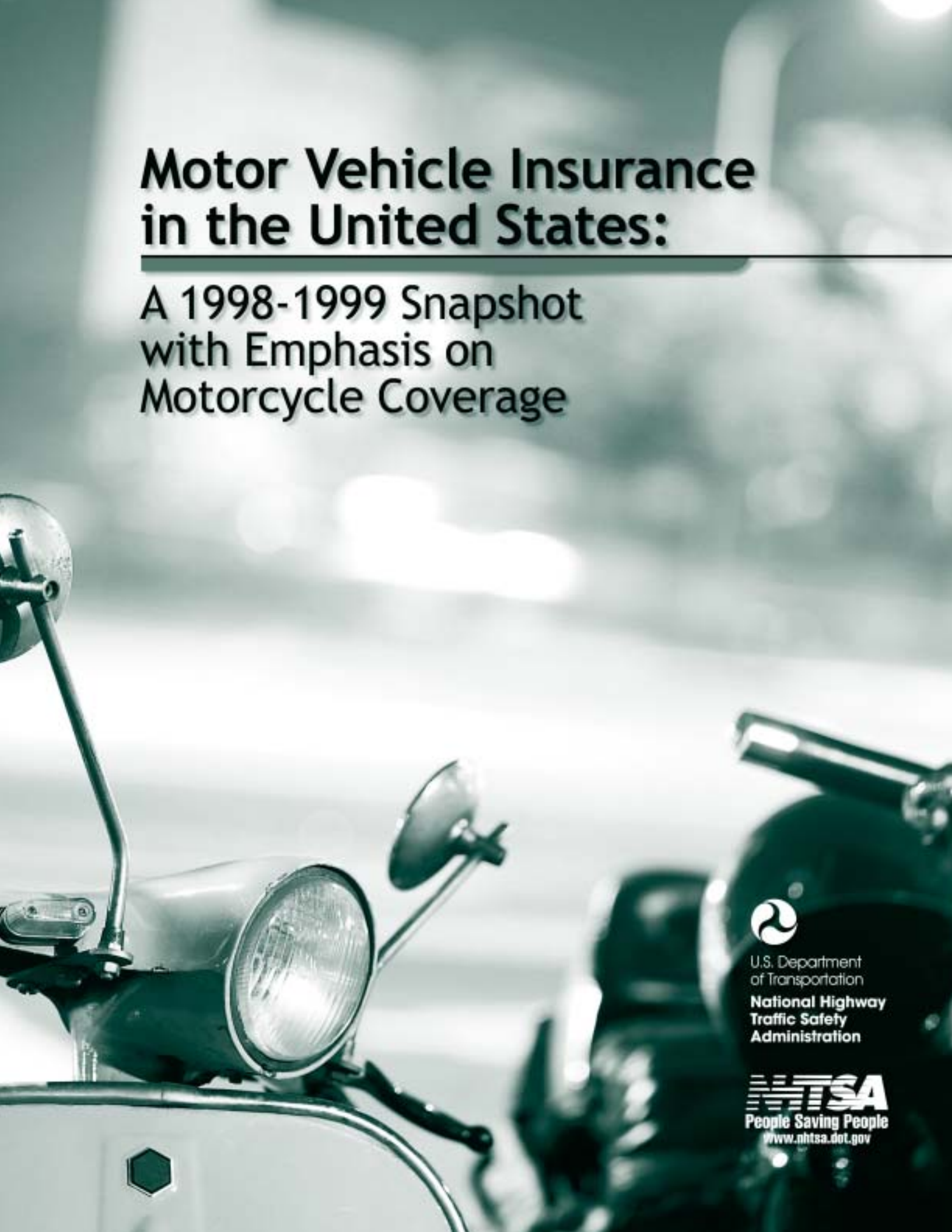
Motor Vehicle Insurance in the United States:

A 1998-1999 Snapshot with Emphasis on Motorcycle Coverage



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16. Abstract

Motor vehicle insurance information is critical to understanding highway crash costs and who pays them. To address this need, PIRE obtained unpublished data from six insurers that specialize in motorcycle insurance, along with parallel data from the nation's five largest motor vehicle insurers.

Both insured motorcycles and other private passenger vehicles experienced $35.50 in crash-related claims per thousand miles traveled in 1998-1999. Motorcycles, however, typically insure against fewer risks than autos. If they were as broadly insured as autos, their claims costs per mile would have been almost 1.6 times average auto claims costs. Average property damage losses per claim were 65 percent larger for motorcycles than for other private passenger vehicles. Compared to other private passenger vehicles, motorcycles also had worse loss experience on theft, vandalism, and other non-crash risks. Per thousand miles traveled, insurance coverage cost $87 for a motorcycle but just $61 for other private passenger vehicles. In aggregate, pricing for motorcycle coverage was commensurate with loss experience. Liability coverage, however, might have been overpriced and property damage coverage underpriced. Profits on motorcycle liability coverage offset losses on property damage coverage.

Among insured motorcycles with coverage details known for 1999, 14 percent had 750-1000 cc engines, 43 percent had larger engines, and 43 percent had smaller ones. The number of claims per policy, claim severity, losses per policy, and premiums all rose with engine size. Among motorcycles with large engines, sportbikes had especially bad loss records, experiencing losses per policy 1.5 to 2 times those of other motorcycles with large engines.

This project yielded data that will enhance future NHTSA crash costing. These data are much different than those NHTSA collected in 1988. Increasing computerization and an improved data collection strategy make them more detailed, on point, and precise.

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Executive Summary

Motor vehicle insurance pays for many of the medical and work losses resulting from highway crashes. Insurance information is critical to understanding crash costs and who pays them. No insurance industry sources provide discrete information on motorcycle insurance. Nor do they indicate what portion of a driver's insurance premiums pay for losses in crashes caused by drivers of other vehicles. They also do not provide factors for estimating how much insurance pays annually to compensate bodily injury versus property damage. NHTSA collected some of this information in 1988.

To address the need for recent information, we obtained unpublished data collected by the Motorcycle Insurance Committee of the National Association of Independent Insurers (NAII) from six members that specialize in motorcycle insurance. We supplemented their data with parallel data requested directly from the nation's five largest motor vehicle insurers. The data were collected on spreadsheets. Data from individual firms would be of considerable value to their competitors. Therefore, insurers required that their data be kept confidential and only released after pooling with data from other responding firms. To further ensure confidentiality, the NAII kindly received and pooled the data, then provided the study team with the aggregates.

Both insured motorcycles and other private passenger vehicles experienced $35.50 in crash-related claims per thousand miles traveled in 1998-1999. Legal and lender mandates force most motorists to insure against a broad range of risks. Motorcycles, however, have less insurance mandates. They typically insure against fewer risks. If they were as broadly insured as autos, their claims costs per mile traveled would have been almost 1.6 times average auto claims costs. Average property damage losses per claim were 65 percent larger for motorcycles than other private passenger vehicles. Compared to other private passenger vehicles, motorcycles also had worse loss experience on theft, vandalism, and other non-crash risks.

Per thousand miles traveled, insurance coverage cost $87 for a motorcycle but just $61 for other private passenger vehicles. In aggregate, pricing for motorcycle coverage was commensurate with loss experience. Liability coverage, however, might have been overpriced and property damage coverage underpriced. Profits on motorcycle liability coverage offset losses on property damage coverage. In contrast, insurers lost money due to the underpricing of other auto policies in 1998-1999. In interpreting these results, it is important to remember that liability insurance largely pays for bodily injury to others injured by the insured, not to the insured personally. Thus, for example, when a motorcyclist chooses against wearing a helmet, any resulting rise in insurance claims primarily will be against the insurance of other at-fault motorists.

Among insured motorcycles with coverage details known for 1999, 14 percent had 750-1000 cc engines, 43 percent had larger engines, and 43 percent had smaller ones. Insured motorcycles with engines below 750 cc had fewer claims. Claim severity rose with engine size. Motorcycles above 1000 cc had especially high claim severity.

