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Evidence from Administrative Housing Data

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Interstate Highways and Urban Blight: Evidence from Administrative Housing Data*†

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Abstract

This paper estimates the effects of the Interstate Highway System on proximate urban neighborhoods using detailed American Housing Survey data from the 35 most-populous US metropolitan areas. I begin by identifying seven adverse housing conditions and measuring their prevalence with respect to the observational housing units' distance to the nearest Interstate. I then use weighted linear regressions to estimate the change in likelihood for the presence of each adverse condition when a housing unit is near an Interstate. I find that housing units within one kilometer of an Interstate are 50% more likely to report being near abandoned buildings, 43% more likely to report serious crime in their neighborhood, and 21% more likely to be deemed inadequate. Furthermore, residents of these Interstate-proximate units are 53% and 41% more likely to report dissatisfaction with their neighborhood and housing unit, respectively. To support these estimates by accounting for the fact that Interstates were often intentionally built through marginalized communities, I also employ an instrumental variable approach. My results provide new evidence and stylized facts on the Interstate system as a locus of urban blight.

Keywords: Neighborhoods, Housing, Urban Transportation, Highway System, Cities, Depressed Areas, Quality of Life

JEL: H54, I31, O18, R23, R41

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1 Introduction

Safe and dignified urban living conditions are a longstanding social objective and research subject. In recent years, academic scrutiny of the Interstate Highway System (IHS) has intensified following advances in geospatial analysis and heightened concern about inequality, the environment, and racism. To contribute to this burgeoning literature and explore the current conditions of urban housing, I use granular housing-unit-level data from major US cities to estimate the Interstates' impact on adjacent neighborhood quality. The internal-use version of the American Housing Survey (AHS) provides geographic coordinates of the observational housing units and several unique measures of unit quality and neighborhood characteristics. By joining this rich housing data with spatial data on Interstate highways and city centers, I produce new insights on blight in the US city, focusing in particular on how Interstate proximity dramatically increases its prevalence.

My analysis focuses on neighborhoods near city centers for two main reasons. First, improvement of the urban core in general, and its housing stock in particular, were part of the IHS's initial conception and frequently used as a major selling point by a vast highway advocacy coalition. A 1939 report to President Roosevelt produced by the federal Bureau of Public Roads provided the first articulation of the agency's plan for a dramatic shift from rural to urban road building. After noting that the automobile had allowed wealthier citizens to move to the suburbs, the authors describe centrally-located areas as: "Almost untenable, occupied by the humblest citizens, they fringe the business district and form the city's slums – a blight near its very core!" (*Toll roads and free roads*, 1939, p. 94). Clearing these areas for urban roadways is then positioned as the solution not only for traffic, but also for betterment of the city itself, and particularly its urban housing stock. My sample thus allows me to evaluate how the urban freeway movement has delivered on the promise of urban core blight removal.[1]

The second reason to examine central neighborhoods is that existing theory and empirical evidence suggests that central business district (CBD) distance influences the net effect of Interstate proximity. Interstates are theorized to provide positive effects to nearby residents through easy access to a key transportation network, as well as negative effects (disamenities) such as air pollution, noise pollution, traffic congestion, safety risks, and physical barriers. Compared to suburban neighborhoods, central neighborhoods are generally expected to benefit less from highway access and experience negative impacts more acutely. Indeed, Brinkman and Lin (2024) find that from 1950-2010 more centrally-located neighborhoods near Interstates experienced severe population losses, while Interstate-proximate distal neighborhoods dramatically grew. By removing suburban and exurban housing units from my sample,

[1] Given decades of suburbanization and sprawling development, what was considered to be the "urban core" in the mid-20th century is smaller than what better fits that description today. The 30km radius of my sample includes the urban core of the mid-20th century as well as this broader core for each MSA. This larger area also allows for greater statistical power and a broader relevance for this paper's estimates.

I can focus on the areas where the disamenity effects are most likely to overcome the benefits of access.

Existing literature has explored several social impacts of the IHS, including how it suburbanized the urban population (Baum-Snow, 2007), increased racial sorting and segregation (Bagagli, 2025; Mahajan, 2024; Weiwu, 2025), and harmed displaced residents (Valenzuela-Casasempere, 2025). Interstate-proximate neighborhoods continue to experience higher pedestrian traffic fatalities (Nehiba & Tyndall, 2023), increased noise and air pollution (Samuels & Freemark, 2022), and barriers that confine movement (Brinkman & Lin, 2024). For this paper, it is hypothesized that the net effect of Interstate proximity negatively influences the general level of investment in urban neighborhoods, thus relatively degrading the quality of the housing stock and overall neighborhood conditions.

My analysis is built on seven indicators of unit and neighborhood characteristics relating to urban blight. For each observational housing unit in the AHS data I construct binary variables indicating: (1) the housing unit is deemed inadequate according to federal standards; (2) one or more abandoned or vandalized buildings within a half-block; (3) two or more abandoned or vandalized buildings within a half-block; (4) presence of "serious crime" in the neighborhood; (5) a low subjective neighborhood rating; (6) a low subjective unit rating; and (7) large amounts of trash within a half-block. Due to NAs depending upon the variable under analysis, my sample size is between 44,500 and 55,000.[2] Following further description of relevant historical context and data, the quantitative analysis begins by examining the frequency of these variables based on the observational housing unit's distance to the nearest Interstate. Placing units in bins according Interstate distance, I produce visualizations with the unweighted averages of each binary indicator variable.

[2]All sample counts are rounded according to federal policy on use of internal data.

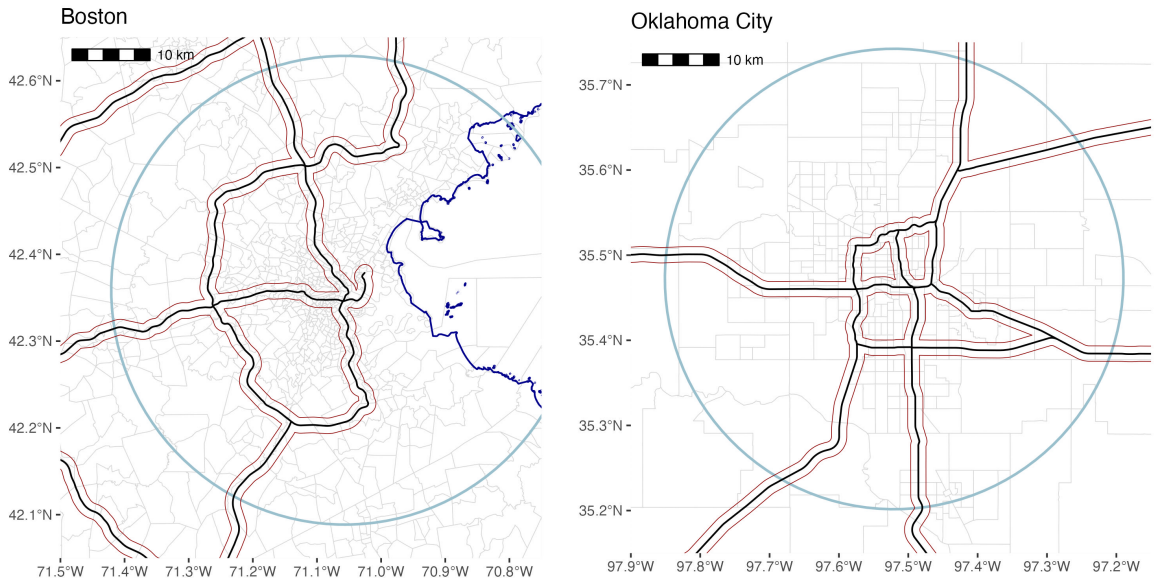

Figure 1: The Interstate Highway System (black lines) in the Boston, MA and Oklahoma City, OK metropolitan areas, displayed with census tract boundaries (light grey polygons) and coastline (dark blue line). The sample region (light blue circle) covers all surveyed housing units within 30km of the principal city's business district center. Enclosing the Interstates are buffers of 1km in each direction (red lines), which show the areas considered Interstate-proximate for the 1km binary independent variable.

