Land-Use Regulations As Exclusion: A GIS Analysis

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September 30, 2016

1 Abstract

As residential areas in the United States are segregated by race and wealth, concerns have arisen about the sources of and motivations behind that segregation. A strong theme in the zoning literature is that municipalities adopt zoning regulations in order to exclude low-income and minority families. This study presents the first nationwide test for the presence of the exclusionary motive. This study utilizes an existing dataset of land-use regulations in approximately 2,600 U.S. municipalities, and U.S. Census data on the demographics of the areas surrounding those municipalities. Geographic Information System (GIS) methods identify the demographics within a set radius of each municipality. To address potential endogeneity of ethnic settlement patterns, this study employs a geographic instrumental variable. As a further robustness check, this study uses a dataset of all school district desegregation court orders as indicators of a municipality's incentive to use land-use regulations to accomplish segregation. The results offer some evidence of zoning to exclude of low-income households, but largely fail to provide empirical evidence of racially motivated land-use regulation.

2 Introduction and literature review

As residential areas in the United States are segregated by race and wealth ([Iceland and Weinberg, 2002], concerns have arisen about the sources and motivations behind that segregation. The exclusionary aspect of zoning regulations is a poignant issue. A strong theme in the zoning literature is that municipalities adopt zoning regulations in order to exclude low-income and minority families (see, for example, Pendall, 2000, and Massey and Denton, 1993). Fogelson [2007] chronicles instances of racially motivated restrictive zoning, describing fear of outsiders as a motivation for restrictive covenants in the early twentieth century. As explicitly racial zoning was restricted, Pendall [2000] reports that local governments used minimum lot sizes and other land-use regulations to accomplish racial exclusion. Clingermayer [2004] posits that smaller, more homogeneous municipalities adopt more exclusionary zoning, even if local politicians use other rhetorical justifications (see also Ellickson, 1977). In 2015, the U.S. Supreme Court held that motives do not matter; zoning regulations that have an exclusionary effect violate the Fair Housing Act, regardless of the intent of the regulations (Texas Department of Housing and Community Affairs v. The Inclusive Communities Project, Inc., 2014).

Many studies have focused on quantifying the impacts of zoning on housing prices and segregation. In a series of articles, Rothwell and Massey find that higher zoning regulations are associated with greater racial and income segregation in urban areas (2009, 2010). Lens and Monkkonen [2016] concur that land-use regulations contribute to residential segregation between rich and poor in metropolitan areas.

This is the first nationwide study to test for the presence of the exclusionary motive. Several prior analyses have used localized case studies to evaluate the motives behind adoption of zoning. Rolleston [1987] finds evidence of racial exclusion in part of New Jersey, but does not find evidence of exclusion of low-income households. In a study of communities in Connecticut, Bates and Santerre [1994] find support for exclusion of households in poverty. Pogodzinski and Sass [1994] study Santa Clara County, California, and discover the percentage of non-Hispanic whites is positively correlated with higher land-use regulations. Results from Clingermeyer's 1996 study of nine metropolitan areas suggests that greater state legislative oversight reduces exclusionary zoning. Considering the rationale behind exclusion, Cervero and Duncan [2004] and Lynch and Rasmussen [2004] find that fewer low-income households and minority households correlate with higher home values.

Ihlanfeldt [2004] identifies four potential goals of land-use regulation: Reducing negative externalities, establishing equitable contribution to public goods, preserving certain land-use patterns,[1]

and excluding low-income or minority households. This paper explores the impact of surrounding demography on a municipality's tendency to adopt higher land-use regulations.

For the purpose of this study, land-use regulations encompass any barriers to building development. This includes zoning by use, permitting processes, and requirements such as minimum lot sizes.[2] I employ Geographic Information System (GIS) methods to identify the demographics within a set radius of each

[1] Downzoning, a subset of zoning that restricts subdivision of undeveloped land, is largely used to preserve open space, often farm land. In a New Jersey case study, Adelaja et al. [2009] find that adoption of downzoning increases with declining farm population and rising non-farm populations.

