

# Public Housing and Public Schools

## Causal Pathways Linking LIHTC Development to School Outcomes in Texas

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### Abstract

This paper investigates how public education systems respond to subsidized housing expansion by estimating a panel VARX model using Texas school district data from 2004 to 2018. Exploiting the institutional sequencing of LIHTC development, enrollment shifts, budgeting cycles, and standardized testing, the analysis identifies causal dynamics among housing, student composition, school finance, and academic outcomes. The results reveal five main findings: (1) LIHTC shocks do not immediately alter student composition; (2) school budgets decline before rebounding after housing shocks; (3) reading performance deteriorates with a lag, while math remains stable; (4) demographic shocks are absorbed institutionally and do not affect downstream outcomes; and (5) fiscal shocks yield only temporary gains in performance. Only the LIHTC shock has significant long-term effects on both budgets and test scores. These findings highlight the indirect and delayed nature of policy spillovers and underscore the need to account for institutional frictions and causal ordering when evaluating the educational consequences of housing investment.

## 1 Introduction

Educational outcomes are shaped not only by what happens inside classrooms but also by broader community conditions and public institutions. A growing body of research points to the influence

of neighborhood characteristics and school-level resources on student achievement, particularly among students from socioeconomically disadvantaged backgrounds. However, the mechanisms by which schools respond to shifts in their surrounding residential environment remain insufficiently understood—especially in the context of large-scale public interventions that alter where families live. A central driver of such residential change is housing policy. In the United States, the Low-Income Housing Tax Credit (LIHTC) program has supported the construction or rehabilitation of over two million affordable rental units since 1986, significantly reshaping the spatial distribution of low-income households. By expanding access to housing in particular neighborhoods, LIHTC may indirectly affect nearby public schools—through changes in enrollment patterns, local funding allocations, and longer-run student outcomes.

These potential linkages between housing and education operate through multiple channels, including neighborhood exposure, changes in peer composition, and the redistribution of school resources (Bobonis & Finan, 2009; Currie & Yelowitz, 2000; Di & Murdoch, 2013). However, such mechanisms are not instantaneous; rather, they evolve over time, as public schools gradually absorb demographic shifts and adjust operational decisions in response. Understanding how these changes play out—and how they interact within the institutional and budgetary structure of education systems—requires a dynamic empirical framework. Specifically, tracing the timing, persistence, and interdependence of institutional responses demands tools that move beyond static comparisons and allow for recursive identification of causal sequences across multiple domains (Houston & Henig, 2023; Kessel, 2018).

Existing research on housing and education tends to focus on whether children residing in subsidized or public housing perform better or worse in school compared to their peers, often relying on cross-sectional comparisons or natural experiments to provide important insights into their average academic outcomes. These studies have documented mixed effects—ranging from modest academic gains in certain relocation or voucher contexts to adverse peer and resource consequences in others—highlighting the complexity of housing-school linkages. However, this body of research generally stops short of unpacking the mechanisms through which housing policy may shape ed-

educational outcomes. In particular, the temporal and structural pathways—such as shifts in student composition, adjustments in school budgets, and lagged changes in academic performance—are often treated as a black box, with little empirical attention to how these channels unfold, interact, and mediate policy impacts over time.

This paper seeks to fill this gap by studying how the construction of LIHTC units affects public school performance over time through a dynamic policy transmission mechanism. Specifically, I conceptualize a sequential pathway in which an increase in subsidized housing units in year  $t$  leads to changes in the socio-demographic composition of enrolled students in year  $t$  which subsequently alters per-pupil instructional budgets and, with a further lag, student academic performance in year  $t + 1$ . To empirically identify and quantify this structure, I estimate a panel vector autoregression with exogenous variables (VARX) model using annual data from Texas school districts between 2004 and 2018. The identification strategy relies on a recursive causal ordering that reflects the administrative and institutional sequencing of demographic shifts, funding adjustments, and performance responses in public school systems. LIHTC shocks are placed first in the ordering, followed by student composition, school budget, and then school performance. To accommodate structural dynamics and temporal delays, the model explicitly incorporates lags between these variables.

This framework allows for a unified estimation of both contemporaneous and lagged effects, and it enables the decomposition of the total effect of housing investments on educational outcomes into distinct channels: neighborhood sorting, student composition change, fiscal redistribution, and cumulative academic impacts. In doing so, the paper provides new evidence on how a housing policy can affect educational outcomes not just through physical relocation or average test score differences, but by reshaping the institutional environments in which students learn.

The empirical results reveal that the effects of subsidized housing expansion on public education are highly dependent on both institutional timing and the specific pathways through which shocks propagate. In the short-to-medium term, structural innovations—whether in housing investment, student demographics, or school finance—have limited and generally transient effects on key edu-

cational outcomes. Notably, LIHTC-induced housing shocks fail to generate meaningful changes in student composition or school budgets within the first three years, and most observed effects of budgetary or demographic shocks on performance are short-lived. Only direct budget shocks yield statistically significant but temporary improvements in math scores, underscoring the restricted capacity of fiscal inflows to drive lasting achievement gains absent complementary reforms or persistent resource increases.

Over a longer ten-year horizon, however, the cumulative impact of LIHTC-driven housing shocks becomes pronounced and persistent, especially in the domain of reading performance. The results indicate that positive housing shocks lead to sustained declines in both instructional budgets and reading achievement, with budget constraints acting as a mediating channel for these long-run educational consequences. In contrast, neither composition nor fiscal shocks produce significant long-term effects on student outcomes, highlighting the buffering capacity of schools to absorb short-term demographic or budgetary disturbances. Together, these findings emphasize the slow-moving and indirect nature of policy spillovers from housing to education, cautioning against expectations of immediate effects and underscoring the need for synchronized institutional planning across sectors.

By moving beyond reduced-form comparisons and instead modeling an internally coherent system of policy propagation, this study offers a structural understanding of how localized public investment can generate broader and delayed social effects. The findings have implications for how we evaluate place-based policies and their potential to reinforce or reduce educational inequality across communities.

## **1.1 The Low-Income Housing Tax Credit**

The Low-Income Housing Tax Credit (LIHTC) program is the largest affordable rental housing production program in the United States, responsible for financing the construction or rehabilitation of over two million housing units since its inception in 1986. Operated through the federal tax code

rather than direct spending, LIHTC allocates tax credits to developers via state housing finance agencies. These developers must then rent units to households with incomes below 50% or 60% of the area median income (AMI), and restrict rents to affordable levels based on local benchmarks (Center, 2024; Di & Murdoch, 2013).

Tenant selection into LIHTC units occurs through a waitlist or open application process managed by property managers, but crucially, it does not rely on centralized government assignment or income-based targeting beyond the initial eligibility threshold. There are no mobility requirements, and there is no formal prioritization of particularly vulnerable populations. This decentralized and largely demand-driven allocation mechanism reduces the likelihood of endogenous placement decisions and makes LIHTC projects more suitable for causal identification strategies that exploit temporal or spatial variation in project openings (Currie & Yelowitz, 2000; Jacob, 2004).

Another distinguishing feature of LIHTC is its quasi-exogenous placement pattern. While developers respond to financial incentives and zoning constraints, the distribution of LIHTC projects is often driven by fixed allocation formulas, political bargaining, and developer discretion within eligible census tracts. This can lead to significant within-city variation in project timing and location that is not tightly correlated with unobserved shocks to school quality or family composition, particularly after accounting for fixed effects and pre-trends (Di & Murdoch, 2013; Han & Schwartz, n.d.).

Compared to other major housing interventions—such as traditional public housing, housing vouchers, or inclusionary zoning—LIHTC offers several advantages for studying the downstream effects on public schools. Public housing projects are often sited in historically segregated areas and suffer from selection bias due to legacy assignment mechanisms. Housing vouchers, on the other hand, allow high mobility but make it difficult to trace neighborhood-level exposure over time. LIHTC, by contrast, creates fixed-location housing that can be reliably linked to nearby institutional contexts such as schools. Moreover, because families self-select into LIHTC units without guarantees of specific school assignments, subsequent changes in school composition or

performance are less likely to reflect direct program targeting, strengthening the empirical case for identifying spillover effects.

