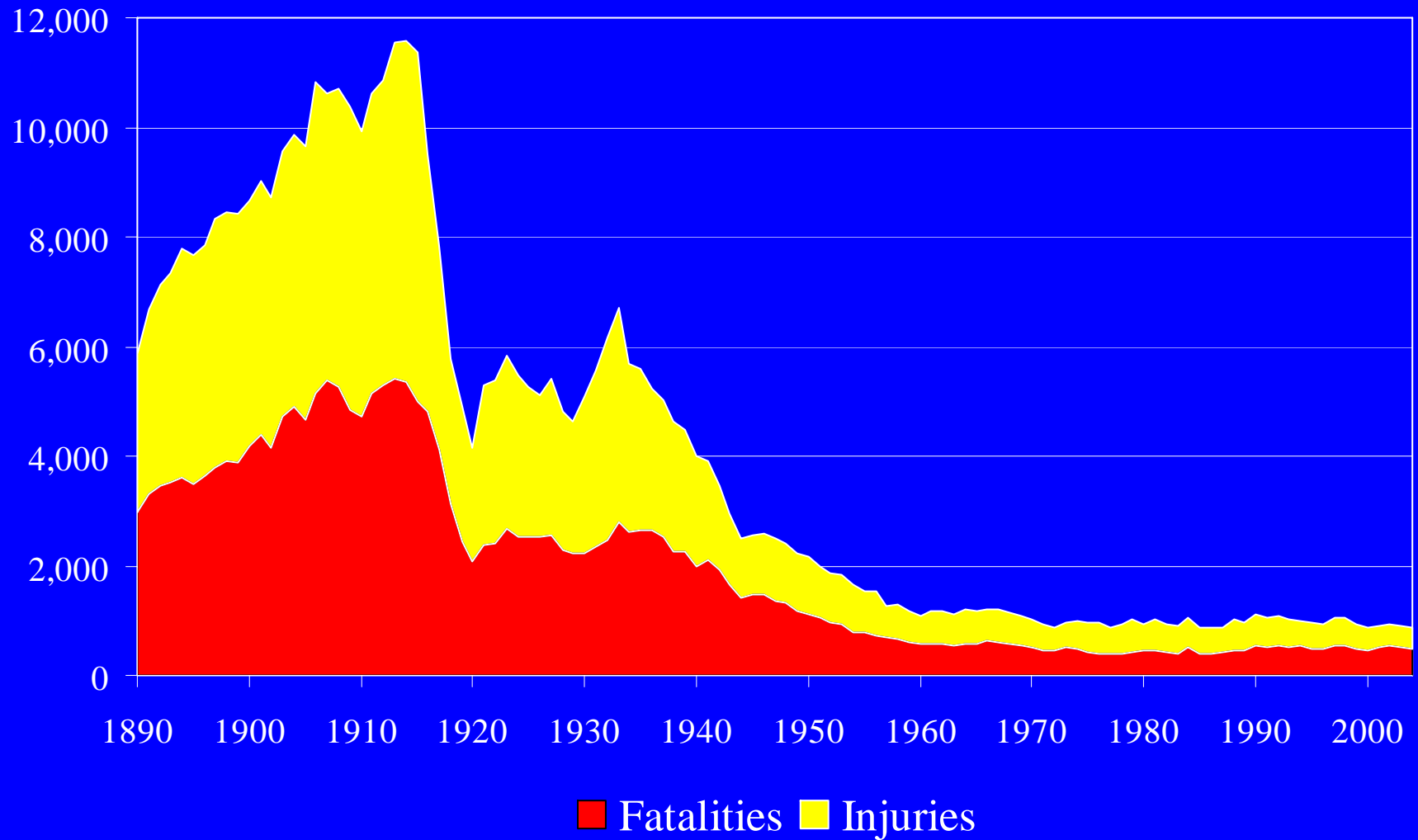


# Trespassing on the Railroad

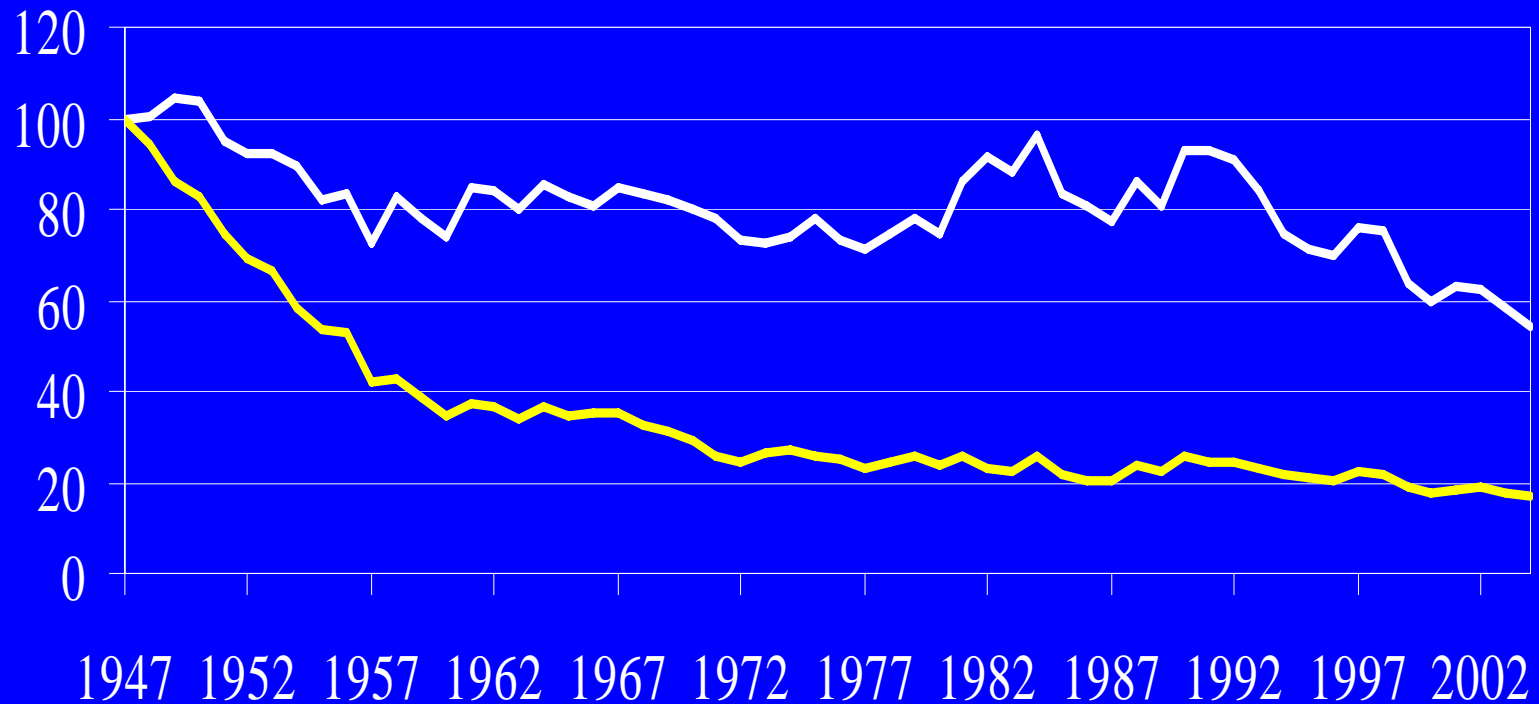
Ian Savage

Northwestern University

# Annual Railroad Trespassing Casualties



## Casualty Rates 1947 = 100



- Per Line-Haul Train Mile
- Per Head of Population

# Regression analysis:

- Two types of regressions – both gave similar results:
  - negative binomial regression on the count of number of annual casualties (fatalities plus injuries) with population as exposure variable
  - log-linear AR(1) regression (deals with serial correlation) on the rate of casualties per head of population

# Explanatory Variables:

- Railroad road miles
- Average daily number of trains
- Proportion of population between 15 and 44
- Wealth – real per-capita gross domestic product
- Ditch lights (introduced 1995-98)

## Variables that did not work:

- Proportion of population living in states in which *Operation Lifesaver* had been implemented (introduced 1972-1986)
- National rate of suicide

# Findings:

- Increased population increases trespassing
- Increased wealth reduces risk taking
- Age composition of population important
- Railroad route miles related 1:1 with trespassing casualties
- Average daily trains related 1:0.9 with trespassing casualties
- Installation of ditch lights reduced casualties by about 10%

# Decomposition:

- Regression results used to decompose change in annual casualty count into constituent causes
- Divide into four periods of interest:
  - 1947 to 1960
  - 1960 to 1974
  - 1974 to 1988
  - 1988 to 2003

## 1947 to 1960: casualties fall 2,490 to 1,088:

<b>Change in Annual Casualties</b>	- 1,402