Losses per policy rose dramatically with motorcycle engine size, with premiums rising proportionately. Touring bikes comprised 10

percent of insured motorcycles and sportbikes just over 3 percent. Losses were higher for these motorcycles, in part because they typically have larger engines. Touring cycles also are expensive and tended to be comprehensively insured. Sportbikes, however, had bad loss records. Despite having narrower policies than most insured motorcycles, these vehicles experienced losses per policy that were 1.5 to 2 times those of other motorcycles with large engines and 3 times the all-motorcycle average.

Roughly 36 percent of auto liability loss costs and 65 percent of auto property damage loss costs compensated crash-related property damage. The comparable figures for motorcycles were 11 percent and 61 percent. In 1999, auto insurance compensated an estimated $43,944 million in crash-related property damage and $34,684 million in bodily injury losses. Of this amount, motorcycle insurance paid for roughly $161 million in crash-related property damage and $155 million in bodily injury losses. About one-ninth of insurance claims payments compensated costs of crashes caused by other drivers.

Because more than half of motorcycle liability payments are under uninsured motorist coverage, however, 55 percent of the motorcyclist's liability insurance bill goes to pay costs imposed by other at-fault drivers.

This project yielded data that will enhance future NHTSA crash costing. These data are much different than those NHTSA collected in 1988. Increasing computerization and an improved data collection strategy make these data more detailed, on point, and precise. Supplying a data spreadsheet to the companies surveyed proved a very useful data collection tool.

Background

Motor vehicle insurance compensates a substantial portion of the medical and work loss costs resulting from highway crashes. Insurance information is critical to understanding crash costs and who pays them. A.M. Best Company annually publishes a very limited amount of insurance data, separating personal and commercial vehicles. The National Association of Insurance Commissioners annually publishes a richer compilation on auto insurance. The Insurance Research Council periodically analyzes closed claim data or surveys crash victims about losses and their reimbursement. Beyond this, a few states also occasionally study aspects of their motor vehicle insurance markets.

The literature leaves many knowledge gaps. Discrete information on motorcycle insurance is virtually unavailable. Nothing has been published about how motorcycle insurance claims vary with motorcycle type and engine size. Nor is information available that compares policy costs or claims experience between motorcycle and automobile insurance. Again, the insurance data needed to estimate external insurance costs—a driver's insurance premiums that pay losses in crashes caused by drivers of other vehicles—are lacking. High external costs are a critical reason to consider highway safety interventions like motorcycle helmet laws that restrict personal freedom. Finally, existing sources do not provide factors for estimating how much motor vehicle insurance pays annually to compensate bodily injury versus property damage. Those factors last were estimated by Miller (1989) and Miller et al. (1991) using 1988 data collected for a Congressionally requested study (Miller 1988) and even older data from Blincoe and Luchter (1983). They are used in modeling the insurance claims processing and administrative costs of highway crashes. Thus major gaps exist in recent auto insurance data with relevance to Federal policy.

This report fills the gaps. It provides data on motorcycle insurance and updated data on auto insurance. Designed as a companion to a NHTSA literature review on the costs of motorcyclist crashes (Lawrence, Max, and Miller 2003), it was produced under the same contract. The data in the present report can be used to understand and more accurately cost motorcycle crashes and highway crashes generally, and provide a template for building insurance related costs of commercial vehicle crashes (an interest of the Network of Employers for Traffic Safety and of the Federal Motor Carrier Safety Administration).

The report summarizes the methods used in the study and defines a number of insurance terms. It then presents findings about (1) motorcycle insurance, (2) insurance for other private passenger vehicles, (3) similarities and differences between motorcycle and other private passenger auto coverage, (4) commercial auto insurance, and (5) what losses auto insurance compensates.

Methods

Aside from some sparse information culled from Best's Aggregates and Averages (2000), this report is based on data collected from insurers. Much of the motorcycle data was collected by the Motorcycle Insurance Committee of the National Association of Independent Insurers (NAII) from six members that specialize in motorcycle insurance. We supplemented their data with parallel data requested directly from the nation's five largest motor vehicle insurers. Some of them, however, could not readily provide some or all of the requested information. The data we collected from individual firms would be of considerable value to their competitors. Therefore, insurers required that their data be kept confidential and only released after pooling with data from other responding firms. To further ensure confidentiality, the NAII kindly received and pooled the data, then provided the study team with the aggregates. As a further confidentiality protection, here we show estimates computed from the data collected but none of the raw data aggregates.

We adapted an Excel data collection spreadsheet developed by the NAII Committee. We requested information by vehicle type (motorcycle; private passenger car, light truck, van, SUV; commercial for-hire vehicle, other light commercial vehicle, bus/passenger van, medium/heavy truck) on seven categories of insurance coverage:

- Bodily injury liability (coverage if the policyholder's vehicle injures someone; mandatory in most states. In no-fault insurance states, this coverage compensates losses that exceed the no-fault threshold.). For motorcycles, some companies separated passenger liability coverage from other bodily injury coverage.
- Property damage liability (coverage if the policyholder's vehicle damages or destroys someone else's property; mandatory in many states)
- Own medical payments (coverage for the policyholder's own injury treatment costs up to a modest ceiling, typically $1,000; often mandatory in states without no-fault insurance)
- Personal injury protection (no-fault coverage for the policyholder's own losses up to a modest ceiling, typically $15,000-$25,000; mandatory in some states)
- Collision (coverage for damage to the policyholder's vehicle when the policyholder is at fault in the crash or no one is; typically required by the lender if vehicle purchase was financed)
- Comprehensive (coverage for theft or non-crash damage to the policyholder's vehicle; typically required by the lender if vehicle purchase was financed)
- Uninsured and underinsured motorist (coverage for injuries to the policyholder and other occupants of the policyholder's vehicle, as well as the policyholder's property damage when a driver without insurance is at fault or when the at-fault driver has too little insurance to fully compensate the policyholder's losses; mandatory in many states)

For each category, we requested five data items for policies written in 1998 and (separately) in 1999. Coverage in a policy is for a maximum of one year:

- Earned exposure (the number of vehicles covered by insurance for this risk)
- Earned premiums (how much policyholders paid for this coverage, net of any dividends or rebates to policyholders)
- Incurred losses (the amount paid or reserved for future payment of claims against the policies, including amounts that will be paid by reinsurers)
- Administrative loss adjustment expenses or ALAE (the amount spent investigating and paying the claims). ALAE is very narrowly defined here and averages just 3 percent of premiums earned for liability coverage and 0.2 percent for collision and comprehensive coverage. A.M. Best (2000) also reports a broader definition of loss adjustment expenses that averages 14.8 percent of private passenger auto liability premiums earned and 10.5 percent of private passenger auto property damage premiums earned in 1999. In addition, commissions and underwriting expenses related to these coverages averaged 24.4 percent and 24.8 percent of premiums earned respectively. We did not study those expenses.
- Incurred claim count (the number of damage claims that the insurance paid for or anticipates paying for as lawsuits and other disputes are resolved)

In some cases, companies were unable to supply a breakdown between incurred losses and ALAE for motorcycles. By coverage and engine size, we applied data from companies that supplied a breakdown to decompose the remaining data into these categories. One company supplied data on premiums written (including funds that would later be rebated to policyholders) rather than premiums earned. This company's data were multiplied by the ratio of earned premiums to premiums written for its aggregate automobile insurance lines from *Best's Aggregates and Averages* (A.M. Best and Company 2000).

