CHAMBER OF PROGRESS

Analysis: AVs in California Could Have Saved Up to 1,300 Lives, Prevented Up to 5,000 Major Injuries Over Past Three Years

Pending California legislation would give cities a veto over AVs, enabling traffic fatality status quo

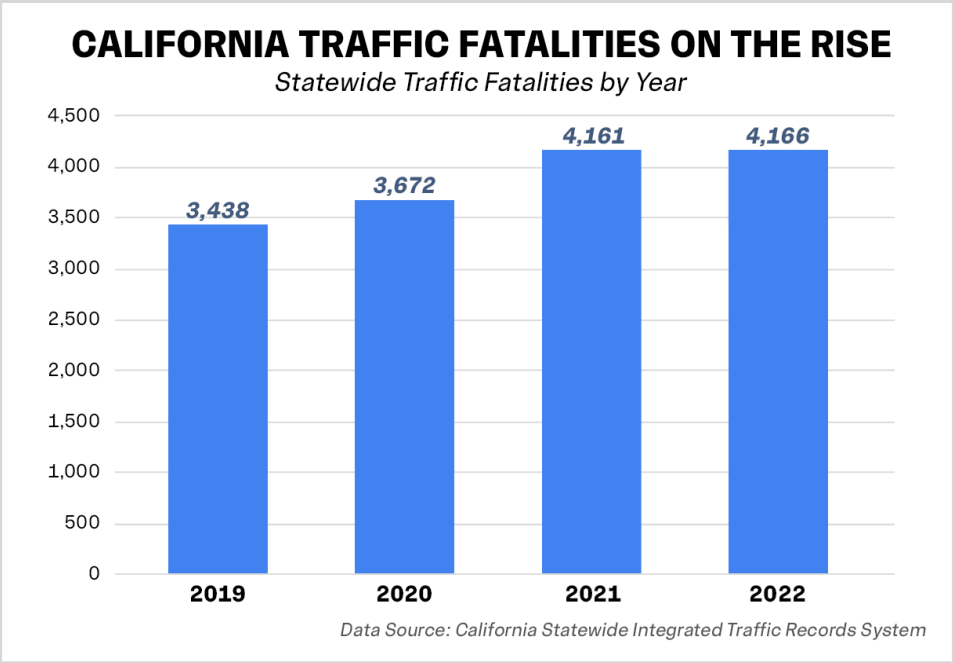
BY KAITLYN HARGER, SENIOR ECONOMIST

Introduction

In January, California Senator Dave Cortese introduced a bill that would allow local cities and municipalities to ban autonomous vehicles (AVs) within their jurisdictions. A press release from his office stated, "The State of California has opened testing of these vehicles in cities without regard to ... public safety."

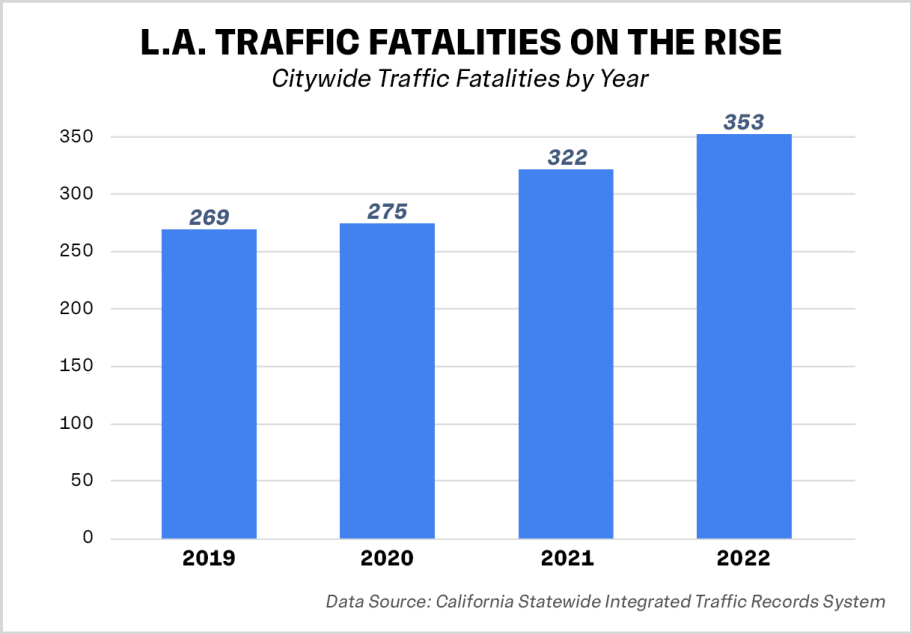
However, new research shows that AV adoption could bolster safety for Californians, finding that AVs are 6.8 times less likely to get into accidents involving injuries than human drivers.

