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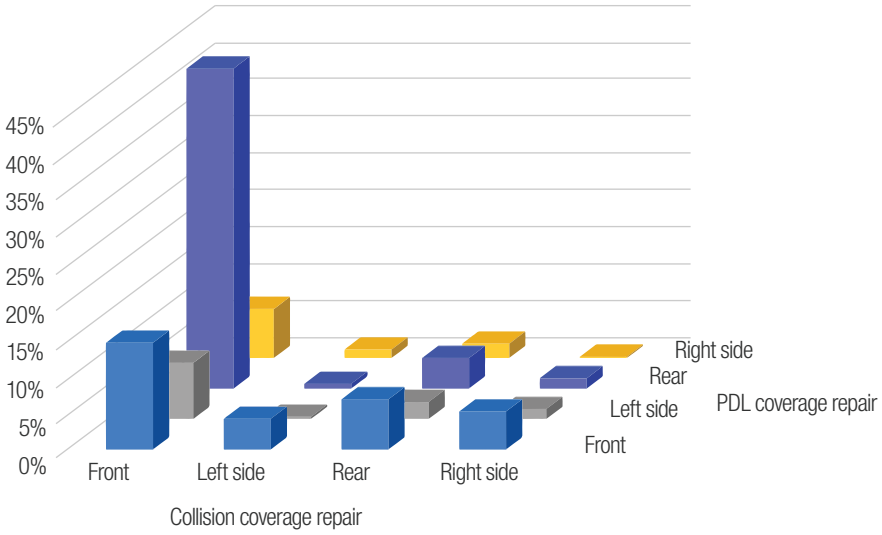
Damage estimate distributions and costs by point of impact

Summary

This report illustrates the distribution of collision and property damage liability (PDL) estimates and damage amounts by the point of impact in motor vehicle crashes for vehicles from model years 1981 through 2023 in calendar year 2022. Nearly half of the estimates for collision coverage had a point of impact at the front of the vehicle. Estimates for the front-center point of impact were the costliest ($6,831). The average cost of a collision estimate was $5,492. Estimates for the rear-center point of impact were the most common for PDL estimates, costing on average $3,432. The average cost of a PDL estimate was $3,642.

Multiple-vehicle crashes were analyzed by matching collision and PDL estimates. In this analysis, front-to-rear configurations were by far the most common (42.7 percent), followed by front-to-front (14.3 percent), as shown in the figure below.

Percent distribution of matched pairs of collision and PDL estimates by point of impact, 1981–2023 model years, 2022 calendar year



Introduction

This Highway Loss Data Institute (HLDI) bulletin examines the distribution of estimates and average damage amounts under collision and property damage liability (PDL) coverages by point of impact for 1981–2023 model year passenger vehicles during calendar year 2022. This is the eighth time HLDI has published the point-of-impact distribution of estimates and damage amounts for collision and PDL (2007, 2017, 2018, 2019, 2020, 2021, 2022).

Method

Repair estimate data

Automobile insurance covers damage incurred to vehicles and property in crashes plus injuries sustained by people involved in the crashes. Vehicle damage and injuries are paid for by different types of insurance coverage, and different coverages may apply depending on who is at fault. The current study is based on collision and PDL coverage. Collision coverage insures against damage to an at-fault driver's vehicle sustained in a crash with an object or another vehicle; this coverage exists in all 50 states. PDL coverage insures against damage that at-fault drivers cause to other people's vehicles and property in crashes. This coverage exists in all states except Michigan, where vehicle damage is covered on a no-fault basis (each insured driver pays for crash damage to their own vehicle, regardless of who is at fault).

Vehicle repair estimates are provided to HLDI by Audatex, CCC Information Services, Inc., and Mitchell. These companies provide automated vehicle repair estimate software used by a large number of auto repair shops and automobile insurers. In addition to the dollar value of the repair estimate and type of estimate (PDL, collision, or comprehensive), the data include primary and secondary points of impact for damaged vehicles. Only primary points of impact were used in the present study due to the low number of estimates with secondary points of impact.

