

Does the Geometry Travel?

Zone Replication, Receiver Context, and School Wealth in the Nashville–Clarksville Sender–Receiver System



Gold: Davidson County (sender). Navy: Montgomery County (receiver). Sand: Shelby, Knox, Hamilton (the other HOLC-graded counties) and Rutherford.

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Key Findings

- Nashville's 1937 HOLC grades still mark a coherent surface. Housing, income, health, and violent crime line up from A to D. Tract income, not the grade, sorts people into it, and once income is held constant the grade adds nothing to health outcomes.
- Clarksville does not replicate Nashville's zones. Its own characteristics form a concentric A to D structure patterned on the HOLC logic through income and access, but the racial inscription on it is faint. No tract is majority Black (Nashville has 22), dissimilarity is 33 against 50, the D core is 46% White and holds 6% of the county, and 77% of Black residents live in the two middle tiers.
- Clarksville reproduces the surface instead, county-wide. Age-adjusted Black mortality is the same as Nashville's (1,122 vs. 1,124 per 100,000), chronic-risk health is worse at every income band, physician density is half Nashville's, and 54% of county general revenue is intergovernmental against Nashville's 16%.
- Nashville's growth reaches Clarksville through commuting and prices, not through resettlement of the displaced. Nashville-bound commuters rose 90% in five years, Clarksville home prices rose 61% from 2020 to 2025 against Nashville's 49%, and local wages rose 48% in nine years while prices doubled.
- The money did not follow the students. A Clarksville student is funded at 60 cents on the Nashville dollar in FY2023, down from 79 cents in FY2015, entirely on the local side. State aid per pupil is nearly equal.
- Receiver context moderates the Echo. A federal installation, one tenth the employment scale, and non-consolidated government determine what geometry the surface takes.

The Question

The Spatial Echo framework holds that historical policy inscribes a geometry onto a place, that the built environment is the surface that carries it, and that the geometry outlives the policy that wrote it (Smart, 2026). Nashville is a graded city: the Home Owners' Loan Corporation drew nine polygons across it in 1937 (Nelson et al., 2023). Clarksville, 45 miles northwest, was never graded; its 1940 population of 11,800 fell below the HOLC threshold. Since 2010, it has grown faster than any large city in Tennessee, while Nashville's labor market has reached into it.

This brief asks one question of that pair. Do the zones the 1937 grades still mark in Nashville replicate in Clarksville (the same co-occurring bundle of housing age, income, composition, health, and institutional capacity), and if not, what do Clarksville's tracts organize into? The framework is the lens, not the claim. Every finding rests on public administrative data pulled and rebuilt for this brief (see Method), and the Echo explains what the data show.

Two things this brief does not claim. It does not claim that people displaced by Nashville's gentrification moved to Clarksville; the migration data do not support that, and the question

requires a different design. It does not treat race as the mechanism. Policy inscribed the geometry, income and housing markets sort people into it, and race is one of the things that sorting distributes.

The Lens: How the Spatial Echo Is Applied

The Spatial Echo is not a hypothesis this brief tests. It is the framework from which the hypotheses are derived and against which the results are read. Its canonical statement is that historical policy inscribes spatial distancing; the resulting geometry structures how variables play out across the space it partitions; inscription requires a surface, and the built environment is that surface; the geometry outlives the policy that wrote it; and the sender–receiver model is a constituent propagation mechanism (Smart, 2026). The framework is epistemic: it is assessed by whether the hypotheses it generates survive testing, and no single study confirms or disconfirms it.

Five hypotheses follow for a graded sender and an ungraded receiver joined by a growing labor market. Table 1 states each with the verdict the evidence returns.

Table 1

Hypotheses Derived From the Framework and the Verdict Returned

Hypothesis	Test	Verdict
H1. The sender's 1937 grades still mark a coherent surface; housing, income, composition, health, and crime line up across A to D	Table 2, Figure 1; income-sorting regressions	Supported; the grade's effect on outcomes runs through income
H2. The receiver's tracts reproduce the sender's geometry; the same bundle co-locates and is racially inscribed	Tables 3 to 5, Figure 2	Not supported for racial geography; supported for an income-and-access geometry patterned on the HOLC logic
H3. The receiver reproduces the sender's surface conditions county-wide (health, capacity, fiscal dependency)	Tables 6 and 7	Supported
H4. Nashville's growth reaches Clarksville through the housing and commuting markets, and school wealth does not follow the students	Tables 8 and 9, Figures 3 and 4	Supported
H5. Receiver context (installation, scale, government form) moderates what geometry the surface takes	Section 5	Supported; the installation decouples the price geometry from race

Two constraints follow from using the framework as a lens. Causal claims are not attributed to the 1937 map itself: the grade marks where the surface was laid, and the sorting test is designed to show what carries the outcomes today. The framework is read against the results, not the results against the framework: where a derived hypothesis fails, the brief says so and treats the failure as information about the receiver.

