

# Rethinking the Minimum Legal Drinking Age

Jeffrey A. Miron  
Department of Economics  
Harvard University

# Introduction

- The MLDA21 is widely regarded as a success on two counts:
  - Saves lives by reducing traffic fatalities among 18-20;
  - Illustrates the benefits of imposing a “good” federal policy on recalcitrant, unenlightened states.
- The mechanism by which the MLDA allegedly, saves lives is reduced drinking by 18-20 year olds, which causes reduced driving under the influence and therefore fewer traffic fatalities.

# Introduction, continued

- Anyone who has spent much time on college campuses, however, might be skeptical:
  - It is not easy to convince oneself that the MLDA21, or anything else, prevents drinking by 18-20 years olds.
- If the MLDA21 does not prevent drinking, it is not obvious it should prevent fatalities.
- Nevertheless, existing research, and most official views, hold that the MLDA21 has a substantial life-saving effects.

# Introduction, continued

- My research (joint with Elina Tetelbaum) challenges the view that the MLDA21 reduces 18-20 year old traffic fatalities, based on three findings.
  - First, the overall impact estimated in earlier research is driven by states that increased their MLDA prior to any inducement from the federal government.
  - Second, even in early adopting states, the impact of the MLDA21 did not persist much past the year of adoption.
  - Third, the MLDA21 had at most a minor impact on teen drinking.

# Outline

- History
- Brief Literature Review
- Aggregate trends.
- State-level analysis.

# Historical Background

- After repeal of Alcohol Prohibition in 1933, the 21st Amendment left states free to legalize, regulate, or prohibit alcohol.
- Most legalized but enacted regulation.
  - This typically included an MLDA.

**Table 1: Minimum Legal Drinking Age Levels in States After Repeal of Prohibition, 1933**

<b>AL</b>	Alcohol Prohibited	<b>KY</b>	21	<b>ND</b>	21
<b>AK</b>	18	<b>LA</b>	21	<b>OH</b>	16
<b>AZ</b>	21	<b>ME</b>	18	<b>OK</b>	21
<b>AR</b>	21	<b>MD</b>	21	<b>OR</b>	21
<b>CA</b>	21	<b>MA</b>	21	<b>PA</b>	21
<b>CO</b>	None	<b>MI</b>	18	<b>RI</b>	21
<b>CT</b>	21	<b>MN</b>	21	<b>SC</b>	18
<b>DE</b>	21	<b>MS</b>	18	<b>SD</b>	18
<b>DC</b>	18	<b>MO</b>	21	<b>TN</b>	21
<b>FL</b>	21	<b>MT</b>	21	<b>TX</b>	21
<b>GA</b>	21	<b>NE</b>	20	<b>UT</b>	21
<b>HI</b>	20	<b>NV</b>	21	<b>VT</b>	18
<b>ID</b>	20	<b>NH</b>	21	<b>VA</b>	18
<b>IL</b>	21	<b>NJ</b>	21	<b>WA</b>	21
<b>IN</b>	21	<b>NM</b>	21	<b>WV</b>	18
<b>IA</b>	21	<b>NY</b>	21	<b>WI</b>	18
<b>KS</b>	18	<b>NC</b>	18	<b>WY</b>	21

# Historical Background, continued

- Most states set an MLDA between 18 and 21.
- 32 states had an MLDA of 21 and 16 had an MLDA between 18 and 20.
  - With few exceptions, these MLDA's persisted through the late 1960s.
- Between 1970 and 1976 thirty states lowered their MLDA from 21 to 18.