In sum, the LIHTC program represents a large-scale, policy-driven source of residential change whose structural design, spatial variation, and quasi-exogenous placement render it a compelling empirical context for examining how public education systems respond to shifts in their surrounding communities.

## **1.2 Accountability and Finance in Texas Public Education**

Texas operates one of the largest and most structured public education systems in the United States, with a well-institutionalized accountability regime and a complex blend of local and state funding mechanisms. The state’s educational infrastructure and assessment regime offer a uniquely transparent and consistent context for tracking school-level performance and understanding institutional responses to demographic or policy shifts.

Public secondary education in Texas (covering grades 6–12) follows a fall-to-spring academic calendar, with the school year typically beginning in late August. These schools are governed by Independent School Districts (ISDs), which, though responsible for day-to-day operations, are subject to state-defined regulations regarding curriculum standards, performance accountability, and funding mechanisms.

Texas public schools are financed through a mix of local property taxes, state general revenue funds, and federal aid. Local funding is largely determined by the appraised property wealth of each school district, which results in wide disparities in local contributions across districts. To mitigate this inequality, the state employs a “recapture” or Robin Hood system, whereby property-rich districts share a portion of their revenues with less wealthy districts. Still, substantial gaps remain in per-pupil spending across different geographies, and school performance is often tightly linked to the local fiscal base.

Central to Texas’s educational governance is its standardized testing system, which has evolved

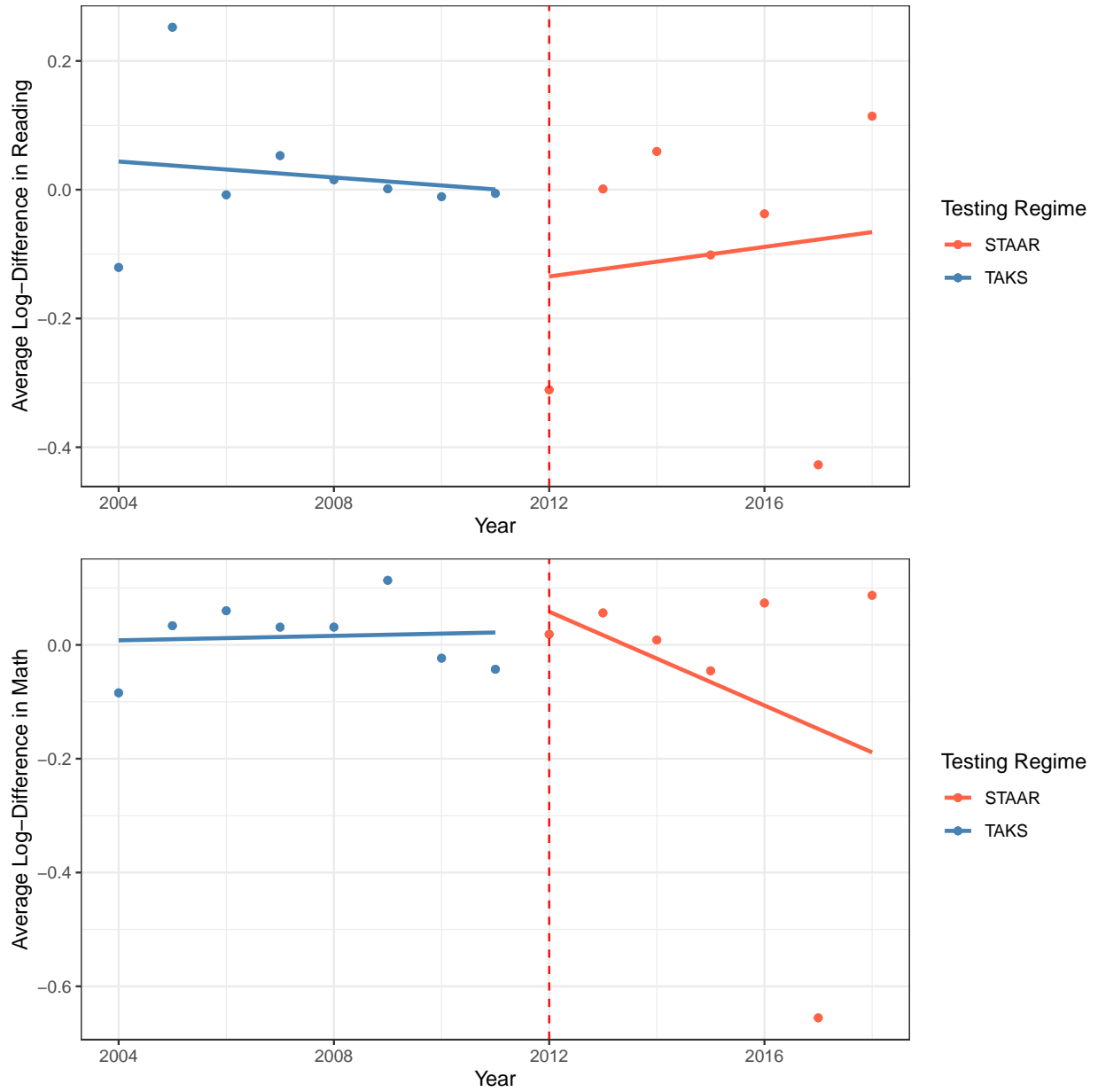
over time. From the early 2000s until 2011, the Texas Assessment of Knowledge and Skills (TAKS) was the primary state-mandated test used to assess student learning and school effectiveness. TAKS tested students in reading, writing, mathematics, science, and social studies at various grade levels, typically in April or May. Student scores were used not only to determine grade promotion in some years but also to calculate accountability ratings for schools and districts.

In 2012, the State of Texas Assessments of Academic Readiness (STAAR) replaced TAKS. STAAR exams are more rigorous and are administered annually to students in grades 3 through 8, as well as in selected high school courses (End-of-Course exams). These tests are designed to measure both achievement status and year-over-year growth, aligning closely with federal reporting requirements under the Every Student Succeeds Act (ESSA). The STAAR system is also a core input to the Texas Education Agency's A–F accountability ratings, which publicly rank schools and districts on metrics such as student performance, school progress, and closing performance gaps.

Both TAKS and STAAR results are released in the summer and are widely disseminated via the Texas Education Agency's online portals, making them suitable for longitudinal policy research. Because these scores are central to performance-based funding decisions, principal evaluations, and parental choice behaviors, they serve as both key outcomes and institutional constraints for public schools.

Although the Texas testing regime transitioned from TAKS to STAAR in 2012, using log differences rather than raw levels helps mitigate concerns related to comparability. By focusing on year-over-year changes within schools—rather than across schools or testing regimes—the model captures relative shifts in school performance, under the assumption that systematic biases from the regime change are either (1) time-invariant within schools or (2) absorbed by fixed effects or differencing.

This assumption appears broadly reasonable, particularly for reading scores, where the transition shows no clear discontinuity in growth trends. However, as shown in Figure 1, math scores exhibit a sharper shift around the transition year, raising the possibility that regime-specific changes in test



**Figure 1:** Average log-difference in reading and math scores by testing regime (TAKS vs. STAAR). A vertical line marks the transition year, 2012.



difficulty, curricular alignment, or grading policies may have introduced structural breaks.

To address this, I include a post2012 indicator as an exogenous control in the panel VARX model. This specification allows for regime-induced structural shifts to be absorbed separately from the main dynamics of interest, ensuring that estimated impulse response functions reflect policy effects net of test design artifacts. Importantly, because log differences measure proportional changes, the model does not require score levels to be directly comparable—only that annual changes reflect meaningful shifts in underlying academic performance. This is a defensible assumption if (i) schools’ rank-ordering is relatively stable across the TAKS-to-STAAR transition, and (ii) variation in the treatment variable (e.g., LIHTC unit construction) is not mechanically synchronized with the regime change.

