

Autonomous Technologies in the Trucking Industry

Daniel Murray
American Transportation
Research Institute

2017 Top Industry Issues

1. Driver Shortage (7)
2. ELD Mandate (1)
3. Hours-of-Service (2)
4. Truck Parking (4)
5. Driver Retention (8)
6. CSA (6)
7. Cumulative Economic Impact of Regulations (3)
8. Driver Distraction (10)
9. Transportation Infrastructure /Congestion/ Funding (9)
10. Driver Health and Wellness (12)

CRITICAL ISSUES IN THE TRUCKING INDUSTRY – 2017



Presented to the
American Trucking Associations

Prepared by
The American Transportation Research Institute
October 2017



950 North Glebe Road
Arlington, VA 22203
(703)838-1966
atri@trucking.org
TruckingResearch.org

Top Issues Drivers vs. Carriers

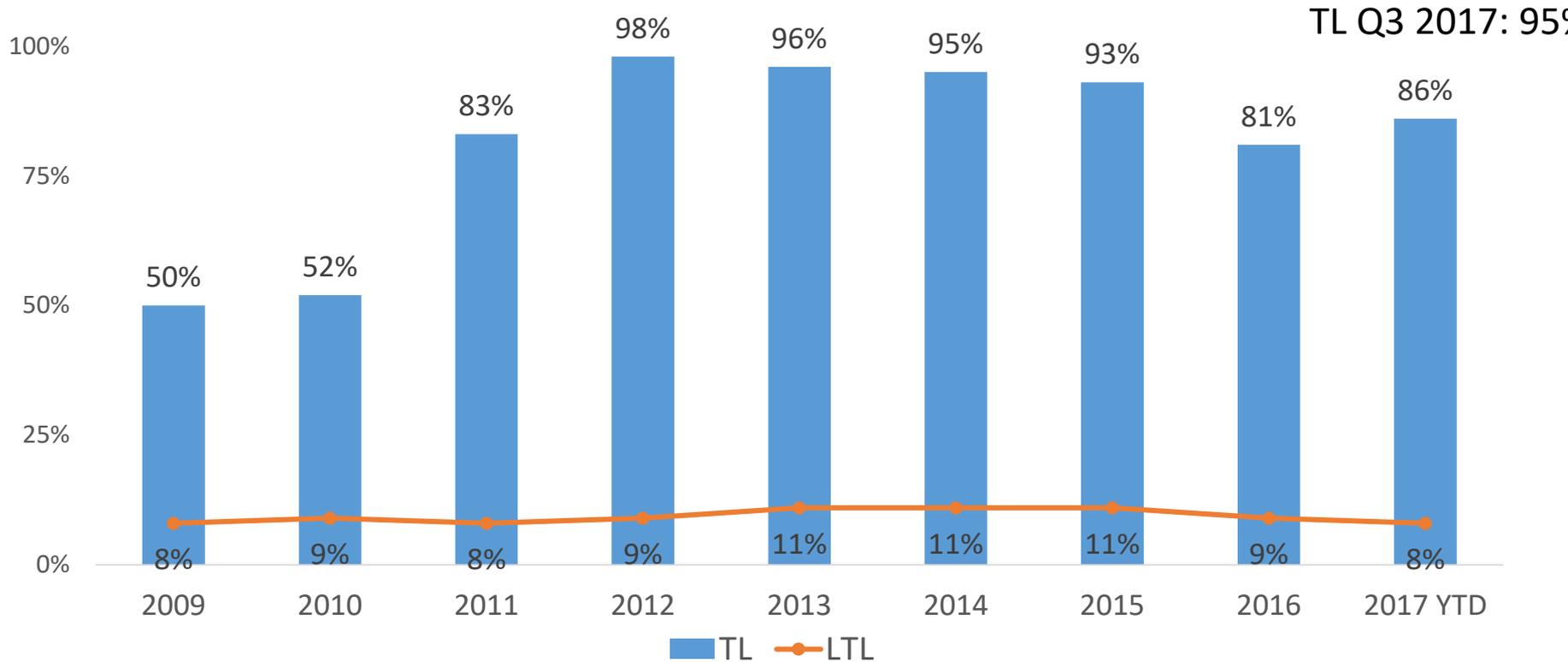
Commercial Drivers

1. ELD Mandate
2. Truck Parking
3. Hours-of-Service
4. Cumulative Economic Impact of Trucking Regulations
5. Driver Distraction
6. CSA
7. Driver Health/Wellness
8. Driver Retention
9. Transportation Infrastructure /Congestion/ Funding
10. Autonomous Vehicles

