

# Impact of Driverless Technology

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March 10, 2018



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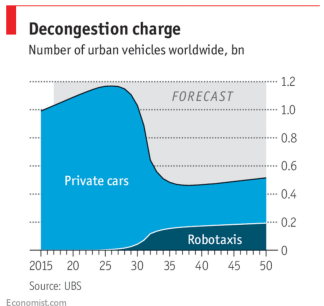
Auto drives **45 percent** of global property casualty premium

Auto lowers industry volatility by **30 percent**...

...and creates over **USD100 billion** capital capacity for other lines

# Long-Term Impact of Driverless Cars

*People seem prepared to tolerate deaths caused by human drivers, but AVs will have to be... infallible. A realistic goal is a **thousandfold improvement** over human drivers, says Amnon Shashua of Mobileye. That would reduce the **number of road deaths in America each year from 40,000 to 40, a level last seen in 1900**. ... Even with modern safety features, 650,000 Americans have died on the roads since 2000, more than were slain in all the wars of the 20th century (about 630,000).*

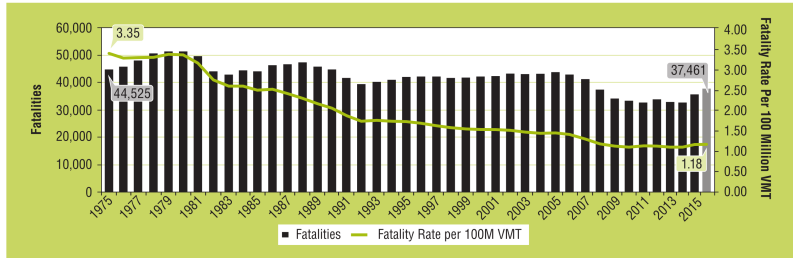


UBS projects urban car ownership will fall by 70% by 2050



# Short-Term Impact of Human Driven Cars

Figure 2  
Fatalities and Fatality Rate per 100 Million VMT, by Year, 1975–2016



Sources: FARS 1975–2015 Final File, 2016 ARF; Vehicle Miles Traveled (VMT): FHWA.

- After years of lower frequency, uptick in last three years
- Distracted driving
- **Morale hazard** of safety devices
- Clear short-term challenge and opportunity for telematics applications

# Impact of Cars on Infrastructure and Lifestyle

- Early cars prized by farmers more than indoor plumbing [Gordon, Rise and Fall of American Growth]
- It is less easy to see cars would be popular, it is less easy to predict Walmart
- Urban planning, commuting, retail. . .
- Consider commercial aviation as model of how low accident rate can go: **zero?**
- Consider more speculation

# Other Drivers of Cost

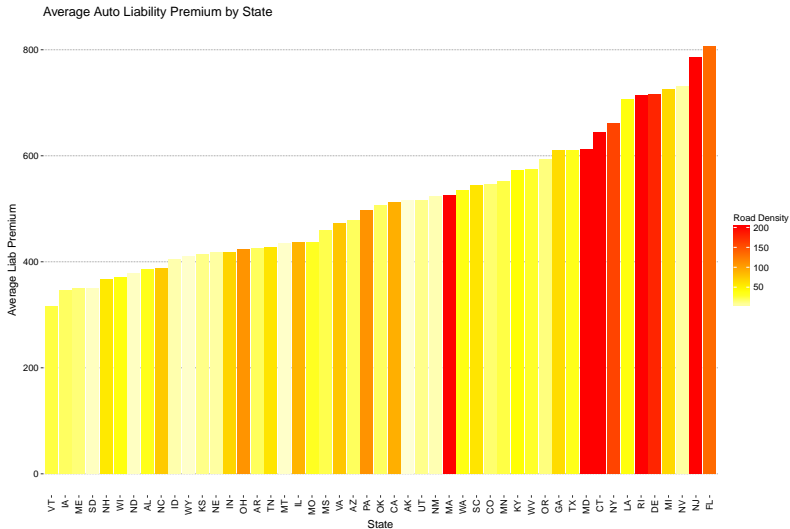
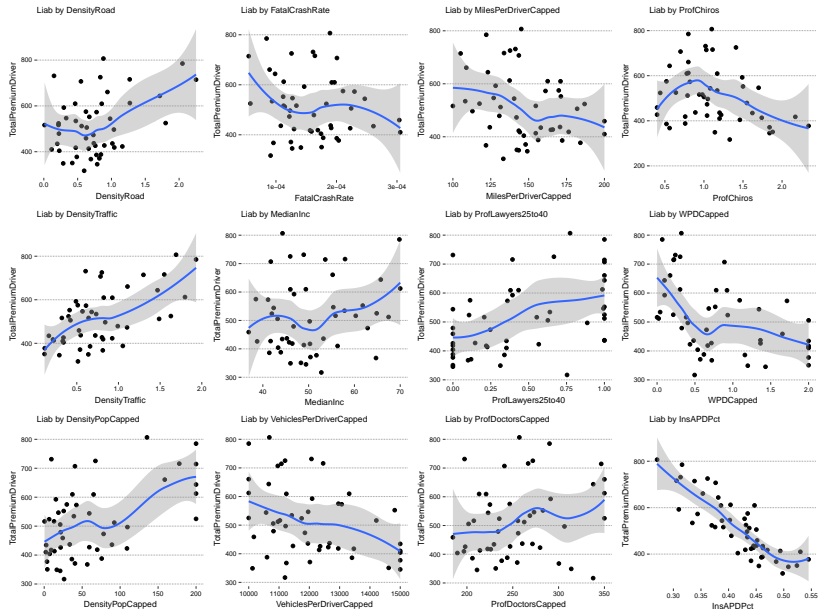