In the HLDI loss database, collision claims typically cover physical damage to a vehicle that has sustained damage after striking something. The payments associated with those claims are payments associated with repairing the insured vehicle. PDL claim counts are also associated with the insured (at-fault) vehicle, but the payments are for repairs to the other vehicle or property damaged in the crash.

Analysis method

Points of impact were classified into 12 locations on the vehicle: front left, front center, front right, right-front pillar (A-pillar), right-center pillar (B-pillar), right-quarter post (C-pillar), rear right, rear center, rear left, left-quarter post (C-pillar), left-center pillar (B-pillar), and left-front pillar (A-pillar). Estimates with points of impact other than these (e.g., rollover and undercarriage damage) were excluded from these analyses. In addition, damage amounts were not estimated for obvious total losses; therefore, these estimates were not included in the study.

Analyses were based on over 7.3 million collision estimates and nearly 3.5 million PDL estimates for 1981–2023 model year passenger vehicles in calendar year 2022. Collision estimates included both single- and multiple-vehicle crashes.

In addition, matched-pair analysis was conducted to provide information on the point-of-impact configurations in multiple-vehicle crashes. Collision estimates and their corresponding PDL estimates were matched based on claim identification number and loss date. Single-vehicle collisions were excluded from this portion of the analysis. For crashes with three or more vehicles, each pair was counted separately. Therefore, a three-vehicle collision would contribute two matched pairs to the distribution, counting the collision estimate vehicle in two separate pairs.

Results

Figure 1 shows the percent distribution of estimates and average damage amounts by point of impact for collision and PDL coverages separately.

For collision coverage, the highest percentage of estimates involved front-center impacts (25.4 percent), followed by rear-center impacts (15.6 percent). The opposite pattern occurred for PDL coverage, for which the highest percentage of estimates involved rear-center impacts (35.1 percent), followed by front-center impacts (12.1 percent).

Average damage amounts were higher for collision estimates than for PDL estimates at each of the 12 points of impact. The average collision estimate was $5,492, compared with $3,642 for PDL.

Figure 1: Percent distribution of estimates and average damage amounts by point of impact and coverage type, 2022 calendar year