Motor Carrier Execs

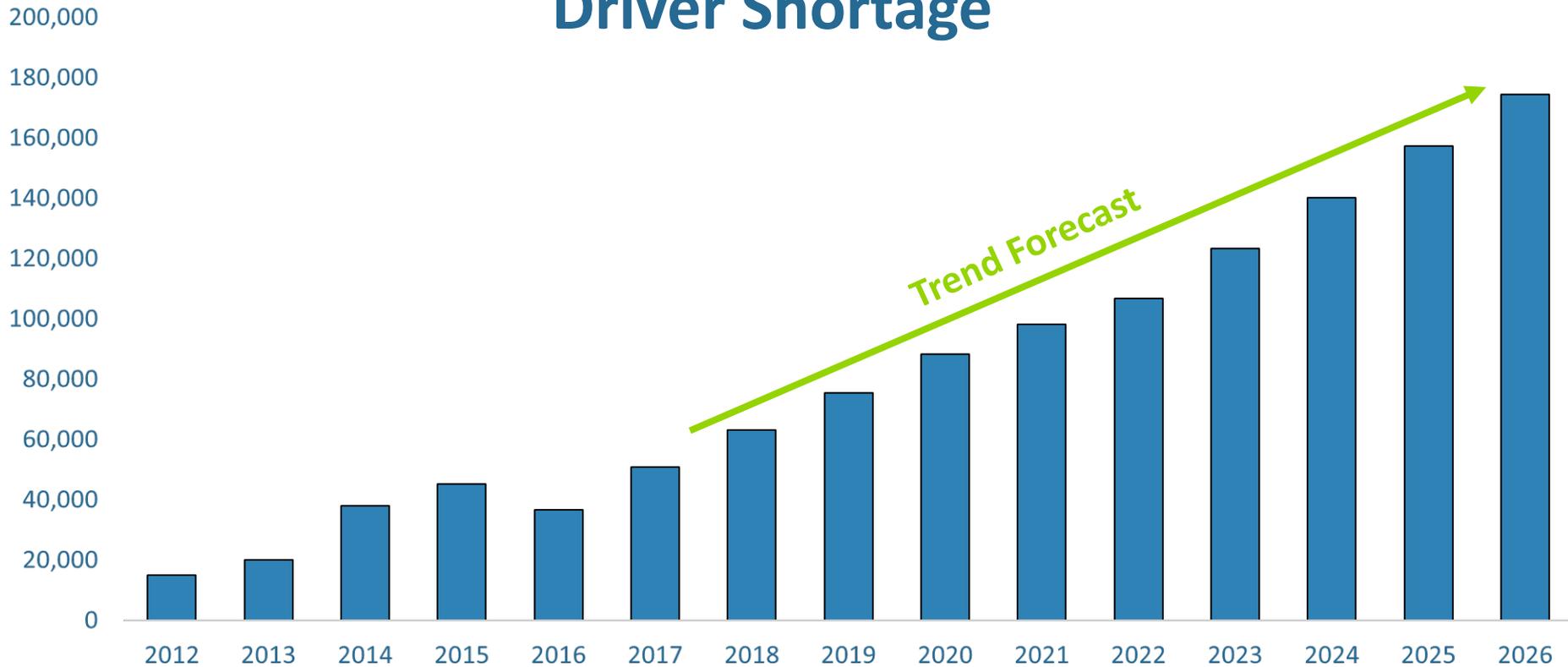
1. Driver Shortage
2. ELD Mandate
3. Driver Retention
4. CSA
5. HOS
6. Cumulative Economic Impact of Trucking Regulations
7. Transportation Infrastructure /Congestion/ Funding
8. Driver Distraction
9. Truck Parking
10. Tort Reform

