# Intergenerational Conflict in Education Financing: Evidence from A Decade of Bond Referenda

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I examine how population aging affects voter support for and the efficiency of public education provision. Analyzing a decade of school bond referendum data, I find that school districts with older populations are less likely to approve bond proposals to finance school investments. I leverage variations in historical fertility trends to separate the effect of aging-in-place from that of endogenous sorting. Comparing narrowly passed and failed referenda, I find that house prices do not appreciate after bond approvals in older-population districts, despite increased spending. These results align with generational political divisions over education investment but do not indicate inefficiency.

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# 1 Introduction

The US public education system plays a vital role, serving approximately 90% of students across the nation.[1] However, the aging population has raised concerns that the next several decades could witness growing intergenerational conflicts over the provision of local public goods, such as education. While the older generations have lower immediate demands for education, they may exhibit intergenerational altruism, or recognize that an educated young workforce benefits them by preserving the tax base necessary to finance programs that support the elderly (Levy, 2005; Epple, Romano, and Sieg, 2012; Galperti and Strulovici, 2017). Even if aging leads to lower voter support for education funding, this doesn't necessarily imply that investment in education will fall to inefficiently low levels. Schools located in areas with an older population may have already received substantial investments in the past, resulting in fewer immediate needs for new investment. In such cases, the political division between the older and younger generations may prevent excessive spending and facilitate the efficient allocation of resources.

In this paper, I study whether the share of the senior population in an area affects voter support for education funding, and consequently, the efficient provision of public education in the U.S. Empiricists face three main barriers in answering this question. First, measuring support for education spending is challenging, because we often cannot observe the decision-making process of local voters. To overcome this challenge, I collect data on municipal bond referenda spanning a decade for several large U.S. states. Using this dataset, I construct proxies for voter support based on school bond voting outcomes. Bond referenda provide a novel and meaningful laboratory to assess local support for education spending because school investments are frequently financed via voter-approved municipal bond issuances in the U.S.

The second challenge lies in quantifying the efficient level of public education investment in a given region. I address this challenge through the lens of housing markets, drawing on standard models of local public goods. These models suggest that school districts should spend up to the point where marginal increases would have zero impact on local house prices (e.g. Cellini, Ferreira, and Rothstein, 2010). This holds because in an open economy where capital and labor are mobile but real estate is not, house prices should reflect the local economic value of infrastructure investment. A positive effect of spending increases

[1] See https://www.bls.gov/opub/ted/2018/a-look-at-elementary-and-secondary-school-employment.htm and https://nces.ed.gov/fastfacts/display.asp?id=55.

on local property values is direct evidence that the initial spending was inefficiently low, and vice versa.

The third challenge involves establishing causality. The proportion of the older population in a community is endogenous to local characteristics, and school capital spending is often correlated with other factors affecting local house prices, such as the state of the local economy. To disentangle the effects of aging in place from those of endogenous sorting, I leverage variations stemming from historical fertility trends. To isolate exogenous variations in education investment unrelated to other potentially confounding factors, I focus on bond proposals that narrowly pass or narrowly fail.

I amass a large dataset: bond referendum data for school districts in several large US states covering about one-third of school districts nationwide, district-level demographics information from the Census American Community Survey (ACS), district historical spending data from the 1980, 1990, and 2000 Decennial Census and recent annual spending data from the National Center for Education Statistics (NCES), hand-collected data on annual state birth rates from the Center for Disease Control and Prevention (CDC)'s historical publications, municipal bond pricing data from Mergent, house price data from the Federal Housing Finance Agency (FHFA), and public school ratings from GreatSchools. The sample period spans from 2010 to 2019

I begin by estimating the relationship between the share of the elderly in a district and the voting outcomes of school bond proposals. I find that a ten percentage point increase in the share of the population above 55 years old is associated with a five percentage point decrease in the probability of bond approval. These regressions condition on a set of school district characteristics, such as income and education level, and state-by-year fixed effects to account for differences in state fiscal institutions such as debt limits and balance budget restrictions. The results also hold after controlling for the share or number of school-age children in a district, or employing inverse probability weighting to address potential sampling biases arising from different frequencies of bond proposals (Solon, Haider, and Wooldridge, 2015). Moreover, the negative relationship between aging and school bond approval rates cannot be attributed to overall debt aversion among seniors, because this negative relationship is not observed among bond proposals unrelated to school spending, such as those related to public transit, sewage, and safety.

The negative association between aging and education support represents the combined effects of population aging in place and endogenous sorting. For instance, areas with good schools often have better amenities and lower crime rates. These characteristics may attract older adults, who may move there either because they value such amenities and safety or because they can afford the higher property prices in such areas. At the same time, better amenities and safety can lead to higher average life expectancy. Thus, these patterns of sorting and mortality could imply a positive association between the share of elderly residents and school spending, potentially mitigating the negative effects of population aging in place.

Next, I disentangle the effects of aging in place from those of endogenous sorting by focusing on variations stemming from historical birth trends. These variations are substantial due to states' different exposure to the post-WWII baby booms. This approach allows me to examine a *ceteris paribus* scenario: what would be the impact on current education support if a district's population consisted solely of individuals born in that district decades ago? Indeed, the estimated negative effects become much larger when relying on historical birth rate variations in a two-stage-least-square (2SLS) framework. This suggests that in the absence of sorting, the effects of aging would have been considerably larger.

So far, these results suggest that an aging population tends to diminish voter support for education investment. However, does this shift in voter preference imply inefficiency? In other words, do the marginally not-financed projects due to generational preferences lead to local losses? *A priori*, the answer to this question is unclear. If schools in aging areas require substantial upgrades, and increased spending generates local economic benefits by enhancing the quality of education in these regions, then decreased voter support could lead to inadequate investment levels. However, if these areas have already received substantial past investments to the point where additional spending no longer yields positive economic values, then it would be efficient to vote against new education investments. In the latter case, the political divide across generations could curb overspending and serve as a disciplinary mechanism.

To examine the efficiency of education investments in areas with younger and older populations, I study housing market reactions to new investments. This approach is inspired by the classic work of Oates (1969), who develops a simple but powerful framework for testing whether local public goods are efficiently provided. The key conjecture is that local governments should spend up to the point where a marginal increase would have zero effect on local housing prices. If, instead, an additional dollar invested in local public goods raised house prices, this would suggest that such investment has increased the desirability of living in the district. Consequently, it would suggest that the initial level of public good provision was inefficiently low.

I combine this framework with plausibly exogenous variations in education investment stemming from bond elections that narrowly pass and fail. While school districts issuing bonds are likely to differ, in both observable and unobservable aspects, from those that do not, these differences can be minimized by focusing on close elections (Cellini, Ferreira, and Rothstein, 2010). Using this approach, I separately estimate house price reactions to new education investment projects in districts with younger and older populations. If it is indeed true that the political division between older and younger demographics leads to inefficiently low investment levels in older regions, then I should observe *larger* house price appreciation effects after bond issuance in regions with an older population.

Dynamic difference-in-differences regressions around close bond elections show that house prices appreciate gradually after debt issuances. However, the pattern is different for districts with younger and older populations. In younger population districts, house prices increase by around 4% in the five-year period after a narrowly passed bond proposal. In contrast, in older population districts, house prices remain flat for at least five years out, despite large and statistically significant spikes in school capital expenditure after bond approvals. Taken together, these dichotomous results suggest that in districts with younger populations, where a marginal dollar of investment is more value-adding, bonds are more likely to be passed. Conversely, in districts with older populations, where a marginal dollar of investment is less value-adding, bonds are less likely to be passed. These findings suggest that while an aging population can lead to lower voter support for education provision, such frictions tend to facilitate efficient investment decisions.

Why don't house prices appreciate in response to education investments in areas with an older population? A plausible explanation is that in these regions, education had received substantial investments in the past relative to current needs. As a result, these areas may require fewer significant capital improvements funded by municipal bond issuances today. Two pieces of evidence are consistent with this interpretation. First, past capital expenditures relative to the current student base are higher in school districts with an older population. Second, current school ratings, a measure of overall school quality, are higher in districts with an older population. I also explore mechanisms related to different bond use-of-proceeds, cost of financing, or lower housing transaction volumes in older-population districts, and find evidence inconsistent with these alternative explanations.

My paper contributes to the literature on intergenerational conflicts over public goods provision. Theories on intergenerational conflicts and the politics of education provision have mixed predictions about whether and how the demographic structure of a population affects the support of public education (Gradstein and Kaganovich, 2004; Levy, 2005; Epple, Romano, and Sieg, 2012). Empirical studies examining the realized levels of spending find mixed results (Poterba, 1997; Harris, Evans, and Schwab, 2001; Hilber and

Mayer, 2009). While an important outcome to study, school spending may not be a direct measure of resident preference because it is also a function of school district fiscal conditions, and districts with older populations could have higher average spending because they have higher property tax revenues, offsetting the negative impact of preference. Measuring pure preferences is more difficult. Brunner and Balsdon (2004) use survey data in California to assess seniors' support for primary and secondary education, and Brunner and Johnson (2016) use California's university bond referendum data to assess preferences for higher education.

I contribute to this literature in three ways. First, I measure voter preferences for education provision by building a bond referendum dataset that covers a third of school districts in the U.S. Second, I use variations originating from historical birth trends to separate the effect of aging-in-place from that of resident sorting. Third, I take a step further and quantify how aging affects the efficiency of public education provision. In this aspect, my study is related to the political economy literature studying the effect of direct democracy on the performance of governments (e.g. Matsusaka 1992, Lupia and Matsusaka 2004, Matsusaka 2005).

My framework of using housing values to gauge returns to school spending is similar to those used in the broader public economics literature. Since the seminal work of Oates (1969), Cellini, Ferreira, and Rothstein (2010) formalize this approach and other papers use this approach to assess whether, and which type, of school spending is efficient in the US (e.g. Bayer, Blair, and Whaley, 2020; Biasi, Lafortune, and Schonholzer, 2023).[2] The framework of using house prices to gauge the efficiency of public spending is also used more broadly in the finance and economics literature (e.g. Aiello, Bernstein, Kargar, Lewis, and Schwert, 2019; Gupta, Van Nieuwerburgh, and Kontokosta, 2022).

My paper also contributes to our understanding of the frictions underlying education financing in the U.S. Existing papers have identified racial biases (Dougal, Gao, Mayew, and Parsons, 2019), underwriting markups (Garrett, Ordin, Roberts, and Suárez Serrato, 2023), wealth inequality (Boyson and Liu, 2022), and ballot information disclosure (Boyson and Liu, 2023) as sources of frictions. I study a different source of friction affecting public education financing: intergenerational divisions over the provision of public goods.

[2] See Jackson (2020) for a literature review of the benefits of school spending.

## 2 School District Finance and Bond Referendum

Public school districts are special-purpose government entities that specialize in the local administration of elementary schools, secondary schools, or both. They typically have the autonomy to levy taxes, issue bonds, and spend on various school-related activities. Public school districts are economically important. Collectively, they spend over $600 billion per year, serve about 50 million students, and provide over 5 million job opportunities.

In most school districts, the school board is at the top of the organizational hierarchy. The board provides oversight and governance for a district and its schools. Below the school board is the superintendent of schools, followed by executive officials or assistant superintendents, who lead various departments within the district's bureaucracy. A school principal manages the daily operations of a given school and reports to the district's superintendent. School boards are responsible for the appointment and dismissal of the district superintendent, whom they delegate the routine operations of the district. School boards often may have the authority to set tax rates, recommend measures to a legislative body, and be involved in personnel and financial decisions.

