HLDI
Highway Loss Data Institute

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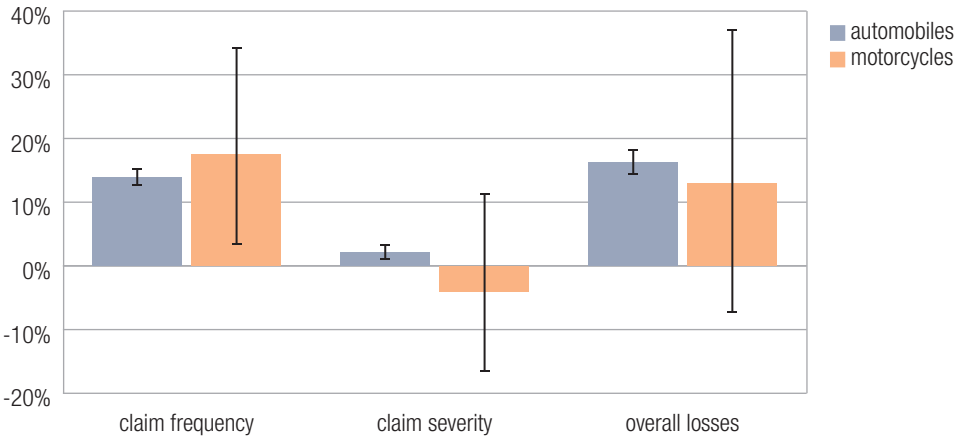
Noncrash fire safety recall losses – for automobiles and motorcycles: 2007–17

Summary

Prior Highway Loss Data Institute (HLDI) studies found that vehicles with known fire-related defects have significantly higher risk of noncrash fire insurance losses compared with vehicles without such defects (HLDI, 2013, 2015). After a recall for the defect has been issued, this risk decreases but still remains higher than for vehicles without any fire safety recalls. This bulletin expands the prior studies to include calendar years 2015–17. The figure below shows that for both automobiles and motorcycles, the risk of noncrash fire losses is significantly higher for vehicles that have a noncrash fire recall. Claim frequencies were 14 percent higher for automobiles and 18 percent higher for motorcycles. Both results were statistically significant. Claim severity was 2 percent higher for automobiles and 4 percent lower for motorcycles. This resulted in an increase to overall losses of 16 percent and 13 percent for autos and motorcycles, respectively.

Effect of fire-related defects on automobile and motorcycle noncrash fire losses



Introduction

HLDI collects and codes information on vehicle recalls from the National Highway Traffic Safety Administration (NHTSA). HLDI identifies vehicles that have been recalled for having defects that can lead to vehicle fires without being in a crash. Insurance losses from noncrash fire damage are covered under comprehensive insurance. Prior HLDI studies from 2013 and 2015 found that vehicles with a noncrash-fire-related recall had significantly higher risk of noncrash fire insurance losses compared to vehicles without a recall. After the recall was issued, the risk declined but still remained higher compared to vehicles without a noncrash fire recall. The purpose of this study is to expand that analysis with additional loss data from calendar years 2015–17.

Methods

Insurance data

Automobile insurance covers damages to vehicles and property, as well as injuries to people involved in crashes. Different insurance coverages pay for vehicle damage versus injuries, and different coverages may apply depending on who is at fault. The current study is based on comprehensive coverage. Comprehensive coverage insures against a variety of perils. These perils include theft, animal strikes, and physical damage to insured vehicles that occurs for reasons other than crashes. A specific physical damage that is covered under comprehensive insurance is noncrash fire. Loss data included calendar years 2007–17. Results for automobiles were based on more than 870 million insured vehicle years and 200,000 claims. Results for motorcycles were based on more than 13 million insured vehicle years and 3,500 claims.

Insurance measures

Several insurance measures are used in this report. Exposure is expressed in insured vehicle years. One insured vehicle year may consist of one vehicle insured for 365 days or 365 vehicles insured for one day or any combination of vehicles and days that adds up to 365 days. Exposure is used as the denominator for calculating claim frequency.

Claim frequency is a measure of claim risk and is calculated by dividing the number of claims by the amount of exposure. For noncrash fires, claim frequency is expressed in claims per 10,000 insured vehicle years. Claim severity is measured in dollars and is calculated by dividing the dollars spent to settle a claim by the number of claims. Overall losses are the product of the frequency and severity measures, and represent the dollars paid for claims per insured vehicle year.

