1960 to 1990. The remaining coefficients shown in the left-hand panel of Table 4 are generally in accord with the parallel coefficients for the 1990 cross-section.

Another way to use the panel data is to examine the effects of *changes* in the population of a county between 1960 and 1990 on *changes* in the number of jurisdictions. The benefit of such estimation is that many idiosyncratic qualities of counties are no longer omitted variables. They are relatively fixed over time and drop out, so this specification is a good test for coincidental correlation between heterogeneity and a large number of jurisdictions.

The first three rows of the right-hand side of Table 4 suggest that counties that experienced increasing racial and/or ethnic heterogeneity between 1960 and 1990 were more likely to resist district consolidation over that period. The coefficient on the change in racial heterogeneity is 18.6 or 19.7, depending on whether we control for changes in ethnic heterogeneity. This implies that difference a county that experienced a near maximum increase in racial heterogeneity lost 11.4 to 12.1 *fewer* districts between 1960 and 1990 than a county that experienced a near minimum increase.

A county that experienced a near maximum increase in white ethnic heterogeneity lost 7.2 fewer districts between 1960 and 1990 than a county that experienced a near minimum increase. If we combine this result with the other evidence on white ethnic heterogeneity (from Table 2 and the left-hand panel of Table 4), we infer that white ethnic heterogeneity generated by immigration produces resistance to district consolidation around the time of the immigration, while white ethnic heterogeneity generated by non-recent immigration does not.

The change in Hispanic ethnic heterogeneity between 1960 and 1990 also affects the consolidation of districts. A county that experienced a near maximum increases in Hispanic ethnic heterogeneity lost 2.7 fewer districts between 1960 and 1990 than one with a near minimum increase.

The coefficient on the change in income heterogeneity is insignificantly different from zero. The coefficient on the change in religious heterogeneity has an unexpected negative sign. We do not make too much of this because we suspect that the effect of a change in white ethnic heterogeneity is overstated and that the change in religious heterogeneity is picking up some of the overstatement. The poor measurement of white ethnic heterogeneity in 1960 (the ancestry of native-born whites is not recorded) means that religious heterogeneity in 1960 is going to pick up white ethnic heterogeneity.

The remaining coefficients in the right-hand panel of Table 4 have reasonable signs and magnitudes. In particular, note that counties in which mean income rose faster between 1960 and 1990 were counties that resisted district consolidation.

VI. Municipalities and Special Districts

A. Basic Results

Table 5 reports our basic regressions on municipalities and special districts, and we have organized it in the same way as Table 2. The econometrics and specification are identical to those used for the school district regressions, except that the number of municipalities and districts in a county is censored at zero (not one).[30] For each dependent variable, the first two specifications include only our parsimonious set of controls and the third adds all the additional controls including industry employment shares.

The first row of Table 5 shows that racial heterogeneity in a county is a very strong predictor of both the number of municipalities and the number of special districts. An increase in the racial heterogeneity from near minimum in the sample to near maximum (an increase of about 0.7 in the index) is associated with 1.7 more municipalities and 3.9 more special districts. The stronger effects for special districts may be caused by the fact that the legal requirements for creating special districts are less stringent than those for creating municipal governments.

Hispanic heterogeneity has a significant impact on the number of municipalities in a county, but the estimated effect weakens somewhat when we include the full set of control variables (column 3). We do not find Hispanic heterogeneity to be significantly correlated with

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[30] In our sample, there are 68 counties with no municipal governments and 108 with no special districts.

the number of special districts.

The results for white heterogeneity are less robust. We find some evidence that white heterogeneity is important for the number of special districts (p-value of 0.09 in the full specification). The estimated coefficient is not, however, large in magnitude: a county with white heterogeneity at the 99th percentile has just about 2 more special districts than one with white heterogeneity at the 1st percentile. The estimated coefficient drops markedly when we control for other county characteristics.

The estimated effect of the Gini coefficient on the number of municipalities is sensitive to the inclusion of the mean income variable in the regressions—a pattern similar to what we found for the school districts results. Once we control for mean income of the county, the estimated effect of the Gini coefficient implies that a county with a near maximum value of the index has 1.6 more municipalities than a county with a near minimum value. Also, when we control for mean income, the Gini coefficient has no statistically significant effect on the number of special districts.[31] Other measures of income inequality, such as the log income ratios, failed to produce robust results for the effect of income inequality on the number of special districts.

We find mixed results for the index of religious heterogeneity, which, overall, does not appear to be a determinant of the number of municipalities and special districts. The results for

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[31] This is not surprising given that special districts often provide services which are financed by user-fees (as opposed to generalized taxation) and hence can be a form of targeted public good provision. Consider a public service which can be provided by the municipal government (and financed by general taxes) or by the creation of a separate special district whereby users pay an equal user fee. The latter arrangement is a more regressive taxation scheme, which would eliminate the implicit transfer from the rich to the poor in the provision of the public service and hence would be resisted by the poor. If rising inequality is associated with a bigger fraction of the population which is poor there can be political pressure against the creation of a special district.

the other variables are in the expected direction. Population has a very strong positive relationship with the number of municipalities. Streams and rivers are significant predictors of the number of local governments. Consistent with the school district results the coefficient on population density is negative and that on land area is strongly positive. Mean household income is positively and significantly related to both the numbers of municipalities and special districts. Our interpretation is that, for a given level of preference heterogeneity, richer counties can afford to break up and forego the economies of scale.

