Spatiotemporal Analysis of Commuting Patterns in Southern California Using ACS PUMS, CTPP and LODES

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Research & Analysis
Southern California Association of Governments

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Southern California Association of Governments (SCAG)

Nation's largest Metropolitan Planning Organization (MPO)

6 counties and 191 cities

19.0 million people within 38,000+ square miles

GRP in 2016: $1,126 Billion
(16th largest economy in the world)

Overview

- Background
- Objectives
- Methodology & Findings
- Conclusions

BACKGROUND

Regional Transportation Plan and Environmental Justice

- Regional Transportation Plan (RTP)
  - A long-range transportation plan
  - Provides a vision for investing in our transportation system in the region.
- Environmental Justice (EJ) analysis to assess the impacts of RTP programs and projects on minority and low-income populations

Jobs-Housing Imbalance/Mismatch and Social Equity

- A key contributor to long distance commuting to work and traffic congestion
- An impediment to Environmental Justice and social equity
  - EJ populations tend to be more sensitive to job accessibility due to the cost of housing and long distance commuting.

OBJECTIVES

Objectives

- To better understand the spatial and temporal dynamics of job-housing imbalance/mismatch
- To understand whether there are significant differences in commuting patterns between:
  - Different income levels
  - Coastal counties and inland counties
  - Temporal periods

METHODOLOGY
&
FINDINGS

ACS Public Use Microdata Samples (PUMS)

- ACS 5-year Public Use Microdata Samples (PUMS)
  - Most detailed geographic unit – Public Use Microdata Area (PUMA)
  - Weighting variable – PWGTP (Person's weight)
- Median wages for inter-county and intra-county commuters
  - Comparison of the median wages between workers residing in their destination-work-counties and outside their destination-work-counties

2005-2009 ACS 5-Year PUMS Median Wages for Inter-County and Intra-County Commuters

- Median Wage for Workers by Place of Residence and Place of Work, 2009

Place of Residence	Place of Work						
	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	San Diego
Imperial	25,170	-	-	32,616	-	-	38,052
Los Angeles	-	29,307	37,487	36,964	31,263	40,701	32,616
Orange	-	56,534	33,816	41,772	48,924	48,000	42,000
Riverside	69,619	54,359	48,924	26,632	41,772	45,087	50,126
San Bernardino	-	45,662	48,000	38,324	27,052	45,853	32,616
Ventura	-	63,684	50,385	-	83,714	30,000	28,947
San Diego	59,980	54,421	54,000	48,000	60,000	45,662	34,790

Sources: 2005-2009 ACS 5-year Public Use Microdata Samples (PUMS) (CPI adjusted to $ in 2013)
('-' indicates sample size is too small for the analysis.)

2009-2013 ACS 5-Year PUMS Median Wages for Inter-County and Intra-County Commuters

- Median Wage for Workers by Place of Residence and Place of Work, 2013

Place of Residence	Place of Work						
	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	San Diego
Imperial	26,154	-	-	18,983	-	-	43,455
Los Angeles	40,995	27,990	36,896	35,264	30,747	37,991	30,226
Orange	-	55,344	31,973	48,121	45,340	40,302	53,188
Riverside	40,909	48,444	46,120	24,597	38,946	25,189	47,458
San Bernardino	-	43,419	43,419	33,048	25,837	32,296	37,966
Ventura	.	60,453	58,438	-	52,731	27,420	65,669
San Diego	77,511	54,273	60,113	53,188	42,185	70,528	32,564

Sources: 2009-2013 ACS 5-year Public Use Microdata Samples (PUMS) (CPI adjusted to $ in 2013)
('-' indicates sample size is too small for the analysis.)

Census Transportation Planning Products (CTPP)

- CTPP 5-Year Data based on 2006–2010 American Community Survey (ACS) Data
  - Residence-based, workplace-based and home-to-work flow tables
  - Most detailed geographic unit – Census Tract
- Median commuting distance
  - Euclidean distance between origin and destination tracts (centroids)
- CTPP Tables
  - Total Workers (A302100), Household income in past 12 months (B303100), Poverty status (B304100), Vehicles available (B303202)

