

1 **ZOMBIE HOMES AND EXCESS HOUSING:**
2 **PATTERNS OF BEDROOM SURPLUS, VACANT LOTS, AND OWNERSHIP**
3 **ACROSS AUSTIN, TEXAS**

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15 **Objectives**

16 Housing shortages in rapidly growing metropolitan areas are often attributed to insufficient
17 housing supply, yet unused indoor capacity and residential space also reduce effective housing
18 availability. When housing near major employment centers remains underutilized, households
19 seeking more affordable housing may relocate to the urban periphery, raising commute distances,
20 automobile dependence, and congestion. This study examines household bedroom surplus,
21 vacant residential lots, along with related ownership and short-term rental patterns in Travis
22 County, Texas, and evaluates how these spatial patterns reflect regional travel demand and
23 transit accessibility.

24 **Methods**

25 The analysis combines the 2022 American Community Survey (ACS) Public Use Microdata
26 Sample (PUMS) for 21,719 households, 2025 Travis Central Appraisal District (TCAD) records
27 for more than 380,000 residential parcels, June 2026 Airbnb listings, and 2021 U.S.
28 Environmental Protection Agency (EPA) Smart Location Database (SLD) measures for 59 ZIP
29 Code Tabulation Areas (ZCTAs). A hurdle model estimates household bedroom surplus, parcel-
30 level binary logistic regressions estimate absentee ownership, non-homestead status, and vacant
31 residential lots, and ZCTA-level ordinary least squares (OLS) models relate these shares to built-
32 environment (BE) attributes and job accessibility.

33 **Findings**

34 About 40% of households have at least one surplus bedroom, and single-family homes are 8.9
35 times more likely than other housing types to have surplus bedrooms. Each 1percentage-point
36 (pp) increase in the share of entire-unit short-term rentals predicts higher odds of absentee
37 ownership (+7.1%), non-homestead status (+7.7%), and vacant residential lots (+9.5%). A 10 pp
38 increase in vacant-lot share 16.7% fewer auto-accessible jobs and 54.2% fewer transit-accessible
39 jobs within a 30-minute commute.

40 **Novelty**

This research develops a multi-scale framework that links household, parcel, and neighborhood housing underutilization with transportation accessibility, distinguishing unused housing capacity from ordinary long-term rental occupancy.

Practical Applications

The findings support policies that encourage infill on vacant residential lots, voluntary home-sharing and accessory dwelling units to put surplus bedrooms to use. These strategies can improve housing availability near jobs, reduce outward urban expansion, shorten commute distances, and reduce traffic congestion and emissions.

MOTIVATION

The State of Texas has been adding residents at a rate of 1.2% persons per year, reaching a population of 31.7 million by July 2025 (U.S. Census Bureau, 2026). Between 2019 and 2025, Travis County's population grew by 9.1% to 1.39 million, while the local Federal Housing Finance Agency house price index climbed 55% before peaking in mid-2022 (Federal Reserve Bank of St. Louis, 2024; U.S. Census Bureau, 2025). Figure 1 shows how Austin's Travis County has Texas' highest median home value (about \$482,000 in 2023, across 254 counties). And median sales prices across 5-county Austin metro area jumped from \$315,000 in 2019 to \$440,000 by 2024 (MacroTrends, 2026; Texas REALTORS®, 2024). Austin's City Council adopted the Home Options for Mobility and Equity (HOME) amendments in 2023 and 2024, permitting up to three dwelling units on lots previously zoned for single-family homes (SFHs) and lowering minimum lot sizes to develop "missing middle" housing and neighborhoods (City of Austin, 2024).