1. Nashville's Zones: The Grade Marks the Surface, Income Fills It

Using the University of Richmond crosswalk of the 1937 polygons to 2020 census tracts (Nelson et al., 2023), each of Davidson County's 172 populated tracts was assigned a dominant grade (area-weighted, 25% minimum overlap) and a continuous share of its area under each grade.

Table 2 reports the surface by dominant grade with 2020–2024 American Community Survey (U.S. Census Bureau, 2025a), CDC PLACES 2025 (Centers for Disease Control and Prevention [CDC], 2025a), and Metro Nashville Police Department incident data (Metropolitan Nashville Police Department, 2026).

Table 2

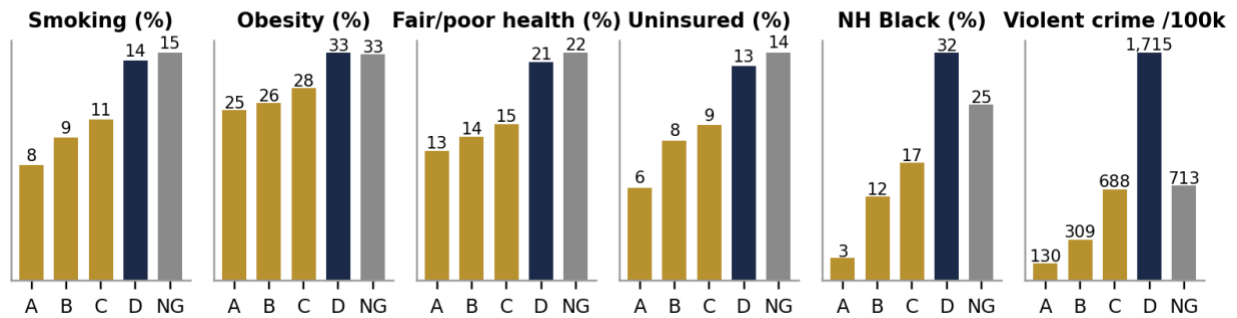
Davidson County by 1937 HOLC Grade (Population-Weighted)

	A	B	C	D	Not graded
Tracts / population	7 / 33,922	8 / 38,533	6 / 22,109	34 / 111,748	117 / 509,076
Median household income	\$154,700	\$95,600	\$95,500	\$72,600	\$81,900
Home value (median)	\$1,095,600	\$716,100	\$675,600	\$527,100	\$399,200
Owner-occupied	73.5%	44.7%	54.0%	36.4%	—
Non-Hispanic Black	3.2%	12.0%	16.8%	32.5%	25.1%
Non-Hispanic White	85.6%	71.2%	68.5%	50.1%	49.6%
Current smoking (adults)	7.6%	9.4%	10.6%	14.5%	15.0%
Obesity	24.8%	25.8%	28.0%	33.1%	32.9%
Uninsured (ages 18–64)	5.5%	8.3%	9.2%	12.7%	13.5%
Fair or poor health	12.6%	14.0%	15.2%	21.3%	22.2%
Violent crime per 100,000 per year, 2020–2024	130	309	688	1,715	713

Note. Violent crime counts homicide, robbery, and aggravated assault, one record per incident; denominators are area-weighted tract populations. The downtown commercial core (Lower Broadway, Public Square) lies outside every 1937 polygon, so its incidents fall in the ungraded remainder. The three D polygons separately run 1,389, 1,910, and 2,142 violent incidents per 100,000, each above C. Ownership is not computed for the ungraded group.

Figure 1
The Nashville Gradient Across Six Measures

Davidson County by 1937 HOLC grade (NG = not graded, 117 tracts)



The gradient is monotonic on every row, and the A-to-D contrast is large: 13-fold on violent crime, 10-fold on Black share, and double on smoking and fair or poor health. The ungraded 117 tracts, three-quarters of the county and urbanized after 1937, look like the D zones rather than the A to C zones. The graded core's A to C tracts is the exception in Davidson County.

