CSA Impacts on Industry Safety

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Compliance, Safety, Accountability Evaluation

- Top RAC priority from 2010
- Speculation over far-reaching implications of CSA replacing SafeStat
- Significant concerns
  - Exacerbate driver shortage, drive motor carriers out of business, increase freight rates, etc.
- Possible benefits
  - Reduce unsafe behaviors, allow FMCSA to do more with less
ATRI Methodology

- Two Tier Approach
  - Supply Chain Impacts
    - Carriers
    - Drivers
    - Shippers / Brokers
    - Enforcement
    - Insurance Industry

- Crash Risk Data Analysis
CSA Evaluation

- Data Collection 2011 and 2012
- 5,899 Commercial Drivers
  - MATS and online surveys
- 1,028 Motor Carriers
- 39 Enforcement personnel representing 25 states and Canada
- 31 Shippers representing tens of billions in freight movement
CSA Evaluation

- **Driver Supply**
  - 2/3rds of drivers continue to be somewhat or very concerned about being fired due to CSA
  - However, close to 90% of carriers have fired no drivers or only 1-5% of drivers due to CSA

![Percent of Driver Workforce Fired](chart.png)

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CSA Evaluation

- **Driver Supply**
  - Carriers reporting increased difficulty in finding new qualified drivers
  - Increasing reliance on PSP – up to 74% in 2012 from 68% in 2011

![Graph showing difficulty of finding qualified new drivers]

- **2011**
  - Much more difficult: 19%
  - Somewhat more difficult: 54%
  - No change: 28%

- **2012**
  - Much more difficult: 26%
  - Somewhat more difficult: 57%
  - No change: 17%
CSA Evaluation

- Driver Supply

- Carriers and drivers expected dramatic impacts on labor pool as result of CSA – reality is impact is less than expected
CSA Evaluation

- Number of Motor Carriers

- Similar disparity between expectations and reality in numbers of motor carriers impacted by CSA

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**CSA's Impact on the Number of Motor Carriers**

<table>
<thead>
<tr>
<th>Year</th>
<th>Yes, substantially</th>
<th>Yes, somewhat</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>28%</td>
<td>59%</td>
<td>13%</td>
</tr>
<tr>
<td>2012</td>
<td>14%</td>
<td>45%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Carriers - Will it? | Carriers - Has it?
Motor Carrier Impacts

- 44% of carriers are still somewhat or extremely concerned they will go out of business due to CSA

- Carriers are increasingly reporting adverse changes in insurance rates, shipper/broker utilization (more so in 2012 than 2011) due to CSA
CSA Evaluation

- **CSA Training**
  - Carriers report providing more CSA training/education than drivers report receiving.

### Amount of CSA Training and Education

<table>
<thead>
<tr>
<th>Year</th>
<th>Carriers</th>
<th>Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>16%</td>
<td>8%</td>
</tr>
<tr>
<td>2012</td>
<td>18%</td>
<td>7%</td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Multiple Sessions**: 76% (Carriers), 75% (Drivers)
- **One Session**: 23% (Carriers), 36% (Drivers)
- **None**: 35% (Carriers), 33% (Drivers)
CSA Statistical Analysis

Previous Research:
- Wells Fargo (2)
- U of Maryland
- Transplace
- U of Michigan
CSA Statistical Analysis

Correlation Between Unsafe Driving BASIC and Crash Rate

R² Linear = 0.018
CSA Statistical Analysis

Correlation Between Unsafe Driving BASIC and Log Transformed Crash Rate

R² Linear = 0.267
Recommended Approach: Negative Binomial Regression

- Explanation: “Count” data
  - (0, 1, 2, 3, ....)
- Non-normal distributions
  - Negative Binomial Regression
### ATRI’s Methodology

#### July 2012 SMS Data

- **All recently active interstate carriers and intrastate hazmat carriers (N = 471,306)**
- **24 months of historical crash data from MCMIS**

<table>
<thead>
<tr>
<th>Carrier Category</th>
<th>Number of Carriers</th>
<th>Percentage of Recently Active Carriers</th>
<th>Number of Crashes in Database</th>
<th>Percentage of Crashes in Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carriers with Recent Activity</td>
<td>471,306</td>
<td>100%</td>
<td>162,455</td>
<td>100%</td>
</tr>
<tr>
<td>Carriers with Insufficient Data</td>
<td>270,846</td>
<td>57.5%</td>
<td>11,831</td>
<td>7.3%</td>
</tr>
<tr>
<td>Carriers with Some Data but No Scores</td>
<td>109,837</td>
<td>23.3%</td>
<td>17,212</td>
<td>10.6%</td>
</tr>
<tr>
<td>Carriers with At Least 1 BASIC Score</td>
<td>90,623</td>
<td>19.2%</td>
<td>133,412</td>
<td>82.1%</td>
</tr>
</tbody>
</table>
Unsafe Driving

Percentile Scores and Crash Rates

\[ \lambda_i = \exp(\beta X_i + \epsilon_i) \]

\[ \exp(B\times(\text{percentile score})) = \exp(0.011\times(50)) = 1.73 \]
Unsafe Driving

- Below Threshold vs. “Alert”

