Preliminary and Incomplete

Motor Vehicle Fatalities in the COVID-19 Recession

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Motor vehicle fatalities generally fall in recessions, but not this one?

ARE RECESSIONS GOOD FOR YOUR HEALTH?*

CHRISTOPHER J. RUHM

This study investigates the relationship between economic conditions and health. Total mortality and eight of the ten sources of fatalities examined are shown to exhibit a procyclical fluctuation, with suicides representing an important exception. The variations are largest for those causes and age groups where behavioral responses are most plausible, and there is some evidence that the unfavorable health effects of temporary upturns are partially or fully offset if the economic growth is long-lasting. An accompanying analysis of microdata indicates that smoking and obesity increase when the economy strengthens, whereas physical activity is reduced and diet becomes less healthy.

This study examines how health responds to transitory changes in economic conditions. Fixed-effect (FE) models are estimated using longitudinal data for the 1972–1991 period, with health proxied by total and age-specific mortality rates and ten particular causes of death. The unit of observation is the state, and most of the analysis focuses on within-state variations in unemployment and personal incomes; limited attention is also paid to the changes in national unemployment rates.[1] In addition, microdata for *1987–1995* from the *Behavioral Risk Factor Surveillance System* (BRFSS) are used to examine how risky behaviors and time-intensive health investments in physical activity, diet, and preventive medical care vary with the status of the economy. State fixed-effects are again controlled for as are a variety of demographic characteristics and general time effects.

The analysis provides strong evidence that health *improves* when the economy temporarily deteriorates. Specifically, state unemployment rates are *negatively* and significantly related to total mortality and eight of the ten specific causes of fatalities, with suicides representing an important exception. The variation in death rates is strongest for those causes and age groups where

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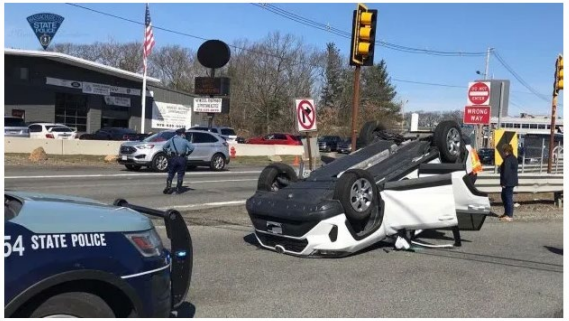
1. Discussions of "cyclical" variations or "macroeconomic" effects below therefore refer mainly to changes occurring within states rather than at the national level. For instance, the term "recession" is used loosely to indicate the effects of increases (decreases) in state unemployment rates (personal incomes), instead of a technical definition based on changes in national GDP.

The Quarterly Journal of Economics, May 2000

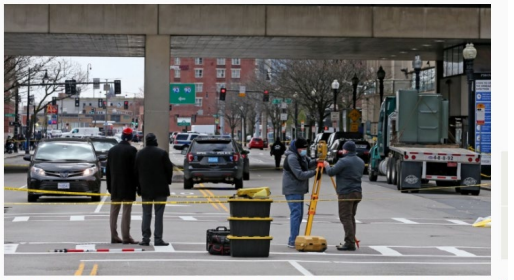
Report: 2020 Roadway Deaths are Way Higher Than Normal

By Gersh Kuntzman | Aug 31, 2020 |



Speed kills — and more data proves it.

Road fatalities up in Massachusetts despite 50% less traffic, o



BOSTON, MA – APRIL 22: Boston police investigate the scene of a crash at the intersection of Massachusetts Avenue and Harrison Avenue on April 22, 2020 in Boston, Massachusetts. (Staff Photo By Angela Rowlings/MediaNews Group/Boston Herald)

By ANDREW MARTINEZ |
May 4, 2020 at 12:10 p.m.

SAFETY

Despite Lockdowns, Motor Vehicle Fatalities Continue to Rise

Deaths on the road have increased for the second consecutive month.

Stefanie Valentic
JUN 29, 2020

Questions

1. Is this time different?
    1. Yes. MVFs have not declined as one would guess they would.

2. Why?
    1. Speed increases have offset the value of fewer cars on the road. [Deaths increase non-linearly in speed.]
    2. Driving with a higher fatality probability may not be down that much (trucks, highways, drugs/ alcohol).

Definition

- Motor Vehicle Fatality – Death due to an automobile accident (rider or pedestrian)

Is 2020 different?

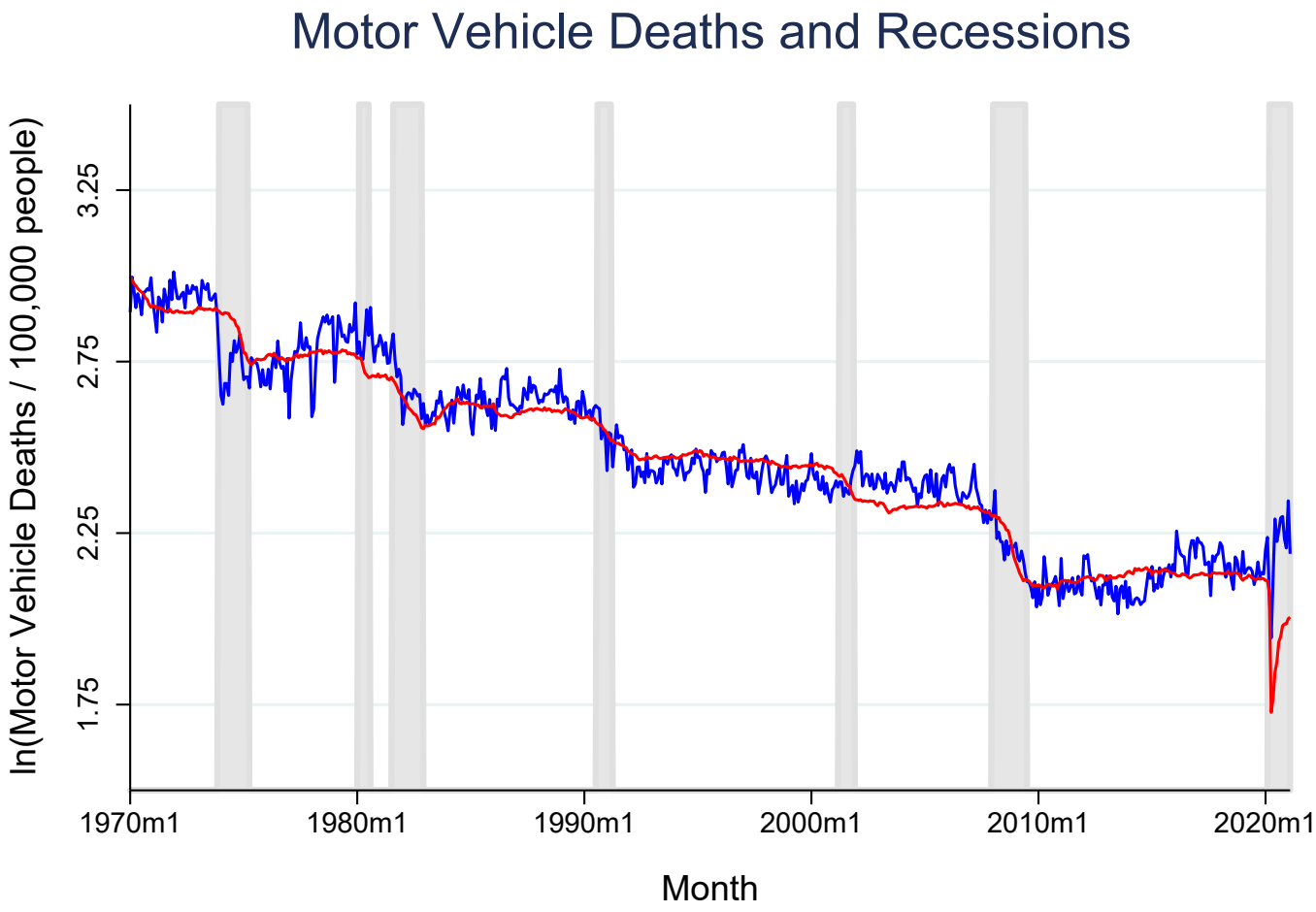
- Relate time series of motor vehicle fatalities per capita to unemployment and gas prices (1970-2019):

