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# Multi-Stop Truckload: Cost and Carrier Behavior

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# Introduction



**80.9% of Nation's Freight Bill**

2011 American Trucking Association Report

# How Truckload

## Step 1. Bidding & Contracts



## Step 2. Routing Guide

New York- Washington DC		
Priority	Carrier Name	Price (\$/mile)
1	Carrier A	\$ 1.80
2	Carrier B	\$ 1.85
3	Carrier C	\$ 1.90
4	Carrier D	\$ 2.00
5	Carrier E	\$ 2.20

# Full Truckloads & Contracts

## Step 3. Tendering Loads



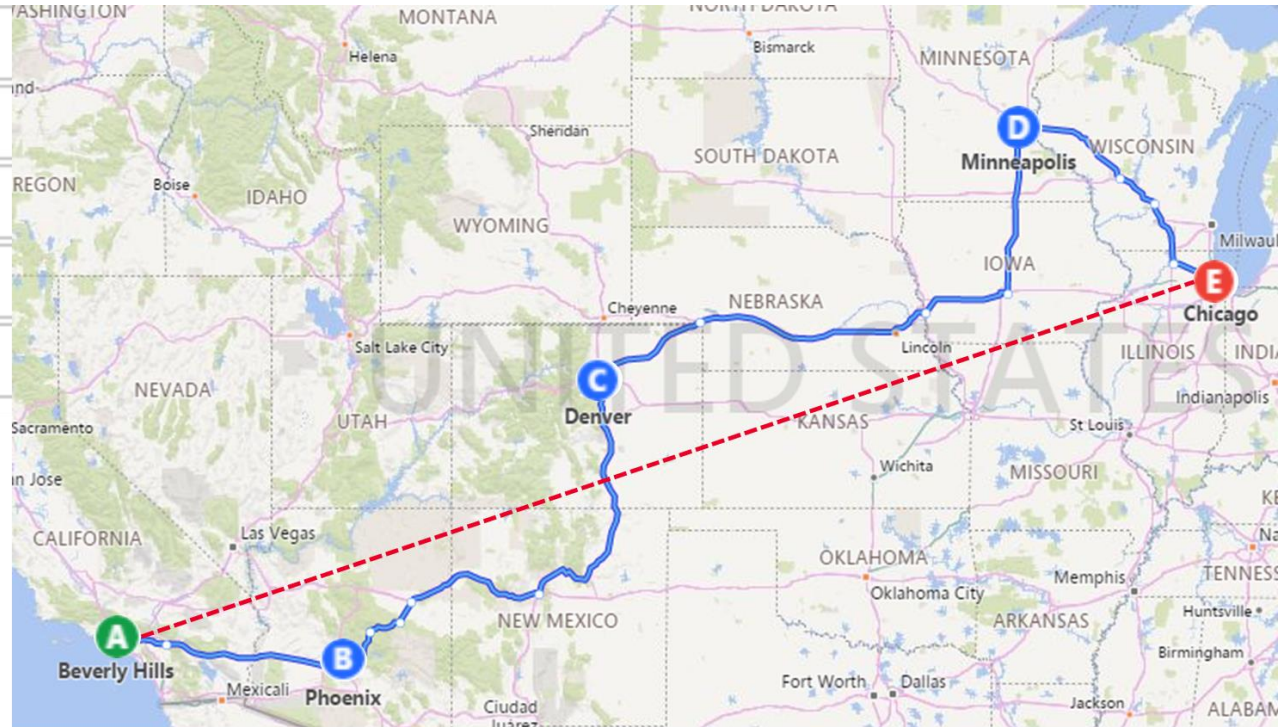
New York- Washington DC		
Priority	Carrier Name	Price (\$/mile)
1	<del>Carrier A</del>	<del>\$ 1.80</del>
2	<del>Carrier B</del>	<del>\$ 1.85</del>
3	<del>Carrier C</del>	<del>\$ 1.90</del>
4	<del>Carrier D</del>	<del>\$ 2.00</del>
5	Carrier E	\$ 2.20

Known as the Routing Guide  
Depth

# Problem & Methodology

# Multi-Stop

- A** Beverly Hills
- B** Phoenix
- C** Denver
- D** Minneapolis
- E** Chicago



Example Multi-Stop Route (5 Stops)

How does having additional stops affect **acceptance** and **price**?



