THE INFLUENCE OF THE ELDERLY ON SCHOOL SPENDING IN A MEDIAN VOTER FRAMEWORK

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Abstract

How do the elderly influence school spending if they are a minority of the population? We estimate the determinants of school spending in a median voter model, comparing four assumptions about how the elderly influence the identity of the median voter. Using a county-level panel, we find that elderly preferences are best characterized by assuming all elderly or all elderly migrants vote with the poor. Having more elderly results in a median voter who is further down the community's income distribution. This median voter is poorer, which lowers preferred school spending, and faces a lower tax price, which raises preferred school spending. The evidence suggests that the income effect is slightly larger than the price effect, so the elderly on net cause a very small drop in spending. Thus the widespread concern about the negative impact of population aging on school funding seems to be misplaced.

1. INTRODUCTION

Families with children benefit from higher spending on public primary and secondary schools for their children. Since the elderly do not enjoy these direct benefits, they may be less willing to support better schools.[1] If so, many observers are deeply concerned about the resulting intergenerational conflict between the elderly and their children's generation as the elderly attempt to block the higher school spending levels that are favored by those with children or those who anticipate having children soon. Geographical variation in the fraction who are elderly creates inequity in school spending. As a result, children growing up in communities that attract a lot of elderly attend inferior schools. Furthermore, the ranks of the elderly nationwide soon will swell as the baby boom cohorts' age and life expectancy continue to rise. Many worry that this will lead to a deterioration of school funding and ultimately an inadequate educational system.

The literature on the effect of the elderly on school spending has tested whether school spending falls as the elderly share in the population rises, holding jurisdictional income and other variables constant. This literature, which is reviewed in the next section, is inconclusive on this question.

The empirical analysis of the determinants of government spending generally is based on the median voter model.[2] This model recognizes that the school spending level preferred by the median voter beats any other spending level in a referendum. Thus referenda are expected to result in spending preferred by the median voter. Similarly, a candidate for school board who proposes to spend the amount preferred by the median voter defeats an opponent who proposes some other spending level. Recognizing this, all candidates for school board promise the spending level preferred by the median voter. Empirical studies based on the median voter model rely on measures of the median voter's income and the "price" of school quality faced by the median voter to explain school spending.

Almost all jurisdictions include some elderly, but they make up a minority of the population. How do the elderly influence school spending if they are a minority of the population? In a median voter framework, the elderly affect spending only if they alter the identity of the median voter. For illustrative purposes, suppose that everyone has the same probability of

1. External benefits associated with the effects of better schools today on these school cohorts' reduced future participation in crime and increased Social Security contributions (see Poterba 1998 and Kemnitz 2000) appear to be very small; few elderly will live long enough to enjoy the external benefits of paying to improve education now. In addition, workforce migration will dissipate the Social Security contribution increases from local increases in school spending.
2. The development of the median voter theorem is credited to Hotelling (1929), Bowen (1943), Downs (1957), and Black (1958). Some of the empirical literature based on the median voter model is summarized in Mueller (2003). See also the literature referenced in section 2.

voting.[3] Suppose also that within a community the preferred spending of the non-elderly is a monotonic, positive function of the household's income. If there were no elderly in the jurisdiction, the median voter would be the household with median income in the jurisdiction. Consider a second jurisdiction that contains some elderly, and suppose that all the elderly prefer there be no spending on schools. Then the distribution of preferred school spending levels has a mass point at $0 that reflects elderly preferences. The median of this distribution of preferred spending is the level of spending that is preferred by a household that we call the *median voter household*. The income of this median voter household is lower than the median household income among the non-elderly. Median voter household income is also smaller than median income in the community if some elderly make more than the community's median household income.

Under various assumptions about elderly preferences, we calculate the income of the median voter household and the tax price facing that household and use these two variables along with others to explain school spending. Our use of a median voter household income and modified tax price is firmly based in the median voter model. Our empirical analysis contrasts with prior research on the effect of the elderly on school spending, which has used median household income in the community and the percent elderly, even though (1) the community's median household income clearly is not the median voter household's income and (2) the elderly share is not directly linked to the median voter's preferences. Furthermore, none of the papers on generational conflict uses a tax price variable specified by the median voter framework. Thus the empirical specification used in the literature to estimate the effect of the elderly on school spending is at best weakly linked to the median voter model.

Our various assumptions about elderly preferences are motivated by Fletcher (2006), who hypothesized that the elderly who have lived in a community for a long period of time may be more likely to support higher school spending than those who have recently moved to the area. This is because the long-term elderly may be more likely to have grandchildren in the district's schools and may care about other children in the school system. Similarly, the elderly who moved from another county in the state may have more ties to their new community than elderly who moved from another state.

Our analysis compares the explanatory powers of four assumptions about elderly preferences on school spending in a median voter model. Under the first, elderly spending preferences are no different than those of others with

3. The large empirical literature that uses median jurisdictional income to explain government spending is based on the assumption that all have the same probability of voting. Our empirical analysis allows the elderly to be weighted more, reflecting their higher probability of voting.

their income; this amounts to using the community's median income for all citizens. Under the second assumption, the elderly who moved from another state align themselves with the poorest households, while long-term elderly residents and recent movers from within the state have the same preferences as non-elderly with their incomes. In the third assumption, the elderly from a different county within the state or another state vote with the poorest households, while long-term elderly residents have the same preferences as non-elderly with their incomes. Under the fourth assumption, all elderly are aligned with the poorest families. In calculating the median voter household income under these four assumptions, we also allow the elderly to have a greater weight that reflects their greater propensity to vote.

Additional regressions were estimated that allow the elderly to align themselves with the richest citizens in the jurisdiction. Since these specifications did not fit the data as well as the specifications in which the elderly align themselves with the poorest citizens, we report only the regressions in which the elderly are aligned with the poorest citizens.

To create the median voter household income and modified tax price variables that reflect the elderly aligning with the poor (or rich), we need the distribution of income for the elderly and non-elderly. The crucial data on income distribution by age and on elderly migration are available at the county level but are not available for individual school districts. Accordingly, our empirical analysis is at the county level. We test which of the four assumptions about elderly preferences best explains per pupil spending in 3,100 counties in 1990 and 2000. In this two-year panel with county fixed effects, we find that elderly preferences are generally best characterized by assuming that all the elderly vote with the district's poorest voters. We sometimes get a better fit taking into account the higher voter turnout among the elderly when calculating median voter household income. Note that we are precluded from testing whether all households without children (not just the elderly) align themselves with the community's poorest or richest households because data on the income distribution are not reported separately for households with and without children.

Communities with more elderly have more households that are aligned with the community's poorest voters, which creates a new median voter household that is located farther down the community's income distribution. The new median voter is not as affluent, which reduces school spending. Working against this income effect is a price effect, in which the new median voter benefits more from being subsidized through property taxes by those in the community who are more affluent. We find that the income effect is slightly larger than the price effect. Our finding that the elderly align themselves with those who prefer to spend the least on education— the poorest households—is

consistent with these results. On net, having more elderly results in a statistically significant but very small drop in school spending. These results imply that the entry of the baby boom cohorts into the ranks of the elderly or the influx of the elderly into locations they find attractive will have very little impact on school spending. Thus the widespread fears that the elderly have a sizeable adverse impact on school spending appear to be misplaced.

The next section provides a brief review of the literature on the impact of the elderly on school spending. Some theoretical structure is provided in section 3. Section 4 describes the sample and develops the hypotheses to be tested and the variables that will be used to test them. The empirical results are reported in section 5.

2. LITERATURE ON THE EFFECT OF THE ELDERLY ON SCHOOL SPENDING

The evidence is mixed on whether spending falls as the percent who are elderly rises. In Miller's (1996) study, the percent who are elderly had a significantly negative impact on educational spending per adult in a panel of Texas counties but was insignificant in a panel of forty-eight states. Using a state panel, Poterba (1997) found that per child education spending falls as the state's fraction who are elderly rises if the percent living in urban areas is not included in the regression. Ladd and Murray (2001) conducted an analysis similar to Poterba's but at the county level with county and time fixed effects and found that the proportion who are elderly does not significantly affect per child education spending. With a panel of school district data, Harris, Evans, and Schwab (2001) found that the elderly share had a significant but small negative effect on revenues per pupil.[4] Using survey data, Brunner and Balsdon (2004) found that the elderly were less likely than younger voters to support school bond initiatives in California. Other research suggests that the impact of the elderly depends on whether the elderly are long-term residents or can capitalize the benefits of having good schools into housing prices.