School districts rely mostly on property taxes to support public education funding. They collect taxes from residential and commercial properties as a direct revenue source. A common way for school districts to finance lump-sum capital investment projects is through issuing municipal bonds. Education municipal bonds constitute about 28% of the entire $4 trillion municipal bond market.[3] Many school districts have issued General Obligation bonds to finance projects such as school construction and renovation, education improvement projects, the acquisition of new land or school buses, etc. A General Obligation bond is a long-term borrowing tool in which a municipality pledges its full faith and credit (taxing power) to repay the debt over a specified term. For school districts, these bonds are typically repaid with revenues raised from property taxes. In many states, the issuance of General Obligation bonds by school districts requires a referendum. A bond referendum is a voting process that gives voters the power to decide if a local government should be authorized to raise funds through the sale of bonds, for specific purposes.

Although the exact processes of bond issuance differ by state, when a referendum is required, a school

[3] See https://www.msrb.org/~~~/media/Files/Resources/MSRB-Infrastructure-Primer.ashx.

district can go through five stages before it issues a municipal bond.[4] First, the school board sets priorities and discusses if a bond issuance is needed, and if so, for what purpose. They can also engage local communities and invite public comments. Second, the board then selects financial advisors, forms a bond counsel, and selects an election attorney. Third, the board can order the election and place the bond on the ballot. Fourth, voters collectively decide to approve or defeat the bond issuance. Last, if the bond is approved by voters, then the district will work with an investment bank to place the bond with investors, or a placement agent in the case of a private placement.

# 3 Data and Summary Statistics

## 3.1 School Bond Referendum

I collect bond referendum data for school districts in the United States through FOIA requests to the states' Department of Treasury and Department of Education. My dataset of school bond referenda covers six large US states, which are California, Illinois, Michigan, Ohio, Texas, and Wisconsin. These states together cover more than 33% of school districts in the U.S. The referendum data are rich and include variables such as the name of the district, the date of the election, the amount of bond proposed, descriptions of the purpose of the bond, the outcome of the bond election, and the number of votes for and against each bond proposal, which allows for the comparison between elections passed and failed by narrow margins.[5] I also use data on local government bond proposals collected from S&P Global to track non-school bond proposals. These data cover 39 states and contain information on the date of the bond proposal and the outcome of the bond.

I match the bond referendum data to school districts' demographics and spending data (described below) based on district name, state, and year. The matching algorithm first pre-processes the strings of the names to adjust for differences in naming convention across states and databases and conduct exact matching. For the unmatched observations, I then use a fuzzy matching algorithm based on string similarities. As a last step, I manually go through each fuzzily matched observation to correct any algorithmic matching mistakes.

[4] For some examples of states' descriptions of the referendum process, see https://www.tasb.org/services/legal-services/tasb-school-law-esource/business/documents/overview-of-school-district-bond-issuance.pdf, https://www.tasb.org/services/legal-services/tasb-school-law-esource/business/documents/school-district-bond-election-process.pdf, and https://www.townofmorrisville.org/home/showpublisheddocument/5573/637595215838570000.

[5] The number of votes for and against was not provided for the state of Illinois.

## 3.2 School District Demographics, Spending, and Ratings

I obtain school district population demographics data from the U.S. Census American Community Survey (ACS). The data come from ACS 5-year surveys and cover all elementary, secondary, and unified school districts in the United States. The data contain the number of people by 5-year age bins and gender for each school district. From ACS, I also collect several variables as controls in my regressions, such as the average family income and the percentage of the population with a bachelor's degree or higher in a school district in a given year. Additionally, to control for local partisanship, I collect gubernatorial election voting data at the county level from U.S. Election Atlas.

I collect nationwide school district revenue and spending data from the NCES Common Core of Data for the years 2010-2020. The Common Core of Data is the Department of Education's primary database on public elementary and secondary education in the United States. It is of annual frequency and contains variables such as the number of students enrolled, teachers and staff, revenues, expenditures, and expenditures by category (e.g. current vs. capital) and by purpose (e.g. instruction, food, salary, support services). I construct per-pupil capital expenditure measures for my analysis, and match these data with data on bond elections by adjusting for the fiscal year-end dates for each state in my sample. To measure historical spending, I further obtain school district spending data from the decennial census conducted by the U.S. Census Bureau for the years 1980, 1990, and 2000.

I also collect data on public school ratings in the U.S. from GreatSchools. The data include the addresses of schools and their ratings in the most recent year (updated as of 2022). The rating assesses how effectively the school serves its students based on a variety of school quality metrics, such as academic progress, college readiness, advanced courses, equity, discipline, attendance, and more. Ratings are on a scale of 1 (below average) to 10 (above average). I calculate the average school rating for all schools within a school district, and merge this dataset with the school district referendum data based on unique school district IDs.

## 3.3 Historical Birth Rates

To isolate variation in population aging determined by historical birth trends, I hand-collect historical birth rates and infant mortality rates for each state from 1945 to 1965 from the CDC's annual Vital Statistics of the United States publications. I transcribe the historical tables to machine-readable formats. The data describe the number of births per 1,000 population and infant mortality rates for each state in a given year.

### 3.4 House Price

My measure of house prices in each school district is based on the local house price indices developed by the Federal Housing Finance Agency (FHFA). The FHFA house price index is a weighted, repeat-sales index constructed using houses that have been sold or refinanced multiple times (Case and Shiller, 1988). During my sample period, these indices are available at the census tract level. I use the census shapefiles to match census tracts to school districts in the U.S. and calculate the average house price of a school district across all the census tracts within the district boundary. Additionally, I collect annual data describing county-level residential housing transaction volumes such as new listings, homes sold, and inventories from Redfin.

### 3.5 Municipal Bond Yields

I obtain tranche-level municipal bond primary market issuance data from the Mergent Municipal Bond Database. It includes variables such as issuer name, issuance date, and bond characteristics such as yield, amount of issuance, time to maturity, credit ratings, tax codes, call option flag, and more. I restrict the sample of Mergent bonds to be new-financing, General Obligation bonds issued between 2010 and 2021, for which the reported use of proceeds is for primary and secondary education. Then, I hand-match the municipal bond issuance data to the bond referendum data based on the name and state of the issuer and the local government, and the date of the bond election and the bond issuance. I require the date of the bond issuance to be within two years after the bond election date, and the amount of issuance to be within a 20% margin of the bond referendum proposed amount. The results are not sensitive to using a tighter margin, a shorter time frame, or requiring the amounts to be exactly equal in the matching process.

### 3.6 Summary Statistics

Table 1 presents summary statistics for my sample of school district bond referenda. The sample period is from 2010 to 2019. The variables are winsorized at the 1st and 99th percentiles. The average district has about 29% of the population with age above 55. This statistic increased during our sample period, from 26% in 2010 to over 30% in 2019. For a school bond proposal, the average percentage of supporting votes is 58%.

About 70% of school bonds are approved by voters, but this statistic varies tremendously across districts and years, and the standard deviation is about 45%. The average amount of bond proposal is $56 million and highly skewed—the median amount of bond proposed is around $18.5 million. An average district spends about $11,888 per pupil, around $1,226 (10.3%) of which is on capital expenditure, spending to support infrastructures such as new buildings, playgrounds, school buses, swimming pools, and major renovations.

# 4 Population Aging and Bond Voting Outcomes

## 4.1 Graphical Evidence

I begin my analysis by presenting graphical evidence that the share of the older population in a school district is negatively correlated with bond proposal passage rates. I use 55 years old as the age cutoff at which the preference towards education spending changes, based on the fact that birth rates decline sharply after the age of 39 (Morse, 2022). Therefore, by the age of 55, most people will have likely seen their children graduate from the public school system. The results are similar using a different age cutoff, such as 65 years old, presented in Appendix Figures A1 and A2.

Figure 1 Panel A shows the binscatter plot of bond passage against the share of population above 55 in a district. The overall relationship is negative. In Panel B, I plot the relationship after conditioning on state-by-year fixed effects and a set of control variables, which include population, income, education (measured as the share of the population with a bachelor's degree and higher), and the share of electoral votes that are for Republican candidates. The negative relationship remains.

Importantly, this negative relationship does not hold for non-school district bond proposals, suggesting that the previous pattern is not driven by a generally different sentiment towards debt financing among the older population. In Figure 2, I use bond referenda that are *not* initiated by school districts to conduct a placebo test. These referenda are often initiated by cities, counties, or local special districts on non-education-related matters. I map these proposals to counties and use county-level measures of population aging on the x-axis. While I observe a negative relationship in the raw data (Panel A), this relationship vanishes after controlling for variables such as income, education, and fixed effects (Panel B). This suggests that other regional characteristics that correlate with an aging population, such as income and education, rather than the aging population itself, drive the observed negative correlation in Figure 2 Panel A.

Histograms and kernel density plots of the share of votes for and against a proposal show evidence consistent with Figure 1. In Figure 3 Panel A, I plot a histogram of the distribution of the share of votes supporting a bond referendum. I divide the sample into quartiles based on the percentage of the population above 55. Compared with districts in the top quartile, districts in the bottom quartile have a higher density of bond referenda with above 50% share of "yes" votes for bond issuance, which is a common threshold for bond approval (but not always). In Panel B, I overlay the kernel density functions for the two distributions. The density function for vote shares in the bottom quartile districts is shifted to the right compared with that in the top quartile districts, suggesting that a higher proportion of the population approves a school bond in districts with a younger population.

## 4.2 OLS Results

Next, I use regression analysis to quantify the patterns observed in graphs. I estimate equations of the following forms:

$$\text{I (Pass)}_{ijt} = \alpha + \beta \text{Share of Population Above } 55_{it} + \gamma \mathbf{X}_{it} + \eta_s + \lambda_t + \epsilon_{ijt}, \quad (1)$$

and

$$\text{I (Pass)}_{ijt} = \alpha + \beta \text{Share of Population Above } 55_{it} + \gamma \mathbf{X}_{it} + \eta_{st} + \epsilon_{ijt}. \quad (2)$$

I use $i$ to denote school districts, $j$ to denote bond proposals, $t$ to denote years, and $s$ to denote states. Standard errors are clustered by school districts to account for residual correlations within a district across different elections. The outcome variable is an indicator of whether the bond proposal is approved in a given election. The regression controls for school district characteristics such as the natural logarithm of the size of the population base, the natural logarithm of the average family income, the share of the population with a bachelor's degree and higher, and the Republican vote share. I include state and year fixed effects in Equation 1 to account for state-invariant fiscal and institutional features and macroeconomic trends, and state-by-year fixed effects in Equation 2 to absorb changing state fiscal conditions and/or institutional features such as debt limits, spending limits, and balance budget restrictions.[6]

Table 2 shows the results. A ten percentage point increase in the share of the population above 55 is associated with a 5-5.3 percentage point decrease in the probability of bond approval. This effect is economically meaningful and represents a 7-8% effect compared with the 70% unconditional probability of bond approval. Figure 4 shows how the estimates change when control variables and fixed effects are added successively. The coefficients are negative, statistically significant, and stable across specifications. The results are quantitatively similar when I control for the share or the log number of school-age children in a district, shown in Appendix Table A1, and when I use weighted regressions to correct for the potential sampling bias resulting from the differential frequency of bond proposals across districts, where the weights are the inverse of the number of bond proposals in a district-year (Solon, Haider, and Wooldridge, 2015). These results are reported in Appendix Table A2.

