

A Longitudinal Analysis of Environmental Justice in Warehousing Location

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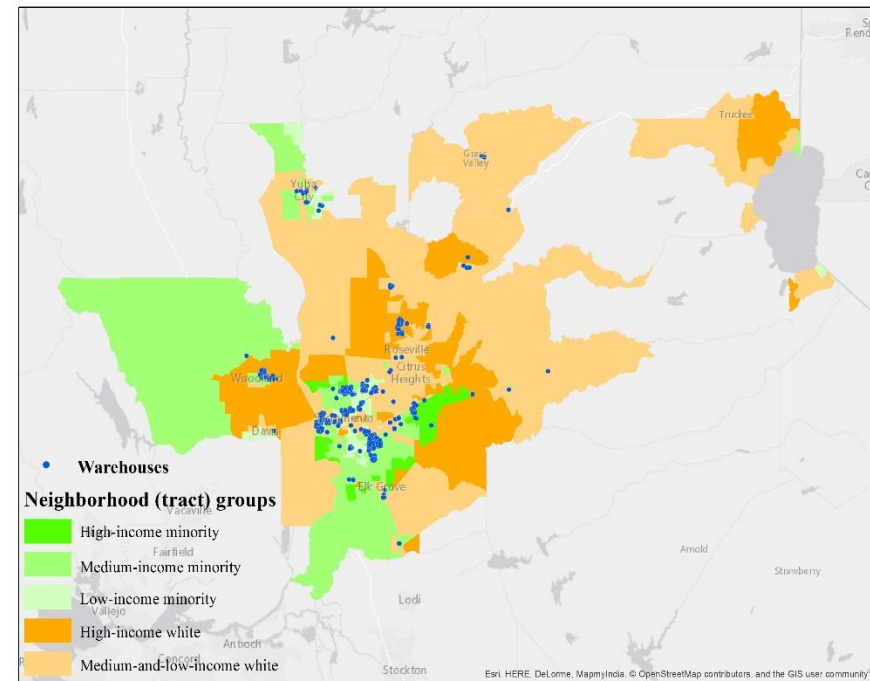
