

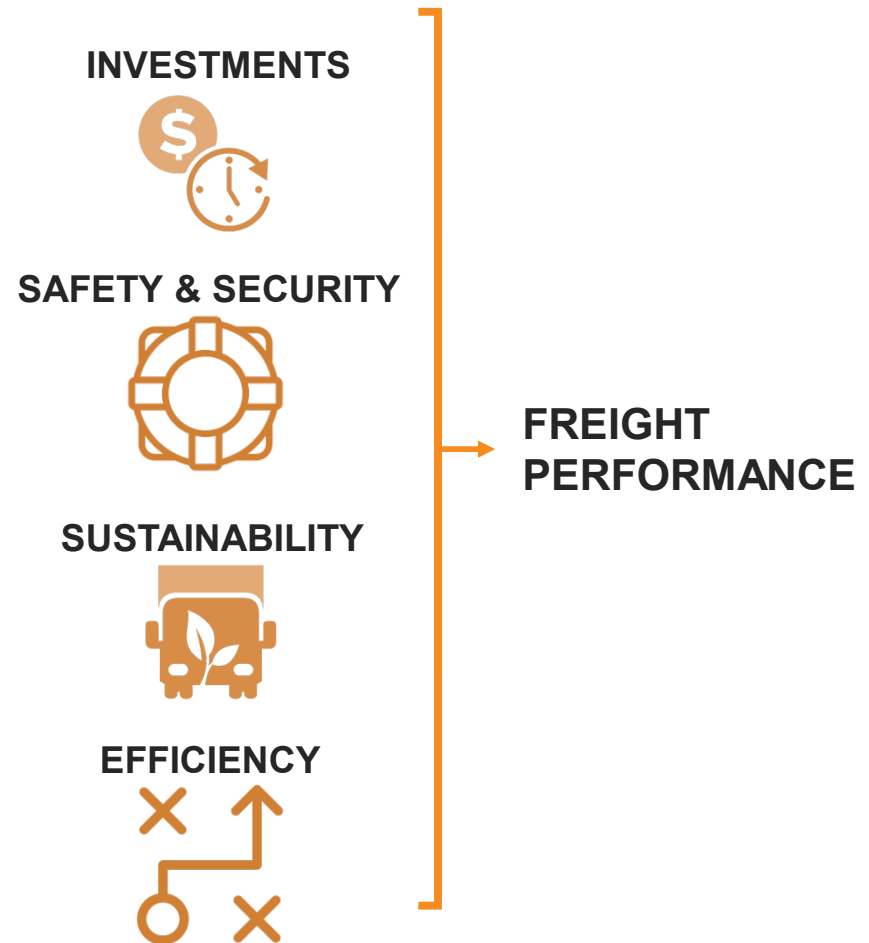
Combined Firm and Establishment Synthesis for the National Freight Model

17th TRB National Transportation Planning Applications Conference

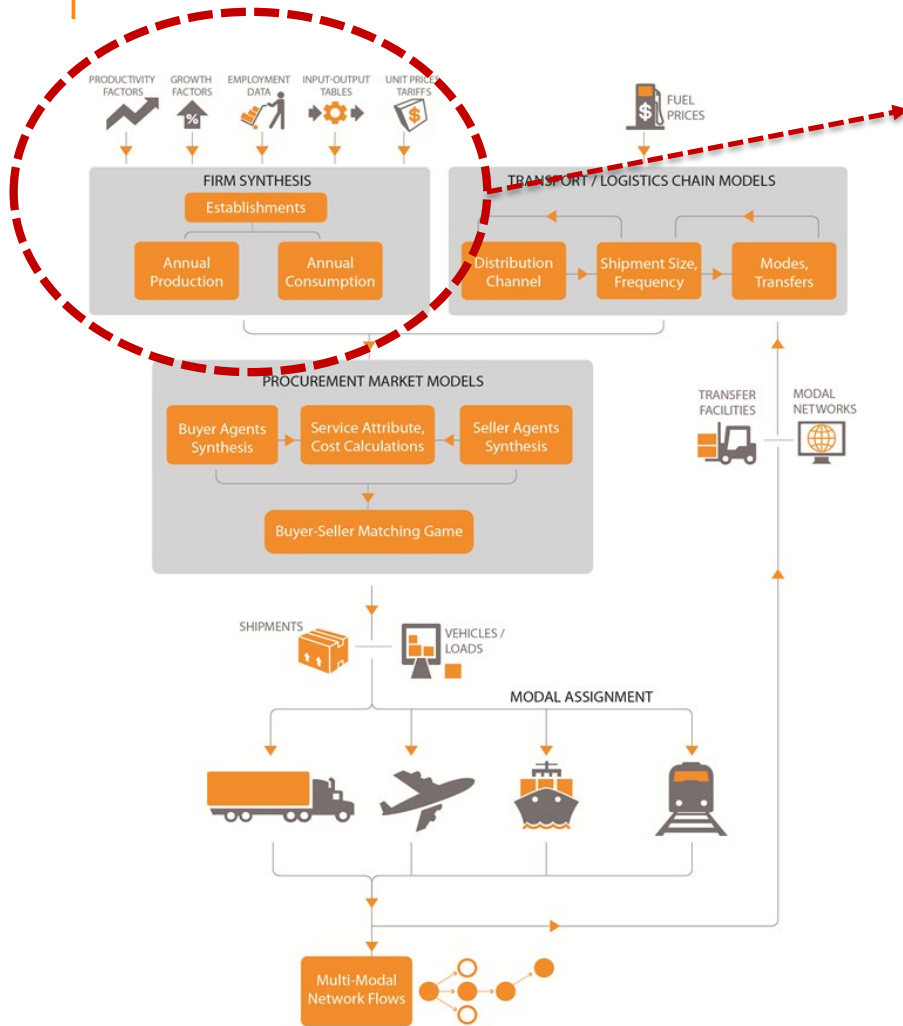
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The national freight model enhances our ability to forecast goods movement