Given this system of transparent, high-stakes testing and granular school-level finance data, Texas offers an exceptionally rich empirical setting for studying how public education systems respond to residential and demographic shifts driven by housing policy.

## **2 Literature Review**

### **2.1 Housing Policy and Student Outcomes**

A growing body of literature examines the relationship between subsidized housing programs and student achievement. Early work by (Currie & Yelowitz, 2000) investigated the effects of public housing participation on children’s educational attainment using national survey data, suggesting modest positive effects once selection is addressed. More recent quasi-experimental studies leverage variation in the timing of public housing access (Han & Schwartz, n.d.; Jacob, 2004), finding that while average effects are often small, they may differ substantially by neighborhood or peer context. However, these studies typically focus on the impact of housing residency per se, rather than isolating institutional responses by public schools.

(Di & Murdoch, 2013) explicitly investigate the impact of the Low-Income Housing Tax Credit (LIHTC) on school performance in Texas, concluding that LIHTC unit development does not significantly harm nearby elementary schools. Yet, their design centers on level shifts in test scores and does not capture dynamic feedback through school operations or budgetary channels.

## **2.2 Neighborhood and Peer Effects in Education**

Parallel to the housing literature, education economists have long emphasized the role of neighborhood environments and peer composition in shaping learning outcomes (Bobonis & Finan, 2009; Houston & Henig, 2023). These studies underscore the importance of demographic context, including income and language background, in determining school climate and achievement dynamics. Nevertheless, peer effects are often difficult to distinguish from selection, and few papers trace how changes in neighborhood composition are institutionally mediated through public resource allocation.

## **2.3 Institutional Response and School Finance**

While many studies acknowledge that schools operate under resource constraints, relatively little is known about how public institutions respond dynamically to demographic shifts induced by housing policy. Existing school finance research focuses largely on tax base variation and equity (Kessel, 2018), often abstracting from exogenous residential shocks. Studies on school accountability and performance-based budgeting (Houston & Henig, 2023) highlight how standardized test results feed into administrative decisions, but rarely situate these responses within the context of long-run housing policy changes.

## 2.4 Gaps in the Literature

Taken together, these strands suggest that housing policy, neighborhood demographics, and educational performance are linked—but the causal pathways and institutional mechanisms remain underexplored. Most prior work estimates reduced-form effects or average treatment effects of housing access, without modeling how public schools endogenously respond via budgets, composition, or performance. No existing study, to our knowledge, uses a dynamic framework such as panel VAR(X) to model sequential policy effects across multiple institutional dimensions.

## 3 Data

### 3.1 Data Source

This study combines administrative education data from the Texas Education Agency (TEA) with geographic and project-level data from the U.S. Department of Housing and Urban Development’s (HUD) Low-Income Housing Tax Credit (LIHTC) database. The TEA dataset includes annual school- and district-level measures of student performance, demographics, and budgetary information from 2004 to 2018. These include standardized test results (TAKS and STAAR), enrollment by income and ethnicity, and instructional expenditure per pupil. Texas is an ideal setting for this analysis due to its large, diverse student population and consistent statewide data collection on academic outcomes and school finance.

The LIHTC dataset provides information on 54,102 projects and over 3.7 million housing units placed in service between 1987 and 2023. For each project, the data include address, number of total and low-income units, number of bedrooms, credit allocation year, placed-in-service year, construction type (new vs. rehab), credit type, and financing sources. All records have been geocoded by HUD, enabling spatial linkage with school district boundaries. These features allow for analysis of the geographical distribution and local concentration of LIHTC investments, and how these

relate to surrounding institutional responses.

To ensure sufficient overall variation for panel analysis, I restrict the sample to school districts with above-median standard deviation in annual LIHTC construction over the study period. Specifically, I calculate the standard deviation of yearly LIHTC unit counts for each district and retain those exceeding the cross-sectional median. The resulting sample comprises a balanced panel of 390 observations, spanning 15 years (2004–2018) across 26 school districts.

### 3.2 Variable Construction

All main variables in the panel are transformed into log differences to capture year-over-year proportional changes. This transformation not only enables interpretation in terms of growth rates but also helps mitigate concerns regarding non-stationarity and regime-induced measurement shifts, particularly due to the 2012 transition from TAKS to STAAR.

The main outcome variable, school performance ( $SP$ ), is defined as the percentage of students meeting the state’s minimum proficiency standard (“met standard”) on state-based standardized tests. Rather than using normalized Z-scores, I focus on this policy-relevant metric to reflect schools’ ability to meet externally defined performance thresholds. Separate performance measures are constructed for reading ( $SP_1$ ) and math ( $SP_2$ ), and included as distinct outcome variables in the VAR framework.

All variables are log-differenced to capture proportional year-over-year changes. The dynamic structure of the model follows a recursive logic: housing investments affect student composition contemporaneously ( $t$ ), which in turn affects the school budget in the following year ( $t + 1$ ), and ultimately school performance in year  $t + 1$ .

Key explanatory variables include:

- **LIHTC Construction** ( $PH_t$ ):

- Log-differenced number of newly placed-in-service LIHTC units per capita.

- **Student Composition** ( $SC_t$ ):
  - Log-differenced share of economically disadvantaged students
- **School Budget** ( $SB_{t+1}$ ):
  - Log-differenced instructional expenditure per test taker (real terms).
  - Focusing on test takers improves precision over general per-pupil spending.
- **School Performance** ( $SP_{t+1}$ ):
  - Log-differenced share of students meeting the “met standard” threshold in reading ( $SP_1$ ) and math ( $SP_2$ ), separately measured.
  - Each score is constructed as a **test-taker weighted average** across relevant grade levels and subjects, reflecting the proportion of students who met proficiency standards conditional on test participation.
- **Post-2012 Regime Indicator** ( $\text{post2012}_t$ ):
  - A binary indicator equal to 1 if the year is 2012 or later, corresponding to the transition from TAKS to STAAR.
  - Included as an exogenous variable in the VAR-X specification to absorb testing regime shifts.

This timing structure ensures that causal ordering in the VAR-X model is consistent with institutional dynamics: housing supply shocks alter student demographics within the year, which feed into district budgeting decisions made for the subsequent academic year, ultimately influencing standardized performance outcomes.

**Table 1:** Descriptive Statistics of Log-Differenced Variables (2004–2018)

Variable	Mean	SD	Min	Max
<b>Public Housing</b>				
PH1	-0.003	0.496	-2.482	1.881
<b>Student Composition</b>				
SC1	0.028	0.134	-0.681	1.306
<b>School Finance</b>				
SB1	-0.014	0.266	-1.319	1.296
<b>School Performance</b>				
SP1	-0.033	0.194	-0.806	0.808
SP2	-0.024	0.254	-1.713	0.713
<b>Covariate</b>				
post2012	0.467	0.500	0.000	1.000

### 3.3 Descriptive Statistics

Table 1 reports descriptive statistics for the log-differenced variables used in the panel VAR(X) analysis, covering 26 school districts over 15 years (2004–2018). All variables are expressed as year-over-year log differences, capturing proportional changes and enabling interpretation of model coefficients as elasticities.

The public housing variable (PH1), defined as the log change in LIHTC units per capita, has a standard deviation of 0.496. This reflects the sampling strategy: only districts with above-median temporal variation in LIHTC construction were retained to ensure sufficient identifying variation for dynamic estimation. The mean log change is slightly negative, indicating a modest decline in LIHTC construction over the period, possibly due to cyclical funding constraints or policy saturation. Student composition (SC1), measured as the share of economically disadvantaged students, exhibits moderate variation (SD = 0.134), suggesting some year-to-year fluctuation in socioeconomic makeup. Instructional expenditure per test taker (SB1) has a standard deviation of 0.266, comparable in scale to the variation in student performance, and likely reflects adjustment dynamics in district budgeting.