The sorting test explains why. Across 171 tracts, log median household income alone accounts for half to three-fifths of the variance in smoking, obesity, fair or poor health, and uninsurance, and in Black and White share. Once income is in the model, the D-share coefficient collapses to zero for composition and turns slightly negative for health and insurance. Conditional on income, D-zone tracts are marginally healthier and better insured than ungraded tracts, not worse. Within the same income band, D-zone and ungraded tracts have identical health (fair or poor health is 28.7% in both below \$60,000). The grade retains one thing: among the poorest tracts, D-zone tracts are 57% Black against 34% in ungraded tracts of the same income. The inscription still holds who sits at the bottom. Where income has moved in, the grade lets go: the seven D-zone tracts above \$100,000 are 79.5% White.

Where people live follows from this. Forty-one percent of Davidson's White residents live in tracts with median incomes above \$100,000; 12% of Black residents do. Thirty-eight percent of Black residents live in tracts below \$60,000; 15% of White residents do.

2. Clarksville Does Not Replicate the Zones

If the geometry traveled, Montgomery County's tracts would show the same bundle co-locating and the same racial inscription on it. Three tests follow: the segregation structure, the market's own valuation of the surface (an appraiser's comparables at tract resolution), and a data-derived tiering that lets Clarksville's characteristics form their own A to D without a map.

Table 3*Segregation Structure, Davidson Versus Montgomery (ACS 2020–2024)*

	Davidson	Montgomery
Tracts majority non-Hispanic Black	22	0
Highest tract Black share	99.1%	48.2%
Black–White dissimilarity index	50.0	33.3
Correlation, tract income and White share	0.70	0.42
Correlation, pre-1950 housing and Black share	–0.07	0.17

Table 4*The Comparables View: Tracts by Median Home Value Quartile*

Value tier (1 = highest)	Davidson: Black share	Davidson: fair/poor health	Montgomery: Black share	Montgomery: fair/poor health
Tier 1	9%	14.3%	16%	17.6%
Tier 2	22%	17.9%	18%	17.8%
Tier 3	29%	23.7%	19%	21.1%
Tier 4	34%	26.7%	27%	23.8%
Black residents in Tier 1 / Tier 4	9% / 40%		25% / 24%	
Hispanic residents in Tier 1 / Tier 4	9% / 46%		27% / 24%	
White residents in Tier 1 / Tier 4	34% / 18%		32% / 13%	

In both counties, the price tiers carry the surface. Income, ownership, poverty, and health all organize by value (the health–value correlation is -0.57 in Davidson and -0.61 in Montgomery). In Nashville, the tiers are also a racial geography: four in ten Black residents and nearly half of Hispanic residents live in the bottom-value quartile. In Clarksville, the same tiers barely sort race; Black and Hispanic residents are spread almost evenly across all four. Clarksville has a price geography without a racial geography. Nashville has both, and they are coupled. The comparables also make a scale point vivid: Clarksville’s top tier (\$312,000 to \$498,000) sits inside Nashville’s bottom half.

Table 5*Clarksville’s Own A to D: Tiers Derived From Eight Surface Variables (Population-Weighted)*

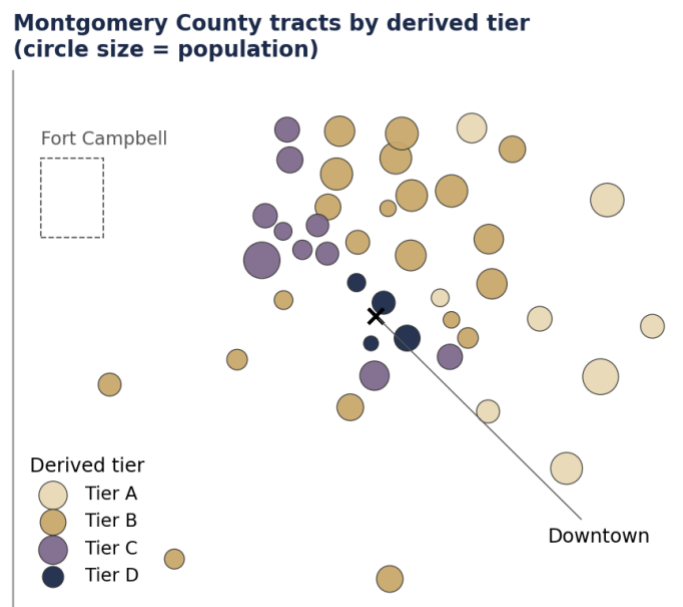
	A	B	C	D
Tracts / population	8 / 48,492	21 / 113,671	10 / 49,402	4 / 13,532
Distance from downtown (km)	13.9	9.6	7.7	1.9
Median household income	\$116,139	\$79,178	\$59,024	\$39,821
Owner-occupied	81%	67%	51%	35%
Pre-1950 / built since 2010	4% / 40%	2% / 28%	3% / 21%	24% / 6%