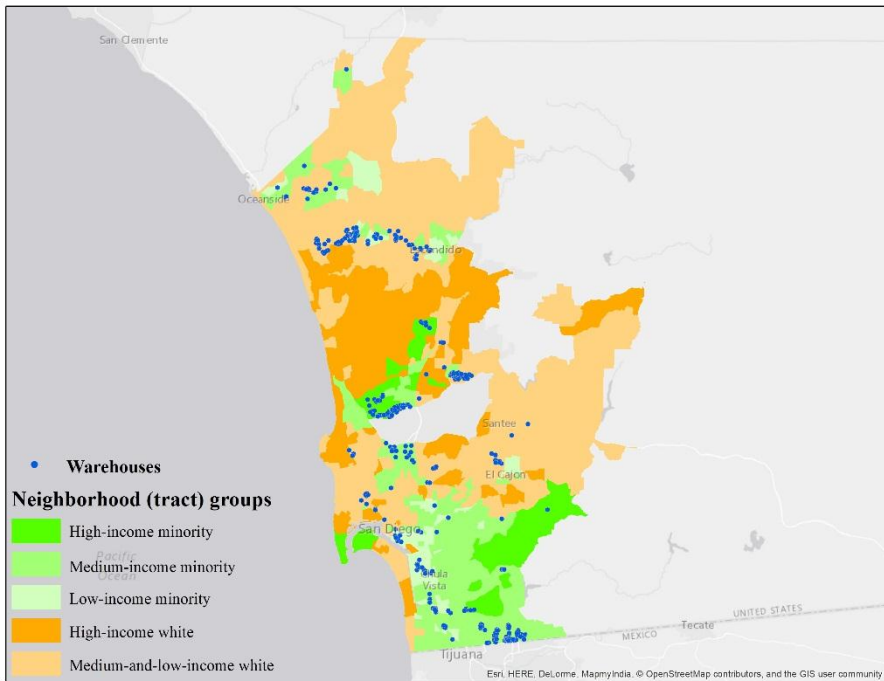
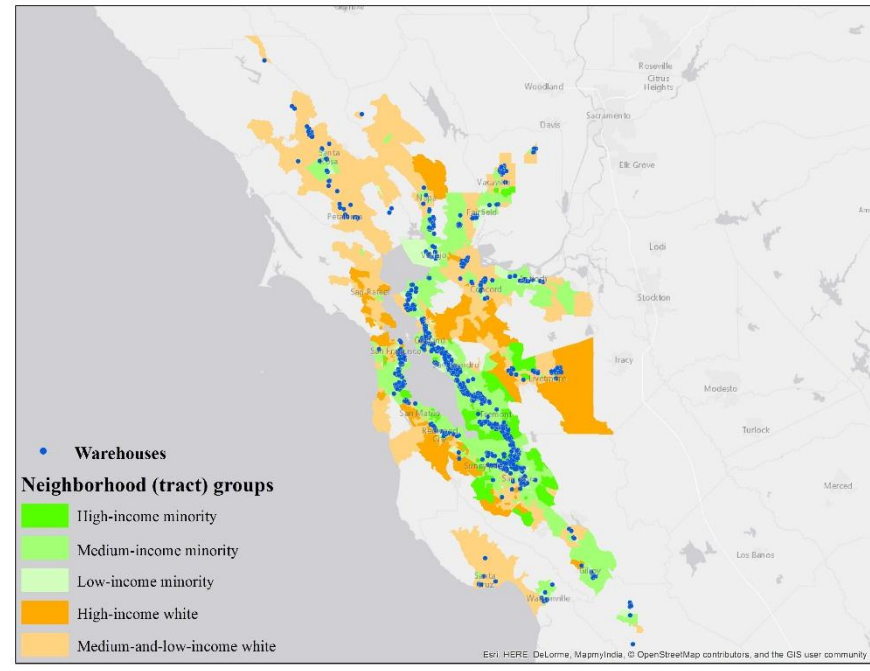
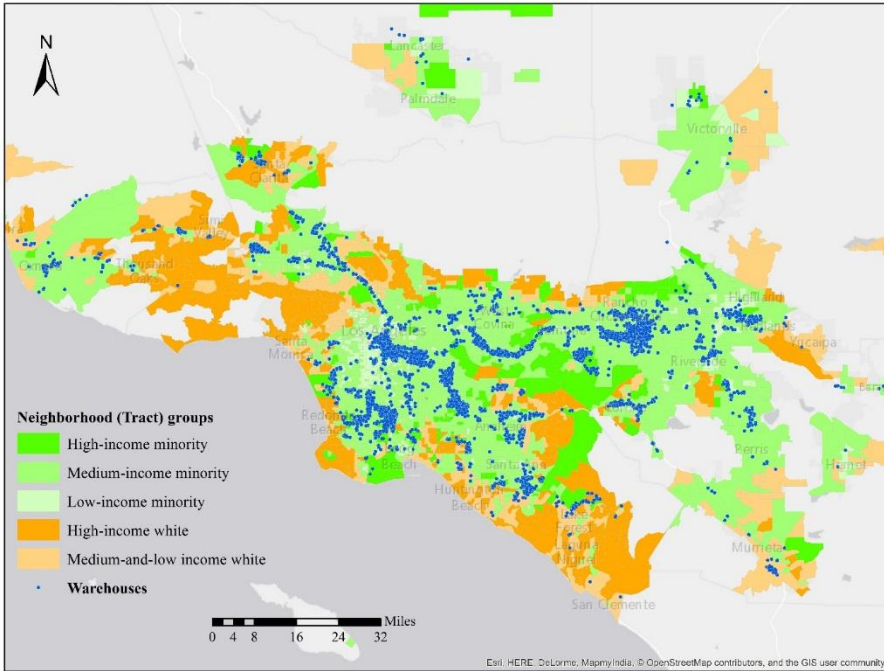
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Overview