Outcome variables—SP1 (reading) and SP2 (math)—show standard deviations of 0.194 and 0.254,

respectively, indicating that test-based school performance fluctuates meaningfully over time, even though mean changes hover near zero. This supports the modeling of performance as a dynamic, policy-sensitive outcome. Lastly, the post2012 indicator averages 0.467, reflecting an even split in observations before and after Texas’s transition from the TAKS to STAAR testing regime. This variable is included as an exogenous control to account for structural breaks in test design and preserve the internal validity of the estimated dynamics.

## 4 Empirical Strategy

To examine how subsidized housing policy affects public school operations and academic outcomes, I estimate a panel Vector Autoregression (VAR) model with exogenous controls (VARX) at the school district-year level. The model captures the dynamic, potentially lagged responses of local institutions to changes in housing investment, student composition, and public budgets. The empirical specification is as follows:

$$\mathbf{y}_{it} = \sum_{l=1}^p B_l \mathbf{y}_{i,t-l} + A \mathbf{z}_{it} + \mathbf{u}_{it} \quad (4.1)$$

where  $\mathbf{y}_{it}$  is a 4-dimensional vector of log-differenced endogenous variables for district  $i$  in year  $t$ , including LIHTC construction ( $PH$ ), student composition ( $SC$ ), school budget ( $SB$ ), and school performance ( $SP$ ). All variables are transformed into first differences in logs, which not only allows interpretation in growth rates but also removes time-invariant district-level heterogeneity, eliminating the need for fixed effects in the main specification. The vector  $\mathbf{z}_{it}$  includes exogenous controls, most notably a dummy for the post-2012 STAAR testing regime. The lag order  $p$  is selected based on standard information criteria; both the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) select the same optimal lag length in this setting. The residual term  $\mathbf{u}_{it}$  captures district-level innovations that are not explained by the model’s lag structure or

exogenous shocks.

To unpack the dynamic relationships between components of the system, I estimate and interpret impulse response functions (IRFs) within the structural VARX framework. The analysis focuses on tracing the effect of innovations in one variable—such as public housing construction ( $PH_1$ ) or student composition ( $SC_1$ )—on subsequent movements in others, particularly school budgets ( $SB_1$ ) and academic outcomes. These IRFs trace the response of each endogenous variable to a one-unit structural shock, while all other structural shocks are held at zero, consistent with the recursive identification strategy.

To accommodate multiple dimensions of academic performance, I estimate two separate panel VARX models with identical structures but alternative outcome variables. In the first specification,  $y_{it}^{(1)}$  includes reading performance ( $SP_{1,it}$ ), and in the second,  $y_{it}^{(2)}$  includes math performance ( $SP_{2,it}$ ). The rest of the system—housing construction ( $PH_{1,it}$ ), student composition ( $SC_{1,it}$ ), and school budget ( $SB_{1,it}$ )—remains the same. By computing IRFs for each relevant combination—such as  $(PH_1, SB_1)$ ,  $(SC_1, SP_1)$ , or  $(SB_1, SP_2)$ —I characterize the dynamic causal pathways linking housing policy, educational investment, and student achievement. This approach highlights both direct and mediated effects, and captures the lagged institutional adjustments that shape observed outcomes.

## 4.1 Identification Strategy

To recover causal impulse responses from the reduced-form residuals, I employ a recursive identification strategy based on the Cholesky decomposition of the residual covariance matrix. This imposes a lower-triangular structure on contemporaneous effects, with the following variable ordering:

$$PH_t \rightarrow SC_t \rightarrow SB_{t+1} \rightarrow SP_{t+1}^{\{1,2\}}$$



A key identifying assumption in this study is that the temporal ordering of variables captures the causal structure of interest. Specifically, the VARX model is estimated using log-differenced variables with a lag length selected via information criteria (typically AIC), and this lag structure plays a central role in enabling causal interpretation.

The ordering assumes that public housing construction ( $PH_{it}$ ) affects student composition ( $SC_{it+1}$ ), which in turn affects school budgets ( $SB_{it+1}$ ), and ultimately student performance ( $SP_{it+1}$ ). This temporal structure reflects both empirical dynamics and institutional design. In Texas, the LIHTC program is administered independently of local school districts, with tax credits allocated through state housing agencies to incentivize private developers. These projects are planned and constructed without regard to educational performance or needs, meaning that the timing and location of LIHTC construction are plausibly exogenous to contemporaneous school conditions. Once operational, however, these housing units can affect the demographic composition of school attendance zones—particularly by increasing the number of low-income, limited English proficient (LEP), or minority students in affected districts.

These shifts in student composition, in turn, influence fiscal decisions through institutional funding formulas that allocate resources based on student need and characteristics. For example, Texas adjusts school funding to account for economically disadvantaged or LEP students, often triggering increases in instructional expenditure as the district attempts to maintain service quality amid a changing student body. However, such budgetary responses are not immediate: they are mediated by annual budget cycles, enrollment reporting lags, and state-level appropriation timelines. Therefore, it is appropriate to model school budget changes as responding to prior-year shifts in composition rather than contemporaneously.

Finally, student performance outcomes—measured through standardized test proficiency—are assumed to respond with the greatest delay, capturing the cumulative effects of prior demographic and fiscal shocks. Institutional features of the education system reinforce this lag: curriculum adjustments, resource deployments, and staffing changes require time to implement and to produce

measurable changes in learning outcomes. Moreover, since standardized assessments occur annually and reflect academic mastery accumulated over multiple months, test scores serve as lagging indicators of school conditions rather than real-time measures. This ordered structure is thus consistent with both theoretical expectations and the institutional timelines governing housing, school finance, and academic accountability in Texas.

Moreover, using lagged values ensures that right-hand-side variables are predetermined relative to the outcomes, mitigating concerns of simultaneity bias. Since policy variables like LIHTC construction are realized prior to the observed outcomes, and because log-differencing removes fixed district-level unobservables, the system approximates a counterfactual framework wherein each year's outcome can be interpreted as a response to past shocks rather than contemporaneous correlations.

Finally, the inclusion of exogenous variables such as the post-2012 STAAR dummy helps control for regime-wide institutional changes that might otherwise confound year-over-year differences. This ensures that estimated dynamic effects are not artifacts of unrelated systemic shifts, but rather reflect underlying policy-relevant mechanisms.

## **4.2 Structural Shock Interpretation**

Under the recursive identification strategy outlined above, each reduced-form residual is interpreted as a linear combination of orthogonal structural shocks that correspond to policy-relevant innovations. These shocks are assumed to be mutually uncorrelated and to represent distinct exogenous sources of variation that transmit through the educational system in empirically traceable ways.

$$\begin{pmatrix} u^{PH} \\ u^{SC} \\ u^{SB} \\ u^{SP} \end{pmatrix} = B_0^{-1} \begin{pmatrix} e^{LIHTC Shock} \\ e^{Demographic Sorting Shock} \\ e^{Education Finance Shock} \\ e^{Academic Productivity Shock} \end{pmatrix} \quad (4.2)$$

(4.3)

#### 4.2.1 Neighborhood Effect

First, the LIHTC Shock ( $e^{LIHTC Shock}$ ) represents policy-induced residential investment through the Low-Income Housing Tax Credit program. Because LIHTC projects are administered by state housing authorities and largely determined by developer applications, allocation formulas, and zoning eligibility, the timing and location of these developments are plausibly exogenous to local school dynamics. This shock captures external variation in the built environment that initiates downstream institutional responses, particularly through its influence on student demographics and school budgets.

While the primary pathway from public housing shocks to student performance is presumed to operate through changes in composition and school budgets, the empirical finding that  $PH$  exerts a direct effect on  $SP$  suggests the presence of additional mechanisms. One plausible interpretation is that this effect reflects a neighborhood-level shock arising from rapid changes to the built environment. LIHTC developments, while aimed at expanding affordable housing, often take place in areas already characterized by infrastructural strain or environmental stress. The construction and initial occupation of these projects can exacerbate local congestion, generate noise pollution, or strain transit and public service systems—all of which may disrupt students' learning conditions outside the classroom.