Similar to Fletcher (2006), Berkman and Plutzer (2004, p. 1181) hypothesize that "those who have lived in their communities for some time may . . . have developed loyalty to the community and its schools," making them more supportive of larger school budgets. Using school district data, they find that school spending in 1994–95 was higher in counties with a larger share of the population who were long-term elderly residents. On the other hand, school spending was lower in counties with a larger share who were elderly migrants in regressions with no state fixed effects; the elderly migrant variable was not

4. In a related study, Button (1992) found that the share of voters aged fifty-five or older had a negative impact on the success of school bond proposals in Florida.

significant in a regression that allowed for state fixed effects. As noted earlier, Fletcher (2006) also expected long-term elderly to be more favorably disposed to greater school spending than recent elderly migrants. Using county data for 1990 and two-stage least squares (2SLS) and three-stage least squares (3SLS) procedures that take account of the endogeneity of elderly migration, she found that school spending was higher in counties with more long-term elderly and was lower in counties with a larger share who were elderly and had moved from another state.

Hilber and Mayer (2004) hypothesized that there would be greater capitalization of school quality into home prices if there was little land available for development. The opportunity to capitalize the value of better schools into home prices was expected to make the elderly more supportive of larger school budgets. Consistent with this reasoning, using a district-level cross section the authors found that the percent who were elderly had a negative impact on spending in locations where there was much land that had not been developed (i.e., little potential for capitalization) and had a positive impact on spending in communities with little available land (i.e., great potential for capitalization).

The estimated effect of the elderly thus appears to be sensitive to the chosen sample or level of aggregation, the inclusion of certain variables, the potential for capital gains, and the time the elderly have spent in their current location. Furthermore, in the intergenerational conflict literature the coefficient on the percent sixty-five or older variable often has been interpreted as reflecting elderly preferences on school spending relative to those of parents or other younger adults for school spending. The finding of some studies that the percent elderly has a positive impact on school spending thus seems to imply that the elderly want to spend more than other voters on schools, which is very difficult to rationalize. The median voter framework developed later in this article will provide an explanation for this apparent anomaly: as more elderly vote with the poor, the median voter is poorer and demands better schools if the price effect overwhelms the income effect; these were described earlier.

3. THEORETICAL BACKGROUND

Here we provide the theoretical underpinnings for some aspects of our empirical specification. Following Lovell (1975), assume that school taxes are proportional to income. This is consistent with schools being financed by property taxes that are proportional to house values and the income elasticity for housing being 1. A household with income M_i and facing a tax rate of t pays $t \cdot M_i$ in taxes, leaving C_i units of private goods (the numeraire) to be consumed.

$$M_i = C_i + t \cdot M_i. \tag{1}$$

Each of N households receives G in government services (e.g., school quality), which are produced at a cost of P_G each. The government budget constraint requires that total taxes equal total spending, or

$$t \cdot (\Sigma M_i) = P_G \cdot G \cdot N. \tag{2}$$

Solving equation 2 for t,

$$\begin{aligned} t &= (P_G \cdot G \cdot N)/(\Sigma M_i) \\ &= (P_G \cdot G)/M_{mean} \end{aligned} \tag{3}$$

where M_{mean} is mean household income. Substituting equation 3 into equation 1 yields

$$M_i = C_i + P_G \cdot (M_i/M_{mean}) \cdot G. \tag{4}$$

Thus, for the household with income M_i, the price of government services equals $P_G \cdot (M_i / M_{mean})$. An increase in the cost of producing each unit of G [P_G], due perhaps to teachers unionizing, raises the household's cost of acquiring one more G. Having a better school is more expensive for a relatively rich household in the community [$(M_i / M_{mean}) > 1$] than for a relatively poor household in the community [$(M_i / M_{mean}) < 1$] because this entails a larger increase in property taxes for the richer household. This effect reflects the redistribution from richer households to poorer households within the jurisdiction.

Kenny (1978) showed that the preferred level of school spending increased as household income rose *within the jurisdiction* if the income effect associated with the household being better off (i.e., M_i rises) dominated the substitution effect associated with the richer household facing a higher price of having a better school [i.e., (M_i / M_{mean}) rises]. He showed that this condition is equivalent to (1) the income elasticity for school quality G being greater than the elasticity of substitution between school quality G and private consumption C, or equivalently (2) the income elasticity for school quality being greater than the uncompensated price elasticity for school quality. Lovell (1978), using this framework, estimated that the income elasticity for school spending was higher than the price elasticity, suggesting that a community's richer households prefer better schools than are preferred by its poorer households.

Suppose that preferences over school spending can be characterized in one of two ways. Some share of the community α_e (e.g., all the elderly) are assumed in this example to align themselves with the poorest households ($M = 0$) regardless of their income. For the remainder of the community

$(1 - \alpha_e)$, preferred spending G^* is a monotonic function of household income (M_i). The cumulative distribution of income for the non-elderly is given by $[F(M_i)]$. The median voter household is the household with income M' for which

$$\alpha_e + (1 - \alpha_e) \cdot F(M') = 0.50.$$

That is, if 20 percent vote with the poorest households, the median voter household is found by going up the distribution of non-elderly income until another 30 percent of the total households are added to the voting coalition of the poor. This occurs where $F(M') = 0.375$, or where 3/8 of the non-elderly have an income below M'. This illustrates how the income of the median voter household ($M_{\text{median voter}}$) is calculated under the various assumptions about which elderly are aligned with the poor.

4. SAMPLE, HYPOTHESES, AND VARIABLES

Sample

Ladd and Murray (2001) argued that a county- or district-level analysis is more appropriate than a state-level analysis because less aggregate data capture important features of education finance that would be missed at the state level. In the median voter framework, because school spending decisions are made at the local level, the income of the median voter household ($M_{\text{median voter}}$) and its tax price ($M_{\text{median voter}}$ / M_{mean}) are best measured at the county or school district level. Since the elderly migration rates and the income distribution by age data are available from the Bureau of the Census at the county level and not the school district level, the empirical analysis in this article uses county data.

Data from the 1990 Census of Population and Housing (U.S. Census Bureau 1990) were available for 3,141 counties or county equivalents. These data were merged with public school district enrollment and finance data taken from the 1992 Census of Governments (U.S. Census Bureau 1992). Ninety-eight of the 15,868 school districts in the Census of Governments could not be matched with a county Federal Information Processing Standards (FIPS) code. The school district data were aggregated to the county level (total revenue/total enrollment for the county). There were school districts in 3,126 of the 3,141 counties, but student enrollments were zero in three of these counties, which were dropped from the sample. Thus the initial sample for 1990 consists of 3,123 counties and county equivalents.

All of the 15,383 school districts in the 2002 Census of Governments could be matched with a county FIPS code (U.S. Census Bureau 2000). Data from the 2000 Census of Population and Housing (U.S. Census Bureau

2000) were available for 3,141 counties or county equivalents.[5] Based on the 2002 Census of Governments (U.S. Census Bureau 2002), 3,123 of these counties had school districts. Two of these counties were dropped from the sample due to zero student enrollments. Twenty-four counties and thirty-one independent cities (county equivalents) in Virginia were dropped because the migration data for the cities were merged with the data for the surrounding or adjacent counties. One county was dropped because a change in the county boundaries was reflected in the Census of Population and Housing but not in the Census of Governments. Thus the initial sample for 2000 consists of 3,065 counties and county equivalents.

The initial pooled sample consists of 3,123 counties in 1990 and 3,065 counties in 2000, for a total of 6,188 observations.