$$\ln(\text{Deaths/cap})_t = \beta_1 UR_t + \beta_2 \ln(P_{gas}/P_{all})_t + \text{time} + \text{time}^2 + \text{month dums} + \varepsilon_t$$

- Compare prediction in 2020 to actual

- Data from National Safety Council, built from reports supplied by states.

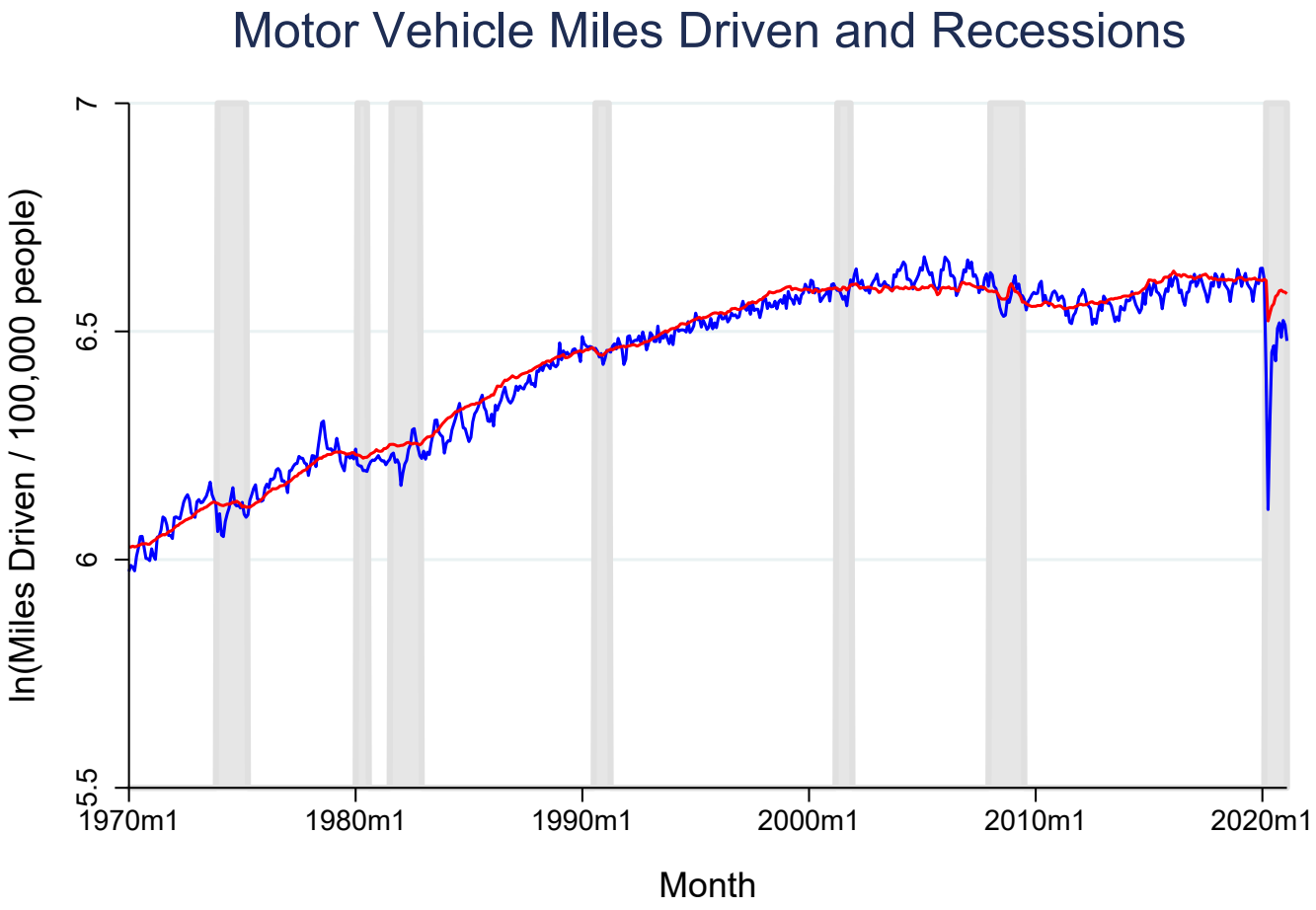
Is 2020 different? Yes.