Measures of sectoral composition of the economy of the county, such as the industry shares of employment, are strongly significant. Further investigation revealed that these variables may be proxying for the number of private businesses in the county. Perhaps, as Burns (1994) argues, the demand for new governments is more likely to be successfully implemented when there are land developers or businessmen who have a large enough stake in jurisdictional structure to lead a campaign. Indeed, when we control for the number of private non-farm establishments in the county, the variable is highly significant and makes most of the employment share variables insignificant.[32] Finally, the state fixed effects are highly significant.

We performed a number of specification checks to confirm that these results are robust. First, there can be considerable variation by county in how responsibility is shared between the county and lower tiers of governments for the provision of particular public services. Some, but not all, of this variation is captured by state fixed effects. The Census of Governments 1992 (Government Organization) breaks down public services provided by local government into 17

[32] The coefficients on our heterogeneity variables remain, however, virtually unchanged.

categories.[33] For each of these 17 services, we constructed indicator variables for whether each county (i) owned and operated the public service, (ii) owned the service but contracted out for the operation, (iii) neither owned nor operated but contracted out for the provision of the service; and (iii) did not provide the service. We than ran the regressions discussed above including sets of these indicators variables. The coefficients on the heterogeneity measures were robust to this change in the specification.[34] Another issue we examined was the effect of outliers; we found that they did not drive the results.

B. Heterogeneity and County Size

We now explore how the effect of racial heterogeneity on the number of municipalities and special districts varies by the size of the county. As before we split the racial heterogeneity variable across the 10 deciles of the county population. In Figure 3 we plot the estimated coefficient on the heterogeneity variable by the decile of the county population. As the figure shows, the magnitude of effect is very small in small counties and increases with county size. The estimated coefficients for the first 5 deciles however are not statistically different from zero at 5%. The results become stronger with the decile of county population, both in terms of magnitude and statistical significance. The coefficients for the last five deciles are all statistically significant with p-values of .03 and lower. The joint test for equality of all 10 coefficients rejects at p-levels of less than 0.01 for both municipalities and special districts.

We also explored the interaction of the ethnic heterogeneity indices with population size

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[33] There are: Airports, Water Utility, Electric Utility, Gas Utility, Hospitals, Ambulances, Landfills, Resource Recovery (Recycling), Refuse Collection, Streets, Roads & Highways, Libraries, Nursing Homes, Public Transit, Sewerage System, Stadiums and Convention Centers, Fire Protection, and Industrial Development.

[34] The point estimates changed slightly, but the pattern of signs and significance was the same.

for both municipalities and special districts; the results (available upon request) are similar to those of Figure 3.

C. Changes over Time in the Number of Municipalities and Special Districts

In Table 6, we report the results from regressing the change in the number of municipalities and special districts on the initial values of the heterogeneity variables and other county characteristics. In addition to the right hand side variables from the cross section, we also include the change in the county population between 1960 and 1990 as this is the strongest predictor of the change in the number of local governments and greatly increases the fit of the model. The table is organized in a manner similar to Table 5, with the first two specifications including only our parsimonious set of variables and the third adding the full set of controls.

The first row of the table shows that initial racial heterogeneity is a significant predictor of subsequent change in the number of jurisdictions, although in one case the estimated coefficient is just below the 5% level. The estimated magnitude of the effect of racial heterogeneity is smaller compared to the cross section results. As discussed above in the school district results, the estimates from these regressions are *underestimates* of the effect of 1960 population characteristics—the number of jurisdictions in 1960 would already have incorporated much of the pressure from contemporaneous heterogeneity in the population. Consistent with the cross-section results we find much stronger marginal effects for special districts than for municipalities.[35]

White heterogeneity is an important factor in explaining the change in number of special

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[35] We examined outliers using DFBetas, as discussed above for the cross-section results, and found results similar to those in Table 6. The number of special districts was reported erroneously for two counties; they were excluded from the regressions.

districts, while there is some evidence that Hispanic heterogeneity is important for the increase in municipal governments. The overall pattern is similar to the cross-section results. Income and religion do not have significant effects on the change in the number of municipalities. Consistent with the cross section results, we find some evidence that income inequality is *negatively* correlated with special district creation.[36]

VII. Understanding the Mechanisms by Which Jurisdictions Respond to Heterogeneity

In this paper, we do not attempt to trace fully the political activities by which the tradeoff between economies of scale and heterogeneity is implemented. Nevertheless, we can gain some insight about the mechanisms behind the tradeoff if we briefly investigate the state effects, which have great explanatory power in all of the regressions. Essentially, we want to know whether the state effects are associated with laws regarding the creation, consolidation, and secession of local jurisdictions.