- ❑ Retrospection
- ❑ Research Questions
- ❑ Research Approach
- ❑ Data
- ❑ Results
- ❑ Discussion

Retrospection

- ❑ Warehouses are **disproportionately** located in both low-income and medium-income minority neighborhoods.
 - Warehousing location is much more relevant to minority concentration than household income levels.
- ❑ Patterns are generally **consistent** across metros.
- ❑ Slightly **different** from traditional Environmental Justice literature



Question 1: Which came first?

- ❑ A classical question in EJ
 - Pre-siting warehousing location choices process **OR** Post-siting demographic changes process (Hamilton, 1993; Oakes et al., 1996)
 - Longitudinal studies are made, but few focuses on interdependent relationship and no consensus is achieved yet (Pastor et al., 2001)
- ❑ Debate on research design
 - Level of study and Unit for analysis
 - Methodology to address interdependence
 - Geospatial techniques

Question 2: What are the factors in the two processes?

- ❑ Firm location choice of warehousing facilities
 - Warehousing vs. other industries (e.g. Sivitanidou, 1996; Demirel et al., 2010)
 - The role of minority population concentration
- ❑ Housing location choice of minority population
 - Preferences and constraints (e.g. Bobo and Zubrinsky, 1996; Peach, 1998)
 - The role of warehousing facilities and activities

Research approach

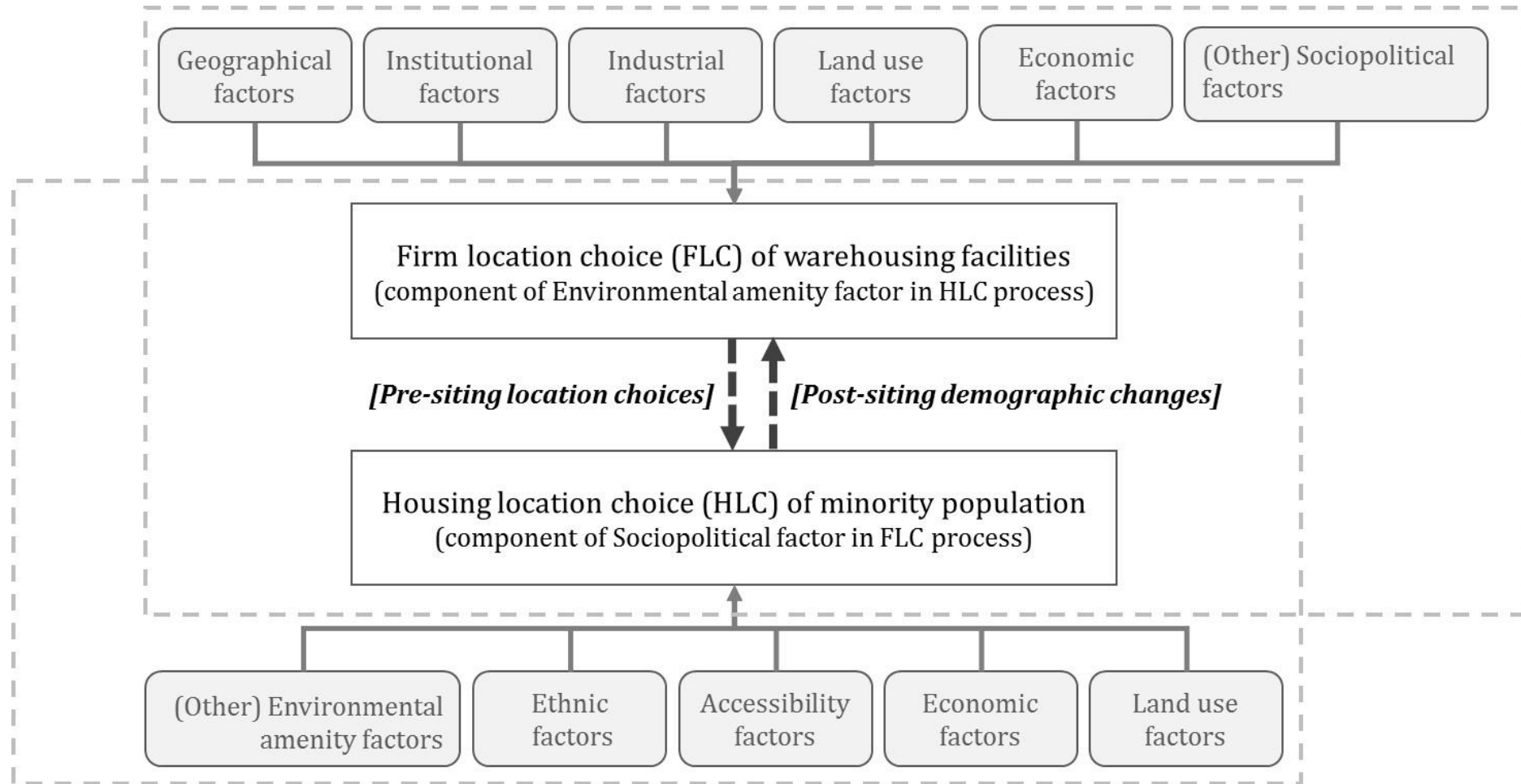
Simultaneous Equation Model of firm location choice of warehousing facilities and housing location choice of minority population.