We have not applied inflation adjusters to any dollar amounts in this report From the data collected, by vehicle and coverage type, we computed:

- Claims per 1000 covers (incurred claim count divided by earned exposure, i.e., the number of claims filed per 1000 policies that offer the specific coverage)
- Claim severity (incurred losses divided by incurred claim count, i.e., the average payments per claim paid)
- Average loss cost (incurred losses divided by earned exposure, a measure influenced by both the frequency of claims and claim severity, i.e., losses per cover)
- Percent of total losses (by vehicle type and year, incurred losses for each coverage divided by total incurred losses for all coverages)
- Loss ratio (the ratio of incurred losses to earned premiums, i.e., the percentage of premiums that is paid to settle claims)
- ALAE ratio (the ratio of ALAE to earned premiums, i.e., the percentage of premiums that is spent to process and investigate claims. This ratio is sometimes called the Direct Defense and Cost Containment Expense or DDCCE ratio)

In addition, by vehicle type, we computed:

- Premium per actual policy (the sum of earned premiums divided by policies written)

- Premium per all-cover policy (the sum of the premium per cover for all covers, except the maximum of personal injury protection or medical payments premiums, since these two coverages would never be purchased simultaneously)
- Covers per policy (the sum of earned exposures divided by policies written)
- Claims per 1000 policies (incurred claim count divided by thousands of policies written)
- Losses per policy (the sum of incurred losses plus ALAE divided by policies written)
- Losses per 1000 vehicle miles (losses per policy divided by thousands of vehicle miles driven per vehicle as reported in FHWA (2000))
- Crash losses per 1000 vehicle miles (losses per policy excluding losses on comprehensive coverage, divided by thousands of vehicle miles driven per vehicle)

Motorcycle data were decomposed into vehicles in three engine size categories: less than 750 cc, 750-1000 cc, and more than 1000 cc. The NAII Motorcycle Insurance Committee members also provided a more limited motorcycle statistical breakout into three styles: touring, sportbike, and other.

To protect confidentiality, the number of policies written by vehicle type is not reported here. Additionally, we report only our computed variables, not the raw exposure, claims, and loss counts.

Motorcycle Insurance Results

We obtained data on 1.1 million motorcycle policies written in 1998 and 1.2 million written in 1999. This represented coverage for 28.5 percent of the motorcycles registered each year and an unknown but much higher percentage of insured motorcycles. (In Hawaii, for example, 39 percent of motorcycles are uninsured (Kim et al. 2002).) Table 1 summarizes the estimates computed from the data collected about this coverage. In viewing these estimates, it is important to remember that some companies did not differentiate passenger liability coverage from other bodily injury liability coverage, instead offering a single coverage for both.

Among insured motorcycles with coverage details known for 1999, 14 percent had 750-1000 cc engines, 43 percent had larger engines, and 43 percent had smaller ones. As Table 1 shows, motorcycles with engines below 750 cc had fewer claims per 1000 covers. Claim severity rose with engine size overall and for passenger liability, comprehensive, uninsured motorist, and to a lesser extent, medical payments/personal injury protection and collision coverages. Motorcycles above 1000 cc had especially high claim severity for several coverage categories and overall.

Motorcycle property/casualty liability insurance covers the costs of injury and property damage that motorcycle riders inflict on auto occupants, pedestrians, and passengers. Because motorcycles typically are over-matched in crashes, occupants of other vehicles rarely are injured by an at-fault motorcyclist. Motorcycle liability insurance, therefore, generally is inexpensive. Average loss costs dramatically illustrate this point. Most losses resulted from compensating the motorcyclist's own losses, with comprehensive and collision coverages accounting for 60 percent of total losses and uninsured motorist coverage another 20 percent. Liability payments were quite modest, only 17 percent of the total. This pattern was quite different from the pattern for personal passenger autos (shown in Table 2), where liability coverage accounted for 41 percent of losses, collision and comprehensive another 41 percent, and uninsured motorist protection only 6.5 percent.

Loss Adjustment Expense (LAE) proved a confusing category. *Best's Review* (Goch 2000) now reports only what they label DDCCE but formerly called ALAE, a very constricted subset of expenses related directly to claims adjustment. This subset excludes the costs of maintaining and quality-controlling a claims processing capability, as well as related overheads. These indirect costs do not result directly from the individual claim. *Best's Aggregates and Averages* reports a more expansive version of LAE that appears to include the indirect costs. Both versions are based on voluntary but virtually complete reporting by insurers. The more expansive version seems more appropriate for crash costing, although one could use the constricted version and separately model defense legal costs. Our intent was to collect an expansive version of LAE but our data request yielded a constricted version. The important information about ALAE in Tables 1 and 2, therefore, is that it varies little between types of coverage or types of vehicles. Thus it is reasonable to apply the annual numbers in Best's publications to subgroups.

Table 3 reproduces Best's data for 1998-1999 auto insurance nationally. For the four major classes of coverage, it shows premiums earned, the percentage of premiums earned that goes to cover LAE by constricted and expansive definitions, the

percentage spent on commissions and brokerage fees, and the percentage devoted to other underwriting expenses. Overall, about 40 percent of premium dollars earned were used to cover these sales and administrative expenses. Claims adjustment costs were higher for liability than property damage claims. Commercial auto policies were sold on a tighter margin than private passenger policies, sometimes as a loss leader or accommodation required to capture other more profitable business. Commissions and brokerage also were larger for commercial policies. In general, auto insurance expenses exceeded premiums earned. In most years, the private passenger line achieved marginal profitability through investment gains during the period between when premiums were collected and when claims were paid.

Accounting for loss adjustment and underwriting expenses (about 37 percent of earned premiums according to A.M. Best (2000)), the loss ratios in Table 1 suggest insurers lost money on optional motorcycle collision and comprehensive and on legally mandated uninsured motorist and personal injury protection coverage. They recouped their losses through profits on legally mandated liability coverage. Overall, the loss ratio for motorcycle insurance ranged from 53.4 percent in 1998 to 56.5 percent in 1999. That was better than the 65 percent loss ratio for private passenger auto among survey respondents and in the auto industry as a whole (as reported by A.M. Best, 2000).

In part the adverse experience on some motorcycle coverages and offsetting profitability on others resulted from the bifurcated nature of this market. A small group of writers specialized in motorcycle coverage. Their loss ratios were balanced between covers, reflecting their expertise in this market. The second group were companies that wrote motorcycle coverage to accommodate purchasers of other insurance who wanted a comprehensive source for their property/casualty or auto insurance needs. These companies did not actively pursue motorcycle business or cultivate expertise in the market. Their underwriting and loss adjustment was less refined, their policies were priced above the specialty writers, their profitability was lower, and their results were more variable between coverages.

Losses per policy rose dramatically with motorcycle engine size, with premiums rising proportionately. Touring bikes comprised 10 percent of insured motorcycles and sportbikes just over 3 percent. Losses were higher for these motorcycles, in part because they typically have larger engines. Touring cycles are expensive and tended to be comprehensively insured, with an average of one additional cover per policy increasing their insurance costs. In contrast, sportbikes had bad loss records. Despite having fewer coverages per policy than most motorcycles, these vehicles experienced losses per policy that were 1.5 to 2 times those of other motorcycles with large engines and 3 times the all-motorcycle average.

Between 1998 and 1999, claims per cover rose by 8 percent, driving up total claims payments despite a stable cost per claim. This rise was observed for all engine sizes and all coverages except medical and comprehensive. It occurred despite a drop in miles ridden per motorcycle. It may result from an influx of novice riders; motorcycle registrations grew by 8 percent between 1998 and 1999.