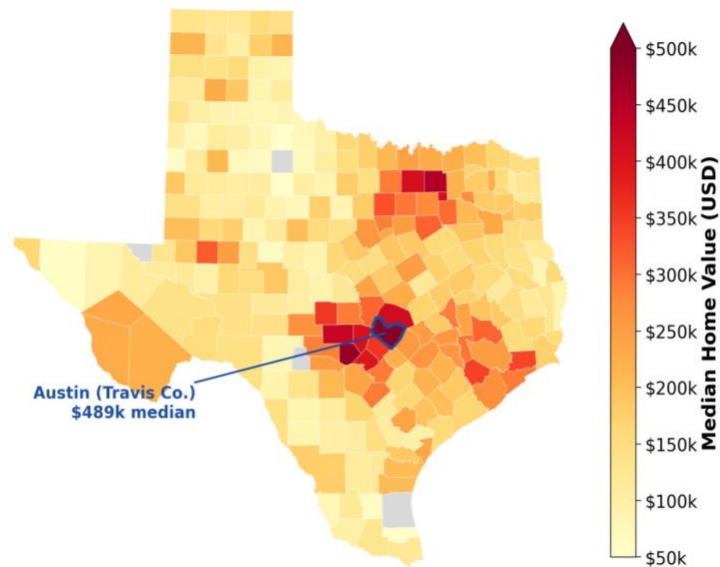


Figure 1 Median Home Value by Texas County, 2023 American Community Survey (ACS)

While Austin's boundary occupies 35% of Travis County, 38.7% of Travis County households occupied dwelling units with 2+ unused/excess bedrooms (according to the 2022 Public Use Microdata Sample or PUMS). Among Travis County's 298,844 SFH parcels as shown in Figure 2, 17.4% of the county's SFH properties are absentee owned, 24.7% lack a homestead exemption

(so these are not their primary residence), 9.1% are vacant residential lots, and 3.1% are short-term Airbnb rentals. These patterns reflect that housing availability depends on both new construction and how existing housing is occupied and used (Wegmann, 2020; Garcia-López et al., 2020; Barron et al., 2021).

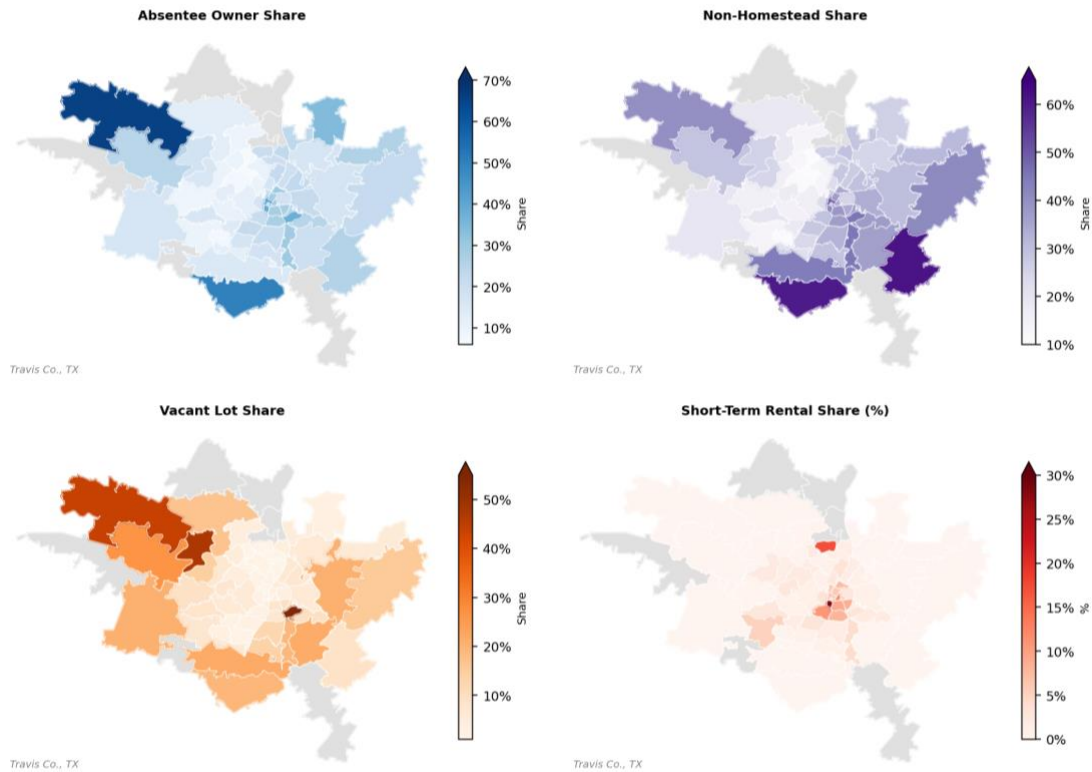


Figure 2 Housing Underutilization Across Travis County ZIP Code Tabulation Areas (2025 TCAD and June 2026 Airbnb)

Unused housing capacity has been widely discussed in the following forms. First, bedroom surplus captures homes with more bedrooms than occupants, which is particularly common among older homeowners aging in place after children leave home (Clark & Deurloo, 2006). Given single-person households, work-from-home patterns, and separate bedrooms within families (Statistics Canada, 2022), current housing usually accommodates one bedroom per occupant. Second, absentee ownership identifies parcels where the owner mailing address differs from the property address. Third, vacant residential lots are undeveloped parcels categorized as residential by the 2025 Travis Central Appraisal District (TCAD). Finally, short-term rentals identify entire housing units listed on platforms such as Airbnb or VRBO, limiting the available supply for long-term residents (Wachsmuth and Weisler, 2018; Bibler et al., 2022).