# Past Research



New York- Washington DC		
Priority	Carrier Name	Price (\$/mile)
1	<del>Carrier A</del>	<del>\$ 1.80</del>
2	<del>Carrier B</del>	<del>\$ 1.85</del>
3	<del>Carrier C</del>	<del>\$ 1.90</del>
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5	Carrier E	\$ 2.20



- Distance traveled
- Lead Time
- Seasonality
- Volume

# Methodology



Collaborated with a 4PL company



Database with 5M tender records over 2.5 years



Over 4K carriers, large and small

# Methodology

## Pricing

$$\text{Price} = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + \dots + \beta_k * x_k + e$$

Looking at final prices

## Carrier Behavior

$$\text{Acceptance} = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + \dots + \beta_k * x_k + e$$

Using tender information

# Results

# Impact of Additional Stops

Additional stops increase rejections and lead to higher prices. The magnitude depends on whether it's a pick or a drop

**+1 = \$172**

**+2 = \$174**

**+1 = \$304**

**+2 = \$334**

Picks

Drops

Illustrative example

# Impact of Additional Stops

Multi-stop loads with higher stop-off charges have higher acceptance rates and might be potentially cheaper

Stop-Off	<b>+100\$ x 2</b>	
Extra Stop	<b>+172\$ x 2</b>	<b>+172\$ x 2</b>
Discount	<b>-280\$</b>	