The evidence so far suggests that voters are less supportive of education funding in areas with an older population. Could this effect be driven by an overall change in the older population's aversion toward debt financing? To this end, I conduct a similar analysis using bond proposals that are not initiated by school districts in Table 3. These bonds are proposed for purposes such as improving public transit, improving sewage, buying police cars, building parking lots, etc. The coefficient estimates suggest no statistically significant relationship between the fraction of the elderly and bond proposal passage rates for bonds not related to schools. This test rules out the alternative explanation that older adults are generally more risk-averse and prefer lower levels of debt financing.

## 4.3 Isolate the Effect of Aging-in-Place from Endogenous Sorting

The negative association estimated using OLS regressions represents the combined effects of population aging in place and that of endogenous migration and mortality trends. This is because three factors can influence the size of the school district populations and their age distributions at any given point in time: historical trends in birth rates, mortality rates, and migration. School spending itself can potentially shape the population age structure by affecting contemporaneous patterns of migration and mortality. Separating

[6] While it would be ideal to control for district fixed effects to absorb time-invariant district characteristics, about 60% of the school districts in my sample only have one or two bond proposals during the sample period. In later analyses where I use annual data on district house price and capital expenditures, district-election fixed effects are included.

the effects of the aging-in-place from those of sorting can have important policy implications for schools with an aging population that seeks to attract younger demographics.

To isolate the effects of the aging of the existing population, I use variations stemming from historical birth rates in a 2SLS framework. This variable is calculated as the average historical birth rates net of infant mortality rates in the decade prior to t-55 in a given state. The idea is that birth rates from more than 55 years ago should be relevant for the share of the population turning 55 today. Indeed, Table 4 Column (1) shows that this variable is strongly related to the current fraction of the population above 55, with an F-statistic of 22.5 The second stage estimates presented in Column (2), once again, point to a statistically significant negative relationship between the share of the older population and school bond approval rates.

It is worth noting that the magnitude of the 2SLS estimate is much larger than the OLS estimates, suggesting that the effect of the aging of the existing population, absent of endogenous sorting and mortality patterns, is much larger. It is important to note that the 2SLS and OLS coefficients should be interpreted differently. The 2SLS estimate isolates one and only one economic channel (the aging of the existing population) through which the population age structure affects education support. By contrast, the OLS approach identifies equilibrium effects that include other offsetting mechanisms, such as contemporaneous trends in migration and mortality. The discrepancy in the economic magnitudes between the OLS and IV estimates suggests that endogenous migration and sorting can significantly dampen the negative effects of aging on support for education financing.

## 5 The Value of Education Investments By District Demographics

It is not immediately clear whether the reduced education support resulting from population aging would lead to less efficient education provisions. If schools in areas with an older population had sufficient investments in the past, to the extent that a marginal dollar spending on education no longer generates positive local economic values, then the reduced voter support may curb overspending in education and facilitate the efficient allocation of public resources.

The conceptual framework through which I investigate the efficiency of new education spending has a long history in the economics literature, dating back to classic works of Tiebout (1956) and Oates (1969). The thought experiment is the following: In an open economy where capital and labor are mobile (i.e.

households can "vote with their feet") but real estate is not, house prices should fully reflect the value of locally-financed infrastructure investment. This is because if a marginal resident values a local project more than the taxes they will pay to finance it, new investment will make the area more attractive, raising house prices. Thus, if public goods are efficiently provided, then a marginal increase in locally financed public goods should have zero effect on house prices. If, instead, a marginal increase in locally financed public good provision increased (decreased) house prices, this would imply that the level of investment was inefficiently low (high) to begin with.

Building on prior research, I quantify the value of education investments in regions with different age profiles by examining housing market dynamics. While it may be tempting to assess outcomes such as student test scores, the benefits of education investments extend beyond academic achievement. These investments can also contribute to improvements in student safety, arts and athletic programs, and various other non-academic aspects. By contrast, any shift in the desirability of a district—along either academic or nonacademic dimensions—should be reflected in equilibrium housing prices. Ideally, housing prices should immediately adjust to account for the present value of all future cash flows once the election outcome is known. Nevertheless, in reality, housing prices tend to be sticky, and it may take several years for them to fully reflect the effects of bond issuance. Thus, I am interested in measuring the full sequence of dynamic treatment effects several years following the bond election.

### 5.1 Graphical Evidence

Figure 5 presents graphical analyses of the average district house price by the margin of victory or defeat, in the year before the election (dotted line) and the second year after it (solid line). I split the sample based on population age, and plot average outcomes (controlling for calendar year fixed effects) in two-percentage-point bins defined by the vote share relative to the threshold, which is indicated by the vertical line. For example, the data point immediately left of the vertical line is calculated based on elections that failed by between one and three percentage points, and the data point left of that is calculated based on elections that failed by between three and five percentage points, and so on. Naturally, these estimates fluctuate more when we move further away from the threshold because landslide elections are more rare and thus there are fewer observations used to estimate the data points far from the threshold.

Figure 5 Panel A shows the results for districts with a below-median proportion of the population aged

55 years old and above, whereas Panel B shows the results for districts with an above-median proportion of the population aged 55 years old and above. In districts where bond measures were approved and the district is relatively young (Panel A), housing prices appear to shift upward two years after the bond proposal. There is no discernible shift in districts where the bonds were approved and the district is relatively old (Panel B). Taken together, the graphs show different house price reactions following bond approvals in districts with older and younger populations, providing suggestive evidence that education investments add less economic value in districts with an older population.

## 5.2 Dynamic Difference-in-Differences Estimation Using Close Elections

Next, I estimate the dynamic effects of bond passage on capital expenditure and local house prices in districts with older and younger populations. While housing markets can be used to overcome the challenge of measuring the value of public investments, this strategy does not avoid the challenge of obtaining causal effects. My empirical approach relies on dynamic difference-in-differences regressions using the sample of bonds passed and failed by narrow margins. Although school districts that issue bonds are likely to differ in both observable and unobservable ways from those that do not, these differences could be minimized by focusing on close elections. As such, a district where a proposed bond fails by a small percentage could potentially serve as a good counterfactual for districts where a proposed bond passed by a small percentage, absent of the "treatment" (bond issuance).

I estimate regressions of the following form, while restricting the sample to bond elections passed and failed within a 10% margin:

$$\begin{aligned}\text{Log House Price}_{ijt} =& \alpha + \sum_{h=-5}^{5} \beta_h \text{Treat} \times \mathbb{1}(t - \text{Election Year}_j = h) \\ &+ \sum_{h=-5}^{5} \gamma_h \mathbb{1}(t - \text{Election Year}_j = h) \\ &+ \eta_j + \lambda_t + \epsilon_{ijt},\end{aligned} \tag{3}$$

where I use $i$ to denote school districts, $j$ to denote bond proposals, $t$ to denote calendar years, and $h$ to denote event years (i.e. year relative to the election year). The specification includes election, calendar year, and event year fixed effects. Standard errors are clustered by school districts. The outcome variable is the natural logarithm of house prices, and in some specifications, the natural logarithm of school capital expenditures per pupil. *Treat* takes a value of one for bonds that are narrowly approved, and zero for bonds that are narrowly defeated. $\{\mathbb{1}(t - \text{Election Year}_j = h)\}$ represents a set of indicator variables for each event year, ranging from five years before the event to five years after. I use the year prior to the bond proposal as the baseline year in all dynamic estimations. The coefficients on the lower-order interaction terms such as indicators for event years are estimated and suppressed in tables for brevity. The coefficient on *Treat* cannot be separately estimated because it is absorbed by election fixed effects.

I report both pooled estimates and estimates separately for younger and older districts. The set of coefficient estimates $\{\beta_h\}$ for the pooled sample are reported in Table 5, and plotted in Figure 6. The effects on capital expenditures peak in years one and two after the bond authorization. Appendix Figure A3 shows that this pattern is similar across districts with a high and low share of the senior population. The effect on house prices appears in year two and persists at least five years after the election, with a magnitude of around 2-3%.

In Table 6 Panel A, I separately estimate the effects on house prices for younger and older population districts. These coefficients are plotted in Figure 7. House prices increase by about 4% locally in districts with younger populations, but this price appreciation is not present in districts with an older population, where local house prices remain flat for at least five years after a bond issuance. In Table 6 Panel B, I further estimate dynamic triple-difference specifications where I interact $Treat \times \mathbb{1}(t - \text{Election Year}_j = h)$ with an indicator for whether the district has an above median share of population 55+ (Column (1)) and the continuous variable measuring the share of population 55+ (Column (2)). These specifications test whether the differences in coefficient estimates observed between Panel A Columns (1) and (2) are statistically significant. Indeed, the coefficient estimates on the triple interaction terms confirm that the house price appreciation effect is significantly weaker in districts with an older population.

A potential concern with the dynamic estimation approach is that a school district may hold more than one bond election during my sample period. For instance, a district that narrowly rejects an initial bond proposal may pass a new proposal within five years thereafter. If that's true, then the current dynamic estimates would be biased downward as the control group may become treated in the post-treatment period. To address this concern, I re-estimate Equation 3 by restricting the sample to school districts that only held *one* bond election during the sample period. The estimates are tabulated in Table 7 and graphed in Figure 8.

This estimation yields even larger house price appreciation effects in younger school districts, but once again, no effect in older districts. Table 7 Panel B uses the dynamic triple-differences specification to show that the estimated differences across regions remain statistically significant.

## 5.3 Discussion on Mechanisms and Alternative Explanations

Why do house prices fail to increase in response to education investments in areas with an older population? One plausible explanation is that these regions had made substantial investments in the past compared to what is needed today. For instance, if these districts acquired sufficient land and constructed spacious classrooms a decade ago, they would require fewer lump-sum capital improvements funded by municipal bonds today. Consequently, a marginal increase in bond-financed education investments may not yield as much additional benefit.

I find two pieces of evidence consistent with this mechanism. First, past capital expenditures are higher in school districts with a larger share of population above 55. In Table 8, the outcome variables are the natural logarithm of historical school capital expenditures in 1980, 1990, and 2000, measured using decennial Census data, divided by the number of school-age children (age 5-20) today. These measures reflect the size of past investments *relative* to the current student base. Across all columns, the share of population 55+ is positively associated with past capital expenditures per pupil. Second, I find that current school ratings tend to be higher in districts with an older population, as shown in Figure 9 using a cross-sectional measure of school rating produced in recent years.