The next section uses weighted least squares (WLS) regressions to estimate the change in likelihood that a given blight indicator is true for housing units within one of two distance thresholds: 1 km and 2.5 km. Figure 1 shows a mapping of the 1km-threshold approach in the Boston and Oklahoma City MSAs: any housing units within the red envelope surrounding the highway is considered Interstate-proximate and given a value of "1." For each pairing of Interstate-proximity indicator and blight indicator, I use a set of 5 model specifications with varying controls and MSA-level fixed effects. The main specification is a simple bivariate regression that allows for a clear comparison of blight frequency between Interstate-proximate units with those further away.

The final quantitative section supports these estimates by instrumenting for Interstate proximity using a variation on the method in Brinkman and Lin (2024), who digitized an earlier 1947 plan for the IHS. This 1947 mapping connected major cities without regard for local neighborhood conditions, and the authors used this instrument to examine census-tract level population change for tracts intersected by an Interstate. For my sample of individual housing units, I develop an instrument for Interstate proximity by taking each unit's shortest distance to the 1947 planned Interstates and applying a decay function, thereby assigning values close to one for units nearest to a planned Interstate and declining to zero units for distant units. Further output and details on all methods are given in the corresponding sections.

2 Historical Background

The Interstate Highway System runs directly through the core of nearly every major US city. To construct these wide, limited-access roadways, hundreds of dense central neighborhoods were destroyed, displacing over a million people.[3] This section briefly covers the origins of government highway building through the federal-aid system, the bureaucracy's pivot to urban traffic service, and a vision of urban renewal through the intentional placement of roadways through poor and Black neighborhoods. The Interstate's private sector advocates, while essential to its ultimate construction, are beyond the scope of this paper.

Prior to this massive urban restructuring, government roadbuilding efforts began in the early 20th century as a program of rural uplift. Following two key pieces of congressional legislation in 1916 and 1921, a system of state highway departments overseen by the federal Bureau of Public Roads (BPR) developed primarily out of an initial mission to "get the farmer out of the mud."[4] This established the institutional foundation of US roadbuilding: the federal-aid system, where state highway departments receive matching funds from the federal government according to particular formulas, as well as technical support and limited oversight. This institutional design produced a professional highway bureaucracy composed of the federal BPR and each state's highway department, as well as a highly-influential professional organization of state highway leaders. With this structure in place, the proliferation of the gasoline tax and other automobile user fees provided an expanding pool of resources, funding a "Golden Age of Highway Building" from 1921-1936, wherein state agencies built over 420,000 miles of rural roadways (Seely, 1987, p. 67).

During the 1930s, the highway bureaucracy began sowing the seeds of a transition to urban traffic service as its top priority.[5] Following the Hayden-Cartwright Act of 1934, states were allowed to spend regular federal-aid on urban extensions[6] for the first time, as well as use 1.5% of these funds for "surveys, plans, and engineering investigations of projects for future construction" ("Hayden-Cartwright", 1934). With this funding, traffic survey data became an essential tool for the highway bureaucracy justifying a shift away from its rural roots and toward the supply of extensive urban facilities.

The Interstate Highway System's seminal document, *Toll Roads and Free Roads*, was produced

[3] Roughly one million is the widely cited number, with Schwartz (1976, p. 483) as the frequent citation. Yet Schwartz merely references a casual estimate from Altshuler (1965, p. 339). The most thorough treatment of this question that I can find comes from Jette (2021), who compiles and compares the existing government estimates, then fills gaps in time periods using simple extrapolations to estimate that "between 1956 and 1976 approximately 400,000 to 500,000 households were displaced or 1 million to 1.5 million individuals" (p6).

[4] An explicit mission of roadbuilding as rural uplift characterized the initial period leading up to these major bills. Shortly thereafter, following the bureaucratization and professionalization of roadbuilding under BPR leader Thomas MacDonald, the rhetoric of roadbuilding instead began to emphasize more technical principles of efficiency over explicit social goals, at least until the urban pivot. See Seely (1987) generally.

[5] For a recent and insightful account of the public highway bureaucracy's pivot toward cities, see Johnson (2021).

[6] The effectiveness of this provision in spurring urban roadways was stunted, however, evidently by forces outside the BPR. Redefinitions of road systems alongside minimum spending requirements effectively compelled states to spend on rural roads instead. This saga is evidence of the continued political strength of rural interests. See Gifford (1983, p. 99-101) , and Johnson (2021, p. 75)

shortly thereafter. Leaders of the BPR wrote this report following an initial request by President Roosevelt to examine the feasibility of "a system of east-west, north-south transcontinental highways" financed by tolls (Rose & Mohl, 2012, p. 98). The BPR, long opposed to both tolling and grand intercontinental roadways, used the first half of the report to knock down the president's suggestion as infeasible. They did so by wielding their new traffic survey data, which showed little need for long-range routes, but great pressure within cities. In the second part of the report, they advance their "Master Plan" of urban freeways construction "pressing into, and through, the heart of the city" (*Toll roads and free roads*, 1939, p. 93).

The highway bureaucracy thus presented a new vision of roadbuilding, tackling urban traffic congestion rather than supplying basic rural infrastructure, while ostensibly providing broader urban benefits. The authors pitch these new facilities as a means of clearing "slums," even arguing against any other potential governmental efforts to improve these "blighted" areas, lest such improvements make it more difficult and costly to build urban highways (pp. 94-95). This early vision of a happy marriage between urban highways and urban uplift, referred to later as the "two birds" theory (Rose & Mohl, 2012, p. 103), became the recurring sales pitch across the next 17 years.

Toll Roads and Free Roads served as the foundation for the next major report, *Interregional Highways*, written by a presidential committee headed by the BPR chief. This led to the Federal-Aid Highway Act of 1944, which officially created the Interstate system, at least on paper. The Interstate plans were later refined in 1947, the mapping used in this paper's instrumental variable design, before release of a more detailed routing in 1955 (Schwartz, 1976, p. 425). Although the vision of the IHS was officially established in 1944, the actual financing of this enormous project was not secured until years later, following a protracted struggle among myriad interest groups over taxation rates and congressional concern over the high cost. With sustained lobbying by the private sector and the public highway bureaucracy, the impasse was ultimately broken, and the 1956 National Interstate and Defense Highways Act provided federal funding for 90% of the system's total cost.