Truck Driver Turnover Rates



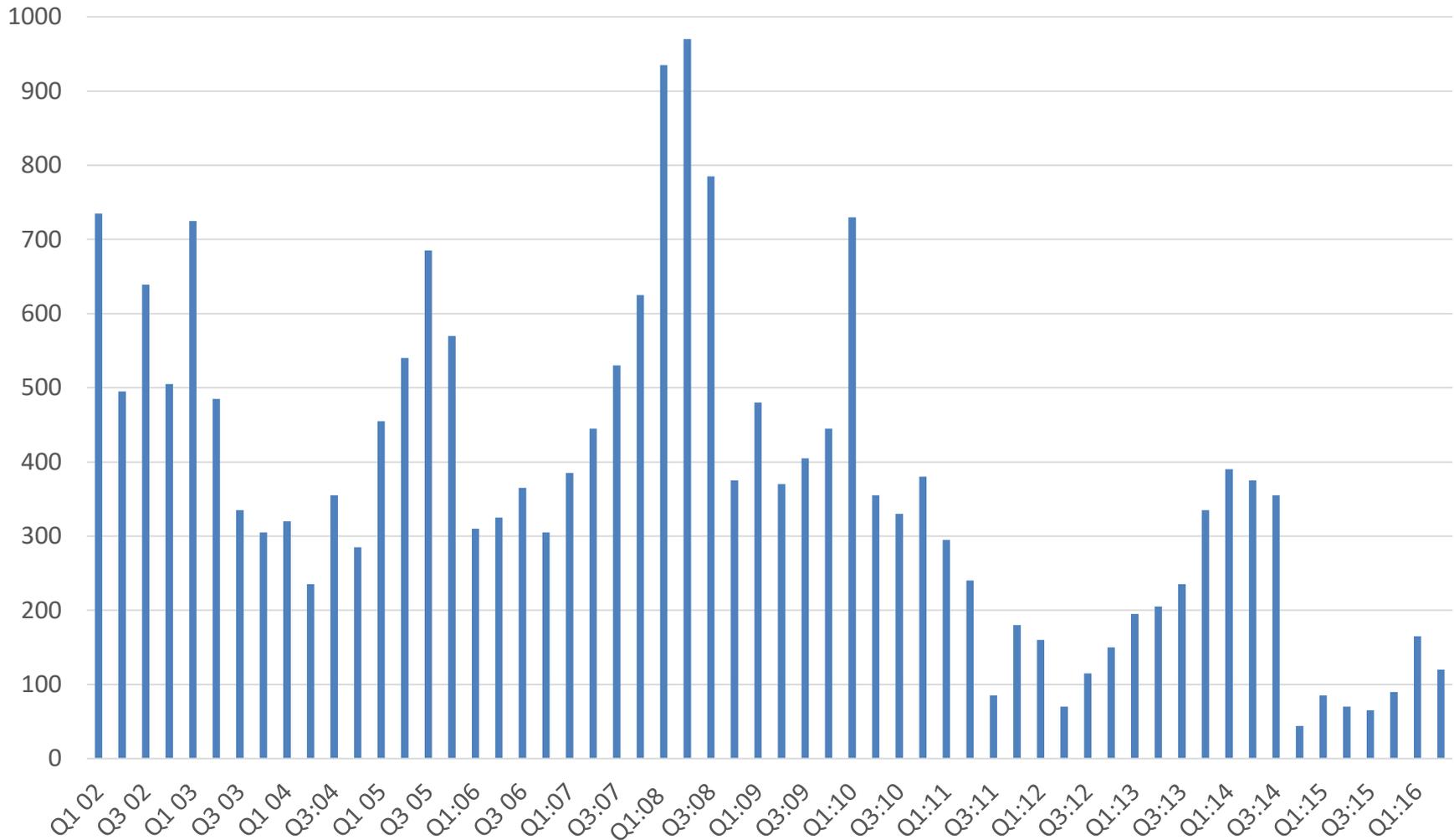
Source: ATA

Driver Shortage



Source: ATA's *Truck Driver Shortage Analysis 2017*