This study examines these patterns from the household, parcel, and neighborhood levels. At the household level, a hurdle Poisson regression models the count of excess bedrooms. At the single-parcel scale, binary logistic regressions model the probability that a SFH has an absentee owner, lacks a primary homestead property tax exemption (ownership/tenure indicator), or that a residential parcel is an undeveloped lot. Ordinary least squares (OLS) models then link ZIP-level shares of these outcomes to built-environment (BE) and demographic attributes, and relate housing indicators to job accessibility.

METHODS

Table 1 summarizes data from three levels. Household characteristics come from the 2022 ACS one-year PUMS for 22,646 Travis County households across nine Public Use Microdata Areas (PUMAs); the hurdle model uses the 21,719 households with positive household size; Parcel characteristics come from the 2025 TCAD assessment roll for vacant-lot models covering 380,364 residential parcels (including 290,845 SFH parcels). Neighborhood characteristics are compiled for 59 ZCTAs by combining TCAD records, June 2026 Airbnb listings, the U.S. Environmental Protection Agency (EPA) 2021 Smart Location Database (SLD), and 2023 ACS five-year estimates. SLD variables are aggregated from census tracts to ZCTAs using population-weighted averages.

Table 1 Summary Statistics (Travis County Housing Data, 2022–2026)

Variable	Mean	Median	Std Dev	Min	Max
Zip-Code Land Use Variables (n = 59 ZIP codes)					
Vacant lot share	0.098	0.059	0.110	0.015	0.546
Absentee owner share (SFH)	0.209	0.197	0.108	0.067	0.659
Non-homestead share (SFH)	0.279	0.271	0.116	0.102	0.615
STR share (% of SFH)	2.956	1.377	4.861	0	28.483
Auto job accessibility (within 45 min)	116,483	107,763	59,335	23,607	226,384
Transit job access (within 45 min)	73,020	39,261	79,547	136.0	261,250
Peak-hour transit frequency (trips/hour)	11.05	7.749	11	0.330	60.49
Distance to nearest transit stop (m)	574.3	540.9	212.2	224.3	1,081.1
Jobs–housing mix entropy (0–1)	0.547	0.560	0.116	0.271	0.753
Street intersection density (per sq mi)	60.60	54.36	48.55	7.018	195.1
National Walkability Index	9.756	8.536	3.623	3.6	17.27
Households without vehicles (%)	0.043	0.028	0.039	0.001	0.161
Median household income (\$100,000s)	1.157	1.035	0.414	0.435	2.171

Variable	Mean	Median	Std Dev	Min	Max
Adults with bachelor's degree or above (%)	0.558	0.572	0.194	0.167	0.848
Median age (years)	37.79	36.78	5.447	25.54	52.09
Distance to downtown Austin (mi)	11.12	9.479	7.229	0.214	34.83
Distance to Lake Travis (mi)	15.36	14.43	7.081	1.377	33.95
ACS Household Characteristics (2022 PUMS, n = 21,719)					
Household size (# persons)	2.312	2	1.372	1	13
# Bedrooms	2.533	3	1.220	0	5
Surplus bedrooms	0.597	0	0.832	0	4
Householder age (years)	45.92	43	16.46	15	92
Household income (\$)	122,660	86,000	127,947	0	1.598 M
Home value (owner-occupied, \$)	547,748	400,000	580,260	1,000	3.874 M
# Household vehicles	1.733	2	0.980	0	6
# Children (<18)	0.431	0	0.880	0	8
ACS Dwelling Unit Indicators (2022 PUMS; n = 21,719; 1=yes, 0=no)					
Any surplus bedrooms	0.404	0	0.491	0	1
Single-family home (SFH)	0.58	1	0.494	0	1
Owner with mortgage	0.357	0	0.479	0	1
Owner without mortgage	0.175	0	0.38	0	1
Renter	0.46	0	0.498	0	1

Notes: Distance to downtown Austin and distance to Lake Travis are Euclidean (straight-line) distances between the centroid of each ZIP code (ZCTA) and the Austin central business district (CBD) at Congress Avenue and 6th Street (30.267° N, 97.743° W) and Mansfield Dam on Lake Travis (30.391° N, 97.927° W), respectively.