While the Interstates' advocates had often spoken of careful, minimally disruptive designs, the actual implementation largely discarded such considerations. State highway engineers prioritized traffic service[7] and had control over the flood of new funds, allowing them to functionally usurp city authority and sideline many less intensive, municipal-level plans.[8] Yet as imagined in the early urban highway reports, local elites and state highway agencies did find common ground in one key area: siting roads through Black and low-income neighborhoods when possible. For the state engineers, this offered cheaper land acquisition costs. For urban elites, the charitable explanation is that they believed

[7] Gifford (1983) provides thorough analysis of the engineering ideals and principles of the highway bureaucracy

[8] See Taylor et al. (2023) for a full articulation of the "follow the money" perspective on Interstate politics. This view demonstrates the relatively weak position of urban planners and governments in relation to state highway agencies.

this would help revitalize the urban core. Another reason was naked racism, as a leading highway official infamously recalled, "some city officials expressed the view in the mid-1950s that the urban Interstates would give them a good opportunity to get rid of the local n—town" (Schwartz, 1976, p. 485). Marginalized communities were also less successful in resisting Interstate construction during the popular resistance movement known as the "Freeway Revolts," further exacerbating the inequalities of final route placement.[9]

For the purposes of the present study, the preceding historical account demonstrates how government road building shifted to an urban focus with an alleged mission of urban core improvement and removal of blight. This continuously expressed goal motivates this paper's research design through the selection and analysis of measures relating to adverse neighborhood and housing-unit conditions. This history further shows that Interstates were deliberately placed in predominantly low-income and Black neighborhoods, a methodological challenge that motivates the use of an instrumental variable approach.

3 Data and Blight Frequency

My major data source is the internal-use files of the 2019 and 2021 American Housing Surveys, a biennial survey of households conducted by the Census Bureau and the Department of Housing and Urban Development. The AHS is the flagship survey of the US housing stock, and no study has yet used this granular data to examine the relationship between highway proximity and adverse housing conditions. Each vintage of the AHS includes independent metropolitan area samples for the 15 largest Metropolitan Statistical Areas (MSA), as well as for 10 additional MSAs from the next-largest 20. I take the "Top 15" and "Next 10" from the 2021 file, and join them with the "Next 10" of the 2019 file, resulting in representative samples of unique housing units for the 35 largest MSAs in the United States.[10]

For the location of each MSA's principal city's center, I bring in data from Fee and Hartley (2012), who use the 1982 Census of Retail Trade to identify the center of US cities' central business districts. I then subset to only units within 30 kilometers of this central point, a threshold chosen based on descriptions from Newman and Kenworthy (1996), who categorize the different eras of urban form based on the prevailing transportation modality. Prior to the "automotive city," the authors estimate

[9] In the two decades following the 1956 Interstate Act, residents in many cities organized resistance to freeway building and its displacement. These efforts had mixed results, sometimes resulting in segment deletion or diversion, and other times merely delaying. See Rose and Mohl (2012, ch. 9) and DiMento and Ellis (2013)

[10] These are: Atlanta, GA ; Baltimore, MD ; Birmingham, AL ; Boston, MA ; Chicago, IL ; Cincinnati, OH ; Cleveland, OH ; Dallas, TX ; Denver, CO ; Detroit, MI ; Houston, TX ; Kansas City, MO ; Las Vegas, NV ; Los Angeles, CA ; Miami, FL ; Memphis, TN; Milwaukee, WI ; Minneapolis, MN ; New Orleans, LA ; New York, NY ; Oklahoma City, OK ; Philadelphia, PA ; Phoenix, AZ ; Pittsburgh, PA ; Portland, OR ; Raleigh, NC ; Richmond, VA ; Riverside, CA ; Rochester, NY ; San Antonio, TX ; San Francisco, CA ; San Jose, CA ; Seattle, WA ; Tampa, FL ; Washington, DC

the outer limits of the preceding "transit city" at 30km. With the sprawling suburban growth of US cities in the later half of the 20th century, this partitioning centers the principal city of each MSA and fits a modern definition of "urban core."

For information on the location of Interstate highways, I used the US Department of Transportation's file of the National Highway Planning Network. For each housing unit, I used spatial analysis packages within R to compute the nearest distance to an Interstate and distance to their city's CBD center. For control variables not included in the AHS, I used the 2014-2019 American Community Survey 5-year estimates for census-tract-level measures of median household income, population density, and Black population percentage.

Table 1: Sample Means (Survey Weights Applied)

	Mean
Inadequate Unit	0.07524
Near 1+ Abandoned/Vandalized Buildings	0.07057
Near 2+ Abandoned/Vandalized Buildings	0.04214
Near Large Amounts of Trash	0.101
Serious Crime in Neighborhood	0.1019
Low Neighborhood Rating	0.08895
Low Unit Rating	0.06875
Distance from Nearest Interstate	3.519
Within 1km of Interstate	0.2295
Within 2.5km of Interstate	0.52
Distance from City Center (km)	15.08
Near Body of Water	0.1179
Age of Building	55.36
Tract Population Density (sq. mile, 1000s)	14.15
Tract Median Household Income (1000s)	75.65
Tract Perecentage Black	18.71
N	44500 - 51500

Sample means of variables. Data: American Housing Survey (2019, 2021)
CBDRB-FY25-P3099-R12467.

The AHS asks a wide variety of questions, and I identify several topics relating to urban blight, which I then coded as binary indicator variables. Table 1 shows the average values for my sample with survey weights applied in order to align with my regression models and describe the condition of major-city housing more generally. Two variables worth describing in greater detail here are the respondent's subjective ratings for their housing unit and their neighborhood. Each interviewee is asked to rate their neighborhood and their unit as a place to live on a scale from 1-10. To turn these ratings into a binary variable, I coded all responses of 5 or lower as indicating a low rating. While a rating of "5" might seem average, the summary statistics show how uncommon such a rating actually is: only 8.9% of the sample rated their neighborhood 5 or lower, and just 6.8% did for their unit.

More generally, Table 1 makes clear that all adverse housing conditions examined here are rare, impacting 10% or less of the housing stock in this sample. This underscores the relative severity of these conditions and affirms them as sound measures of urban blight. These sample averages are also valuable in their own right. This is new information on the condition of urban core housing stock, as publicly available AHS data does not allow for the kind of subsetting applied here. By refining the data geographically and applying sample weights, Table 1 provides new insights into the quality of life in the American city.