Vehicles

Vehicle age is calculated as the difference between the calendar year and model year. Many manufacturers release new models in the calendar year prior to the vehicle's model year. For example, a 2008 model year vehicle may be released during the 2007 calendar year. In this situation, a vehicle would have an age of -1. As models are typically released mid-year, exposure is limited for vehicles of age -1. Therefore, for the purposes of this analysis, vehicles of age -1 were combined with vehicles of age 0. This study includes automobiles aged -1 to 8 years and motorcycles aged -1 to 6 years from calendar years 2007–17.

Recall information

HLDI collects and codes information on vehicle recalls from NHTSA. HLDI identifies vehicles that have been recalled for having defects that can lead to a vehicle fire without being in a crash. Vehicles identified by HLDI as having a noncrash-fire-related recall were used to identify the study populations. Recalled vehicles are identified only by model year, make, and series. Manufacturers are not required to report to NHTSA the vehicle identification numbers (VIN) of the vehicles involved in the recalls. Specific recall information is available on HLDI's member website (www.iihs-hldi.org) and from prior HLDI reports. Other possible noncrash-fire-related defects still may be under investigation by NHTSA. In addition, some fire-related defects may be handled through manufacturer service bulletins.

Analysis methods

Regression analysis was used to quantify the difference between vehicles with known fire-related defects that have been subject to a noncrash fire recall and those that were not subject to noncrash fire recalls, while controlling for other covariates. Covariates included calendar year, vehicle age, vehicle make and series, deductible range, rated driver age, gender, marital status, garaging state, and vehicle density. A binary variable was included to identify whether or not a particular vehicle had been subject to a noncrash fire recall.

Regression analysis was also used to quantify the difference before and after a recall notice was given. In order to assess this effect, a categorical variable was included to classify the data into three groups: no recall, prerecall, and postrecall. No recall includes all observations for vehicles that are not associated with any noncrash-fire-safety re-

lated recall. Prerecall includes observations for recalled vehicles where the calendar year is less than or equal to the year of the recall. Postrecall includes observations for recalled vehicles where the calendar year is after the year of the recall. Some vehicles may be associated with multiple recalls. For the purpose of this analysis, only the date of the most recently issued recall is considered.

Claim frequency was modeled using a Poisson distribution, whereas claim severity (average loss payment per claim) was modeled using a Gamma distribution. Both models used a logarithmic link function. Estimates for overall losses were derived from the claim frequency and claim severity models.

Results

Figure 1 illustrates the results comparing automobiles with and without noncrash fire recalls. Automobiles with a noncrash fire recall are associated with a 14 percent increase in claim frequency, 2 percent increase in claim severity, and 16 percent increase in overall losses. All results were statistically significant. The vertical I-bars correspond to the range of the 95 percent confidence intervals for that estimate.

Figure 1: Effect of fire-related defects on automobile noncrash fire losses

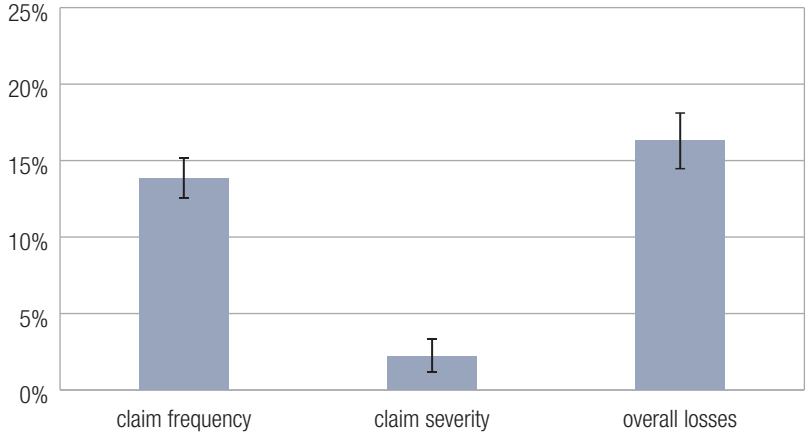


Figure 2 illustrates the results of the pre- and postrecall analysis for automobiles. Vehicles with a noncrash fire recall, prior to being recalled (i.e., prerecall) were associated with 19 percent higher noncrash fire claim frequencies compared with vehicles without a recall. Claim severity was 2 percent higher and overall losses were 21 percent higher during the prerecall time period as well. After being recalled (i.e., postrecall), the difference in claim frequency dropped to 11 percent with claim severity remaining the same. As a result, overall losses for recalled automobiles during the postrecall period was 14 percent higher compared to vehicles without a noncrash fire recall.