# Historical Background, continued

- In 1984, the Federal Uniform Drinking Age Act threatened to withhold highway funds from states that failed to increase their MLDA to 21 by October, 1986.
- Some states complied but others sued to prevent implementation of the Act.
- In *South Dakota v. Dole* (1987), the U.S. Supreme Court ruled the Act constitutional.
- The Court argued that reducing traffic fatalities among 18-20 year olds was sufficient reason for federal intervention in an arena traditionally reserved to states

**Table 2: States' Most Recent Date of Adopting an MLDA of 21**

<b>AL</b>	10/85	<b>KY</b>	05/38	<b>ND</b>	12/36
<b>AK</b>	10/83	<b>LA</b>	03/87	<b>OH</b>	08/87
<b>AZ</b>	01/85	<b>ME</b>	07/85	<b>OK</b>	09/83
<b>AR</b>	03/35	<b>MD</b>	07/82	<b>OR</b>	12/33
<b>CA</b>	12/33	<b>MA</b>	06/85	<b>PA</b>	07/35
<b>CO</b>	07/87	<b>MI</b>	12/78	<b>RI</b>	07/84
<b>CT</b>	09/85	<b>MN</b>	09/86	<b>SC</b>	09/86
<b>DE</b>	01/84	<b>MS</b>	10/86	<b>SD</b>	04/88
<b>DC</b>	10/86	<b>MO</b>	05/45	<b>TN</b>	08/84
<b>FL</b>	07/85	<b>MT</b>	05/87	<b>TX</b>	09/86
<b>GA</b>	09/86	<b>NE</b>	01/85	<b>UT</b>	03/35
<b>HI</b>	10/86	<b>NV</b>	12/33	<b>VT</b>	07/86
<b>ID</b>	04/87	<b>NH</b>	06/85	<b>VA</b>	07/85
<b>IL</b>	01/80	<b>NJ</b>	01/83	<b>WA</b>	01/34
<b>IN</b>	01/34	<b>NM</b>	12/34	<b>WV</b>	07/86
<b>IA</b>	07/86	<b>NY</b>	12/85	<b>WI</b>	09/86
<b>KS</b>	07/85	<b>NC</b>	09/86	<b>WY</b>	07/88

# Historical Background, continued

- After passage of the FUDAA, all states adopted an MLDA21 by the end of 1988.
- Several states were early adopters, increasing their MLDA before the FUDAA.
- Other states were less eager.
  - Some passed MLDA21 legislation but provided for repeal if the FUDAA were held unconstitutional
  - Texas and Kansas enacted “sunset provisions” allowing the MLDA to drop back to 18 once federal sanctions expired.