In most states, a supermajority of the voters in *each* (potential) jurisdiction must vote for a consolidation or secession. Getting a supermajority is costly if a minority of voters in either (potential) jurisdiction opposes the change. There is not much variation among states' secession laws, but there is variation among states' consolidation laws. States with "strong annexation" laws allow one jurisdiction to annex another, so long as the annexing jurisdiction gets support from the majority of *its* voters. "Weak" annexation laws provide for a similar process, but require the annexing jurisdiction to provide substantial evidence that the target jurisdiction is

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[36] We also ran regressions of the change in the number of jurisdictions on the change in the value of the right-hand-side variables. The results on racial heterogeneity were consistent with the panel results presented here.

dependent on its (the annexing jurisdiction's) businesses or infrastructure. "Mutual annexation" is a very weak form of annexation in which annexation can be initiated by only one jurisdiction, but must be completed by majority voting in both jurisdictions. We classified states as strong annexation, weak annexation, mutual annexation, or mutual consolidation states.

In addition, state effects may be explained by laws that governed how land was sold and how local jurisdictions were set up when the state was still a territory or colony. In particular, if land was sold so that individual landowners tended to acquire diffuse acreage, then large jurisdictions were set up because they allowed a landowner with diffuse acreage to deal with only one local jurisdiction. Conversely, if land was sold so that individual landowners tended to acquire compact acreage, then small jurisdictions were created. We distinguish between four types of laws: the proprietor system, the direct purchase system, the laws that prevailed in Louisiana Purchase states, and the Homestead Act. Under the proprietor system, proprietors (developers) bought large pieces of land, which they repackaged and sold as compact landholdings to individuals. Under the direct purchase system, an individual could buy acreage directly from the (colonial) government. This system encouraged individuals to find the best land available and produced landholdings that straggled over large areas. Most Louisiana Purchase territories had a system similar to the direct purchase system, although some land was repackaged by developers. Under the Homestead Act, individuals could satisfy the homestead requirement by buying adjacent parcels, thus creating compact holdings.

Our law variables explain about 30 percent of the variation in the state fixed effects estimated in Table 2. (Fixed effects from any specification in Table 2 or Table 5 work similarly). For instance, we found that counties located in states with strong, weak, and mutual annexation laws have, respectively, 2.1 fewer districts, 1.7 fewer districts, and 0.2 fewer districts than counties in states with mutual consolidation laws. We found that proprietor system and Homestead Act states had, respectively, 10.7 and 7.7 more districts per county than Louisiana Purchase states.[37] The effect of the direct purchase laws was not statistically significantly different from that of Louisiana purchase laws.

In short, we have some idea of how local jurisdictional structure responds to heterogeneity. States started with different "typical" numbers of local jurisdictions in a county because of different geography and different initial laws; heterogeneity created pressure for secession or (more often) for resistance to consolidation; the incidence of actual secessions and consolidations varied with the cost of these activities.

VIII. Conclusions

The tradeoff between economies of scale and heterogeneity is an important determinant of the number and size of local political jurisdictions in the United States. Racial heterogeneity consistently has a significant positive effect on the number of local jurisdictions. That is, there is strong evidence that people are willing to sacrifice economies of scale in order to avoid racial heterogeneity in their local jurisdiction. We find weaker evidence of a tradeoff between white ethnic heterogeneity and economies of scale, and the results suggest that white ethnic heterogeneity matters only if it is generated by recent immigration. Some of the evidence supports the existence of tradeoff between income heterogeneity and economies of scale, but the tradeoff is smaller in magnitude and less robust (to variation in the specification) than the tradeoff with racial heterogeneity. We find no evidence of a tradeoff between religious

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[37] All of the effects described thus far in this paragraph are statistically significantly different from zero at the five percent level.

heterogeneity and economies of scale and partial evidence of one between Hispanic ethnic heterogeneity and economies of scale. In the case of school districts and school attendance areas, heterogeneity of the *school-aged* population is what matters most. This suggests that households not only have preferences that differ along the lines of race, ethnicity, *et cetera*, but that some households prefer not to mix their children with children from other groups.

We provide both cross-section and panel evidence. Since 1960, there has been strong pressure on school districts to consolidate, but we find that less consolidation took place in counties that more diverse racially. We also find that municipalities and special districts were less likely to consolidate and more likely to break up in counties that were more diverse racially.

The effects of heterogeneity form a pattern that supports the notion that economies of scale are key. In counties with small populations, economies of scale are predominant. The gains from increased scale are so great that people tolerate a large amount of heterogeneity in their jurisdiction. In counties with larger populations, heterogeneity has larger effect on local jurisdictional structure. Interestingly, it appears that *dis*economies of scale make very large counties have an excess supply of school districts, from the point of view of handling racial heterogeneity.