CTPP 5-Year Data Set (2006–2010) Median Commute Distance, by Income

- Weighted Median Commute Distance (mi.), by Household Income,2010

Origin	Destination	Total Workers	Less than 15K	15K to 25K	25K to 35K	35K to 50K	50K to 75K	75K to 100K	100K to 150K	150K or More
SCAG	SCAG	**7.1**	5.3	5.7	6.0	6.3	7.0	7.5	8.0	7.9
Imperial	SCAG	**5.2**	1.9	2.7	5.0	4.7	5.4	5.4	5.9	5.1
Los Angeles	SCAG	**7.1**	5.6	6.0	6.1	6.4	7.0	7.3	7.9	7.6
Orange	SCAG	**6.5**	4.5	4.6	5.0	5.6	5.9	6.5	7.2	7.8
Riverside	SCAG	**8.8**	5.3	6.5	6.7	7.3	8.4	10.1	10.4	10.2
San Bernardino	SCAG	**8.4**	5.7	5.5	6.3	7.2	8.4	9.5	10.0	9.6
Ventura	SCAG	**6.2**	4.2	3.8	4.3	5.2	5.7	6.1	6.8	7.8

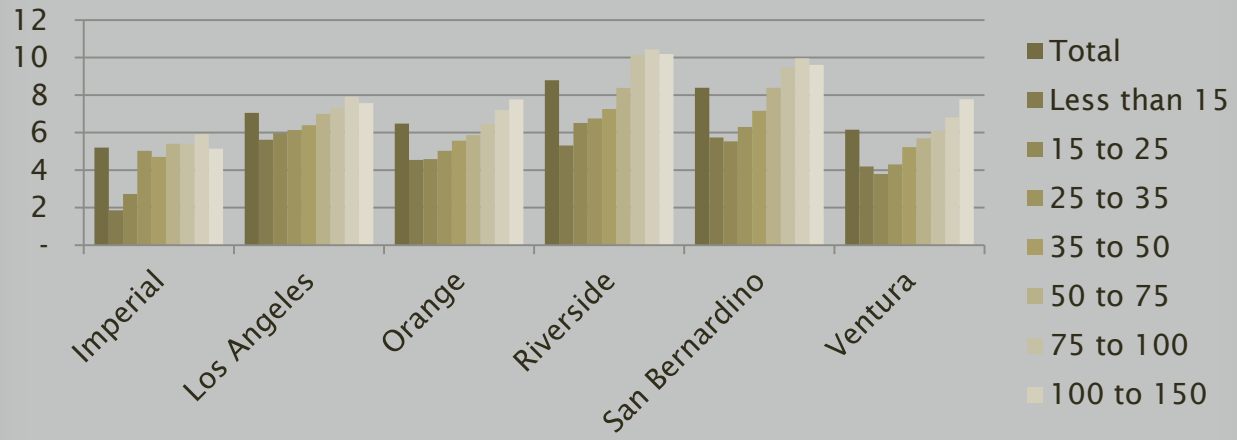
Coastal

Inland

Source: Census Transportation Planning Products (CTPP) 5-Year ACS 2006-2010

CTPP 5-Year Data Set (2006–2010) Median Commute Distance, by Income

- Weighted Median Commute Distance (mi.), by Household Income,2010



Source: Census Transportation Planning Products (CTPP) 5-Year ACS 2006-2010

CTPP 5-Year Data Set (2006–2010) Median Commute Distance, by Poverty Status and Vehicle Available

- Weighted Median Commute Distance (mi.), by Poverty Status and Vehicle Available, 2010

Origin	Destination	Total Workers	Poverty Status			Vehicle Available	
			Below 100%	100 to 149%	At-or-Above 150%	No Vehicles	1+ Vehicles
SCAG	SCAG	7.1	5.6	5.9	7.4	7.8	8.9
Imperial	SCAG	5.2	2.5	4.2	5.4	5.6	7.2
Los Angeles	SCAG	7.0	5.9	6.3	7.2	7.7	8.8
Orange	SCAG	6.5	4.8	5.0	6.7	7.3	7.0
Riverside	SCAG	8.8	6.2	6.7	9.2	9.5	13.4
San Bernardino	SCAG	8.4	5.6	5.8	9.0	8.9	12.1
Ventura	SCAG	6.2	3.9	4.3	6.5	7.1	6.5

Source: Census Transportation Planning Products (CTPP) 5-Year ACS 2006-2010

Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES)

- LODES Version 7.2 Data
  - Origin-Destination (OD), Residence Area Characteristics (RAC), and Workplace Area Characteristics (WAC) datasets
  - Enumerated with 2010 census block
- Median commuting distance by wage group for the years 2002, 2008 and 2012
  - Weighted by block-level commuter number
  - Euclidean distance between origin and destination blocks (centroids)
  - Aggregated at tract level