# Prior Research

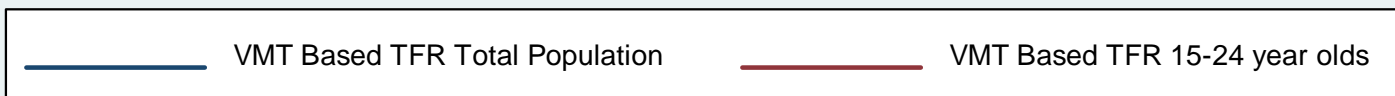
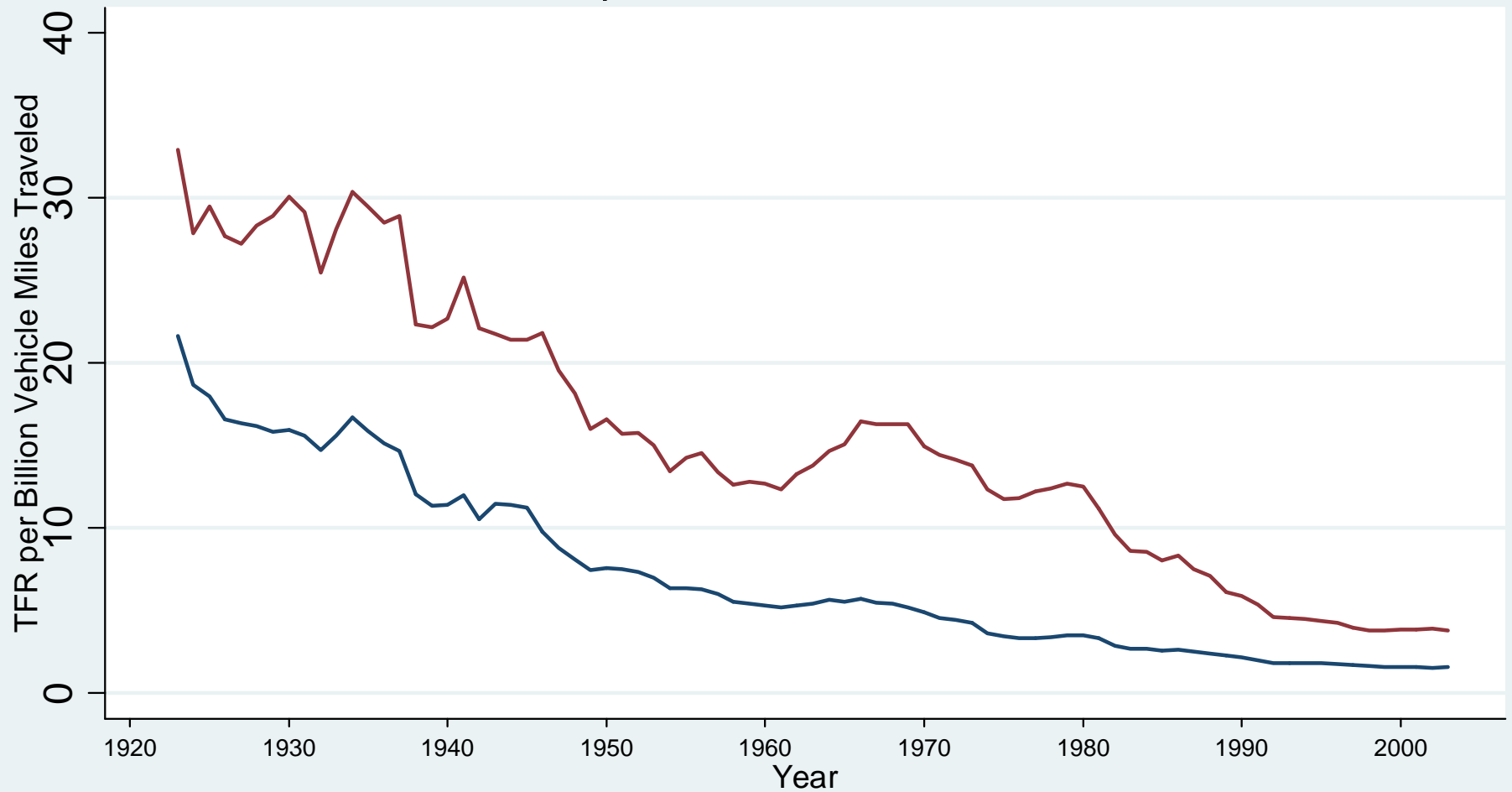
- Overall, existing research finds a negative relationship between the MLDA and traffic fatalities.
- BUT:
  - most studies have crucial limitations
- Dee (1999) is an exception:
  - uses a far more robust and general statistical model.
- Dee's estimates suggest “that the movement to [a] higher MLDA reduced ... traffic fatalities by at least 9%”

# An Overview of the Aggregate Data

- Before examining state-level data, it is useful to examine aggregate plots of the key variables.
- These suggest some of the key conclusions of the paper.

