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Demographic Divergence and Local School Funding, 1990-2010

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ABSTRACT
As the percentage of nonwhite children grows in the United States, so too does the percentage of elderly adults. This age-dependent racial/ethnic diversity, or "demographic divergence," is causing some communities to be characterized by an increasing social difference between younger and older populations. In this paper, we investigate whether age-dependent racial/ethnic diversity affects support for a local public good that specifically targets youth—public schooling. We have compiled a longitudinal dataset that matches demographic characteristics of school districts to local education funding data from 1990-2010 for all U.S. school districts. The results of this study will shed light on a potentially important consequence of the changing demographic structure of the U.S. population.

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INTRODUCTION

As the percentage of nonwhite children grows in the United States (Lichter 2013), so too does the percentage of elderly adults. This age-dependent racial/ethnic diversity, or demographic divergence, is causing some communities to be characterized by an increasing social difference between younger and older populations. In this paper, we investigate whether age-dependent racial/ethnic diversity affects support for a local public good that specifically targets youth—public schooling. The results of this study will shed light on a potentially important consequence of the changing demographic structure of the U.S. population.

BACKGROUND

A sizable body of research has investigated whether racial/ethnic diversity affects support for public goods. Diversity, it is posited, can make it difficult to reach consensus on how to spend public dollars if there is a difference in preferences for public goods across racial/ethnic groups, in part, due to economic inequality across groups (Habyarimana et al. 2007). Highly cited research by Alesina et al. (1999) has concluded that racial/ethnic diversity depresses support for public goods in U.S. cities. More recent work has concluded that rapid increases in diversity, as opposed to levels of diversity, reduce support for public goods (Hopkins 2017), and that diversity negatively impacts some kinds of public goods, but not others. In particular, Lee et al. (2016) show that ethnic heterogeneity increases support for goods for which there are few affordable substitutes, such as fire protection and public education.

A separate body of research investigates whether an aging population negatively impacts support for public education, a public good that only serves children. In places with larger shares of elderly adults, there may be a reluctance to pay for services that will not be used by the voters themselves either due to a greater salience of other priorities (Chew 1992) or due to a preference to keep taxes low and devote more resources to private, rather than public, consumption (Hopkins 2017). A number of studies find that older residents are less likely to support services that do not directly benefit them (Brunner and Balsdon 20014; Button 1992; Figlio and Fletcher 2012; Poterba 1997), such as public schooling, though theory would suggest that there are many reasons to support education regardless of whether an individual has children or not. Prior research has shown that perceptions of school quality affect property values (Davidoff and Leigh 2008; Figlio and Lucas 2004), making public schooling relevant for all homeowners. And from a structural viewpoint, investing in education may benefit the entire community by providing more opportunities for youth. More broadly, the success of the country's youth is crucial for the future economic health of the nation and the capacity of the government to continue to provide a social safety net for the elderly. Indeed, other research has found that the percentage of residents over the age of 65 does not negatively affect local education funding (Kurban et al. 2105; Corcoran and Evans 2011).

In addition to the conflicting findings in the literature relating to the effects of an aging population and a diverse population on support for public schools, even less is known about the effects of the growing demographic divergence between elderly and youth populations on support for public schooling. An aging population that is increasingly of a different racial and/or ethnic background than the youth population may be even more reluctant to fund services for those youth. This may stem from out-group aversion and racial threat (Key 1939) or a disinclination to support free-riders (Trounstine 2014).

CURRENT STUDY

In this study, we extend prior research on the relationship between demographic change and support for local education systems. More specifically, we ask whether a divergence between the share of the elderly population that is white and the share of the school-age population that is white, affects funding for local schools from 1990 to 2010. In addition to assessing average trends across all school districts in the United States, we will also investigate heterogeneity in the relationship between demographic change and changes in support for local schools along three dimensions: size of the school district, whether the district has experienced rapid changes in racial/ethnic diversity, and whether residents directly vote on school funding. School district size may matter because demographic changes may be more salient, or visible, in smaller jurisdictions. Rapid changes in the demographic composition of a school district may produce a shock that disrupts residents' perceptions of their local community, thereby affecting their support of public education more so than in cases where demographic change is gradual. Finally, we expect the relationship between demographic changes and school funding to be more pronounced in places that hold annual elections to approve school taxes, such as New York state. In these places, residents' preferences may be better reflected in funding decisions than in places where preferences are filtered through elected officials, such as school board members.

DATA AND METHOD

Data

Our analysis requires demographic data for residential populations in U.S. school districts as well as district-level finance data. We obtain demographic data for all U.S. school districts from 1990-2010 using the Education Demographic and Geographic Estimates (EDGE) system, which provides U.S. census (1990 and 2000) and American Community Survey (2008-12 (midpoint of 2010)) data tabulated in school district boundaries (National Center for Education Statistics). We obtain school district finance data from the F-33 files of the Common Core of Data (National Center for Education Statistics). This publicly available dataset provides annual information on local, state, and federal revenues and expenditures for each school district. We have constructed a panel dataset with three time points over this 20-year period. We include in our analysis regular

schools districts[1] that exist in all three time points.[2] In addition, we restrict our sample to districts that had at least 1,000 residents in the school district in all three time points as well as those that enrolled at least 300 students in all three time points. We follow previous studies in dropping school finance outliers from our analysis, mostly to account for data reporting errors (Murray, Evans, and Schwab 1998).[3] We also lose a set of districts for which EDGE data are missing. EDGE data are not available in some cases when populations or subpopulations in tabulated tables are deemed too small by the Census Bureau. Our final stable sample consists of 9,214 school districts in each year.