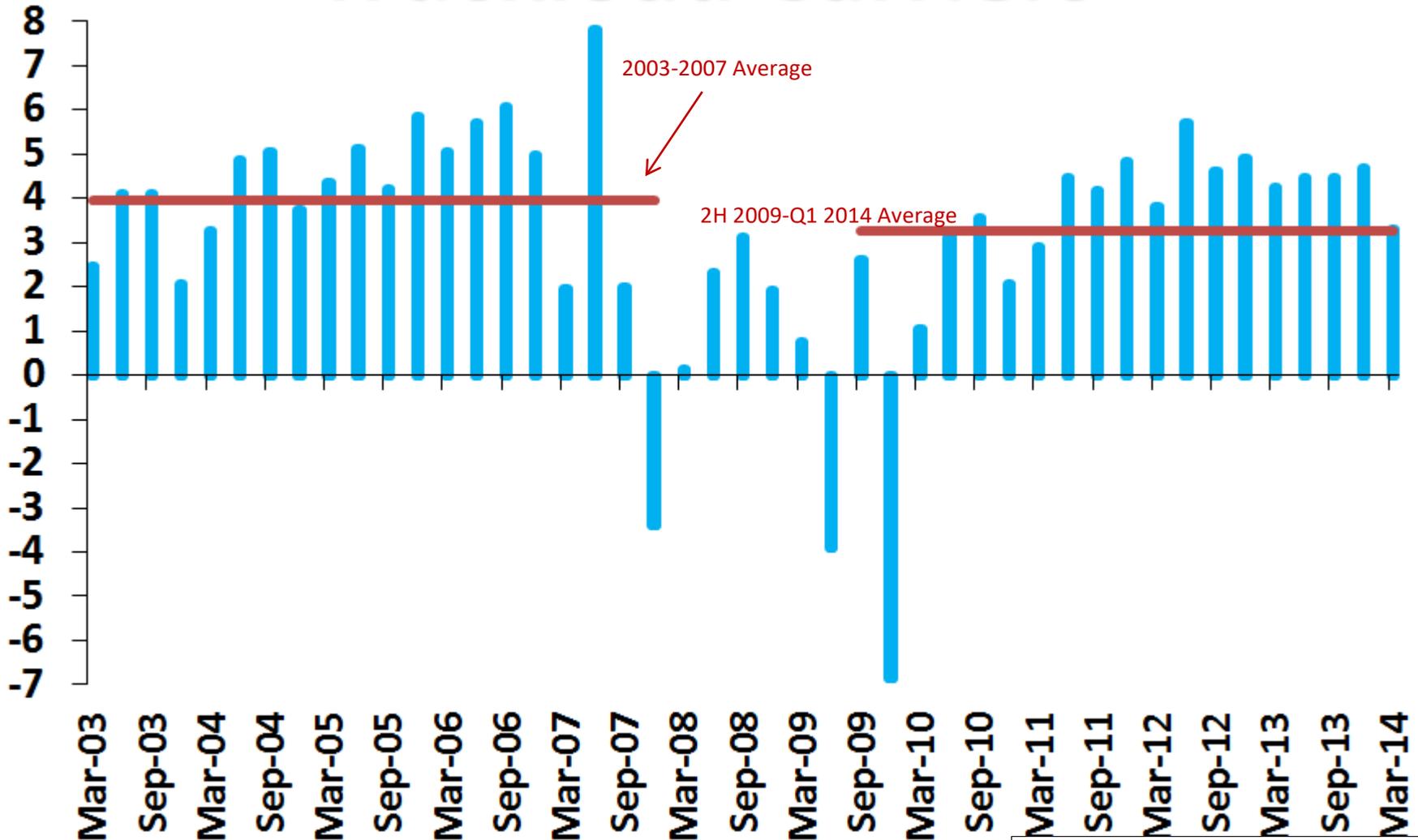
Trucking Failures Per Quarter



Source: Avondale Partners