	A	B	C	D
Poverty	5%	9%	16%	32%
Veterans (adults)	20%	21%	19%	8%
White / Black / Hispanic	70 / 12 / 8	61 / 17 / 11	47 / 29 / 13	46 / 34 / 13
Smoking / obesity / fair-poor health	12.8 / 35.5 / 15.5	15.5 / 38.3 / 18.7	18.2 / 41.2 / 22.8	22.8 / 45.6 / 30.6
Share of White / Black / Hispanic residents	26 / 13 / 15	52 / 44 / 52	17 / 33 / 25	5 / 11 / 7

Note. Tiers are k-means clusters ($k = 4$) on standardized household income, home value, ownership, pre-1950 share, post-2010 share, poverty, fair or poor health, and uninsurance for the 43 tracts with more than 500 residents, ordered by mean income and lettered A to D. Location and race were not inputs. Distance is from the tract centroid to downtown Clarksville.

Figure 2

Where the Derived Tiers Sit



The HOLC logic is present without the HOLC map. Every bundle variable runs monotonically across the tiers, and the tiers run outward from downtown: an old, rental, poor, unhealthy D core at 2 km and a new, owned, affluent A ring at 14 km. That is the 1930s appraisal geometry (graded by housing age, tenure, and income) reproduced by the market through income and access. Home value alone breaks the pattern, with D above C, because the old core's houses carry location value that the poor periphery does not.

The racial inscription is faint, and the D zone is small. Black share rises across the tiers (12%, 17%, 29%, 34%), but the D core holds 13,500 people, 6% of the county, and is 46% White. Eleven percent of Black residents live there, against Nashville's D zones holding 21% of the county's Black population at 32.5% Black. Clarksville's Black population is a B and C population: 77% of it lives in the two middle tiers. The gradient exists; the concentration does not. The installation explains the shape. Veteran share is flat near 20% across A, B, and C and

collapses to 8% in D. Military households, including the Black military households that make Clarksville’s Black population mid-income and dispersed, do not live in the old core. The civilian poor do. Fort Campbell is what keeps the market’s D zone from becoming a racial D zone.

3. What Clarksville Reproduces: The Surface, County-Wide

Health

With no zones to grade, the comparison is county to zone. On every chronic-risk measure, Montgomery County as a whole sits at or beyond Nashville’s hazardous-graded zones: smoking 16.1% (Nashville D zones 14.5%), obesity 38.8% (33.1%), hypertension 34.1%, COPD 6.4%, and diabetes 11.0%. Health tracks income in Montgomery as tightly as in Nashville (the correlation with fair or poor health is -0.85), but every Montgomery income band runs worse than the same Davidson band; obesity is 42%, 39%, 38%, and 36% across the four bands against 36%, 33%, 32%, and 27%. The penalty applies to the whole county at every income.

Table 6

Mortality and Health-System Capacity, Sender and Receiver

	Davidson	Montgomery
Age-adjusted all-cause mortality per 100,000, non-Hispanic Black, 2020–2024	1,123.5	1,122.2
Age-adjusted all-cause mortality per 100,000, non-Hispanic White, 2020–2024	889.7	1,041.3
Mortality ratio at ages 65–74 / 75–84 / 85+, White (Montgomery ÷ Davidson)	—	1.31 / 1.24 / 1.17
Population per primary care physician	1,080	2,560
Population per mental health provider	220	410
Population per dentist	1,180	2,220
Flu vaccination / mammography (Medicare)	49% / 44%	42% / 40%

Note. Mortality is computed from CDC WONDER deaths by 10-year age group (CDC, 2025b), directly standardized to the 2000 U.S. standard population with Census Vintage 2024 county estimates as denominators; WONDER does not age-adjust at county level. Capacity measures are from County Health Rankings (University of Wisconsin Population Health Institute, 2025); the Tennessee ratio is 1,440 per physician and the U.S. ratio is 1,310. Crude rates are not reported because crude White mortality exceeds crude Black mortality in both counties and age adjustment reverses it.