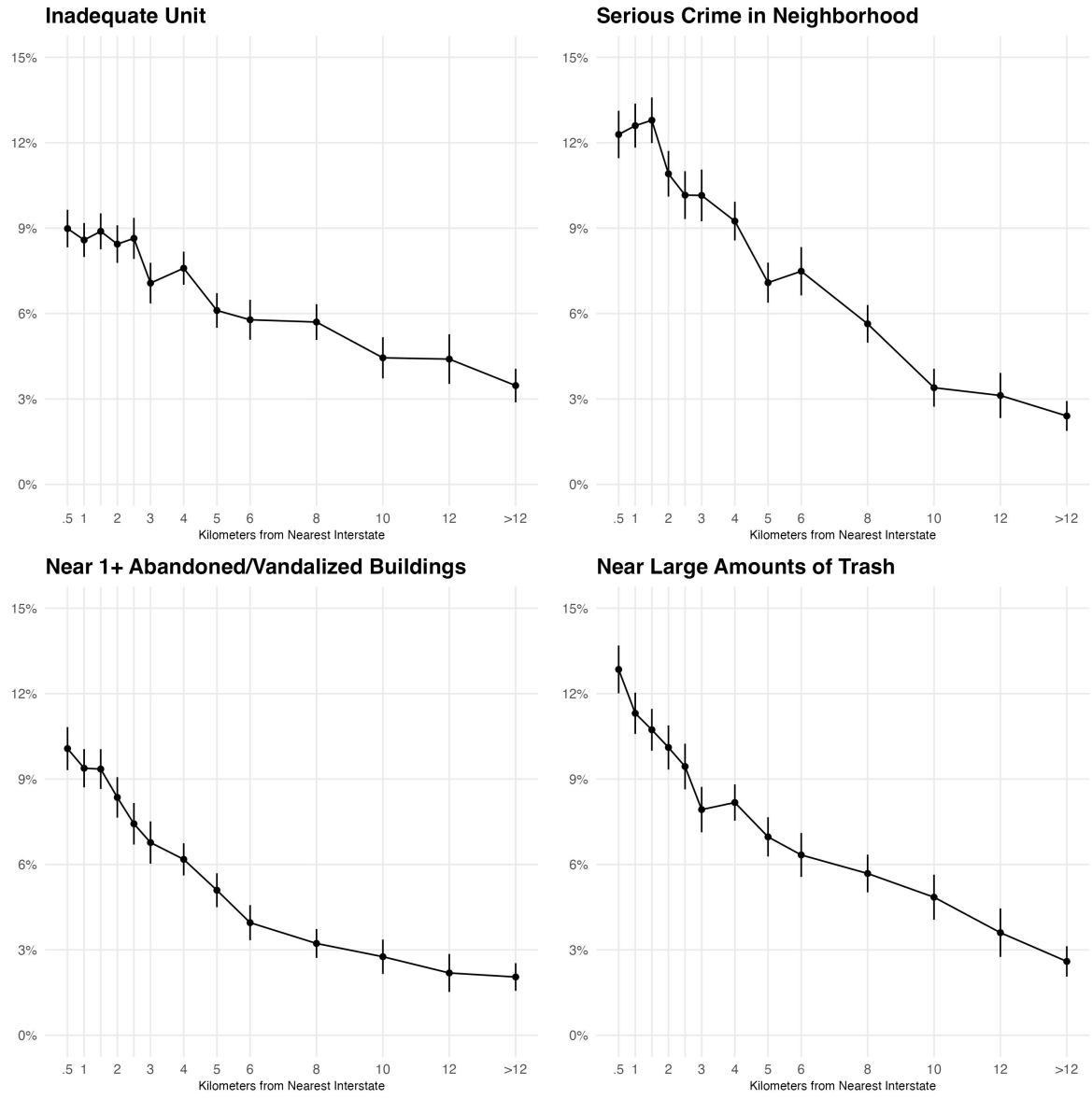

Figure 2: The frequency of adverse housing conditions, calculated in bins based on the observational housing unit's distance to the nearest Interstate highway. X-axis placements mark the outer boundary of each bin, with the first bin including housing units between 0-0.5km of the nearest Interstate. Black lines through each point denote margin of error. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

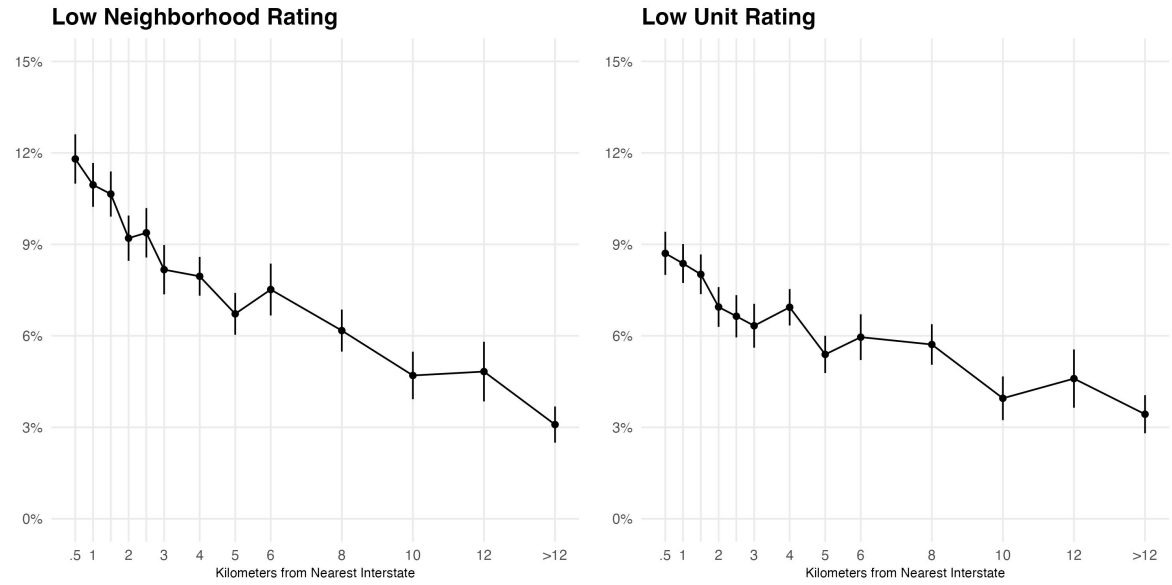

Figure 3: The frequency of low ratings for resident's housing unit and neighborhood, calculated in bins based on the observational housing unit's distance to the nearest Interstate highway. X-axis placements mark the outer boundary of each bin, with the first bin including housing units between 0-0.5km of the nearest Interstate. Black lines through each point denote margin of error. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

Figure 2 and Figure 3 show the frequency of blight indicators binned by the unit's distance to an Interstate.[11] Bins vary in size, with the placement on the x-axis denoting the outer boundary for each bin. The bin widths were selected to capture the change in outcome frequency at clear thresholds with the finest detail allowable under federal policy for restricted-use data, which limits geographic output based on the represented population. For all adverse housing conditions and low subjective ratings, we see greater frequency among closer units, followed by almost monotonic declines. As expected based on an assumption of more acute disamenity effects at close distances, units in the closest bins show a sharp relative increase in most conditions. These visualizations also help guide and justify the selection of 1km and 2.5km distance thresholds for the Interstate proximity indicators used in this paper's regressions.

4 Results

I select two thresholds for Interstate proximity, 1 kilometer and 2.5 kilometers, and create binary independent variables for each, where a value of 1 indicates that the observed housing unit falls within a given threshold, and 0 indicates otherwise. Each pairing of proximity variable and dependent variable (one of the 7 adverse housing conditions) is run under a set of five specifications. All specifications

[11] For brevity, the graph for one adverse outcome variable, unit proximity to 2+ abandoned buildings, is omitted here

Table 2: Bivariate Regression Results: Within 1km Indicator as Indep. Var.

	Inadequate Unit	Near 1+ Abandoned Buildings	Near 2+ Abandoned Buildings	Serious Crime in Neighborhood	Low Neighborhood Rating	Low Unit Rating	Near Large Amounts of Trash
Constant	0.0717^c	0.0634^c	0.0379^c	0.0928^c	0.0802^c	0.063^c	0.0909^c
	(0.002)	(0.002)	(0.0016)	(0.0025)	(0.0022)	(0.0019)	(0.0025)
Coefficient	0.0153^c	0.0317^c	0.0188^c	0.0401^c	0.0386^c	0.0254^c	0.0442^c
	(0.0047)	(0.005)	(0.0037)	(0.0064)	(0.0057)	(0.0049)	(0.0064)
Percentage Change	+21.34%	+50%	+49.6%	+43.21%	+48.13%	+40.32%	+48.62%

Each column denotes a separate bivariate regression. The indepedent variable in all models is an indicator for a housing unit being within 1km of an Interstate, and the dependent variables are given in the column names. All standard errors are robust and clustered at the census tract level. ^{a} $p < 0.10$; ^{b} $p < 0.05$; ^{c} $p < 0.01$. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

Table 3: Bivariate Regression Results: Within 2.5km Indicator as Indep. Var.