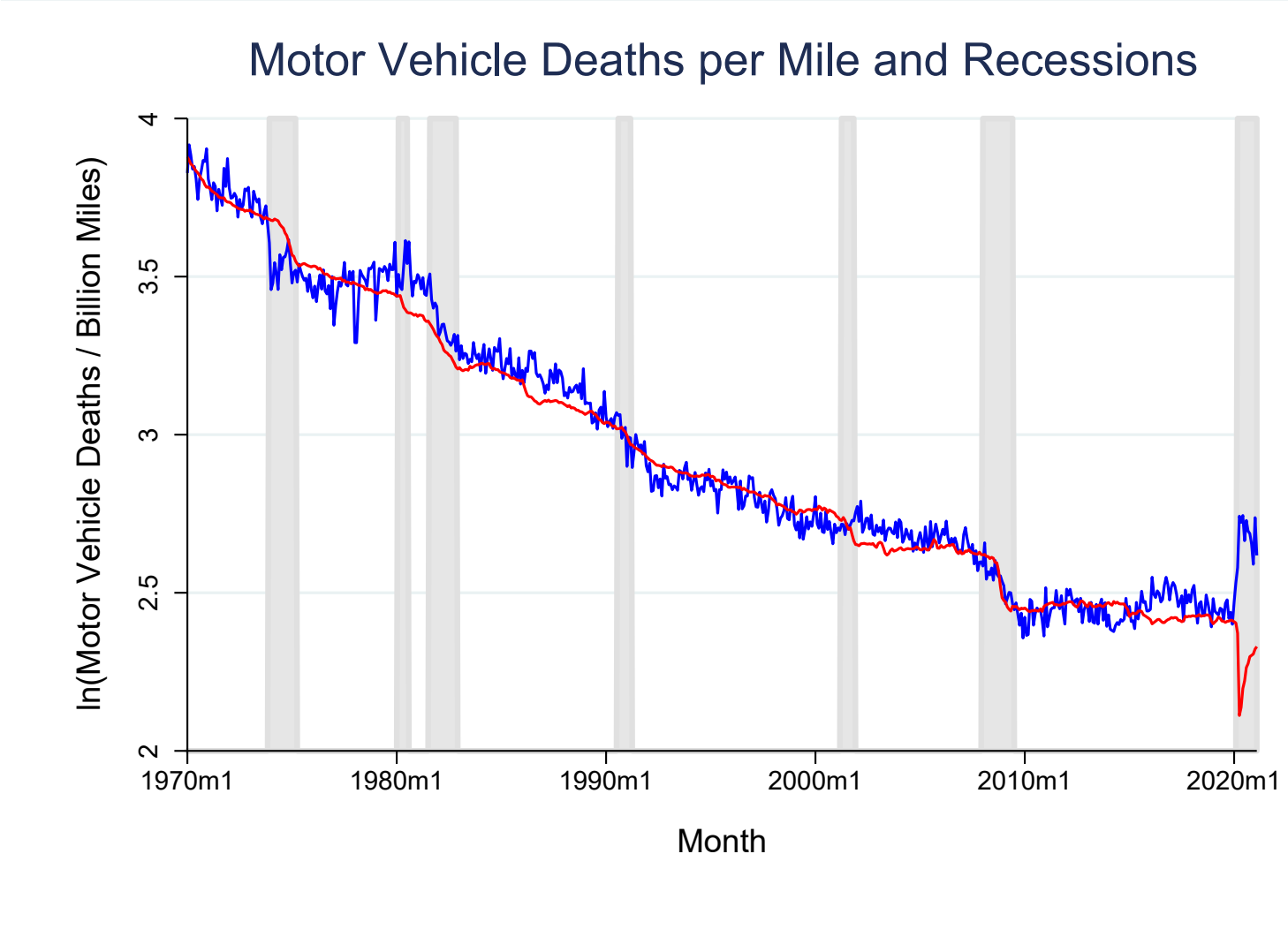
Monthly data are seasonally adjusted.

Actual deaths have increased, despite a large reduction in predicted deaths.

Miles driven fell far more than in a typical recession.



Deaths per mile driven increased greatly.



Why Did Deaths/mile Increase so Much?

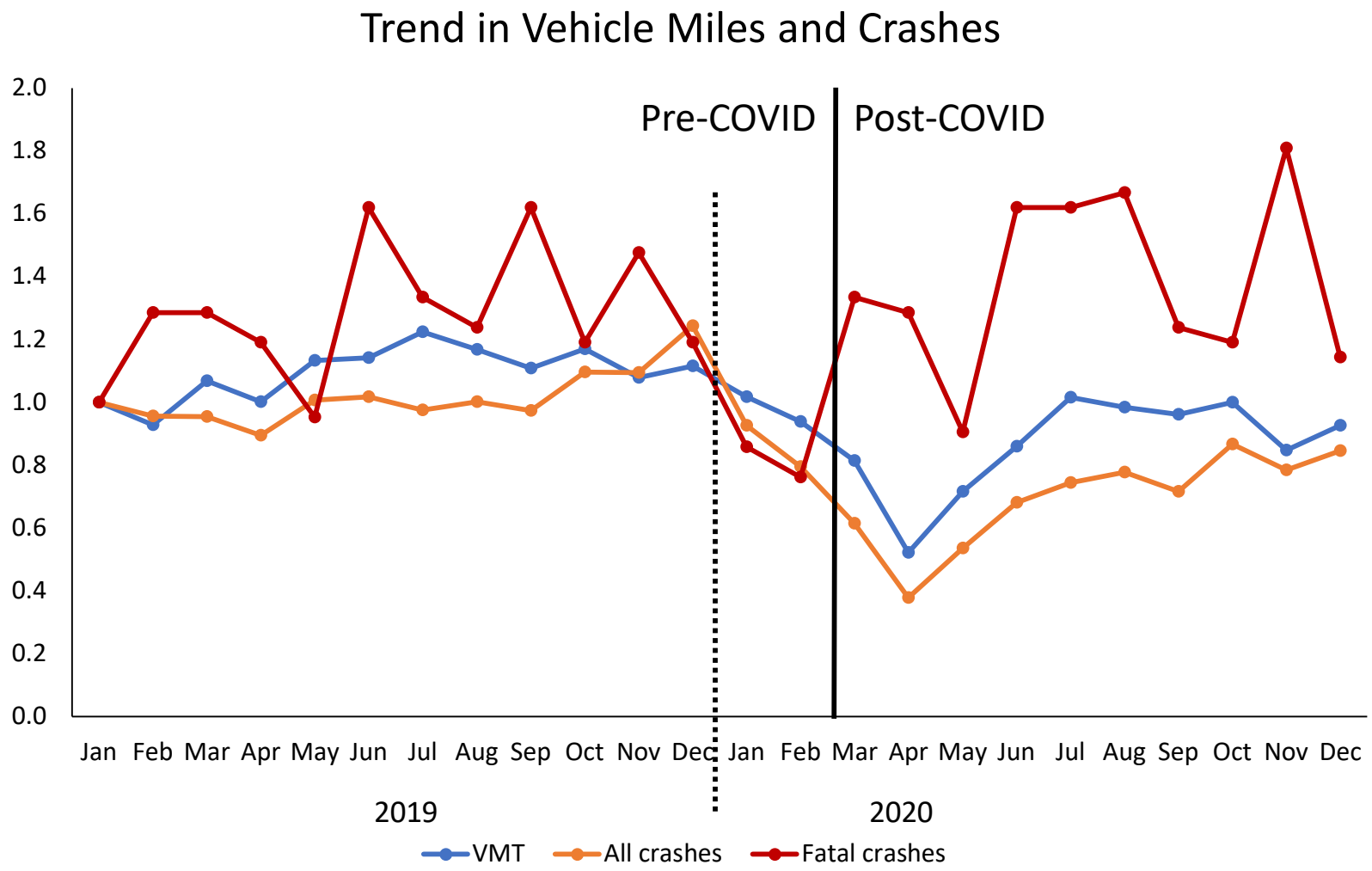
- Composition effect: overall driving is down, but that is predominantly among the safer drivers
  - Risky drivers (motorcycles, trucks) are still on the road

- Accidents are deadlier
  - Speeds have increased
  - More joy-riding

Data

- Universe of automobile accidents in MA
  - Report required if physical injury or property damage >$1,000
  - Filed by individual or police, verified by police
- (In future iterations) match with vehicle miles and speeds on relevant roadways
  - Collected from MA DOT

Motor vehicle crashes have fallen more than vehicle miles, but fatal crashes are unchanged.