- Evaluate freight investments
- Test effectiveness of national policies
- Support statewide and regional freight planning
- Evaluate private sector and global trade decisions

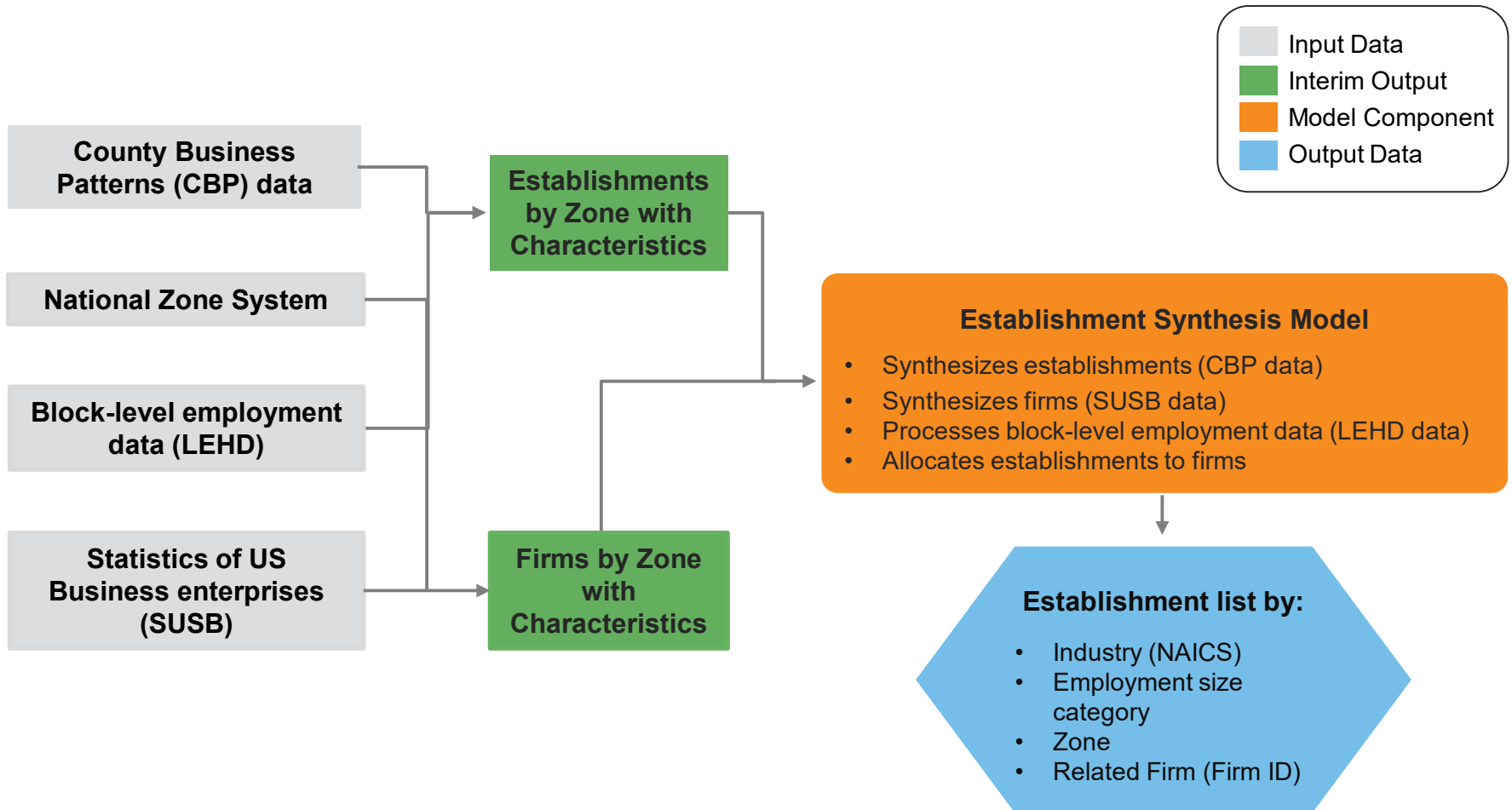


Establishment and firm synthesis is the first step



- First element of the national freight model
- Simulating establishments as a function of the firm to which they belong
- Synthesizes U.S. business establishments and their related firms by firm characteristics
- Uses publicly available data sources
- Covers all 6-digit North American Industry Classification System (NAICS) industries

Establishment synthesis model process connects establishments to firms