General conceptual model:

$$\begin{cases} \Delta WH_i = f(\Delta Minor_i, CV_{1i}) \\ \Delta Minor_i = f(\Delta WH_i, CV_{2i}) \end{cases}$$

Where: ΔWH = changes in warehousing activity density,
 $\Delta Minor$ = changes in minority shares of the entire population,
 CV_1 = control variables in firm location choice equation,
 CV_2 = control variables in housing location choice equation.

Research approach



Research approach

Exogenous variables:

Name	Definition
Firm location choice equation	
Population Characteristics	Minority shares in 2000
	Median household income in 2000
Transport Access	Distance to nearest freeway ramp
	Distance to nearest intermodal facility
Land Use	Population density in 2000
Industrial Connection	Employment density in manufacturing in 2000

Research approach

Exogenous variables:

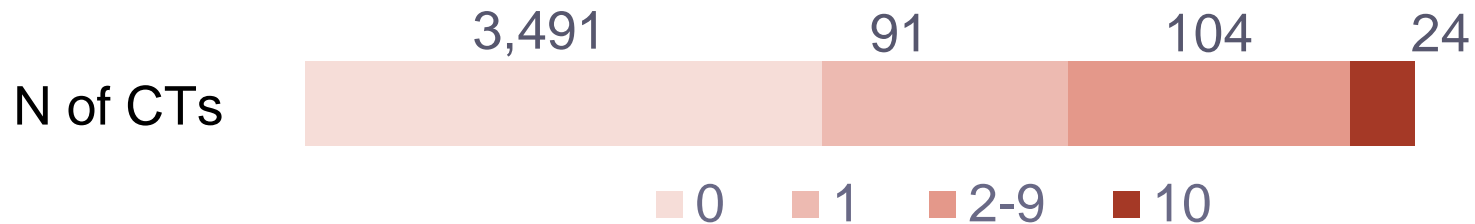
Name	Definition
Housing location choice equation	
Population Characteristics	Minority shares in 2000
	Median household income in 2000
Housing Preferences	Distance to employment center in 2000
	Distance to coast
Land Use	Population density in 2000
Ethnic Preferences	Racial diversity index in 2000