Measures

Dependent Variable. The dependent variable in our analysis is annual per pupil revenue in the school district from local sources. This represents a measure of local support for public education. Local property taxes are the primary source of local school funding, though in some states, local revenue is derived from secondary sources as well, such as sales tax. In future analyses, we will also consider alternative measures of support for local schools, such as approval of bond measures (noted below).

Independent Variables. The primary independent variable in our analysis, a measure of demographic divergence, is the difference in the percentage of older adults who are non-Hispanic white (ages 65+) and the percentage of school-aged children who are non-Hispanic white (ages 5-17). Larger positive values indicate larger differences in the share of white adults and white children within a school district. We have also estimated models with alternative measures of demographic divergence, such as using all adults 18+ instead of elderly adults. The results are somewhat sensitive to these decisions and we plan to investigate these differences more in future analyses.

We include the following set of control variables that may also affect local support for public education and the age-specific racial composition of a district based on theoretical predictions and prior research: population size (log), median household income, homeownership rate, percent black, income inequality, age composition, state and federal funding for local schools, Republican vote share, percent of the adult population with a bachelor's degree or higher, and

[1] Non-regular districts include those in the juvenile justice system, special education districts, and other non-geographically-based districts.

[2] Some districts emerge in the data, or drop out of the data, after 1990. This is due to school district mergers and splits. One way to deal with this is to impose mergers that occur in later years on earlier years--for example, if two districts merge in 2000, to then treat those separate districts as merged in 1990. For the purposes of this study, doing this is problematic because we are measuring public support for a political entity. Treating two districts that are not actually one political entity as such is incorrect. Prior research using school districts as the unit of analysis over time has reported that dropping school districts that have merged or split is inconsequential (Hall and Hibbel 2017). We follow these prior studies and simply include the set of districts that have remained stable over this time period.

[3] Outliers are defined as districts with local revenue values greater than 150 percent of the 95th percentile in that state-year, or less than 50 percent of the 5th percentile of local revenue values in that state-year.

percent unemployed. In addition, we control for the percentage of the 65+ population that has resided in the same home for more than 21 years. This helps account for concerns related to population selection whereby older individuals may move into school districts with low taxes (a process of reverse causation). All of these variables are tabulated at the school district level, except Republican vote share and age-specific residential longevity in 1990, for which the county is the lowest level of geography available.

Method

We estimate a series of linear regression models with school district and state-year fixed effects to analyze how changes in the demographic composition of school districts affects changes in financial support for local schools. The school district fixed effects control for the many ways in which school districts differ from one another, and results in estimates that can be interpreted as the average within-district association between school funding and the explanatory variables over time. The state-year fixed effects net out state-level changes in school funding over this time period. The regression analyses are weighted by the total residential population.

PRELIMINARY RESULTS

Table 1 presents descriptive statistics for the 9,214 school districts in our balanced panel in 1990 and 2010. The difference in the percentage of adults ages 65+ who are white and the percentage of children ages 5-17 who are white increased from approximately 8 percentage points in 1990 to 15 percentage points in 2010. That is to say that demographic divergence nearly doubled from 1990 to 2010 in U.S. school districts. The descriptive results also show that the share of elderly residents increased over this time period, as did the share of school-aged children declined. The non-white percentage of the population increased substantially, as did the share of the population with a 4-year college degree. Income inequality also increased, on average.

[Table 1 here]

Table 2 presents descriptive statistics for various features of education funding in 1990 and 2010. Notably, total school district revenues and expenditures rose considerably over this 20 year period. Overall per-pupil revenues increased from $8,251 to $12,357 on average (in 2010 dollars), with more of that increase attributable to increases in state and federal sources than to increases in local revenue streams.

[Table 2 here]

Table 3 presents preliminary regression estimates of per pupil local revenue on demographic divergence and other community characteristics. These results suggest that the baseline significant negative relationship between demographic divergence and local per pupil revenues becomes weaker and loses statistical significance once we account for the full set of district characteristics. In models where we measure demographic divergence as the difference between

the total adult population and the child population, the relationship appears to be stronger. In-line with previous research, the results show that school revenues increase as median income, educational attainment, and homeownership rates rise, as well as when income inequality rises. Local revenues are depressed by more state and federal funding, as well as by increasing shares of Republican voters. Results not shown here suggest that district size is an important mediator of the relationship between demographic changes and local school funding, a direction we plan to explore in-depth in the coming months.