Table 1.
Motorcycle Insurance Statistics by Engine Size, Selected Companies, 1998-1999

			Claims Per 1000 Covers	Claim Severity	Average Loss Cost	Percent of Total Losses	Loss Ratio	ALAE Ratio
Bodily Injury Liability	Less than 750 cc	1998	0.7	$14,367	$9	10.4%	19.5%	1.8%
		1999	0.8	$14,385	$10	10.3%	23.7%	3.1%
	750-1000 cc	1998	1.2	$15,653	$17	11.8%	26.8%	1.7%
		1999	1.3	$13,651	$17	10.1%	26.4%	1.6%
	More than 1000 cc	1998	1.3	$15,105	$18	10.8%	27.6%	2.5%
		1999	1.4	$14,392	$18	9.8%	28.0%	2.8%
	Total	1998	1.0	$14,971	$14	10.8%	24.5%	2.1%
		1999	1.1	$14,271	$14	10.0%	26.3%	2.7%
Passenger Liability	Less than 750 cc	1998	0.3	$9,556	$3	1.0%	19.8%	1.8%
		1999	0.4	$4,268	$1	0.4%	10.9%	1.4%
	750-1000 cc	1998	0.5	$16,799	$8	1.6%	37.2%	2.3%
		1999	0.6	$7,792	$5	0.8%	21.4%	1.3%
	More than 1000 cc	1998	0.8	$13,642	$10	1.4%	41.0%	3.8%
		1999	1.0	$15,878	$14	1.7%	54.0%	5.3%
	Total	1998	0.5	$12,832	$6	1.3%	32.4%	2.8%
		1999	0.6	$11,193	$6	1.2%	33.5%	3.3%
Property Damage Liability	Less than 750 cc	1998	3.1	$1,592	$5	5.6%	15.5%	0.0%
		1999	3.4	$1,629	$6	5.7%	17.3%	0.2%
	750-1000 cc	1998	3.7	$1,597	$6	3.8%	13.1%	0.1%
		1999	4.5	$1,806	$8	4.9%	17.3%	0.0%
	More than 1000 cc	1998	3.3	$1,497	$5	2.8%	10.7%	0.1%
		1999	3.8	$1,787	$7	3.6%	14.0%	0.1%
	Total	1998	3.3	$1,553	$5	3.8%	12.8%	0.1%
		1999	3.7	$1,726	$6	4.4%	15.7%	0.1%
Own Medical Payments	Less than 750 cc	1998	11.7	$859	$10	1.4%	22.6%	0.3%
		1999	12.2	$1,094	$13	1.7%	32.5%	0.5%
	750-1000 cc	1998	15.6	$957	$15	1.2%	29.1%	0.5%
		1999	15.5	$1,015	$15	1.2%	30.9%	0.5%
	More than 1000 cc	1998	14.7	$1,017	$15	1.1%	28.3%	0.3%
		1999	12.1	$1,256	$15	1.2%	28.8%	0.5%
	Total	1998	13.5	$949	$13	1.2%	26.2%	0.3%
		1999	12.6	$1,151	$14	1.3%	30.4%	0.5%

Table 1. (cont.)

Motorcycle Insurance Statistics by Engine Size, Selected Companies, 1998-1999

			Claims Per 1000 Covers	Claim Severity	Average Loss Cost	Percent of Total Losses	Loss Ratio	ALAE Ratio
Personal Injury Protection	Less than 750 cc	1998	8.8	$2,382	$21	0.8%	61.7%	1.4%
		1999	6.4	$1,994	$12	0.5%	31.0%	2.5%
	750-1000 cc	1998	8.4	$3,147	$25	0.6%	71.0%	2.2%
		1999	11.6	$2,300	$26	0.7%	70.9%	1.2%
	More than 1000 cc	1998	8.2	$3,099	$24	0.6%	69.2%	2.8%
		1999	9.2	$3,577	$32	0.8%	86.2%	2.3%
	Total	1998	8.5	$2,791	$23	0.6%	66.4%	2.1%
		1999	8.3	$2,779	$22	0.7%	58.5%	2.2%
Collision	Less than 750 cc	1998	31.8	$2,529	$80	39.0%	137.6%	0.6%
		1999	34.4	$2,509	$86	40.2%	142.3%	0.4%
	750-1000 cc	1998	34.1	$3,435	$117	42.0%	127.0%	0.1%
		1999	37.6	$3,399	$128	43.9%	129.8%	0.2%
	More than 1000 cc	1998	22.4	$3,469	$78	34.4%	70.0%	0.1%
		1999	24.0	$3,504	$84	35.8%	72.5%	0.1%
	Total	1998	27.0	$3,098	$84	37.0%	91.8%	0.2%
		1999	29.1	$3,105	$90	38.4%	94.5%	0.2%
Comprehensive	Less than 750 cc	1998	15.2	$2,988	$44	24.5%	114.5%	3.1%
		1999	14.3	$2,882	$41	21.7%	101.3%	0.8%
	750-1000 cc	1998	13.3	$4,055	$54	21.3%	79.7%	0.5%
		1999	13.3	$4,327	$57	21.4%	81.8%	0.7%
	More than 1000 cc	1998	9.2	$6,346	$58	27.1%	68.2%	0.6%
		1999	9.0	$5,972	$53	23.8%	60.9%	0.6%
	Total	1998	11.8	$4,518	$53	25.4%	79.1%	1.1%
		1999	11.3	$4,399	$49	22.8%	71.6%	0.7%
Uninsured Motorist & Uninsured/ Underinsured Combined	Less than 750 cc	1998	1.0	$16,275	$15	17.5%	47.1%	3.0%
		1999	1.2	$16,374	$18	19.5%	57.4%	1.8%
	750-1000 cc	1998	1.7	$16,129	$26	17.7%	67.8%	2.4%
		1999	1.7	$16,874	$27	17.0%	74.1%	4.0%
	More than 1000 cc	1998	1.5	$24,637	$35	21.7%	84.5%	3.9%
		1999	1.8	$22,975	$39	23.3%	96.8%	2.8%
	Total	1998	1.3	$20,315	$25	19.8%	67.7%	3.4%
		1999	1.5	$19,856	$29	21.2%	78.9%	2.6%

Table 1. (cont.)

Motorcycle Insurance Statistics by Engine Size, Selected Companies, 1998-1999

			Claims Per 1000 Covers	Claim Severity	Average Loss Cost	Percent of Total Losses	Loss Ratio	ALAE Ratio
Total	**Less than 750 cc**	**1998**	6.2	$3,290	$20	100.0%	52.3%	1.7%
		1999	6.7	$3,291	$21	100.0%	57.0%	1.5%
	750-1000 cc	**1998**	7.6	$4,341	$32	100.0%	58.9%	1.0%
		1999	8.5	$4,224	$35	100.0%	62.8%	1.2%
	More than 1000 cc	**1998**	6.6	$5,317	$34	100.0%	52.7%	1.3%
		1999	7.0	$5,279	$36	100.0%	54.6%	1.2%
	All Motorcycles	**1998**	6.6	$4,351	$28	100.0%	53.4%	1.4%
		1999	7.1	$4,331	$30	100.0%	56.5%	1.3%

Table 2.

Personal Auto Insurance Statistics by Vehicle Type, Selected Companies, 1998-1999

			Claims Per 1000 Covers	Claim Severity	Average Loss Cost	Percent of Total Losses	Loss Ratio	ALAE Ratio
Bodily Injury Liability	Car	1998	15.6	$8,056	$125	24.8%	61.9%	5.2%
		1999	15.0	$6,979	$105	21.5%	55.7%	5.1%
	Light Truck	1998	13.9	$8,154	$114	26.1%	63.2%	4.3%
		1999	13.4	$7,383	$99	23.0%	59.4%	4.0%
	Van	1998	12.5	$8,200	$102	23.8%	56.7%	4.5%
		1999	11.9	$7,344	$88	21.2%	52.5%	4.5%
	SUV	1998	14.8	$8,382	$124	24.8%	62.9%	4.3%
		1999	14.2	$7,454	$106	21.6%	57.9%	4.0%
	Total	1998	14.9	$8,124	$121	25.0%	61.8%	4.9%
		1999	14.3	$7,140	$102	21.7%	56.3%	4.7%
Property Damage Liability	Car	1998	58.2	$1,464	$85	16.3%	71.9%	0.2%
		1999	59.5	$1,460	$87	17.2%	74.2%	0.2%
	Light Truck	1998	59.1	$1,607	$95	20.8%	85.2%	0.2%
		1999	59.2	$1,652	$98	21.7%	88.9%	0.2%
	Van	1998	53.5	$1,418	$76	17.1%	72.7%	0.2%
		1999	54.3	$1,436	$78	18.2%	76.1%	0.2%
	SUV	1998	61.5	$1,583	$97	18.9%	87.7%	0.3%
		1999	62.2	$1,597	$99	19.8%	91.0%	0.2%
	Total	1998	58.4	$1,502	$88	17.4%	76.2%	0.2%
		1999	59.3	$1,513	$90	18.4%	79.2%	0.2%
Own Medical Payments	Car	1998	16.3	$1,897	$31	3.7%	81.9%	1.2%
		1999	16.5	$1,959	$32	4.1%	90.9%	1.2%
	Light Truck	1998	10.0	$1,986	$20	2.7%	52.0%	1.0%
		1999	10.1	$2,100	$21	2.9%	58.8%	1.0%
	Van	1998	12.0	$2,165	$26	3.7%	73.5%	1.0%
		1999	12.0	$2,146	$26	3.9%	78.2%	1.1%
	SUV	1998	11.8	$2,069	$24	2.8%	63.7%	0.9%
		1999	12.0	$2,136	$26	3.1%	72.2%	0.8%
	Total	1998	14.2	$1,946	$28	3.4%	73.5%	1.1%
		1999	14.3	$2,011	$29	3.7%	81.4%	1.1%

Table 2. (cont.)