# Traffic Fatality Rate per Vehicle Miles Traveled 1923-2003

## Total Population and 15-24 Year Olds

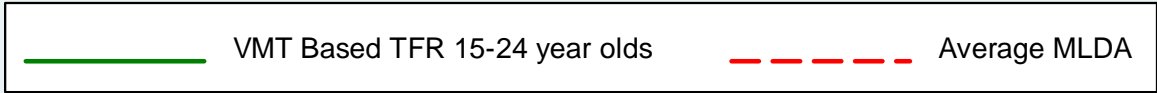
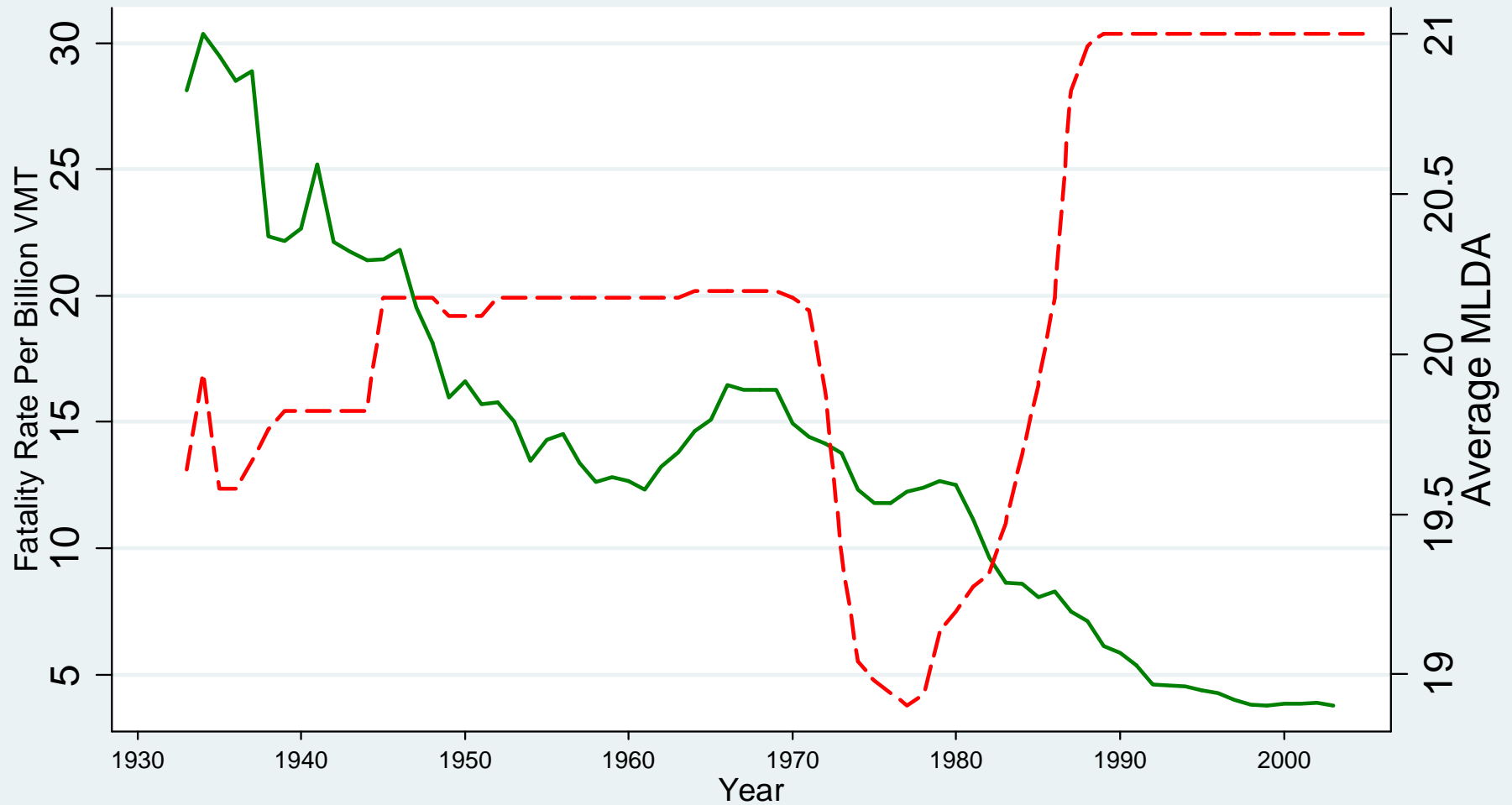


National Safety Council Data

# Long-Time Series on TFR

- The behavior of the TFR for 15-24 is similar to that for overall population:
  - This does not suggest a major impact of the MLDA, since it should have affected the 15-24 group to a much greater degree.
- A major decline begins in the mid-1960s, well before the changes in the MLDA.
- The marked decline in the TFR during this period contravenes claims of a rapid increase in traffic fatalities after several states decreased their MLDAs between 1970 and 1973.