The dependent variable is the county per pupil state and local revenues for public primary and secondary schools, inflated to 2000 dollars using the implicit government purchases deflator. This variable ranged from $2,486 to $28,451 in 1990 and from $3,836 to $50,114 in 2000. To eliminate outliers due to data errors, a subsample was created by trimming in each year the 1 percent of the observations with the largest per pupil school revenues and the 1 percent of the observations with the smallest per pupil school revenues, resulting in 6,064 observations from 3,100 counties. Summary statistics for school revenue and the independent variables in this trimmed sample are reported in table 1. The range in school revenue per pupil was $3,000–$12,478 in 1990 and $4,586–$15,223 in 2000. Thus the trimmed sample has a range that is 0.365 (0.230) the range in the untrimmed sample in 1990 (2000). Note, however, that we get very similar results, reported in the appendix, when we use the (untrimmed) initial sample.

County characteristics provide a perfect match to school district characteristics in the six states in which the school district is the county (FL, LA, MD, NV, VA, WV). Using county data to characterize school districts is more difficult in states in which school districts often wander across county borders. To minimize this problem, a second sample is constructed that restricts the trimmed sample to the twenty-eight states in which no more than 20 percent of the school districts span two or more counties, which we call the "districts-within-county states."[6] As already noted, the match between county and school

5. There were a few differences between the 3,141 counties in 1990 and the 3,141 counties in 2000. Two county equivalents in 1990 did not exist in the 2000 census: Yellowstone National Park, listed as a county equivalent in 1990, is legally part of Gallatin County, MT, and Park County, MT. In 1995, South Boston City, VA, was absorbed into Halifax County, VA. Two new county equivalents were also created between 1990 and 2000: Yakutat Borough, AK, and Broomfield County, CO.

6. This is compiled from state-level data reported in the Government Organization section of the 1992 Census of Governments. Note that we get very similar results using only states in which less than 10 percent of the school districts span county boundaries.

Table 1. Data Characteristics

A. Non-median income variables

	Trimmed Sample (n = 6,064)			
	Mean	Std Dev	Min	Max
STATE & LOCAL SCHOOL REVENUE	6554	1831	3000	15223
FEDERAL REVENUE	612	525	0	10391
FRACTION 5–17	.195	.026	.067	.360
FRACTION URBAN	.383	.302	0	1
HOMEOWNER DUMMY	.990	.097	0	1
SUPREME CT RULING	.178	.383	0	1
RELATIVE STATE INC	.865	.168	.426	1.897
SUPREME CT RULING × RELATIVE STATE INC	.230	.392	0	1.897
RACIAL MISMATCH	.093	.095	−.495	.586

B. Median income variables: Elderly and non-elderly equally weighted

	Trimmed Sample (n = 6,064)			
	Mean	Std Dev	Min	Max
Same preferences				
MED HHD INCOME	35098	9095	12601	86624
MED INCOME/MEAN INCOME	.794	.059	.446	.978
Elderly cross-state migrants aligned with poor				
MED HHD INCOME	34978	9087	12575	86466
MED INCOME/MEAN INCOME	.791	.060	.446	.977
All elderly migrants aligned with poor				
MED HHD INCOME	34794	9081	12488	86289
MED INCOME/MEAN INCOME	.787	.061	.445	.975
All elderly aligned with poor				
MED HHD INCOME	28235	10217	6601	85118
MED INCOME/MEAN INCOME	.628	.110	.174	.959

C. Median income variables: Elderly and non-elderly weighted by voter turnout

	Trimmed Sample (n = 6,064)			
	Mean	Std Dev	Min	Max
Elderly cross-state migrants aligned with poor				
MED HHD INCOME	34218	9006	12524	85869
MED INCOME/MEAN INCOME	.773	.058	.434	.970
All elderly migrants aligned with poor				
MED HHD INCOME	34001	8997	12427	85653
MED INCOME/MEAN INCOME	.768	.059	.433	.968
All elderly aligned with poor				
MED HHD INCOME	25759	10491	6147	84212
MED INCOME/MEAN INCOME	.568	.125	.122	.951

Notes: SCHOOL SPENDING and FEDERAL REVENUE are deflated to 2000 dollars using implicit government purchases deflator. MEAN HHD is deflated to 2000 dollars using the CPI-U.

district is perfect in the six states with countywide school districts. Less than 3 percent of the school districts wander across county boundaries in nine states (AK, AZ, CT, GA, KY, NJ, RI, UT, VT), and county borders are spanned for 3–19 percent of the school districts in AL, CA, IN, MA, ME, MS, MT, NH, NC, PA, SC, TN, and WY. This sample consists of 2,805 observations from 1,462 counties.[7]

A number of states have sought to reduce the variation in educational spending across school districts in the state. These "reforms" leave school districts with much less latitude in determining school spending. To take one extreme example, the California state supreme court in its *Serrano* decision decreed that there be no more than $100 variation in per pupil spending across districts. In reform states, the usual demand variables are expected to have very little impact on spending. To obtain better estimates of the demand for school spending in districts that are relatively unfettered by state government, we created another subsample by removing states where the coefficient of variation (CV) in state and local per pupil revenues is less than 0.1. Twelve states (AR, AZ, CT, DE, HI, KY, ME, NH, NJ, NY, RI, WI) were removed in 1990, and eighteen states (AL, AR, AZ, CT, DE, HI, IA, IN, KY, MA, NH, NJ, RI, SD, TN, VT, WI, WV) were stricken in 2000, leaving 4,851 observations from 2,754 counties.

A fourth sample was created from the intersection of the second and third samples. It consists of states with few districts spanning county borders and states with a coefficient of variation in spending that is at least 0.1. It comprises 2,113 observations from 1,269 counties.

In these four samples there is a trade-off between having more appropriate data and having more data. The fourth sample is based on the most appropriate data, but it is much smaller than the other three samples. The regressions that we report from all four samples provide some evidence on how robust our findings are to varying the sample.

Independent Variables and Hypotheses

An increase in income is expected to lead, through an income effect, to higher school revenues. MED HHD INCOME equals the income of the median voter household ($M_{\text{median voter}}$) inflated to 2000 dollars using the consumer price index for all urban consumers (CPI-U). This is calculated for each of the four

7. Even if school districts are confined to a single county, the median voter in a county may not have the same characteristics as the median voters in the school districts in the county. This is not a problem in 63 percent of the counties in the districts-within-county states, where there is only one unified or high school district; in these the median voter in the county is the median voter in the school district. It is our belief that in many of the remaining counties there is a dominant large-city school district that makes plausible our assumption that the median voter in the county is a reasonable approximation to the weighted school district median voter.

scenarios described above by aligning the appropriate group of elderly with the county's poorest households and then moving up the income distribution of the remaining households until the median voter household is found. Interpolation between the midpoints of adjacent income categories is used to find the household income of this median voter household. It can be seen in table 1 that the calculated income of the median voter household falls as more elderly vote with the poor. As already noted, we also tried aligning the elderly with the county's richest households. Since this assumption consistently provided a worse fit than assuming that the elderly vote with the poor, the alignments with rich regressions are not reported.

The ratio of the median voter household's income to mean household income in the county (MED INCOME / MEAN INCOME) corresponds to the term $M_{\text{median voter}} / M_{\text{mean}}$. Due to the skewness in the income distribution, median income is less than mean income in each county. The ratio of the median voter's income to mean income falls in table 1 as more elderly vote with the poor. As the ratio of the median voter household's income to mean household income falls, the median voter faces a lower price to increase school quality, which should lead to more spending. There is some support for this prediction in the literature (e.g., Lovell 1978; Gemmell, Morrissey, and Pinar 2002).

The variable just described captures the potential for redistribution from the community's richer households to the median voter. Nonresidential property offers another vehicle for redistribution to the median voter through property taxation. Unfortunately there are no reliable data on the share of nonresidential property values in the total value of assessed property.[8] The bias on the coefficient of the tax price variable that we do use ($M_{\text{median voter}} / M_{\text{mean}}$) due to not having some measure of the importance of nonresidential property hinges on the correlation between this variable and the importance of nonresidential property, which appears to be small and of unknown sign. Note that the county fixed effects included in all the regressions probably capture much of the variation across counties in nonresidential property relative to residential property.