Even short-run disturbances, such as increased residential turnover during the school year or tempo-

rary relocation pressures, can undermine educational continuity and induce stress among students. These factors, though external to the school itself, constitute a neighborhood effect in the strict sense: environmental externalities from housing investment that impair academic outcomes independent of peer composition or school finance. Hence, the observed direct response of  $SP$  to  $e^{\text{LIHTC Shock}}$  may capture the immediate spillovers of housing policy on educational performance through the local physical and institutional environment.

#### 4.2.2 Peer Effect

Second, the Demographic Sorting Shock ( $e^{\text{Demographic Sorting Shock}}$ ) captures year-to-year changes in the socioeconomic composition of the student population unrelated to LIHTC development. These shocks may arise from endogenous neighborhood change, local migration, labor market fluctuations, or family-level relocation patterns that affect who enrolls in public schools, independent of policy-driven housing supply. When such shocks transmit to academic performance ( $SP$ ), they are interpreted as evidence of peer effects, whereby changes in the socioeconomic composition of the classroom environment directly influence learning outcomes through behavioral, instructional, or social channels, independent of formal school funding adjustments.

If  $e^{\text{Demographic Sorting Shock}}$  is found to exert a statistically significant effect on student performance ( $SP$ ), this can be interpreted as evidence of peer effects—causal mechanisms through which the socioeconomic composition of a classroom shapes individual learning outcomes. Unlike budgetary shocks, which operate through changes in instructional resources or staffing, peer effects arise from social, behavioral, and instructional dynamics within the student body itself. A positive or negative performance response to this shock would suggest that schools are sensitive not only to aggregate resource levels but also to the educational climate created by the demographic characteristics of enrolled students. These mechanisms may include altered classroom behavior norms, differentiated instructional pacing, teacher expectations, or psychological stressors related to social comparison, all of which can influence academic achievement independently of formal funding adjustments.

### 4.2.3 Budget Effect

Third, the Education Finance Shock ( $e^{\text{Education Finance Shock}}$ ) reflects exogenous changes in school budgets that are not mechanically tied to student composition or housing dynamics. These may stem from shifts in state appropriations, changes in property tax bases, or modifications to school finance formulas. Because they are assumed to be orthogonal to the other shocks by construction, they isolate independent fiscal impulses to public education systems.

If student performance responds significantly to the Education Finance Shock ( $e^{\text{Education Finance Shock}}$ ), this effect can be interpreted as a Budget Effect—that is, the causal impact of exogenous fiscal changes on educational outcomes. Because this shock is constructed to be orthogonal to both housing policy and enrollment composition, it isolates the role of financial resources per se in shaping academic performance. Such a response suggests that variations in school budgets—whether driven by state appropriations, local tax bases, or funding formula adjustments—can directly influence student achievement, independent of demographic or infrastructural context.

### 4.2.4 Academic Productivity Shock

Finally, the Academic Productivity Shock ( $e^{\text{Academic Productivity Shock}}$ ) encompasses all residual innovations in test-based academic performance not attributable to observed changes in housing, composition, or budget. These shocks may reflect unobserved shifts in instructional quality, curriculum design, teacher effectiveness, assessment difficulty, or broader socio-psychological learning environments.

This structural interpretation maps directly onto the decomposition in Equation (4.2), and enables a causal accounting of how distinct policy-relevant shocks propagate through the housing–composition–budget–performance nexus. The impulse response functions that follow trace the effect of each structural shock in isolation, holding all others at zero, as implied by the Cholesky identification strategy.

## 5 Results

To quantify how public education systems dynamically respond to housing policy shocks, I estimate a panel VAR model with exogenous controls and compute impulse response functions (IRFs) using a recursive identification strategy. The estimated IRFs trace the sequential effects of innovations in housing investment, student composition, and public budgets on educational outcomes. The identification follows a recursive ordering that reflects institutional timing: housing construction precedes demographic shifts, which shape budget allocations, which in turn influence academic performance.

This section is organized into two parts. First, I report reduced-form coefficient estimates to provide a preliminary view of contemporaneous and lagged correlations across variables. While not causal in nature, these associations offer insight into potential linkages and magnitudes of policy effects. Second, I present structural impulse response functions derived from the VARX specification to identify the timing, direction, and persistence of institutional responses. IRFs provide a dynamic view of how local educational systems absorb and transmit housing shocks over time.

The analysis reveals five core findings. First, shocks to LIHTC construction (PH1) yield no detectable impact on student composition, whether measured by the share of economically disadvantaged students (SC1) or limited English proficiency (SC2); institutional lags and enrollment mechanisms likely mute short-run demographic responses. Second, school budgets (SB1) react in an oscillatory pattern: an initial decline in year one is followed by a rebound in year three and a subsequent dip by year five. This non-monotonic adjustment reflects fiscal frictions such as budget cycles and delayed administrative responses. Third, school performance in both reading (SP1) and math (SP2) declines with a delay, showing statistically significant drops around year three and beyond, indicating that instructional strain accumulates over time. Fourth, student composition shocks themselves (SC1, SC2) have little to no impact on either budgets or outcomes, suggesting that schools may buffer demographic changes through compensatory funding or targeted interventions. Finally, positive budget shocks improve performance briefly but unsustainably, with modest

gains in year two that quickly vanish. These findings highlight the importance of tracing the temporal structure of institutional responses to housing interventions.

## 5.1 Reduced-Form Estimates

Before turning to the dynamic results from the VARX framework, I begin by reporting reduced-form coefficient estimates from the system of equations. These estimates describe contemporaneous and lagged associations between key institutional variables—housing investment (PH), student composition (SC), school budget (SB), and school performance (SP)—in a flexible but non-structural way. By examining the signs, magnitudes, and significance patterns of these coefficients, we gain preliminary insight into the potential pathways through which housing policy and demographic shifts influence educational institutions. Although these estimates do not account for feedback dynamics or long-run cumulative effects, they provide an important foundation for interpreting the impulse responses presented later.

**Table 2:** Reduced-Form Estimates from Panel VARX

	PH1	SC1	SB1	SP1
<b>PH</b>				
PH1_L1	-0.674 *** (0.047)	-0.007 (0.017)	0.050 (0.030)	-0.024 (0.018)
PH1_L2	-0.388 *** (0.047)	-0.004 (0.017)	0.053 (0.030)	-0.012 (0.017)
<b>SC</b>				
SC1_L1	-0.007 (0.150)	-0.229 *** (0.053)	0.053 (0.095)	0.014 (0.056)
SC1_L2	-0.057 (0.155)	-0.204 ** (0.055)	-0.043 (0.098)	0.061 (0.058)
<b>SB</b>				
SB1_L1	-0.205 * (0.083)	0.003 (0.029)	-0.495 *** (0.053)	0.130 *** (0.031)
SB1_L2	-0.299 ** (0.085)	0.006 (0.030)	-0.176 ** (0.054)	0.032 (0.032)
<b>SP</b>				
SP1_L1	0.249 (0.126)	0.089 (0.045)	-0.174 * (0.080)	-0.318 *** (0.047)
SP1_L2	0.378 ** (0.143)	0.036 (0.051)	0.179 (0.091)	-0.071 (0.053)
<b>Covariate</b>				
post2012	0.027 (0.034)	0.035 ** (0.012)	-0.049 * (0.022)	-0.138 *** (0.013)

*Note:*

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3:** Reduced-Form Estimates from Panel VARX