Model produces firms by industry type

(by 6-digit freight NAICS)



6.0 million firms
7.6 million establishments

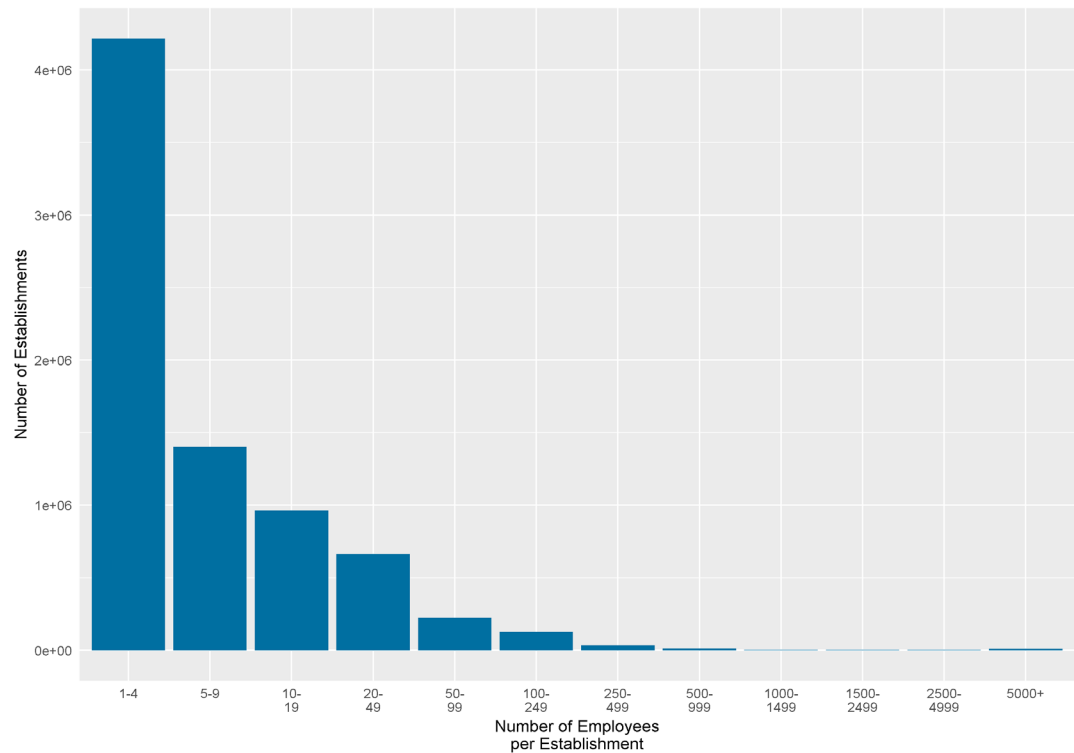
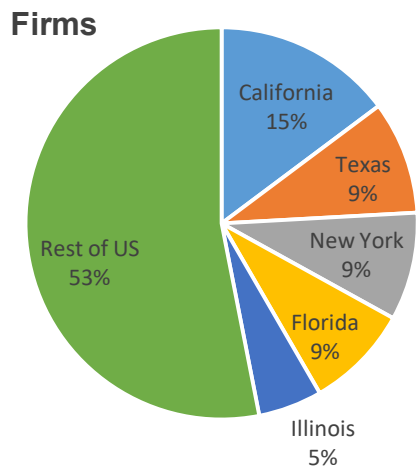
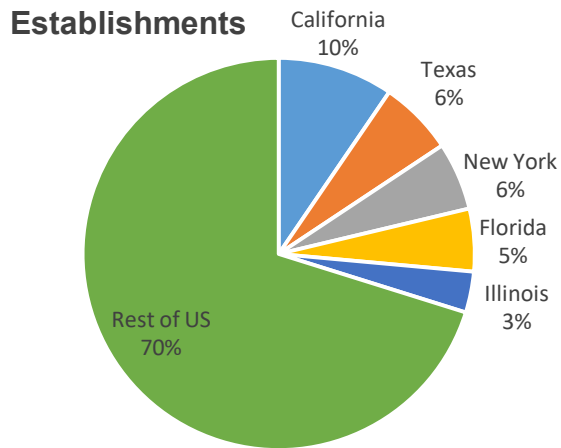
NAICS	Establishments	Firms	Est./Firm Ratio
Agriculture, Forestry, Fishing and Hunting	141,723	141,079	1.0
Mining, Quarrying, and Oil and Gas Extraction	29,179	23,469	1.2
Utilities	17,994	6,317	2.9
Construction	667,091	655,934	1.0
Manufacturing	295,441	265,194	1.1
Wholesale Trade	412,494	316,108	1.3
Retail Trade	1,065,834	657,414	1.6
Transportation and Warehousing	220,858	176,444	1.3
All Industries	7,654,785	6,058,858	1.3