	Inadequate Unit	Near 1+ Abandoned Buildings	Near 2+ Abandoned Buildings	Serious Crime in Neighborhood	Low Neighborhood Rating	Low Unit Rating	Near Large Amounts of Trash
Constant	0.0624^c	0.0515^c	0.0299^c	0.080^c	0.0698^c	0.0566^c	0.0748^c
	(0.0022)	(0.0023)	(0.0018)	(0.0029)	(0.0025)	(0.0022)	(0.0028)
Coefficient	0.0246^c	0.0369^c	0.0237^c	0.0425^c	0.037^c	0.0236^c	0.0507^c
	(0.0036)	(0.0037)	(0.0029)	(0.0047)	(0.0041)	(0.0035)	(0.0046)
Percentage Change	+39.42%	+71.65%	+79.26%	+53.12%	+53.01%	+41.7%	+67.78%

Each column denotes a separate bivariate regression. The indepedent variable in all models is an indicator for a housing unit being within 2.5km of an Interstate, and the dependent variables are given in the column names. All standard errors are robust and clustered at the census tract level. ^{a} $p < 0.10$; ^{b} $p < 0.05$; ^{c} $p < 0.01$. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

use the AHS survey weights[12] and robust standard errors clustered at the census-tract level. The first specification is a simple bivariate regression, from which we can clearly compare the change in blight frequency/likelihood for Interstate-proximate units compared with those further away. The equation for this specification is given simply as:

$$Y_i = \beta_0 + \beta_1 I_i \tag{1}$$

Where Y denotes an indicator for blight, I denotes an indicator for proximity to an Interstate, and subscript i represents an observational housing unit. This first specification is shown in Table 2 for the 1km proximity independent variable, and in Table 3 for the 2.5km threshold, where the constant

[12]This improves estimates due to the inherent heteroskedasticity of binary variables, and makes these estimates representative of the overall population of the 35 cities' urban cores (Solon et al., 2015)

term is given by β_0, and the coefficient estimate from β_1.

Looking at Table 2, we see each column represents a separate regression labeled by its dependent variable (blight indicator). The coefficient in each column estimates the percentage point change in likelihood of the given blight condition when a housing unit is within 1km of an Interstate. These coefficients are then compared with the intercept term to produce estimates of percentage change in likelihood, shown in the final row. Looking at the first column, we see that units within 1km of an Interstate are 1.53 percentage points more likely to be deemed inadequate, a 21.34% increase compared to the more distant units. For the other six adverse conditions investigated, I find that being within 1km of an Interstate increases incidence by 40-50%.

Table 4: Regression Results Across 5 Specifications: 1km Interstate Threshold

	Dependent Variable: Near 1+ Abandoned Buildings				
	A	B	C	D	E
Constant	0.0634^{c}				
	(0.002)				
Within 1km of Interstate	0.0317^{c}	0.029^{c}	0.0148^{c}	0.02^{c}	0.0108^{b}
	(0.005)	(0.005)	(0.005)	(0.0049)	(0.0048)
CBD distance (km)			-0.005^{c}		-0.0041^{c}
			(0.0003)		(0.0003)
Near Water			−0.0048		0.0041
			(0.0048)		(0.0047)
Building Age			0.0004^{c}		0.0003^{c}
			(0.0001)		(0.0001)
Median HH Income (1,000s)				-0.0007^{c}	-0.0006^{c}
				(0.0001)	(0.0001)
Population Density (1,000s/sq. mile)				0.0004^{c}	-0.0002^{b}
				(0.0001)	(0.0001)
Black Population Share (Census Tract)				0.0018^{c}	0.0017^{c}
				(0.0001)	(0.0001)
Observations	45,000	45,000	45,000	45,000	45,000

Each column denotes a separate regression with the dependent variable as an indicator for housing-unit proximity to 1 or more abandoned buildings. The key independent variable in all regressions is an indicator for a housing unit being within 1km of an Interstate. Controls vary according to specification. All standard errors are robust and clustered at the census tract level. ^{a} $p < 0.10$; ^{b} $p < 0.05$; ^{c} $p < 0.01$. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

Building on this first specification, from here on referred to as specification A, I add four more specifications, B-E. To display the variables included in each specification, Table 4 provides an example for a single dependent variable, proximity to 1+ abandoned buildings, with the 1km Interstate-proximity independent variable. All of these additional approaches include MSA-level fixed effects to produce estimates based only on intra-city comparisons of housing units. Specification B adds only these fixed

effects. The next specification, C, approaches the difficult issue of separating the effects of Interstate proximity from city centrality. Neighborhoods in the geographic core of the main sample are more likely to be close to Interstates, but they are also expected to present factors that increase blight for reasons potentially independent of Interstate proximity, such as an older built environment and a greater concentration of human activity. To what extent are the estimated effects in specifications A and B due to a unit's proximity to Interstates as opposed to its proximity to the city center? To attempt to address this, specification C adds a set of predominately geographic control variables: unit distance from city center, an indicator variable for if the unit is near a body of water, and variable for the age of each housing unit's structure. With the MSA-level fixed effects, this building age variable provides a proxy for the relative age of the neighborhood within each city.

Approaching the centrality issue by simply controlling for CBD distance creates a risk, however. The previous question on Interstate vs CBD proximity begs another: to what extent are city centers more blight-prone because they are typically criss-crossed by multiple Interstates with compounding harmful effects? In major cities, state highway engineers typically designed and implemented an interdispersal loop ringing the CBD (Schwartz, 1976, p. 425). This places central neighborhoods in an enclosure of massive roadways, and the greater density of Interstates means that even neighborhoods just outside the loop are often bordered by roadways on two sides, along with arterial roads attracting additional traffic.

Put simply, the compounding effects of multiple roadways is likely a major contributor to the more blighted condition of the city centers generally, including for neighborhoods falling outside of the distance thresholds I examine here.[13] Inclusion of the CBD distance variable then risks soaking up these Interstate effects. By including this measure, for central units the model essentially compares units that are very close to Interstates with other central housing units that are merely somewhat close to one or more Interstates, thus dampening the overall estimate. Specification C can therefore be interpreted as a highly conservative estimate of the effects of Interstate proximity. Additional analysis that explores this centrality question is currently in progress, and these results will be integrated into future versions of this paper.

Specification D then uses a set of controls regarding residential sorting, with census-tract-level measures of median household income, population density, and Black population share. With the notable disamenities of Interstate proximity, a selection mechanism is expected where residents of low socioeconomic status move closer to highways. The adverse neighborhood conditions examined here are of course correlated with lower resident socioeconomic status. For most specifications, it is better to not control for socioeconomic variables, as this residential sorting is an important pathway in assessing

[13]For example, Brinkman and Lin (2024) find barrier effects extending up to 3 miles (4.8 km)

the overall condition of housing near Interstates. By controlling for sorting factors in specification D, we can assess the importance of this pathway as well as the impact of Interstate proximity without it. Finally, specification E uses both the geographic and sorting controls to assess the strength of the Interstate proximity with all measures included.