Profit Margins of Publicly Traded Truckload Carriers

Percent

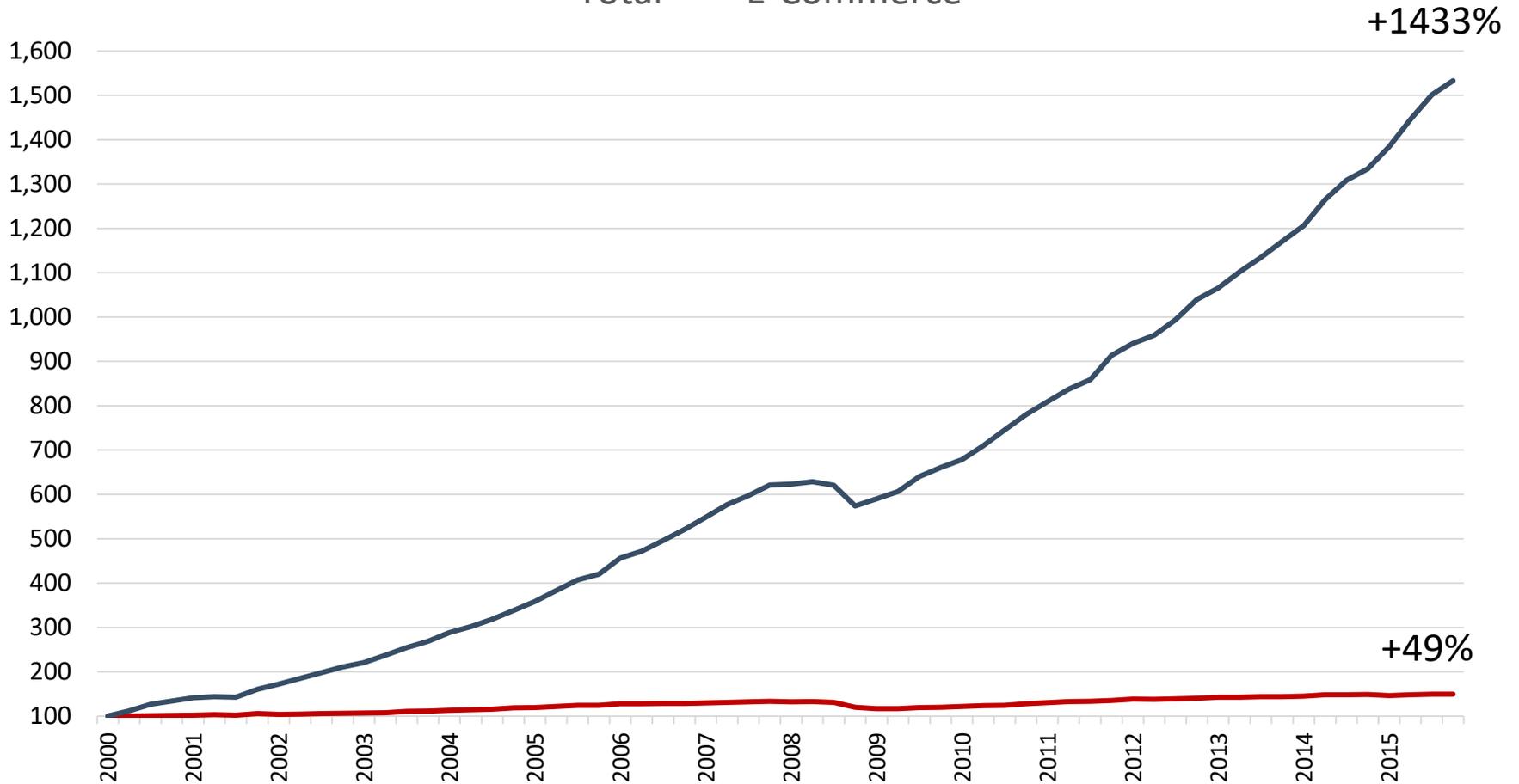


Source: ACT Research

Retail Sales

(Q1 2000 = 100)