An increase in the number of students per household makes it more expensive to increase spending on each student by $100, which is expected to result in lower spending per student. This effect is captured by the fraction of the population who are aged 5–17 (FRACTION 5–17). This hypothesis has

8. Mark Schneider, commissioner of the National Center for Education Statistics (NCES), in a speech at the American Education Finance Association meetings in Baltimore in March 2007, lamented that it is impossible to get high-quality data on the property tax base that would be consistent across the fifty states and could be "certified" by NCES. We also searched state blue books and state finance Web sites and were unable to find consistent data on residential and nonresidential property for 1990 and 2000 for more than a handful of states.

been supported in Poterba (1997), Ladd and Murray (2001), Harris, Evans, and Schwab (2001), and a number of other papers.

Per pupil revenue from the federal government (FEDERAL REVENUE) has an ambiguous impact on state and local school revenues. The largest federal program for primary and secondary education, Title I, is a block grant. This has an income effect that should lead to higher total revenues for schooling but lower state and local funds, as some of these are diverted to fund increases in noneducational programs. Gordon (2004) studied the effect of discrete census-induced changes in Title I funding and concluded that greater funds from this program led to no change in state revenues and to smaller local revenues. But other federal programs, such as the free/reduced lunch and technology funds programs, require some local matching. Matching provisions could lead to greater state and local spending. Ladd and Murray (2001) reported that aggregate federal aid had a significantly positive impact on state and local revenues in the urban sample of counties but was unrelated to spending in the complete sample. Harris, Evans, and Schwab (2001) found that aggregate federal revenues had a positive effect on school district local revenues.

There is some evidence in the intergenerational conflict literature that school spending is lower in communities in which the elderly are of a different race than the students, suggesting that the elderly care more about educating children of their race than about educating children of a different race. This is tested here with RACIAL MISMATCH, which equals the fraction of those aged 5–17 who are nonwhite less the fraction of those sixty-five or older who are nonwhite.

An increase in the fraction of a county's population living in an urban area (FRACTION URBAN) makes it easier to take advantage of economies of scale in schooling, which leads to lower expenditure (see Kenny 1982). There is also generally more competition among school districts in urban areas, which should make public schools more efficient and thus lower spending. On the other hand, teacher salaries are higher in urban areas due to the higher cost of living (see Kenny and Denslow 1980), making the net effect ambiguous.

Fischel (2001) argued that the ability to capitalize good schools into home values makes homeowners more willing than renters to support higher spending on schools. But Denzau and Grier (1984) rationalized the negative coefficient often found on the fraction of housing units that are owner occupied with "renter illusion," in which renters favor higher taxes because they do not expect the higher taxes to result in higher rents. The fraction of housing units that are owner occupied is commonly used in spending studies and is another variable that does not fit into a median voter framework. To overcome this problem, we use a HOMEOWNER DUMMY, which equals 1 if a majority of housing units are owner occupied and 0 if a majority are rentals. A value

of 1 suggests that the median voter is a homeowner. Only 40 of the 3,061 counties in the full trimmed sample for 1990 did not have a majority living in owner-occupied housing; in 2000 there were only 18 "renter" counties.

State governments engage in redistribution from a state's richer school districts to a state's poorer school districts, which results in *relatively* affluent districts spending less and *relatively* poor districts spending more. A number of state supreme courts have ruled that the state's educational finance system was unconstitutional because of the disparity in school resources or spending across districts. This court-mandated redistribution is expected to be more substantial than the redistribution by the state that took place without a court ruling. There is some support in the literature for this prediction. Harris, Evans, and Schwab (2001) interacted dummies capturing a school district's position in the state income distribution with a dummy indicating whether the state supreme court had overturned the state's school finance system. Overturning the educational finance structure resulted in a shift in total revenues from richer districts to poorer districts. Card and Payne (2002) similarly showed that rulings that the school financing system was unconstitutional caused the slopes describing the effect of district income on state revenues and on total spending to be flatter.

The county's position on the state's income distribution is measured here by the ratio of mean income in the county to mean income in the state (RELATIVE STATE INC). SUPREME CT RULING equals 1 for 1990 in the seven states in which the state supreme court had overturned the state's educational finance system prior to 1987 (NJ 1973, CA 1976, CT 1977, WA 1978, WV 1979, WY 1980, and AR 1983); another six states (KY 1989, MT 1989, TX 1989, MA 1993, TN 1993, and AZ 1994) were added for 2000 based on a similar criterion.[9] This treatment allows some time for the court ruling to affect the distribution of spending within the state. The interaction between these two variables (SUPREME CT RULING × RELATIVE STATE INC) provides a test for the hypothesis described above.

County fixed effects control for variation in local amenities, the timing of school board elections, state education policies, and so on. A year dummy allows for spending to change over the decade in response to factors that have not been taken into account by other variables.

5. EMPIRICAL RESULTS

Results for county fixed effects regressions under the four scenarios describing elderly preferences are reported in (1) tables 2 and 3 for the full trimmed sample, (2) tables 4 and 5 for the trimmed sample limited to the twenty-eight

9. This classification is based on Figlio, Husted, and Kenny (2001).

Table 2. Spending Regressions: Full Trimmed Sample, 6,064 Observations from 3,100 Counties. Elderly and Non-elderly Equally Weighted

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.043	.045	.045	.058
	(3.20)	(3.30)	(3.32)	(4.56)
MED INCOME/	−1694	−1845	−1831	−2503
MEAN INCOME	(2.26)	(2.46)	(2.44)	(4.12)
FEDERAL REVENUE	.351	.352	.352	.363
	(5.53)	(5.55)	(5.55)	(5.77)
FRACTION 5–17	−6553	−6528	−6520	−6432
	(4.88)	(4.86)	(4.85)	(4.80)
FRACTION URBAN	42.8	41.2	40.9	−27.6
	(0.23)	(0.22)	(0.22)	(0.15)
HOMEOWNER DUMMY	−389	−388	−389	−417
	(1.32)	(1.32)	(1.32)	(1.42)
RELATIVE STATE INC	−923	−995	−992	−1060
	(1.47)	(1.59)	(1.59)	(2.08)
SUPREME CT RULING	−219	−219	−219	−212
	(4.11)	(4.10)	(4.10)	(3.98)
SUPREME CT RULING	−1332	−1330	−1325	−1243
× RELATIVE STATE INC	(2.26)	(2.25)	(2.25)	(2.11)
RACIAL MISMATCH	−1003	−1006	−1002	−1006
	(2.53)	(2.54)	(2.53)	(2.53)
2000 DUMMY	1433	1425	1425	1421
	(21.0)	(20.9)	(20.9)	(26.4)
R^2: Within	.7161	.7162	.7162	.7172
Between	.0785	.0798	.0807	.0924
Overall	.2421	.2433	.2443	.2563
F-statistic: Overall	677.22	677.40	677.45	680.65
F-statistic: Fixed effects = 0	6.02	6.03	6.02	6.14
σ(error)	743.7	743.7	743.6	742.4

Note: Absolute *t*-statistics are in parentheses.

districts-within-county states, (3) tables 6 and 7 for the trimmed sample in which the low-spending inequality states were removed, and (4) tables 8 and 9 for the trimmed sample with the low-spending inequality states removed and limited to the districts-within-county states. In tables 2, 4, 6, and 8, the elderly and non-elderly receive equal weights; in tables 3, 5, 7, and 9, the elderly receive more weight to reflect their higher voter turnout rate.[10] The regressions

10. The voter turnout rates pertain to the 2000 presidential election and were obtained from the U.S. Bureau of the Census (2002).