[2] The attributes of land-use are adopted from Gyourko et al. [2007], as I use their comprehensive index of land-use regulations in approximately 2,600 municipalities in the United States.

municipality. The exclusionary motive predicts that wealthier and more homogenous municipalities with more nearby low-income or minority populations tend to adopt more land-use restrictions. The results offer some evidence of exclusion of low-income households, but largely fail to provide empirical evidence of racial exclusion.

As robustness checks, I use a geographic instrumental variable to address spatial autocorrelation of ethnic settlement patterns. As a further robustness check, this study uses school district desegregation orders as indicators of a municipality's incentive to use land-use regulations to accomplish segregation.

3 Conceptual model and hypotheses

An assumption behind this research is that adoption of land-use regulation is responsive to local demand. This assumption is consistent with analysis by Fischel [2004]; Ellickson [1977]; and Been et al. [2014]. The desire to exclude is a potential motivation for adopting land-use regulation. The exclusionary motive may be a function both of attitudes, as well as surrounding demographics. The combination of these internal and external factors constitute the exclusionary motive. Without attitudes opposing heterogeneity of incomes or race, a municipality's residents would not pursue exclusion through regulation, including through zoning. Without a perceived threat to the homogeneity of the municipality from surrounding populations, a municipality's residents would have no incentive to pursue exclusionary zoning.

This verbal model gives rise to two hypotheses. First, ceteris paribus, greater internal or external pressure for land-use regulations will lead to stricter regulations adopted. Second, when other methods of exclusion are removed, municipalities with a desire to exclude will substitute into land-use regulations.

4 Data and Methods

4.1 Data sources

The index of land-use regulations is from the Wharton Residential Land Use Regulation Index compiled by Gyourko et al. [2007]. As with any analysis based on survey responses, selection bias may have been a factor. The index authors note that, compared to the average U.S. municipality, responding municipalities have larger populations, a greater share of the elderly and young, higher median levels of education, higher housing values, a lower share of non-Hispanic whites and less owner-occupied housing (Gyourko et al., 2007). The index contains 2,611 observations, and is normalized to have a mean of 0 and standard deviation of 1. Values run from a minimum of -2.2 to a maximum of 4.8.

For this study, I restrict this sample to the contiguous United States, that is, omitting Hawaii and Alaska. The omitted states contain a total of 8 survey respondents. Further, I restrict my sample to the 1,907 municipalities for which all explanatory variables are available. For this subsample, the regulation index has a mean of -0.22 and a standard deviation of 0.87, with a minimum value of -2.15 and a maximum of 3.76.

Demographic data is from the U.S. Census Bureau's American Community Survey. For most data, 5-year averages from 2005-2009 are used. Gini coefficients for metropolitan statistical areas are 3-year averages from 2007-2009. Density data is from 2010. Other than the Gini coefficient, all Census data used is at the level Census-designated place, that is, incorporated municipalities. There are approximately 26,000 of these municipalities in each Census dataset. Geocoded maps are from the U.S. Census Bureau's Topologically Integrated Geographic Encoding and Referencing (TIGER) database, using U.S. Census 2000 boundary definitions.

Data on court-ordered desegregation in U.S. school districts comes from Reardon et al. [2012]. The authors used a variety of sources to construct a comprehensive list of school districts ever under a federal court order to desegregate.

4.2 Reduced-form model

I assume motivations regarding negative externalities and public goods provision are randomly distributed within a state. There may be state-level variation in state or federal contributions to public goods, and certain state-level land-use regulations may be in effect in some states. Employing state fixed effects removes all state-level variation on these and other margins.

The basic specification is:

$$Regulations_i = \alpha + \beta_1 DemographicGap_{ij} + \beta_2 Income_i + \beta_3 Controls_i + \gamma F_i + \epsilon_i.$$

Regulations for municipality i are measured by the Wharton Index. Income for municipality i is the median household income for that Census-designated place. Controls include a vector of control characteristics, including municipality population.[3] F_i indicates states fixed effects. Due to potential differences in state-level restrictions regarding land-use, I include state fixed effects specifications of all regressions, and all fixed effects regressions have standard errors clustered at the state level.[4]

DemographicGap captures the income or ethnic difference between municipality i and the municipalities within a buffer zone j. The buffer zone is a geographic

[3]In a Chicago-area case study, McDonald and McMillen [2004] find that larger suburbs are more likely to utilize growth controls.