# VMT Based TFR 15-24 vs Average MLDA 1933-2004



National Safety Council Data

# The MLDA vs. the TFR

- While the MLDA remained at approximately 20 between 1944 and 1970, traffic fatalities continued to decrease for years and then increased.
- The brief increase in TFRs that occurred in the latter half of the 1970s looks modest in comparison to the larger, downward trend that preceded changes to the MLDA.
- Studies that focused on the late 1970s and the early 1980s were unlikely to see this longstanding trend.
- The TFR has been decreasing steadily since 1969, but most variation in the MLDA occurred in the 1980s.
- The one major increase in fatalities, from 1961-1967, occurred while the average MLDA remained constant.

# Summary of Aggregate Trends

- TFRs have been trending downward for decades and have been poorly correlated with the MLDA.
- Several other factors plausibly explain this downward trend.
  - advances in medical technology
  - advances in car design (air-bags, anti-lock brakes, seat belts, safety glass)
- The aggregate data thus provide little indication that MLDAs reduce traffic fatalities.
  - These data also suggest the importance of controlling for pre-existing trends.

# State Level Analysis

- State-Level data for the period 1975-2006.
- Dependent variable is traffic fatalities by age range from the Fatality Analysis Reporting System (FARS).
  - FARS contains the characteristics of vehicles, drivers, occupants, and non-occupants involved in all recorded fatal motor vehicle accidents in the United States.
- Dee (1999) uses the FARS to construct a panel data set for the 48 contiguous states over the period 1977-1992.
  - We reconstruct Dee's (1999) data set and extend it to include Alaska, Hawaii, and Washington DC and the years 1976 and 1993-2005.
  - We focus on 18-20 year-old fatalities because this group is most directly affected by changes in MLDA laws.

# Data, continued

- Standard control variables:
  - unemployment rate, real per capita personal income, a binary indicator for whether a state has a mandatory seat belt law, the blood alcohol concentration (BAC) limit for legal driving, beer taxes, and total vehicle miles traveled.
- We omit several potentially relevant policies, in part to conform with Dee (1999), in part because of data availability, in part because previous studies have found limited evidence of any impact on traffic fatality rates.
  - dram shop liability laws, mandatory sentences for driving under the influence (DUI), sobriety check points, anti-plea bargaining statutes, changes in tort liability laws that place greater responsibility with intoxicated drivers, happy-hour regulations, and alcohol education programs.

