HIGHWAY LOSS DATA INSTITUTE

Bulletin | Vol. 29, No. 8 : September 2012

Estimating the effect of projected changes in the driving population on collision claim frequency

Despite having higher claim frequencies than prime age drivers, the increasing number of older drivers is not expected to affect overall collision claim frequency. The increase in the proportion of older drivers is expected to be offset by a decrease in the proportion of the youngest drivers. While the decrease in the proportion of younger drivers is not as big as the increase in older drivers, their claim frequency is much greater than that of older drivers.

Introduction

The proportion of drivers aged 75 and older is growing. This trend is expected to continue as baby boomers age. In 2010, there were more than 22 million licensed drivers 70 and older, compared with fewer than 18 million in 1997. A previous analysis by the Highway Loss Data Institute (HLDI) showed that starting at about age 65, collision losses increase with age, though they don't get as high as the youngest drivers' claim rates (HLDI, 2005). Thus, the rapid increase in the number of older drivers has led to concerns about the potential effects on traffic safety. The purpose of this HLDI bulletin is to estimate the effect that the changing age profile of the U.S. population will have on collision claim frequencies.

Methods

External data source

Population counts by age for the years 2010-2030 were obtained from the U.S. Census Bureau for ages 15 and older. Data for years 2011-30 were projections based on the 2000 census.

Insurance data

Insurance covers damage to vehicles and property as well as injuries to people involved in crashes. Different insurance coverages pay for physical damage versus injuries. Also, different coverages may apply depending on who is at fault. In the present study, collision coverage was examined. Collision coverage insures against vehicle damage to an at-fault driver's vehicle sustained in a crash with an object or other vehicle; this coverage is common to all 50 states. The main analysis was based on collision loss data from calendar year 2010 and involving vehicles from the 10 most current model years in 80,518,055 insured vehicle years and 4,960,431 claims. Data from calendar years 2007 through 2010 (337,003,757 insured vehicle years and 20,858,741 claims) were used to characterize trends over time that were incorporated into variations on the main analysis to check its sensitivity to necessary assumptions.

Rated drivers

Insurance data were stratified by age of the rated driver. The rated driver is the one who typically is considered to represent the greatest loss potential for the insured vehicle. In a household with multiple vehicles and/or drivers, the assignment of drivers to vehicles can vary by insurance company and by state, but usually it reflects the driver most likely to operate the vehicle. Information on the actual driver at the time of a collision is not available in the HLDI database.

Age was unknown for 7.6 percent of drivers in the HLDI data, and their exposure was assigned proportionally across the known ages. The exact year of birth was available in the insurance data for drivers aged 85 and older, but in order to make the data structure consistent with the Census Bureau's data, all such drivers were assigned to a single 85+ group, which comprised approximately 1 percent of the data.

Analytical method

In order to understand how changes in the population affect collision claims, the relationship between the driving-age population and rated driver collision exposure in the HLDI database had to be quantified. In this study, that relationship is referred to as the insured driver rate. The insured driver rates were calculated by age group and calendar year. For example, in 2010 there were 247.5 million people of driving age and 80.5 million insured vehicle years in the HLDI database. Thus, the insured driver rate in the study for 2010 was 0.325. This underestimates the ratio of insured drivers to population of driving age because of limitations of the HLDI database. Only the 10 most current model years per calendar year are included. In calendar year 2010 these vehicles represent approximately 49 percent of registered vehicles in the U.S. (R.L. Polk). Additionally, not all insurers supply data to HLDI. Based on information published by AM Best, the companies that supply data to HLDI comprise over 80 percent of the private passenger automobile insurance. Strictly speaking, the insured driver rate is the relationship between the driving age population and the rated drivers associated with insured vehicles in the HLDI database. Despite its limitations, the insured driver rate as defined in this analysis is expected to be a useful metric for the calculations needed to estimate the effects of the aging population on insurance losses.