Personal Auto Insurance Statistics by Vehicle Type, Selected Companies, 1998-1999

			Claims Per 1000 Covers	Claim Severity	Average Loss Cost	Percent of Total Losses	Loss Ratio	ALAE Ratio
Personal Injury Protection	Car	1998	23.8	$4,546	$108	8.3%	98.2%	4.4%
		1999	25.2	$3,776	$95	7.6%	91.7%	4.8%
	Light Truck	1998	14.9	$4,112	$61	4.9%	63.6%	2.3%
		1999	15.4	$3,541	$55	4.4%	60.9%	2.3%
	Van	1998	17.5	$5,235	$92	8.3%	89.9%	3.5%
		1999	18.4	$4,159	$77	7.1%	80.5%	4.0%
	SUV	1998	17.9	$5,032	$90	7.3%	80.9%	3.2%
		1999	19.2	$4,637	$89	7.2%	86.3%	3.1%
	Total	1998	21.0	$4,602	$96	7.6%	90.0%	3.8%
		1999	22.1	$3,882	$86	7.0%	85.3%	4.1%
Collision	Car	1998	87.3	$1,788	$156	26.3%	65.6%	0.2%
		1999	90.9	$1,848	$168	29.7%	71.0%	0.1%
	Light Truck	1998	64.3	$1,819	$117	22.3%	56.4%	0.1%
		1999	66.0	$1,952	$129	25.3%	61.9%	0.1%
	Van	1998	71.2	$1,595	$114	23.5%	55.5%	0.1%
		1999	74.1	$1,656	$123	26.5%	60.0%	0.1%
	SUV	1998	68.3	$2,026	$138	24.4%	51.2%	0.1%
		1999	70.6	$2,153	$152	28.0%	56.5%	0.1%
	Total	1998	79.3	$1,802	$143	25.2%	61.2%	0.1%
		1999	82.0	$1,884	$154	28.4%	66.3%	0.1%
Comprehensive	Car	1998	89.4	$836	$75	13.4%	60.5%	0.3%
		1999	87.0	$814	$71	13.2%	58.1%	0.2%
	Light Truck	1998	119.1	$718	$86	17.3%	73.5%	0.3%
		1999	117.0	$713	$83	17.3%	71.2%	0.2%
	Van	1998	101.5	$731	$74	16.1%	71.6%	0.2%
		1999	99.1	$723	$72	16.2%	69.1%	0.2%
	SUV	1998	115.3	$754	$87	16.0%	56.3%	0.2%
		1999	111.5	$716	$80	15.3%	52.8%	0.2%
	Total	1998	99.2	$788	$78	14.6%	62.9%	0.2%
		1999	96.9	$767	$74	14.4%	60.3%	0.2%

Table 2. (cont.)

Personal Auto Insurance Statistics by Vehicle Type, Selected Companies, 1998-1999

			Claims Per 1000 Covers	Claim Severity	Average Loss Cost	Percent of Total Losses	Loss Ratio	ALAE Ratio
Uninsured Motorist & Uninsured/ Underinsured Combined	Car	1998	6.4	$5,635	$36	7.2%	59.6%	3.5%
		1999	6.4	$5,129	$33	6.8%	57.3%	3.4%
	Light Truck	1998	4.6	$5,554	$25	6.0%	46.6%	2.2%
		1999	4.5	$4,995	$23	5.4%	43.6%	2.1%
	Van	1998	4.7	$6,957	$33	7.6%	55.8%	3.0%
		1999	4.7	$6,057	$29	6.9%	51.2%	2.9%
	SUV	1998	4.5	$6,410	$29	5.7%	46.9%	2.3%
		1999	4.5	$5,482	$25	5.0%	42.4%	2.3%
	Total	1998	5.7	$5,796	$33	6.8%	55.4%	3.1%
		1999	5.7	$5,216	$30	6.3%	52.3%	3.0%
Total	Car	1998	44.1	$2,001	$88	100.0%	66.7%	2.1%
		1999	44.7	$1,903	$85	100.0%	66.3%	2.0%
	Light Truck	1998	43.4	$1,782	$77	100.0%	64.8%	1.6%
		1999	43.5	$1,749	$76	100.0%	65.4%	1.4%
	Van	1998	41.6	$1,784	$74	100.0%	63.2%	1.8%
		1999	41.8	$1,705	$71	100.0%	62.8%	1.7%
	SUV	1998	45.2	$1,926	$87	100.0%	61.4%	1.5%
		1999	45.3	$1,867	$84	100.0%	61.7%	1.4%
	Total	1998	43.9	$1,933	$85	100.0%	65.4%	1.9%
		1999	44.3	$1,853	$82	100.0%	65.2%	1.8%

Table 3.
Losses and Loss and Expense Ratios by Kind of Auto Insurance, Nationwide, 1998-1999

Kind of Insurance	Vehicle Type	Year	Premiums Earned	Loss Ratio	LAE (Narrowly Defined)	Com-LAE (Broadly Defined)	mission & Brokerage	Total Other Under-writing	LAE & Under-writing
Liability	**Private Passenger**	**1998**	70,488,746	61.6%	NA	14.7%	9.0%	14.5%	38.3%
		1999	69,541,977	66.5%	4.6%	14.8%	8.9%	15.5%	39.2%
	Commercial	**1998**	12,736,277	72.1%	NA	13.6%	13.0%	17.2%	43.9%
		1999	12,565,725	72.3%	7.7%	15.8%	14.5%	17.5%	47.9%
Physical Damage	**Private Passenger**	**1998**	45,375,351	63.7%	NA	10.2%	9.7%	14.7%	34.6%
		1999	47,981,924	63.4%	0.7%	10.5%	9.1%	15.7%	35.3%
	Commercial	**1998**	5,127,653	69.4%	NA	8.8%	14.2%	16.1%	39.1%
		1999	5,191,970	69.8%	0.9%	10.0%	15.5%	17.3%	42.8%

All numbers are percentages of premiums earned.
NA = not available
Source: Quoted or computed from Best's Aggregates and Averages - Property Casualty, 2000 Edition

Insurance for Other Private Passenger Vehicles

The survey responses described more than 25 percent but less than 50 percent of all private passenger insurance premiums. These responses appeared to be highly representative of the industry as a whole. The loss ratio for the responding companies averaged 65.2 percent, essentially the same as the 66.3 percent for the industry (A.M. Best 2000). ALAE for liability coverage averaged 3 percent, identical to the all-industry percentage (Goch, 2000).

Table 4 shows the percentage distribution of policies between vehicle types. Passenger cars comprised almost 60 percent of the covered vehicles. Sport utility vehicles (SUVs) were rising in popularity, reaching 13 percent of covered vehicles in 1999. Light trucks were 19 percent of covered vehicles and vans were 9 percent.