Table 4

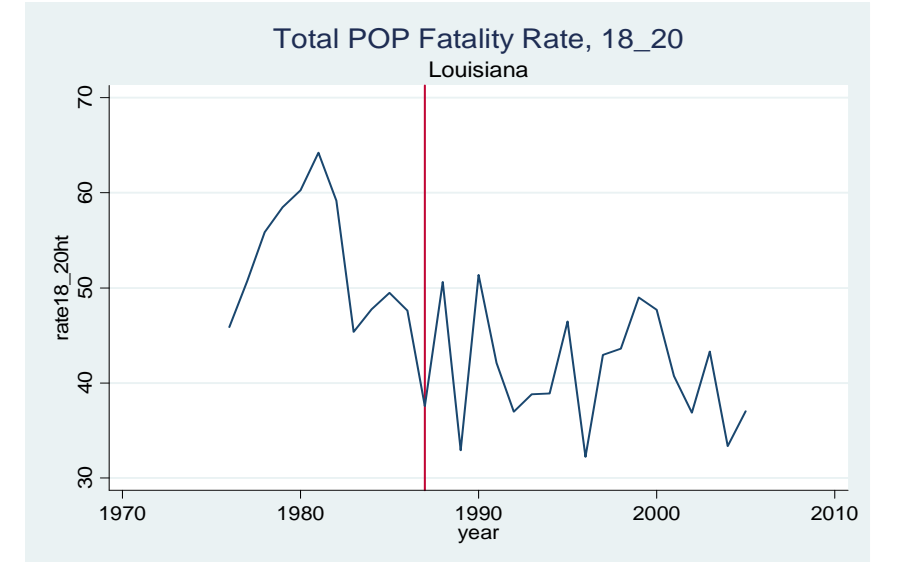
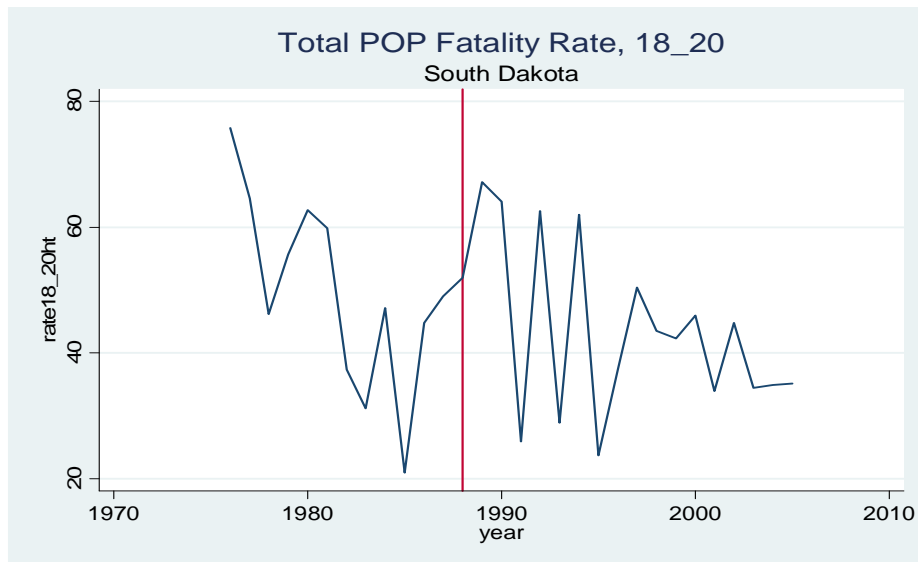
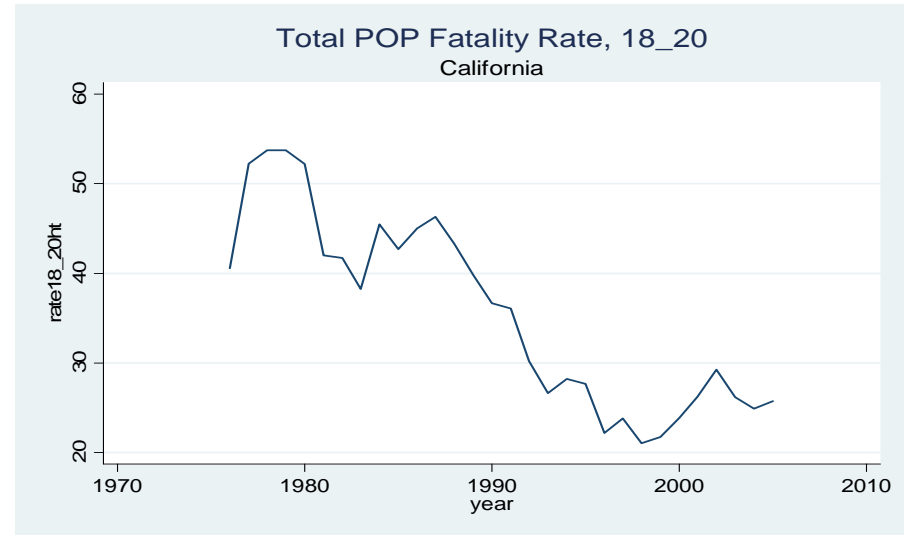
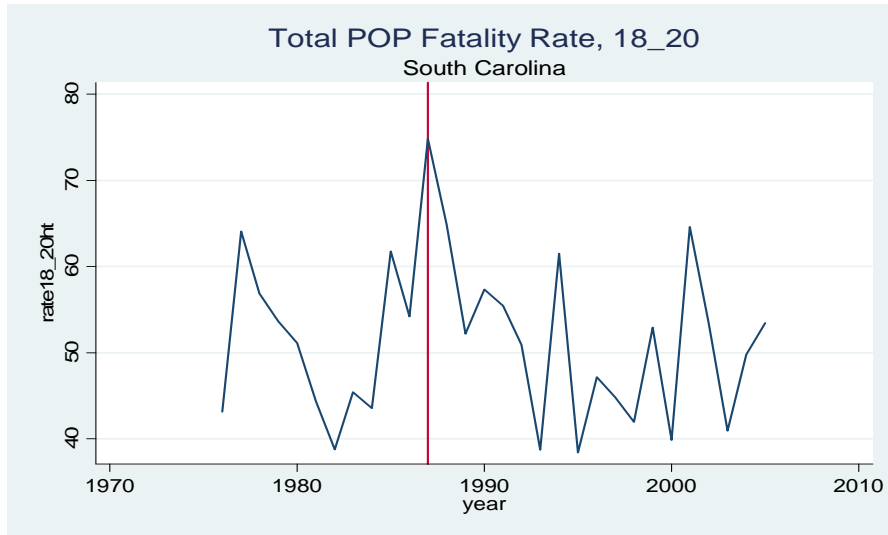
**WLS Estimates of Teen Traffic Fatality Equation, 18-20 Year Olds**