Black age-adjusted mortality is identical in sender and receiver. The receiver’s narrower gap comes from higher White mortality, and the excess is not a working-age story (under 65 the two counties are alike) but an old-age one, concentrated in respiratory disease (1.54 times Nashville’s rate at 65 and over), diabetes (1.48), cancer, and circulatory disease, and elevated for Black elders too. That is the chronic-risk profile above, meeting a county with less than half the sender’s physician density. Health in the receiver is a capacity outcome, not a zone outcome.

Fiscal Capacity

Table 7

Local Government Finance per Capita, FY2023 (Reported Data, All Units)

	Metro Nashville	Montgomery County + Clarksville	Receiver %
Property tax	\$2,381	\$1,090	46
All taxes	\$3,910	\$1,366	35
State intergovernmental revenue	\$1,099	\$1,472	134
Intergovernmental share of general revenue	16%	54% (county)	—
Police protection, current	\$411	\$272	66
Education, current	\$2,047	\$1,813	89
Education capital outlay	\$228	\$449	197
Long-term debt outstanding	\$13,469	\$4,623	34

Note. Source: Annual Survey of State and Local Government Finances, FY2023 individual-unit file (U.S. Census Bureau, 2025b); populations are from the file. FY2022 is not used because Montgomery County did not report and 41 of its 49 records are Bureau imputations.

The Autonomy Gap in one number: more than half of Montgomery County’s general revenue is intergovernmental, against a sixth of Nashville’s. The receiver is building schools at twice the sender’s per-capita rate on a tax base a third the size, which is the growth-absorption signature.

Schools

Tennessee school districts are county-coterminous and county-dependent, so the sender–receiver question is direct: when the receiver’s property values double, does the money follow the students?

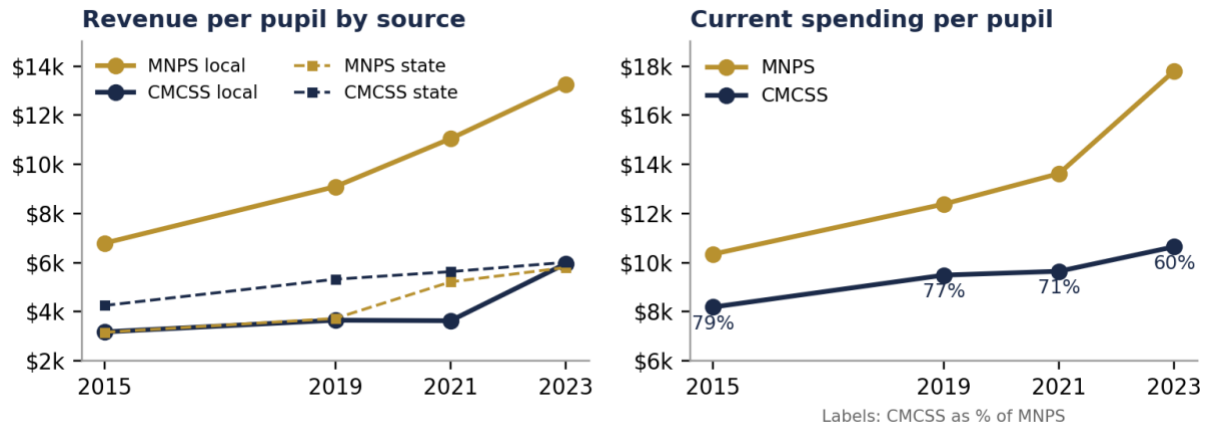
Table 8

Per-Pupil Revenue and Spending, MNPS and CMCSS (Census F-33 School Finance Survey)

	FY2015	FY2019	FY2021	FY2023
Local revenue per pupil, MNPS	\$6,793	\$9,092	\$11,047	\$13,254
Local revenue per pupil, CMCSS	\$3,178	\$3,654	\$3,633	\$5,959
State revenue per pupil, MNPS / CMCSS	3,163 / 4,254	3,727 / 5,322	5,214 / 5,631	5,800 / 6,011
Current spending per pupil, MNPS	\$10,344	\$12,380	\$13,624	\$17,808
Current spending per pupil, CMCSS	\$8,189	\$9,488	\$9,647	\$10,645
CMCSS as % of MNPS, current spending	79%	77%	71%	60%
Capital outlay per pupil, CMCSS / MNPS	248 / 1,462	695 / 1,323	639 / 917	2,639 / 1,991
Enrollment, CMCSS / MNPS	32,056 / 84,069	35,366 / 84,667	36,426 / 80,494	38,773 / 80,651

Note. Source: Annual Survey of School System Finances (U.S. Census Bureau, 2025c), per pupil on fall enrollment. MNPS is Metropolitan Nashville Public Schools; CMCSS is the Clarksville-Montgomery County School System.