Our most striking result is probably the importance of racial heterogeneity relative to income heterogeneity. Most conventional models of local jurisdictions assume that households care *exclusively* about the income of the other residents in their jurisdiction, since income determines who bears the burden of taxes for local public goods. Our work suggests that diverse preferences have at least as important an effect as diverse income and that race and ethnicity are important correlates of preferences.

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Table 1
Descriptive Statistics for Counties

Variable	Mean	Std. Deviation
Number of districts	4.743	6.770
Number of schools	25.781	58.844
Racial heterogeneity based on whole population	0.202	0.179
White ethnic heterogeneity based on whole population	0.729	0.088
Hispanic ethnic heterogeneity based on whole population	0.393	0.197
Racial heterogeneity based on school-aged population	0.230	0.190
White ethnic heterogeneity based on school-aged population	0.698	0.106
Hispanic ethnic heterogeneity based on school-aged population	0.318	0.215
Gini coefficient household income	0.408	0.032
school-aged population (thousands)	17.620	57.700
population (thousands)	79.182	263.813
land area (thousands of square miles)	1.115	3.811
number of larger streams in county	2.579	7.130
number of smaller streams in county (hundreds)	0.706	0.993
mean household income (thousands)	29.389	6.867
percentage of adults with at least high school education	70.622	10.119
percentage of adults with at least college education (16 years)	12.812	6.090
percentage aged 65 or older	14.861	4.420
population density (thousands/square mile)	0.231	1.633
percentage of employment in agriculture	10.061	10.115
percentage of employment in mining and resources	2.625	5.576
percentage of employment in construction	7.129	2.674
percentage of employment in manufacturing	20.827	12.168
percentage of employment in transportation	6.582	2.504
percentage of employment in trade	18.614	3.652
percentage of employment in finance, real estate, insurance	3.847	1.658
percentage of employment in business services	2.713	1.539
percentage of employment in personal services	3.933	2.047
percentage of employment in entertainment	6.527	2.741
percentage of employment in health	2.299	0.814
percentage of employment in education	8.990	3.625
percentage of employment in other professions	3.077	1.201
percentage of employment in public administration	5.068	3.596

Notes: The table shows unweighted descriptive statistics for the data, in which an observation is a county. With the exception of the jurisdiction variables, which are from the Census of Governments, the variables are from the Census of Population and Housing.

Table 2
Effect of Population Heterogeneity on the Number of School *Districts* in a County
dependent variable: number of school districts in a county

	race, ethnicity and population variables based on...					
	entire population			school-aged children		
racial heterogeneity	2.509 (0.964) [0.009]	2.391 (0.976) [0.014]	3.506 (0.873) [0.001]	2.689 (0.906) [0.003]	2.190 (0.890) [0.014]	1.671 (0.926) [0.071]
white ethnic heterogeneity		3.829 (1.667) [0.022]		4.975 (1.419) [0.001]		3.685 (1.494) [0.014]
Hispanic ethnic heterogeneity		1.376 (0.665) [0.039]		1.049 (0.589) [0.075]		0.692 (0.590) [0.241]
Gini coefficient household income	-15.744 (4.415) [0.001]	-15.736 (4.494) [0.001]	-14.947 (4.366) [0.001]	-12.757 (4.556) [0.005]	14.365 (5.539) [0.010]	14.368 (5.839) [0.014]
religious heterogeneity	1.256 (0.920) [0.172]	0.211 (0.974) [0.828]	1.139 (0.921) [0.216]	-0.793 (1.000) [0.428]	-0.976 (0.960) [0.309]	-2.183 (1.022) [0.033]
population (thousands)	0.135 (0.004) [0.001]	0.134 (0.004) [0.001]	0.604 (0.018) [0.001]	0.598 (0.018) [0.001]	0.557 (0.018) [0.001]	0.552 (0.018) [0.001]
population density (hundreds of square miles per person)	-0.012 (0.002) [0.001]	-0.010 (0.003) [0.001]	-0.011 (0.002) [0.001]	-0.009 (0.003) [0.001]	-0.026 (0.004) [0.001]	-0.025 (0.004) [0.001]
number of larger streams	0.085 (0.022) [0.001]	0.077 (0.022) [0.001]	0.085 (0.022) [0.001]	0.072 (0.022) [0.001]	0.032 (0.024) [0.178]	0.021 (0.024) [0.379]
number of smaller streams (hundreds)	0.954 (0.139) [0.001]	0.915 (0.140) [0.001]	0.951 (0.139) [0.001]	0.897 (0.141) [0.001]	0.912 (0.141) [0.001]	0.889 (0.143) [0.001]
land area (thousands of square miles)					0.315 (0.069) [0.001]	0.314 (0.074) [0.001]
mean household income (thousands)					0.302 (0.035) [0.001]	0.300 (0.036) [0.001]
percent of adults with at least high school					0.027 (0.025) [0.286]	0.008 (0.028) [0.763]
percent of adults with at least college					-0.109 (0.037) [0.003]	-0.105 (0.038) [0.006]
percent of population age 65 or older					0.054 (0.031) [0.081]	0.053 (0.033) [0.105]
χ^2: joint significance of industry variables					117.900 [0.001]	101.220 [0.001]
χ^2: joint significance of state indicator variables	1764.640 [0.001]	1654.980 [0.001]	1811.110 [0.001]	1622.220 [0.001]	1727.160 [0.001]	1633.130 [0.001]

See next page for notes.