1 Model 1 estimates household bedroom surplus using a hurdle Poisson model,

2
$$E_i = \max(0, BDSP_i - NP_i)$$

3 where $BDSP_i$ is the reported number of bedrooms and NP_i is household size measuring by 1
4 person/bedroom. The first stage estimates

5
$$P(E_i > 0 | X_i) = \frac{1}{1 + \exp(-X_i\beta_1)}$$

6 while the second stage applies a weighted zero-truncated Poisson model,

$$P(E_i = y \mid E_i > 0) = \frac{e^{-\lambda_i} \lambda_i^y / y!}{1 - e^{-\lambda_i}}, \ln(\lambda_i) = X_i \beta_2$$

Both stages use ACS household weights (WGTP) with heteroskedasticity-consistent (HC0) standard errors. Household covariates include tenure, householder age, SFH status, home value, number of household vehicles, and number of children under 18.

Model 2 estimates three parcel-level housing underutilization outcomes using separate binary logistic regressions with HC0:

$$P(Y_i = 1 \mid W_i) = \frac{1}{1 + \exp(-W_i \gamma)}$$

where $Y_i = 1$ when parcel i is an absentee-owned SFH, non-homestead SFH (ownership/tenure; includes long-term rentals), or vacant residential lot. W_i includes parcel characteristics, location, BE, and neighborhood variables. The National Walkability Index (1 = least walkable, 20 = most walkable) measures street connectivity, transit proximity, land-use diversity, and jobs–housing mix (U.S. Environmental Protection Agency, 2021). Assessed value, living area, and building age are omitted for undeveloped residential lots because no structure exists.

Model 3 estimates ZCTA-level housing underutilization using OLS,

$$Share_j = \alpha_0 + \alpha_1 STR_j + \alpha_2 DistCBD_j + \alpha_3 DistLake_j + \alpha_4 Z_j + \varepsilon_j$$

where $Share_j$ is the ZCTA share of absentee-owned SFHs, non-homestead SFHs, or vacant residential lots. Z_j represents BE and neighborhood characteristics, including employment density, walkability, street intersection density, average household vehicles, median household income, education level, median age, and peak transit frequency.

Model 4 examines transportation accessibility using ZCTA-level OLS models,

$$\ln(A_j + 1) = \beta_0 + \beta_1 H_j + \beta_2 Vacant_j + \beta_3 STR_j + \beta_4 DistCBD_j + \beta_5 D1B_j + \beta_6 Mix_j + \beta_7 Income_j + \beta_8 Age_j + \varepsilon_j$$

where A_j represents auto job accessibility or transit job accessibility. H_j estimates either absentee ownership share or non-homestead share, while STR_j is the percentage of SFHs listed as entire-unit short-term rentals. Accessibility outcomes are log-transformed to reduce skewness and allow coefficient estimates to be interpreted as percentage differences.

FINDINGS

Model 1 results are shown in Table 2, and suggest that excess/surplus bedrooms are more commonly found in owner-occupied SFHs rather than in renter-occupied units or multi-family dwelling units (MFDUs, e.g., apartments and condominiums). About 40% of households have at least one excess bedroom. SFHs have 8.86 times the odds of holding surplus bedrooms compared with other housing types, while renters have nearly 0.3 times the odds of owners with a mortgage. Each additional child under 18 lowers the odds of a surplus bedroom to 0.18 times, indicating that spare space is rare where bedrooms are more likely to be actively used.

Table 2 Hurdle Model for Household Excess Bedrooms (n = 21,719).

Variable	Logit Coef.	T-stat	ZTP coefficient	T-stat
Constant	−1.6160***	−6.45	−1.5306***	−6.59
Tenure (base: owner with mortgage)				
Owner without mortgage	−0.1679*	−2.03	0.0495	1.49
Renter	−1.2308***	−15.39	−0.3475***	−4.81
Household and unit characteristics				
Householder age (years)	0.0611***	5.76	0.0302***	4.17
Single-family home	2.1821***	27.36	1.0077***	7.97
Household income, per \$10,000	0.0088***	4.17	−0.0007	−0.58
Home value, per \$100,000 (owners)	0.0471***	6.88	0.0188***	9.36
# Household vehicles	−0.6125***	−17.76	−0.2234***	−8.48
# Children (<18)	−1.7120***	−33.48	−1.1405***	−13.51
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $p < 0.10$.				