LODES Version 7.1 Data
Median Commute Distance

- Weighted Median Commute Distance (mi.), by Wage Group, 2002-2012

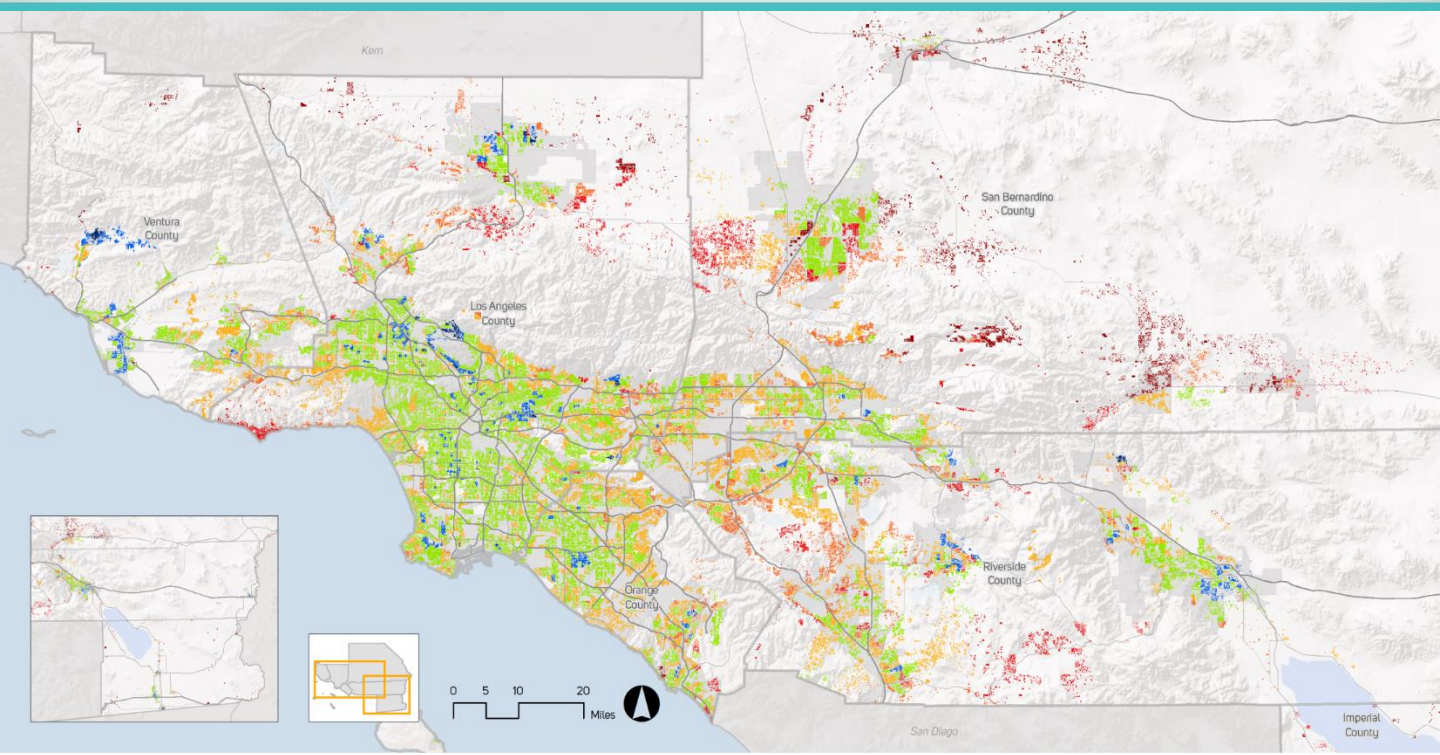
Origin	Destination	2002			2008			2012		
		All	Low Wage	High Wage	All	Low Wage	High Wage	All	Low Wage	High Wage
SCAG	SCAG	**9.4**	**8.6**	**11.0**	**9.8**	8.9	11.0	**10.1**	**9.0**	**11.3**
Imperial	SCAG	**7.5**	8.1	5.6	**7.6**	5.5	8.2	**8.5**	6.3	9.6
Los Angeles	SCAG	**8.8**	8.2	10.2	**9.0**	8.1	10.0	**9.1**	8.1	10.1
Orange	SCAG	**9.0**	8.0	10.6	**9.3**	8.6	10.3	**9.8**	8.9	10.8
Riverside	SCAG	**13.4**	11.8	17.6	**15.8**	14.2	18.5	**16.6**	14.8	19.3
San Bernardino	SCAG	**13.3**	12.1	16.0	**15.7**	14.8	17.4	**16.2**	14.7	18.2
Ventura	SCAG	**9.4**	8.6	11.5	**10.5**	11.2	11.4	**11.2**	11.7	12.0

Coastal

Inland

(Note: 'Low Wage' = Jobs with earnings $1250/month or less; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: U.S. Census Bureau. 2015. LODES Data. Longitudinal-Employer Household Dynamics Program.