Other tests suggest that alternative mechanisms, such as different use-of-proceeds or cost of financing, are not driving the diverging effects on house prices. If districts with an older population are more likely to issue refinancing bonds or bonds used for liquidity needs that generate lower economic benefits, this difference in bond types could explain the lack of house price appreciation in older districts.[7] To investigate this hypothesis, I examine the descriptions of the bond's purpose to determine whether it is issued for school operating and improvement projects or purely for refinancing and liquidity needs. A school improvement bond is broadly defined as a bond used to improve a school's operation, and can include projects related to buildings, technology, instruction programs, etc. A pure financing bond is defined as a bond used to

[7] Ang, Green, Longstaff, and Xing (2017) find that refinancing bonds typically occur at a net present value loss for local governments.

raise working cash, refinance an existing bond, or raise money to cover post-employment benefit payments.[8] The results are presented in Appendix Table A3. Contrary to the hypothesis, I find that districts with an older population are (weakly) more likely to propose a school improvement bond and less likely to propose a financing bond. Additionally, I did not find a statistically significant difference in bond yields between younger and older school districts, as shown in Appendix Table A4.[9]

Another concern may be that housing transaction volumes are lower in regions with an older population, potentially hindering price adjustments in the short run. Examining prices five years out alleviates this concern. More importantly, data show that regions with older populations do not necessarily have lower housing transaction volumes. To investigate this, I divide the sample into quartiles based on *Share Population 55+* and tabulated the average number of new residential housing listings, homes sold, and housing inventories per capita within each quartile. There is a U-shaped relationship between population age and housing transactions, with both the youngest and oldest quartile regions showing large numbers of new listings, sales, and inventories. These statistics are presented in Appendix Table A5.

## 6 Conclusion

The population age structure of the United States underwent a significant change in the past decade and is projected to continue shifting at a similar pace over the next thirty years. This shift can lead to intergenerational conflicts over the provision of public services, given that younger and older populations often have differing demands for publicly provided goods, with education being a prominent example.

In this paper, I study whether population aging affects voter support for and the efficiency of public education investment in the U.S., using a decade of bond referenda data. I find that districts with an older population are less likely to approve bond proposals to finance school investments. However, house prices

[8] Specifically, I used the following list of keywords to identify pure financing bonds: "refinance," "debt service," "funding bond," "refund," "post-employment," and "retirement system." I used the following list of keywords and phrases to identify school improvement bonds: "program," "improve," "build," "construct," "remodel," "furnish," "erect," "install," "acquire," "renovate," "build," "repair," "replace," "capital," "maintenance," "purchase," "bldg," "space," "land," "technology," "upgrade." Bond proposals in CA are excluded from this test because the descriptions of bond purposes provided were not detailed enough to make this distinction.

[9] This result differs from the findings in Butler and Yi (2022). At least two factors could drive this discrepancy. School districts mainly rely on property tax revenues rather than income tax revenues, and homeownership rates increase with population age, implying that school district wealth should *not* decline with aging. Moreover, the aging measure in this paper is 55 years old rather than 65, rendering the retiree cost mechanism less significant.

react positively to new investments only in districts with younger populations, suggesting that investments do not yield positive local economic returns in districts with older populations. These findings are more consistent with cross-generational preferences leading to the efficient provision of public goods.

The approach of using housing markets to evaluate returns to education spending has limitations because the notion of efficiency in this context is localized. To consider broader notions of social efficiency and national welfare, one would need to account for the positive externalities that better-funded schools provide indirectly to other areas. This avenue may be a fruitful direction to explore for future work.

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## Table 1: Summary Statistics

The sample includes school bond referendum data from 2010 through 2019 for school districts in CA, IL, MI, OH, TX, and WI. *Share of Population 55+* measures the share of the district population with age above 55 years old. *Pass* is an indicator variable for whether a bond referendum passes. *Share of Yes Votes* is the number of "yes" votes in a bond referendum divided by total votes. *Amount (M)* is the amount proposed for the bond issuance. *Share Electoral Votes Republican* measures the share of the county population who voted for a Republican candidate in the most recent gubernatorial election. *Population* measures total number of people living in a school district. *Family Income* measures the average family income in a school district. *Share Bachelor's Degree* measures the share of the population in a district with a bachelor's degree and above. *Share of School Age Children* is the share of the district aged between 5 and 20. *House Price Index* is FHFA house price index, obtained at the census tract level and aggregated at the school district level. *Total Expenditure Per Pupil* is the dollar amount of total spending in a school district divided by the number of students enrolled. *Capital Expenditure Per Pupil* is the dollar amount of capital expenditure in a school district divided by the number of students enrolled.

| | Mean | SD | P25 | Median | P75 | N |
|---|---|---|---|---|---|---|
| Share of Population 55+ | 0.3 | 0.1 | 0.2 | 0.3 | 0.3 | 3,244.0 |
| Pass | 0.7 | 0.5 | 0.0 | 1.0 | 1.0 | 3,244.0 |
| Share of Yes Votes | 0.6 | 0.2 | 0.5 | 0.6 | 0.7 | 3,049.0 |
| Amount (M) | 55.6 | 100.9 | 6.3 | 18.5 | 55.0 | 3,049.0 |
| Share Electoral Votes Republican | 0.6 | 0.2 | 0.5 | 0.6 | 0.7 | 3,244.0 |
| Population | 37,678.9 | 84,403.9 | 5,054.5 | 11,928.0 | 31,094.5 | 3,244.0 |
| Family Income | 85,805.9 | 33,109.9 | 66,970.0 | 78,478.0 | 95,468.0 | 3,244.0 |
| Share Bachelor's Degree | 0.2 | 0.1 | 0.1 | 0.2 | 0.3 | 3,244.0 |
| Share School Age Population | 0.2 | 0.0 | 0.2 | 0.2 | 0.2 | 3,244.0 |
| House Price Index | 237.4 | 130.6 | 162.8 | 201.3 | 255.7 | 13,913.0 |
| Total Expenditure Per Pupil | 11,888.3 | 3,412.6 | 9,731.1 | 11,143.6 | 12,858.9 | 11,981.0 |
| Capital Expenditure Per Pupil | 1,225.5 | 1,904.5 | 210.8 | 467.2 | 1,283.9 | 11,981.0 |

**Table 2: Demographic Shift and School Bond Voting Outcomes**

This table estimates regression models of Equation 1 and Equation 2. The sample period is 2010 through 2019. *I (Pass)* is an indicator variable for whether a bond referendum is approved. *Share of Population 55+* measures the share of the district population with age above 55 years old. Other variable definitions are described in the legend of Table 1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | I (Pass) | |
|---|---|---|
| | (1) | (2) |
| Share of Population 55+ | -0.528*** | -0.498*** |
| | (0.135) | (0.136) |
| Log Family Income | -0.043 | -0.051 |
| | (0.059) | (0.058) |
| Share Bachelor's Degree | 0.312** | 0.304** |
| | (0.126) | (0.125) |
| Log Population | -0.001 | -0.001 |
| | (0.008) | (0.008) |
| Share Electoral Votes Republican | -0.123* | -0.169** |
| | (0.075) | (0.077) |
| State FE | Yes | No |
| Year FE | Yes | No |
| State × Year FE | No | Yes |
| Number of Obs. | 3,244 | 3,244 |
| $R^2$ | 0.08 | 0.10 |

**Table 3: What about non-school bond proposals?**

This table estimates regression models of Equation 1 and Equation 2. The sample period is 2010 through 2019. *I (Pass)* is an indicator variable for whether a bond referendum passes. *Share of Population 55+* measures the share of the district population with age above 55 years old. Other variable definitions are described in the legend of Table 1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | I (Pass) | |
|---|---|---|
| | (1) | (2) |
| Share of Population 55+ | -0.192 | -0.070 |
| | (0.252) | (0.262) |
| Log Per Capita Income | -0.024 | -0.073 |
| | (0.060) | (0.068) |
| Share Bachelor's Degree | 0.001 | 0.003 |
| | (0.002) | (0.002) |
| Log Population | 0.025*** | 0.030*** |
| | (0.009) | (0.010) |
| Share Electoral Votes Republican | -0.098 | -0.067 |
| | (0.075) | (0.085) |
| State FE | Yes | No |
| Year FE | Yes | No |
| State × Year FE | No | Yes |
| Number of Obs. | 3,429 | 3,375 |
| $R^2$ | 0.16 | 0.26 |

**Table 4: Isolating the Effect of Population Aging In Place: 2SLS Estimates**

This table estimates two-stage-least-square estimates of the effect of aging on school bond voting outcomes. The sample period is 2010 through 2019. The instrumental variable, *Historical Birth Rates*, is the average historical birth rates net of infant mortality rates in the ten-year period prior to t-55 in a given state. Column (1) presents first stage estimates, and Column (2) presents second stage estimates. *I (Pass)* is an indicator variable for whether a bond referendum is approved. *Share of Population 55+* measures the share of the district population with age above 55 years old. Other variable definitions are described in the legend of Table 1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | **First Stage** | **Second Stage** |
|---|---|---|
| | Share Population 55+ | I (Pass) |
| | (1) | (2) |
| Historical Birth Rates | 0.236*** | |
| | (0.049) | |
| Share of Population 55+ | | -4.362** |
| | | (1.994) |
| Log Family Income | 0.013 | 0.005 |
| | (0.014) | (0.084) |
| Share Bachelor's Degree | 0.077*** | 0.608** |
| | (0.030) | (0.242) |
| Log Population | -0.024*** | -0.093* |
| | (0.001) | (0.049) |
| Share Electoral Votes Republican | 0.049*** | 0.031 |
| | (0.014) | (0.124) |
| State FE | Yes | Yes |
| Year FE | Yes | Yes |
| Number of Obs. | 3,247 | 3,244 |
| $R^2$ | 0.28 | |
| F-statistic | 22.47 | |

**Table 5: Dynamic Effects on Capital Expenditure and House Price**

This table estimates regression models of Equation 3. The sample includes five years before and after school bond elections passed and failed within 10% margins held from 2010 through 2019 in CA, OH, MI, TX, and WI. The outcome variable in Column (1) is the natural logarithm of school capital expenditures per pupil, and in Column (2) is the natural logarithm of house prices. *Treat* takes a value of one for bonds that are narrowly approved, and zero for bonds that are narrowly defeated. Event year is defined as the number of years relative to the election year. I use the year prior to the bond proposal as the baseline year in all dynamic estimations. The coefficients on the lower-order interaction terms such as indicators for event years are estimated and suppressed in tables for brevity. The coefficient on *Treat* cannot be separately estimated because it is absorbed by election fixed effects. The specification includes election, calendar year, and event year fixed effects. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | (1)<br>Log Capital Expenditure Per Pupil | (2)<br>Log House Price |
|---|---|---|
| Treat × Event Year -5 | -0.114 | -0.001 |
| | (0.101) | (0.008) |
| Treat × Event Year -4 | -0.154 | -0.001 |
| | (0.094) | (0.006) |
| Treat × Event Year -3 | -0.109 | -0.001 |
| | (0.081) | (0.005) |
| Treat × Event Year -2 | -0.006 | -0.005 |
| | (0.069) | (0.003) |
| Treat × Event Year -1 | Base | Base |
| Treat × Event Year 0 | 0.257*** | 0.003 |
| | (0.079) | (0.003) |
| Treat × Event Year 1 | 1.263*** | 0.004 |
| | (0.110) | (0.004) |
| Treat × Event Year 2 | 0.843*** | 0.015*** |
| | (0.133) | (0.005) |
| Treat × Event Year 3 | 0.077 | 0.021*** |
| | (0.125) | (0.006) |
| Treat × Event Year 4 | -0.101 | 0.027*** |
| | (0.141) | (0.007) |
| Treat × Event Year 5 | -0.122 | 0.024** |
| | (0.162) | (0.010) |
| Election FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event Year FE | Yes | Yes |
| Number of Obs. | 11,396 | 13,907 |
| $R^2$ | 0.46 | 0.97 |