Table 3. Spending Regressions: Full Trimmed Sample, 6,064 Observations from 3,100 Counties. Elderly and Non-elderly Weighted by Voter Turnout

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.043 (3.20)	.045 (3.30)	.046 (3.32)	.057 (4.67)
MED INCOME/ MEAN INCOME	−1694 (2.26)	−1846 (2.46)	−1836 (2.44)	−2514 (4.45)
FEDERAL REVENUE	.351 (5.53)	.351 (5.54)	.352 (5.55)	.359 (5.73)
FRACTION 5–17	−6553 (4.88)	−6566 (4.89)	−6556 (4.88)	−6522 (4.88)
FRACTION URBAN	42.8 (0.23)	36.8 (0.20)	36.5 (0.20)	−46.9 (0.25)
HOMEOWNER DUMMY	−389 (1.32)	−391 (1.33)	−391 (1.33)	−429 (1.46)
RELATIVE STATE INC	−923 (1.47)	−973 (1.57)	−970 (1.57)	−889 (1.86)
SUPREME CT RULING	−219 (4.11)	−218 (4.09)	−218 (4.09)	−211 (3.95)
SUPREME CT RULING × RELATIVE STATE INC	−1332 (2.26)	−1329 (2.25)	−1324 (2.24)	−1249 (2.12)
RACIAL MISMATCH	−1003 (2.53)	−1014 (2.56)	−1010 (2.55)	−1031 (2.60)
2000 DUMMY	1433 (21.0)	1428 (21.4)	1428 (21.4)	1443 (29.3)
R^2: Within	.7161	.7162	.7162	.7173
Between	.0785	.0791	.0801	.0864
Overall	.2421	.2428	.2438	.2512
F-statistic: Overall	677.22	677.41	677.45	681.20
F-statistic: Fixed effects = 0	6.02	6.04	6.04	6.23
σ(error)	743.7	743.7	743.6	742.2

Note: Absolute *t*-statistics are in parentheses.

are highly significant. With fixed effects, the ordinary R^2 is maximized and is reported as the R^2 within. This ranges from 0.63 to 0.72. The hypothesis that the set of county fixed effects adds nothing to the regressions is soundly rejected. The standard deviation in estimated county fixed effects is quite large, falling between 1393 and 1554.

Table 4. Spending Regressions: Trimmed Sample, Districts-within-County States, 2,805 Observations from 1,462 Counties. Elderly and Non-elderly Equally Weighted

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.163	.165	.168	.165
	(8.16)	(8.27)	(8.35)	(8.76)
MED INCOME/	−7048	−7351	−7359	−6850
MEAN INCOME	(6.50)	(6.78)	(6.78)	(7.14)
FEDERAL REVENUE	.294	.294	.297	.283
	(2.94)	(2.95)	(2.98)	(2.87)
FRACTION 5–17	−3676	−3625	−3557	−4550
	(1.98)	(1.95)	(1.91)	(2.48)
FRACTION URBAN	−503	−500	−503	−534
	(2.01)	(2.01)	(2.02)	(2.15)
HOMEOWNER DUMMY	−264	−260	−259	−315
	(0.67)	(0.66)	(0.66)	(0.81)
RELATIVE STATE INC	−4957	−5081	−5106	−4081
	(5.50)	(5.66)	(5.69)	(5.30)
SUPREME CT RULING	−449	−448	−450	−448
	(6.29)	(6.29)	(6.32)	(6.27)
SUPREME CT RULING	−525	−520	−507	−264
× RELATIVE STATE INC	(0.65)	(0.65)	(0.63)	(0.33)
RACIAL MISMATCH	−1392	−1398	−1381	−1303
	(2.02)	(2.03)	(2.01)	(1.88)
2000 DUMMY	979	965	963	1108
	(10.4)	(10.3)	(10.3)	(14.2)
R^2: Within	.7025	.7030	.7032	.7046
Between	.2835	.2823	.2849	.2882
Overall	.3695	.3685	.3705	.3769
F-statistic: Overall	285.95	286.61	286.96	288.85
F-statistic:				
Fixed effects = 0	6.01	6.03	6.04	6.31
σ(error)	722.4	721.8	721.5	719.8

Note: Absolute *t*-statistics are in parentheses.

Specification Tests

The results of various specification tests comparing the seven regressions estimated for each of the four samples are summarized in table 10.[11] Akaike's ACI

11. The relative weighting of the elderly and younger households has no impact on the regression if elderly and younger households have the same preferences about school spending. Thus for each sample, the first regression in the sample's second table duplicates the first regression in the sample's first table.

Table 5. Spending Regressions: Trimmed Sample, Districts-within-County States, 2,805 Observations from 1,462 Counties. Elderly and Non-elderly Weighted by Voter Turnout

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.163 (8.16)	.167 (8.28)	.170 (8.36)	.159 (8.61)
MED INCOME/ MEAN INCOME	−7048 (6.50)	−7398 (6.75)	−7423 (6.75)	−6490 (7.06)
FEDERAL REVENUE	.294 (2.94)	.292 (2.93)	.295 (2.96)	.266 (2.70)
FRACTION 5–17	−3676 (1.98)	−3853 (2.08)	−3774 (2.04)	−5132 (2.81)
FRACTION URBAN	−503 (2.01)	−515 (2.07)	−517 (2.07)	−540 (2.17)
HOMEOWNER DUMMY	−264 (0.67)	−266 (0.68)	−265 (0.68)	−341 (0.87)
RELATIVE STATE INC	−4957 (5.50)	−5034 (5.62)	−5061 (5.67)	−3575 (4.89)
SUPREME CT RULING	−449 (6.29)	−447 (6.27)	−448 (6.30)	−445 (6.22)
SUPREME CT RULING × RELATIVE STATE INC	−525 (0.65)	−510 (0.63)	−495 (0.62)	−253 (0.31)
RACIAL MISMATCH	−1392 (2.02)	−1441 (2.10)	−1423 (2.07)	−1338 (1.93)
2000 DUMMY	979 (10.4)	978 (10.6)	975 (10.6)	1174 (16.2)
R^2: Within	.7025	.7030	.7033	.7041
Between	.2835	.2811	.2838	.2750
Overall	.3695	.3677	.3700	.3669
F-statistic: Overall	285.95	286.59	286.98	288.13
F-statistic: Fixed effects = 0	6.01	6.06	6.06	6.39
σ(error)	722.4	721.8	721.5	720.5

Note: Absolute *t*-statistics are in parentheses.

criterion, Amemiya's PC R^2 criterion, Hocking's Sp criterion, the Davidson-McKinnon J test and the prediction sum of squares (PRESS) criterion are described in Maddala (1992), and the Schwartz's SBC criterion is described in Greene (2003). Table 10 reports which of the seven specifications provided the best fit and which provided the second best fit.

In the three largest samples, all the tests indicate that the best fit is obtained assuming *all* the elderly are aligned with the county's poorest households. The

Table 6. Spending Regressions: Trimmed Sample, Low-CV States Removed, 4,851 Observations from 2,754 Counties. Elderly and Non-elderly Equally Weighted

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.087	.089	.090	.087
	(5.07)	(5.16)	(5.19)	(5.47)
MED INCOME/	−3022	−3216	−3196	−3186
MEAN INCOME	(3.25)	(3.46)	(3.43)	(4.30)
FEDERAL REVENUE	.477	.478	.478	.465
	(5.70)	(5.71)	(5.72)	(5.63)
FRACTION 5–17	−8692	−8667	−8662	−8803
	(5.11)	(5.09)	(5.09)	(5.17)
FRACTION URBAN	145	143	142	84.6
	(0.61)	(0.60)	(0.60)	(0.35)
HOMEOWNER DUMMY	−277	−277	−277	−320
	(0.79)	(0.78)	(0.79)	(0.91)
RELATIVE STATE INC	−2705	−2788	−2782	−2159
	(3.71)	(3.83)	(3.84)	(3.80)
RACIAL MISMATCH	−1262	−1260	−1254	−1221
	(2.71)	(2.70)	(2.69)	(2.62)
2000 DUMMY	1195	1186	1186	1275
	(13.5)	(13.4)	(13.4)	(18.5)
R^2: Within	.6768	.6769	.6769	.6773
Between	.3016	.3006	.3012	.2976
Overall	.3531	.3528	.3533	.3491
F-statistic: Overall	485.80	486.00	486.15	487.04
F-statistic:				
Fixed effects = 0	4.39	4.40	4.40	4.36
σ(error)	818.3	818.2	818.1	817.6

Note: Absolute *t*-statistics are in parentheses.

only difference is whether the best fit is found by weighting the elderly and younger households according to their voter turnout rates or by equally weighting elderly and younger households. In the full trimmed sample, weighting according to voter turnout yields the best fit. In the other two samples, the best fit is obtained in nearly two-thirds of the tests by weighting the two age groups equally and in the remainder of the tests by using voter turnout weights.