Insurance and population data for calendar year 2010 were used to calculate insured driver rates and collision claim frequencies by age. These figures were then combined with population projections to predict exposure and collision claim counts for future years. This was done by fitting two regression models in which driver age was the single independent variable. The first model used the binomial distribution along with the 2010 insured driver rate as the dependent variable to predict the available exposure (rated driver insured vehicle years) for calendar years 2011-2030. The second model used the Poisson distribution along with 2010 collision claim frequency as the dependent variable to predict claim counts for calendar years 2011-2030. These models yielded results similar to multiplying the future population counts in each age group by the corresponding insured driver rates and claim frequencies for that group. The estimates of future claim counts derived in this way assume that neither the insured driver rate nor claim frequency for each age group changes over time.

Several variations on the main analysis were conducted to examine the sensitivity of results to deviations from the assumptions that were made. Seven variations examine changes over time in the insured driver rates from those observed in the 2010 data. These rates may change over time if younger people delay licensing or older ones keep their licenses longer than people in 2010. These rates also may change if drivers change their insurance subscription tendencies as a result of economic changes or statutory requirements. Linear increases from 2010 to 2030 in older insured driver rates from 10 to 20 percent above the 2010 value are examined, as is a 10 percent decrease in the younger insured driver rate. Also, extreme changes in the insured driver rate for the oldest drivers were investigated. As the concern about older drivers' effect on traffic safety is based on their higher-than-average crash rates, three scenarios increasing their claim frequency from 5 to 20 percent above 2010 levels were also calculated. Also, instead of basing the predictions solely on 2010 claim frequencies and insured driver rates, the trends exhibited among these variables for calendar years 2007 through 2010 were extrapolated out to 2030. Finally, two scenarios modifying the extrapolated trends were examined. One examines the possibility that the current decreasing claim frequency trend accelerates by 2 percent each year and the other that older and younger driver claim frequency trends accelerate by different amounts.

Results

Figure 1 displays the predicted increase in total U.S. driving-age population (ages 15+) from 2010 through 2030. In 20 years this population is expected to increase by almost 20 percent from 247 million to 291 million. The distribution by age for 2010 and 2030 are shown in Figure 2. Driver age groups younger than 65 will make up a smaller proportion of the driving age population in 2030 than they did in 2010. In contrast, drivers in the 65 and older age groups will make up a larger portion of the driver population in 2030 than they did in 2010. Figure 3 shows the population change over the same time period by age group. Between 2010 and 2030 the largest population change will be seen in the older age groups, 65 and older. The youngest of the age groups are projected to only see minimal growth in that time period. Despite the differences in growth, the youngest drivers each still will make up a larger proportion of the future population than the oldest. People aged 15-29 years are expected to comprise 23.8 percent of the 2030 population and those that are 70 years and older are expected to comprise 17.6 percent.

Figure 1: U.S. driving age population (in millions), 2010-2030

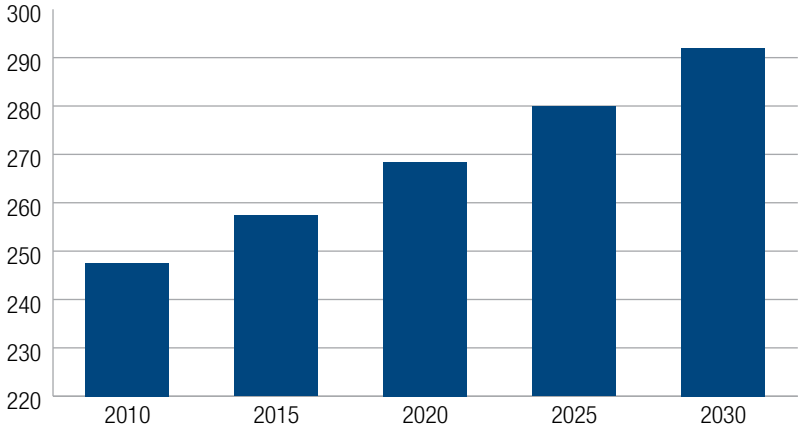


Figure 2: Age group proportions in U.S. driving age population by age, 2010 and 2030