[4]Clingermayer [1996] analyzes the presence of state-level legislation curbing local governments' ability to adopt ad-hoc zoning.

zone of a fixed radius around each survey-responding municipality i. The attributes of the buffer zone are the average of all Census municipalities that lie within that radius around the municipality i. The income gap is measured by the Gini coefficient among the municipalities within buffer j.[5]

Ethnic dissimilarity is captured in two ways. First, ethnic difference between each municipality and the surrounding area in the specified buffer zone is measured as:

$$Ethnic_{ij} = 1/n \sum (s_{gi} - s_{gj})^2,$$

where n is the number of ethnic groups g, and s is the share of ethnic group g in municipality i or buffer zone j.

The second measure of ethnic dissimilarity is

$$Whitegap_{ij} = max[percentwhite_i - percentwhite_j, 0],$$

where percentwhite is the percentage white in municipality i or buffer zone j. Whitegap measures the difference in percentage white between a municipality and its neighboring municipalities. This variable is equal to that difference for municipalities that are a higher percentage white than their neighbors, and is zero otherwise. If the exclusion motive primarily affects largely white populations, this measure will capture the exclusion motive more precisely than the Ethnic measure.

Due to the cross-sectional nature of the regulatory index, causal claims are difficult to make.[6] For this reason, I use a variety of robustness checks.

4.3 Geographic instrumental variable

As one robustness check, I use a geographic instrumental variable, following a process similar to that used by Johnson and Koyama [2016]. The location of minority populations may be endogenous to welcoming attitudes, which would also be correlated with lower exclusionary regulations. That is, initial minority populations may settle in places relatively non-hostile toward them, and further influxes of that minority may tend to locate near existing populations of the minority. To address this, I use the demographics of the ring of municipalities between 10 miles and 20 miles from the municipality of interest to instrument for the demographics of the municipalities within the 10-mile buffer around the municipality of interest. The outer ring is set to be sufficiently far from the

[5]The Gini is calculated using the Ginidesc module for Stata (Aliaga et al., 1999).

[6]While some authors have analyzed determinants broad zoning shifts, e.g., from residential to commercial (see Cho et al., 2012, and Munneke, 2005), nationwide data on the tightening or loosening of residential requirements such as minimum lot size does not appear to be available.

core municipality to avoid the neighborhood effects of particular racial groups locating in and close to towns more open to diversity. This instrument is relevant (F=16.5 for Ethnic, F=45.32 for Gini coefficient).

As an example, Figure 2 shows the 10-mile and 20-mile radii around Falls Church, Virginia, a suburb of Washington, D.C. Falls Church, highlighted in yellow, answered the Wharton survey, and is municipality i for this example. The 10-mile buffer zone is denoted in orange, and includes such nearby municipalities as Bethesda, Maryland; Annandale, Virginia; and Washington, D.C. The purple ring includes all municipalities between 10 and 20 miles from Falls Church.[7] It includes such municipalities as Rockville, Maryland; Woodbridge, Virginia; and Centreville, Virginia. The average demographics of the purple ring is used to instrument for the average demographics of the orange buffer zone.[8]

4.4 Court-ordered desegregation

In the decades following *Brown v. Board of Education*, many school districts came under federal court orders to desegregate (Reardon et al., 2011). If the exclusionary motive is a determinant of land-use regulations, we would expect higher land-use regulations in municipalities whose school districts are received court desegregation orders. First, segregated districts may indicate local attitudes in favor of segregation, which are expected to be positively correlated with exclusionary zoning. Second, court desegregation orders removed a potential method of excluding; municipalities barred from school segregation may have substituted into land-use regulation in order to achieve exclusion.

As mentioned above, this study uses the dataset compiled by Reardon et al. [2012] of all districts ever under a court order to desegregate. For this study, a municipality is coded as having a court order equal to 1 if any of its school districts were under such an order, and 0 otherwise.

5 Results

5.1 Neighboring demographics and zoning

In the most basic specification, the difference in ethnic make-up between the municipality and the surrounding area is positively correlated with higher land-use regulations. However, once introducing controls for income and housing density,

[7] Municipalities partially intersecting the buffer zone or outer ring are included; in Figure 1, for example, Washington, D.C. is included in both the buffer zone and the outer ring for calculation purposes.