Notes: Interval regression estimates (including left censoring of dependent variable). Standard errors are in parentheses; p-values are in square brackets (p-values less than 0.001 are listed as "0.001"). An observation is a county. There are 3068 observations in regressions that do not include the Hispanic ethnicity index and 3019 observations in regressions that do. Missing information about the ancestry of the Hispanic population appears to be random. Data are from the School District Data Book and Survey of Churches and Church Membership.

Table 3
Effect of Population Heterogeneity on the Number of Schools *within* a District
dependent variable: number of schools in a district

	race, ethnicity and population variables based on...					
	entire population			school-aged population		
racial heterogeneity	5.736	4.941	5.405	3.433	3.644	2.269
	(0.378)	(0.413)	(0.277)	(0.335)	(0.282)	(0.343)
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
white ethnic heterogeneity		2.082		3.200		1.643
		(0.599)		(0.425)		(0.472)
		[0.001]		[0.001]		[0.001]
Hispanic ethnic heterogeneity		3.945		3.888		2.717
		(0.262)		(0.204)		(0.208)
		[0.001]		[0.001]		[0.001]
Gini coefficient household income	7.087	6.578	7.812	11.384	13.103	15.283
	(1.133)	(1.416)	(0.943)	(1.287)	(1.190)	(1.692)
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
population (thousands)	1.613	1.604	7.954	7.895	7.857	7.814
	(0.005)	(0.005)	(0.020)	(0.021)	(0.019)	(0.021)
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
population density (hundreds of square miles per person)	-0.005	-0.003	-0.003	-0.002	-0.008	-0.007
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	[0.001]	[0.004]	[0.001]	[0.060]	[0.001]	[0.001]
land area (thousands of square miles)					0.566	0.472
					(0.046)	(0.052)
					[0.001]	[0.001]
mean household income (thousands)					-77.734	-85.465
					(7.700)	(9.872)
					[0.001]	[0.001]
percent of adults with at least high school					0.006	-0.001
					(0.006)	(0.009)
					[0.334]	[0.875]
percent of adults with at least college					0.026	0.013
					(0.010)	(0.013)
					[0.007]	[0.316]
percent of population age 65 or older					-0.038	-0.073
					(0.008)	(0.011)
					[0.001]	[0.001]
F-stat: joint significance of industry variables					48.710	30.750
					[0.001]	[0.001]
F-stat: joint significance of state indicator variables	100.680	86.230	126.870	94.700	125.770	96.930
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]

Notes: Interval regression estimates (including left censoring of dependent variable). Standard errors are in parentheses; p-values are in square brackets (p-values less than 0.001 are listed as "0.001"). An observation is a district. There are 14,718 observations in regressions that do not include the Hispanic ethnicity index and 12,265 observations in regressions that do. Missing information about the ancestry of the Hispanic population appears to be random. Data are from the School District Data Book and Survey of Churches and Church Membership.

Table 4
Explaining Changes Over Time in the Number of Districts per County, 1960-1990
dependent variable: number of districts in 1990 - number of districts in 1960