States with low coefficients of variation and states in which school districts often spilled across county boundaries are not included in the smallest sample. In this sample, the Hocking's Sp and the PRESS criterion tests conclude that the best fit is found assuming that all (i.e., recent migrants and long-term residents) elderly are aligned with the jurisdiction's poorest voters. But in the

Table 7. Spending Regressions: Trimmed Sample, Low-CV States Removed, 4,851 Observations from 2,754 Counties. Elderly and Non-elderly Weighted by Voter Turnout

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.087 (5.07)	.089 (5.10)	.090 (5.14)	.081 (5.27)
MED INCOME/ MEAN INCOME	−3022 (3.25)	−3139 (3.37)	−3123 (3.35)	−2960 (4.29)
FEDERAL REVENUE	.477 (5.70)	.476 (5.69)	.476 (5.70)	.451 (5.49)
FRACTION 5–17	−8692 (5.11)	−8737 (5.14)	−8730 (5.13)	−8934 (5.25)
FRACTION URBAN	145 (0.61)	140 (0.59)	138 (0.58)	78.4 (0.33)
HOMEOWNER DUMMY	−277 (0.79)	−280 (0.79)	−281 (0.80)	−332 (0.94)
RELATIVE STATE INC	−2705 (3.71)	−2701 (3.75)	−2696 (3.77)	−1809 (3.43)
RACIAL MISMATCH	−1262 (2.71)	−1274 (2.73)	−1267 (2.72)	−1250 (2.67)
2000 DUMMY	1195 (13.5)	1196 (13.8)	1296 (13.8)	1321 (20.8)
R^2: Within	.6768	.6768	.6769	.6770
Between	.3016	.3011	.3018	.2946
Overall	.3531	.3529	.3534	.3453
F-statistic: Overall	485.80	485.81	485.97	486.26
F-statistic: Fixed effects = 0	4.39	4.40	4.40	4.39
σ(error)	818.3	818.3	818.2	818.0

Note: Absolute *t*-statistics are in parentheses.

other four tests, assuming that all elderly migrants (from another county in the state or a different state) are clumped with the poorest households and that long-term elderly residents have the same preferences as younger households provides the best fit.

In summary, almost all of the specification tests indicate that all elderly are aligned with the poorest households. But there is some evidence in the smallest sample that elderly alignment with the poorest households is confined to those who have migrated recently from another county in the state or a different state. This evidence based on the smallest sample suggests that long-term elderly residents, who may be more likely to have grandchildren in the school

Table 8. Spending Regressions: Trimmed Sample, Low-CV States Removed, Districts-within-County States, 2,113 Observations from 1,269 Counties. Elderly and Non-elderly Equally Weighted

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.205	.207	.209	.194
	(8.06)	(8.16)	(8.21)	(7.98)
MED INCOME/MEAN INCOME	−7973	−8364	−8321	−7665
	(5.67)	(5.96)	(5.93)	(6.06)
FEDERAL REVENUE	.288	.289	.291	.249
	(2.35)	(2.36)	(2.37)	(2.05)
FRACTION 5–17	−6281	−6246	−6195	−7498
	(2.55)	(2.53)	(2.51)	(3.07)
FRACTION URBAN	−288	−278	−283	−288
	(0.83)	(0.80)	(0.82)	(0.83)
HOMEOWNER DUMMY	195	203	203	123
	(0.41)	(0.43)	(0.43)	(0.26)
RELATIVE STATE INC	−5757	−5904	−5894	−4425
	(5.50)	(5.66)	(5.67)	(4.99)
RACIAL MISMATCH	351	347	362	344
	(0.40)	(0.39)	(0.41)	(0.39)
2000 DUMMY	552	534	537	753
	(4.41)	(4.28)	(4.31)	(7.17)
R^2: Within	.6280	.6286	.6290	.6275
Between	.2997	.2967	.2972	.2971
Overall	.3345	.3320	.3321	.3378
F-statistic: Overall	156.62	157.06	157.29	156.32
F-statistic: Fixed effects = 0	3.84	3.86	3.86	3.91
σ(error)	808.7	807.9	807.6	809.2

Note: Absolute *t*-statistics are in parentheses.

system and who may care about others in the public schools, have the same preferences as younger households about school spending.

Individual Variable Effects

Our summary of the empirical results will be based on the specification in each of the four samples that best fit the data according to the specification tests described above. Estimates of the impact of a variable will be taken from the two samples that do not include states in which the school districts appear to be given little latitude in determining school spending.

Removing states with little variation in school spending across counties should result in a sample that is comprised mostly of states that interfere little

Table 9. Spending Regressions: Trimmed Sample, Low-CV States Removed, Districts-within-County States, 2,113 Observations from 1,269 Counties. Elderly and Non-elderly Weighted by Voter Turnout

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.205 (8.06)	.208 (8.13)	.210 (8.18)	.183 (7.64)
MED INCOME/ MEAN INCOME	−7973 (5.67)	−8209 (5.76)	−8176 (5.73)	−7127 (5.85)
FEDERAL REVENUE	.288 (2.35)	.288 (2.35)	.289 (2.36)	.222 (1.83)
FRACTION 5–17	−6281 (2.55)	−6521 (2.65)	−6462 (2.63)	−8212 (3.37)
FRACTION URBAN	−278 (0.83)	−288 (0.83)	−294 (0.85)	−285 (0.82)
HOMEOWNER DUMMY	195 (0.41)	193 (0.41)	194 (0.41)	87.3 (0.18)
RELATIVE STATE INC	−5757 (5.50)	−5773 (5.54)	−5762 (5.55)	−3761 (4.49)
RACIAL MISMATCH	351 (0.40)	315 (0.36)	329 (0.38)	258 (0.29)
2000 DUMMY	552 (4.41)	553 (4.50)	556 (4.54)	843 (8.65)
R^2: Within	.6280	.6284	.6288	.6254
Between	.2997	.2981	.2986	.2971
Overall	.3345	.3335	.3336	.3396
F-statistic: Overall	156.62	156.90	157.15	154.88
F-statistic: Fixed effects = 0	3.84	3.86	3.87	3.91
σ(error)	808.7	808.2	807.8	811.5

Note: Absolute *t*-statistics are in parentheses.

in the local determination of school spending. Consider education "reform," which is designed to reduce the impact of income on school revenues. Removing states that had undertaken education reform to equalize spending should result in larger coefficients for the income variables. This is indeed the case. The coefficient on MED HHD INCOME is 53 percent larger in table 6 than in table 3, and the coefficient on MED INCOME / MEAN INCOME is 27 percent larger when the low-CV states are removed. Note also that the FEDERAL REVENUE and FRACTION 5–17 coefficients are 30 percent and 35 percent greater, respectively, in table 6 than in table 3. Let us now turn to the results for the individual variables.

Income has the anticipated positive impact on school revenues. In the fourth regression in table 6, a one standard deviation rise in median household

Table 10. Specification Tests for Which Elderly Groups Align with the Poor

	Trimmed Samples							
	Full		Less Cross-Co States		Less Low-CV States		Less Low CV States Less Cross-Co States	
	Specification		Specification		Specification		Specification	
	Best	2nd	Best	2nd	Best	2nd	Best	2nd
Amemiya PC R^2 criterion	T All elderly	E All elderly	E All elderly	T All migrants	E All elderly	T All elderly	E All migrants	T All migrants
Hocking's Sp criterion	T All elderly	E All elderly	T All elderly	E All elderly	T All elderly	E All elderly	T All elderly	E All elderly
Akaike's AIC criterion	T All elderly	E All elderly	E All elderly	T All elderly	E All elderly	T All elderly	E All migrants	T All migrants
Schwartz's SBC criterion	T All elderly	E All elderly	E All elderly	T All elderly	E All elderly	T All elderly	E All migrants	T All migrants
Prediction sum of squares criterion	All elderly	Remaining spec's	T All elderly	E All elderly	T All elderly	E All elderly	T All elderly	E All elderly
J test conclusive comparisons of top spec's	T All elderly	Non-all elderly	All elderly	Non-all elderly	E All elderly	3 spec's*	E All migrants	T Cross state migrants
							T All migrants	Same pref's

Notes: E = equal weights; T = voter turnout weights. No E or T indicates that there was no significant difference between the two weighting schemes. Two specifications for Best or 2nd mean that the specifications were not significantly different from one another, but were better than other specifications. Specifications are significantly different at the 5% level.