[8] Demographics of the orange buffer zone and purple outer ring are gathered by averaging the demographics within all the municipalities that at least partially intersect the relevant radius.

the magnitude of the coefficient falls and loses statistical significance. A plot of this regression, with those controls as well as state fixed effects, is shown in Figure 1. As the figure indicates, there is minimal relationship between ethnic difference and land-use regulations, and the relationship is not statistically significant. The effect of log income is statistically significant at the 1 percent level. Housing density and the log of total population are also positively correlated with land-use regulations, also statistically significant at the 1 percent level.

Table 1 shows the relationship between land-use regulations and the ethnic difference between each municipality and the communities within a 10-mile radius of it. The ethnic difference has a strongly positive coefficient of 3.72 when no controls are included, statistically significant at the 1 percent level. However, when the municipality's income is included, the magnitude of the coefficient falls, and is statistically insignificant at the 10 percent level. Due to varying distributions of the explanatory variables, these raw coefficients are difficult to interpret. With the 3.72 coefficient, a one-standard-deviation increase in the ethnic variable would correspond with a 0.07 standard deviation increase in the land-use regulation measure. Using the estimates in column 3 of Table 1, a one-standard deviation in the ethnic difference would correspond to a 0.02 standard deviation increase in regulations; a one-standard-deviation increase in the log income would be associated with a 0.39 standard deviation increase in regulations; the housing density with 0.06 increase in regulations, and the log population a 0.11 increase in regulations. The income variable has the greatest estimated impact on chosen levels of land-use regulation.

For land-use regulations and the ethnic difference between municipality and surrounding municipalities, with state fixed effects, see Table 2. The coefficients are similar to Table 1, except for the estimate of the housing density variable, which is now negative. With state fixed effects, a one-standard-deviation increase in housing density is associated with 0.06-standard deviations lower regulations. This estimate is statistically significant at the 5 percent level.

Table 3 shows the estimated impact of the difference between the gap in percentage white between the municipality and surrounding municipalities. Without controls, the estimate of that gap is positive and statistically significant at the 1 percent level, with a one-standard-deviation increase in the gap corresponding to a 0.06 standard deviation increase in regulation. Introducing controls, the estimate becomes negative, statistically significant at the 10 percent level. Adjusted magnitudes for the controls are similar to Tables 1 and 2, with a one-standard-deviation increase in log income implying a 0.42-standard-deviation increase in regulation ($p<0.01$). With fixed effects, shown in Table 4, the estimated coefficient of the white gap variable is statistically insignificant, although slightly positive, with a 0.015-standard-deviation increase in regulation for a one-standard-deviation increase for the white gap. The control variables remain similar, although slightly smaller in magnitude.

The Gini coefficient among the surrounding municipalities is positively correlated with higher land-use regulations. This is robust to adding controls for income and housing density, as well as to state fixed effects. Table 5 shows the estimated relationship between land-use regulations and the Gini coefficient among surrounding municipalities, and Table 6 shows the same with fixed effects. In both specifications, the Gini variable is positive and statistically significant at the 1 percent level. In Column 1 of Table 5, the estimated coefficient for the Gini without any controls is 2.826. This can be interpreted as a one-standard-deviation increase in the Gini being associated with a land-use regulations being higher by 0.19 standard deviations. With controls, this adjusted estimate falls to 0.06. The estimates in the fixed-effects specification in Table 6 are similar. With controls, the 1.06 coefficient for the Gini variable implies a one-standard-deviation increase in the Gini corresponds to 0.07-standard-deviations higher land-use regulations.

As with the specifications with the Ethnic variable, log income is strongly positively correlated with higher land-use regulations, as is total population. The impact of housing density is again sensitive to fixed effects, with the estimated sign becoming negative with the controls for state.

5.2 Geographic instrumental variable

To address the potential endogeneity of openness and presence of low-income or minority households, I implement a geographic instrumental variable. I use the demographics in the 10-mile to 20-mile ring around each municipality to instrument for the demographics in the 10-mile buffer around the municipality.

