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).

### 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.