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## **Project Objective**

- Explore the relationship between spatial structure and freight activity
- Test whether urban economic theory can help explain location of freight intensive activities: the impact of land price in freight-related land uses

## **Conceptual Framework**

### *Standard urban model:*

- The land rent gradient explains many features of urban spatial structure, especially how extensively space is used across places.

### *Density and employment mix:*

- Higher employment density should mean greater density of freight trips in the city core relative to outside the city core, all else equal;
- But industry sectors with the greatest freight trip generation rates are likely to be priced out by high rents.
- Therefore the relationship between density and freight trips is unclear.

### *Indirect effects of density:*

- Freight trip generation rates are affected by density. Frequency of deliveries, utilization of inventory space and other behaviors differ across areas with different densities.
- Existing freight trip generation approach does not account for such indirect effect of density.

## **Research Approach**

- Test this question by categorizing industry sectors by average freight trip generation rates
- Examine the spatial distribution of employment by industry sector inside and outside employment centers.

## **Data:**

- Employment characteristics: 2010 Longitudinal Employer-Household Dynamics (LEHD)
- Freight trip generation data: Southern California Association of Governments (SCAG) 2008 Baseline Regional Model

To control for polycentricity, we identify two categories of employment centers:

**10/10 centers** (TAZs that together have a job density above 10 jobs/acre and at least 10,000 jobs), and

**20/20 centers** (TAZs that together have a job density above 20 jobs/acre and at least 20,000 jobs).

	10/10	20/20
Total number of centers	53	20
Total employment in centers	2.5 M	1.2 M
Share employment in centers	36.5%	17.8%

## Results:

We categorize industry sectors into three groups based on their freight trip generation rates, and test several hypotheses regarding the relationship between freight intensity and density.

### I. Freight intensive sectors inside vs outside center ▶

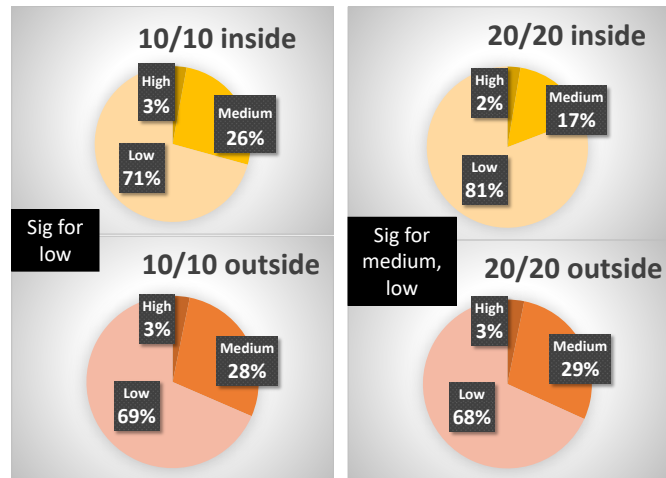
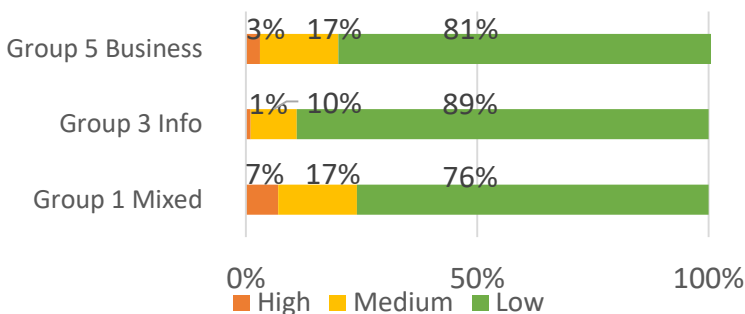
- More low intensity activities in centers, and more medium intensity activities outside of centers, with all differences greater for the 20/20 centers

### II. Freight intensive sectors within centers

- In the densest part of 20/20 centers, the concentration of medium freight intensity sectors is lower while that of low freight intensity sectors is higher. All the other differences between peak and non-peak zones are not significant.

### III. Freight intensive sectors across center types ▼

- Differences in center function are reflected in differences in freight intensity.



### IV. Freight intensive sectors and distance from center

- In information centers, high and medium freight intensity sectors increase with distance from the center, and low freight intensity sectors decrease with distance from the center.

## Conclusions:

Density matters.

- Freight intensive sectors more prevalent outside centers;
- Centers have different shares of low and medium freight intensity sectors;
- Preliminary evidence that freight intensity is related to distance from center core