In this specification, the difference in ethnic-makeup between the municipality and the surrounding areas is negative, although statistically insignificant, both with and without state fixed effects and standard controls, as shown in Tables 7 and 8. Coefficients for income and total population are similar in magnitude to those estimated in regressions above, and remain statistically significant at the 1 percent level.

Table 9 shows the difference in the percentage white of each municipality and the area within 10 miles of it instrumented with white gap between the municipality and the 10- to 20-mile outer ring, and Table 10 shows the same with state fixed effects. In both, the estimated coefficient for the white gap is positive and statistically significant at the 1 percent level. Once introducing controls, however, the coefficient for the white gap is no longer statistically significant. In the specification without fixed effects, the estimate becomes negative, and it is close to zero in the specification with state fixed effects. Again, income and total population are strongly positively correlated with higher land-use regulations.

With the Gini coefficient, this geographic instrumental variable leads to negative although statistically insignificant estimates in the standard regression, but with state fixed effects all estimates are positive, although again statistically insignificant. These results are shown in Tables 11 and 12. In Table 12, coefficients for income and total population differ from previous specifications; the estimate for income is lower, at 0.548, implying a one-standard-deviation higher income corresponds with land-use regulations 0.24 standard deviations higher. This is still a larger effect than any other explanatory variable, but lower than most estimates in this study, which normally imply standardized coefficients in the range of 0.30 to 0.40. In Table 12 as well, total population is no longer statistically significantly correlated with land-use regulations. This is the only specification in which this is the case.

5.3 Desegregation orders and zoning

As another method of testing for the exclusionary motive, I analyze the impact of school desegregation on land-use regulations. Court-ordered desegregation identifies areas that revealed a preference for segregation through school district policies. These orders also remove one mechanism of achieving segregation, increasing the incentive to use land-use regulations as a substitute policy to exclude. Table 13 shows the relationship between land-use regulations and court-ordered desegregation of schools, with and without state fixed effects. This table shows that regulations tend to be lower in municipalities located in school districts that were ever under court orders to desegregate. The coefficients on the dummy variable for a court order are consistently negative, although statistically insignificant in the fixed-effects specifications. The estimated effects of income, housing density, and population are similar to the previous regressions. Again, the sign on the housing density coefficient becomes negative with state fixed effects.

6 Conclusion

While cross-sectional data limits causal claims, the data do shed light on the exclusionary motive. The results in this paper are consistent with wealthy communities seeking to exclude low-income households. Even with the most basic controls and without clustering standard errors, the data fail to show evidence of land-use regulation adopted in order to exclude minorities.

Income is a robust predictor of land-use regulations, and estimated coefficients are large in magnitude, with a one-standard-deviation increase in log income corresponding with land-use regulations between 0.24 to 0.42 standard deviations higher. This relationship is consistent with non-exclusionary motivations for land-use regulations, such as public goods provision and preservation of lower density.

The robustly positive estimates for the impact of total population on land-use regulations goes against the hypothesis in much of the exclusionary zoning literature that smaller municipalities are more prone to adopt more extensive land-use regulations.

