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# Premium Rating Error:

## Industry Audit Results for Private Passenger Auto

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### **Executive Summary:**

This report presents the results of premium audit reviews of over 12 million private passenger auto policies from 10 carriers. We estimate that the industry is losing \$13 billion dollars in premium annually due to rating error. The report summarizes audit methods, breaks down loss estimates by rating factors and examines available solutions.



## Premium Rating Error: Industry Audit Results for Private Passenger Auto

Quality Planning conducts premium audits for private passenger auto policies. As a service to the industry, this report aggregates and summarizes audit results of over 12 million auto policies from 10 major carriers during the last two years. The sample includes substandard to preferred books of business, all distribution channels, and national and regional carriers<sup>1</sup>. Results were weighted to reflect the total national private passenger auto line. To protect carrier confidentiality, only average and aggregate results are presented. All findings individual or idiosyncratic to a single carrier have been removed. Specific examples have been both disguised and based on multiple carriers to reflect general issues. Losses reported are typical throughout the industry.

The insurance industry manages risk through managing information. We are able to understand and manage risk only to the extent our information on the risk is complete and accurate. Errors in rating data result in premium loss and risk management failures. This report overviews the extent of rating error in private passenger auto lines, examines the sources and costs of the error and evaluates alternative methods for error prevention and correction. For illustrative purposes, most examples use a single rating factor—annual mileage—to demonstrate issues relating to rating error.

### Estimating Rating Error

Two primary methods were used to develop the estimates of rating error: *Statistical Risk Estimators* and *Direct Measures*.

**Statistical Risk Estimators:** The first method we employ to estimate rating error is to compare the “expected distribution” of rating factors to the “rated distribution”. In the case of annual mileage the “expected distribution” is the distribution given the characteristics of policies written. We “expect” the average new Ferrari to be driven an average of 3,500 miles per year and the average new Chevy cargo van to be driven more than 20,000 miles. Based on numerous studies of vehicle use patterns we have estimated and validated equations which develop an “expected mileage” based on vehicle make, model, and year; number of vehicles in the household; garaging ZIP code; number of drivers in the household; age and occupation of driver and so on. Actual odometer reading data from over 30 million vehicles was used in developing the statistical models. For every vehicle insured, “expected mileage” is compared to “reported mileage” to detect any patterns of systematic error.

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<sup>1</sup> The sample was limited to audits where we retained the contractual right to aggregate data for industry analysis.

**Direct Measures:** The second method we use to estimate rating error is direct measurement. For over a million vehicles in the sample we had data for multiple odometer readings to evaluate actual annual mileage. In addition, for multiple carriers, we interviewed over nearly one million insureds concerning their vehicle usage patterns and annual mileage. Results of the odometer and interview data, in turn, were used to validate and refine the statistical models.

Statistical and direct measures were combined for each carrier in the sample and contrasted with rated values. These were then consolidated for this industry report.

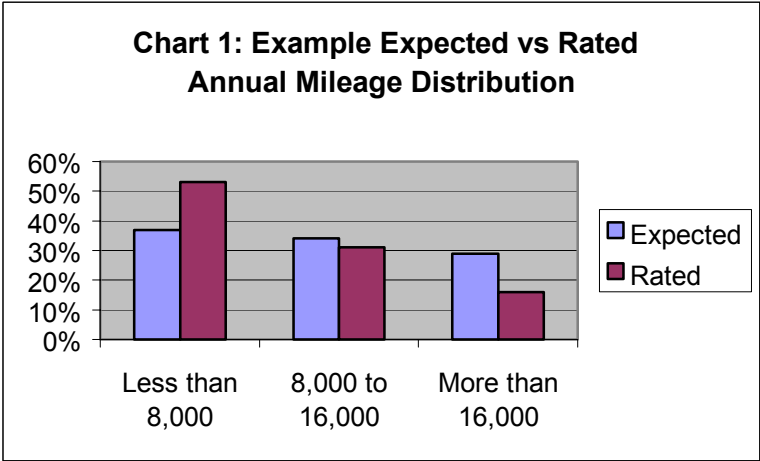


Chart 1 displays the results for a typical carrier. The chart shows significantly higher than expected percent of vehicles were rated in the lowest category of less than 8,000 miles and only about half as many vehicles as expected were rated in the highest category of over 16,000 miles.

The last step was to develop premium loss estimates. For each vehicle premium “loss” was computed by subtracting current premium from what the premium would have been given the expected annual mileage. The sum of the differences divided by total premium is the percent of premium associated with the rating error.

To generate total national premium loss estimates, individual carrier results by state, were weighted to reflect the total and summed.

## Findings

Table 1 presents national private passenger auto rating estimate errors as a percent of premium.

TABLE 1: Rating Error as a Percent of Premium

Private Passenger Auto	Percent of Premium
<b>Vehicle Rating Factors</b>	
Commute/Annual Mileage	1.6%
Vehicle Characteristics, Discounts <sup>2</sup>	.6%
Vehicle Usage	.9%
Rated Territory	.5%
<i>Vehicle Subtotal</i>	<i>3.7%</i>
<b>Driver Rating Factors</b>	
Unrated Operators	1.8%
Vehicle-Driver Assignment	1.2%
Driver Characteristics <sup>3</sup>	1.5%
Violations/Accidents	1.4%
<i>Driver Subtotal</i>	<i>5.9%</i>
<b>Other Rating Factors<sup>4</sup></b>	<b>.2%</b>
<b>Total Rating Error</b>	<b>9.8%</b>

Rating error costs vary greatly by individual carrier. The amount and kind of rating errors varies by a myriad of factors including: characteristics of the book of business, geographic location, distribution channels, rating plan, systems history, regulatory environment, relationships with sales agents, and underwriting standards.

