Los Angeles Traffic Congestion

Research Question & Independent Variables

Do the following independent variables influence traffic delay in the Los Angeles Urban Area?

• Number of auto commuters (in thousands)
• Aggregate daily miles traveled (arterial roads and freeway miles combined)
• Unemployment rate (retrieved from Bureau of Labor Statistics)
• Average gasoline price per gallon (in the State of California adjusted for yearly inflation)

Dependent Variable

• Annual hours of delay per auto commuter
Data Selection

Sources

• 2015 Urban Mobility scorecard by Texas A&M Transportation Institute
• Data collected from 1982 – 2014
• Focuses on Los Angeles-Long Beach-Anaheim Urban Area.

- Traffic volume is often measured as a function of marginal social costs and private average costs.
- When freeway volume exceeds its design capacity, traffic occurs.
- The cost of traffic to society is greater than the cost of traffic to an individual consumer.
- To internalize this externality, tolls are implemented to shift the equilibrium to meet the social marginal cost curve.

How People Travel to Work 2013
Source: US Census Bureau, 2013 American Community Survey Table S0801

- Drove Alone: 76.3%
- Carooled: 9.4%
- Public Transportation: 5.2%
- Worked at Home: 4.4%
- Walked: 2.8%
- Other means of Travel: 1.3%
- Bicycle: 0.6%
Multiple Linear Regression Test Summary

R² = 0.987
Observations: 32

<table>
<thead>
<tr>
<th>Variable</th>
<th>β Coefficient</th>
<th>Standard Error</th>
<th>T – statistic</th>
<th>P – value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Intercept</td>
<td>14.74324</td>
<td>3.87702</td>
<td>3.80273</td>
<td>0.00071</td>
</tr>
<tr>
<td># of Auto Commuters (000)</td>
<td>0.00746</td>
<td>0.00112</td>
<td>6.61674</td>
<td>3.5E-07</td>
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<tr>
<td>Total Daily Mileage (000)</td>
<td>8.75409E-05</td>
<td>3.24838E-05</td>
<td>2.69491</td>
<td>0.01177</td>
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<tr>
<td>Unemployment Rate</td>
<td>-0.89490</td>
<td>0.16411</td>
<td>-5.45311</td>
<td>8.04877E-06</td>
</tr>
<tr>
<td>Avg. State Gasoline Price</td>
<td>1.76487</td>
<td>0.47260</td>
<td>3.73438</td>
<td>0.00085</td>
</tr>
</tbody>
</table>

Delay = 

14.74 + [(Commuters) × 0.007] + [(Miles) × 0.00008] + [(Unemployment) × -0.89] + [(Gasoline Price) × 1.76]
Delay x # of auto commuters
- Positively Correlated
- Increase in auto commuters implies that traffic will occur since freeways have fixed capacities
- Increased demand for commuting vehicle widens the gap between marginal social cost and average cost

Delay x Daily Miles Driven
- Positively Correlated
- Increase in quantity of driven miles, can be explained by more drivers or further commutes
- Contributes to hours of delay by creating more areas of traffic
Delay x Unemployment Rate

- **Negatively Correlated**
- When less people are employed, less people are commuting
- Shifts demand to the left, eliminating traffic congestion towards CBD

Delay x Gasoline Prices

- **Positively Correlated**
- Although volatile, it is a reflection of increased driving habits, which in turn cause hours of delay
- This suggests that gasoline is an inelastic good
Conclusion

- The four variables we chose are significant in the study of hours spent in traffic.
- These variables have the potential to shift the demand curve, and thus congestion prices.

Factors to address in future studies
- This study did not factor for multicollinearity.
- Lack of variable scaling may have skewed the Beta Coefficients.
- Fluctuations in economic activity were not taken into consideration.