Historical Analysis of Job-Housing Mismatch in Southern California

An Integration of Python Scripting, Statistical Analysis Software, and ArcGIS

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BACKGROUND:

The imbalance of jobs and housing is considered a key contributor to traffic congestion and an impediment to environmental justice (EJ). EJ populations tend to be more sensitive to job accessibility due to the cost of housing and long distance commuting. Low-income workers, or workers without a car, who cannot afford a vehicle have to either live near jobs with accessible transit or within walkable/bikable distances. As part of SCAG's EJ analysis, SCAG calculated median commute distance and job-to-worker ratio for nearly 4,000 census tracts to better understand the spatial and temporal dynamics of job-housing imbalance. To automate and expedite the workflow, SCAG utilized ArcGIS, Python scripting and Statistical Analysis Software, which offers benefits in time and cost savings.

OBJECTIVES:

- To better understand the spatial and temporal dynamics of job-housing imbalance/mismatch in a geographically detailed way
- To understand whether there are significant differences in commute distances and job-to-worker ratios.
  - Between different income levels
  - Between coastal and inland counties
  - Between temporal periods

METHODOLOGY:

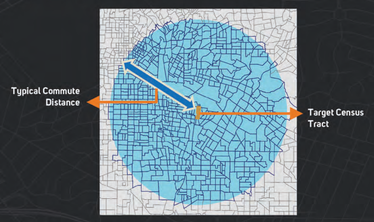
To analyze median commute distance and job-to-worker ratio, SCAG retrieved data from the Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) version 7.2, annually published from 2002.

MEDIAN COMMUTE DISTANCE

SCAG staff found the Euclidean distance (or the distance "as the crow flies") between origin and destination blocks (centroid). The commute distance was weighted by block-level commuter number. The weighted block-level commute distance was compiled to estimate the median distance at tract level. The weighted median commute distance is then categorized into low-wage and high-wage groups:

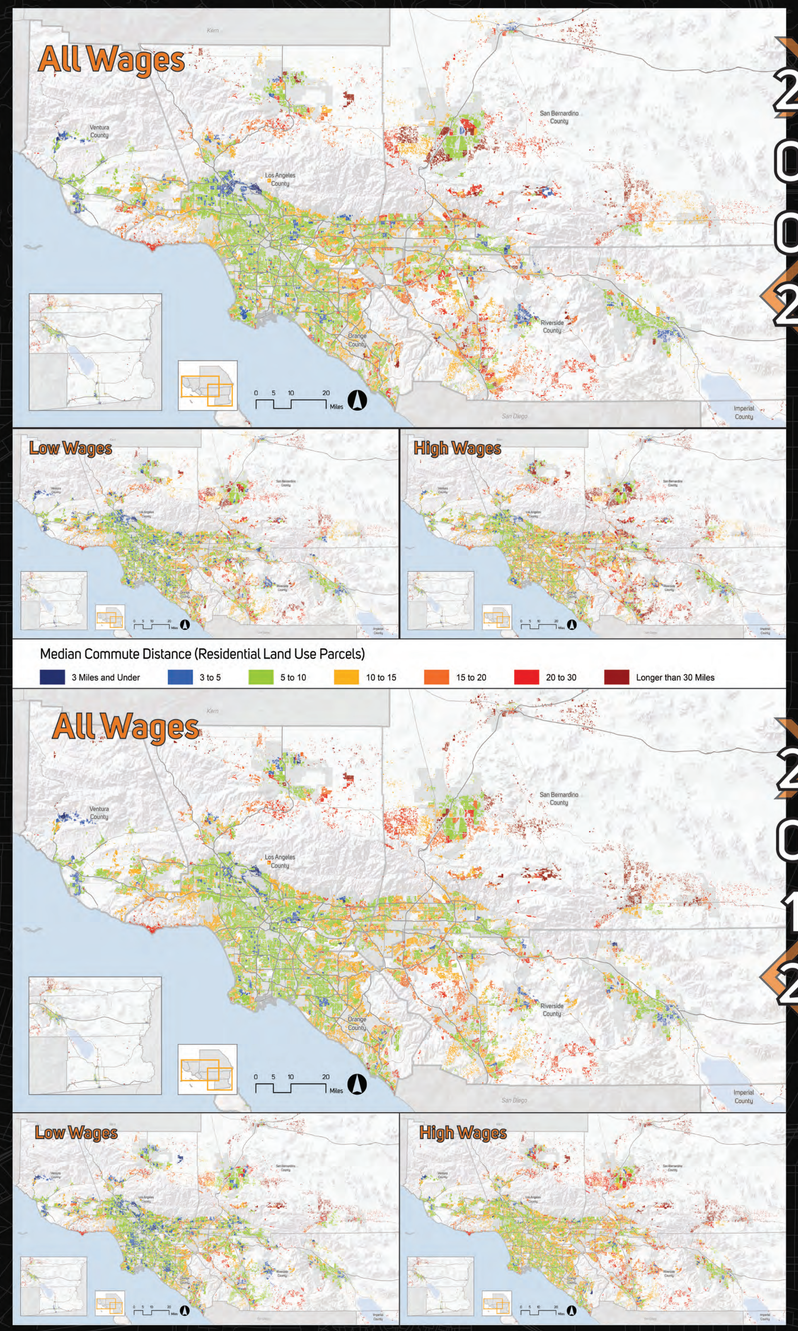
'Low Wage' = Jobs with earnings < $1,250/month;
'High Wage' = Jobs with earnings > $3,333/month.

