Symposium on the work of Leon N. Moses

February 7, 2014
Leon N. Moses 1924-2013

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<tr>
<th>Decade</th>
<th>Milestones</th>
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<td>Deregulation and safety</td>
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<td>HazMat transportation&lt;br&gt;Truck safety</td>
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<td>2000s</td>
<td>Retires, 2005</td>
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Program

• 9:30-10:00 - Leon Moses' work on Transportation Safety - Ian Savage (Northwestern University)

• 10:00-10:30 - Production Decisions in Time and Space - Lanny Arvan (University of Illinois at Urbana-Champaign)

• 10:30-10:45 - Coffee Break

• 10:45-11:15 - Buyback Auctions for Fisheries Management - John Ledyard (California Institute of Technology)

• 12:00 – Memorial Service for Leon and Rae Moses – Jeanne Vail Chapel

• 1:15 – Buffet Lunch – Guild Lounge, Scott Hall
Program

- 2:30-3:00 - Leon Moses and Walter Isard: Collaborators, Rivals and/or Antagonists? - David Boyce (University of Illinois at Chicago and Northwestern University)

- 3:00-3:30 - Employment Decentralization and Commuting in U.S. Metropolitan Areas - Alex Anas (University at Buffalo)

- 3:30-4:00 - Coffee Break

- 4:00-4:30 - The Elasticity of Substitution between Land and Capital: Evidence from Chicago - Daniel McMillen (University of Illinois at Urbana-Champaign)
Transportation Regulatory Reform . . .

Airline Deregulation Act of 1978
Motor Carrier Regulatory Reform and Modernization Act of 1980
(Staggers Railroad Act of 1980)

1. Freedom to enter the industry
2. Freedom to enter or exit individual markets
3. Pricing Freedom
A few years later . . .

“Can we keep the Skies Safe?”
*Newsweek*
January 30, 1984

“The Scandal of Killer Trucks”
*Fortune*
March 30, 1987
Deregulation and Safety Conference

- On June 23-25, 1987 NU-TC organized a large conference involving a huge number of academics, industry leaders and government and Congressional figures.
- Proceedings the size of a telephone book.
- 54 papers.
Book

• “Transportation Safety in an Age of Deregulation” edited by Leon Moses and Ian Savage, Oxford University Press, 1989

• 18 papers plus introductory, summary and concluding chapters
What was the empirical focus?

1. Safety of the many new entrants
2. Safety of existing firms, especially those in financial distress and close to exit
3. Expansion of demand leading to congestion and safety concerns regarding the infrastructure
4. “Modal shifts” (truck-rail, mainline-commuter airlines)
5. Adjustment of safety regulations and enforcement efforts to the new market conditions
Conclusions: Aviation

• “The decline in the nonsafety aspects of service has been extensively documented.”

• “The forecasts of some deregulation critics that price competition would cause an absolute decline in safety have proven incorrect.”

• “Adherents of the safety stock-congestion theory hold that the record of accidents is insufficient to the task of predicting where the system is likely to go in terms of safety.”

• “the federal government has not mounted a major campaign to significantly relieve congestion at major hub airports and in the airspace in their vicinity.”
Conclusions: Trucking

• “fail to find evidence of the kind of consumer unrest that characterizes airline travel.”
• “The adjusted index of [property damage] accidents per truck-mile fell from 100 in 1978 to 69 in 1985 – a 30% reduction.”
• “The index of auto fatalities in truck-related accidents per mile of automobile usage fell by 21% from 1978 to 1985.”
• “Economic deregulation has not led to an increase in the fatality rate. Neither has it increased the rate of industrial injuries and illnesses of trucking industry employees.”
• “the trucking industry feels strongly that safety difficulties that are identified should be addressed by safety measures, not economic regulation.”
Truck Safety Regulation Changes