<b>Increased Population</b>	+ 415
<b>Decreased Railroad Road Miles</b>	- 68
<b>Decreased Average Daily Trains</b>	- 806
<b>Decreased Proportion Aged 15-44</b>	- 338
<b>Increased Wealth</b>	- 436
<b>Ditch Lights</b>	na
<b>Cross-product Terms</b>	- 15
<b>Not Explained</b>	- 154

## 1960 to 1974: casualties fall 1,088 to 1,004:

<b>Change in Annual Casualties</b>	- 84
Increased Population	+ 184
Decreased Railroad Road Miles	- 84
Decreased Average Daily Trains	- 1
<b>Increased Proportion Aged 15-44</b>	+ 110
Increased Wealth	- 373
Ditch Lights	na
Cross-product Terms	- 9
Not Explained	+ 89

## 1974 to 1988: casualties rise 1,004 to 1,010:

<b>Change in Annual Casualties</b>	+ 6
Increased Population	+ 135
<b>Decreased Railroad Road Miles</b>	- 218
Increased Average Daily Trains	+ 65
<b>Increased Proportion Aged 15-44</b>	+ 109
Increased Wealth	- 181
Ditch Lights	na
Cross-product Terms	- 27
Not Explained	+ 123

## 1988 to 2003: casualties fall 1,010 to 896:

<b>Change in Annual Casualties</b>	- 114
<b>Increased Population</b>	+ 170
<b>Decreased Railroad Road Miles</b>	- 128
<b>Increased Average Daily Trains</b>	+ 374
<b>Decreased Proportion Aged 15-44</b>	- 232
<b>Increased Wealth</b>	- 142
<b>Ditch Lights</b>	- 136
<b>Cross-product Terms</b>	- 11
<b>Not Explained</b>	- 127

# Predicting the future:

- Favorable Effects
  - increased wealth
  - aging population
- Unfavorable Effects
  - increased population
  - increased railroad activity
- Can we expect total trespassing casualties to fall?

# Contact Information:

- ipsavage@northwestern.edu
- (847) 491-8241
- Read the paper at:  
<http://faculty-web.at.northwestern.edu/economics/savage/rail.html>