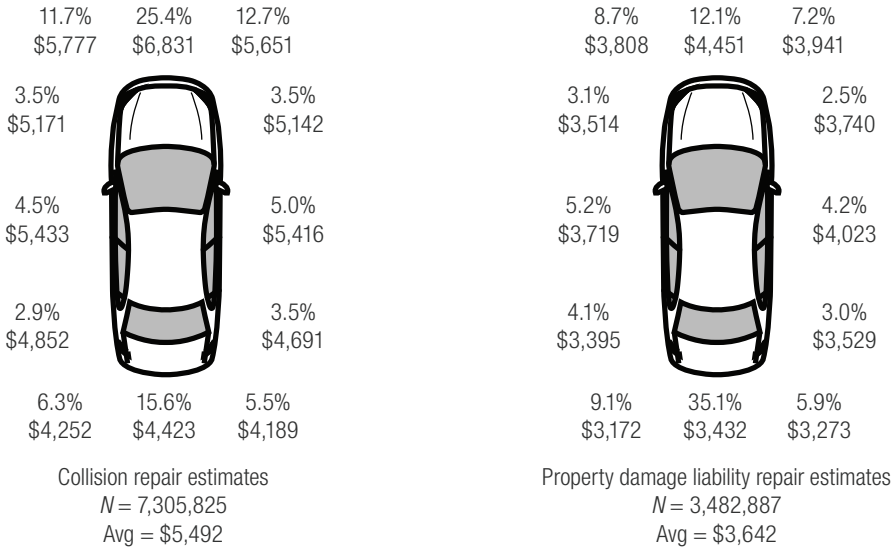


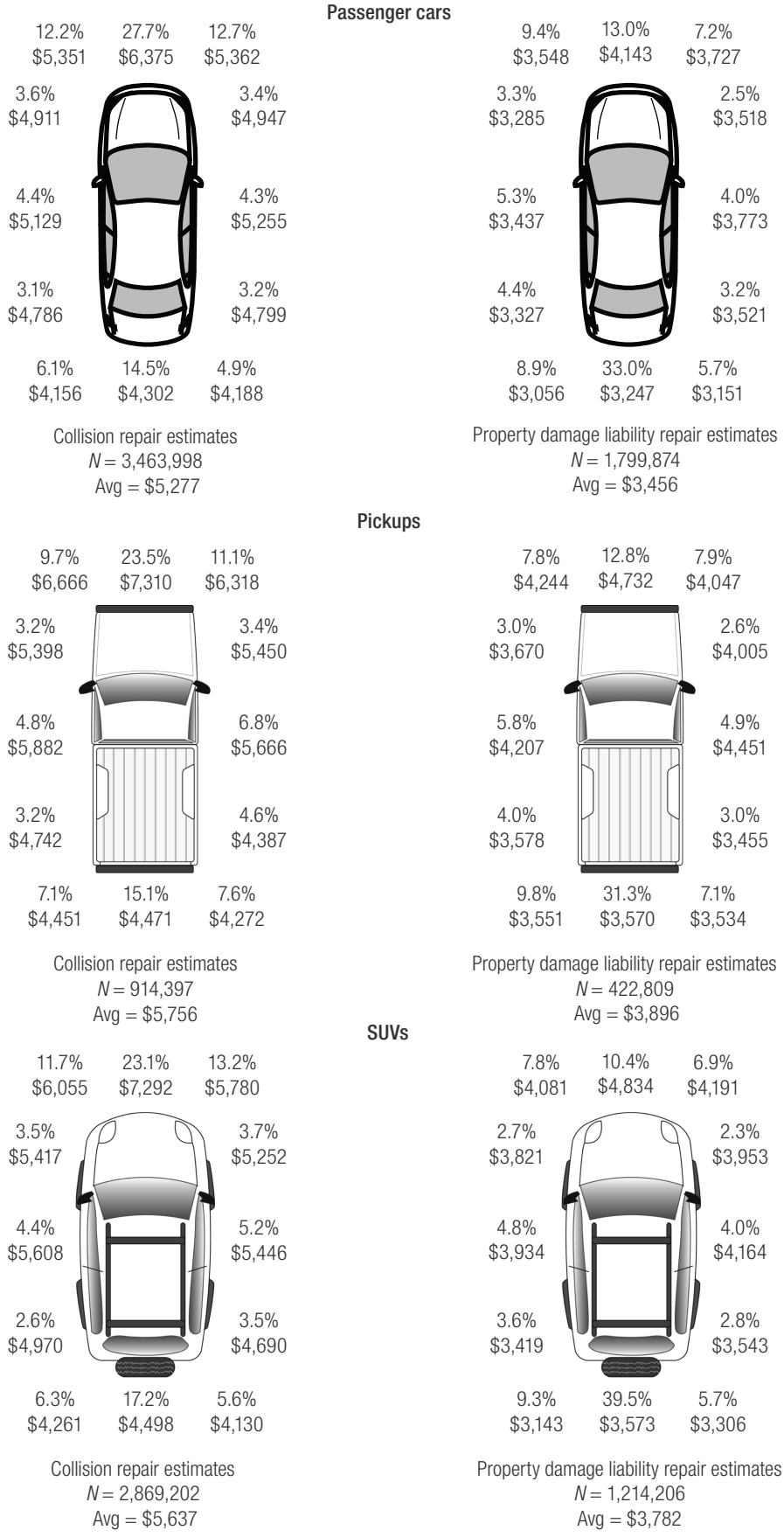
Figure 2 shows the percent distribution of collision and PDL estimates and average damage amounts by point of impact for passenger cars, pickups, and SUVs.