Table 5: WLS Coefficient Estimates for 1km Proximity Across 5 Specifications

	Inadequate Unit	Near 1+ Abandoned Buildings	Near 2+ Abandoned Buildings	Serious Crime in Neighborhood	Low Neighborhood Rating	Low Unit Rating	Near Large Amounts of Trash
A	0.0153^{c}	0.0317^{c}	0.0188^{c}	0.0401^{c}	0.0386^{c}	0.0254^{c}	0.0442^{c}
	(0.0047)	(0.005)	(0.0037)	(0.0064)	(0.0057)	(0.0049)	(0.0064)
B	0.011^{b}	0.029^{c}	0.0172^{c}	0.0335^{c}	0.0374^{c}	0.0244^{c}	0.0362^{c}
	(0.0047)	(0.005)	(0.0038)	(0.0064)	(0.0057)	(0.0049)	(0.0063)
C	0.0044	0.0148^{c}	0.0077^{b}	0.0151^{b}	0.0277^{c}	0.0195^{c}	0.0217^{c}
	(0.0048)	(0.005)	(0.0038)	(0.0065)	(0.0058)	(0.005)	(0.0064)
D	0.0045	0.02^{c}	0.0112^{c}	0.0179^{c}	0.0227^{c}	0.0146^{c}	0.0247^{c}
	(0.0046)	(0.0049)	(0.0038)	(0.006)	(0.0054)	(0.0047)	(0.0063)
E	0.0024	0.0108^{b}	0.0052	0.0083	0.0194^{c}	0.0143^{c}	0.0175^{c}
	(0.0047)	(0.0048)	(0.0037)	(0.0061)	(0.0055)	(0.0048)	(0.0064)

Each cell gives a coefficient estimate and standard error for the 1km Interstate proximity indicator independent variable in a different model. Column names indicate dependent variables. Rows denote different speficiations. A is a simple bivariate regression, B adds MSA-level fixed effects, C uses fixed effects and geographic controls, D uses fixed effects and residential characteristic controls, and E uses fixed effects with both geographic and residential sorting controls. All standard errors are robust and clustered at the census tract level. ^{a} $p < 0.10$; ^{b} $p < 0.05$; ^{c} $p < 0.01$. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

For their respective Interstate-proximity independent variable, Table 5 and Table 6 show coefficient estimates across the five specifications for all seven dependent variables. Since all models use a binary independent variable and a binary dependent variable, every coefficient estimate shown here can be interpreted as the percentage point change in likelihood of a given adverse condition for housing units close to an Interstate. For easy comparison of these Interstate-proximity coefficients, control variable coefficients are omitted and made available in the supplementary material.

Looking between specifications A and B in both tables, we see that adding MSA fixed effects has little impact on the Interstate-proximity coefficient estimates, all of which remain similar in size and statistically significant. Specification B thus supports the estimates in specification A as an accurate description of the change in blight likelihood for Interstate-proximate units, and is further valuable for use in comparison with subsequent specifications. The inclusion of the CBD distance measure in specification C makes a more substantial reduction in the size of coefficient estimates, in several cases reducing the estimate in specification B by half or more. All of these estimates remain positive and nearly all are still statistically significant at the 0.05 level.

Table 6: WLS Coefficient Estimates for 2.5km Proximity Across 5 Specifications

	Inadequate Unit	Near 1+ Abandoned Buildings	Near 2+ Abandoned Buildings	Serious Crime in Neighborhood	Low Neighborhood Rating	Low Unit Rating	Near Large Amounts of Trash
A	0.0246^{c}	0.0369^{c}	0.0237^{c}	0.0425^{c}	0.037^{c}	0.0236^{c}	0.0507^{c}
	(0.0036)	(0.0037)	(0.0029)	(0.0047)	(0.0041)	(0.0035)	(0.0046)
B	0.0199^{c}	0.0335^{c}	0.0212^{c}	0.0345^{c}	0.0374^{c}	0.0236^{c}	0.0418^{c}
	(0.0036)	(0.0038)	(0.0031)	(0.0047)	(0.0041)	(0.0036)	(0.0046)
C	0.0083^{b}	0.012^{c}	0.0066^{b}	0.0069	0.0228^{c}	0.0153^{c}	0.0199^{c}
	(0.0037)	(0.004)	(0.0032)	(0.005)	(0.0045)	(0.0038)	(0.0048)
D	0.0099^{c}	0.0224^{c}	0.0138^{c}	0.0138^{c}	0.0193^{c}	0.0111^{c}	0.025^{c}
	(0.0035)	(0.0038)	(0.003)	(0.0045)	(0.004)	(0.0035)	(0.0046)
E	0.005	0.0089^{b}	0.0048	-0.0001	0.0145^{c}	0.0095^{b}	0.0141^{c}
	(0.0037)	(0.0039)	(0.0031)	(0.0047)	(0.0043)	(0.0037)	(0.0047)

Each cell gives a coefficient estimate and standard error for the 2.5km Interstate proximity indicator independent variable in a different model. Column names indicate dependent variables. Rows denote different speficiations. A is a simple bivariate regression, B adds MSA-level fixed effects, C uses fixed effects and geographic controls, D uses fixed effects and residential characteristic controls, and E uses fixed effects with both geographic and residential sorting controls. All standard errors are robust and clustered at the census tract level. ^{a} $p < 0.10$; ^{b} $p < 0.05$; ^{c} $p < 0.01$. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

Specification D, which seeks to pull out the impact of neighborhood residential sorting, also reduces the Interstate-proximity estimates as expected. By comparing the results of specifications B and D and calculating the size of the reduction, we can assess how much of the estimated Interstate-proximity effect is due to residential sorting. Using Table 5, we can see that on the low end, sorting accounts for 31.8% of the estimated effect for the nearby presence of large amounts of trash, and 31% or 34.8% of the estimated effect for the nearby presence of abandoned buildings. On the high end, sorting accounts for 59.1% of the estimate for inadequacy and 46.6% for presence of serious crime. These findings make intuitive sense, as effects that are not due to residential sorting are presumably due to the roadway itself. Trash and unused buildings seem like clear consequences of proximity to high-traffic, limited-access roadways irrespective of a neighborhood's residential mix, while dilapidated residential conditions and higher crime are understood to be more related to local socioeconomic status.

Finally, specification E tests the durability of our estimates when including both the sorting and geographic controls. Estimates for the two subjective rating variables and the presence of trash remain sizable and statistically significant at the 0.01 level. The remaining four variables all remain positive, but only the variable for unit proximity to 1+ abandoned buildings is significant at the 0.05 level.

5 Instrumental Variable Results

As discussed, Interstates were often intentionally sited in socioeconomically disadvantaged communities, which could provide an alternative explanation for the previous regression results. Perhaps these neighborhoods were and still are more blight-prone for reasons other than the Interstates, and that the positive association between Interstate proximity and blight is due to the endogenous selection of Interstates to blighted areas. However, it is possible to account for this endogenous route selection by instrumenting for Interstate proximity using an earlier highway plan, following Baum-Snow (2007), Brinkman and Lin (2024), Nehiba and Tyndall (2023), and Mahajan (2024). The fact that some Interstate routes were built without consideration of local conditions provides quasi-random variation that can be exploited. This is done using a 1947 Interstate mapping, digitized by Brinkman and Lin (2024), that was drawn for national and regional linkage. In this plan and in reality, some routes were essentially fixed by regional geography, where a given city receives an Interstate traveling through particular neighborhoods in order to connect it with major neighboring cities.