## Table 6: Dynamic Effects on House Price By District Demographics

Panel A estimates regression models of Equation 3, while splitting the sample into districts with a below (Panel A Column (1)) and above (Panel A Column (2)) median share of the population above 55+. Panel B estimates dynamic triple-difference regressions, where *Treat* × *Event Year* is interacted with an indicator for whether the district has an above median share of population 55+ (Panel B Column (1)) and the continuous variable measuring the share of population 55+, standardized to have a mean of 0 and standard deviation of 1 (Panel B Column (2)). The sample includes five years before and after school bond elections passed and failed within 10% margins held from 2010 through 2019 in CA, OH, MI, TX, and WI. The outcome variable in Column (1) is the natural logarithm of school capital expenditures per pupil, and in Column (2) is the natural logarithm of house prices. *Treat* takes a value of one for bonds that are narrowly approved, and zero for bonds that are narrowly defeated. Event year is defined as the number of years relative to the election year. I use the year prior to the bond proposal as the baseline year in all dynamic estimations. The coefficients on the lower-order interaction terms are estimated and suppressed in tables for brevity. The specification includes election, calendar year, and event year fixed effects. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| **Panel A: Sample Split** | | |
|---|---|---|
| | Y: Log House Price | |
| | *Low Senior Share* | *High Senior Share* |
| | (1) | (2) |
| Treat × Event Year -5 | 0.013 | -0.005 |
| | (0.015) | (0.009) |
| Treat × Event Year -4 | 0.010 | -0.003 |
| | (0.012) | (0.007) |
| Treat × Event Year -3 | 0.005 | -0.001 |
| | (0.010) | (0.006) |
| Treat × Event Year -2 | -0.006 | -0.001 |
| | (0.006) | (0.004) |
| Treat × Event Year -1 | Base | Base |
| Treat × Event Year 0 | 0.004 | 0.000 |
| | (0.005) | (0.003) |
| Treat × Event Year 1 | 0.005 | -0.002 |
| | (0.006) | (0.005) |
| Treat × Event Year 2 | 0.025*** | 0.001 |
| | (0.009) | (0.006) |
| Treat × Event Year 3 | 0.033*** | 0.003 |
| | (0.010) | (0.007) |
| Treat × Event Year 4 | 0.044*** | 0.003 |
| | (0.012) | (0.009) |
| Treat × Event Year 5 | 0.043*** | -0.004 |
| | (0.015) | (0.012) |
| Election FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event Year FE | Yes | Yes |
| Number of Obs. | 6,261 | 7,646 |
| $R^2$ | 0.96 | 0.98 |

| Panel B: Triple Interactions | | |
|---|---|---|
| | Y: Log House Price | |
| | Interacted Var. = Above Median | Interacted Var. =% Population 55+ (std) |
| | (1) | (2) |
| Treat × Event Year -5 | 0.009 | 0.003 |
| | (0.015) | (0.009) |
| Treat × Event Year -4 | 0.006 | 0.001 |
| | (0.012) | (0.007) |
| Treat × Event Year -3 | 0.001 | 0.000 |
| | (0.009) | (0.006) |
| Treat × Event Year -2 | -0.008 | -0.005 |
| | (0.006) | (0.004) |
| Treat × Event Year -1 | Base | Base |
| Treat × Event Year 0 | 0.006 | 0.003 |
| | (0.005) | (0.003) |
| Treat × Event Year 1 | 0.007 | 0.003 |
| | (0.006) | (0.004) |
| Treat × Event Year 2 | 0.026*** | 0.014*** |
| | (0.009) | (0.005) |
| Treat × Event Year 3 | 0.033*** | 0.019*** |
| | (0.010) | (0.006) |
| Treat × Event Year 4 | 0.042*** | 0.023*** |
| | (0.012) | (0.007) |
| Treat × Event Year 5 | 0.041*** | 0.017* |
| | (0.015) | (0.010) |
| Treat × Event Year -5 × Senior Share | -0.013 | -0.009 |
| | (0.018) | (0.009) |
| Treat × Event Year -4 × Senior Share | -0.009 | -0.000 |
| | (0.014) | (0.008) |
| Treat × Event Year -3 × Senior Share | -0.001 | 0.001 |
| | (0.011) | (0.007) |
| Treat × Event Year -2 × Senior Share | 0.006 | 0.005 |
| | (0.007) | (0.005) |
| Treat × Event Year -1 × Senior Share | Base | Base |
| Treat × Event Year 0 × Senior Share | -0.005 | -0.003 |
| | (0.006) | (0.003) |
| Treat × Event Year 1 × Senior Share | -0.009 | -0.008* |
| | (0.008) | (0.004) |
| Treat × Event Year 2 × Senior Share | -0.025** | -0.018*** |
| | (0.010) | (0.006) |
| Treat × Event Year 3 × Senior Share | -0.030** | -0.024*** |
| | (0.013) | (0.008) |
| Treat × Event Year 4 × Senior Share | -0.038*** | -0.026*** |
| | (0.015) | (0.008) |
| Treat × Event Year 5 × Senior Share | -0.045** | -0.034*** |
| | (0.019) | (0.011) |
| Lower Order Interactions | Yes | Yes |
| Election FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event Year FE | Yes | Yes |
| Number of Obs. | 13,907 | 13,907 |
| $R^2$ | 0.97 | 0.97 |

## Table 7: Dynamic Effects on House Price By District Demographics in Single Election Districts

This table repeats the analysis in Table 6, restricting the sample to school districts with a single bond election during the sample period. Panel A estimates regression models of Equation 3, while splitting the sample into districts with a below (Panel A Column (1)) and above (Panel A Column (2)) median share of the population above 55+. Panel B estimates dynamic triple-difference regressions, where *Treat* × *Event Year* is interacted with an indicator for whether the district has an above median share of population 55+ (Panel B Column (1)) and the continuous variable measuring the share of population 55+, standardized to have a mean of 0 and standard deviation of 1 (Panel B Column (2)). The sample includes five years before and after school bond elections passed and failed within 10% margins held from 2010 through 2019 in CA, OH, MI, TX, and WI. The outcome variable in Column (1) is the natural logarithm of school capital expenditures per pupil, and in Column (2) is the natural logarithm of house prices. *Treat* takes a value of one for bonds that are narrowly approved, and zero for bonds that are narrowly defeated. Event year is defined as the number of years relative to the election year. I use the year prior to the bond proposal as the baseline year in all dynamic estimations. The coefficients on the lower-order interaction terms are estimated and suppressed in tables for brevity. The specification includes election, calendar year, and event year fixed effects. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

**Panel A: Sample Split**

| | Y: Log House Price | |
|---|---|---|
| | *Low Senior Share* | *High Senior Share* |
| | (1) | (2) |
| Treat × Event Year -5 | -0.014 | 0.013 |
| | (0.032) | (0.021) |
| Treat × Event Year -4 | 0.004 | 0.011 |
| | (0.021) | (0.017) |
| Treat × Event Year -3 | -0.018 | 0.003 |
| | (0.017) | (0.011) |
| Treat × Event Year -2 | -0.023** | 0.012 |
| | (0.012) | (0.009) |
| Treat × Event Year -1 | Base | Base |
| Treat × Event Year 0 | 0.005 | 0.003 |
| | (0.010) | (0.007) |
| Treat × Event Year 1 | 0.027 | 0.005 |
| | (0.022) | (0.011) |
| Treat × Event Year 2 | 0.072** | -0.001 |
| | (0.030) | (0.015) |
| Treat × Event Year 3 | 0.089*** | 0.000 |
| | (0.033) | (0.025) |
| Treat × Event Year 4 | 0.093** | 0.001 |
| | (0.040) | (0.021) |
| Treat × Event Year 5 | 0.107** | -0.018 |
| | (0.050) | (0.039) |
| Election FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event Year FE | Yes | Yes |
| Number of Obs. | 1,518 | 2,094 |
| $R^2$ | 0.97 | 0.98 |

**Panel B: Triple Interactions**

| | Y: Log House Price | |
|---|---|---|
| | Interacted Var. = Above Median | Interacted Var. =% Population 55+ (std) |
| | (1) | (2) |
| Treat × Event Year -5 | -0.000 | 0.012 |
| | (0.028) | (0.021) |
| Treat × Event Year -4 | 0.012 | 0.016 |
| | (0.020) | (0.016) |
| Treat × Event Year -3 | -0.015 | -0.007 |
| | (0.016) | (0.011) |
| Treat × Event Year -2 | -0.025** | -0.008 |
| | (0.011) | (0.008) |
| Treat × Event Year -1 | Base | Base |
| Treat × Event Year 0 | 0.008 | 0.008 |
| | (0.010) | (0.006) |
| Treat × Event Year 1 | 0.025 | 0.020 |
| | (0.022) | (0.013) |
| Treat × Event Year 2 | 0.070** | 0.044** |
| | (0.029) | (0.018) |
| Treat × Event Year 3 | 0.091*** | 0.068*** |
| | (0.032) | (0.022) |
| Treat × Event Year 4 | 0.093** | 0.061** |
| | (0.039) | (0.026) |
| Treat × Event Year 5 | 0.107** | 0.071** |
| | (0.051) | (0.033) |
| Treat × Event Year -5 × Senior Share | 0.013 | 0.000 |
| | (0.036) | (0.014) |
| Treat × Event Year -4 × Senior Share | -0.000 | 0.000 |
| | (0.026) | (0.011) |
| Treat × Event Year -3 × Senior Share | 0.021 | 0.016* |
| | (0.020) | (0.009) |
| Treat × Event Year -2 × Senior Share | 0.038*** | 0.017*** |
| | (0.014) | (0.006) |
| Treat × Event Year -1 × Senior Share | Base | Base |
| Treat × Event Year 0 × Senior Share | -0.005 | -0.007 |
| | (0.012) | (0.007) |
| Treat × Event Year 1 × Senior Share | -0.020 | -0.019* |
| | (0.024) | (0.011) |
| Treat × Event Year 2 × Senior Share | -0.071** | -0.042*** |
| | (0.033) | (0.015) |
| Treat × Event Year 3 × Senior Share | -0.090** | -0.075*** |
| | (0.040) | (0.024) |
| Treat × Event Year 4 × Senior Share | -0.092** | -0.063*** |
| | (0.045) | (0.021) |
| Treat × Event Year 5 × Senior Share | -0.124* | -0.093*** |
| | (0.064) | (0.030) |
| Lower Order Interactions | Yes | Yes |
| Election FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event Year FE | Yes | Yes |
| Number of Obs. | 3,612 | 3,612 |
| $R^2$ | 0.97 | 0.97 |