Table 2 presents insurance statistics by coverage for personal passenger auto other than motorcycles. Property damage liability and collision claims each are four to five times as frequent as bodily injury liability claims. Claims under PIP and own medical also are more common than under bodily injury liability. In part, that is because bodily injury liability claims in no-fault states only are filed for losses above the PIP limit, typically $15,000-$25,000. In states that do not adhere to a no-fault regime, coverage for own medical payments is designed to assure that no one hesitates to treat an injured driver because (s)he might be unable to pay the bill. Policy limits for this coverage are established legislatively and low, perhaps $500 to $5,000 depending on the state. Predictably, bodily injury claims are much more severe than PIP or own medical payments claims and account for double the total losses. Claims under uninsured motorist coverage also tend to be severe.

Intriguingly, bodily injury liability, PIP, uninsured motorist, and total claim severity fell from 1998 to 1999. It is possible that this fall resulted from tighter medical cost management or declining crash severity. Judging by loss ratios, own medical payments and PIP coverage were less profitable than most coverages. ALAE was substantially lower for property damage claims than for other claims.

Table 4.
Percentage Distribution of Personal Passenger Auto Insurance Policies by Vehicle Type and Year, for Selected Companies, Excluding Motorcycle

Vehicle Type	1998	1999
Car	59.95%	58.71%
Light Truck	18.82%	18.94%
Van	8.95%	9.04%
SUV	12.28%	13.31%
Total	100.00%	100.00%

A Further Comparison of Motorcycle and Other Private Passenger Auto Insurance

Table 5 compares the coverages included in typical motorcycle and auto insurance policies. They differ radically. Motorcycles were covered by much less comprehensive insurance than other vehicles.

Policies on other vehicles virtually all included coverage for bodily injury liability, property damage liability, uninsured motorist, and one of PIP or own medical expenses. This broad range of coverage was not entirely due to legislative mandates since some states (e.g., Mississippi) did not require drivers to carry insurance. Furthermore, 90.8 percent of policies included comprehensive coverage and 86.1 percent included collision coverage. Our survey, however, did not include insurers that primarily cover high-risk drivers, so collision coverage may be less common in the overall insurance pool.

Table 5.
Percentage of Policyholders with Different Coverages, Motorcyclists versus Other Motorists, Selected Companies, 1999

Coverage	Motorcycles	Other Vehicles
Bodily Injury Liability	87.1%	99.6%
Passenger Liability	24.1%	99.6% *
Property Damage Liability	85.4%	96.0%
Own Medical Expenses	11.5%	60.3%
Personal Injury Protection	3.8%	37.9%
Collision	52.3%	86.1%
Comprehensive	56.8%	90.8%
Uninsured Motorist	90.6%	99.9%

* = Included in bodily injury liability.

Bodily injury liability, property damage liability and uninsured motorist coverage were included in 85 percent to 90 percent of motorcycle insurance policies. Personal injury protection or own medical expense coverage was extremely uncommon in the motorcycle market. David Large, an executive in GuideOne Insurance's motorcycle program, reports (personal communication with Ted Miller, July 27, 1998) that other drivers are at fault in more than 75 percent of motorcycle crashes. Motorcyclists have successfully argued it is unfair to shift costs from auto drivers to motorcyclists. Consequently, legislatures typically have exempted motorcyclists from no-fault laws and not required them to purchase no-fault personal injury protection (PIP) coverage or even own medical payments coverage. In Kentucky and Texas, however, recent laws require that motorcyclists carry coverage for their medical costs, regardless of who is at fault, if they wish to ride unhelmeted. Our survey revealed that some

insurers responded to this requirement by offering optional PIP coverage for motorcyclists in these states. Just over half of motorcycle policies include collision and comprehensive coverage.

Comparing Tables 1 and 2 reveals that the average severity of medical payment and PIP claims was substantially lower for motorcycles than for other personal passenger vehicles. Conversely, the average bodily injury claim against a motorcycle was almost twice as severe as one against other personal passenger vehicles. This finding is especially surprising since policies on other vehicles were much more likely to include no-fault PIP coverage that shifted low-severity claims away from bodily injury coverage. The reasons for the observed differences are unknown. One probable contributor is a heavier concentration of pedestrians and motorcycle passengers among bodily injury claims against motorcycles. Indeed, Mr. Large reports that many states only require motorcyclists to purchase bodily injury liability protection covering those groups.

Average collision claim severity (losses per claim) for motorcycles was 1.65 times the average severity for other private passenger vehicles ($3,105 versus $1,884 in 1999, from Tables 1 and 2). This differential is especially notable since autos typically cost more than motorcycles. Claim severity varied minimally between other types of private passenger vehicles.

When comparing claims frequencies and average loss costs between motorcycles and other personal passenger vehicles, it is important to remember that other passenger vehicles travel 4.6 times as many miles (FHWA 2000). If these two vehicle types were equally safe, claims per 1000 covers would be 4.6 times greater for the other vehicles than for motorcycles. With this adjustment, for bodily injury liability claims (including passenger injury liability claims in the motorcycle total), the motorcycles experienced slightly fewer liability claims per 1000 covers than other vehicles. They experienced far fewer property damage liability claims, many more medical payments claims, modestly more PIP claims, and comparable numbers of uninsured motorist claims.

Table 6 presents comparative statistics at the policy level rather than the individual cover level. As Table 5 illustrated, motorcycle insurance policies were narrow, averaging fewer covers than other policies. Motorcycle insurance policies also had lower premiums; they cost much less than other private passenger insurance policies. The premium difference arose not only because motorcycle policies included less covers but because motorcycles traveled an average of 2,600 miles annually while other vehicles traveled 11,700 miles.

Table 6.
Statistics About Private Passenger Auto Insurance Policies by Vehicle Type, Selected Companies, 1998-1999

		Covers per Policy	Premium per Actual Policy	Premium per All-Cover Policy	Claims per 1000 Policies	Losses per Policy	Losses per 1000 Miles	Crash Losses* per 1000 Miles
Less than 750 cc Motorcycle	**1998**	3.9	$150	$273	23.9	$79	NA	NA
	1999	3.9	$152	$270	26.3	$87	NA	NA
750-1000 cc Motorcycle	**1998**	4.0	$222	$387	30.2	$131	NA	NA
	1999	4.0	$231	$395	34.4	$145	NA	NA
More than 1000 cc Motorcycle	**1998**	4.3	$284	$440	28.2	$150	NA	NA
	1999	4.3	$291	$446	30.2	$159	NA	NA
All Motorcycles	**1998**	4.1	$216	$368	26.5	$116	$44	$33
	1999	4.1	$223	$372	29.1	$126	$49	$38
Car	**1998**	5.7	$757	$853	252.2	$520	$44	$38
	1999	5.7	$735	$825	255.8	$501	$42	$37
Light Truck	**1998**	5.5	$657	$765	239.1	$437	$36	$30
	1999	5.5	$644	$744	240.8	$430	$36	$30
Van	**1998**	5.8	$680	$754	240.8	$442	$36	$31
	1999	5.8	$658	$728	242.3	$425	$36	$30
SUV	**1998**	5.8	$816	$906	260.3	$514	$42	$36
	1999	5.8	$792	$873	261.8	$499	$42	$35
Subtotal	**1998**	5.7	$738	$835	249.7	$497	$42	$36
	1999	5.7	$718	$808	252.5	$481	$40	$35
All Private Passenger Auto	**1998**	5.6	$724	NA	244.0	$487	$41	$36
	1999	5.6	$704	NA	246.4	$471	$40	$35

* = Excludes comprehensive

Differences in miles traveled primarily affect crash-related risk. Breaking down the premium data in more detail than Table 6, premiums for comprehensive coverage against theft, vandalism, and other non-crash losses, across all policyholders, averaged $40 for motorcycles and $110 for other vehicles. Among purchasers, premiums for comprehensive coverage averaged $70 and $125 respectively. The 1.8 ratio of premiums for comprehensive coverage of other vehicles versus motorcycles (125/70) is greater than the 1.5 ratio of average loss costs (74/49, from Tables 1 and 2). Thus, this coverage is relatively less costly for motorcycles than other vehicles.