![Graph showing relative crash risk for unsafe driving. The graph compares the crash risk below the threshold to the crash risk when an alert is given. The baseline is at 1.0, and the alert level is at 1.7.]
Fatigued Driving

- Percentile Scores and Crash Rates

![Fatigued Driving and Relative Crash Rates Graph](image-url)
Fatigued Driving

No Score vs. Below Threshold vs. “Alert”

Relative Crash Risk - Fatigued Driving

Data (no score)  Below Threshold  "Alert"

Crash Risk

Baseline

1.0  1.5  2.0
Vehicle Maintenance

- Percentile Scores and Crash Rates

![Graph showing vehicle maintenance and relative crash rates. The x-axis represents percentile score ranging from 0 to 100, and the y-axis represents crash risk ranging from 0.5 to 3.5. The graph shows an increasing trend from the baseline at percentile 10 to percentile 100.](image-url)
Vehicle Maintenance

- No Score vs. Below Threshold vs. "Alert"

![Relative Crash Risk - Vehicle Maintenance](chart)

- Data (no score)
- Below Threshold
- "Alert"
Controlled Substances/Alcohol

- Percentile Scores and Crash Rates

![Graph showing the relationship between percentile scores and crash rates. The graph illustrates how crash risk decreases as percentile scores increase, with a baseline trend near 1.0.]
Controlled Substances/Alcohol

- No Score vs. Below Threshold vs. “Alert”
Driver Fitness

Percentile Scores and Crash Rates

\[ \lambda_i = \exp(\beta X_i + \varepsilon_i) \]

\[ \exp(B^*(\text{percentile score})) = \exp(-0.009\times50) = 0.64 \]
Driver Fitness

- No Score vs. Below Threshold vs. "Alert"

![Relative Crash Risk - Driver Fitness Graph](image-url)
Statistically Defensible Safety Conclusions

Crash Risk By Proposed Safety Category

- Group A (Some Data, No Scores)
- Group B (Scores, No Alerts)
- Group C1 (1 Alert)
- Group C2 (2 Alerts)
- Group C3 (3 Alerts)
- Group C4 (4 Alerts)
- Group C5 (5 Alerts)

Baseline:

Crash Risk:
- 0.5
- 1.0
- 1.3
- 1.6
- 2.1
- 3.7
- 4.2
- 5.1

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## Statistically Defensible Safety Conclusions

<table>
<thead>
<tr>
<th>Classification Group</th>
<th>Description</th>
<th>Level of Safety Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Sufficient data in at least one BASIC, but no &quot;Alerts&quot;</td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>Scores in at least one BASIC, but no &quot;Alerts&quot;</td>
<td></td>
</tr>
<tr>
<td>Group C-1</td>
<td>1 &quot;Alert&quot;</td>
<td>Low</td>
</tr>
<tr>
<td>Group C-2</td>
<td>2 &quot;Alerts&quot;</td>
<td></td>
</tr>
<tr>
<td>Group C-3</td>
<td>3 &quot;Alerts&quot;</td>
<td></td>
</tr>
<tr>
<td>Group C-4</td>
<td>4 &quot;Alerts&quot;</td>
<td></td>
</tr>
<tr>
<td>Group C-5</td>
<td>5 &quot;Alerts&quot;</td>
<td>High</td>
</tr>
<tr>
<td>Violations</td>
<td>SMS Violation Severity Weight</td>
<td>Increase in Crash Likelihood</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Crash Indicator BASIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past Crash</td>
<td>*</td>
<td>88%</td>
</tr>
<tr>
<td>Driver Fatigue BASIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours-of-Service violation</td>
<td>7</td>
<td>45%</td>
</tr>
<tr>
<td>False or No Log Book violation</td>
<td>7</td>
<td>42%</td>
</tr>
<tr>
<td>Cargo-Related BASIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size and Weight violation**</td>
<td>-</td>
<td>18%</td>
</tr>
<tr>
<td>Unsafe Driving BASIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reckless Driving violation</td>
<td>10</td>
<td>88%</td>
</tr>
<tr>
<td>Failure to Yield Right of Way violation</td>
<td>5</td>
<td>41%</td>
</tr>
<tr>
<td>Improper Turns violation</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>Improper Passing violation</td>
<td>5</td>
<td>88%</td>
</tr>
<tr>
<td>Improper Lane Change violation</td>
<td>5</td>
<td>41%</td>
</tr>
<tr>
<td>Following Too Close violation</td>
<td>5</td>
<td>41%</td>
</tr>
<tr>
<td>Speeding violation</td>
<td>5</td>
<td>38%</td>
</tr>
<tr>
<td>Failure to Obey Traffic Control Device violation</td>
<td>5</td>
<td>21%</td>
</tr>
<tr>
<td>Driver Fitness BASIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disqualified Driver violation</td>
<td>8</td>
<td>15%</td>
</tr>
<tr>
<td>Medical Certificate violation</td>
<td>1</td>
<td>2%</td>
</tr>
</tbody>
</table>

*Weights are assigned to crashes contingent on crash severity (e.g. injuries, fatalities)

**Size and Weight violation has been removed from the Cargo-Related BASIC equation
Questions?

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