Figure 3 separates absentee ownership from homestead status among Travis County's 298,844 SFH parcels. Overall, 74.4% of parcels are homesteaded with matching owner and property addresses, suggesting owner-occupied primary residences. In contrast, 16.5% of parcels are both absentee-owned and non-homesteaded serving as proxy for non-primary residential ownership, although long-term rentals maybe included. Meanwhile, another 8.2% of parcels are non-homesteaded despite matching owner and property addresses, while only 0.9% are absentee-owned but keep a homestead exemption, noting that neither homestead status nor owner mailing address alone can identify housing underutilization. Similarly, among June 2026 entire-unit Airbnb listings in Austin, about 39.5% have high estimated occupancy (≥ 90 nights), whereas nearly 36% have fewer than 30 occupied nights, suggesting that many listings may reflect occasional home-sharing, for example during South by Southwest (SXSW), Austin City Limits (ACL), or other temporary homeowner absences.

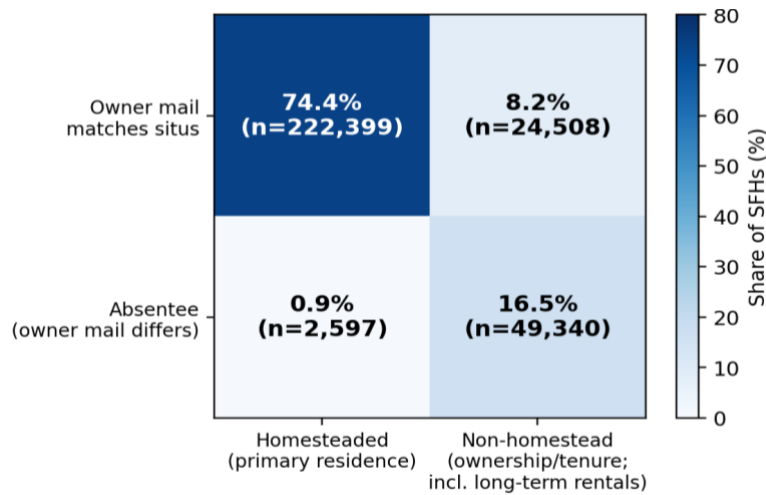


Figure 3 Absentee Ownership and Homestead Status among Travis County SFHs

At the parcel level, Table 3 shows the short-term rental activity and walkable locations have different underuse patterns. A 1 pp increase in the ZIP Code share of SFHs listed as entire-unit short-term rentals raises the odds of absentee ownership by 7.1%, non-homestead status by 7.7%, and vacant-lot classification by 9.5%, holding other attributes constant. Holding other attributes constant, each additional vehicle per household raises the odds of predicted absentee ownership by about 15%, non-homestead status by 43%, and vacant-lot categorizes by 52%. Increasing the National Walkability Index from 3 to 18 raises predicted absentee ownership about 38% but lowers the undeveloped-lot probability about 25%, noting that walkable locations help infill the residential land.

Table 3 Parcel-Level Logistic Models of Housing Underutilization, Travis County, 2025.

Predictor	Absentee-owned SFH	Non-homestead SFH	Vacant residential lot
Short-term rental share (pp)	0.069***	0.074***	0.090***
ln(assessed property value [\$])	-0.462***	-0.502***	n/a
Living area (per 100 sq ft)	-0.011***	-0.014***	n/a
Property age (years)	-1.80E-04.	-2.28E-04**	n/a
Distance to downtown Austin (mi)	0.008***	-0.002	0.015***
Distance to Lake Travis (mi)	0.007***	0.008***	0.012***
Gross employment density (jobs/acre)	0.007***	0.002	-0.018***
National Walkability Index	0.022***	0.004	-0.019**

Predictor	Absentee-owned SFH	Non-homestead SFH	Vacant residential lot
Street intersection density (intersections/sq mi)	0.000	0.001**	−0.008***
Mean Household vehicles	0.137*	0.355***	0.419***
Median household income (\$100,000s)	−0.296***	−0.178***	−0.605***
Adults with bachelor's degree or higher (share)	−0.075	−0.457***	−3.053***
Median age (years)	0.018***	0.016***	0.119***
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $p < 0.10$.			