Has high risk driving changed?

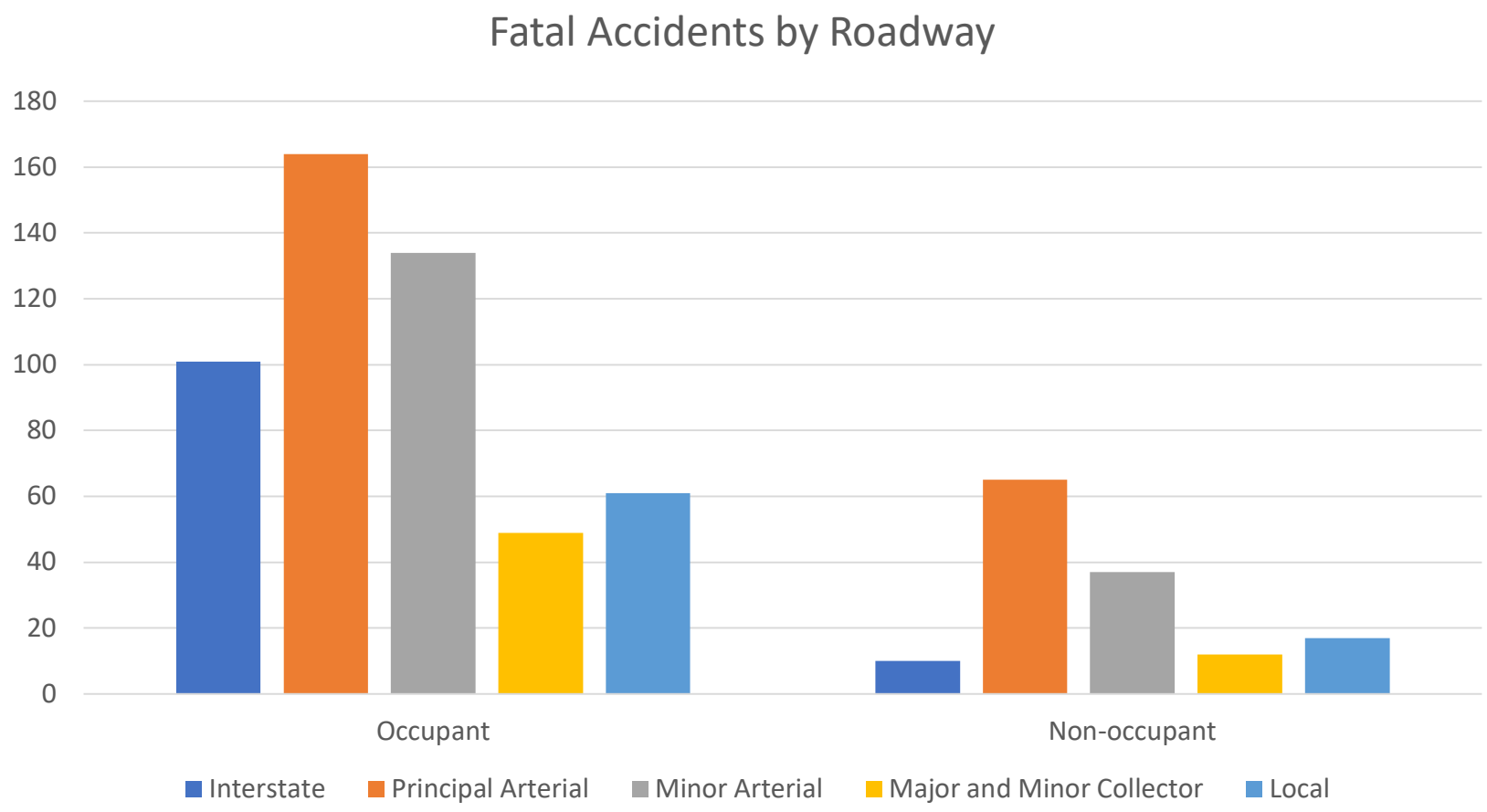
- Estimate logistic model for the probability that a crash involves a fatality, using 2019 data
  - Use predicted value as measure of risk.

- Look at trend in accidents by fatality probability and death rate by fatality probability