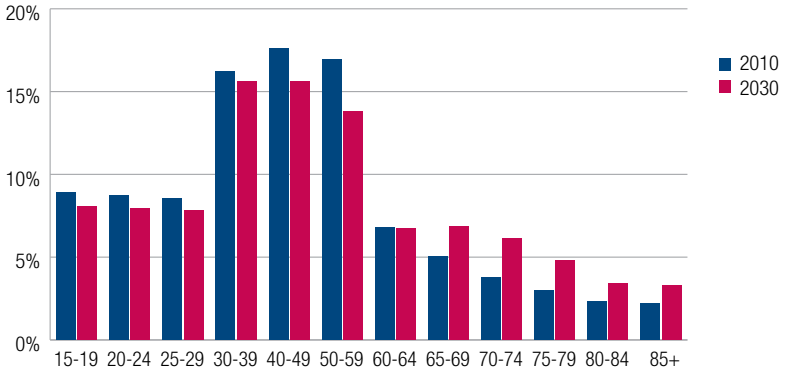


Figure 3: Percent change in U.S. population by age group, 2010-30

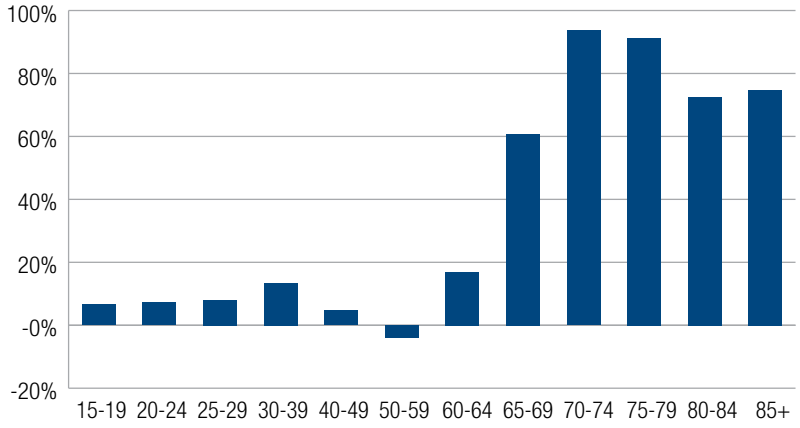


Figure 4 shows relative collision claim frequencies by age group for vehicles from model years 2002-11 in calendar year 2010. Collision claim frequencies are highest for the youngest age group (ages 15-19) and slowly decline and level off around age 50. Claim frequencies begin to rise again around age 70, reaching average at age 75 and never reaching the level of the youngest drivers. The 60-64 age group has the lowest relative claim frequency at 86 percent of the all driver average. This is compared with 15-19 year-olds that have a relative claim frequency nearly 70 percent higher than the average.

Figure 4: Relative collision claim frequencies by rated driver age, calendar year 2010, model years 2002 to 2011