This instrument has become well-established in the economics literature when working with data at the MSA and census-tract level, and here I adapt it for use in this more granular data. To instrument for my binary measures of actual-Interstate proximity, I take a unit's distance from a planned Interstate and apply a decay function ranging from 1 to 0, creating a measure of planned-Interstate proximity. The equation assigning the intrument value is given by: $\frac{1}{1+\left(\frac{x}{2}\right)^6}$, where x is unit's distance from a planned Interstate.

This approach strikes a balance between using a simple binary instrument (1 if sufficiently close to a planned Interstate, 0 if not) and simple continuous instrument (a unit's distance from a planned Interstate). There are two main advantages for using an instrument with a continuous, non-linear value declining to zero. First, it strengthens our confidence that complier units are only those that received treatment due to their proximity to the 1947 plan. Interstates making regional connections were still sometimes deviated to travel through low-income areas. A decay function declining to 0 limits the range of acceptable deviation under which units are considered close to an actual Interstate because they were close to the plan. Second, assigning instrument values non-linearly based on planned-Interstate distance reflects a greater confidence that the very close units, as opposed to the merely somewhat close units, received treatment due the 1947 plan and not due to endogenous site selection. The decay function approach thus allows for more variation than the simple binary instrument, while also improving on the continuous measure by emphasizing closer units and ignoring distal units. This focus on precision is especially important when instrumenting for Interstate proximity. As shown earlier in Figure 2 and Figure 3, the marginal kilometer can make a substantial difference, especially in close quarters with an Interstate.

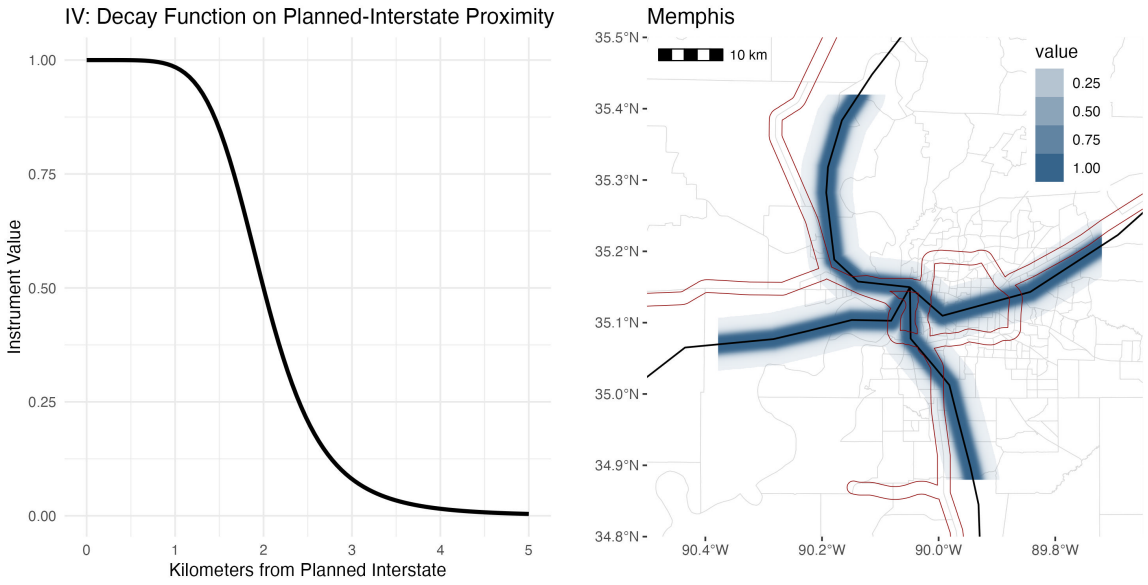

Figure 4: The first panel shows a plot of the decay function used to produce instrumental variable values, with the input being a housing unit's distance to the digitized 1947 plan used by Brinkman and Lin (2024). The second panel uses Memphis, TN to show the values of the instrument (blue gradient) radiating from the plan (black lines) alongside the actual Interstates with a 1km envelope in both directions (red lines)

Table 7: First-Stage Regressions

	1km Indicator	2.5km Indicator
Intercept	0.2112^{c}	0.474^{c}
	(0.0044)	(0.0054)
Plan IV	0.0793^{c}	0.1986^{c}
	(0.0103)	(0.0117)
N	51500	51500
R sq.	0.005	0.023

^{a} $p < 0.10$; ^{b} $p < 0.05$; ^{c} $p < 0.01$.

First-stage regression results for the two Interstate proximity variables on the decayed-distance-to-plan instrument. Columns denote the different proximity indicators. Data: American Housing Survey (2019, 2021)
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Figure 4 plots the decay function alongside a visualization of its implementation for the Memphis MSA. We see that Memphis was planned to receive, and then actually did receive, four Interstate rays converging on its downtown. The exact placement of these roads deviates from the digitized plan,[14] but many neighborhoods fall within the high-end range of the decay function, making any observed housing units into strong compliers for the instrument. Table 7 provides results from the two first-

[14]See DiMento and Ellis (2013, ch. 6) for an account of the community organizing and extensive litigation in opposition to I-40 in Memphis. The planned construction for the east-west route running through a park was continuously delayed and ultimately defeated, resulting in the Interstate's diversion as seen in the eastern portion of Figure 4.

stage regressions, where the instrumental variable predicts each of the Interstate-proximity indicators. These first-stage results, alongside large F statistics[15] that easily exceed the rule-of-thumb value of 10, evince a strong instrument. For each of my seven outcome variables, this IV approach estimates the local average treatment effect (LATE), meaning the average effect of highway proximity for housing units that are recorded as close to an actual interstate because they were close to the 1947 planned Interstate.

Table 8: Instrumental Variable Regressions: 1km Proximity Coefficient Estimates

	Inadequate Unit	Near 1+ Abandoned Buildings	Near 2+ Abandoned Buildings	Serious Crime in Neighborhood	Low Neighborhood Rating	Low Unit Rating	Near Large Amounts of Trash
A	0.2732^{c}	0.5856^{c}	0.4525^{c}	0.5018^{c}	0.1536^{b}	0.0249	0.4821^{c}
	(0.0713)	(0.0997)	(0.0798)	(0.1008)	(0.0717)	(0.0584)	(0.1011)
B	0.2654^{c}	0.567^{c}	0.4146^{c}	0.501^{c}	0.2004^{c}	0.0358	0.55^{c}
	(0.076)	(0.0994)	(0.0774)	(0.1025)	(0.0751)	(0.0606)	(0.1098)
C	0.0765	0.3872	0.3707	-0.1724	-0.4712	-0.5147	0.2722
	(0.236)	(0.2693)	(0.2369)	(0.2583)	(0.3429)	(0.3177)	(0.2737)
D	0.1515^{b}	0.5052^{c}	0.3718^{c}	0.331^{c}	0.0886	-0.0524	0.3762^{c}
	(0.0701)	(0.096)	(0.0754)	(0.0903)	(0.072)	(0.0626)	(0.0948)
E	0.0985	0.4667^{b}	0.399^{b}	0.0763	-0.0917	-0.2413	0.2884
	(0.1604)	(0.2103)	(0.1781)	(0.1707)	(0.1707)	(0.1669)	(0.1956)