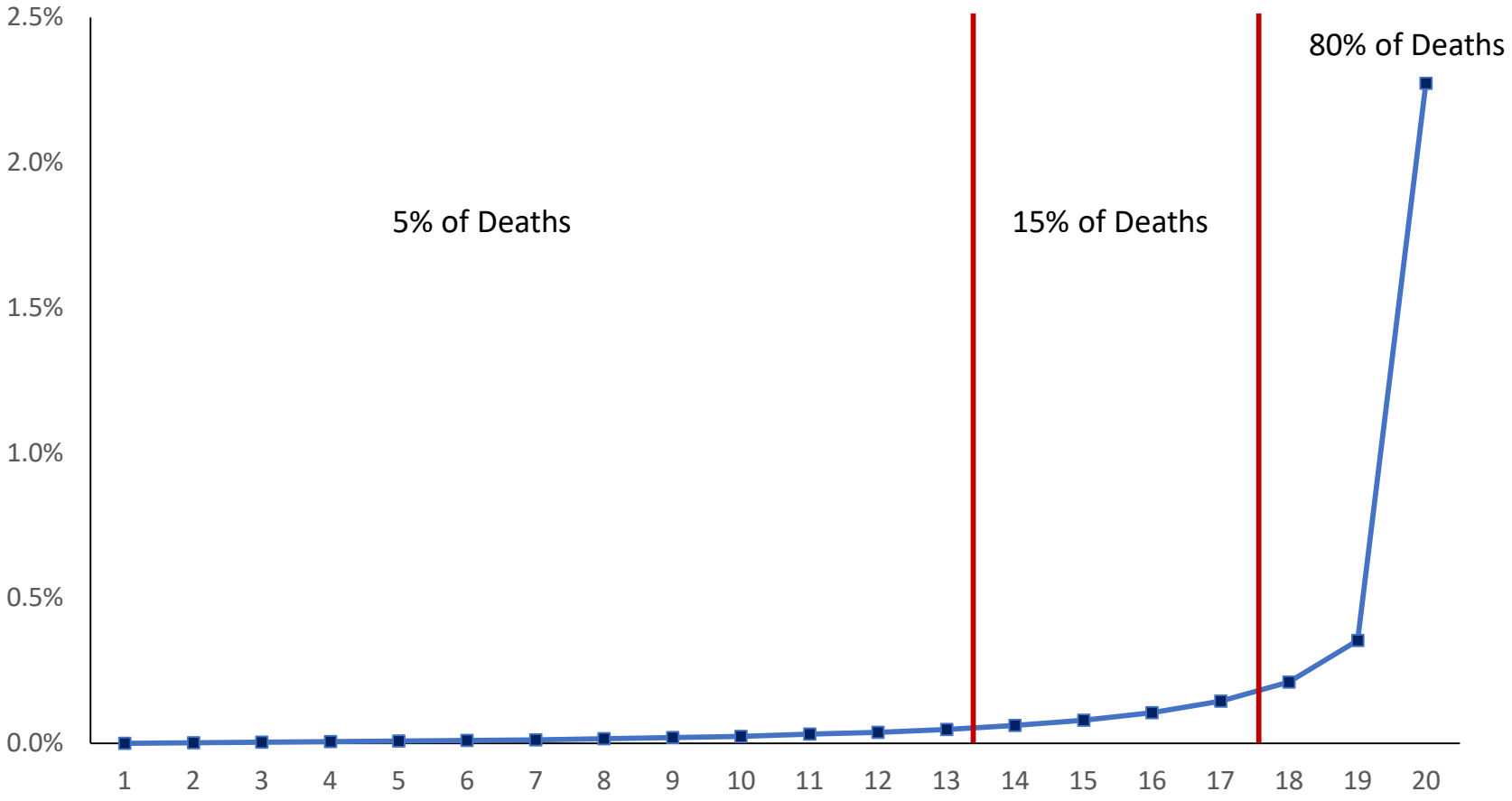
Measuring fatality risk

Category	Variables
Vehicles involved	Small (motorcycle), car, truck, unknown
Type of collision	Head on, rear-end, angle, sideswipe, rear-to-rear, unknown
Time/day	{AM rush, PM rush, night, day} x weekday/weekend
Road type	Interstate, arterial, collector, local, unknown
Number of people	By age
Road conditions	Wet/icy
Driver behavior	Drug/alcohol use, distracted, no helmet (small) / seatbelt (other)
N=140,000; pseudo-R^2 = .269	

Where do fatal accidents occur?