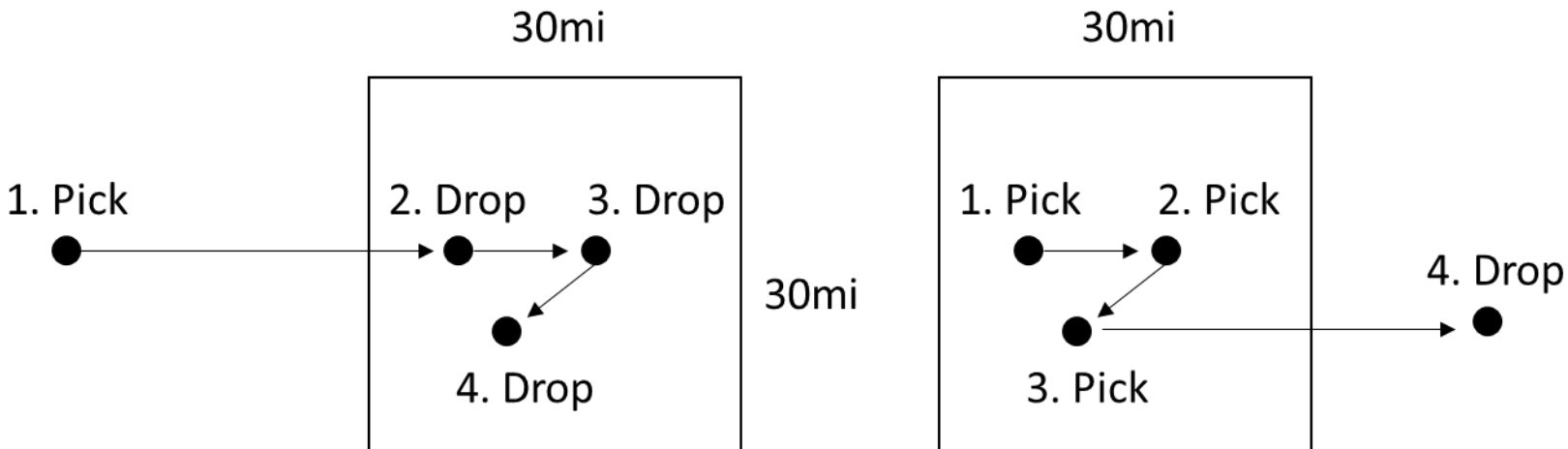
Strategy 1 **-80\$**  
**+40%**

Strategy 2

Illustrative example

# Clustering

Clustering stops together improves price



**-80\$**

Clustering Drops

**-113\$**

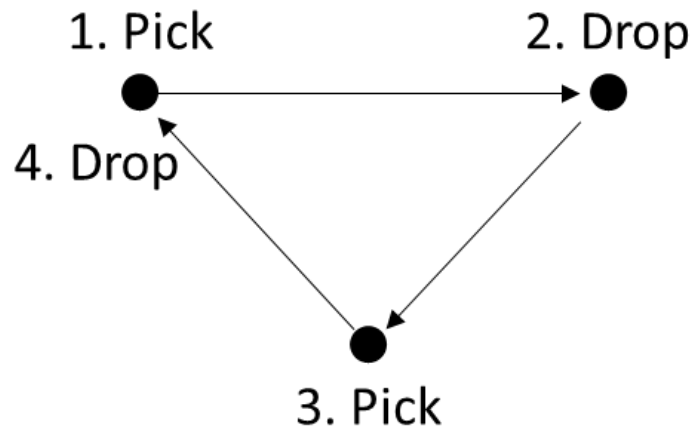
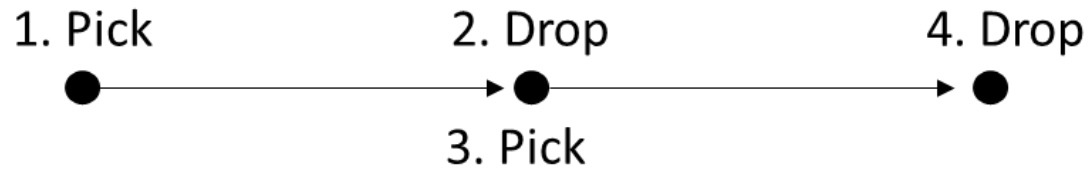
Clustering Picks