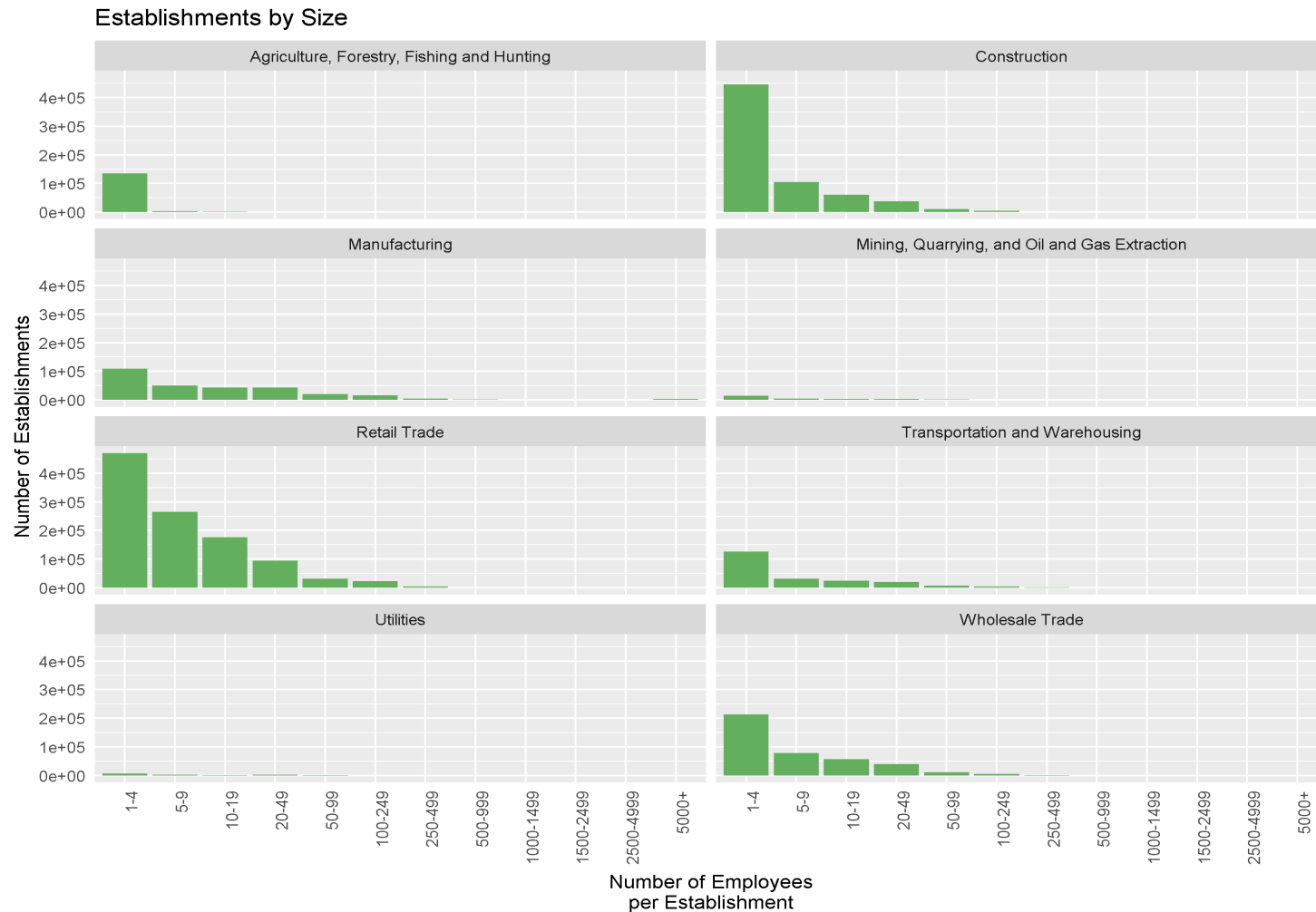
Model produces firms and establishments by location and size