* Same preferences, turnout-weighted cross-state migrants, and turnout-weighted all elderly.

income ($10,139) is estimated to raise spending per pupil by $879. The estimated income elasticity, evaluated at mean values for spending and income, is 0.37 in table 6 and 1.18 in table 8.

Communities in which the median voter is less able to take advantage of redistribution within the jurisdiction spend less on schools. In the fourth regression in table 6, a one standard deviation rise in MED INCOME / MEAN INCOME (0.112) leads to a $356 fall in school revenues. The price elasticity, evaluated at mean values, equals −0.31 in table 6 and −1.05 in table 8. Our finding that the $M_{\text{median voter}}$ / M_{mean} variable has the predicted effect on school spending suggests that this variable is capturing at least an important component of the tax price facing the median voter.

It also is costlier to increase school quality if school-age children represent a larger share of the population. The coefficients on FRACTION 5–17 have the predicted negative sign and are statistically significant. In table 6, a one standard deviation rise in the fraction of those of school age results in a small $232 fall in school revenue per pupil.

Unlike some other studies, we find that state and local school revenue increases when the federal government provides more revenue for primary and secondary schools. In the fourth regression in table 6, a typical rise in FEDERAL results in a modest $234 rise in state and local revenues.

Part of the generational conflict over school funding may reflect racial preferences. That is, older whites may be more likely to support higher school spending if the students are mostly white than if the students are mostly black. This is captured by RACIAL MISMATCH, which equals the fraction of school-age children who are nonwhite less the fraction of elderly who are nonwhite. The negative coefficients support this hypothesis and are statistically significant in the three largest samples. A typical rise in this variable is estimated to result in a very small $118 fall in school spending.

With two-tailed tests, the HOMEOWNER DUMMY is never statistically significant and FRACTION URBAN is statistically significant only in tables 4 and 5. The latter finding suggests that the effects associated with economies of scale and the greater competition among districts typically found in urban areas are dominating the higher teacher salaries paid in urban areas.

The significantly negative coefficients on RELATIVE STATE INC in tables 6–9 provide evidence of redistribution from a state's richer counties to its poorer counties even when states with little variation in spending have been removed. Counties with higher values of the ratio of mean county income to mean state income are higher up the state's income distribution. Holding median income constant, a one standard deviation increase in this ratio is associated with $366 lower spending in table 6.

The regressions in tables 2–5 utilize states with a low coefficient of variation in school spending as well as states with medium and high CVs. Estimates of the effects of state supreme court rulings that overturned the state's education finance system are found in these regressions. Tables 2 and 3 are based on the full trimmed sample. The coefficients imply that after a school financing system was ruled unconstitutional, revenues fell in all the state's counties, particularly in the richer counties. A court mandate to equalize spending led to a $1,291 fall in revenues evaluated at the mean value for RELATIVE STATE INC and to a $1,501 fall in revenues evaluated at one standard deviation above the mean of RELATIVE STATE INC. There is also evidence, based on the significantly negative coefficient of RELATIVE STATE INC, of redistribution within the state even with no court mandate to equalize spending.

Tables 4 and 5 utilize the twenty-eight states with little school district spillover across county borders. Once again, there is evidence of redistribution within the state with no supreme court mandate and evidence that a state supreme court ruling resulted in lower school spending. But the surprising lack of statistical significance for the interaction variable SUPREME CT RULING × RELATIVE STATE INC suggests that the fall in spending due to a court ruling was no greater in the state's richer counties than in the state's poorer counties.

Finally, note that real spending was $537–1,443 higher in 2000 than in 1990, holding our other variables constant.

Estimating the Effect of the Elderly on Spending

The estimated income elasticity is slightly (0.06–0.13) greater, although not statistically significantly greater, than the estimated price elasticity. As noted earlier, this difference implies that a district's poorer citizens prefer to spend less money on schools than do the district's richer citizens. Since the elderly benefit less from better schools than do parents, the elderly are expected to align themselves with others who prefer lower school revenues. And, as expected, we get a better fit by assuming that the elderly vote with the community's poorest households than by assuming that the elderly vote with the richest households.

The regressions provide no direct evidence on how much the elderly affect spending. In the median voter model used in this article, the elderly affect spending through a change in the identity of the median voter household and, through a reduction in the number of school-age children, make it less expensive to raise school expenditure per child. Let us begin by examining the effect on the identity of the median voter.

Median Voter Effects of the Elderly on Spending

The alignment of the elderly with the poor results in a median voter household that is further down the community's income distribution. The median voter

household is poorer than would have been the case if the elderly did not clump with the poor. In table 6, the change in a community's median voter household's income due to its elderly equals the community's median voter household income calculated under the assumption that all the elderly are aligned with the poor (used in regression 4) less median income calculated under the assumption that age does not matter, which is median household income in the community (used in regression 1):

$$\text{MED HHD INCOME}_{\text{all elderly}} - \text{MED HHD INCOME}_{\text{same preferences}}.$$

The estimated effect of the change in median voter household income on spending will be calculated using the regression coefficient in the fourth regression in table 6.

$$0.0867 \times (\text{MED HHD INCOME}_{\text{all elderly}} - \text{MED HHD INCOME}_{\text{same preferences}})$$

The median voter household also faces a lower tax price due to there being some elderly in the community. The effect of the elderly on the median voter household's tax price is given by

$$\text{MED INCOME/MEAN INCOME}_{\text{all elderly}} - \text{MED INCOME/MEAN INCOME}_{\text{same preferences}}.$$

In turn, the effect of the elderly on spending through a change in the tax price equals

$$-3185.545 \times (\text{MED INCOME/MEAN INCOME}_{\text{all elderly}} - \text{MED INCOME/MEAN INCOME}_{\text{same preferences}}).$$

The net effect of the elderly on school spending, working through a change in the identity of the median voter, is given by summing the above income and price effects:

$$0.0867 \times (\text{MED HHD INCOME}_{\text{all elderly}} - \text{MED HHD INCOME}_{\text{same preferences}}) - 3185.545 \times (\text{MED INCOME/MEAN INCOME}_{\text{all elderly}} - \text{MED INCOME/MEAN INCOME}_{\text{same preferences}}).$$

Table 11. Distribution of Estimated Net Median Voter Effect of Elderly on Spending. Elderly and Non-elderly Equally Weighted

	Trimmed Samples	
		Less Low-CV States
	Less Low-CV States	Less Cross-County States
	Table 6: 4th regression	Table 8: 3rd regression
Mean	−65*	−8*
Standard deviation	116	23
5th percentile	−230	−46
10th percentile	−180	−28
25th percentile	−123	−11
50th percentile	−66	3
75th percentile	−7	8
90th percentile	65	12
95th percentile	117	23

* Mean is significantly different from 0.

This estimate of the net effect of the elderly on school revenues was calculated for each of the 4,851 observations in the trimmed sample where the low-spending CV states were removed. The distribution of estimated net median voter effects based on table 6 is reported in the first column of table 11. The presence of the elderly is estimated to lower per pupil school revenues by $66 in the median county. In over three-quarters of the counties, the elderly have resulted in lower school spending. This negative impact is consistent with the income elasticity being larger than the price elasticity and with the elderly aligning with the poor. The mean effect (−$65) is significantly negative, but the effect is tiny in comparison with mean per pupil revenues ($6,510) and the effects estimated for other variables.

A similar calculation of the effect of the elderly is based on the third regression in table 8, which uses only states in which few school districts spill over into two or more counties and which excludes states with little variation in spending. In this sample, the best fit was found assuming that all elderly migrants were aligned with the jurisdiction's poorest households. The estimated effect of the elderly, working through changes in the identity of the median voter, based on this regression is

$$0.2090 \times (\text{MED HHD INCOME}_{\text{all migrants}} - \text{MED HHD INCOME}_{\text{same preferences}}) - 8321 \times (\text{MED INCOME/MEAN INCOME}_{\text{all migrants}} - \text{MED INCOME/MEAN INCOME}_{\text{same preferences}}).$$

The distribution of estimated net median voter effects is described in the second column of table 11. The elderly are estimated to have a much smaller impact in this sample than in the larger sample that is not limited to states with few districts crossing county boundaries. The mean estimated net median voter effect based on the regression in table 8, although significant, is only −$8.