Figure 3
School Wealth, Sender and Receiver



The answer is no. A Clarksville student is funded at 60 cents on the Nashville dollar, down from 79 cents in eight years, and the whole gap is local. State revenue per pupil is nearly equal, and the receiver's state-aid advantage has shrunk from 135% of Nashville's to 104%. Montgomery's house prices rose 93% over the period, and CMCSS local revenue per pupil rose 88% from less than half Nashville's base, against a 21% enrollment increase while Nashville's enrollment fell 4%. The sender kept the wealth and shed the students. The receiver gained the students, gained the prices, and gained less than half the money per child. Its capital outlay per pupil rose tenfold.

Outcomes follow the same shape. On the state's 2024–2025 assessments (Tennessee Department of Education [TDOE], 2025), CMCSS runs 8 to 14 points above MNPS for every reported group, including the combined Black, Hispanic, and Native American group and economically disadvantaged students. What reproduces is the within-district gap, about 10 points in both, and the discipline rate: out-of-school suspension is 7.1% in MNPS and 7.0% in CMCSS on very different enrollments.

Criminalization

For reliably reported offenses, the receiver rate is about a third of the sender's. The 2024 TBI rates per 100,000 are 359 violent and 383 property in Clarksville versus 1,073 and 1,160 in Nashville (Tennessee Bureau of Investigation, 2025), placing Clarksville between Nashville's B and C zones. Enforcement-driven offenses run the other way: drug and narcotic violations are 675 per 100,000 in Clarksville against 334 in Nashville. Low victimization, high institutional contact. Fort Campbell's off-post population inflates Clarksville's numerator more than its denominator, and the brief names this rather than waits to be asked.

4. How Nashville Reaches Clarksville: Growth-Pressure Transmission

Direct residential movement from Davidson to Montgomery is modest: about 1,364 people a year in 2016–2020 against 714 the other way, a net of roughly 650, while Montgomery took in

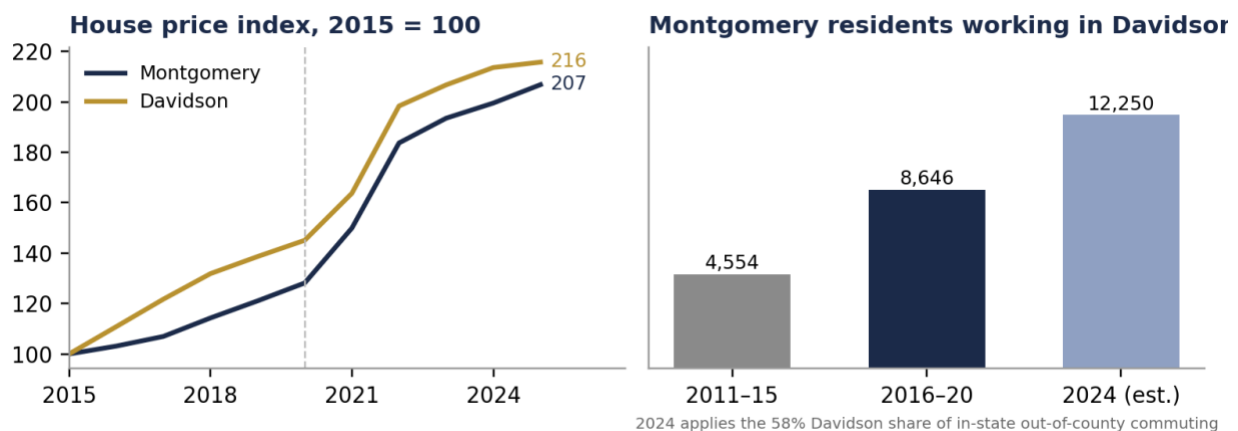
nearly 17,000 a year from other states (U.S. Census Bureau, 2023a). Nashville’s labor market is a different matter.