	PH1	SC1	SB1	SP2
<b>PH</b>				
PH1_L1	-0.650 *** (0.049)	-0.001 (0.017)	0.024 (0.031)	-0.022 (0.031)
PH1_L2	-0.379 *** (0.047)	-0.003 (0.017)	0.053 (0.030)	-0.022 (0.030)
<b>SC</b>				
SC1_L1	-0.005 (0.151)	-0.224 *** (0.053)	0.076 (0.096)	0.038 (0.098)
SC1_L2	0.016 (0.159)	-0.188 ** (0.056)	-0.090 (0.101)	0.015 (0.103)
<b>SB</b>				
SB1_L1	-0.282 ** (0.081)	-0.014 (0.028)	-0.518 *** (0.051)	0.059 (0.052)
SB1_L2	-0.345 *** (0.083)	0.003 (0.029)	-0.243 *** (0.052)	-0.128 * (0.053)
<b>SP</b>				
SP2_L1	-0.000 (0.087)	0.047 (0.030)	0.091 (0.055)	-0.307 *** (0.056)
SP2_L2	0.339 * (0.166)	0.086 (0.059)	-0.199 (0.105)	-0.050 (0.108)
<b>Covariate</b>				
post2012	-0.030 (0.029)	0.026 * (0.010)	-0.030 (0.019)	-0.102 *** (0.019)

*Note:*

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The reduced-form estimates in Tables 2 and 3 reveal several consistent patterns across reading (SP1) and math (SP2) performance equations. First, school budgets (SB1) exhibit a statistically significant and positive association with subsequent academic outcomes, particularly in reading. In Table 2, the first lag of SB1 is associated with a 1% level increase in SP1, while in Table 3, the second lag of SB1 shows a weaker but still statistically significant relationship with SP2 at the 10% level. These findings suggest that instructional spending per test taker has a short-run positive effect on student achievement, although the impact appears stronger and more immediate for reading than for math.

Second, lagged performance terms (SP1\_L1 and SP2\_L1) show large and negative coefficients in both models, indicating strong autoregressive dynamics. The magnitudes of these coefficients (approximately  $-0.3$ ) imply that performance tends to partially revert to the mean after a positive or negative deviation, consistent with transitory shocks or adjustment processes in school environments.



In contrast, public housing construction (PH1) and student composition (SC1) do not exhibit statistically significant effects on either school budgets or performance in the reduced-form specifications. The coefficients on PH1 and SC1 are generally small and imprecisely estimated, with confidence intervals that include zero across all lags and outcomes. This suggests that any effects of housing investment or demographic change on educational outcomes are not immediate or are mediated through more complex institutional channels not fully captured in the reduced-form structure.

Overall, the reduced-form results underscore the short-run role of school budgets as a key mediating variable in the education production process, while also highlighting the temporal inertia and complexity of demographic and housing-related effects.

## 5.2 Impulse Response Analysis

To trace the dynamic responses of local educational institutions to exogenous shocks, I estimate impulse response functions (IRFs) derived from the recursively identified structural VAR model. Each IRF represents the effect of a one-time structural shock on the future trajectory of an outcome variable, holding all other shocks constant. This allows a causal interpretation of how innovations in housing policy, student demographics, or school finance propagate over time through the education system. Since the model employs log-differenced variables, the IRFs capture proportional or growth rate changes, providing a dynamic view of institutional adjustment.

In this framework, each impulse response function (IRF) represents the marginal effect of a one-time structural shock—such as a policy-driven increase in LIHTC development or an exogenous shift in school finance—on the subsequent evolution of an outcome variable, while holding all other shocks fixed. The analysis is designed to trace the causal sequencing, intensity, and persistence of these effects as they propagate through the interlinked domains of housing, student composition, budgeting, and academic outcomes. Since the model is estimated in log-differences, the IRFs quantify relative or percentage changes over time, which aligns well with interpreting institutional

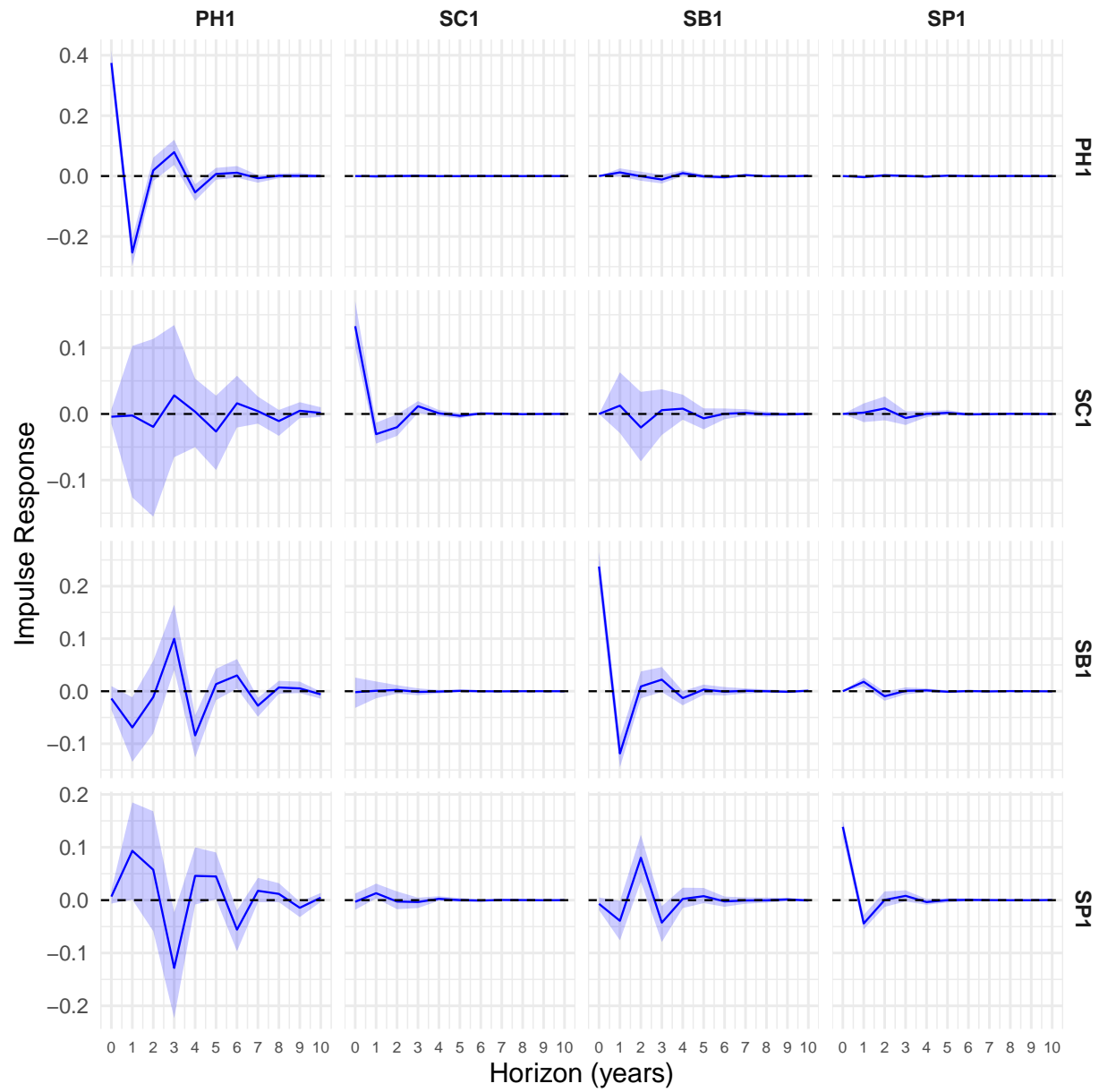
adjustments in terms of dynamic growth responses rather than static level shifts.

I present IRFs for each endogenous variable in turn, disaggregated by shock source and outcome type. Confidence intervals based on bootstrapped standard errors are included to assess statistical precision. The VAR model is estimated with lag order 2, as both the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) jointly suggest this specification. Together, these IRFs provide a richer understanding of the causal pathways that link housing policy to educational inequality.