This comes at a time when cities and counties across California are seeing increasing fatalities in traffic accidents. The University of California, Berkeley's Transportation Injury Mapping System (TIMS) includes data from California's Statewide Integrated Traffic Records System (SWITRS). SWITRS includes the number of fatal traffic accidents by city. The graph below shows total traffic fatalities in California for the 2019-2022 time period.



Los Angeles, California's largest city, has also experienced increasing numbers of traffic fatalities over recent years. The Los Angeles Times reported that California's traffic fatalities in 2022 outpaced national trends. Over 50% of the fatalities reported by the LAPD in 2022 involved collisions between pedestrians and vehicles. Traffic fatalities there were so numerous in 2023 that they exceeded the number of deaths due to homicide.

The graph below shows a pattern of increasing fatalities in Los Angeles since 2019.



Research finds AVs safer than human drivers

Because autonomous vehicles are now operating alongside human-driven vehicles in Phoenix, San Francisco, and Los Angeles, we can compare the relative safety of AVs to human drivers.

Recent research on vehicle crash rates in those cities found that **AVs were 6.8 times less likely to be involved in a crash** resulting in injury as compared to human drivers. The results suggest that cities could see substantial traffic safety improvements with additional or new AV deployment.

Given the potential safety gains associated with AV adoption, let's examine how traffic injuries and fatalities could change if more AVs were driving instead of human drivers.

Potential Safety Gains in California if AV Adoption Grew

California requires companies testing AVs to register with the Department of Motor Vehicles (DMV). The DMV then posts accident reports for crashes involving AVs. These

reports indicate where the crash took place, the circumstances surrounding the crash, and whether injuries occurred.

For this analysis, I reviewed all AV accident reports during the 2020-2022 time period and recorded when injuries occurred and the severity of injury. During this time period, I found zero fatalities and three instances of serious injury, which I defined as an injury requiring a trip to the hospital.

The data on accidents with human drivers in California come from SWITRS, accessed through the University of California at Berkeley's TIMS. The data are provided on an annual basis and can be broken into three overlapping categories of injury including: fatalities, fatalities and serious injuries, and fatalities and any level of injury. For this analysis, I examined all categories of injury for the most recent three years of data available, 2020-2022.

In order to estimate how many accidents could have been avoided by the use of AVs, I first needed to remove from the data accidents that already involved AVs. To do this, I reviewed information from the accident reports provided by the DMV in order to remove those accidents from the total potential accidents avoided. The table below shows the total number of AV accidents by year.

Total AV Accidents Resulting in Injury	
Year	**Number of Accidents Involving Injury**
2020	**6**
2021	**14**
2022	**18**

After removing the accidents already involving AVs, I consider accidents that could potentially be avoided if AVs replaced human-driven cars.

Recall that the research from Waymo suggests that AVs are 85% less likely to get into accidents resulting in injury than human drivers. While AVs are less likely to be involved in accidents, there are also fewer AVs on the road. In order to estimate how many accidents could be avoided on California roads, we have to make an estimation of how quickly AVs will be adopted.

The consultancy Steer has considered three scenarios: a conservative scenario where AVs would make up 1.3% of the total US share of cars on the road, a moderate scenario