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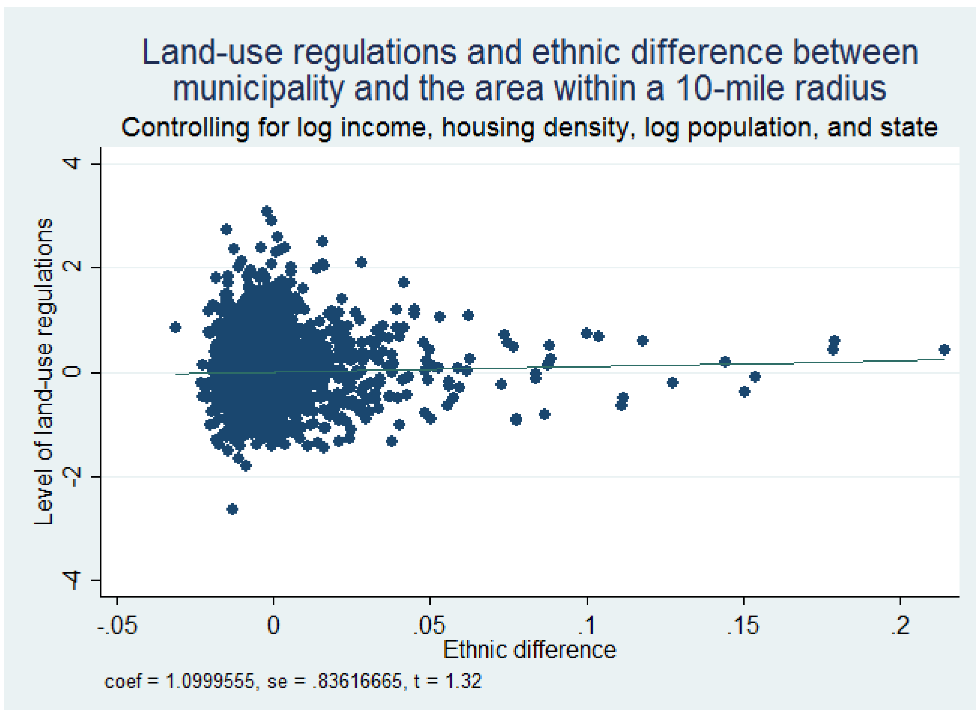

Figure 1: A plot of land-use regulations and the ethnic difference between each municipality and those within a 10-mile radius, with controls for log income, housing density, log population, and state.

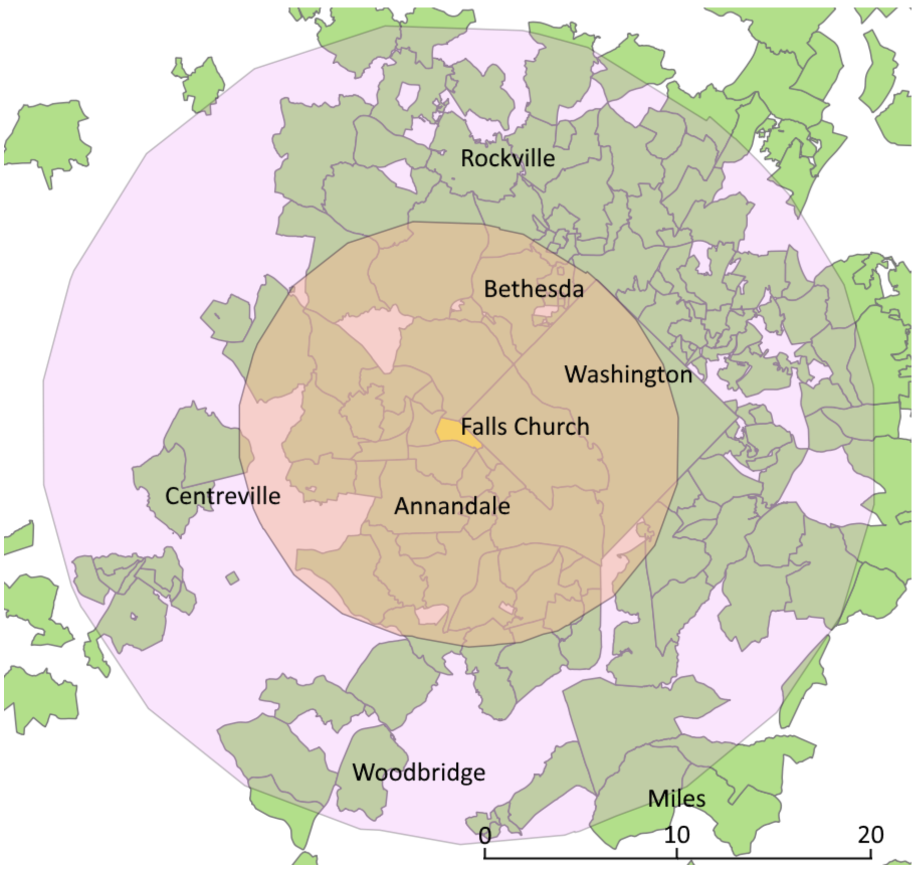

Figure 2: An example of a 10-mile buffer and 10-mile to 20-mile outer ring constructed around a Falls Church, Virginia, a municipality that responded to the land-use survey.