Median Commute Distance, 2012 (All Jobs, Residential Parcels)

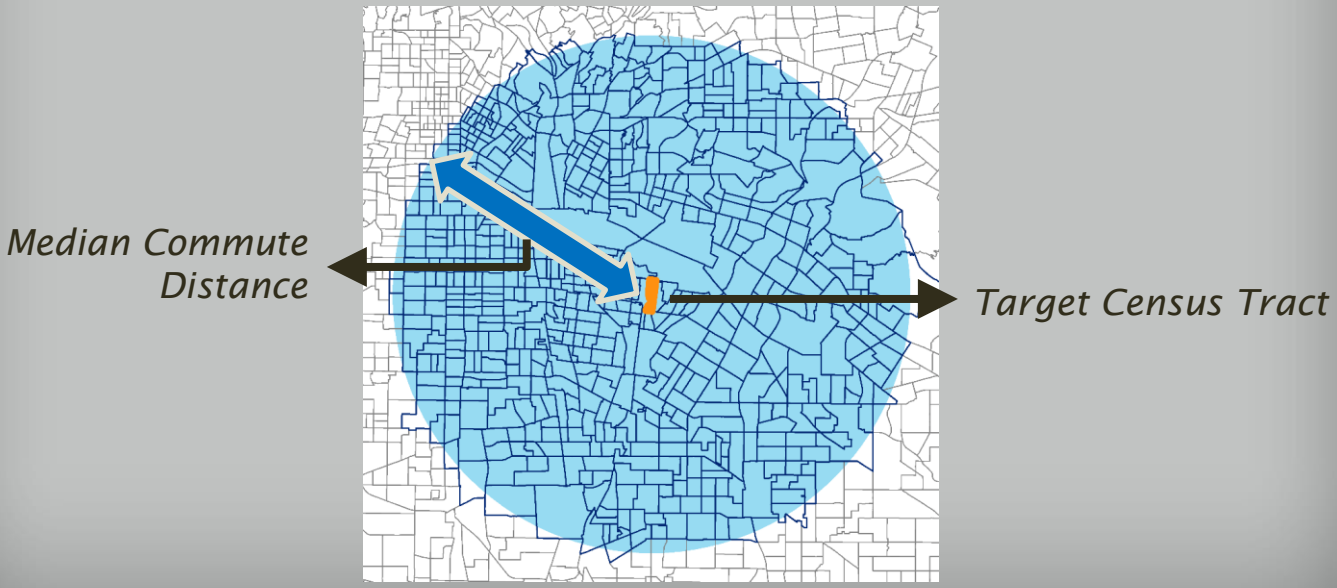


Median Commute Distance (Residential Land Use Parcels)

- 3 Miles and Under
- 3 to 5
- 5 to 10
- 10 to 15
- 15 to 20
- 20 to 30
- Longer than 30 Miles

LODES Version 7.1 Data
Job-to-Worker Ratio

- Estimated total jobs and workers for each tract within median commute distance



LODES Version 7.1 Data
Job-to-Worker Ratio

- Job-to-Worker Ratio by Wage Group, 2012
  - Higher ratio means more jobs.
  - Lower ratio means more workers.

	County	All Jobs	Low Wage	High Wage
	Imperial	**0.94**	0.93	1.01
Coastal	Los Angeles	**1.17**	1.09	1.23
Coastal	Orange	**1.13**	1.16	1.11
Inland	Riverside	**0.86**	0.88	0.88
Inland	San Bernardino	**0.91**	0.93	0.92
	Ventura	**0.91**	0.97	0.86

(Note: 'Low Wage' = Jobs with earnings $1250/month or less; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: U.S. Census Bureau. 2015. LODES Data. Longitudinal-Employer Household Dynamics Program.

CONCLUSIONS

Conclusions

- Higher wage workers tend to commute longer distance than lower wage workers.
- The commute distance is growing in the region, especially more rapidly in inland counties.
- Inland counties show a lower job-to-worker ratio than coastal counties.
- Need for more job growth in inland counties, while coastal counties need more housing growth

Thank you!

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