Motorcycle insurance premiums for crash-related coverage averaged $180 per policy compared with $620 per policy for other private passenger vehicles. Motorcyclists tend to buy policies that cover less risks than other drivers. Premiums for a policy that included all the crash-related coverages available (with the more costly of medical payments or personal injury protection) would average $300 for motorcycles and $700 for

other private passenger autos. Because motorcycles typically are driven less than other private passenger vehicles, these lower premiums for motorcycles are misleading. Per 1000 vehicle miles traveled, premiums earned in 1999 averaged $87 for narrow motorcycle policies and $61 for broader policies for other vehicles. Thus, motorcycle coverage is expensive relative to coverage on other private passenger vehicles.

The higher price of motorcycle policies did not result from worse loss experience. Compensated crash-related losses per thousand miles driven in 1998-1999 were comparable for motorcycles and other private passenger vehicles, with both averaging $35.50. Goch (2000) suggests auto insurance premiums were untenably low in 1999. The auto insurers lost money. Our data indicate that problem did not extend to the motorcycle market, which probably broke even or yielded a modest profit. As Tables 1 and 2 showed, the loss ratio for motorcycles averaged 55 percent in 1998-1999, well below the 67 percent average for other vehicles. If auto insurance premium adjustments return this line to profitability, premiums might rise into the range in the motorcycle insurance market. Over even a 20-year time horizon, however, auto liability insurance often has been a loss leader for property-casualty insurers.

The finding that motorcycles and other private passenger vehicles have comparable crash-related loss costs per thousand miles driven is strongly influenced by the narrower coverage in a typical motorcycle policy. If all policies included broad coverage, losses per thousand miles driven would have been $59.50 for motorcycles and $37.50 for other vehicles. These estimates assume each policy would include only one of own medical payments or PIP, with the actual percentage split between these two coverages preserved. Even these estimates are not completely comparable because motorcyclists are more likely than other motorists to have own medical payments coverage rather than more costly PIP coverage; PIP has a higher payment maximum for the insured's own injury losses. Policy limits on own medical also may be lower on motorcycle than other private passenger vehicle policies, a distinct possibility given that own medical payments per claim average half as large for motorcyclists as other vehicle operators.

A final notable aspect of Table 5 is the variation in claims experience between vehicle types. Light trucks and vans had 10 percent lower losses per policy (and proportionately lower premiums) than cars or SUVs. Vans sustained slightly less property damage per claim (collision loss severity in Table 2) than other vehicles; SUVs sustained slightly more damage than other vehicles. Light truck owners bought slightly less comprehensive coverage than other vehicle owners. Their loss experience per 1000 vehicle miles of travel was comparable to vans but better than the loss experience for cars and SUVs.

Commercial Vehicle Insurance

The companies surveyed for this study were selected because they were the largest writers of private passenger vehicle or motorcycle insurance. They were not, however, among the largest writers of commercial vehicle insurance. Indeed, the respondents collectively account for less than 5 percent of commercial vehicle premiums. The survey should be viewed as a pilot effort for this population. It proved the data can be obtained and suggests ways to organize it, but the information collected probably is not representative. In particular, the for-hire vehicle category, intended to capture taxicabs and limousines, proved unclear and difficult for respondents, forcing us to aggregate information on these vehicles with light personal commercial vehicles.

The most useful information from this segment of the survey was on the ratio of property damage payments per collision claim between categories of vehicle types: light personal and for hire vehicles. buses/passenger vans, and medium/heavy trucks. The ratios lend insight into the relative vehicle damage when each of these three vehicle types is crash-involved. The average payments of $4,300 to heavy truck owners under their collision coverage were 2.15 times average payments to owners of other commercial vehicles. Payments under collision coverage for light commercial vehicles and buses/vans averaged about $2,000 (comparable to or slightly above average payments per collision claim under personal passenger vehicle insurance). Since deductibles on collision coverage probably were similar across all types of commercial vehicles, the property damage cost for a crash-involved medium/heavy truck probably was about double the property damage cost for other crash-involved vehicles ($4,600 versus $2,300 if we assume a $300 average deductible). Average property damage costs for crash-involved buses, however, did not exceed passenger vehicle property damage costs (a finding consistent with the suggestion by Zaloshnja and Miller (2000) that low-cost, presumably low-speed bus crashes are reported to police more often than other low-cost crashes). These findings can be used to improve current property damage cost estimates for medium/heavy trucks.

Who Pays?

The insurance data yielded critical factors for estimating the breakdown between cost categories of crash costs compensated by auto insurers. They allowed computation of five multipliers for use with data from the annual *Best's Aggregates and Averages*. These multipliers were computed separately for private passenger and commercial insurance. Following *Best's*, the private passenger category includes motorcycles. We show motorcycle-specific percentages as well. The multipliers are:

- The percentage of motor vehicle liability loss costs that compensate bodily injury. In this computation, we applied the percentage split between bodily injury and property damage liability to decompose uninsured motorist loss costs.
- The percentage of motor vehicle liability loss costs that compensate property damage
- The percentage of motor vehicle property damage loss costs that compensate collision damage (as opposed to theft-related damage, for example)
- Internal costs, computed as the percentage of motor vehicle liability loss costs that compensate costs paid by the insurance of at-fault drivers (or by the driver's own insurance in crashes where no one was at fault). In separating internal from external costs, we assumed that drivers were at fault for 50 percent of multi-vehicle crash costs paid by personal injury protection and for all single vehicle crashes. The split of costs between single and multi-vehicle crashes by vehicle type came from Miller, Levy, et al. (1998).
- External costs, computed as the percentage of motor vehicle liability loss costs that compensate costs paid by the driver's insurance when another driver was at fault

Table 7 shows average multipliers for 1998-1999. The multipliers to split out crash-related property damage are virtually identical for personal and commercial lines. Roughly 36 percent of total private passenger and commercial auto liability loss costs and 65 percent of total property damage loss costs compensated crash-related property losses. Crash-related property damage compensated by private passenger and commercial motor vehicle insurance totaled $39,777 million in 1998 and $43,944 million in 1999. Bodily injury losses compensated by motor vehicle insurance totaled $34,135 million in 1998 and $34,684 million in 1999.

Commercial insurance was more heavily oriented toward internal cost compensation than private passenger insurance was (88.9 percent versus 84.7 percent of loss costs). Internal crash costs compensated by private passenger and commercial motor vehicle insurance totaled $65,698 million in 1998 and $70,157 million in 1999, about eight times the compensated external costs of $8,213 million in 1998 and $8,471 million in 1999.

Table 7.
Percentage Multipliers for Breaking Down Annual Insurance Loss Cost Data into Losses by Cost Category and into Internal vs. External Costs

	Private Passenger *	Commercial	Motorcycle
Percent liability = bodily injury	63.2%	64.7%	75.2%
Percent liability = property damage	36.8%	35.3%	24.8%
Percent property damage = collision damage	64.8%	64.0%	61.0%
Percent liability = internal costs	84.7%	88.9%	45.0%
Percent liability = external costs	15.3%	11.1%	55.0%

* = Includes motorcycles and other private passenger vehicles.
Note: Computed from 1998 and 1999 data from selected insurers.

Motorcycle insurance data contrasts markedly with the pattern for other vehicles. Motorcycles cause less property damage than bodily injury, with 75 percent rather than 63 percent of liability costs related to bodily injury. Because more than half of motorcycle liability payments are under uninsured motorist coverage, much of the motorcyclist's liability insurance bill goes to pay costs imposed by other at-fault drivers. Only an estimated 45 percent of motorcyclists' liability payments cover the costs of their at-fault crashes. In contrast 85percent to 89 percent of liability payments for other vehicles cover the costs of their at-fault crashes.