SUVs had the highest percentage of rear-center impacts for collision and PDL estimates (17.2 and 39.5 percent, respectively). SUVs are, to varying degrees, higher than cars, which may hinder the driver's ability to see the immediate rear of the vehicle when reversing and block the view of following vehicles, leading to the increased likelihood that SUVs will be struck from behind.

Pickups had the highest percentage of right-center impacts (6.8 percent) and right-quarter post impacts (4.6 percent) for collision estimates. Cargo in the bed of a pickup, as well as a higher driving position, may limit the driver's view of smaller vehicles traveling next to or slightly behind the pickup.

Passenger cars had the highest percentage of front-center impacts (27.7 percent) for collision estimates. For all three vehicle types, average collision damage amounts were higher than average PDL damage amounts.

Figure 2: Percent distribution of estimates and average damage amounts by point of impact, vehicle type, and coverage type, 2022 calendar year



Matched pairs of collision and PDL estimates

Collision estimates and their corresponding PDL estimates were matched based on claim identification number and loss date. These 1,126,771 pairs provided information on the point-of-impact configurations in multiple-vehicle crashes. Figure 3 shows the percent distribution of matched pairs of collision and PDL estimates by point of impact for passenger vehicles during calendar year 2022. The most common pairing (42.7 percent) was a collision estimate for a front impact with a related PDL estimate for a rear impact. The second most frequent pairing (14.3 percent) was a front-impact collision estimate with a front-impact PDL estimate.

Figure 3: Percent distribution of matched pairs of collision and PDL estimates by point of impact, 1981–2023 model years, 2022 calendar year

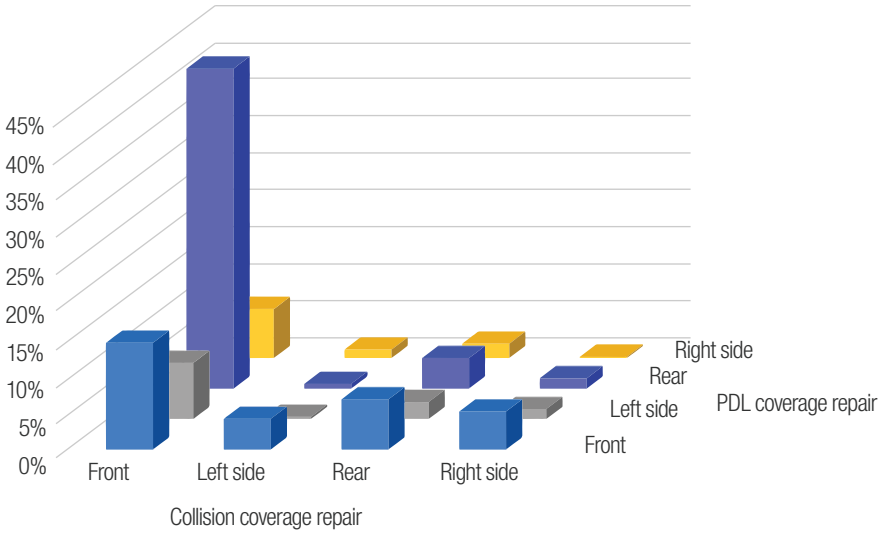
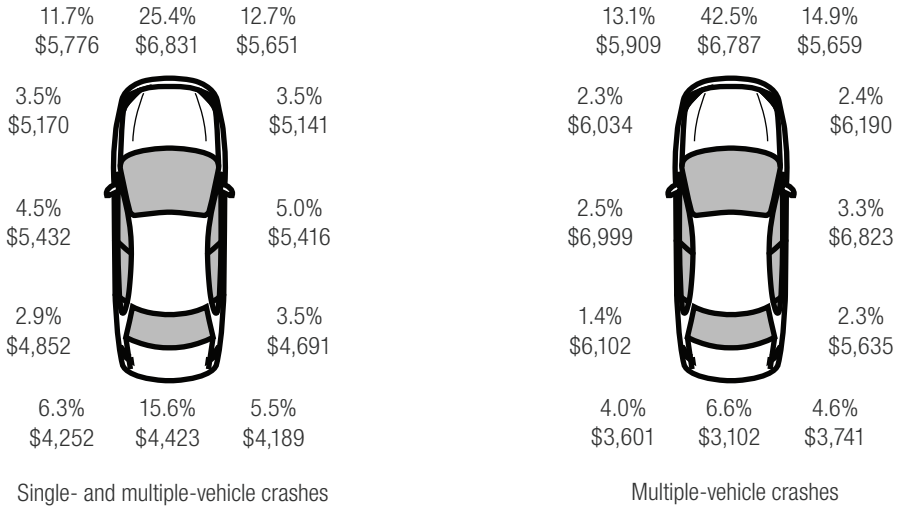