[Table 3 here]

FUTURE ANALYSES

As noted above, we plan to conduct several additional analyses. First, we plan to investigate whether the relationship between school funding and demographic changes varies by certain district characteristics. In addition, we are in the process of collecting data on school bond initiatives to capture a more discrete measure of support for local education. In most states, school bonds are proposed for large capital expenses, such as building construction, sports facilities, auditoriums, and technology upgrades. Bond initiatives must be approved by voters and they represent a sharper decision point about educational expenditures than gradual changes in local property taxes, which are arguably somewhat path-dependent. No national dataset exists on local bond elections, but we have identified several states that have high-quality, publicly available data on school bond elections. We intend to incorporate these data into our analyses as an additional dependent variable.

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TABLES

Table 1. Descriptive Statistics for School Districts in Analytic Sample

	1990		2010	
	Mean	SD	Mean	SD
Adult - Child Percent White Difference	8.42	10.74	15.25	12.30
Log Total Population	9.27	1.10	9.45	1.15
Percent Age 65 and Up	13.74	4.72	14.96	4.15
Percent Age 5-17	19.54	3.04	17.80	2.85
Percent Non-White	0.13	0.18	0.21	0.22
Percent Unemployed	6.68	4.52	8.73	3.88
Percent with Bachelors or Higher	15.01	10.09	22.81	13.74
Median HH Income (Thousands, 2010 dollars)	50.11	20.18	54.18	21.41
Percent Homeowner	73.88	10.51	73.99	11.27
Percent of 65+ Population with Residential Tenure>21 Years	32.20	8.82	37.53	12.78
Income Inequality (Gini)	39.84	4.78	41.04	4.61
Republican Vote Share	46.68	8.19	52.63	13.73
N	9214		9214	

Table 2. Descriptive Per-Pupil Fiscal Statistics for School Districts in Analytic Sample (2010 Dollars)

	1990		2010	
	Mean	SD	Mean	SD
Local Revenue	4195	3105	5393	3968
State Revenue	3638	1634	5591	2521
Federal Revenue	417	451	1373	924
Total Revenue	8251	2844	12357	3982
Total Expenditures	8367	3066	12490	4482
N	9214		9214	

Table 3. Estimates from Fixed Effects Regressions of Per Pupil Local Revenues on Demographic Divergence and Community Characteristics

	M1	M2	M3	M4	M5	M6	M7
Elderly Adult - Child Percent White Difference	-12.09 *	-4.09	-7.05	-6.18	-5.90	-7.06	-3.96
	(5.20)	(6.35)	(6.12)	(5.78)	(5.83)	(5.20)	(5.26)
Log Total Population		564.28 ***	-126.82	-56.35	-63.92	-175.23	-155.23
		(125.16)	(133.50)	(145.19)	(145.30)	(131.05)	(131.12)
Percent Age 65 and Up		42.41 ***	58.93 ***	52.27 ***	48.84 ***	24.27 *	24.24 *
		(10.44)	(11.07)	(12.06)	(12.22)	(11.59)	(11.61)
Percent Non-White		-2244.69 ***	16.19	-91.90	-223.96	-45.26	-673.21
		(490.31)	(502.66)	(487.48)	(488.25)	(436.65)	(467.68)
Percent Age 5-17		-60.71 ***	-83.45 ***	-87.33 ***	-87.27 ***	-97.03 ***	-99.10 ***
		(12.86)	(12.69)	(13.10)	(13.08)	(12.17)	(12.14)
Percent Unemployed			13.24 *	13.82 **	12.91 *	11.08 *	9.49
			(5.38)	(5.36)	(5.34)	(5.06)	(5.13)
Percent with Bachelors or Higher			55.46 ***	55.01 ***	51.62 ***	38.53 ***	31.77 ***
			(7.46)	(7.35)	(7.31)	(7.06)	(7.09)
Median HH Income (Thousands, 2010 dollars)			40.92 ***	36.93 ***	40.56 ***	32.98 ***	36.49 ***
			(5.21)	(5.74)	(5.68)	(5.35)	(5.31)
Percent Homeowner				19.53 *	20.36 *	18.67 *	15.37 *
				(7.89)	(7.92)	(7.67)	(7.53)
Percent of 65+ Population with Tenure>21 Years				4.19	4.35	0.47	-0.41
				(2.79)	(2.79)	(2.62)	(2.65)
Income Inequality (Gini)					21.92 ***	20.06 ***	18.30 **
					(6.58)	(6.06)	(5.92)
Per Pupil State Revenue (2010 dollars)						-0.30 ***	-0.29 ***
						(0.02)	(0.02)
Per Pupil Federal Revenue (2010 dollars)						0.01	0.01
						(0.06)	(0.06)
Republican Vote Share							-14.39 ***
							(3.87)
School District Fixed Effects	X	X	X	X	X	X	X
State*Year Fixed Effects	X	X	X	X	X	X	X
Constant	5745.09***	4576.91 ***	5277.14***	5297.91***	5312.44***	5728.92***	5719.10***
	(85.98)	(343.20)	(339.61)	(348.52)	(348.98)	(315.12)	(315.32)
N	27642	27642	27642	27642	27642	27642	27642
R-Squared	0.939	0.941	0.944	0.945	0.945	0.948	0.948

*p<0.05, **p<0.01, ***p<0.001

Note: Robust standard errors are in parentheses; results weighted by total residential population in school district