- 1982 Surface Transportation Assistance Act – Motor Carrier Safety Assistance Program (MCSAP) funding to states to conduct enforcement activities
- 1984 Motor Carrier Safety Act – uniform national standards for drivers and equipment
- 1986 Commercial Motor Vehicle Safety Act – MCSAP funding expanded, expanded national standards including uniform national Commercial Drivers’ License (CDL)
- Setting up of the Commercial Vehicle Safety Alliance (CVSA)
- Early pre-Internet safety databases for shippers and enforcement agencies
Hazardous Materials Conference

• For his last conference, a return to his roots
• How might the controversies over hazardous raw materials and hazardous wastes transportation affect industrial location?
Hazardous Materials Conference

• Much public debate:
  – Oil Pollution Act 1990
  – Sanitary Food Transportation Act of 1990

• June 17-19, 1991

• Proceedings also the size of a telephone book

• 43 papers – academics, industry and government
Book


• 18 papers plus introductory chapter
Multi-disciplinary issues

1. Quantitative risk assessment
2. Routing decisions and restrictions
3. Risk perceptions
4. Placarding and information provision
5. Emergency response training and location
6. Legal liability
7. Insurance
8. Federal preemption
9. Costs of transportation and pricing
Truck safety work

Methodology

• Data on 75,000 truck firms
• Merged together files on crashes, firm characteristics, safety audits and inspections
• Data arrived on magnetic tapes (nowadays the data is publicly available on a website)
• Used negative binomial regressions on a count of crashes (quite novel in accident analysis at that time)
Firm size and reportable accident rate

![Graph showing the relationship between firm size and reportable accident rate. The x-axis represents Annual Fleet Miles in Thousands, ranging from 0 to 1,000. The y-axis represents the Index of the smallest firm, with 100 as the reference point. The graph illustrates a decrease in the index as the annual fleet miles increase, indicating a lower reportable accident rate for larger firms.]
Accident rate & firm characteristics

- Private Carrier: -22%
- General Freight: 9%
- Hazardous Materials: 22%
“Northwestern University has given transportation its own, less consequential, version of Fleischman and Pons [the “discoverers” of cold fusion] in the form of professors Leon Moses and Ian Savage. A controversial Moses-Savage safety study, released at a hazardous materials safety conference earlier this month . . . ”

Government safety audits

- Only 5 of the 45 items investigated by inspectors were significantly positively related to crash rates
  - Reporting of accidents to the government
  - Internal investigation and disciplinary process
  - Knowledge of hours-of-service rules
  - Tracking of driver’s hours-of-service

- 16 of the 45 items had significant counterintuitive relationship (noncompliant firms had better crash rate)
Identifying dangerous firms

For Hire
0.55 crashes per million miles

Poor Roadside Inspection
0.64

Unsatisf. Audit
0.63

0.84

0.87

1.18

1.11

0.45
# Costs & benefits of audits and inspections

<table>
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<th>1992 $ millions</th>
<th>Firm Audits</th>
<th>Roadside Inspections</th>
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<td></td>
<td>Upper Bound</td>
<td>Mid-range</td>
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## DIRECT BENEFITS (mainly reduced crash costs)

| Total benefits | 1370.9 | 219.8 | 151.5 |

## COSTS

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<th>Cost Category</th>
<th>Firm Audits</th>
<th>Roadside Inspections</th>
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<tbody>
<tr>
<td>Government Costs</td>
<td>36.3</td>
<td>72.7</td>
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<tr>
<td>Firm Inspection Costs</td>
<td>8.6</td>
<td>101.9</td>
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<tr>
<td>Higher Operating Costs</td>
<td>278.1</td>
<td>-</td>
</tr>
<tr>
<td>Deadweight loss (less freight traffic)</td>
<td>7.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Total costs</td>
<td>330.9</td>
<td>174.7</td>
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## BENEFIT-COST RATIO

|                  | 4.21       | 1.26       | 0.87    |
Including a “deterrence effect”

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<th>Benefit – Cost Ratio</th>
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<tr>
<td></td>
<td>Upper Bound</td>
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<tr>
<td>0</td>
<td>4.14</td>
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<tr>
<td>25%</td>
<td>4.24</td>
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<td>50%</td>
<td>4.31</td>
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October 24, 1924 – October 12, 2013

• Friend

• Leader

• Scholar