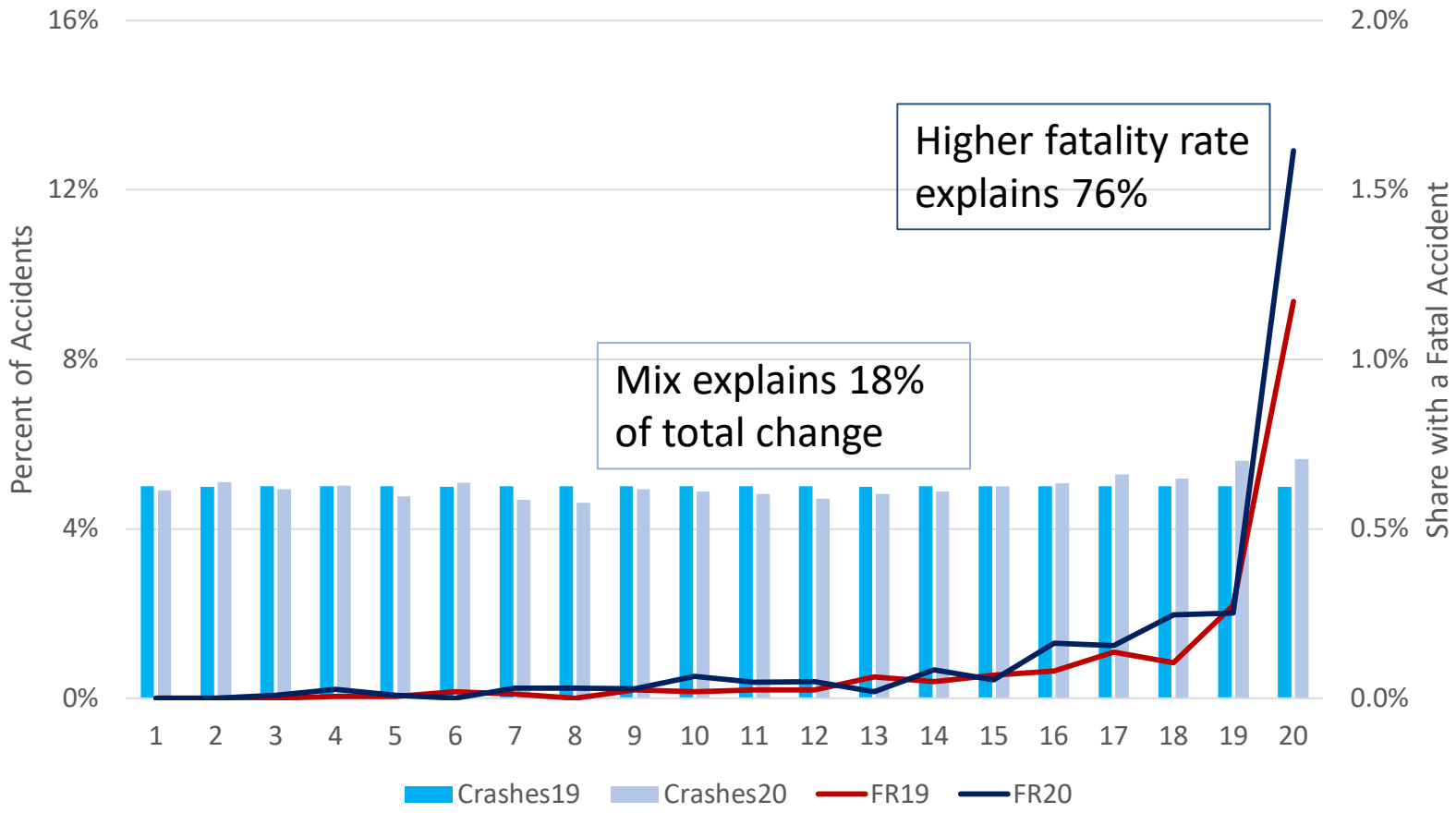
Vingtiles of predicted fatality risk



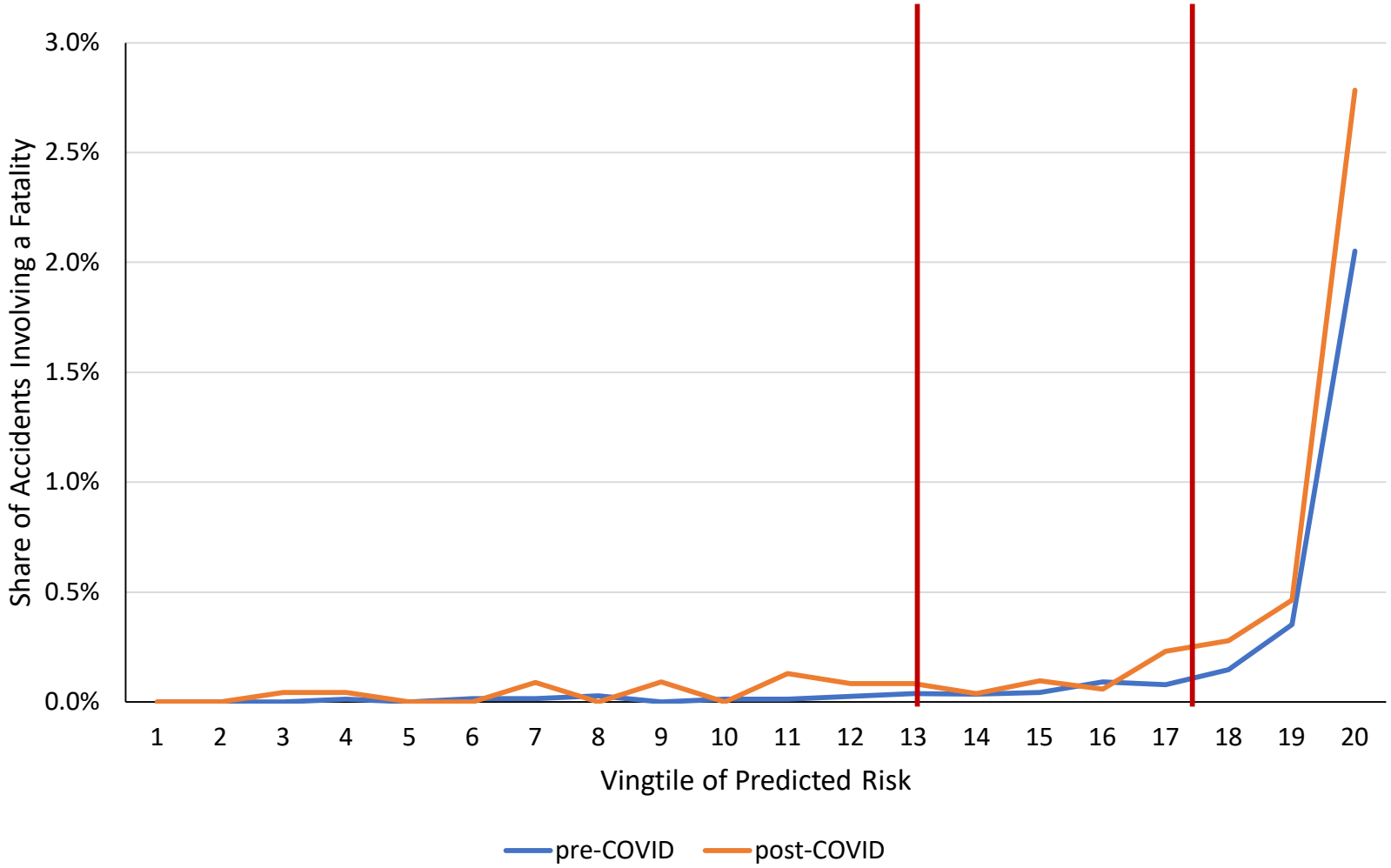
Who is in the highest predicted risk groups?

Percent of Group in Indicated Risk Cell			
	Predicted Risk of Death		
Group	All accidents	Top 3 vingtiles	Top vingtile
Motorcycle, MOPED	1%	6%	14%
Evening/night	19%	36%	38%
Interstate	10%	16%	18%
Drug/alcohol use	3%	9%	12%

Changes in Accident Mix and Mortality Rate



Fatality rate increased most for highest risk accidents.

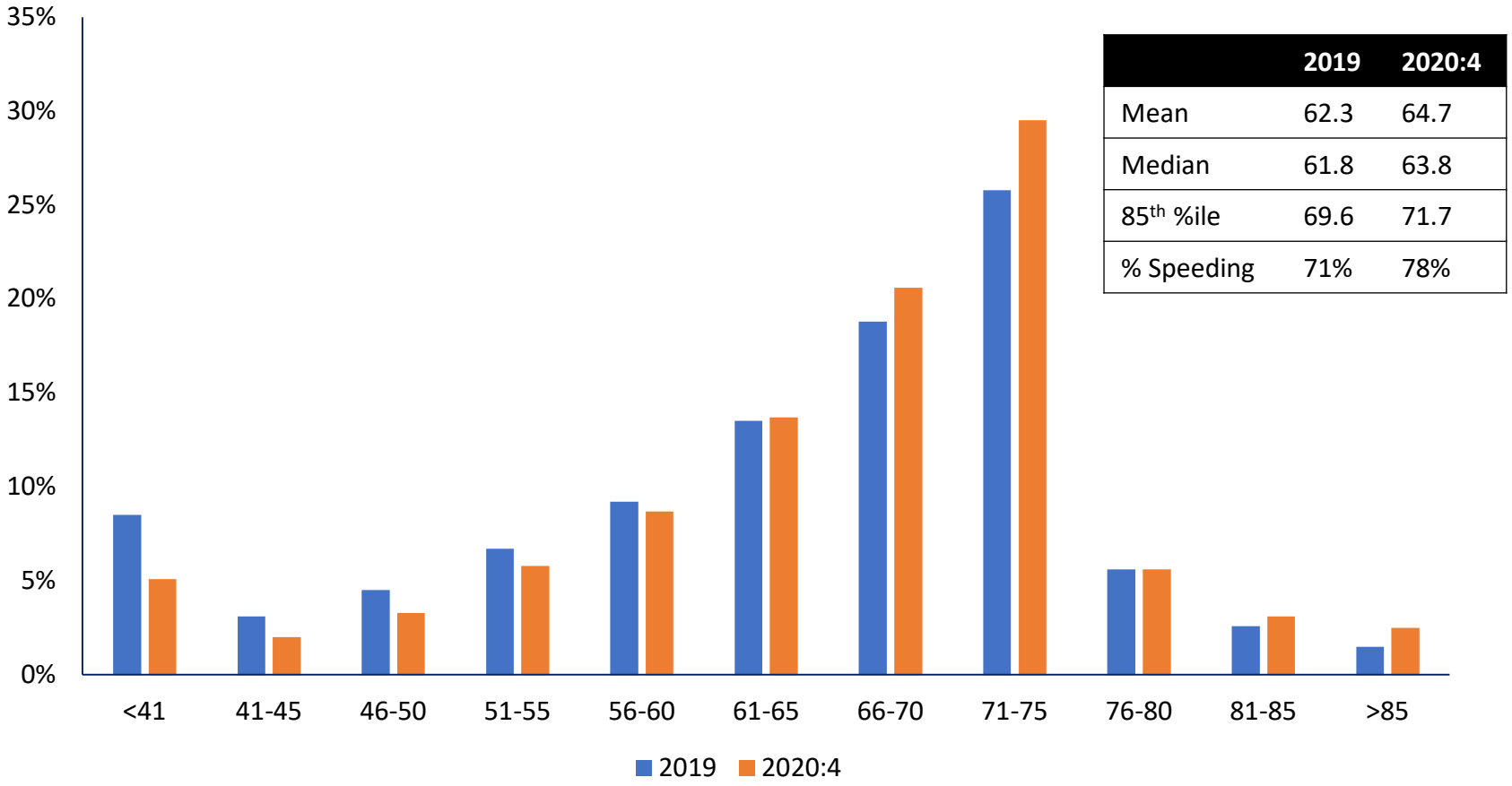


What happened to traffic speeds?