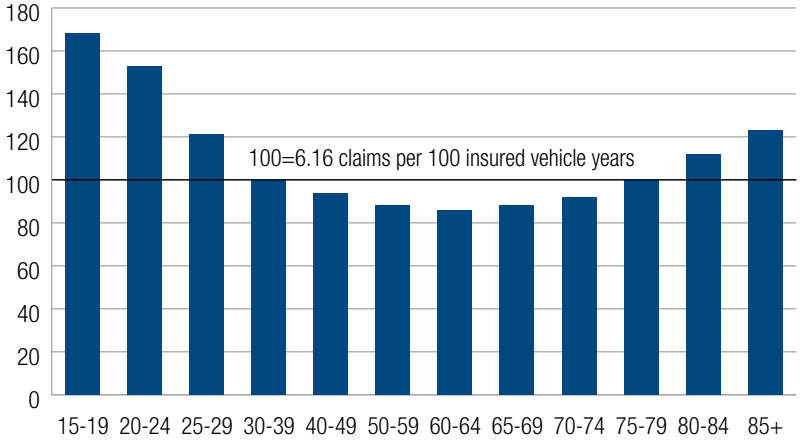


Figure 5 displays 2010 insured driver rates (the ratio of insured vehicle years to population) for each age group. The youngest and oldest age groups have the lowest insured driver rates. The highest insured driver rate is for people aged 60-64 followed closely by the 65-69 and 50-59 age groups.

Figure 5: Ratio of collision exposure to population by age group, 2010

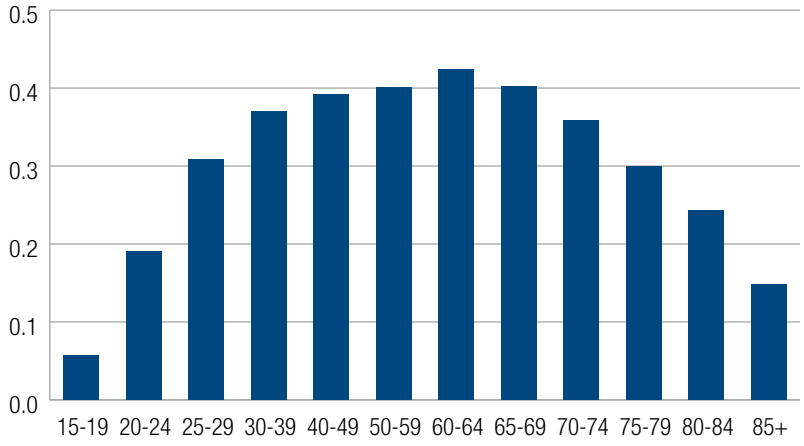


Figure 6 shows predicted collision claim frequencies from 2010 to 2030 assuming that the insured driver rates and claim frequencies in each age group do not change over this time period. Despite the expected shift toward an older population, frequencies remain essentially flat, ranging from 6.12 claims per 100 insured vehicle years in 2020 to a high of 6.16 in 2010. The difference is seen in Figure 7, where the axis is narrowed to better visualize the change.

Figure 6: Predicted collision claim frequencies due to changing age distribution, 2010 to 2030

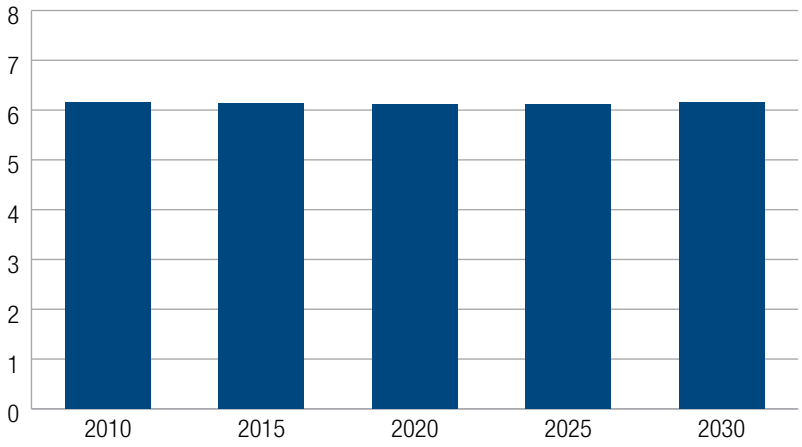


Figure 7: Predicted collision claim frequencies due to changing age distribution, 2010 to 2030

