

# **Spatial and Socioeconomic Analysis of Commuting Patterns in Southern California Using LODES, CTPP, and ACS PUMS**

**Census for Transportation Planning Subcommittee meeting**  
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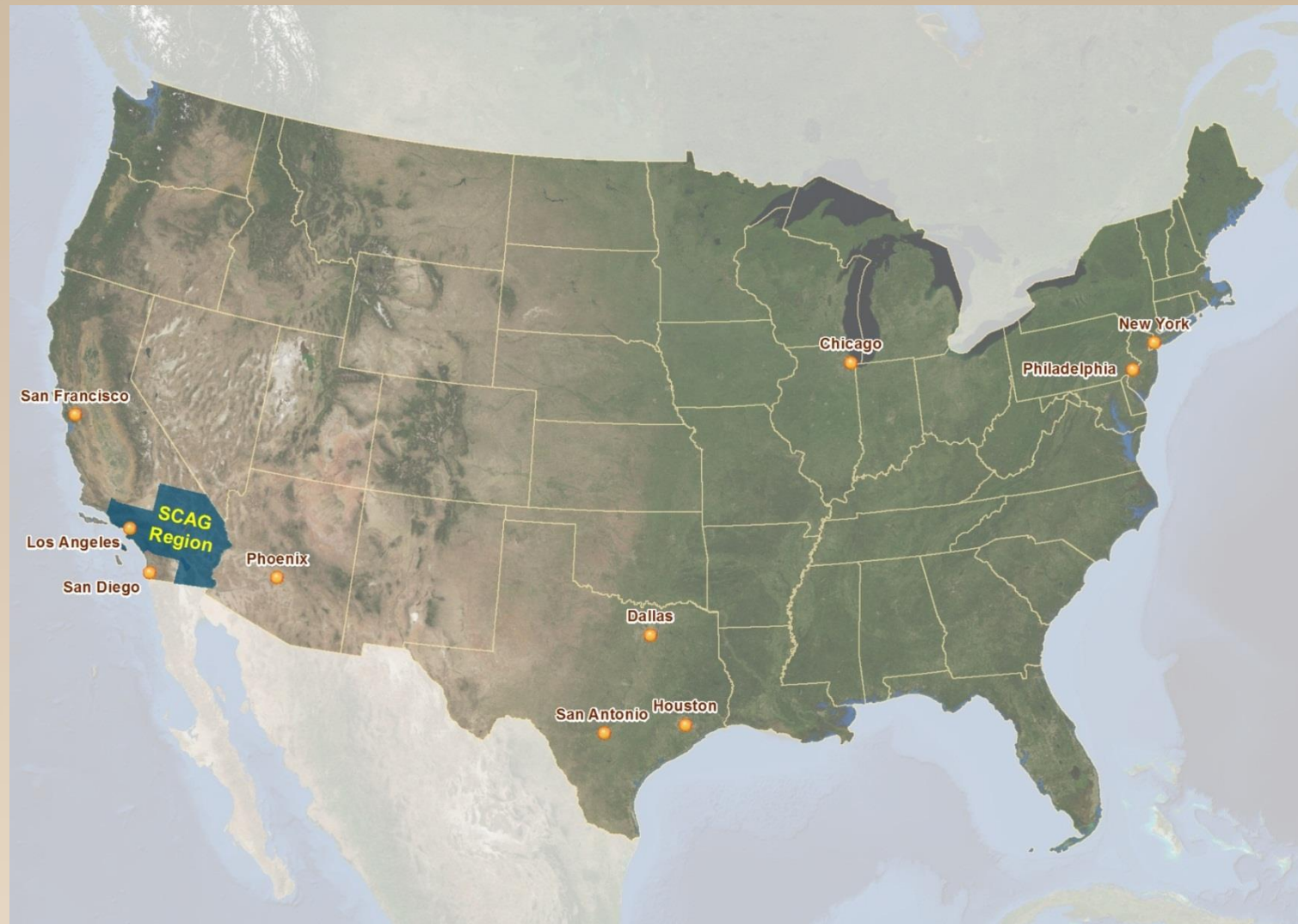
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Research & Analysis

Southern California Association of Governments



# Southern California Association of Governments (SCAG)



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Nation's largest Metropolitan Planning Organization (MPO)

6 counties and 191 cities

18.4 million people within 38,000+ square miles

GRP in 2013: \$924 Billion  
(16th largest economy in the world)