- 133 interstate locations with speed monitors in 2019/2020.
- Data on
  - Share of cars by mph bins (<40, 41-45, …, >85)
  - Each month 2019 and 2020
  - Averaged to the hour (e.g., 7-8 am)

- % cars in bin_{lhm} = $Month_m$ + $loc\text{-}id_l$ * $hour_h$

Speed distribution on Massachusetts Interstates



	2019	2020:4
Mean	62.3	64.7
Median	61.8	63.8
85th %ile	69.6	71.7
% Speeding	71%	78%

Predicted impact of changes in speed

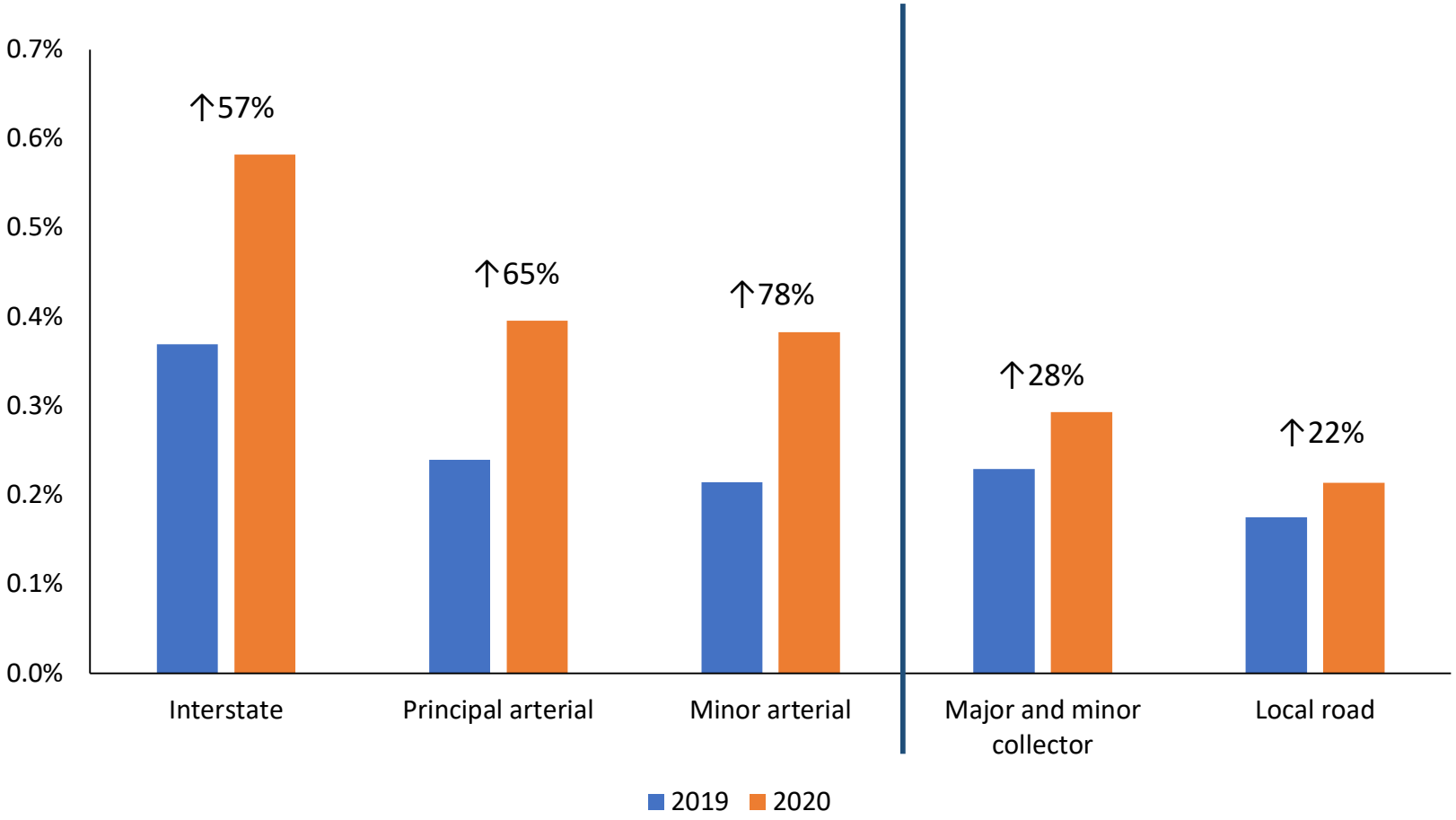
- Estimates (typically based on changes in speed limits) suggest a power law for traffic fatalities:

$$\frac{F_2}{F_1} = \left(\frac{s_2}{s_1}\right)^{2.6}$$

Elvik (2009)