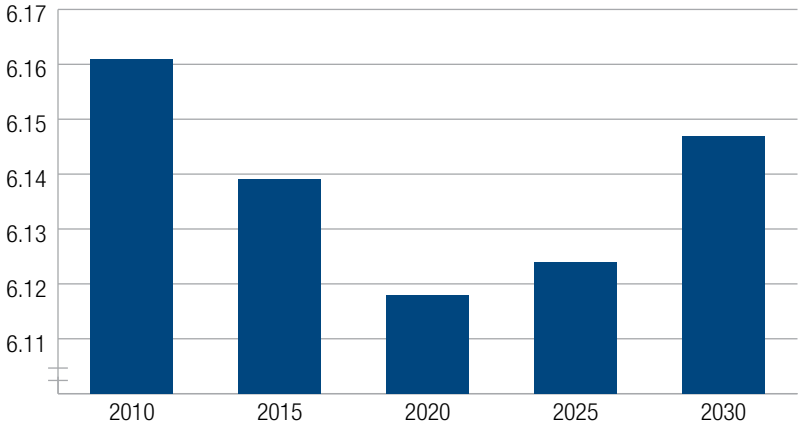


Table 1 illustrates how each age group contributes to the overall claim frequencies in years 2010 and 2030 and also shows the change in contribution for each. Each age group's contribution to the overall claim frequency columns is calculated by multiplying the percent of total exposure by claim frequency. The change in age group contribution to frequency is the arithmetic difference between the 2010 and 2030 age group contributions to the overall claim frequency columns. The positive values in the last column for the age groups for drivers over 65 indicate that additional collision claims will occur as a result of having a higher percentage of the insured population in these age groups. However, those increases will be offset by reductions in the age groups under 60, which will still comprise more than 65 percent of the future exposure.

Table 1: Projected incremental changes to collision claim frequency by age group, 2030

	2010 actual			2030 projected			
Age group	Percent of total exposure	Overall claim frequency	Age group contribution to frequency	Percent of total exposure	Overall claim frequency	Age group contribution to frequency	Change in age group contribution to frequency
15-19	1.6%	10.3	0.162	1.4%	10.3	0.147	-0.015
20-24	5.1%	9.4	0.479	4.7%	9.4	0.438	-0.042
25-29	8.1%	7.5	0.605	7.5%	7.5	0.557	-0.048
30-39	18.5%	6.2	1.140	17.8%	6.2	1.100	-0.040
40-49	21.2%	5.8	1.235	18.9%	5.8	1.101	-0.133
50-59	20.9%	5.4	1.135	17.1%	5.4	0.927	-0.209
60-64	8.9%	5.3	0.469	8.8%	5.3	0.467	-0.002
65-69	6.2%	5.4	0.336	8.5%	5.4	0.460	0.124
70-74	4.1%	5.7	0.235	6.8%	5.7	0.387	0.153
75-79	2.7%	6.2	0.168	4.4%	6.2	0.274	0.105
80-84	1.7%	6.9	0.119	2.5%	6.9	0.175	0.056
85+	1.0%	7.6	0.077	1.5%	7.6	0.115	0.038
Total frequency			**6.161**			**6.148**	**-0.012**

As stated earlier, this analysis is based on assuming that neither the insured driver rates nor the claim frequencies in each age group change from their values in 2010. However, there is some reason to expect that the insured driver rates for the older drivers may increase over time as improvements in health and mobility allow more people in the older age groups to continue driving later in life. The effect of this possibility was examined by inflating the insured driver rates for the oldest age groups by as much as 20 percent above the 2010 values. As shown in **Table 2**, none of these scenarios results in a predicted increase in the overall claim frequency in 2030. Even under the extreme scenario that the insured driver rate reaches 99 percent by 2030, the overall claim frequency would only be expected to increase by 2 percent above the 2010 value. The one scenario examining a decrease in younger driver insured rates also has little effect on estimated future claim rates.