Specification		Model (1)	Model (2)	Model (3)
	Dee (1999) published results	Replication of Dee (1999)	Dee (1999) extended 13 years, plus HI, AK, & D.C.	Model (2) controlling for VMT and BAC .08
MLDA 19	-0.022 (1.06)	-0.028 (0.022)	-0.021 (0.023)	-0.014 (0.021)
MLDA 20	-0.009 (.22)	0.007 (0.053)	-0.012 (0.036)	-0.004 (.034)
MLDA 21	-0.110 (3.98)***	-0.117 (0.031)***	-0.110 (0.032)***	-0.08 (0.032)**
BEERTAX	.351 (1.66)	0.352 (0.237)	-0.223 (0.134)*	
Constant		128.318 (32.287)***	65.950 (23.788)***	75.177 (19.260)***
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
State Trends	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Clustered SE	No	No	Yes	Yes
Observations	758	758	1519	1519
R-squared	0.88	0.88	0.87	0.87
Years	1977-1992	1977-1992	1976-2005	1976-2005

# Basic Results

- The results so far support two claims.
  - Aggregate data provide little evidence that the MLDA reduces the TRF for 18-20 year olds.
  - Yet panel-data estimates suggest a substantial and statistically significant impact of the MLDA21.
- To reconcile these different estimates, we conduct a state-by-state analysis of how the MLDA affects traffic fatalities.

**FIGURE 5: AVERAGE TOTAL FATALITY RATE PER 100,000 18-20 YEAR OLDS  
1976-2005**



# Raw Data for Individual States

- In South Carolina, TFR18-20 was increasing rapidly prior to adoption and then began a marked decline, consistent with an effect of the MLDA21 in reducing 18-20 year old fatalities.
- In California, however, TFR18-20 also declined dramatically even though the MLDA was 21 throughout.
- In South Dakota and Louisiana, TFR18-20 declined *prior* to the increase in the MLDA and seems to have decreased at a slower rate after MLDA21 adoption.
- These four graphs, therefore, show a wide range of “impacts” of the MLDA.
  - Plots for all 50 states confirm substantial heterogeneity in MLDA21’s effect.