Illustrative example

# Continuous Moves

Continuous moves are cheaper

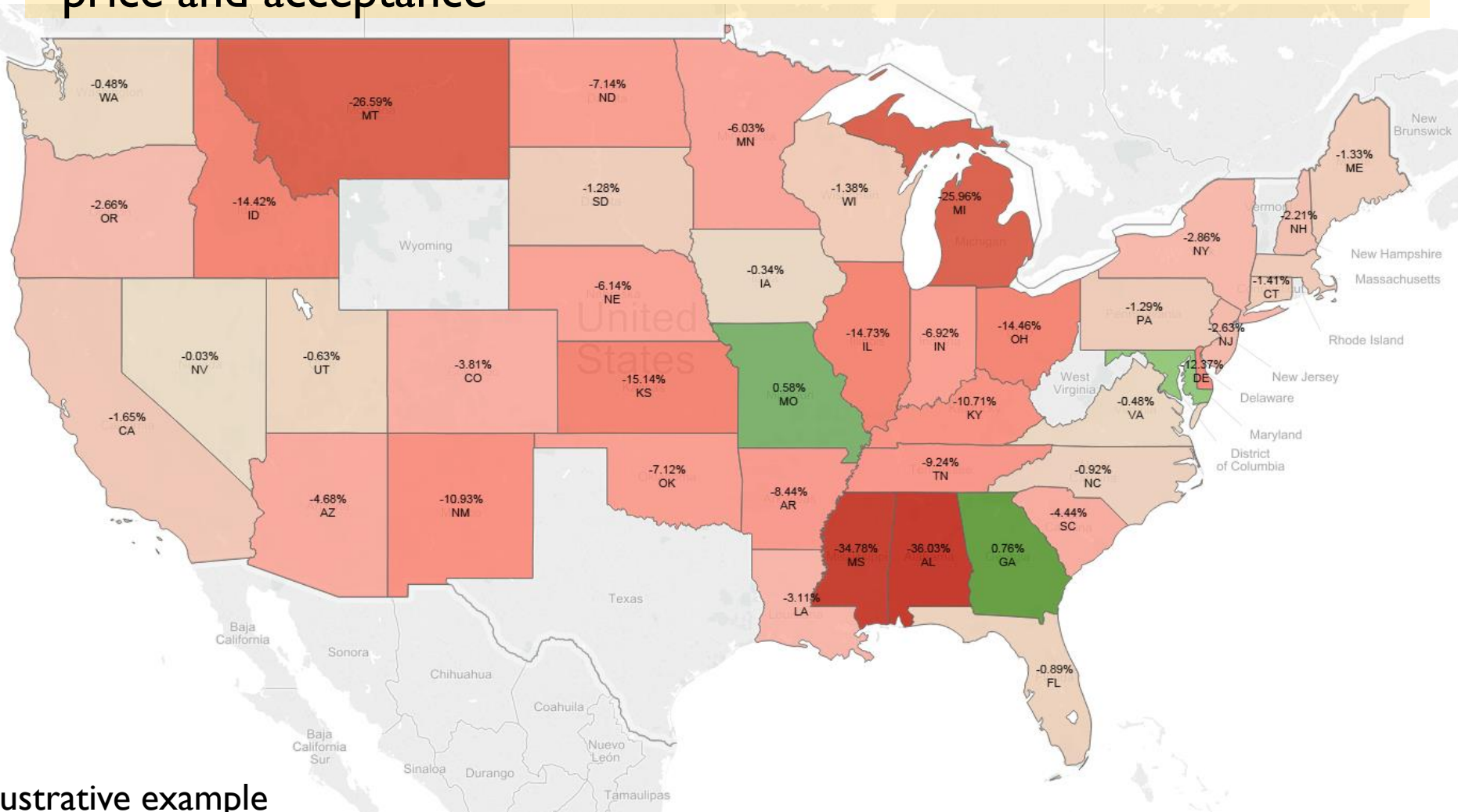
**-270\$**





# Geographic Effects

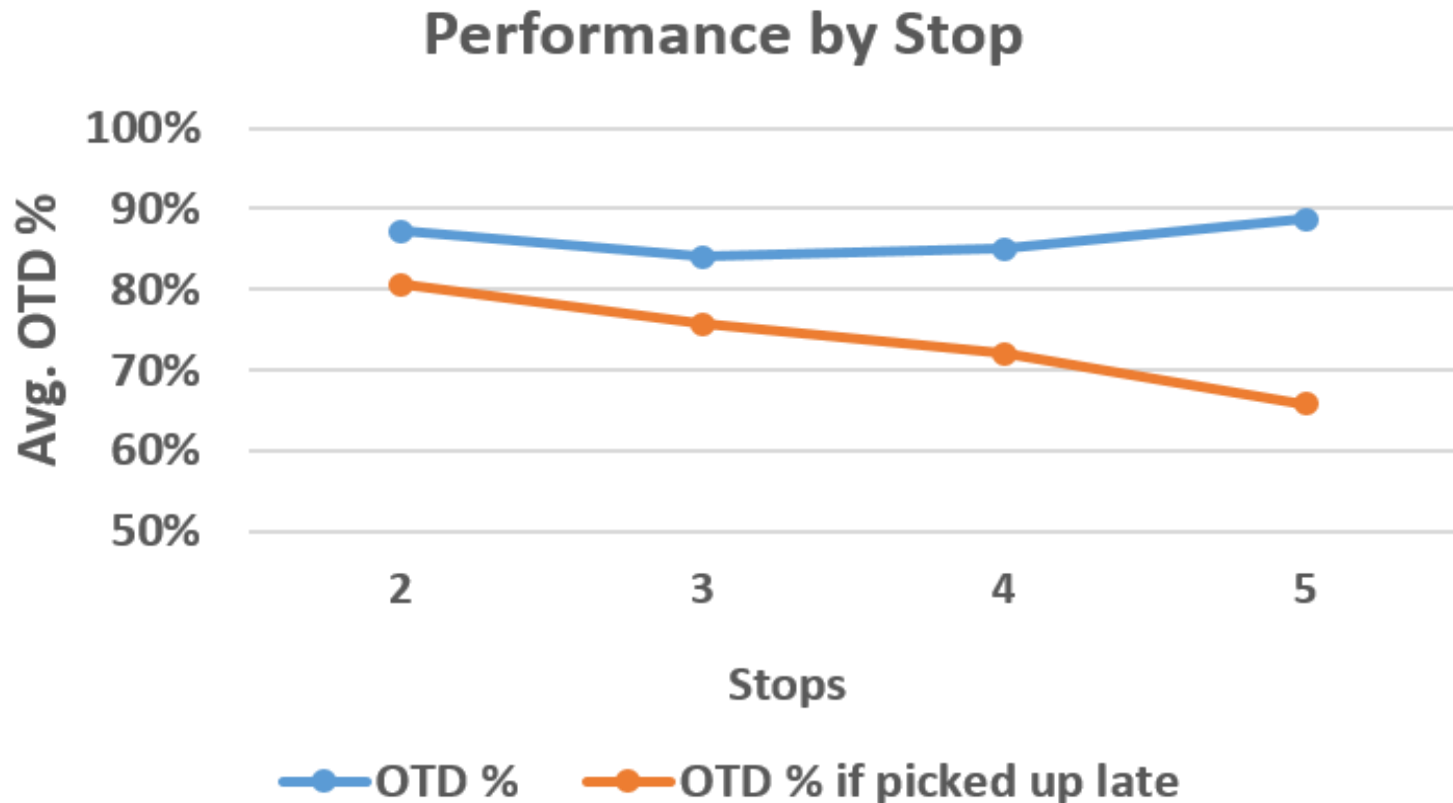
There is significant regional sensitivity to multiple stops in both price and acceptance