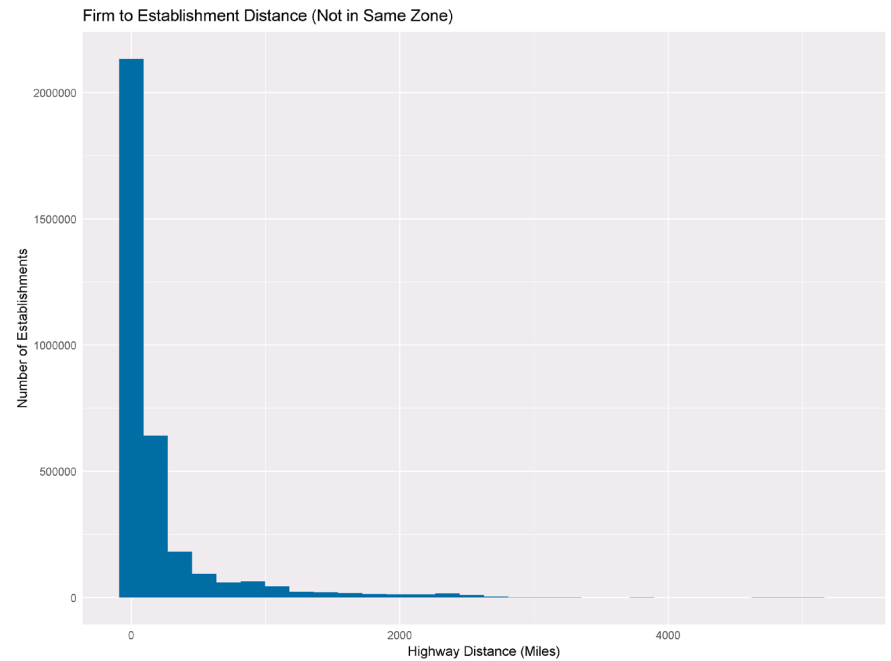
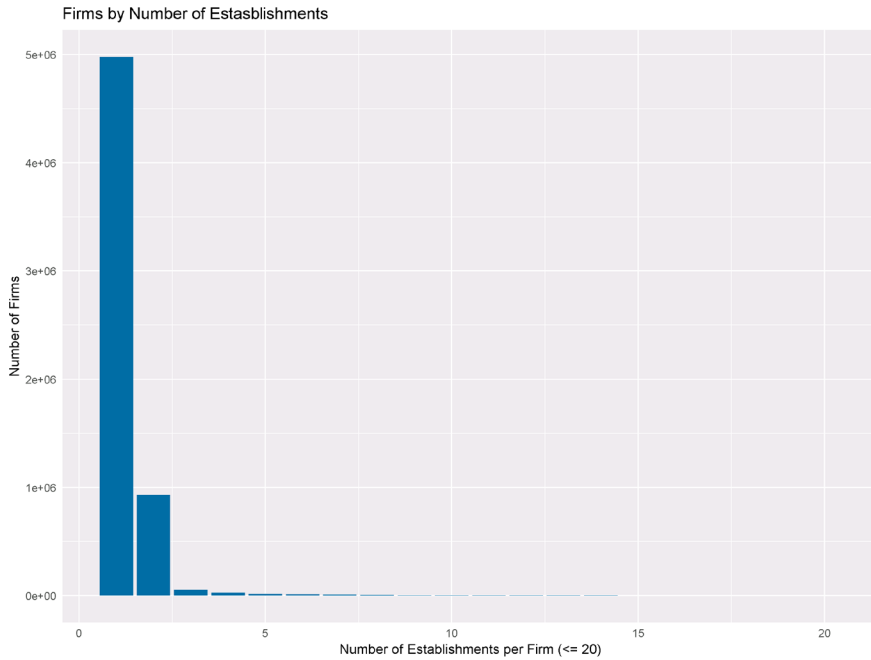
6.0 million firms
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Freight-intensive industries vary by employees per establishment