## Table 8: Demographics and Past Capital Spending

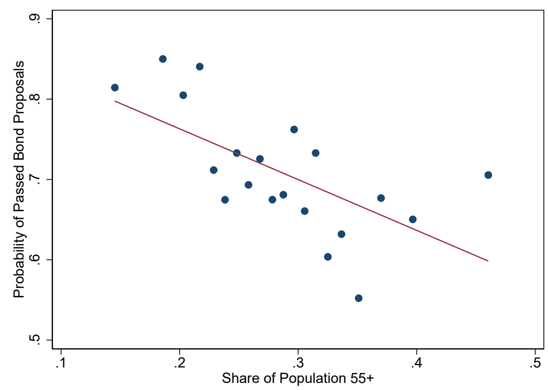
This table estimates regression models of Equation 1 and Equation 2, replacing the outcome variables with the natural logarithm of school capital expenditure in 1980 (Columns (1) and (2)), 1990 (Columns (3) and (4), and 2000 (Columns (5) and (6)), divided by the number of school age population (aged 5-20) in a school district today. *Share of Population 55+* measures the share of the district population with age above 55 years old. Other variable definitions are described in the legend of Table 1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | Log Past Capital Expenditure Per Pupil | | | | | |
|---|---|---|---|---|---|---|
| | 1980 | | 1990 | | 2000 | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Share of Population 55+ | 2.268*** | 2.252*** | 1.336*** | 1.414*** | 1.221*** | 1.149** |
| | (0.524) | (0.528) | (0.473) | (0.476) | (0.462) | (0.464) |
| Log Family Income | 0.284 | 0.309 | -0.093 | -0.106 | 0.453** | 0.461** |
| | (0.233) | (0.233) | (0.212) | (0.213) | (0.199) | (0.198) |
| Share Bachelor's Degree | -1.156** | -1.186** | -0.424 | -0.395 | -0.208 | -0.245 |
| | (0.520) | (0.519) | (0.480) | (0.480) | (0.436) | (0.434) |
| Log Population | -0.062* | -0.061* | -0.027 | -0.026 | -0.002 | -0.001 |
| | (0.033) | (0.033) | (0.028) | (0.028) | (0.024) | (0.024) |
| Share Electoral Votes Republican | -0.185 | -0.146 | -0.417 | -0.471* | -0.663*** | -0.624** |
| | (0.248) | (0.266) | (0.255) | (0.272) | (0.235) | (0.250) |
| State FE | Yes | No | Yes | No | Yes | No |
| Year FE | Yes | No | Yes | No | Yes | No |
| State × Year FE | No | Yes | No | Yes | No | Yes |
| Number of Obs. | 3,097 | 3,097 | 3,176 | 3,176 | 3,209 | 3,209 |
| $R^2$ | 0.23 | 0.24 | 0.04 | 0.05 | 0.04 | 0.05 |

**Figure 1: Relationship Between Demographics and School Bond Voting Outcomes**

This figure shows the binscatter plot of school bond referendum approval rates against the share of the school district population above 55. The sample period is 2010-2019. Panel A plots the raw data and Panel B plots the data after controlling for state-by-year fixed effects and control variables, which include: the natural logarithm of population, the natural logarithm of average family income, the share of population with a bachelor's degree and above, the share of school-age population, and the share of Republican votes in the most recent gubernatorial election.

**Panel A: Raw**




**Panel B: Adding Controls and Fixed Effects**

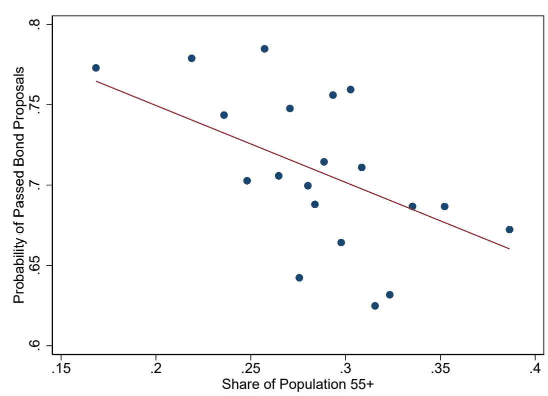
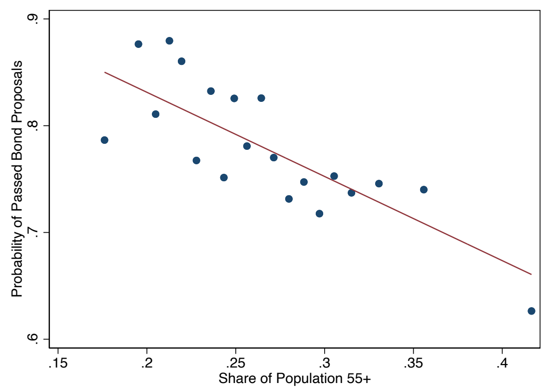


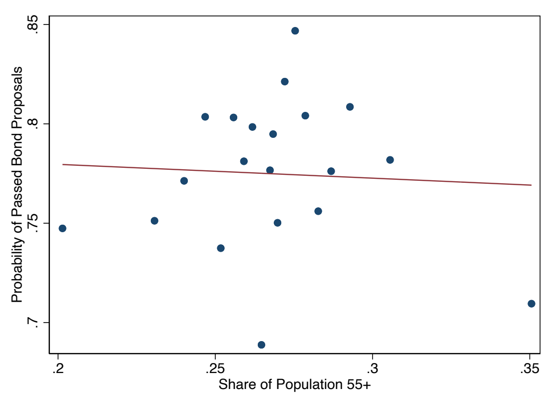
**Figure 2: Relationship Between Demographics and Non-School Bond Voting Outcomes**

This figure shows the binscatter plot of non-school bond referendum approval rates against the share of the county population above 55. The sample period is 2010-2019. Panel A plots the raw data and Panel B plots the data after controlling for state-by-year fixed effects and control variables, which include: the natural logarithm of population, the natural logarithm of average family income, the share of population with a bachelor's degree and above, the share of school-age population, and the share of Republican votes in the most recent gubernatorial election.

**Panel A: Raw**



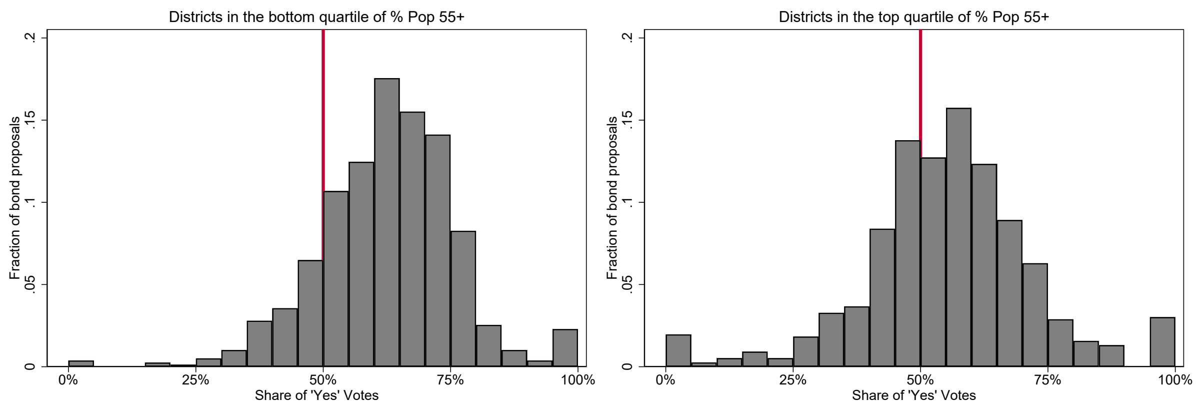

**Panel B: Adding Controls and Fixed Effects**



## Figure 3: Distribution of Voting Outcomes

Panel A plots the distribution of the share of “yes” votes in bond elections. The left (right) graph shows the distribution for districts in the top (bottom) quartile of the share of the population above 55. Panel B plots the kernel densities of the share of “yes” votes for the two groups of districts. The sample period is 2010-2019.

**Panel A: Histograms of the Share of “Yes" Votes**




**Panel B: Kernel Density of the Share of “Yes" Votes**

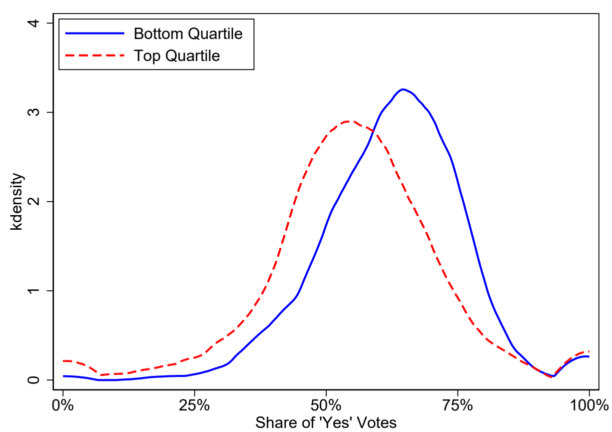
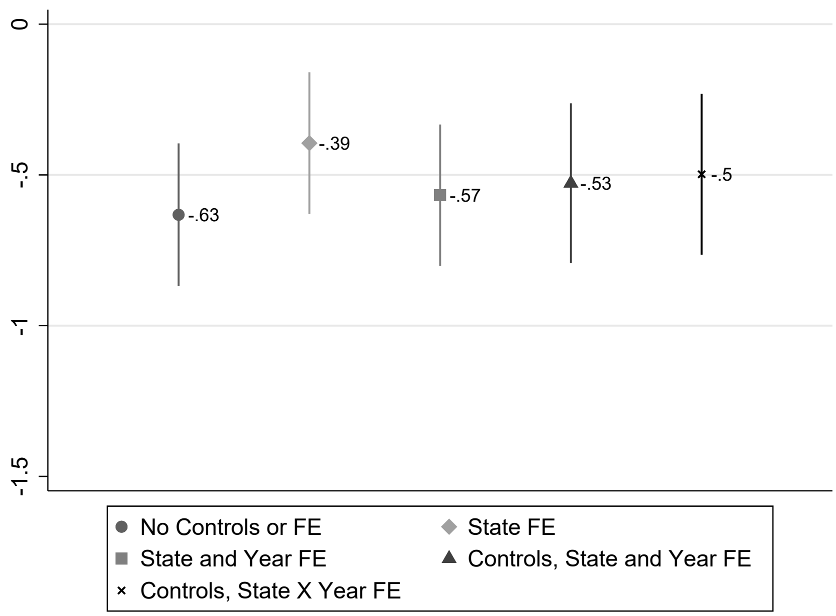


**Figure 4: Robustness of coefficient estimates across specifications**

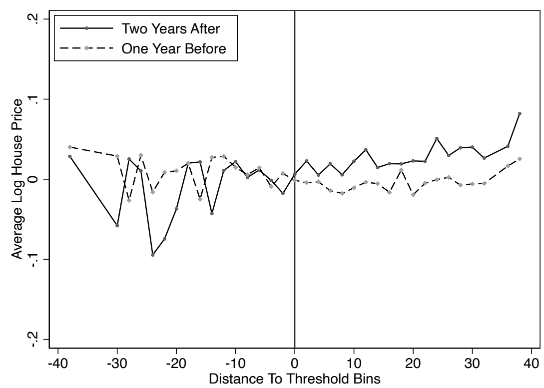
This figure displays the coefficient estimates and their 95% confidence intervals from a set of regressions in which the outcome variable is an indicator for passing a school bond referendum, and the independent variable of interest is the share of the population 55+ in a school district. The regressions successively add different layers of fixed effects and control variables, described in the legend. The control variables include: the natural logarithm of population, the natural logarithm of average family income, the share of population with a bachelor's degree and above, and the share of Republican votes in the most recent gubernatorial election. Standard errors are clustered by school districts.