Illustrative example

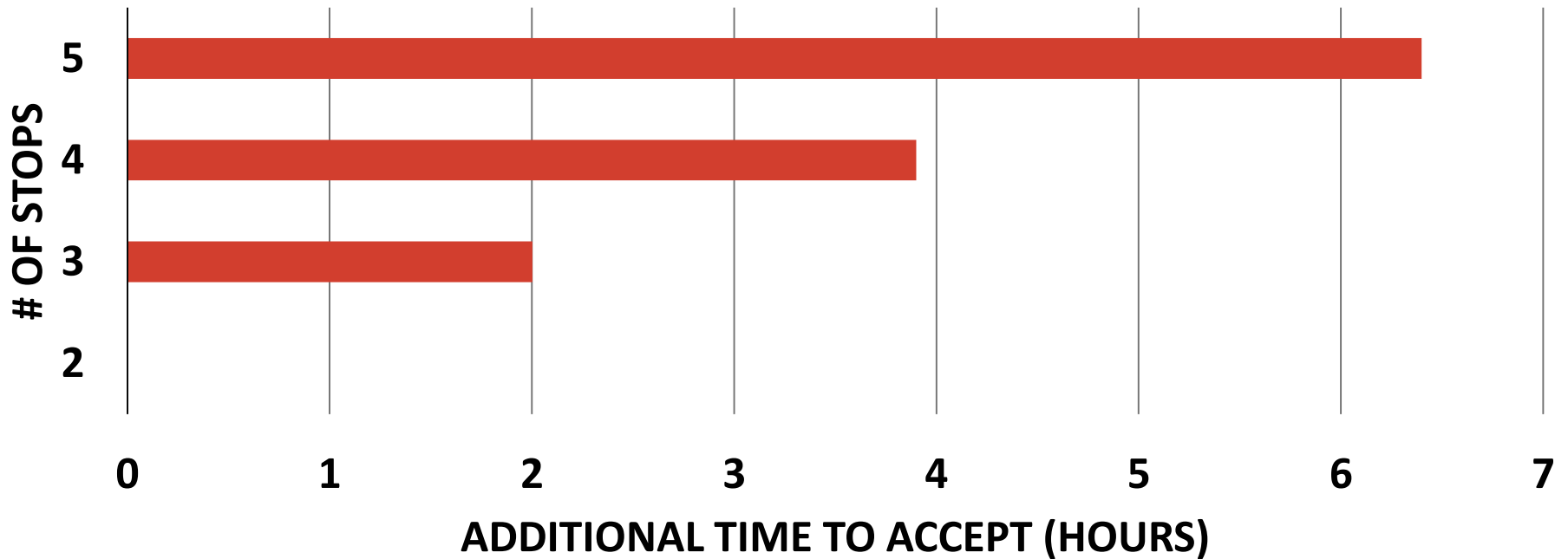
# Performance Effects

Delivery performance deteriorates



# Time to Accept

Tender acceptance time increases



# Conclusion



**Autonomous Vehicles, Electronic Logs,  
Environmental Regulation, Hours of Service,  
Onboard Computers, On-Demand Economy...**

# Summary Findings

1. Multi-stop Truckload shares some characteristics with Full Truckload, but with significant differences.
2. Beware of black box software promising risk-free cost savings
3. Communication and information sharing is key: clustering, continuous moves, planned moves...
4. Data is power: analysis, prediction

# Questions, Comments, Suggestions?

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