Premiums earned per private passenger liability policy averaged $431 in 1998 and $409 in 1999. The comparable figures for private passenger auto property damage were $342 and $341. We divided these numbers into total premiums earned as reported in *Best's Aggregates and Averages* to estimate the total number of insured private passenger vehicles. We followed a similar procedure with the relatively sparse commercial insurance data that we were able to collect. We summed the insured private passenger and commercial vehicles, then divided by the total number of registered vehicles from FHWA (2000).

Those calculations yield estimates that 87 percent of motor vehicles had liability insurance in 1998 and 88 percent had it in 1999. Comparable percentages for property damage coverage were 71 percent and 72 percent. By comparison, the Insurance Research Council (2001) estimates that insured motorists caused 86 percent of crashes where an insured private passenger vehicle occupant was injured; uninsured motorists caused the remaining 14 percent. Their estimate was computed completely differently from ours. The percentage uninsured is the ratio of injury claims under uninsured motorist coverage to bodily injury liability claims.

If we assume motorcycles are insured at the same rate as other private passenger vehicles, motorcycle insurance claims paid would total $336 million in 1998 and $400 million in 1999. The

estimated 19 percent growth between years results primarily from an 8 percent rise in claims per cover and an 8 percent growth in registered motorcycles, with inflation at just 2 percent and the percentage of passenger vehicles insured rising by 1 percent. These claims payment estimates are extremely tenuous. Insured motorcyclists buy less comprehensive coverage than other motorists, so they also may be less likely to buy insurance at all.

Roughly 11 percent of auto liability loss costs and 61 percent of auto property damage loss costs compensated crash-related property damage. The percentage of liability costs that compensate property damage rather than bodily injury is much lower for motorcycles than for other passenger vehicles because motorcycles weigh less and thus cause less property damage. Motorcycle insurance compensated about $155 million in bodily injury losses, $161 million in crash-related property damage, and $84 million in theft, vandalism, and other non-crash losses in 1999. The comparable figures for 1998 were $128 million, $129 million, and $79 million.

Conclusion

Both insured motorcycles and other private passenger vehicles experienced $35.50 in crash-related claims per thousand miles traveled in 1998-1999. Legal and lender mandates force most motorists to insure against a broad range of risks. Motorcycles, however, have less insurance mandates. They typically insure against fewer risks. If they were as broadly insured as autos, their claims costs per mile traveled would have been almost 1.6 times average auto claims costs. Average collision losses per claim varied little between vehicle types, except that medium/heavy truck claims were twice as large as claims for other vehicles and motorcycle claims were 65 percent larger. Compared to other private passenger vehicles, motorcycles also had worse loss experience on theft, vandalism, and other non-crash risks.

Per thousand miles traveled, insurance coverage cost $87 for a motorcycle but just $61 for other private passenger vehicles. In aggregate, pricing for motorcycle coverage was commensurate with loss experience. Liability coverage, however, might have been overpriced and property damage coverage underpriced. Profits on motorcycle liability coverage offset property damage coverage losses. In contrast, insurers lost money due to the underpricing of other auto policies in 1998-1999. In interpreting these results, it is important to remember that liability insurance largely pays for bodily injury to others injured by the insured, not to the insured personally. Thus, for example, when a motorcyclist chooses against wearing a helmet, any resulting rise in insurance claims primarily will be against the insurance of other at-fault motorists.

Among insured motorcycles with coverage details known for 1999, 14 percent had 750-1000 cc engines, 43 percent had larger engines, and 43 percent had smaller ones. Insured motorcycles with engines below 750 cc had fewer claims. Claim severity rose with engine size. Motorcycles above 1000 cc had especially high claim severity.

Losses per policy rose dramatically with motorcycle engine size, with premiums rising proportionately. Touring bikes comprised 10 percent of insured motorcycles and sportbikes just over 3 percent. Losses were higher for these motorcycles, in part because they typically have larger engines. Touring cycles also are expensive and tended to be comprehensively insured. Sportbikes, however, had bad loss records. Despite having fewer coverages per policy than most motorcycles, these vehicles experienced losses per policy that were 1.5 to 2 times those of other motorcycles with large engines and 3 times the all-motorcycle average.

Roughly 36 percent of motor vehicle liability loss costs and 65 percent of motor vehicle property damage loss costs compensated crash-related property damage. The comparable figures for motorcycles were 11 percent and 61 percent. In 1999, motor vehicle insurance compensated an estimated $43,944 million in crash-related property damage and $34,684 million in bodily injury losses. Of this amount, motorcycle insurance paid for roughly $161 million in crash-related property damage and $155 million in bodily injury losses.

Because more than half of motorcycle liability payments are under uninsured motorist coverage, much of the motorcyclist's liability insurance bill goes to pay costs imposed by other at-fault drivers. Internal crash costs compensated by insurance totaled $70,157 million in 1999, about eight times the compensated external costs of $8,471 million. Only an estimated 45 percent of motorcyclists' liability payments cover the internal costs of their at-fault crashes. In contrast 85 percent to 89 percent of liability payments for other vehicles cover their internal costs.

This project yielded data that will greatly enhance future NHTSA crash costing. These data are much different than those collected in 1988. Increasing computerization and an improved data collection strategy make them more detailed, on point, and precise. Supplying a data spreadsheet to the companies surveyed proved a very useful data collection tool. NAII's involvement as an intermediary also increased the comfort of at least one company with releasing data. At the same time, some changes would be appropriate when similar data next are collected. First, we do not recommend collecting ALAE; Best's data appear to be adequate. Second, more consultation with major writers is needed to refine the commercial vehicle types. Third, it currently would be desirable to gather further data on commercial coverage and on auto insurance coverage offered by assigned risk plans and other large writers of insurance for high-risk drivers. Fourth, in the future, simply breaking personal auto into car, light truck/van/SUV, and motorcycle may adequately differentiate vehicle types. Finally, a simpler data request that collapsed some covers might improve the response rate. Some insurers could not produce some of the detailed data we desired.

References

A.M. Best and Company. (2000). *Best's Aggregates and Averages*, Oldwick NJ: A.M. Best and Company.

Goch, L. (2000). *Car Wars*, Best's Review 101:6, 34-60.

FHWA. (2000). *Highway Statistics 1999*, Washington DC: Federal Highway Administration.

Insurance Research Council. (2001). *Uninsured Motorists, 2000 Edition*. Malvern PA: Insurance Research Council.

Kim, K.E., Boski, J., and Yamashita, E.Y. (2002). *Typology of Motorcycle Crashes: Rider Characteristics, Environmental Factors, and Spatial Factors (02-2885)*, TRB 2002 presentation.

Lawrence, B.A., Max, W., and Miller, T.R. (2002). *Cost of Injuries Resulting from Motorcycle Crashes: A Literature Review*, Washington, DC: National Highway Traffic Safety Administration, DOT HS 809 242.

Blincoe, L.J., and Luchter, S. (1983). *The Economic Cost to Society of Motor Vehicle Accidents*, Washington, DC: National Highway Traffic Safety Administration, DOT HS 806 342.

Miller, T.R. (1988). *Safety Belt Use and Auto Insurance Prices: A Report to Congress*, Washington, DC: National Highway Traffic Safety Administration.

Miller, T.R. (1989). *65 MPH: Does It Save Time?*, 33rd Proceedings of the Association for the Advancement of Automotive Medicine, 73-90.

Miller, T.R., Viner, J.G., Rossman, S.B., Pindus, N.M., Gellert, W.A., Douglass, J.B., Dillingham, A.E., and Blomquist, G. (1991). *The Costs of Highway Crashes*, Washington, DC: National Technical Information Service, FHWARD91055.

Miller, T.R., Levy, D., Spicer, R., and Lestina, D. (1998). *Allocating the Costs of Motor Vehicle Crashes Between Vehicle Types*, Transportation Research Record 1635, 81-87.

Zaloshnja, E., Miller, T.R., and Spicer, R. (2000). *Cost of Large Truck- and Bus-Involved Crashes*, Report of Federal Motor Carrier Safety Administration, Washington, DC.

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