Increases in older driver claim frequencies from 5 percent to 20 percent above 2010 levels were also examined. All of these scenarios predict small increases in the overall claim frequency (**Table 3**). However, the recent trend for both collision claim frequencies and insured driver rates has been downward, possibly because of the recent economic downturn in the U.S. (**Figures 8 & 9**). **Figure 8** illustrates the collision claim frequency trend for calendar years 2007 through 2010, while **Figure 9** shows the trend in the driving ratio over the same time period. If the current trends are extrapolated to future years and included in the calculations examining changes in the age distribution, then the overall claim frequency in 2030 will be lower than 2010, although the difference will be small (**Table 4**). If these trends were to accelerate, then there would be large reductions in overall claim frequency.

Table 2: Predicted changes to collision claim frequency given changes in the driving rate

	2010	2015	2020	2025	2030
Predicted results	6.16	6.14	6.12	6.12	6.15
Changes to Driving Rate Assumptions					
10% increase for ages 65+ by 2030	6.16	6.14	6.12	6.12	6.14
20% increase for ages 65+ by 2030	6.16	6.14	6.11	6.12	6.14
10% increase for ages 75+ by 2030	6.16	6.14	6.12	6.13	6.15
10% decrease for ages 15-19 by 2030	6.16	6.14	6.12	6.12	6.14
65+ age group reaches 45% by 2030	6.16	6.15	6.14	6.15	6.19
75+ age group reaches 45% by 2030	6.16	6.15	6.14	6.16	6.20
75+ age group reaches 99% by 2030	6.16	6.17	6.19	6.23	6.29

Table 3: Predicted changes to overall collision claim frequency given changes in age group claim frequencies

	2010	2015	2020	2025	2030
Predicted results	6.16	6.14	6.12	6.12	6.15
Changes to Claim Freqeuncy Assumptions					
5% increase for ages 75+ by 2030	6.16	6.14	6.13	6.14	6.18
10% increase for ages 75+ by 2030	6.16	6.15	6.14	6.16	6.20
20% increase for ages 75+ by 2030	6.16	6.16	6.16	6.20	6.26

Table 4: Predicted changes to collision claim frequency under alternative trend assumptions					
	2010	2015	2020	2025	2030
Predicted results	6.16	6.14	6.12	6.12	6.15
Alternative Trend Assumptions					
Including frequency trend (2007-2010) into the model	6.16	6.08	6.01	5.98	5.96
Including frequency and driving ratio trend (2007-2010) into the model	6.16	6.03	5.93	5.85	5.80
2% annual decrease in the frequency trend	6.16	5.52	4.89	4.29	3.69
1% decrease for youthful drivers and 3% decrease for older drivers in the frequency trend	6.16	5.38	4.60	3.86	3.16

Figure 8: Collision claim frequency trend 2007 - 2010

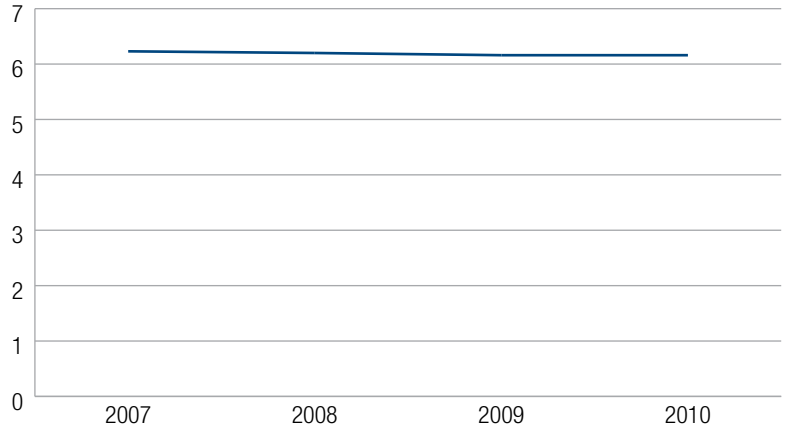
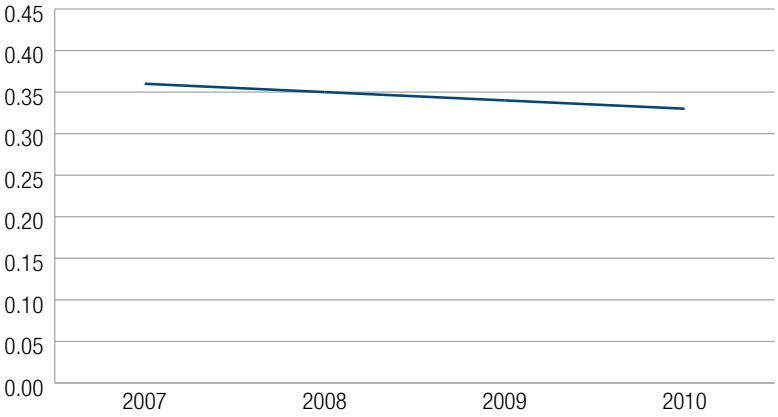