explanatory variables are 1960 levels			explanatory variables are (1990 value - 1960 value)		
racial heterogeneity	3.302	4.733	change in racial heterogeneity	18.562	19.688
	(1.638)	(2.647)		(3.274)	(3.229)
	[0.043]	[0.074]		[0.001]	[0.001]
white ethnic heterogeneity		-0.762	change in white ethnic heterogeneity		7.235
		(1.018)			(0.993)
		[0.454]			[0.001]
Hispanic ethnic heterogeneity		-1.113	change in Hispanic ethnic heterogeneity		2.989
		(1.892)			(1.455)
		[0.588]			[0.040]
Gini coefficient household income	-7.240	-11.306	change in Gini coefficient of household income	-3.649	11.380
	(16.553)	(16.416)		(12.652)	(12.521)
	[0.662]	[0.491]		[0.773]	[0.363]
religious heterogeneity	0.873	1.567	change in religious heterogeneity	-6.940	-3.749
	(2.077)	(2.073)		(2.394)	(2.365)
	[0.674]	[0.450]		[0.004]	[0.113]
population (thousands)	-0.001	-0.001	change in population (thousands)	-0.004	-0.003
	(0.001)	(0.001)		(0.003)	(0.003)
	[0.467]	[0.646]		[0.141]	[0.282]
population density (hundreds of square miles per person)	0.052	0.028	change in population density (hundreds of square miles per person)	0.020	-0.019
	(0.019)	(0.020)		(0.034)	(0.038)
	[0.007]	[0.179]		[0.554]	[0.622]
number of larger streams	0.061	0.075			
	(0.067)	(0.067)			
	[0.365]	[0.262]			
number of smaller streams (hundreds)	0.093	0.325			
	(0.356)	(0.355)			
	[0.793]	[0.360]			
land area (thousands of square miles)	-0.976	-0.985			
	(0.311)	(0.310)			
	[0.002]	[0.001]			
mean household income (thousands)	-0.280	0.111	change in mean household income (thousands)	0.101	0.133
	(0.593)	(0.592)		(0.077)	(0.074)
	[0.637]	[0.851]		[0.188]	[0.073]
percent of adults with at least high school	0.148	0.182	change in percent of adults with at least high school	-0.100	-0.043
	(0.050)	(0.050)		(0.046)	(0.046)
	[0.003]	[0.001]		[0.031]	[0.355]
percent of population age 65 or older	0.021	-0.020	change in percent of population age 65 or older	-0.304	-0.189
	(0.113)	(0.112)		(0.105)	(0.104)
	[0.851]	[0.856]		[0.004]	[0.070]
χ^2: joint significance of industry variables	20.720	19.580	χ^2: joint significance of industry variables	40.310	35.190
	[0.008]	[0.012]		[0.001]	[0.001]
χ^2: joint significance of state indicator variables	1146.84	1136.75			
	[0.001]	[0.001]			

Notes: Interval regression estimates (including left censoring of dependent variable). Standard errors are in parentheses; p-values are in square brackets (p-values less than 0.001 are listed as "0.001"). An observation is a county. There are 3068 observations in regressions that do not include the Hispanic ethnicity index and 3019 observations in regressions that do. Missing information about the ancestry of the Hispanic population appears to be random. Data are from the School District Data Book and Survey of Churches and Church Membership.

Table 5
Effect of Population Heterogeneity on the Number of Municipalities and Special Districts in a County

	dependent variable: Number of Municipalities			Number of Special Districts		
Racial heterogeneity	1.990	1.842	2.362	7.554	7.483	5.611
	(0.779)	(0.790)	(0.870)	(1.521)	(1.540)	(1.709)
	[0.011]	[0.020]	[0.007]	[0.001]	[0.001]	[0.001]
White ethnic heterogeneity		2.413	0.052		5.670	4.908
		(1.375)	(1.468)		(2.699)	(2.894)
		[0.079]	[0.972]		[0.036]	[0.090]
Hispanic heterogeneity		2.212	1.396		1.711	-0.468
		(0.547)	(0.553)		(1.064)	(1.086)
		[0.001]	[0.012]		[0.108]	[0.667]
Gini coefficient, household income	-7.571	-5.794	10.881	-25.939	-24.203	-17.535
	(3.575)	(3.675)	(5.097)	(6.963)	(7.137)	(9.949)
	[0.034]	[0.115]	[0.033]	[0.001]	[0.001]	[0.078]
Religious heterogeneity	1.556	0.540	-1.733	5.405	4.134	0.702
	(0.717)	(0.766)	(0.776)	(1.403)	(1.502)	(1.533)
	[0.030]	[0.480]	[0.026]	[0.001]	[0.006]	[0.647]
Population (thousands)	0.015	0.015	0.014	0.022	0.022	0.018
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Population density (100s of square miles per person)	-0.132	-0.125	-0.163	-0.413	-0.391	-0.474
	(0.028)	(0.030)	(0.047)	(0.055)	(0.057)	(0.090)
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Number of larger streams	0.097	0.081	0.049	0.303	0.287	0.210
	(0.023)	(0.024)	(0.024)	(0.046)	(0.046)	(0.047)
	[0.001]	[0.001]	[0.045]	[0.001]	[0.001]	[0.001]
Number of smaller streams	0.003	0.003	0.004	0.014	0.013	0.013
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
	[0.005]	[0.012]	[0.001]	[0.001]	[0.001]	[0.001]
Land area (thousands of square miles)			0.312			0.731
			(0.087)			(0.171)
			[0.001]			[0.001]
Mean household income (thousands)			0.191			0.148
			(0.039)			(0.076)
			[0.001]			[0.050]
Percent of adults with at least high school			0.038			-0.129
			(0.023)			(0.046)
			[0.105]			[0.005]
Percent of adults with at least college			-0.090			0.101
			(0.041)			(0.080)
			[0.028]			[0.207]
Percent of population age 65 or older			0.124			0.040
			(0.031)			(0.061)
			[0.001]			[0.516]
χ^2: joint significance of industry variables			110.370			105.930
			[0.001]			[0.001]
χ^2: joint significance of state indicator variables	974.510	938.690	760.440	2096.810	1983.380	2025.860
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Number of observations	3018	2969	2969	3017	2968	2968

See next page for notes.