## Figure 5: House Price Before and After Bond Election, by Vote Share

These figures plot the average log house price by the vote share in bond elections in districts with below (Panel A) and above (Panel B) median shares of the population 55+. Elections are grouped into bins two percentage points wide based on the vote share relative to the voting threshold, indicated by the vertical line. For example, the data points immediately left of the vertical line represent elections that failed by between one and three percentage points, and the points left of that represent elections that failed by between three and five percentage points, and so on. The dashed (solid) line measures outcomes in the year prior to (two years after) the bond election. The outcomes are residualized with respect to calendar year fixed effects.

**Panel A: Low Senior Share**

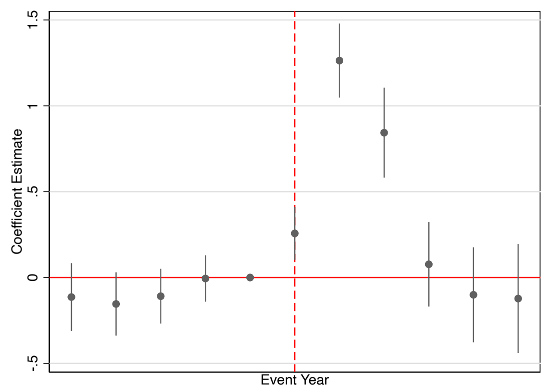



**Panel B: High Senior Share**

## Figure 6: Dynamic Effects on Capital Expenditure and House Price

These figures plot coefficient estimates of Equation 3 and two-tailed 95% confidence intervals based on standard errors clustered at the district level. The sample includes five years before and after school bond elections passed and failed within 10% margins held from 2010 through 2019 in CA, OH, MI, TX, and WI. The outcome variable in Panel A is the natural logarithm of school capital expenditures per pupil, and in Panel B is the natural logarithm of house prices. Event year is defined as the number of years relative to the election year. I use the year prior to the bond proposal as the baseline year in all dynamic estimations. The specification includes district, calendar year, and event year fixed effects. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A: Y = Log Capital Expenditure Per Pupil**




**Panel B: Y = Log House Price**

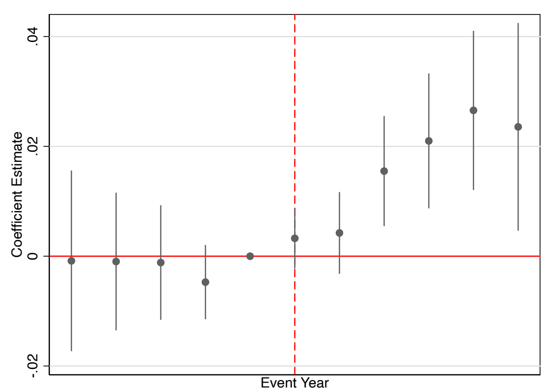
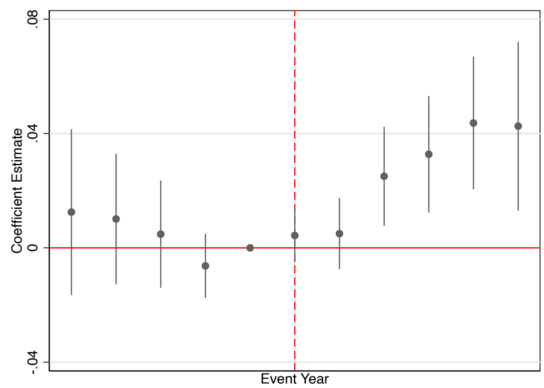


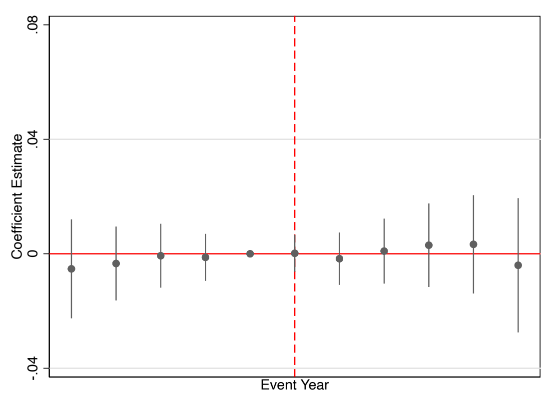
**Figure 7: Dynamic Effects on House Price By District Demographics**

These figures plot coefficient estimates of Equation 3 and two-tailed 95% confidence intervals based on standard errors clustered at the district level. The outcome variable is the natural logarithm of house prices. Panel A (B) uses the sample of districts with a below (above) median share of the population aged 55+. The sample includes five years before and after school bond elections passed and failed within 10% margins held from 2010 through 2019 in CA, OH, MI, TX, and WI. Event year is defined as the number of years relative to the election year. I use the year prior to the bond proposal as the baseline year in all dynamic estimations. The specification includes district, calendar year, and event year fixed effects. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A: Low Senior Share**



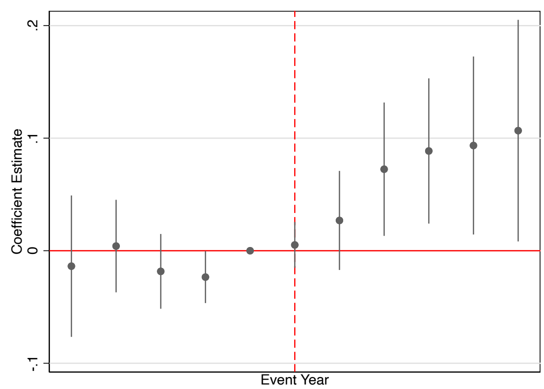

**Panel B: High Senior Share**



## Figure 8: Dynamic Effects on House Price By District Demographics in Single Election Districts

This table repeats the analysis in Figure 7, restricting the sample to school districts with a single bond election during the sample period. These figures plot coefficient estimates of Equation 3 and two-tailed 95% confidence intervals based on standard errors clustered at the district level. The outcome variable is the natural logarithm of house prices. Panel A (B) uses the sample of districts with a below (above) median share of the population aged 55+. The sample includes five years before and after school bond elections passed and failed within 10% margins held from 2010 through 2019 in CA, OH, MI, TX, and WI. Event year is defined as the number of years relative to the election year. I use the year prior to the bond proposal as the baseline year in all dynamic estimations. The specification includes district, calendar year, and event year fixed effects. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A: Low Senior Share**




**Panel B: High Senior Share**

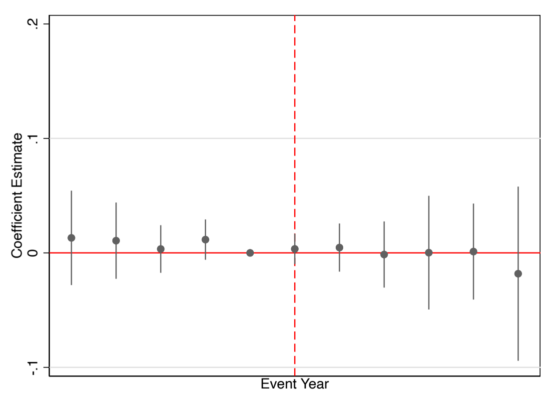
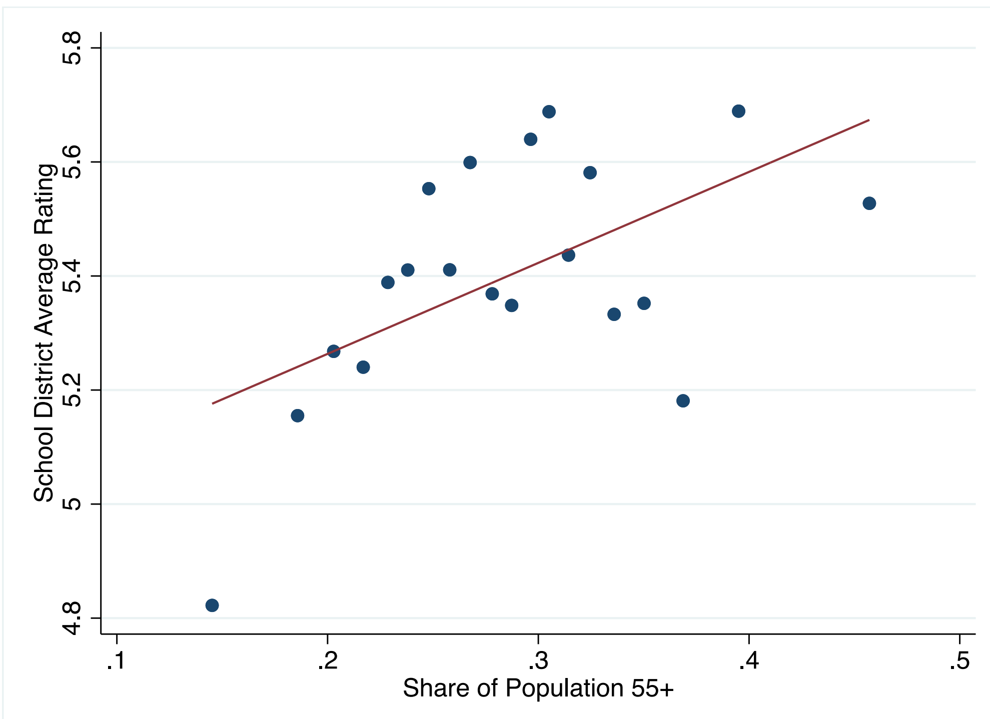


**Figure 9: Average School District Rating by Senior Share**

This graph shows a binscatter plot of the school district's overall rating (plotted on the y-axis) against the share of the population above 55 (plotted on the x-axis). The school ratings data are produced by GreatSchools and obtained for the most recent updates as of 2022.



# Internet Appendix

"Intergenerational Conflict in Education Financing:
Evidence from A Decade of Bond Elections ”

### Table A1: Demographic Shift and School Bond Voting: Control for School-Age Population

This table estimates regression models of Equation 1 and Equation 2. The sample period is 2010 through 2019. *I (Pass)* is an indicator variable for whether a bond referendum is approved. *Share of Population 55+* measures the share of the district population with age above 55 years old. In Columns (1) and (2), I include the share of school-age population (aged 5-20) as an additional control variable. In Columns (3) and (4), I include the natural logarithm of the number of school-age population (aged 5-20) as an additional control variable. Other variable definitions are described in the legend of Table 1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | I (Pass) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Share of Population 55+ | -0.551*** | -0.479*** | -0.539*** | -0.485*** |
| | (0.179) | (0.180) | (0.170) | (0.170) |
| Log Family Income | -0.044 | -0.050 | -0.043 | -0.051 |
| | (0.059) | (0.058) | (0.059) | (0.058) |
| Share Bachelor's Degree | 0.314** | 0.302** | 0.313** | 0.303** |
| | (0.127) | (0.126) | (0.126) | (0.125) |
| Log Population | -0.001 | -0.001 | 0.006 | -0.008 |
| | (0.008) | (0.008) | (0.053) | (0.053) |
| Share Electoral Votes Republican | -0.122 | -0.170** | -0.122 | -0.170** |
| | (0.075) | (0.077) | (0.075) | (0.077) |
| Share of School Age Population | -0.061 | 0.050 | | |
| | (0.292) | (0.289) | | |
| Log School Age Population | | | -0.006 | 0.007 |
| | | | (0.053) | (0.052) |
| State FE | Yes | No | Yes | No |
| Year FE | Yes | No | Yes | No |
| State × Year FE | No | Yes | No | Yes |
| Number of Obs. | 3,244 | 3,244 | 3,244 | 3,244 |
| $R^2$ | 0.08 | 0.10 | 0.08 | 0.10 |