Table 1: Land-use regulations and the ethnic gap between municipality and surrounding municipalities

VARIABLES	(1) Regulations	(2) Regulations	(3) Regulations
Ethnic (10-mile buffer)	3.720***	1.655	1.085
	(1.140)	(1.046)	(1.039)
Log income		0.950***	0.912***
		(0.0483)	(0.0481)
Housing density			4.55e-05***
			(1.63e-05)
Log population			0.0802***
			(0.0152)
Constant	-0.249***	-10.44***	-10.84***
	(0.0218)	(0.519)	(0.520)
Observations	1,928	1,928	1,928
R-squared	0.005	0.172	0.191

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Land-use regulations and the ethnic gap between municipality and surrounding municipalities, with state fixed effects

VARIABLES	(1) Regulations (State FE)	(2) Regulations (State FE)	(3) Regulations (State FE)
Ethnic (10-mile buffer)	3.015***	1.134	1.155
	(1.122)	(0.767)	(0.750)
Log income		0.744***	0.717***
		(0.0831)	(0.0856)
Housing density			-4.45e-05**
			(1.71e-05)
Log population			0.0635***
			(0.0148)
Observations	1,928	1,928	1,928
R-squared	0.005	0.140	0.151
Number of states	48	48	48

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Standard errors clustered by state.

Table 3: Land-use regulations and the gap in percentage white between municipality and surrounding municipalities

VARIABLES	(1) Regulations	(2) Regulations	(3) Regulations
White gap	1.456***	-0.555***	-0.392*
	(0.195)	(0.210)	(0.214)
Log income		1.035***	0.973***
		(0.0562)	(0.0569)
Housing density			5.04e-05***
			(1.64e-05)
Log population			0.0743***
			(0.0156)
Constant	-0.318***	-11.30***	-11.41***
	(0.0236)	(0.597)	(0.591)
Observations	1,928	1,928	1,928
R-squared	0.028	0.174	0.192

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Land-use regulations and the gap in percentage white between municipality and surrounding municipalities, with state fixed effects

VARIABLES	(1) Regulations (State FE)	(2) Regulations (State FE)	(3) Regulations (State FE)
White gap	1.432***	-0.0862	0.132
	(0.228)	(0.228)	(0.249)
Log income		0.764***	0.703***
		(0.0990)	(0.108)
Housing density			-4.43e-05**
			(1.75e-05)
Log population			0.0660***
			(0.0162)
Observations	1,928	1,928	1,928
R-squared	0.039	0.139	0.151
Number of states	48	48	48

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Standard errors clustered by state.

Table 5: Land-use regulations and the Gini coefficient among surrounding municipalities

VARIABLES	(1) Regulations	(2) Regulations	(3) Regulations
Gini	2.826***	1.164***	0.835***
	(0.333)	(0.321)	(0.323)
Log income		0.906***	0.882***
		(0.0500)	(0.0497)
Housing density			4.09e-05**
			(1.64e-05)
Log population			0.0775***
			(0.0153)
Constant	-0.488***	-10.07***	-10.56***
	(0.0372)	(0.530)	(0.533)
Observations	1,928	1,928	1,928
R-squared	0.036	0.177	0.193

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Land-use regulations and the Gini coefficient among surrounding municipalities, with state fixed effects

VARIABLES	(1) Regulations (State FE)	(2) Regulations (State FE)	(3) Regulations (State FE)
Gini	2.494***	1.193***	1.060***
	(0.414)	(0.296)	(0.297)
Log income		0.700***	0.681***
		(0.0795)	(0.0818)
Housing density			-4.62e-05**
			(1.96e-05)
Log population			0.0567***
			(0.0147)
Observations	1,928	1,928	1,928
R-squared	0.035	0.146	0.156
Number of states	48	48	48

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Standard errors clustered by state.