Table 9
Commuting, Prices, and Wages

	2015 / 2011–2015	2020 / 2016–2020	2024–2025
Montgomery residents working in Davidson	4,554 (5.5%)	8,646 (9.0%)	~12,000–12,500 (est.)
Montgomery residents commuting 60+ minutes	—	—	14,109 (12.6%)
Montgomery resident workers, all	82,710	96,509	125,155
House price index growth, Montgomery	+28% (2015–2020)		+61% (2020–2025)
House price index growth, Davidson	+45% (2015–2020)		+49% (2020–2025)
Median listing price, Montgomery / Davidson	\$181k / \$325k (2016)	\$275k / \$400k (2020)	\$350k / \$555k (2025)
Private-sector average pay, Montgomery	\$33,709	\$40,340	\$49,766 (2024)

Note. Sources: ACS county-to-county commuting flows (U.S. Census Bureau, 2018, 2023b); ACS 2024 1-year (U.S. Census Bureau, 2025d); FHFA all-transactions house price index and Realtor.com median listing price via FRED (Federal Housing Finance Agency, 2026; Realtor.com, 2026); BLS Quarterly Census of Employment and Wages (U.S. Bureau of Labor Statistics, 2025). The 2024 Davidson-bound figure applies Davidson’s 58% share of in-state out-of-county commuting from the last published flow table and is labelled an estimate.

Figure 4
Price Transmission and the Commuter Draw



Nashville-bound commuters nearly doubled in five years and account for about 30% of the net growth in Clarksville’s employed residents. Davidson is now the receiver’s second-largest workplace after Fort Campbell. Before 2020, Clarksville’s prices lagged Nashville’s by a wide margin; after 2020, they outran them, and the Clarksville-to-Nashville price ratio rose from 0.56 to 0.63. Local wages rose 48% in nine years, the same as Nashville’s, while prices doubled on a workforce earning 60 cents on Nashville’s dollar. The demand that doubled prices did not come from the local labor market. Nashville flourished; its own workers bought affordability in Clarksville, and in doing so they imported Nashville’s price curve, its commute, and its children.

5. Receiver Context as a Moderating Variable

The framework predicts a surface; the receiver's context determines what geometry the surface takes. Three conditions differ between the cases, and each has a measured effect.

- **The installation.** Fort Campbell disperses the Black population into new, mid-income, veteran-heavy subdivisions, sets a housing floor through the Basic Allowance for Housing, draws 19.5% of resident workers across the state line, inflates enforcement denominators, and leaves the old core White. It is the reason income sorting in Clarksville does not rebuild zones.
- **Scale.** Montgomery's private employment is 10% of Davidson's. Scale runs through provider ratios, small-cell suppression, bonding capacity, and the arithmetic of absorbing 6,700 students on a base of 32,000.
- **Government form.** A consolidated sender faces a non-consolidated receiver at 54% intergovernmental dependency; the receiver cannot self-finance the growth it houses.

Clarksville is therefore not the framework's exception. It shows that the inscription needs a surface, and that the surface is set locally. Where a garrison laid it, the geometry the sender's growth reproduces is a county-wide penalty rather than a set of zones.

What This Means

- State aid is holding the school gap still, not closing it. The receiver's per-pupil state advantage fell from 135% to 104% of the sender's over eight years while its local base stayed below half. Growth-absorbing districts need a capital-cost recognition the current formula lacks.
- The receiver's health penalty is a capacity problem at every income. Provider density, not zone composition, is the lever.
- Sender–receiver accounting should be regional. Nashville's labor market draws on Clarksville's housing, schools, and roads without contributing to them, and the commuter data make the scale of that draw measurable for the first time.
- Receiver-city research should treat federal installations, scale, and government form as moderators to model, not confounders to remove.

Method

Design and Units

The study uses a descriptive, comparative, cross-sectional design in a sender–receiver pair: Davidson County (Metropolitan Nashville, graded in 1937) and Montgomery County (Clarksville, ungraded). The census tract is the primary unit for composition, housing, and health; the county for mortality, finance, employment, and crime; and the school district (county-coterminous in both cases) for school finance and outcomes. All tract inferences are about

places, not persons. No causal claim is attributed to the 1937 map. The analytic question is what carries the outcomes today, and the sorting test is built to answer it.

Treatment Geography

The nine 1937 Nashville polygons (A, B1–B2, C1–C3, D1–D3, all City Survey) are joined to 2020 tracts through the Mapping Inequality v3 crosswalk (Nelson et al., 2023). Two treatments are carried out: the continuous share of each tract’s area under each grade (primary, per the program’s locked design) and a dominant grade with a 25% minimum overlap (the reported table, as a sensitivity check). Area weights are the crosswalks; population-weighted dasymetric weights are a documented refinement for the full study. Only Chattanooga, Knoxville, Memphis, and Nashville carry graded City Survey maps in Tennessee; the receiver has none.