Figure 2: Effect of fire-related defects on automobile noncrash fire losses, before and after recall

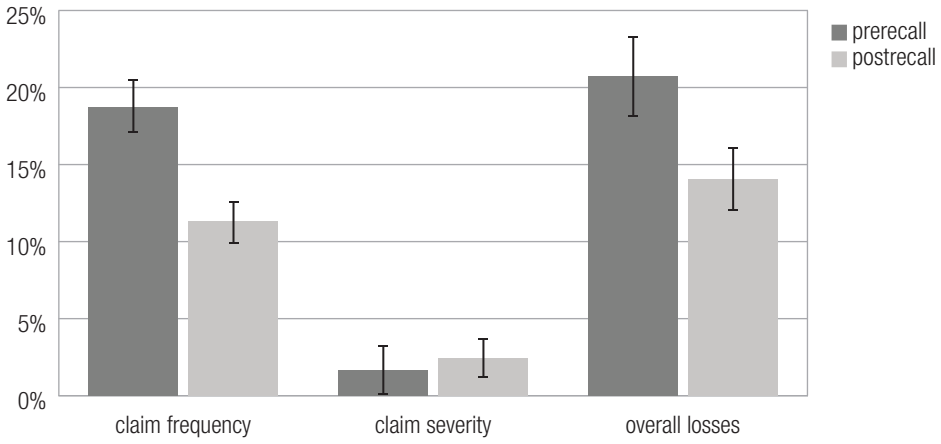


Figure 3 shows the results comparing motorcycles with and without recalls. Claim frequency was 18 percent higher for motorcycles with a noncrash fire recall, with no significant difference in severity. As a result, overall losses were 13 percent higher as well.

Figure 3: Effect of fire-related defects on motorcycle noncrash fire losses

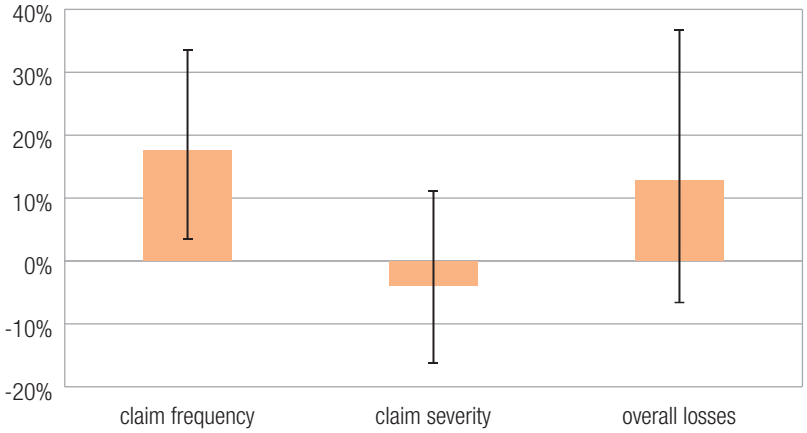


Figure 4 shows the result of the pre- and postrecall analysis for motorcycles. Prerecall claim frequencies for recalled motorcycles were 32 percent higher than motorcycles without a noncrash fire recall. After being recalled, this dropped in half to 15 percent. Claim severities showed no significant differences before or after being recalled. Consequently, overall losses were 31 percent higher during the prerecall time period and 10 percent higher during the postrecall time period.

Figure 4: Effect of fire-related defects on motorcycle noncrash fire losses, before and after recall