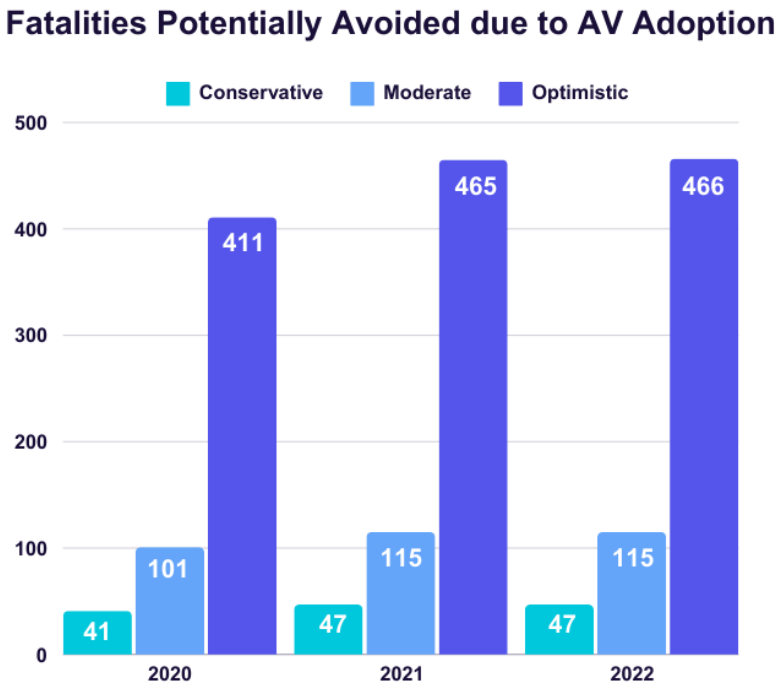
where AVs would comprise 3.2% of cars on the road, and an optimistic scenario where 13% of cars on the road would be AVs.

I applied these same adoption percentages to this analysis. Under a conservative scenario, 1.3% of accidents involving human drivers would be replaced with AVs, which are less likely to be involved in an accident. The moderate scenario assumes that 3.2% of accidents involving human drivers would be replaced by AVs. In the optimistic scenario, 13% of accidents involving human drivers would be replaced by AVs.

Fatal injuries

I considered the most recent three years that California has reported numbers for fatal crashes: 2020, 2021, and 2022. Recall that AVs are 85% less likely to be involved in a crash resulting in injury as compared to human drivers.

The graph below shows traffic fatalities for California under three scenarios - a conservative scenario assuming that 1.3% of the vehicles are replaced by AVs, a moderate scenario assuming 3.2% of vehicles are replaced by AVs, and an optimistic scenario which assumes that 13% of vehicles are replaced by AVs.



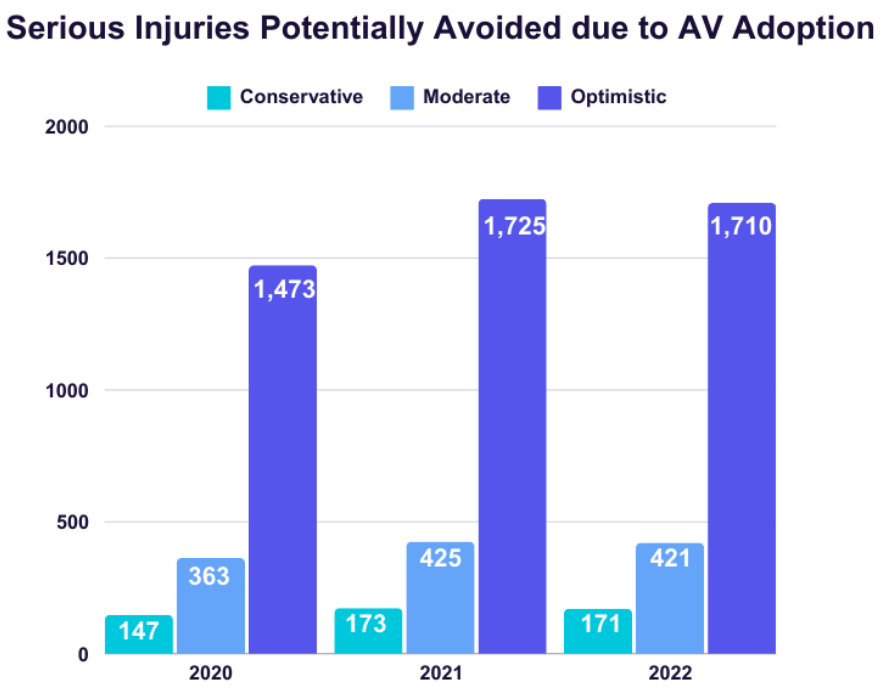
Under the conservative adoption scenario, **replacing 1.3% of human-driven vehicles with AVs could have saved an average of 45 lives per year in California, a total of 135 lives between 2020 and 2022.** Under the moderate scenario, **replacing 3.2% of human-driven vehicles could have saved roughly 100 lives per year in California, a total of 331 lives**

over a three-year period. Under the optimistic adoption scenario, **an estimated 400-500 fatalities could have been avoided annually, totaling 1,342 lives** over the last three years.