JOB-TO-WORKERS RATIO

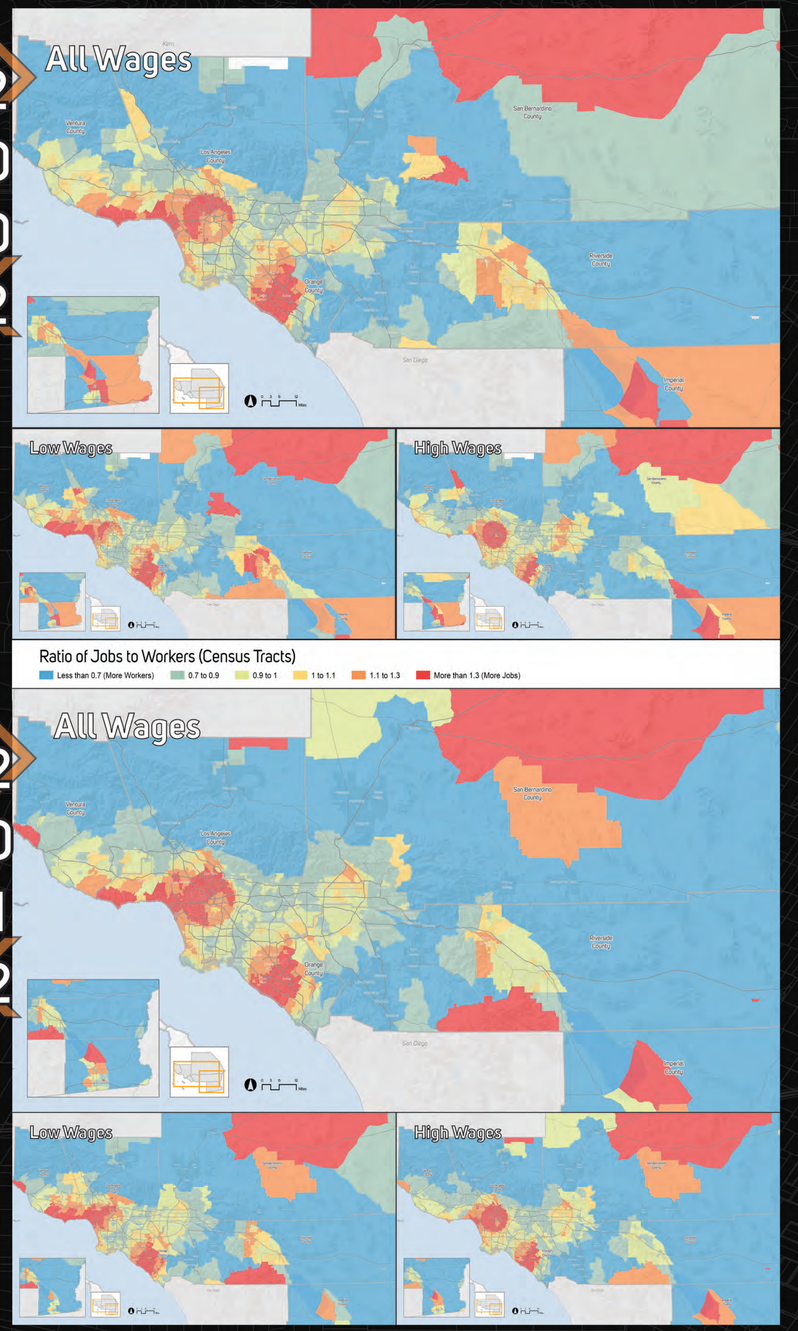


Considering the centroid of each census tract, within typical commute distance (median commute distance using LODES), SCAG staff estimated the total number of "nearby" jobs and workers for each tract. To do so, Python scripting is used to create buffers and to calculate statistics for 3,956 census tracts.

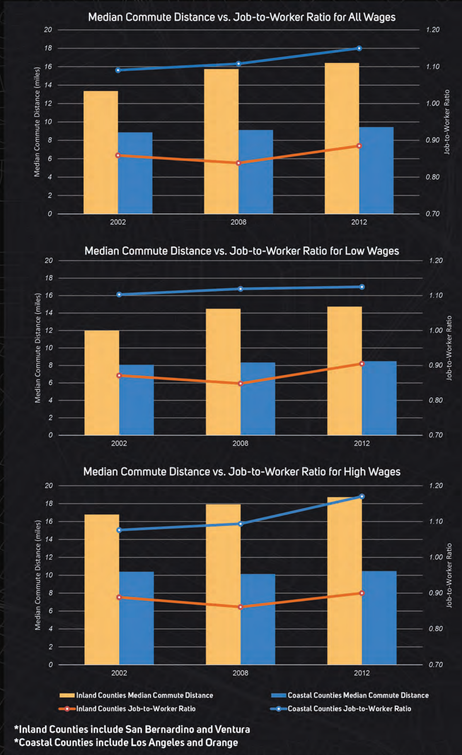
MEDIAN COMMUTE DISTANCE (MILES)



JOB-TO-WORKER RATIO



RESULTS



*Inland Counties include San Bernardino and Ventura
*Coastal Counties include Los Angeles and Orange

CONCLUSION

The commute distance is growing in the SCAG region between 2002 and 2012. Higher wage workers tend to commute longer distance than lower wage workers. The commute distance of workers in inland counties grew more rapidly than in coastal counties, especially in low wage workers. Inland counties show a lower job-to-worker ratio than coastal counties. Counties with lower job-to-worker ratio generate more long distance commuters, indicating the need for more job growth in inland counties, while coastal counties need more housing growth. The growing commute distance can influence a range of economic, social, transportation and environmental outcomes, particularly to low-income workers.

The SCAG region is projected to experience faster employment growth in inland counties through 2040. Improvements in job-housing balance may result in the reduction of transportation congestion and related air quality issues. The spatial mismatch of low-income workers and jobs also may be less in the future than was observed from the recent data.