## Table A2: Demographic Shift and School Bond Voting: Weighted Least Squares

This table estimates regression models of Equation 1 and Equation 2. The sample period is 2010 through 2019. *I (Pass)* is an indicator variable for whether a bond referendum is approved. *Share of Population 55+* measures the share of the district population with age above 55 years old. Each observation is weighted by the inverse of the number of school bond proposals in a district-year to adjust for potential sampling frequency differences (Solon, Haider, and Wooldridge, 2015). Other variable definitions are described in the legend of Table 1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | I (Pass) | |
|---|---|---|
| | (1) | (2) |
| Share of Population 55+ | -0.467*** | -0.437*** |
| | (0.130) | (0.130) |
| Log Family Income | -0.041 | -0.048 |
| | (0.055) | (0.055) |
| Share Bachelor's Degree | 0.261** | 0.258** |
| | (0.119) | (0.119) |
| Log Population | 0.003 | 0.003 |
| | (0.007) | (0.007) |
| Share Electoral Votes Republican | -0.157** | -0.180** |
| | (0.070) | (0.072) |
| State FE | Yes | No |
| Year FE | Yes | No |
| State × Year FE | No | Yes |
| Number of Obs. | 3,244 | 3,244 |
| $R^2$ | 0.08 | 0.10 |

## Table A3: Demographic Shift and School Bond Type: Financing vs. Capital Improvement Bond

This table estimates regression models of Equation 1 and Equation 2. The sample period is 2010 through 2019. A school improvement bond is broadly defined as a bond used to improve a school's operation, and can include projects related to buildings, technology, instruction programs, etc. A pure financing bond is defined as a bond used to raise working cash, refinance an existing bond, or raise money to cover post-employment benefit payments. Bond proposals in CA are excluded from this test because the descriptions of bond purposes provided were homogeneous. *Share of Population 55+* measures the share of the district population with age above 55 years old. Other variable definitions are described in the legend of Table 1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | I (School Improvement Bond) | | I (Financing Bond) | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Share of Population 55+ | 0.162 | 0.197* | -0.158*** | -0.157*** |
| | (0.108) | (0.108) | (0.051) | (0.051) |
| Log Family Income | -0.007 | 0.001 | -0.048** | -0.039** |
| | (0.055) | (0.053) | (0.021) | (0.020) |
| Share Bachelor's Degree | -0.044 | -0.069 | 0.070 | 0.057 |
| | (0.109) | (0.107) | (0.052) | (0.052) |
| Log Population | 0.007 | 0.005 | -0.011*** | -0.012*** |
| | (0.007) | (0.006) | (0.003) | (0.003) |
| Share Electoral Votes Republican | 0.094* | 0.025 | -0.047 | -0.055* |
| | (0.048) | (0.053) | (0.030) | (0.032) |
| State FE | Yes | No | Yes | No |
| Year FE | Yes | No | Yes | No |
| State × Year FE | No | Yes | No | Yes |
| Number of Obs. | 2,603 | 2,603 | 2,603 | 2,603 |
| $R^2$ | 0.09 | 0.14 | 0.10 | 0.13 |

## Table A4: Demographic Shift and School Bond Yield

This table estimates regression models of Equation 1 and Equation 2, while including other bond-level control variables and bond maturity fixed effects. The sample period is 2010 through 2019. The outcome variable, *Offer Yield*, measures the primary market bond yield of a bond issuance. *Share of Population 55+* measures the share of the district population with age above 55 years old. I include additional bond-level control variables such as whether the bond has a tax-exmept status (*Tax Exempt*), whether it is callable (*Callable*), whether it is sold through competitive bidding (*Competitive Bid*), and whether it is qualified to be held by banks while retaining interest deduction benefits for banks (*Bank Qualified*). Other variable definitions are described in the legend of Table 1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors, adjusted for clustering at the school district level, are reported in parentheses.

| | Offer Yield | |
|---|---|---|
| | (1) | (2) |
| Share of Population 55+ | 0.067 | 0.068 |
| | (0.194) | (0.188) |
| Log Family Income | -0.034 | -0.040 |
| | (0.101) | (0.098) |
| Share Bachelor's Degree | 0.056 | 0.025 |
| | (0.233) | (0.231) |
| Log Population | -0.093*** | -0.093*** |
| | (0.019) | (0.018) |
| Share Electoral Votes Republican | 0.205* | 0.165 |
| | (0.117) | (0.127) |
| State Tax Exempt | 1.092*** | 1.056*** |
| | (0.255) | (0.219) |
| Federal Tax Exempt | -1.044*** | -1.019*** |
| | (0.114) | (0.159) |
| Callable | -0.156*** | -0.159*** |
| | (0.046) | (0.042) |
| Competitive Bid | 0.007 | 0.006 |
| | (0.035) | (0.037) |
| Bank Qualified | -0.275*** | -0.256*** |
| | (0.037) | (0.037) |
| Bond Maturity FE | Yes | Yes |
| State FE | Yes | No |
| Year FE | Yes | No |
| State × Year FE | No | Yes |
| Number of Obs. | 11,569 | 11,569 |
| $R^2$ | 0.82 | 0.83 |

## Table A5: Population Age and Housing Transaction Volume

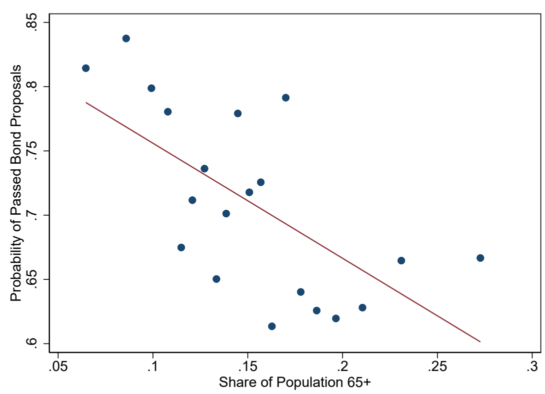
This table describes the mean of variables representing housing transaction volumes across regions with different local population age. I divide the sample into quartiles based on *Share Population 55+*, the proportion of the population aged 55 and above in a region, and tabulated the average number of new residential housing listings, homes sold, and housing inventories per capita within each quartile. The data are obtained from Redfin.

| Quartile | New Listings Per Capital | Homes Sold Per Capita | Housing Inventory Per Capita |
|---|---|---|---|
| 1 | 0.81 | 0.67 | 2.01 |
| 2 | 0.47 | 0.38 | 1.26 |
| 3 | 0.35 | 0.30 | 1.11 |
| 4 | 0.92 | 0.76 | 2.51 |

**Figure A1: Relationship Between Demographics and School Bond Voting Outcomes: Robustness Using Population 65+**

This figure shows the binscatter plot of school bond referendum approval rates against the share of the school district population above 65. The sample period is 2010-2019. Panel A plots the raw data and Panel B plots the data after controlling for state-by-year fixed effects and control variables, which include: the natural logarithm of population, the natural logarithm of average family income, the share of population with a bachelor's degree and above, the share of school-age population, and the share of Republican votes in the most recent gubernatorial election.

**Panel A: Raw**




**Panel B: Adding Controls and Fixed Effects**

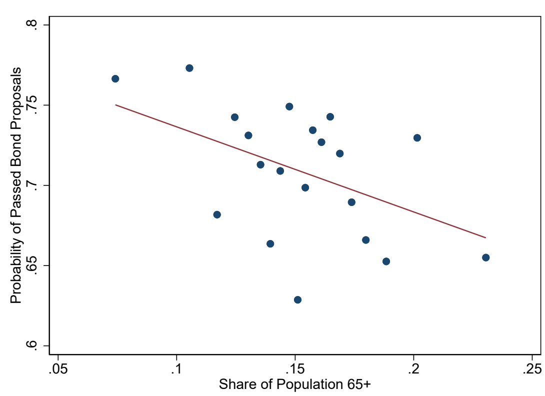
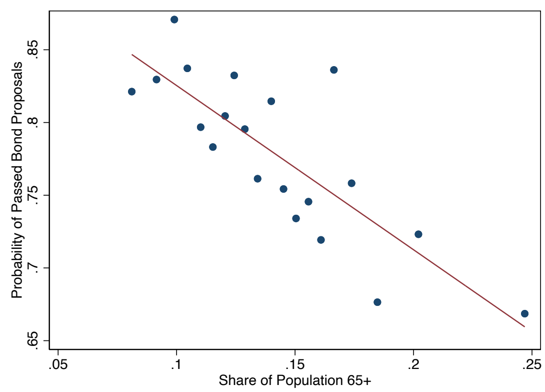


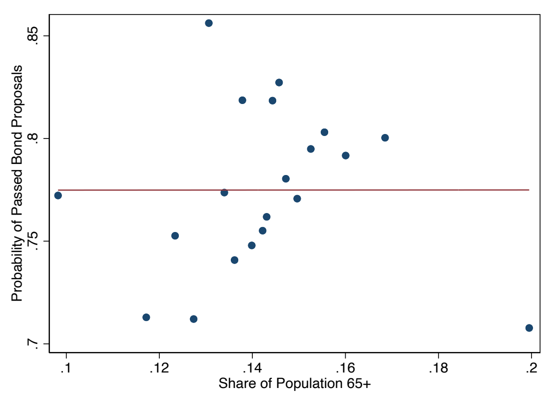
**Figure A2: Placebo Relationship Between Demographics and Non-School Bond Voting Outcomes: Robustness Using Population 65+**

This figure shows the binscatter plot of non-school bond referendum approval rates against the share of the county population above 65. The sample period is 2010-2019. Panel A plots the raw data and Panel B plots the data after controlling for state-by-year fixed effects and control variables, which include: the natural logarithm of population, the natural logarithm of average family income, the share of population with a bachelor's degree and above, the share of school-age population, and the share of Republican votes in the most recent gubernatorial election.

**Panel A: Raw**



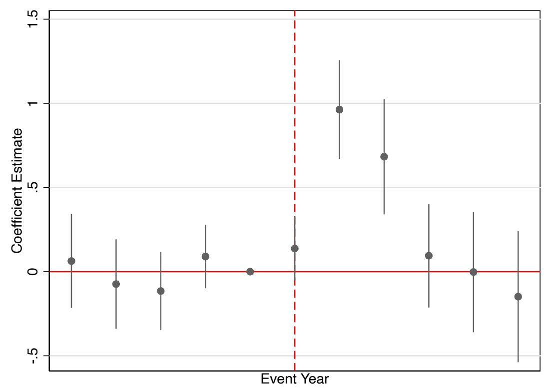

**Panel B: Adding Controls and Fixed Effects**



### Figure A3: Dynamic Effects on Capital Expenditures Per Pupil By District Demographics

These figures plot coefficient estimates of Equation 3 and two-tailed 95% confidence intervals based on standard errors clustered at the district level. The outcome variable is the natural logarithm of school capital expenditures per pupil,. Panel A (B) uses the sample of districts with a below (above) median share of the population aged 55+. The sample includes five years before and after school bond elections passed and failed within 10% margins held from 2010 through 2019 in CA, OH, MI, TX, and WI. Event year is defined as the number of years relative to the election year. I use the year prior to the bond proposal as the baseline year in all dynamic estimations. The specification includes district, calendar year, and event year fixed effects. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A: Low Senior Share**




**Panel B: High Senior Share**