Receiver Tiers

Clarksville’s A to D is derived, not assigned. Forty-three tracts with more than 500 residents were clustered by k-means ($k = 4$, 50 initializations, fixed seed) on eight standardized variables: median household income, median home value, owner-occupancy, pre-1950 housing share, post-2010 housing share, poverty rate, fair or poor health, and uninsurance. The clusters were ordered by mean income and lettered A to D. Location, race, and veteran status were withheld from the inputs, so the concentric result and the racial and veteran profiles of the tiers are findings rather than construction. Robustness: the four D-core tracts are identical under Ward hierarchical clustering, with home value dropped, with the health inputs dropped, and in 18 of 20 random restarts; the A, B, and C boundaries move for a handful of tracts (adjusted Rand index 0.63 to 0.81 across restarts). At $k = 3$ and $k = 5$ the structure is still concentric with the same old-core cluster at 1.9 to 2.9 km. Across the four tiers, Black share rises 8.4 points per tier ($p < .001$) and distance falls 3.4 km per tier ($p < .001$); the veteran pattern is a D-versus-rest contrast, not a linear trend. The comparables view (Table 4) applies the same logic with a single input, tract median home value, in quartiles.

Sorting Test

Population-weighted least squares across 171 Davidson tracts regresses each outcome (Black share, White share, smoking, obesity, fair or poor health, uninsurance) on continuous D-share alone, then with log median household income, then adding pre-1950 share and ownership. The reported result is the change in the D-share coefficient. Unweighted least squares, a dominant-D indicator in place of the continuous share, and heteroskedasticity-robust (HC1) errors give the same result: no positive income-adjusted D effect on any outcome, and negative income-adjusted coefficients for fair or poor health and uninsurance that are significant at the 5% level. Within-income-band comparisons (below \$60,000; \$60,000 to \$80,000; \$80,000 to \$100,000; above \$100,000) are shown for zone versus ungraded tracts. Tract-level spatial dependence is not modeled; the design is descriptive.

Measures and Standardization

Mortality uses CDC WONDER single-race deaths for non-Hispanic Black and White residents, pooled 2020–2024, by 10-year age group, directly standardized to the 2000 U.S. standard population (SEER weights) with Census Vintage 2024 county estimates as person-year denominators (CDC, 2025b; U.S. Census Bureau, 2025e). WONDER does not age-adjust at county level and drops rates when county and age group are both requested. Three suppressed cells (under 10 deaths) move the receiver’s rates by at most 7 points, and substituting WONDER’s own population denominators changes the age-adjusted rates by at most 1.6%. Health prevalence uses CDC PLACES 2025 (2022 BRFSS, small-area modelled), adult-population-weighted (CDC, 2025a). Finance uses the FY2023 Annual Survey of State and Local Government Finances individual-unit file, reported values only; FY2022 was rejected because Montgomery County did not report (U.S. Census Bureau, 2025b). School finance uses the Census F-33 survey, FY2015 to FY2023, per pupil on fall enrollment (U.S. Census Bureau, 2025c). Crime counts MNPd incidents once per incident on the primary offense (homicide, robbery, aggravated assault; burglary, motor-vehicle theft), located by spatial query against the dissolved grade polygons, with each D polygon also queried separately as a sensitivity check (Metropolitan Nashville Police Department, 2026); county rates use the TBI Crime in Tennessee 2024 agency tables (Tennessee Bureau of Investigation, 2025); drug offenses are reported only as an enforcement-intensity indicator. Commuting and migration use the ACS county-to-county flow tables. Prices use the FHFA all-transactions index and Realtor.com listing prices via FRED.

Limitations

The design is cross-sectional and ecological throughout. Mortality is county-level because tract-level deaths are not published. The derived tiers describe Clarksville at one point in time and depend on the eight inputs chosen; a sale-price comparables analysis from assessor records would resolve them below the tract. Montgomery County’s reported general sales tax awaits reconciliation with its Comptroller audit. The 2024 Nashville-bound commuter count is an estimate pending the next county-to-county flow table. Transportation and warehousing employment is nondisclosed for Montgomery in the QCEW. Rents are reported only as a single ACS anchor (\$1,308 in Montgomery and \$1,582 in Davidson). Fort Campbell’s off-post population affects crime denominators, and the brief names the veteran and armed-forces measures rather than adjusting them.

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