Each cell gives a coefficient estimate and standard error for the 1km Interstate proximity indicator independent variable, instrumented by decayed-distance-to-plan, in a different model. Column names indicate dependent variables. Rows denote different speficiations. A is a simple bivariate regression, B adds MSA-level fixed effects, C uses fixed effects and geographic controls, D uses fixed effects and residential characteristic controls, and E uses fixed effects with both geographic and residential sorting controls. All standard errors are robust and clustered at the census tract level. ^{a} $p < 0.10$; ^{b} $p < 0.05$; ^{c} $p < 0.01$. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

Table 8 and Table 9 follow the same formatting and specifications of the earlier WLS tables, only now instrumenting for the Interstate-proximity variable in each model. Overall, these results support that the earlier WLS estimates are not simply due to endogenous Interstate route selection. In specifications A and B for both tables, nearly every estimate is large, positive, and statistically significant, the only exception being the models using low unit rating as the dependent variable, which are positive but not statistically significant. Compared to the WLS results, the magnitude of the IV results is much larger. This can be explained by the mathematical structure of IV estimates, which can be interpreted as a ratio of the reduced-form estimate divided by the first-stage estimate (Angrist & Pischke, 2009). Given the small first-stage estimates, for example .079 and .199 respectively for

[15]For my smallest sample, as seen in specification A column four (serious crime) of Table 7 and Table 8, I report F statistics of 55.92 and 267.6, respectively. Full reporting of F statistics for all models will be made available in the supplementary materials after release of further results following federal disclosure-avoidance review.

Table 9: Instrumental Variable Regressions: 2.5km Proximity Coefficient Estimates

	Inadequate Unit	Near 1+ Abandoned Buildings	Near 2+ Abandoned Buildings	Serious Crime in Neighborhood	Low Neighborhood Rating	Low Unit Rating	Near Large Amounts of Trash
A	0.1091^{c}	0.2332^{c}	0.1802^{c}	0.2035^{c}	0.0604^{b}	0.0099	0.1931^{c}
	(0.0252)	(0.0298)	(0.024)	(0.0341)	(0.0275)	(0.0232)	(0.0334)
B	0.1092^{c}	0.2365^{c}	0.1729^{c}	0.2135^{c}	0.0828^{c}	0.0149	0.2306^{c}
	(0.0279)	(0.0317)	(0.0252)	(0.037)	(0.0298)	(0.0252)	(0.0365)
C	0.0202	0.1106^{a}	0.1059^{b}	-0.0537	-0.1297^{a}	-0.1468^{b}	0.0806
	(0.0614)	(0.0643)	(0.0527)	(0.0766)	(0.0709)	(0.0636)	(0.0746)
D	0.068^{b}	0.2274^{c}	0.1674^{c}	0.1528^{c}	0.0394	-0.0235	0.1703^{c}
	(0.03)	(0.0338)	(0.0271)	(0.0382)	(0.0318)	(0.0279)	(0.038)
E	0.0343	0.168^{c}	0.1436^{c}	0.0292	-0.0321	-0.0867	0.1067
	(0.0546)	(0.0596)	(0.0492)	(0.0653)	(0.0587)	(0.0537)	(0.0664)

Each cell gives a coefficient estimate and standard error for the 2.5km Interstate proximity indicator independent variable, instrumented by decayed-distance-to-plan, in a different model. Column names indicate dependent variables. Rows denote different speficiations. A is a simple bivariate regression, B adds MSA-level fixed effects, C uses fixed effects and geographic controls, D uses fixed effects and residential characteristic controls, and E uses fixed effects with both geographic and residential sorting controls. All standard errors are robust and clustered at the census tract level. ^{a} $p < 0.10$; ^{b} $p < 0.05$; ^{c} $p < 0.01$. Data: American Housing Survey (2019, 2021) CBDRB-FY25-P3099-R12467.

specification A, it is unsurprising that the size of the IV estimates would be substantially larger than those of WLS.

A departure from WLS estimates occurs in specification C for both tables, where we not only see a loss of statistical significance for many estimates, but we also see the coefficients switch signs for the crime and subjective rating measures. How to account for this? With the IV approach, we reduce the amount of variation available for producing estimates, which may be exacerbating the same issues described earlier regarding including a measure of CBD distance. In the tight geography of the city center, the effects of multiple highways may be impacting units not assigned as "proximate" according to the independent variable, raising the blight frequency of the comparison group and thus dampening the estimate. This would then raise the salience of the comparison among more distal units, where Interstate proximity may provide net benefits, resulting in the sign switch.

Specification D largely follows the patterns observed in the WLS case. Sorting reduces the estimated coefficients, which remain statistically significant, except for the subjective unit and neighborhood rating models. We again see that the models examining the presence of abandoned buildings and trash experienced the smallest reduction in estimated effect size. Finally in specification E, the two models for abandoned buildings withstand the full gamut of controls and retain their positive, statistically significant coefficients.

6 Conclusion

The statistics, visualizations, and regression models presented here provide stylized facts and produce new estimates of the Interstate Highway System's negative impact on nearby neighborhood quality. I find that housing units near Interstate highways exhibit far greater incidence of several conditions characteristic of urban blight. Reported physical dilapidation and crime, hallmarks of a dangerous and unpleasant neighborhood, are markedly more pronounced at close distances. Additionally, subjective ratings of housing units and neighborhoods show that residents of Interstate-proximate units are more frequently dissatisfied. These findings contribute to the growing literature linking automobiles and their infrastructure with lower personal well-being (Pfeiffer & Cloutier, 2016; Saadaoui et al., 2025).

It is also worth noting that this paper examines units by distance from Interstate highways specifically, not any major highway. It is not immediately apparent how these results might be understood in relation to the impacts of major highways more generally. Would these estimated effects be smaller or larger with the inclusion of major state highways? Given the unique history and scale of the IHS, the Interstates are expected to be the most intrusive and unpleasant for nearby neighborhoods. However, many units within this sample may be several kilometers away from an Interstate, yet very close to a major state highway, lowering the estimated effects of highway proximity. It is not easily inferred which of these countervailing forces might dominate, but a slightly broader approach that includes sufficiently major non-Interstate highways seems likely to produce estimates similar to those produced here.

Finally, we can consider the policy implications of these results. The Biden administration launched the most ambitious national efforts to redress the Interstate's local neighborhood impacts in their "Reconnecting Communities" and "Neighborhood Access and Equity" grant programs. Approved grants included several projects for the construction of reconnective infrastructure over Interstates running through many major cities, such as Austin ($105.2 million), Atlanta ($157.6 million), Dallas ($80 million), and Portland, OR ($450 million). However, the 2025 budget reconciliation bill rescinded $4.3 billion of the $5.3 billion in total grants under these programs, jeopardizing the future of these projects ("Eno Reconciliation Report", 2025). Given the persistent, harmful effects of Interstates identified within this paper and the urban economics literature generally, reconstruction projects are a worthwhile investment. To remedy the destructive decisions of past generations, the transportation leaders of today ought to pursue capping urban highways, or simply removing many altogether.

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