Figure 1: Average liability premium per driver from under \$400 to over \$800

# Candidate Regression Variables





# Regression Parameters for Total Premium per Driver

Table 1: Regression Parameters

Variable	Estimate	StdErr	t	p	vif
DensityRoad	36.295	18.356	1.977	0.055	1.418
FatalCrashRate	7.471	1.889	3.955	0.000	2.146
MedianInc	2.794	1.253	2.230	0.031	2.177
RegPIP_VerbalTRUE	72.362	34.501	2.097	0.042	1.284
RegFRLimitLowTRUE	42.839	19.252	2.225	0.032	1.286
ProfLawyers25to40	58.216	25.264	2.304	0.026	1.757
InsAPDPct	-1446.113	137.502	-10.517	0.000	1.367

Residual standard error: 51.1 on 41 degrees of freedom

Multiple R-squared: 0.8603, Adjusted R-squared: 0.8365

F-statistic: 36.08 on 7 and 41 DF, p-value: 1.465e-15

# Actual vs. Predicted

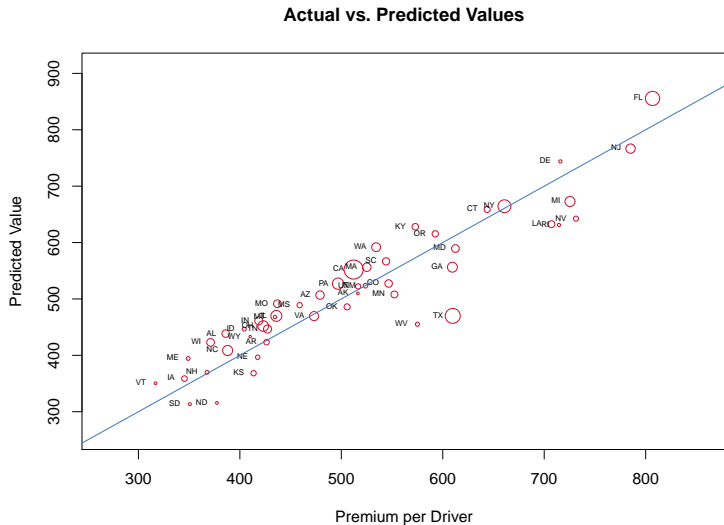


Figure 3: Actual vs. Predicted Values

## Specific Comments

- Driverless cars does not take **cars** off the road; just drivers; mileage and congestion remain but managed differently
- $\beta = 1$  is null: why would death rates not be proportional to exposure?
- Consider test of  $\beta = 1$  in addition to  $\beta = 0$
- Consider working with rates rather than absolute values, which defaults  $\beta = 1$
- Weights and logs interact: consider using GLM rather than OLS
  - E.g. lognormal with constant cv implies constant  $\sigma$  and probably no need for weights
- Health insurance costs: lower demand but auto insurers pay retail rates (no managed care) and subsidize other users