Serious, non-fatal injuries

Next, I looked at crashes that resulted in serious injuries that were not fatal.

The data provided by SWITRS provides totals for fatal injuries and fatal and serious injuries. In order to isolate serious injuries within the data, I removed fatal crashes from the data so that I am left with serious injuries only.

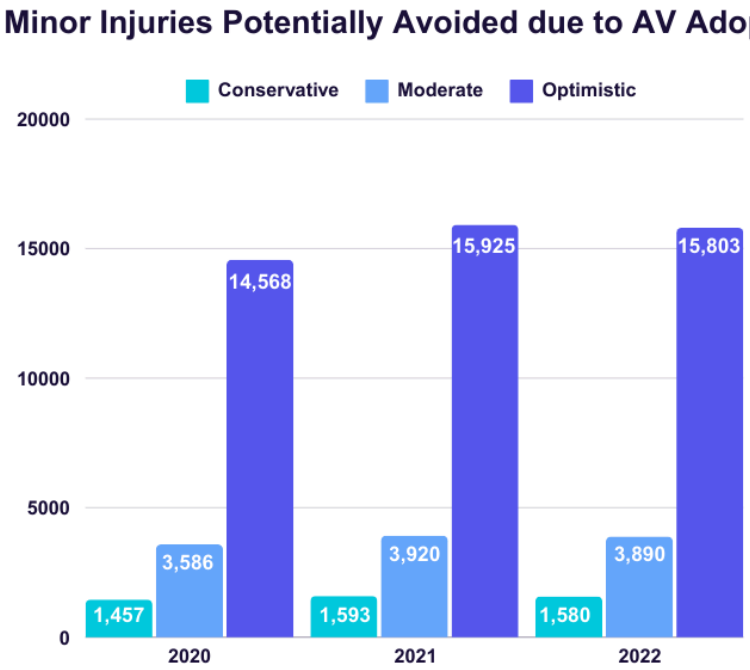


Again, the conservative adoption scenario assumes that 1.3% of human-driver accidents are replaced by AVs, thereby decreasing the likelihood of an accident occurring since AVs are less likely to be involved in accidents resulting in injury. **Based on the conservative scenario, a total of 491 serious injuries over a three-year period could have been avoided using AVs**.

The moderate scenario assumes that 3.2% of human-driver accidents are replaced by AVs and thus less likely to occur. In this scenario, **an average of 403 serious injuries per year could potentially be avoided, with a total of 1,209 serious injuries potentially avoided over a three-year period.**

In the optimistic scenario, 13% of crashes that resulted in serious injury would now be less likely to occur as the drivers were replaced by AVs. This assumption results in over 1,000 serious injuries prevented each year and a total of **almost 5,000 serious injuries prevented between 2020 and 2022**.

Minor Injuries (non-serious, non-fatal)
The SWITRS also includes information on 'fatalities and any level of injuries'. In order to examine minor injuries alone, I remove fatalities and serious injuries from this category.



Based on the conservative scenario above, AV adoption may have prevented over **1,500 minor injuries annually and over 4,500 during the last three years**. Under the moderate scenario, AVs may have prevented over **3,500 injuries annually and over 11,000 injuries between 2020 and 2022**. The optimistic scenario suggests almost **15,000 annual minor injuries and 46,000** over the last three years may have been avoided if 13% of human-driven vehicles were replaced with AVs.

Conclusion

The recent bill from Senator Cortese shows some California cities' resistance to deploying AVs in their communities due to safety concerns. However, research suggests that AVs are safer than human drivers.

If AVs were more fully embraced in California, Californians could see a decrease in fatalities, serious injuries, and minor injuries from traffic accidents. But if cities are allowed to block AVs from the streets, we're likely to see the unsafe status quo.