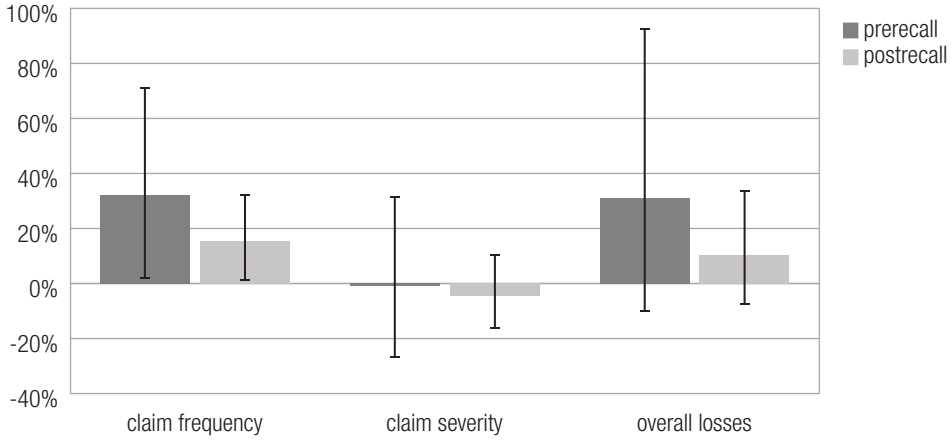


Table 1 compares the current claim frequency results with the two prior studies. Motorcycles were not included in the original study. The current results are consistent with the prior analyses.

Table 1: Effect of fire-related defects and recalls on noncrash fire claim frequency

	Automobiles			Motorcycles		
	overall	prerecall	postrecall	overall	prerecall	postrecall
2013 Study	16%	23%	12%	—	—	—
2015 Study	13%	19%	11%	14%	27%	12%
2017 Study	14%	19%	11%	18%	32%	15%

Discussion

A record 53.2 million vehicles were recalled in 2016; the third straight year that auto safety recalls set a record and topped 50 million (Shepardson, 2017). This analysis indicates that recalls are effective at reducing risk. Vehicles with known fire defects have a significantly increased risk of noncrash-fire-related loss, and this risk decreases after the defects have been identified and a recall is issued. However, even after being recalled, the risk of noncrash fire losses remains significantly higher compared with vehicles with no known fire defects. One complication is that not all recalled vehicles are being repaired. NHSTA estimates that approximately 25 percent of recalled cars have not been repaired (Geiger, 2017). Although not a noncrash fire recall, according to NHTSA's website as of September 29, 2017, less than 50 percent of defective Takata airbags had been repaired.

There are several potential reasons why so many recalled vehicles may be going unrepaired. Repair parts may be unavailable or owners may not feel the repairs are urgent (Hirsch, 2014). Additionally, some dealers continue to sell used cars with open recalls (Consumer Reports, 2017). However, one of the largest factors is that the owner may not know there is an open recall on their vehicle. According to Mark Chernoby, chief technical compliance officer for Fiat Chrysler Automobiles, "the greatest challenge is making contact with the current owner of the vehicle. Vehicles may change hands many times over their lifecycle" (Lawrence, 2017).

One state, Maryland, is attempting to help with the notification process. As part of a two-year pilot program for up to six states, recall notices will be sent with registration renewals. However, this is just a notification as vehicles with open recalls will not be prevented from registering with the state, and Maryland was the only state to opt into this program (Northrup, 2017). If this program is successful, it could expand to more states and prove a useful measure in getting recalled vehicles repaired.

Regression analysis was used to quantify the difference in noncrash fire losses between vehicles with a noncrash fire recall and those without. Most HLDI studies typically control for model year, calendar year, garaging state, vehicle density (number of registered vehicles per square mile), rated driver age group, rated driver gender, rated driver marital status, deductible range, and risk. These covariates highly correlate with collision claim frequency. However, unlike collision claims, noncrash fire claims do not result from a crash and can occur without a driver in the vehicle. Therefore, the covariates typically used are not likely relevant to noncrash fire claims. HLDI conducted several analyses with and without covariates, such as the rated driver demographics, but their inclusion or exclusion did not significantly impact the results. Therefore, for consistency with other studies, the results presented in this bulletin include the usual covariates.

Limitations

Recalled vehicles are identified only by model year, make, and series because manufacturers are not required to report to NHTSA the VINs of the vehicles involved in the recalls. A particular recall may not apply to every vehicle with the same model year, make, and series. Therefore, it is possible that some vehicles are incorrectly being classified as having a known fire-related defect. If a significant number of vehicles are being incorrectly classified, any reported increases may actually be underestimates of the true effect of fire-related defects. It is also possible that some fire-related defects have not yet been detected, and therefore a recall has not yet been issued. This is more likely for newer models, but also possible for older models as well. For example, in 2009 General Motors issued a recall that affected model years as far back as 1997. This would also cause any reported increases to be underestimates of the true effect of fire-related defects.

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