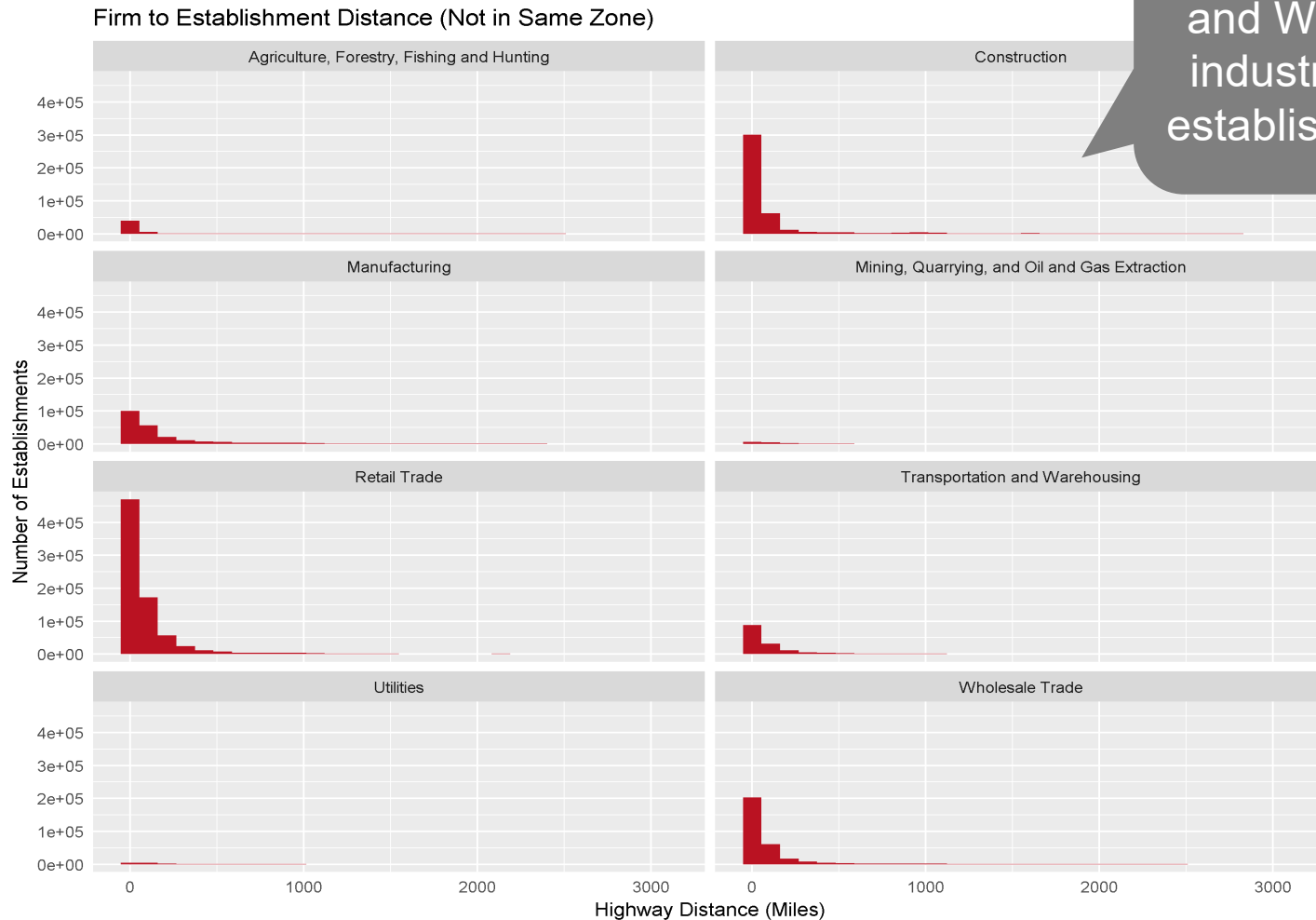


Most firms have one establishment and firms with multiple establishments are nearby



Firm to establishment distance varies for freight-intensive industries

Construction, Retail and Wholesale Trade industries have more establishments per firm



An example discount department store in Los Angeles has establishments in nearby states

Example Firm (Discount department store in Los Angeles County)

County	State	Industry	NAICS	FAF Zone	Employment	Firm ID	TAZ
Los Angeles	California	Retail Trade	452112	61	5,000	5919311	64