Notes: Interval regression estimates (including left censoring of the dependent variables). Standard errors are in parenthesis; p-values are in square brackets (standard errors and p-values less than 0.001 are listed as "0.001"). An observation is a county. Regressions with the index of Hispanic ethnicity have slightly fewer observations. Missing information about the ancestry of the Hispanic population appears to be random. Data are from the Census of Governments 1992, Census of the Population 1990, and Survey of Churches and Church Membership.

Table 6
Explaining Changes Over Time in the Number of Municipalities and Special Districts, 1960-1990

	dependent variable:					
	Change in Number of Municipalities			Change in Number of Special Districts		
Racial heterogeneity, 1960	0.704 (0.238) [0.003]	0.675 (0.239) [0.005]	0.468 (0.250) [0.062]	5.691 (1.783) [0.001]	5.654 (1.786) [0.002]	5.308 (1.886) [0.005]
White ethnic heterogeneity, 1960		-0.065 (0.105) [0.533]	-0.097 (0.108) [0.370]		2.104 (0.771) [0.006]	2.300 (0.799) [0.004]
Hispanic heterogeneity, 1960		0.330 (0.206) [0.109]	0.296 (0.209) [0.157]		-1.599 (1.512) [0.291]	-1.128 (1.547) [0.466]
Gini coefficient, houseold income, 1960	-1.830 (1.037) [0.078]	-1.398 (1.107) [0.207]	0.266 (1.730) [0.878]	-25.863 (7.783) [0.001]	-21.897 (8.293) [0.008]	-23.842 (12.966) [0.066]
Religious heterogeneity, 1960	0.010 (0.193) [0.958]	-0.001 (0.196) [0.999]	0.198 (0.203) [0.331]	-0.008 (1.439) [0.996]	-0.574 (1.456) [0.694]	0.138 (1.524) [0.928]
Population (thousands), 1960	0.0003 (0.0002) [0.045]	0.0003 (0.0002) [0.063]	0.0003 (0.0002) [0.039]	0.004 (0.001) [0.001]	0.004 (0.001) [0.001]	0.005 (0.001) [0.001]
Population change (thousands), 1990 - 1960	0.0039 (0.0003) [0.001]	0.0039 (0.0003) [0.001]	0.0036 (0.0003) [0.001]	0.037 (0.002) [0.001]	0.037 (0.002) [0.001]	0.037 (0.002) [0.001]
Population density (100s of square miles per person), 1960	-0.037 (0.014) [0.006]	-0.037 (0.014) [0.010]	-0.040 (0.016) [0.014]	-0.147 (0.100) [0.142]	-0.069 (0.105) [0.511]	-0.100 (0.119) [0.402]
Number of larger streams, 1960	-0.001 (0.007) [0.948]	-0.001 (0.007) [0.916]	-0.002 (0.007) [0.785]	0.051 (0.054) [0.347]	0.048 (0.054) [0.370]	0.043 (0.054) [0.429]
Number of smaller streams, 1960	0.0013 (0.0003) [0.001]	0.0012 (0.0003) [0.001]	0.0004 (0.0004) [0.268]	0.013 (0.003) [0.001]	0.013 (0.003) [0.001]	0.011 (0.003) [0.001]
Land area (thousands of square miles), 1960			0.088 (0.032) [0.006]			0.181 (0.247) [0.464]
Median family income (thousands), 1960			-0.059 (0.068) [0.387]			-1.010 (0.506) [0.046]
Percent of adults with at least high school, 1960			-0.012 (0.006) [0.049]			0.051 (0.046) [0.261]
Percent of population age 65 or older, 1960			-0.028 (0.012) [0.016]			-0.124 (0.086) [0.149]
χ^2: joint significance of industry variables			49.900 [0.001]			11.790 [0.225]
χ^2: joint significance of state indicator variables	345.800 [0.001]	345.770 [0.001]	319.660 [0.001]	406.730 [0.001]	403.840 [0.001]	395.250 [0.001]
Number of Observations	2994	2994	2992	2993	2993	2991

See next page for notes.

Notes: Interval regression estimates (including left censoring of the dependent variables). Standard errors are in parenthesis; p-values are in square brackets (standard errors and p-values less than 0.001 are listed as "0.001"). An observation is a county. Data are from the Census of Governments (1992, 1962), Census of the Population (1960), and Survey of Churches and Church Membership.