— Total — E-Commerce



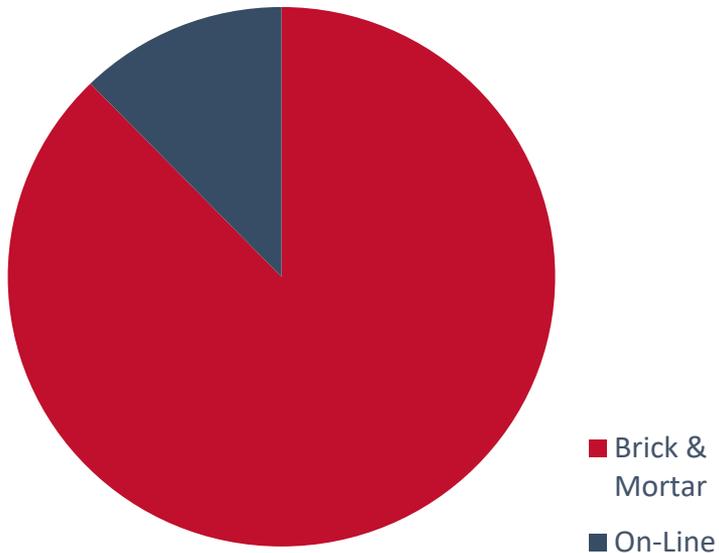
Source: Census Bureau



TRUCKING
Moves America Forward

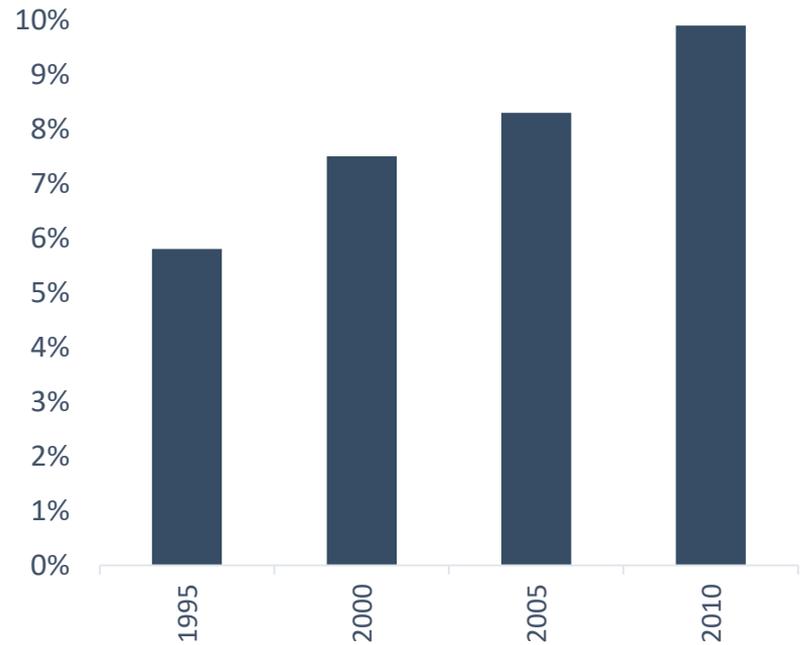
Retail Sales

Retail Sales (2016)