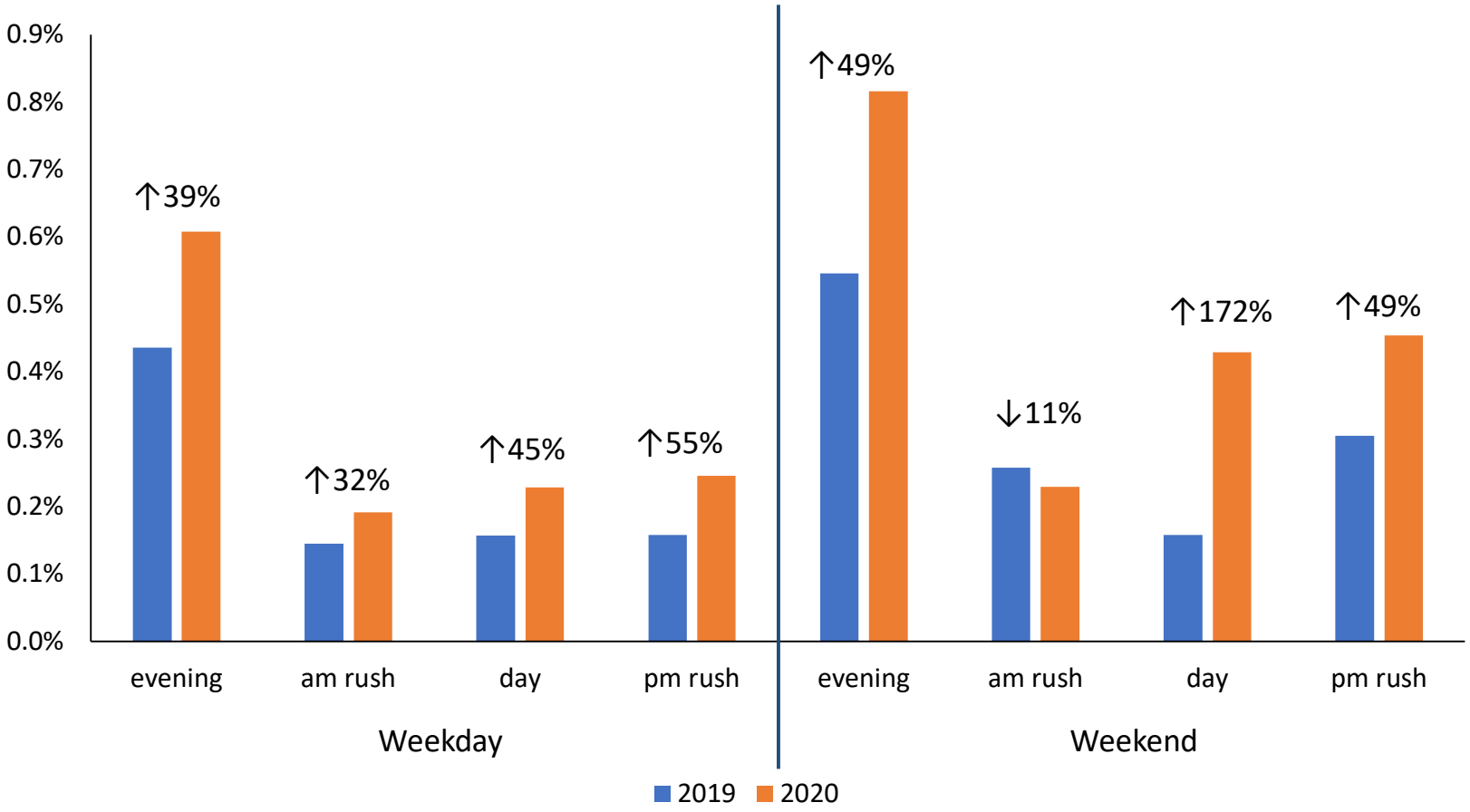
- Change in average interstate speed → 10% predicted increase in fatal crashes
  - Actual fatal crashes | crash increased 40%.

Crash Fatality Rate by Road Type



Data are for April-December, 2019 and 2020.

Crash Fatality Rate by Time of Day



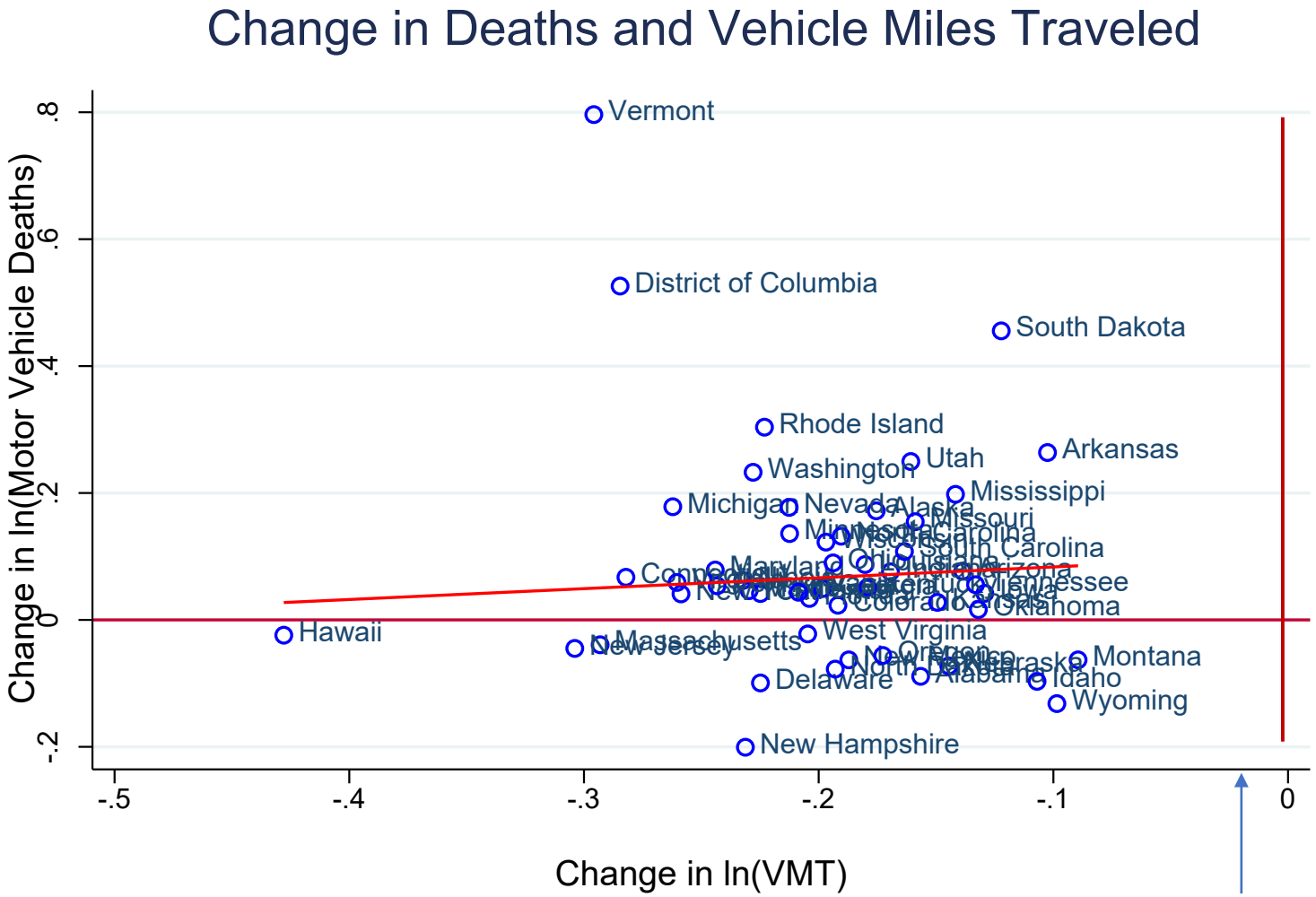
Data are for April-December, 2019 and 2020.

Conclusion

- Reduction in miles driven overstates the reduction in high risk driving.

- Even still, accidents are becoming increasingly fatal.
  - Link with highway speed information can help determine how much is related to speed increase.

The modest increase in deaths has been widespread and bears little relationship to the change in miles driven.



Or to the change in unemployment