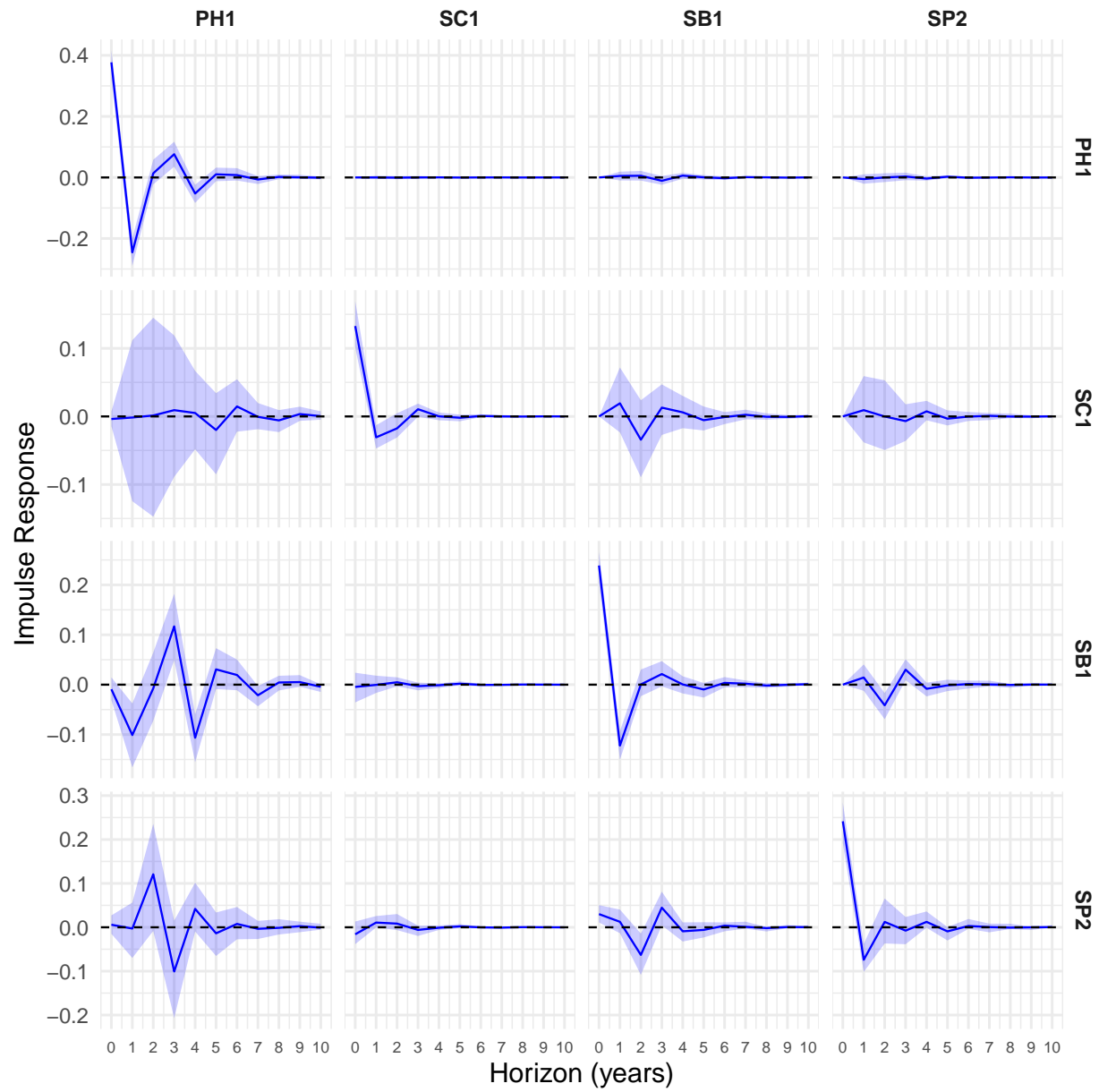
In summary, the estimated impulse response functions reveal that the effects of LIHTC-driven housing shocks on public education are both delayed and heterogeneous across institutional channels. Contrary to prevailing assumptions, housing shocks do not induce immediate demographic changes in student composition, nor do composition shocks themselves translate into measurable impacts on budgets or academic performance—suggesting the presence of institutional buffers and compensatory mechanisms that maintain short-term stability. However, school budgets and student outcomes do respond to housing shocks, albeit in non-monotonic and temporally lagged ways. Instructional budgets initially decline before rebounding and ultimately dissipating, reflecting administrative lags and fiscal frictions in aligning educational resources with residential change.

Most notably, student performance in English deteriorates significantly several years after a LIHTC shock, consistent with the hypothesis that neighborhood-level disturbances—rather than classroom composition—drive long-run educational externalities. These delayed declines are not mirrored in math performance, indicating subject-specific vulnerability to psychosocial or environmental stressors. Meanwhile, direct shocks to school budgets yield only short-lived gains in performance, reinforcing the notion that fiscal inputs alone, without systemic reforms, are insufficient to produce durable academic improvements.

Taken together, the findings highlight the complexity of housing-education linkages: policy-induced residential change can ripple through educational systems via indirect, lagged, and uneven channels, often governed by institutional inertia and local context. These results call for



**Figure 2:** *Impulse Response Functions (95% CI) — VARX(2)*



**Figure 3:** *Impulse Response Functions (95% CI) — VARX(2)*

more anticipatory and integrative planning across housing and education sectors, ensuring that infrastructure expansion is accompanied by timely educational support to mitigate unintended consequences and promote equitable learning environments.

Together, these IRFs provide a nuanced empirical portrait of how housing shocks cascade through educational institutions. The null effect on student composition, the nonlinear oscillation in budget responses, and the lagged deterioration in performance all point to complex institutional filters and time-dependent adjustment costs. These dynamics caution against simplistic assumptions about immediate policy spillovers and underscore the importance of evaluating not only whether policy affects schools, but also when and through which channels such effects materialize.

### 5.3 Cumulative Effects

To complement the dynamic analysis presented above, I next examine the cumulative effects of key structural shocks over two policy-relevant horizons: the short run (three years) and the long run (ten years). While the impulse response functions (IRFs) trace the timing and direction of policy transmission, cumulative IRFs summarize the total magnitude of response, offering a clearer view of the net impact over time. This perspective is particularly useful for interpreting complex or oscillatory dynamics, and for comparing the strength of competing channels such as housing, budgets, and composition.

The choice of three-year and ten-year horizons for cumulative IRF analysis is motivated by both institutional realities and substantive intuition. From an institutional perspective, the short-run window of three years reflects the typical duration of major school planning cycles and the period over which most administrative or policy responses to housing shocks are expected to materialize. In many public school systems, including Texas, budget reallocations, staffing changes, and programmatic adjustments often follow multi-year cycles, making the three-year mark a natural threshold for capturing early-stage adaptation and policy responsiveness.

The ten-year horizon, on the other hand, is chosen to represent the extended-horizon effects that

encompass a full cycle of student progression from entry through graduation within a district. This period is long enough to observe not only the cumulative effects of delayed institutional adjustment, but also potential feedback mechanisms, persistent resource shifts, and the realization of educational outcomes influenced by residential change. Intuitively, three years correspond to the time needed for initial administrative inertia and adaptation to dissipate, while ten years reflect the maximum horizon over which structural shocks could plausibly shape both resource allocation and student achievement trajectories within the same local context.

### 5.3.1 Three-Year Horizon

**Table 4:** Cumulative IRF

Shock	Response	Cumulative.IRF	CI.Lower	CI.Upper	Significant
<b>PH</b>					
PH1	SC1	0.002	-0.047	0.044	No
PH1	SB1	0.006	-0.030	0.039	No
PH1	SP1	0.029	-0.023	0.083	No
<b>SC</b>					
SC1	SP1	0.004	-0.008	0.025	No
<b>SB</b>					
SB1	SP1	-0.008	-0.033	0.019	No

**Table 5:** Cumulative IRF

Shock	Response	Cumulative.IRF	CI.Lower	CI.Upper	Significant
<b>PH</b>					
PH1	SC1	0.005	-0.049	0.056	No
PH1	SB1	-0.001	-0.034	0.031	No
PH1	SP2	0.023	-0.025	0.076	No
<b>SC</b>					
SC1	SP2	-0.003	-0.020	0.022	No
<b>SB</b>					
SB1	SP2	0.024	0.001	0.052	Yes

To assess the magnitude of structural shocks over the early horizon, Table 4 and Table 5 report cumulative impulse response functions (IRFs) over a three-year window for both reading (SP1)

and math (SP2) performance outcomes. The results reveal that early-horizon cumulative effects are generally weak and statistically insignificant across most combinations of structural shock and response variable. Specifically, the LIHTC Shock ( $e^{\text{LIHTC Shock}}$ ) exhibits no meaningful cumulative impact on student composition (SC1), school budgets (SB1), or student performance in either subject area. Likewise, Demographic Sorting Shocks ( $e^{\text{Demographic Sorting Shock}}$ ) fail to generate significant cumulative responses in school performance, providing additional support for the institutional buffering hypothesis discussed above.