Brick & Mortar excludes auto sales and gasoline stations

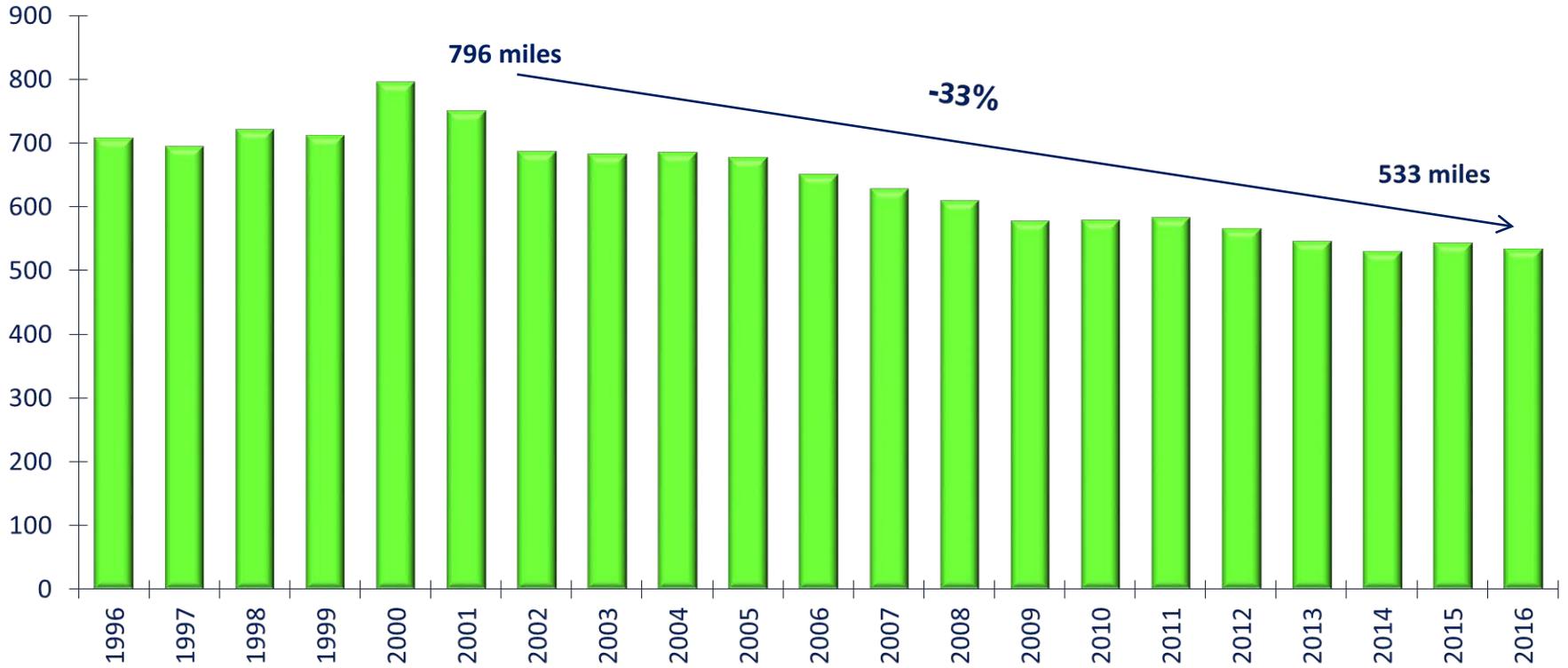
Percentage of On-Line Sales



On-line Sales have increased nearly 500% since 1995 versus 140% for core-retail sales.