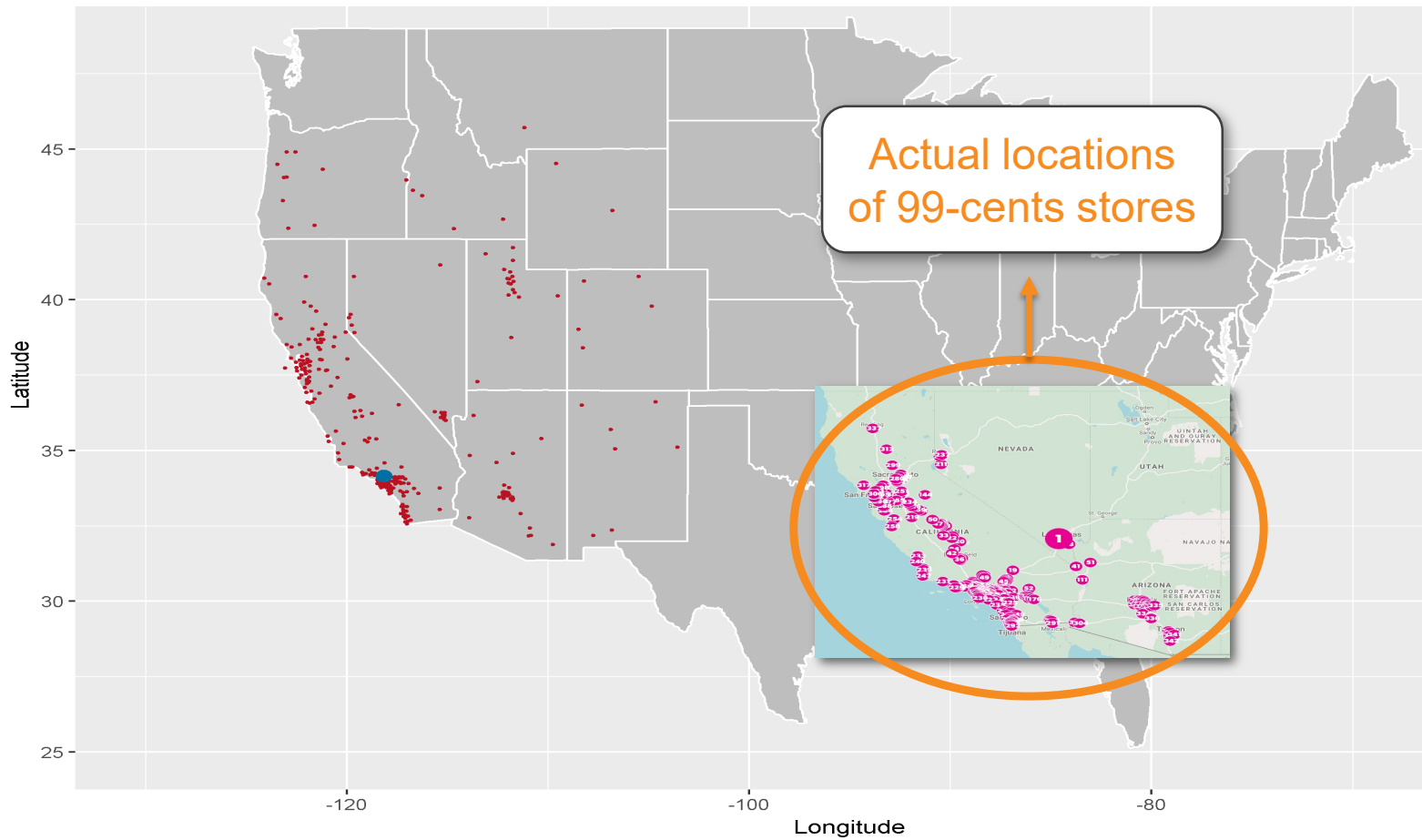
Distribution of Establishments

State	Establishments	%
California	467	71%
Arizona	60	9%
Utah	45	7%
Nevada	40	6%
Oregon	16	2%
Other States	33	5%

- More than 70% of the allocated establishments are in the same state as the firm and the rest are distributed in other states near California.
- 99-cents stores is headquartered in Los Angeles and have about 390 locations in California, Texas, Arizona, and Nevada (283, 48, 38, and 21 respectively)
- More than 85% of the allocated establishments are less than 500 miles away from the firm location.