# Overview

- Background
- Objectives
- Methodology & Findings
- Conclusions

# **BACKGROUND**

# 2016 RTP/SCS and Senate Bill 375

- 2016-2040 Regional Transportation Plan / Sustainable Communities Strategy (RTP/SCS)
  - A long-range transportation plan
- SB375 – California’s Climate Protection Act
  - Integration of transportation, land use, housing and environmental planning to meet the regional GHG emission reduction targets

# 2016 RTP/SCS and Environmental Justice

- Integration of the principles of Title VI into RTPs to address EJ
- EJ analysis to assess the impacts of RTP programs and projects on minority and low-income populations
- Performance Measures to analyze social and environmental equity

# Jobs-Housing Imbalance/Mismatch and Social Equity

- A key contributor to 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
  - Workers without a car or people with less income who cannot afford a vehicle have to either live close to their jobs where they can have access to transit or within walkable/bikable distance.



# **OBJECTIVES**

# Objectives

- To better understand the spatial and temporal dynamics of job-housing imbalance/mismatch
  - In a geographically detailed way
  - Using multiple datasets
- To understand whether there are significant differences in commute distance
  - between different income levels
  - between coastal counties and inland counties
  - between temporal periods

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**METHODOLOGY  
&  
FINDINGS**

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

- LODES Version 7.1 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 Jobs	Low Wage	Med. Wage	High Wage	All Jobs	Low Wage	Med. Wage	High Wage	All Jobs	Low Wage	Med. Wage	High Wage
SCAG	SCAG	9.4	8.6	8.8	11.0	9.8	8.9	9.4	11.0	10.1	9.0	9.7	11.3
Imperial	SCAG	7.5	8.1	7.2	5.6	7.6	5.5	8.4	8.2	8.5	6.3	9.1	9.6
Los Angeles	SCAG	8.8	8.2	8.4	10.2	9.0	8.1	8.7	10.0	9.1	8.1	8.9	10.1
Orange	SCAG	9.0	8.0	8.1	10.6	9.3	8.6	8.4	10.3	9.8	8.9	8.9	10.8
Riverside	SCAG	13.4	11.8	12.2	17.6	15.8	14.2	14.3	18.5	16.6	14.8	14.9	19.3
San Bernardino	SCAG	13.3	12.1	12.4	16.0	15.7	14.8	14.7	17.4	16.2	14.7	15.1	18.2
Ventura	SCAG	9.4	8.6	8.4	11.5	10.5	11.2	9.3	11.4	11.2	11.7	10.0	12.0

(Note: 'Low Wage' = Jobs with earnings \$1250/month or less; 'Med. Wage' = Jobs with earnings \$1251/month to \$3333/month; 'High Wage' = Jobs with earnings greater than \$3333/month)

Source: U.S. Census Bureau. 2015. LODES Data. Longitudinal-Employer Household Dynamics Program.

# LODES Version 7.1 Data

## Job-to-Worker Ratio

- Job-to-Worker Ratio by Wage Group, 2012
  - Estimated total jobs and workers for each tract within county-level median commute distance
  - Higher job-to-worker ratio means more jobs.
  - Lower job-to-worker ratio means more workers.

County	All Jobs	Low Wage	Med. Wage	High Wage
Imperial	0.94	0.93	0.93	1.01
Los Angeles	1.17	1.09	1.18	1.23
Orange	1.13	1.16	1.13	1.11
Riverside	0.86	0.88	0.85	0.88
San Bernardino	0.91	0.93	0.9	0.92
Ventura	0.91	0.97	0.91	0.86

(Note: 'Low Wage' = Jobs with earnings \$1250/month or less; 'Med. Wage' = Jobs with earnings \$1251/month to \$3333/month; 'High Wage' = Jobs with earnings greater than \$3333/month)  
Source: U.S. Census Bureau. 2015. LODES Data. Longitudinal-Employer Household Dynamics Program.