Table 7: Land-use regulations and the ethnic gap, with geographic instrumental variable

VARIABLES	(1) Regulations	(2) Regulations	(3) Regulations
Ethnic (IV)	-6.539	-6.382	-9.922
	(8.755)	(7.940)	(8.299)
Log income		0.987***	0.958***
		(0.0611)	(0.0602)
Housing density			5.68e-05***
			(1.88e-05)
Log population			0.0872***
			(0.0165)
Constant	-0.164**	-10.78***	-11.33***
	(0.0748)	(0.619)	(0.645)
Observations	1,928	1,928	1,928
R-squared		0.147	0.144

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Land-use regulations and the ethnic gap, with geographic instrumental variable and state fixed effects

VARIABLES	(1) Regulations (State FE)	(2) Regulations (State FE)	(3) Regulations (State FE)
Ethnic (IV)	-6.607	-10.84	-10.70
	(11.88)	(11.63)	(12.13)
Log income		0.815***	0.788***
		(0.0829)	(0.0857)
Housing density			-3.10e-05
			(2.12e-05)
Log population			0.0673***
			(0.0144)
Observations	1,928	1,928	1,928
Number of states	48	48	48

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Standard errors clustered by state.

Table 9: Land-use regulations and the gap in percentage white between municipality and surrounding municipalities, with geographic instrumental variable

VARIABLES	(1) Regulations	(2) Regulations	(3) Regulations
White gap (IV)	1.311***	-0.537	-0.136
	(0.408)	(0.488)	(0.525)
Log income		1.032***	0.936***
		(0.0830)	(0.0893)
Housing density			4.79e-05***
			(1.70e-05)
Log population			0.0786***
			(0.0175)
Constant	-0.308***	-11.28***	-11.07***
	(0.0341)	(0.865)	(0.867)
Observations	1,928	1,928	1,928
R-squared	0.028	0.174	0.191

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Land-use regulations and the gap in percentage white between municipality and surrounding municipalities, with geographic instrumental variable and state fixed effects

VARIABLES	(1) Regulations (State FE)	(2) Regulations (State FE)	(3) Regulations (State FE)
White gap (IV)	1.213***	-0.402	0.0305
	(0.343)	(0.449)	(0.491)
Log income		0.812***	0.719***
		(0.0810)	(0.0891)
Housing density			-4.35e-05***
			(1.58e-05)
Log population			0.0644***
			(0.0155)
Observations	1,928	1,928	1,928
Number of states	48	48	48

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Standard errors clustered by state.

Table 11: Land-use regulations and Gini coefficient, with geographic instrumental variable

VARIABLES	(1) Regulations	(2) Regulations	(3) Regulations
Gini (IV)	-2.093	0.418	-0.126
	(2.339)	(1.830)	(1.920)
Log income		0.939***	0.922***
		(0.0946)	(0.0932)
Housing density			4.74e-05**
			(2.08e-05)
Log population			0.0814***
			(0.0171)
Constant	-0.0183	-10.35***	-10.94***
	(0.224)	(0.871)	(0.923)
Observations	1,928	1,928	1,928
R-squared		0.174	0.189

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Land-use regulations and income inequality, with geographic instrumental variable and state fixed effects

VARIABLES	(1) Regulations (State FE)	(2) Regulations (State FE)	(3) Regulations (State FE)
Gini (IV)	4.737	4.807	4.329
	(3.114)	(2.984)	(3.137)
Log income		0.546***	0.548***
		(0.135)	(0.135)
Housing density			-5.53e-05***
			(1.80e-05)
Log population			0.0344
			(0.0253)
Observations	1,928	1,928	1,928
Number of states	48	48	48

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Standard errors clustered by state.

Table 13: Land-use regulations and court-ordered desegregation of schools, with and without state fixed effects

VARIABLES	(1) Regulations	(2) Regulations	(3) Regulations (State FE)	(4) Regulations (State FE)
Desegregation orders	-0.134***	-0.0970**	-0.0276	-0.0388
	(0.0494)	(0.0458)	(0.0601)	(0.0395)
Log income		0.828***		0.659***
		(0.0431)		(0.107)
Housing density		3.65e-05**		-6.37e-05**
		(1.53e-05)		(2.46e-05)
Log population		0.0910***		0.0745***
		(0.0145)		(0.0166)
Constant	-0.163***	-10.02***		
	(0.0201)	(0.468)		
Observations	2,211	2,211	2,211	2,211
R-squared	0.003	0.181	0.000	0.137
Number of states			49	49

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: For Columns (3) and (4), standard errors clustered by state.