The only statistically significant early-horizon effect emerges from Education Finance Shocks ( $e^{\text{Education Finance Shock}}$ ) to math performance (SP2), with a cumulative effect of 0.024 and a 95% confidence interval that excludes zero. This result suggests that increases in instructional spending may yield modest short-term improvements in quantitative achievement, even if similar effects are not observed for reading outcomes. Taken together, these findings reinforce the view that most policy-induced changes in the educational environment require time to materialize, and that institutional rigidities and adaptation costs may attenuate their initial transmission.

### 5.3.2 Ten-Year Horizon

**Table 6:** Cumulative IRF

Shock	Response	Cumulative.IRF	CI.Lower	CI.Upper	Significant
<b>PH</b>					
PH1	SC1	-0.005	-0.073	0.051	No
PH1	SB1	-0.056	-0.095	-0.022	Yes
PH1	SP1	0.084	0.019	0.143	Yes
<b>SC</b>					
SC1	SP1	0.006	-0.006	0.028	No
<b>SB</b>					
SB1	SP1	-0.001	-0.029	0.033	No

To examine the extended-horizon consequences of structural shocks, Tables 6 and 7 report cumulative IRFs over a ten-year window. The results indicate that the LIHTC Shock ( $e^{\text{LIHTC Shock}}$ )

**Table 7:** Cumulative IRF

Shock	Response	Cumulative.IRF	CI.Lower	CI.Upper	Significant
<b>PH</b>					
PH1	SC1	0.002	-0.068	0.071	No
PH1	SB1	-0.073	-0.106	-0.040	Yes
PH1	SP2	0.056	-0.004	0.123	No
<b>SC</b>					
SC1	SP2	-0.002	-0.020	0.024	No
<b>SB</b>					
SB1	SP2	0.013	-0.015	0.047	No

produces the most pronounced and statistically significant long-term effects. For reading performance (SP1), a positive LIHTC shock is associated with a significant cumulative decline in school budgets ( $-0.056$ ) and a simultaneous decline in student achievement ( $0.084$ ), suggesting that long-run budgetary constraints may partially mediate the educational consequences of housing policy. Importantly, these effects only emerge over the extended horizon, underscoring the slow-moving nature of institutional adjustment and the lagged impact of resource strain on academic outcomes.

In contrast, cumulative shocks to student composition ( $e^{\text{Demographic Sorting Shock}}$ ) and to school budgets ( $e^{\text{Education Finance Shock}}$ ) do not generate significant long-term effects on student performance. This null pattern reinforces earlier evidence that schools may possess buffering mechanisms that prevent transitory shocks from translating into sustained changes in academic achievement. For math performance (SP2), only the cumulative budgetary response to the LIHTC shock ( $e^{\text{LIHTC Shock}} \rightarrow SB1$ ) remains statistically significant in the long run. The previously observed short-run gains from direct budget shocks ( $e^{\text{Education Finance Shock}} \rightarrow SP2$ ) dissipate over time, suggesting that one-time funding increases alone are insufficient to produce persistent improvements in student outcomes.

Collectively, these findings highlight the cumulative nature of housing-related spillovers, with sustained effects on both institutional resources and academic performance, while also emphasizing the relative rigidity of education systems in the face of internal demographic or fiscal perturbations.



## 6 Conclusion

This study reveals that the most consequential and persistent changes in public education arise not from gradual demographic shifts or short-term budget fluctuations, but from policy-driven shocks to the local built environment—specifically, LIHTC-induced housing investment. The analysis demonstrates that exogenous shocks to subsidized housing supply (LIHTC Shocks) generate significant and enduring declines in both school budgets and student achievement, particularly in reading. In contrast, structural shocks to student composition and school finance—representing demographic sorting and budgetary adjustments independent of housing policy—exert little measurable impact on long-run educational outcomes. These patterns suggest that institutional buffers and compensatory mechanisms within school systems effectively absorb routine demographic and fiscal fluctuations, but are less equipped to handle the protracted strains imposed by large-scale changes in the neighborhood environment.

Taken together, the findings highlight the importance of accounting for the indirect and delayed pathways by which place-based housing policy can influence educational resources and student performance. The durability and magnitude of these effects underscore the need for more integrative policy planning between housing and education sectors, particularly in contexts where new housing development may impose sustained pressures on already constrained school systems.

### 6.1 Policy Implication

The findings of this study offer several actionable insights for policymakers tasked with coordinating housing and education policy

### **6.1.1 Beyond Composition: Institutional and Environmental Pathways Linking LIHTC Expansion to Educational Outcomes**

The findings indicate that the negative long-run impact of subsidized housing expansion on school resources and academic achievement does not operate through student sorting or compositional change. Instead, the mechanism is institutional and environmental: school districts experience sustained fiscal strain and neighborhood-level disruptions when LIHTC projects are introduced, but do not see compensatory adjustments in funding formulas or student allocation. This institutional rigidity means that schools may face budget constraints and environmental pressures—such as infrastructural congestion or psychosocial stressors—even when the actual student composition remains unchanged.

For policymakers, this underscores the need to move beyond assumptions about demographic “burden” and to instead anticipate the indirect institutional costs of housing policy:

- Educational impact assessments should be required as part of the LIHTC siting and allocation process, evaluating not only projected enrollment shifts but also the fiscal and infrastructural resilience of affected school districts.
- States and municipalities should consider automatic funding adjustments or reserve allocations for districts experiencing LIHTC-driven development, even if student composition appears unchanged.
- Local education agencies should be given advance notice and flexibility to plan for neighborhood-level disruptions, not just headcount changes, through targeted support for school leadership, student services, and family engagement programs.

Further, these findings caution against interpreting housing-education linkages solely through the lens of peer or composition effects. Future research should further disentangle the environmental and institutional frictions that mediate the impact of place-based housing policy on human capital formation.

### 6.1.2 Reforming School Finance Formulas

The observed delayed and non-monotonic response of school budgets to LIHTC-induced housing shocks highlights a fundamental temporal misalignment between infrastructure provision and fiscal adaptation in public education. Under the current system—where local property taxes form the core of school funding and state appropriations often follow rigid or retrospective formulas—there is a persistent lag between demographic pressures generated by new housing development and the fiscal capacity of districts to respond. This lag can leave schools under-resourced in precisely the period when additional investment is most needed.

There are several policy recommendations:

- Automatic Triggers:
  - Funding mechanisms should incorporate automatic triggers or responsive adjustments that activate when projected housing completions or enrollment thresholds are met, allowing fiscal support to precede, rather than trail, demographic change.
- Real-Time Data Integration:
  - Finance formulas should leverage real-time enrollment and housing data, enabling timely resource allocation aligned with the actual needs of schools as neighborhoods evolve.
- Reduce Reliance on Local Property Taxes:
  - Heavy reliance on the local property tax base entrenches inequity and delays, particularly in communities experiencing rapid LIHTC-driven development but with limited taxable value growth.

By proactively synchronizing funding with infrastructure and demographic trends, states can ensure that the fiscal capacity of public schools keeps pace with the demands created by affordable housing expansion, ultimately promoting educational stability and equity for all students.

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