Figure 1
Pattern of Effects of Racial Heterogeneity
on School Districts

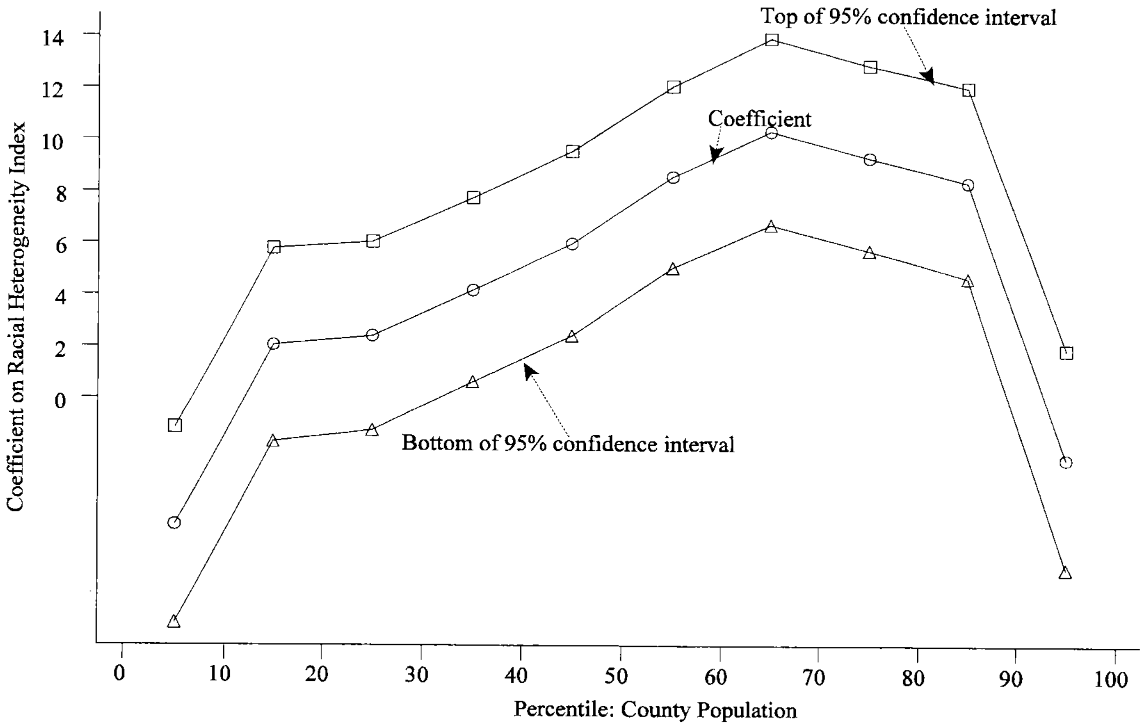

Figure 2
Pattern of Effects of Heterogeneity (in Income, Ethnicity, and Religion) on School Districts

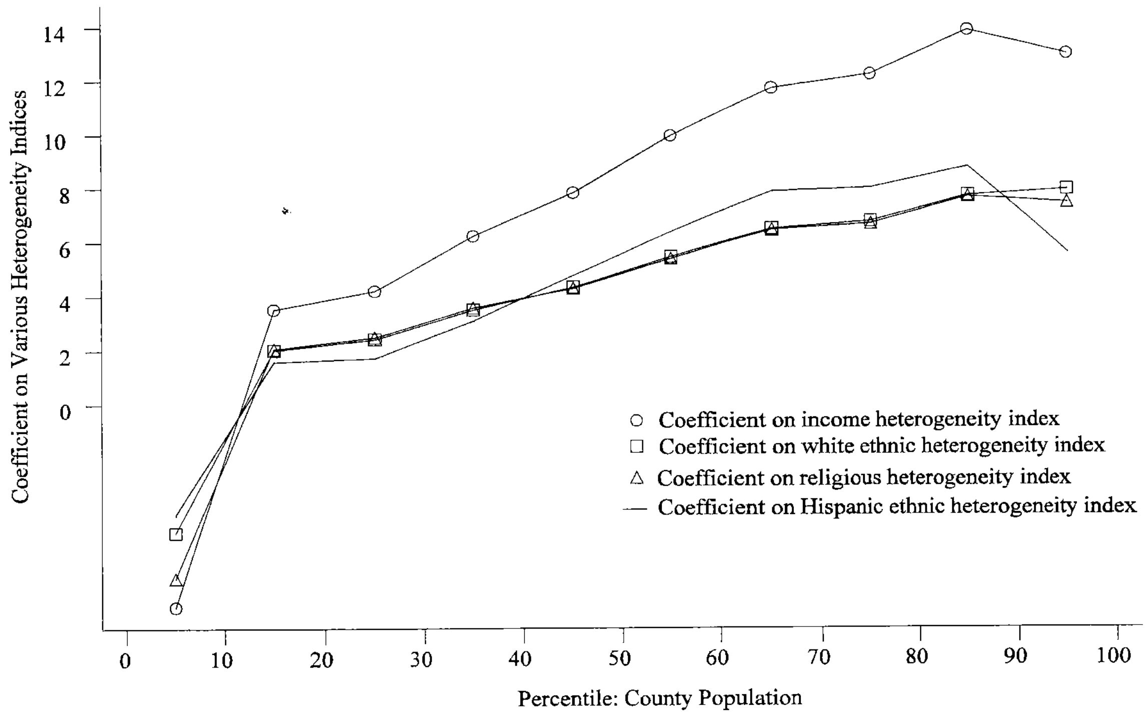

Figure 3
Pattern of Effects of Racial Heterogeneity
on Muncipalities and Special Districts