UNIVERSITY OF GEORGIA

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Department of Statistics

Identifying Drivers of Housing Cost Burden in Georgia via Weighted Least Squares and Welch's Anova

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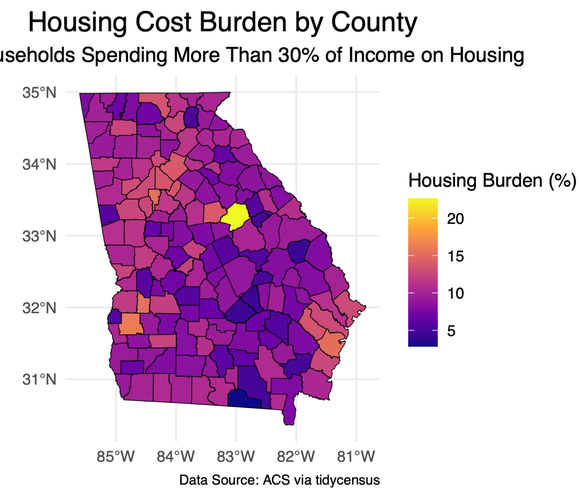
Introduction

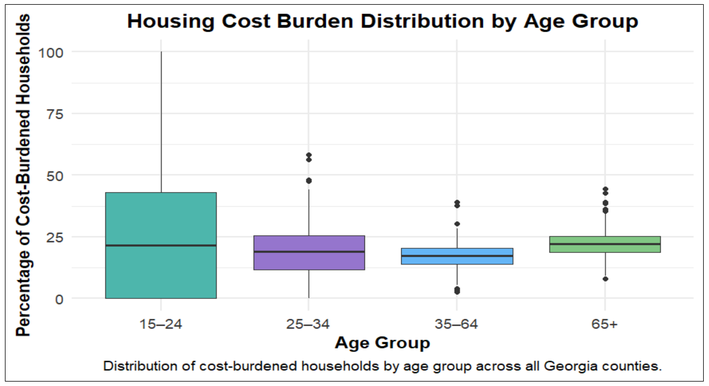
- Why are many Georgia residents spending so much on housing?
- Housing cost burden (spending over 30% of income on housing) affects many Georgia households, straining both renters and homeowners.
- In collaboration with the Carl Vinson Institute of Government, this project analyzes demographic, economic, and geographic factors driving cost burden.



Methods

- 159 counties in Georgia using 2023 American Survey (ACS) 5-year estimates
- **Target response**: percentage of cost-burdened owner and renter-occupied households
- **Welch's One-Way Anova and Games Howell Test**
  - Compare housing cost burden across age and racial groups, accounting for unequal variances between groups
- **Weighted Least Squares Regression**
  - Explore the relationship between county-level predictors and housing cost burden
  - Weighted by *isUrban* factor, accounting for non-constant variance of residuals across urban and rural counties
- All statistical analyses were conducted in *R*, and diagnostic tests were performed to ensure model assumptions (normality, linearity, heteroscedasticity) were adequately met.

Results



Welch's ANOVA Results for Cost Burden by Age Group (Owners)

	Source	DF	F_value	p_value
1	Between Groups	3	23.429	<0.001
2	Residuals	330.1600		

Games Howell Test Results for Age Groups (Owners)

Comparison	P_Value
15-24 vs 25-34	0.005
15-24 vs 35-64	< 0.001
15-24 vs 65+	0.175
25-34 vs 35-64	0.439
25-34 vs 65+	0.004
35-64 vs 65+	< 0.001

Weighted Least Squares Model for Rent Burden

	Dependent variable:
	percent_renter_occupied_cost_burdened
Urban (isUrban = 1)	9.429 (1.479) t = 6.377 p = <0.001
Median Household Income	−0.0002 (0.0001) t = −2.971 p = <0.001
Percent with Bachelor's or Higher	0.351 (0.094) t = 3.741 p = <0.001
(Intercept)	38.134 (2.235) t = 17.066 p = <0.001
Observations	159
Log Likelihood	−559.308
Akaike Inf. Crit.	1,130.616
Bayesian Inf. Crit.	1,148.877
Note:	GLS model weighted by varIdent(form = 1 | isUrban)

Conclusions

- **Urban vs. Rural**: Urban counties show a significantly higher percentage of renter-occupied cost-burdened households (+9.43%) compared to rural areas.
- **Income Effects**: Increases in median household income are correlated with lower cost burden for renters—but the impact is modest.
- **Education Paradox:** Counties with higher percentages of bachelor's degrees unexpectedly see slightly higher rates of cost-burdened households for renter-occupied households.
- **Age disparities**
  - **Owners:** The youngest (15–24) and oldest (65+) homeowners face notably higher cost burdens than middle-aged groups.
  - **Renters:** Older adults (65+) are significantly more likely to be cost-burdened compared to younger renters.
- **Racial Inequities**
  - **Owners:** Black and "Other" racial groups have higher owner cost-burden rates than White owners.
  - **Renters:** Black renters experience significantly higher cost burden compared to White and Other groups.