Figure 9: Insured driver ratio trend 2007 - 2010



Discussion

The higher-than-average insurance claim rates of the oldest drivers combined with expectations that their proportion in the U.S. population will increase has led to concerns that crash rates and claim frequencies will increase in the future. However, these concerns do not take into account the broader context in which the aging of the U.S. population is taking place. Even though the segment of the population older than 65 years is expected to be 77 percent larger in 2030 than in 2010, it still will comprise a smaller proportion of the total driving-aged population than those younger than 30. And while all drivers younger than 30 have higher than average claim rates, on the older end of the spectrum only those 80 and over do. Furthermore, the oldest driver claim rates are just 23 percent higher than average, while those of drivers aged 15-19 are 68 percent higher and those of drivers aged 20-24 are 53 percent higher. Thus, the increase in claim frequency associated with an increase in the older driver population is expected to be offset by decreasing proportions of the youngest drivers. Drivers aged 30-64, who have below-average claim frequencies, are expected to remain the largest segment of the driving population. This analysis shows that the expected increase in insurance claim frequencies associated with the aging of the U.S. population will not occur.

The main analysis described earlier is based on the assumptions that the pattern of claim frequency by age in the future is the same as it was in 2010 and that the ratio of drivers represented in the HLDI database to the driving age population at large also does not change. There are reasons to question both of these assumptions. Better health of future older populations could lead to more older drivers continuing to drive later in life. This would lead to higher ratios of HLDI drivers to the general population than in 2010. Similarly, it has been reported that younger people are delaying licensure, which would lead to lower insured driver rates in the youngest age groups. Both of these possibilities were examined with additional analyses and only those scenarios representing extreme deviations from the main analysis predict increases in the future claim rate, the largest of which was about 2 percent higher than the claim rate in 2010.

The assumptions about the constancy of current claim frequencies were also examined by computing scenarios in which claim frequencies were varied over time for different age groups. Only an acceleration of the current downward trend in claim frequency produced a future prediction significantly different from the main analysis. However, it's possible that the current downward trend in frequency is due to the economic recession begun in 2007. A recovering economy could end the downward trend in claim frequency or even reverse it.

Limitations

This bulletin predicts collision claim frequency changes that might occur as the driving population ages. Only age was varied in the model. Assumptions were made that other demographics remained unchanged between 2010 and 2030. In reality, demographic and other factors could change over time, and those changes could affect claim frequency.

These analyses depend heavily on U.S. Census Bureau projections of future population. If these projections should change, then the conclusions based on these analyses may no longer be valid. Also, while the ratio of drivers in the HLDI database to the population of driving aged people seems a valid way to calculate exposure, the results may not extend to other measures of vehicle crash rates besides insurance claim rates.

References

Highway Loss Data Institute. 2005. Insurance losses by driver age. Insurance special report A-70. Arlington, VA.

HIGHWAY LOSS DATA INSTITUTE

1005 N. Glebe Road, Suite 700
Arlington, VA 22201 USA
tel 703/247-1600
fax 703/247-1595
iihs-hldi.org