Estimated Effect of Elderly through Fewer School-Age Children

In communities with more elderly, there are fewer households with school-age children, which makes it cheaper for the median voter to increase school spending per pupil. There is strong evidence in this and other studies that spending per pupil is higher in communities with few school-age children.

To gauge the magnitude of this effect, we first estimated a simple bivariate regression using the full trimmed sample, in which the fraction who are of school age is explained by the fraction who are aged sixty-five or older. The coefficient on the elderly variable (−0.173) is negative, as predicted, and is highly significant ($t = 23.7$). A one standard deviation rise in the fraction sixty-five and older (0.0429) is estimated to lead to a reduction in FRACTION 5–17 by 0.00742.

This estimated drop in the fraction of school age then is multiplied by the relevant FRACTION 5–17 coefficients. The coefficient in the fourth regression in table 6 (−8803), corresponding to the sample with low-CV states removed, implies a $65 rise in per pupil spending. Similarly, a $46 rise in school spending is implied by the third regression in table 8; this sample in addition is confined to states in which few districts wander across county lines.

6. CONCLUSION

The literature on the effect of the elderly on primary and secondary school spending has not taken advantage of the structure provided by the median voter model. As a result, the specification used in this literature offers little insight into how the elderly affect school spending.

We have used the median voter model to estimate the demand for school spending under four assumptions about elderly preferences and under two assumptions about how the elderly and non-elderly populations should be weighted in determining the median voter household income. There is strong evidence that median income and tax price measures that are constructed based on the assumptions that all the elderly or all elderly migrants align themselves with the county's poorest households better explain school spending than unadjusted county median income and tax price variables, which are based on no differences in preferences between elderly and non-elderly households. The alignment of the elderly with the group that favors the least school spending (the poor) provides evidence of intergenerational conflict and correspondingly

that the elderly alter the identity of the median voter. Furthermore, elderly preferences are best described by assuming that all the elderly or all elderly migrants vote with the poor. Elderly opposition to higher school spending comes from more than elderly migrants from other states.

In jurisdictions with more elderly, the median voter household is further down the jurisdiction's income distribution. Due to lower income, this household would spend less on schools. But this household also faces a lower price to improve schools because its income is lower relative to mean income in the county. Several bits of evidence suggest that the income effect is slightly larger than the price effect, implying that spending is lower in communities with more elderly. First, the income elasticity is 0.06–0.13 greater than the price elasticity. Second, the elderly vote with the poor, who, based on these numbers, support lower spending on schools. Third, the typical estimated effect of the shift in the median voter on spending due to the elderly, working through these income and tax price effects, is negative, although small (−$8 to −$65).

An increase in the elderly population is also associated with a drop in the school-age population. This reduces each voter's cost of raising per pupil spending, leading to higher spending. We estimate that a typical rise in the elderly share leads, through a fall in the school-age population, to a $46–$65 rise in spending per pupil.

To summarize, an influx of the elderly leads to a small fall in spending due to a shift in the identity of the median voter and leads to a small rise in spending due to there being fewer children to educate. On net, a rise in the fraction who are elderly is associated with a very small, if any, rise in spending per pupil. The lack of consistent evidence in the literature on the impact of the elderly on spending may be due to the net effect being close to zero. These results suggest that there is little reason to be concerned about the influence of a graying population on support for better schools. School districts experiencing a growth in the fraction aged sixty-five and older have no need to prepare for a sizeable ensuing drop in school spending because the elderly have an almost imperceptible impact on school spending. Similarly, there is no reason to be concerned about children in elderly havens receiving an inferior education.

We thank Steve Slutsky for stimulating discussions that led to this article. We have also benefited from valuable comments from Burton Abrams, Eric Brunner, David Figlio, David Monk, Randy Reback, Kim Rueben, panel participants at the American Education Finance Association meetings and the Public Choice Society meetings, seminar participants at the University of Northern Illinois, and three anonymous referees.

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APPENDIX

Table A.1. Spending regressions: Untrimmed Sample, 6,188 Observations from 3,124 Counties. Elderly and Non-elderly Equally Weighted

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.075	.077	.077	.090
	(4.44)	(4.52)	(4.54)	(5.65)
MED INCOME/MEAN INCOME	−3701	−3823	−3930	−4388
	(3.87)	(4.00)	(4.10)	(5.62)
FEDERAL REVENUE	.577	.577	.577	.587
	(7.74)	(7.75)	(7.75)	(7.93)
FRACTION 5–17	−10639	−10598	−10551	−10432
	(6.24)	(6.22)	(6.18)	(6.14)
FRACTION URBAN	93.3	92.6	91.9	−20.4
	(0.38)	(0.38)	(0.37)	(0.08)
HOMEOWNER DUMMY	−366	−335	−335	−367
	(0.87)	(0.87)	(0.87)	(0.95)
RELATIVE STATE INC	−2396	−2455	−2481	−2172
	(3.02)	(3.10)	(3.13)	(3.32)
SUPREME CT RULING	−16.7	−16.6	−16.0	−5.76
	(0.24)	(0.24)	(0.23)	(0.08)
SUPREME CT RULING	−2307	−2304	−2293	−2227
× RELATIVE STATE INC	(3.07)	(3.07)	(3.05)	(2.97)
2000 DUMMY	1154	1147	1144	1178
	(14.0)	(13.9)	(13.9)	(18.3)
R^2: Within	.5924	.5925	.5925	.5942
Between	.0431	.0437	.0438	.0485
Overall	.1404	.1411	.1415	.1489
F-statistic: Overall	443.80	444.01	444.11	447.28
F-statistic: Fixed effects = 0	5.80	5.81	5.81	5.93
σ(error)	1006.1	1005.9	1005.9	1003.8

Note: Absolute *t*-statistics are in parentheses.

Table A.2. Spending regressions: Untrimmed Sample, 6,188 Observations from 3,124 Counties. Elderly and Non-elderly Weighted by Voter Turnout

		Elderly Aligned with Poor		
	Same Preferences	**Cross-State Migrants**	**All Migrants**	**All Elderly**
MED HHD INCOME	.075	.078	.078	.088
	(4.44)	(4.53)	(4.55)	(5.64)
MED INCOME/MEAN INCOME	−3701	−3999	−4148	−4127
	(3.87)	(4.17)	(4.32)	(5.65)
FEDERAL REVENUE	.577	.576	.575	.581
	(7.74)	(7.73)	(7.72)	(7.88)
FRACTION 5–17	−10639	−10677	−10623	−10698
	(6.24)	(6.28)	(6.24)	(6.32)
FRACTION URBAN	93.3	79.9	78.7	−39.1
	(0.38)	(0.32)	(0.32)	(0.16)
HOMEOWNER DUMMY	−366	−339	−339	−384
	(0.87)	(0.88)	(0.88)	(1.00)
RELATIVE STATE INC	−2396	−2465	−2499	−1830
	(3.02)	(3.14)	(3.19)	(2.96)
SUPREME CT RULING	−16.7	−15.2	−14.4	−6.51
	(0.24)	(0.22)	(0.21)	(0.09)
SUPREME CT RULING	−2307	−2304	−2291	−2253
× RELATIVE STATE INC	(3.07)	(3.07)	(3.05)	(3.00)
2000 DUMMY	1154	1150	1146	1224
	(14.0)	(14.2)	(14.2)	(21.0)
R^2: Within	.5924	.5926	.5926	.5943
Between	.0431	.0427	.0427	.0440
Overall	.1404	.1401	.1405	.1435
F-statistic: Overall	443.80	444.17	444.32	447.29
F-statistic:				
Fixed effects = 0	5.80	5.82	5.82	6.00
σ(error)	1006.1	1005.8	1005.7	1003.7

Note: Absolute *t*-statistics are in parentheses.