Figure 4 shows the percent distribution of collision estimates and average damage amounts for calendar year 2022 by point of impact for passenger vehicles involved in all crashes (single- and multiple-vehicle) compared with multiple-vehicle crashes. Collision estimates for front-center impacts were much more common for multiple-vehicle crashes (42.5 percent) than for all crashes (25.4 percent). Average damage amounts were higher for side impacts but lower for rear impacts in multiple-vehicle crashes than in all crashes.

Figure 4: Percent distribution of estimates and average damage amounts by point of impact for collision coverage, 2022 calendar year



Discussion

In publications, HLDI often cites the point-of-impact distribution of collision and PDL estimates. The distribution for calendar year 2022 is similar to the distribution found in prior reports. As before, nearly half of collision estimates are for the front of the vehicle, the location of the costliest collision estimates, whereas half of PDL estimates are for the rear of the struck vehicle.

Front-to-rear collisions, the most common type, made up 42.7 percent of all two-vehicle collisions, compared with only 14.3 percent for front-to-front collisions, the next most common crash configuration. Advanced driver assistance systems (ADAS) are designed to prevent these types of crashes, and HLDI research indicates that these systems are associated with reductions in PDL claim frequency. A voluntary commitment by 20 automakers representing 99 percent of U.S. light-vehicle sales has made automatic emergency braking a standard feature on the majority of recent models (Insurance Institute for Highway Safety, 2022). However, HLDI research estimates that only 23 percent of the 2022 registered vehicle fleet is equipped with front automatic emergency braking (HLDI, 2023). The distribution of two-vehicle collision claims by point of impact may change as the number of vehicles equipped with ADAS increases. It is estimated that by 2045, 95 percent of registered vehicles will be equipped with front automatic emergency braking.

References

Highway Loss Data Institute. (2007). Point-of-impact distribution. *Loss Bulletin, 24*(3).

Highway Loss Data Institute. (2017). Point-of-impact distribution. *Loss Bulletin, 34*(24).

Highway Loss Data Institute. (2018). Point-of-impact distribution. *Loss Bulletin*, *35*(16).

Highway Loss Data Institute. (2019). Point-of-impact distribution. *Loss Bulletin*, *36*(19).

Highway Loss Data Institute. (2020). Point-of-impact distribution. *Loss Bulletin*, *37*(13).

Highway Loss Data Institute. (2021). Point-of-impact distribution. *Loss Bulletin*, *38*(25).

Highway Loss Data Institute. (2022). Point-of-impact distribution. *Loss Bulletin*, *39*(16).

Highway Loss Data Institute. (2023). Predicted availability of safety features on registered vehicles – a 2023 update. *Loss Bulletin*, *40*(2).

Insurance Institute for Highway Safety. (2022, December 8). *Three more automakers fulfill pledge to make autobrake nearly universal.* https://www.iihs.org/news/detail/three-more-automakers-fulfill-pledge-to-make-autobrake-nearly-universal

HLDI
Highway Loss Data Institute

4121 Wilson Boulevard, 6th floor
Arlington, VA 22203
+1 703 247 1500
iihs-hldi.org