# 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
  - Geographies from census tract to the nation
- Median commuting distance
  - Euclidean distance between origin and destination tracts (centroids)
  - By household income, poverty status, vehicles available and minority status

# CTPP 5-Year Data Set (2006–2010)

## Median Commute Distance, by Income

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

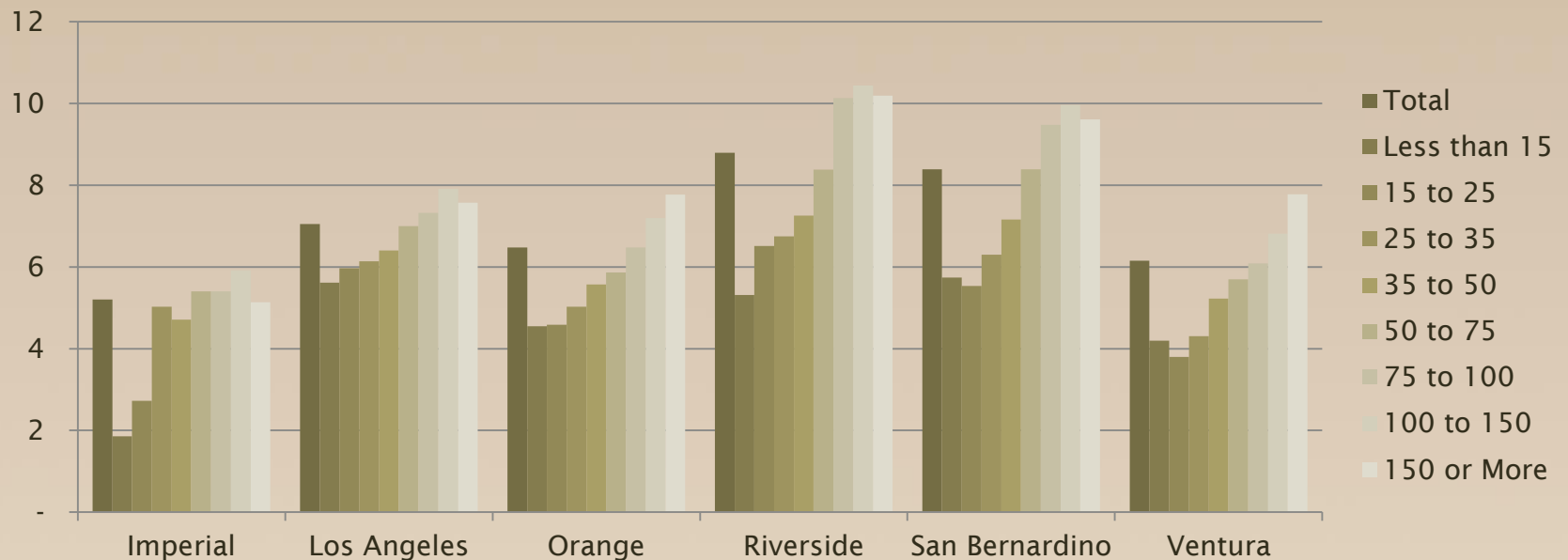
Origin	Destination	Total Workers	Less than 15K	15K to 25K	25K to 35K	35K to 50K	50K to 75K	75K to 100K	100K to 150K	150K or More
SCAG	SCAG	7.1	5.3	5.7	6.0	6.3	7.0	7.5	8.0	7.9
Imperial	SCAG	5.2	1.9	2.7	5.0	4.7	5.4	5.4	5.9	5.1
Los Angeles	SCAG	7.1	5.6	6.0	6.1	6.4	7.0	7.3	7.9	7.6
Orange	SCAG	6.5	4.5	4.6	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

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

# ACS Public Use Microdata Samples (PUMS)

- 2009-2013 ACS 5-year Public Use Microdata Samples (PUMS)
  - Most detailed geographic unit – Public Use Microdata Area (PUMA)
  - Weighting variables – PWGTP and WGTP
- 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

# 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.)

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# CONCLUSIONS

# Results

- The commute distance is growing in the region, especially more rapidly in inland counties.
- Higher wage workers or people with a car tend to commute longer distance than lower wage workers or people without a car.
- Counties with lower job-to-worker ratio would generate more long distance commuters.
- More balanced distribution of population and employment may result in the reduction of transportation congestion and the related air quality problems.

# Commuting Patterns from LODES, CTPP and PUMS

- In general, the commuting pattern from LODES, CTPP and PUMS datasets are strongly correlated.
- Median commute distance from LODES dataset is longer than those from CTPP dataset.
  - Differences between LODES and CTPP datasets in data input source, data coverage, geographic tabulation level, time period and characteristics.

# Commuting Patterns from LODES, CTPP and PUMS (cont.)

- LODES and CTPP datasets are complementary given that each dataset has its unique characteristics that the other does not provide.
- LODES commute flow characteristics are released at the census block level which would enable users to conduct geographically detailed analysis.
- CTPP's work-to-home flow table provides more characteristics than LODES dataset.
- PUMS has limitations in sample size and geographic detail.



# Thank you!

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