Data

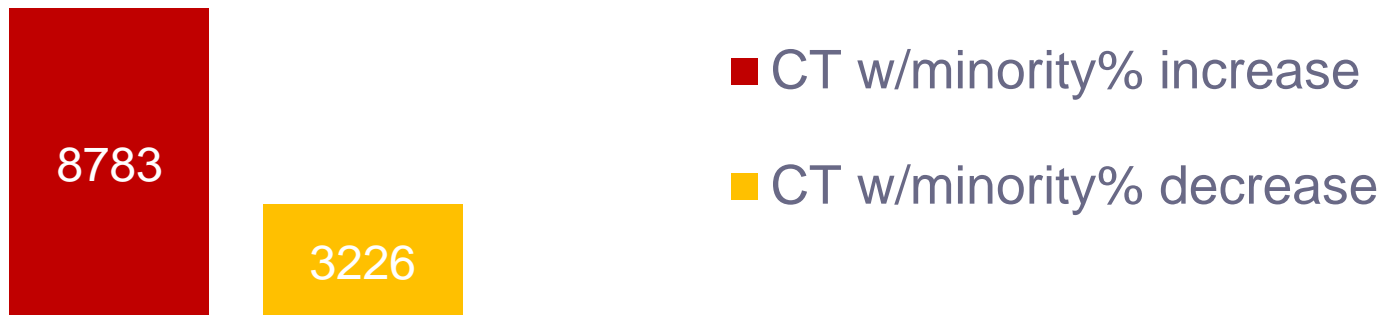
- ❑ Study area: The Los Angeles Region
 - 2nd largest metro
 - The largest trade gateway
 - Warehousing development and freight demand
 - Comprehensive data available: Costar, SCAG, LEHD, Census, etc.
- ❑ Study period: 2000-2010
- ❑ N of observations = 3,710 census tracts

Data: warehouse locations

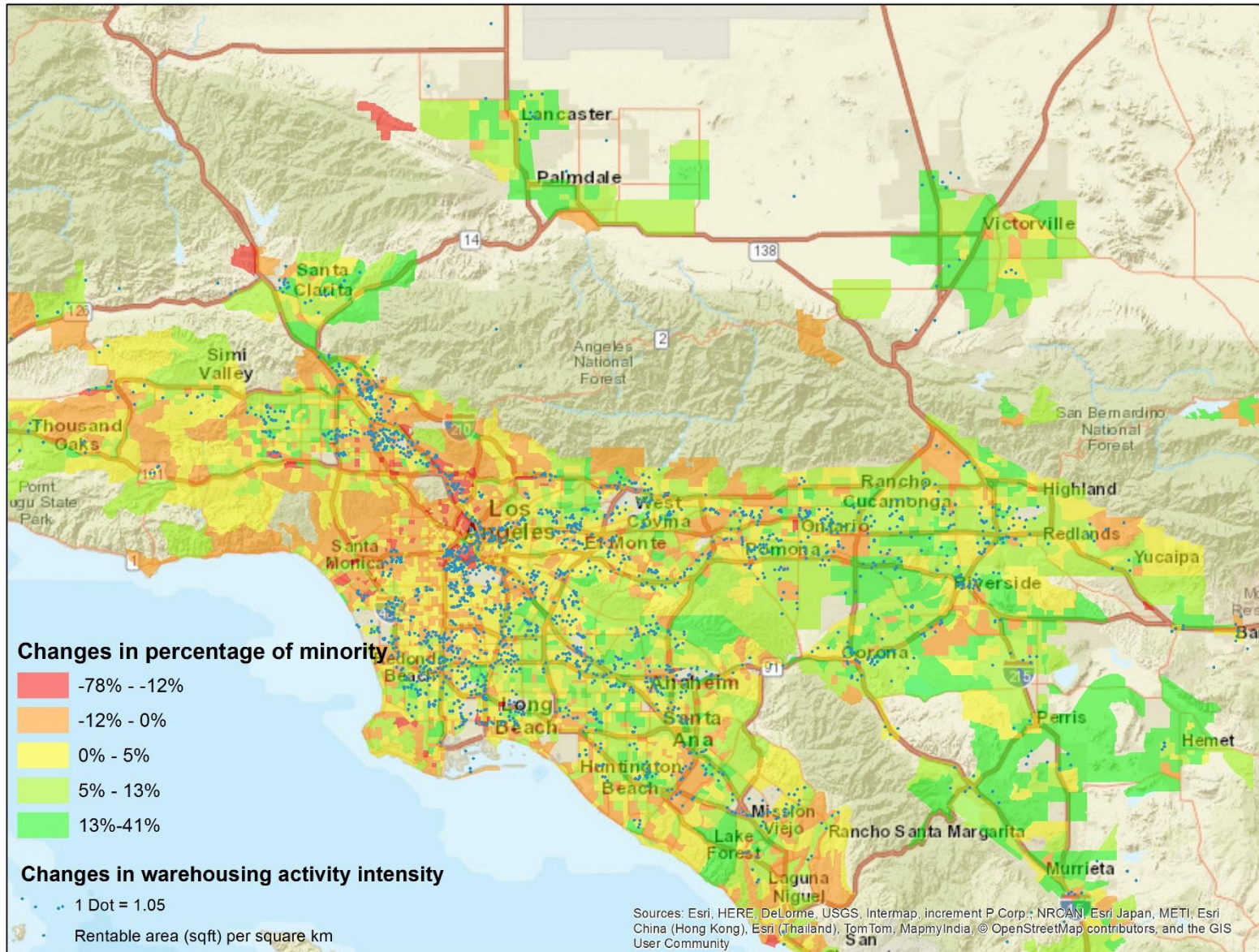
Where are the newly added (during 2000-2010) warehouses located?