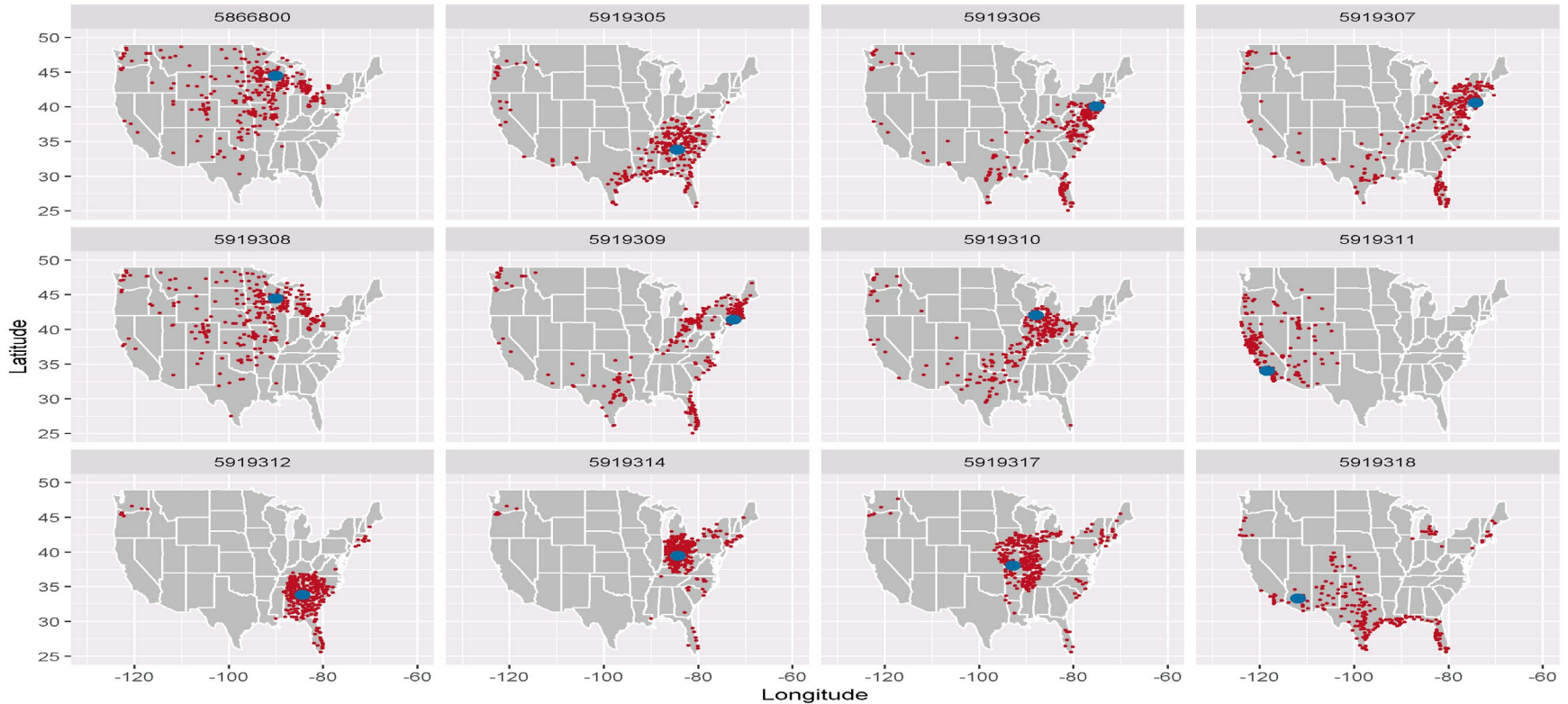
Comparison to 99-cent stores with similar spatial patterns



The output for the largest firms shows a reasonable distribution



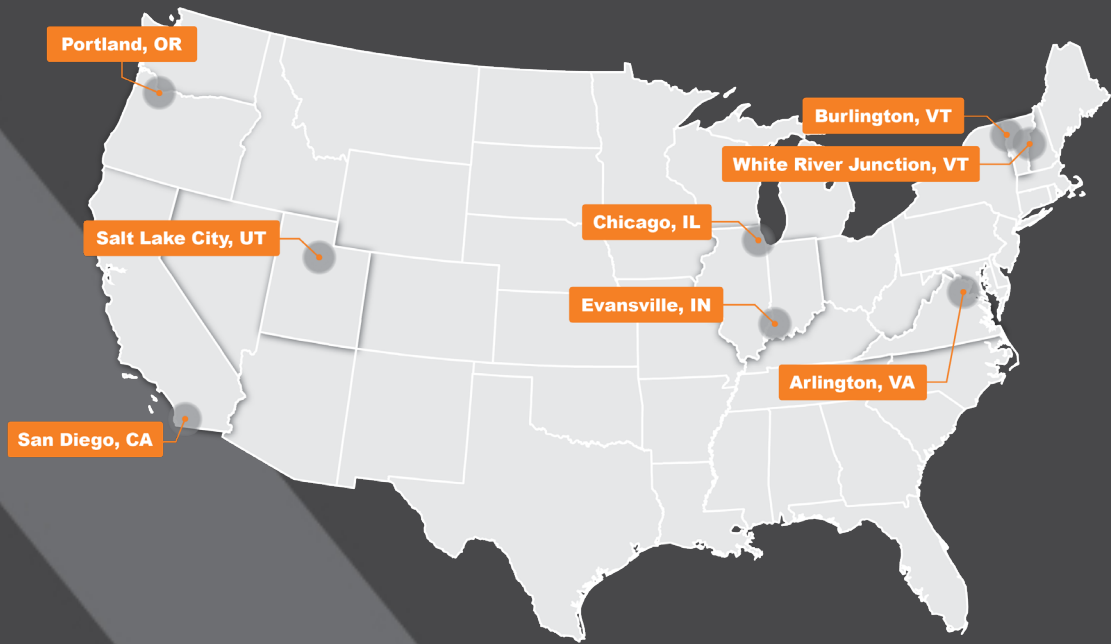
Establishment Locations (12 Largest Retail Firms)



Connecting establishments and firms provides important relationships for modeling goods movement

- Suppliers are chosen firm-wide rather than for each establishment
- Distribution channels and mode are influenced by firms as well as establishments
- Carrier choice decisions are made by firms rather than individual establishments
- Backhauling decisions for private carriers are made by firms





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