Sources: Census Bureau & ATA

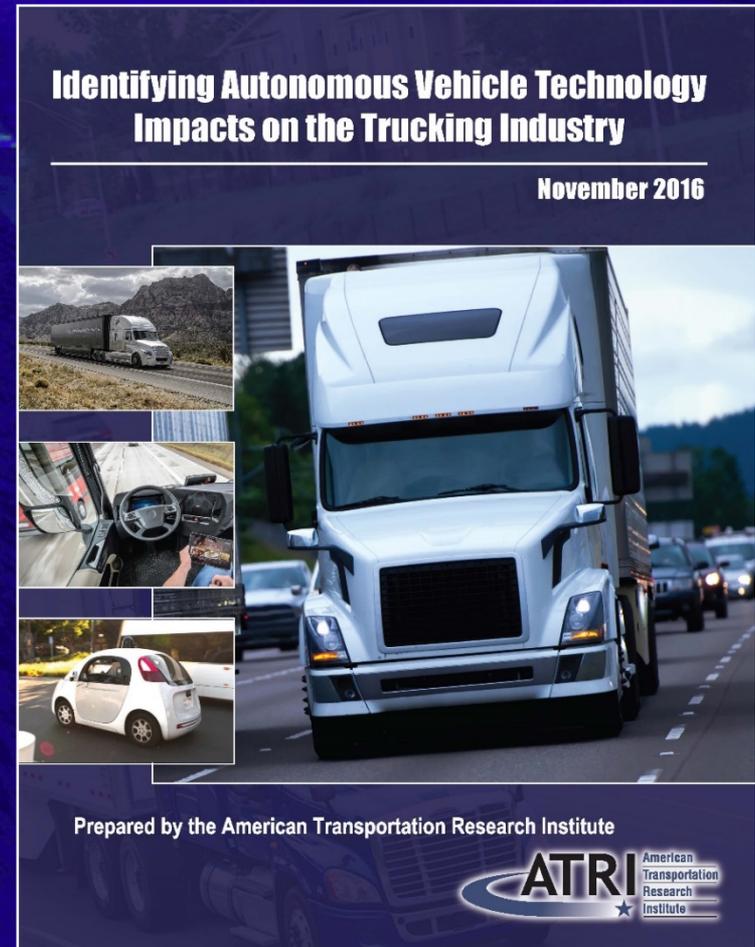
Dry Van Average Length-Of-Haul is Down



Source: ATA

Autonomous Vehicle Technology Impacts

- RAC-identified top research priority for 2016
- Maps AV impacts to trucking industry's top concerns
 - ◆ HOS
 - ◆ CSA
 - ◆ Driver H/W
 - ◆ Congestion



AV/AT Definitions

At SAE **Level 0**, the human driver does everything;

At SAE **Level 1**, an automated system on the vehicle can sometimes assist the human driver conduct some parts of the driving task;

At SAE **Level 2**, an automated system on the vehicle can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task;

At SAE **Level 3**, an automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests;

At SAE **Level 4**, an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions; and

At SAE **Level 5**, the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

AV/AT Definitions

At SAE **Level 0**, the human driver does everything;

At SAE **Level 1**, an automated system can sometimes assist the human driver control of the driving task;

At SAE **Level 2**, an automated system on the vehicle can actually conduct some parts of the driving task, but the human continues to monitor the driving environment and performs the driving task;

At SAE **Level 3**, an automated system can actually conduct some parts of the driving task and monitor the driving environment for some interventions, but the human driver must be ready to take back control when the system requests;

At SAE **Level 4**, an automated system can conduct the driving task and monitor the driving environment for take back control, but the automated system can operate in limited environments and under certain conditions; and

At SAE **Level 5**, the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

Freightliner kick-started the commercial vehicle automation conversation with Inspiration Truck



Techologies...

- **RADAR**
- **LIDAR**
- **Video Optics**
- **D-GPS / Digitized Mapping**
- **????**

Top Issues	Key Autonomous Truck Benefit
Hours-of-Service	Allows for driver rest and productivity to occur simultaneously.
Compliance, Safety, Accountability	Will decrease raw SMS scores, though percentile scoring needs to change.
Driver Shortage	Driving more attractive with higher productivity, less time away from home, and additional logistics tasks; fewer drivers may be needed.
Driver Retention	Companies with autonomous technology may attract and retain drivers.
Truck Parking	If "productive rest" is taken in the cab during operations, less time will be required away from home at truck parking facilities and fewer facilities will be needed.
Electronic Logging Device Mandate	Modifications will be necessary depending on level of autonomy.
Driver Health and Wellness	Driver could be less sedentary; injuries could be reduced.
The Economy	Carriers that use AT may see productivity and cost benefits.
Infrastructure / Congestion / Funding	Urban congestion could be mitigated through widespread use of autonomous vehicles (including cars).
Driver Distraction	Drivers will not be distracted from driving if vehicle in autonomous mode.



**PROUDLY BREWED.
SELF-DRIVEN.**

Budweiser
OTTO

Most Issues Not Technology-Related

- Safety by the Numbers...
- Where is U.S. DOT?

- Tort Issues will destroy the Best of Ideas
 - ◆ Negligence vs Liability
 - ◆ Drivers/Carriers to OEMs/Suppliers

- Insurance is King
- Public Perceptions...

- Please Define "Autonomous"
 - ◆ Reign in "driverless car" PR
 - ◆ Smart Trucks Already Exist
 - ◆ DATP for a Reason!
 - ◆ CV vs AV = 5.9 vs Better?

- ROIs & BCAs Will Solve All...

WSJ

FRONT



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Questions?

Dan Murray

dmurray@trucking.org

www.TruckingResearch.org