Changes in warehousing activity intensity (sqft/km²)




Changes in warehousing activity intensity and percentage of minority



Results: Firm location choice equation

Dep. Var.: **Changes in warehousing activity densities during 2000-2010**

	Relationship
Changes in minority shares during 2000-2010	+
Warehouse activity density in 2000	-
Square of warehouse activity density in 2000	+
Percentage of minority in 2000	+
Household income in 2000	-
Population density in 2000	-
Census Tract in Orange County	+
Census Tract in Riverside County	+
Census Tract in San Bernardino County	+
Census Tract in Ventura County	+
Employment density in manufacturing in 2000	+
Distance to nearest freeway	-
Distance to nearest intermodal facility	-
Constant	+
F-statistics	1,360
Sample Size	3,710

 Statistically significant

Results: Housing location choice equation

Dep. Var.: **Changes in minority shares during 2000-2010**

	Relationship
Changes in warehousing activity density during 2000-2010	+
Warehouse activity density in 2000	-
Percentage of minority in 2000	-
Square of percentage of minority in 2000	-
Household income in 2000	+
Square of household income in 2000	-
Population density in 2000	-
Census Tract in Orange County	+
Census Tract in Riverside County	+
Census Tract in San Bernardino County	+
Census Tract in Ventura County	-
Distance to employment center in 2000	+
Distance to coast	+
Racial diversity in 2000	-
Constant	-
F-statistics	1,040
Sample Size	3,710

Discussion

- ❑ Pre-siting location choice ✓
- ❑ Post-siting demographic changes ✗
 - Consistent with Pastor et al. (2001)
 - Land rent and environmental impacts
- ❑ Housing preferences or constraints?
 - Access to employment center and coast
- ❑ Missing variables
 - Difficulty to control at neighborhood level

Conclusion and Future research

□ Conclusion

- Environmental injustice in warehousing location solely results from the **pre-siting location choices process**, instead of the **post-siting demographic changes process**.
- Warehouses follow minority population.

□ Future research

- Municipality level qualitative study
- Policy implications