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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 ▶

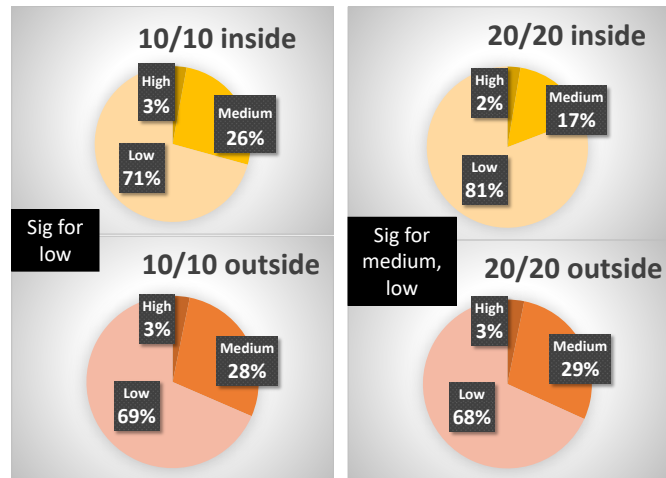
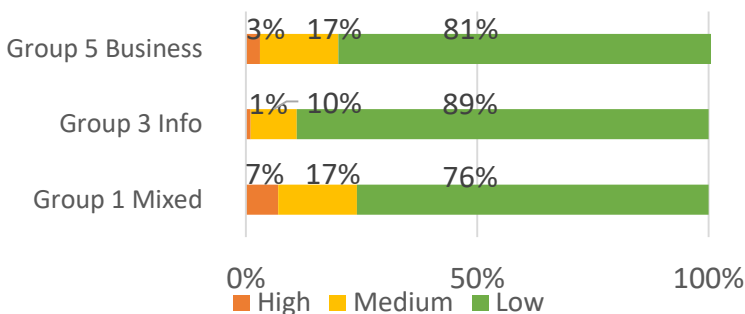
- More low intensity activities in centers, and more medium intensity activities outside of centers, with all differences greater for the 20/20 centers

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