Table 5

**State by State OLS Estimates with Newey-West HAC Standard Errors of MLDA Regressed on Total Traffic Fatalities among 18-20 Year Olds 1976-2005**

State	MLDA	SE	State	MLDA	SE
AL	0.065	(0.054)	MT	0.168	(0.054)***
AK	-0.406	(0.206)*	NE	-0.034	(0.127)
AZ	-0.065	(0.054)	NV		
AR			NH	-0.153	(0.146)
CA			NJ	-0.176	(0.032)***
CO	0.063	(0.031)*	NM		
CT	-0.244	(0.071)***	NY	0.007	(0.053)
DE	0.092	(0.158)	NC	-0.124	(0.024)***
FL	0.076	(0.07)	ND		
GA	-0.018	(0.028)	OH	-0.012	(0.028)
HI	0.356	(0.144)**	OK	-0.055	(0.024)**
ID	-0.023	(0.093)	OR		
IL	-0.066	(0.059)	PA		
IN			RI	-0.31	(0.123)**
IA	-0.102	(0.068)	SC	0.166	(0.052)***
KS	0.102	(0.034)***	SD	0.092	(0.11)
KY			TN	0.015	(0.086)
LA	-0.05	(0.029)*	TX	-0.056	(0.035)
ME	0.078	(0.091)	UT		
MD	-0.104	(0.025)***	VT	0.038	(0.031)
MA	0.04	(0.129)	VA	0.097	(0.075)
MI	-0.1	(0.053)*	WA		
MN	-0.116	(0.128)	WV	-0.176	(0.126)
MS	0.013	(0.033)	WI	-0.055	(0.034)
MO			WY	-0.142	(0.089)

# State-by-State Regressions

- Of the 38 states that increased their MLDA over the post 1975 time period, the MLDA21 reduced fatalities in six at the 5% level and in nine at the 10% level.
- At the same time, however, the MLDA21 increased fatalities in four states at the 5% level and in five at the 10% level.
- In eleven states the coefficient on MLDA is positive but insignificant while in thirteen it is negative but insignificant.

# State-by-State Results, continued

- This heterogeneity suggests Dee's results are driven by a few states in which the impact is sufficiently negative to outweigh the positive or small impact in most states.
- The question is whether this heterogeneity is just sampling variation or something more systematic.

# Results by Year of Adoption

- Regressions that exclude states that adopted early – before 1984 or 1985 – find little evidence that the MLDA reduces the TFR.
  - Model (4), for example, which restricts the sample to states that changed their MLDA to 21 during or after 1984, results in a lower point estimate (-.04) that is not significant at even the 10% level.
  - Model (5), which restricts the sample to those states that changed the MLDA after 1984, produces a coefficient on MLDA21 near zero with a *t*-statistic of .21.

# Results by Year of Adoption, continued

- The year 1984 is when the federal government became directly involved in state-level MLDA legislation.
- The federal government's threat to withhold highway funding from states is arguably an exogenous shock.
- Thus inference should focus especially on states that increased their MLDAs in response to this pressure.
- Yet results for these states show virtually no effect of the MLDA21; the only such evidence comes from early adopters.

# Interpretation

- These results suggest that the MLDA21 reduced traffic fatalities only when it was adopted endogenously by a state.
- If adoption was forced by a federal law, there was no life-saving effect.
- This is plausible:
  - The MLDA21 in the early adopting states may have been enacted in response to grassroots concern against drunk driving or implemented alongside other efforts to reduce traffic fatalities.

# Interpretation, continued

- In additional empirical work, we examine the early adopting states in more detail and find that even in these states, the life-saving effect of the MLDA persisted for at most a year or two;
- In the later adopting states, the results that allow for flexible timing sometimes show significant, perverse effects of the MLDA.

# Conclusions

- The imposition of an MLDA21 on all states by the FUDAA does not appear to have reduced 18-20 year old traffic fatalities.
- The endogenous adoption of the MLDA21 in a few states during the late 1970s and early 1980s might have contributed to a decline in 18-20 year old traffic fatalities, but this evidence suggests short term effects at best.

# Conclusions, continued

- The most interesting result is the first of the two just mentioned, namely, that coercive federalism does not appear to have been effective in this case.
- Perhaps the same applies in other contexts:
  - NCLB is an obvious case to consider.
  - Many states have objected to provisions in NCLB, and evidence of non-compliance is widespread.