The ZCTA models in Table 4 explain 51% of variation in absentee ownership, 62% in non-homestead status, and 43% in undeveloped residential lots. Each 1 pp increase in the short-term rental share predicts about a 0.4 pp increase in absentee ownership. Average household vehicle ownership significantly predicts a 0.21 (21 pp) higher vacant-lot share ($p < 0.05$).

Table 4 ZIP-Level OLS Models of Housing Underutilization

Predictor	Absentee-owned SFH share	Non-homestead SFH share	Vacant residential-lot share
Entire-unit short-term rental share (pp)	0.004 (0.003)	0.005 (0.003)	0.005. (0.003)
Distance to downtown Austin (mi)	0.008. (0.005)	−0.000 (0.002)	0.003 (0.005)
Distance to Lake Travis (mi)	0.004 (0.003)	0.011*** (0.003)	−0.000 (0.002)
Mean Household vehicles	−0.003 (0.096)	0.052 (0.107)	0.209* (0.098)
Median household income (\$100,000s)	−0.082 (0.050)	−0.134** (0.046)	−0.176* (0.076)
Evening peak transit frequency (trips/hour)	0.003* (0.001)	0.002 (0.002)	0.001 (0.002)
National Walkability Index	0.012. (0.007)	0.006 (0.006)	0.008 (0.008)
Median age (years)	0.001 (0.003)	0.007* (0.003)	0.012** (0.004)
Model (Adj. R²)	0.51	0.62	0.43
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $p < 0.10$.			

Model 4 links housing underutilization to automobile and transit job accessibility. Table 5 showed that one additional mile from downtown Austin comes with 5.3% lower automobile job accessibility and 21.4% lower transit job accessibility, holding other attributes constant.

Undeveloped residential lots predicted lower accessibility. A 10 pp increase in their share predicts reduction in both automobile job accessibility (16.7%) and transit job accessibility (54.2%). Infill policy should coordinate lot availability and access quality for housing supply.

Table 5 ZIP-Level Associations Between Housing Underutilization and Job Accessibility

Predictor	ln(automobile job accessibility + 1)	ln(transit job accessibility + 1)
Intercept	12.782*** (0.475)	13.366*** (2.731)
Absentee-owned SFH share (pp)	0.098 (1.013)	−3.047 (3.662)
Undeveloped residential lot share (pp)	−1.832* (0.841)	−7.816* (3.168)
Entire-unit short-term rental share (pp)	0.003 (0.01)	0.05. (0.03)
Distance to downtown Austin (mi)	−0.054*** (0.009)	−0.241*** (0.047)
Employment density (jobs/acre)	0.008 (0.011)	0.015 (0.02)
Jobs–housing mix index (0–1)	−0.1 (0.384)	−0.18 (2.187)
Median household income (per \$100,000)	−0.309. (0.169)	−2.322 (1.515)
Median age (years)	−0.005 (0.014)	0.060 (0.102)
Model (Adj. R²)	0.74	0.70
# Observations	51	39

CONCLUSIONS

Nearly 40% of Travis County households hold at least one excess bedroom, with single-family homes raising those odds ninefold. Over 43,000 single-family properties are absentee-owned or non-homesteaded, holding \$26 billion in appraised value. Another 35,000 vacant residential lots keep \$7 billion to \$10 billion out of active use, while bedroom surplus represents over \$50 billion in underused living capacity. Leaving this central space empty forces outward sprawl (Every additional mile from downtown Austin reduces the number of jobs reachable within a 30-minute commute by 5.3% driving and 21.4% by public transit), raising house prices, household travel costs, long commutes, and road emissions.

The findings suggested that policies should address surplus bedrooms, vacant residential lots, and high-intensity entire-unit short-term rentals separately rather than treating all non-owner-occupied housing alike. Home-sharing programs, such as HIP Housing's Home Sharing Program in the San Francisco Bay Area, can help older homeowners rent spare bedrooms to longer-term housemates, making better use of existing housing. Likewise, regulations should focus on high-intensity entire-unit short-term rentals instead of occasional home-sharing during temporary absences or major local events. Finally, encouraging infill near jobs and transit can shorten

commute distances and help reduce congestion and emissions (Ewing & Cervero, 2010; U.S. Environmental Protection Agency, 2021).

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