## Costs of Rating Error

### Direct Premium Losses

Rating error costs of 9.8 percent of premium translates into \$12.7 billion in lost premium for the total United States Private Passenger Auto market. Best's preliminary estimate for 2001 for personal auto was a combined ratio of 107. A ratio of 105 would represent break-even<sup>5</sup>. The losses due to rating error represent the difference between the industry making a 8 percent profit on premium and the 2 percent loss experienced in 2001.

<sup>2</sup> Includes symbol, safety discounts such as air bags, and vehicle body type discounts.

<sup>3</sup> Includes years driving experience, age, marital status, student discounts, affinity group discount, driver identification such as DL and SSN.

<sup>4</sup> A wide variety of factors are in this category including multi-policy discounts, years insured, and credit rating.

<sup>5</sup> A.M. Best Review/Preview

For individual carriers opportunities for profit gains in rating error reduction are significant. In a good year, individual carriers can expect to have average profits of five percent of premium. Under such circumstances, each one percent reduction in error results in a twenty percent profit gain.

## **Risk Management Costs**

Rating error leads directly to failures in risk management. As an example, policies with unrated 16-year-old male drivers in the household experience an average loss-ratio of over 200.

Failures of risk management occur at the aggregate, as well as the individual policy level. For example, many carriers, aware of the high error in annual mileage data, only rate in two or three categories such as 0 to 8,000 miles, 8,001 to 16,000 miles and 16,000 plus miles. However, our analysis of the loss-histories of vehicles which were driven more than 30,000 miles (verified through odometer readings), found loss frequencies that were 31 percent higher than vehicles driven 16,000 to 20,000 miles. Failure to identify these higher risk vehicles and rate accordingly represents a major source of unmanaged loss costs. Further, carriers that are capable of building and maintaining finely graduated rating plans enjoy multiple competitive advantages over carriers with flat rating plans.

## **Business Management Costs**

The modern insurer relies on rating and underwriting data in all primary areas of corporate management. Policy data provides key inputs to marketing, sales, business segmentation, financial planning, corporate planning, staff compensation, among others. Errors, or worse still, systematic biases in underwriting data deteriorates performance in all management functions for they are all subject to the same iron law of information—garbage in; garbage out.

## **Moral Hazard Costs**

An often-overlooked cost of rating error is moral hazard. Our analyses have repeatedly demonstrated that individuals who misreport policy-rating information are associated with high loss experience. For example, an individual driving 30,000 miles per year but reporting an annual mileage of 5,000 will, on the average, have higher claim costs than an individual driving 30,000 miles and correctly reporting that fact. Rating misreporting is indicative of high general risk.

One area where moral hazard is particularly strong is in the misreporting of personal identification information. For example, we have identified thousands of cases of insurance applicants appropriating the identity of deceased individuals to obtain insurance. Resulting policies are associated with high claiming behavior, much of which is fraudulent. The number of accidents is so high, we joke in-house that dead people should not be

allowed to drive. More to the point, dead people should not be insured to drive.

## **Costs to Customers**

Insurance customers have a strong interest in rating integrity. In the presence of rating error, honest insureds subsidize the dishonest. Low risk insureds subsidize the high risk. Individuals who seldom use their vehicles are unable to obtain low cost insurance because, many individuals with high mileage claim low mileage. Moreover, almost 25 percent of all rating errors result in insureds being overcharged. This translates into over \$2 billion annually in excess premium payments<sup>6</sup>.

## **Agency Interests**

Similarly, the majority of sales agents who work to accurately determine premium have a strong interest in rating integrity. In the absence of meaningful controls, the honest agent is placed at a competitive disadvantage by the minority of agents willing to mis-rate a policy to close a sale.

## **Correcting Rating Error**

Two primary methods are currently employed to manage rating error in private passenger auto insurance; renewal questionnaires and telephone re-underwriting by staff underwriters. Experience has shown both methods are ineffective.

## **Renewal Questionnaires**

Use of renewal questionnaires to correct rating errors is like drilling a hole in the bottom of the boat to drain steering water. The evidence is overwhelming that while simple mail questionnaires may be successful in obtaining policy changes they do not correct rating errors. Response rates are low and the data is worse. Consider the case of annual mileage data. Some carriers have tried setting mileage at some arbitrary level—such as 12,000 miles—for those insureds who do not respond to the questionnaire. Results have not been good. Those with lower mileage, or who wish to claim lower mileage, have high response rates. Those with higher mileage systematically do not respond. Data quality remains bad. Any increased income comes from implicitly raising the base premium, not from better risk control. The single mileage number results in flat rates and generates significant competitive disadvantages and adverse selection. Finally such procedures tend to lock carriers into bad data and make later corrections more difficult.

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<sup>6</sup> The \$12.7 billion annual rating loss estimate is the sum of over and under rated policies. Total under-rated costs exceed \$15 billion.

## **Staff Telephone Re-Underwriting**

The primary existing alternative to renewal questionnaires is to have in-house staff underwriters conduct telephone interviews to re-underwrite the book. Most such efforts in personal lines have been conspicuous failures. The sources of failure are multiple: The ratio of policies to staff underwriters is usually so high that the workload is impossible. Most insureds cannot be contacted by telephone in mid-day during the standard workweek. There are large inefficiencies in scheduling contacts and callbacks. Most insurer systems are not designed to support re-underwriting projects. Targeting of policies likely to contain errors is usually weak so that most customer contacts result in no change. Staff underwriters are seldom trained in positive interviewing techniques, therefore errors are missed and negative customer experiences are common. Because a single interview script is generally employed for all policies, re-underwriting can take up to 45 minutes each with high respondent refusal and incomplete rates. The result is that the average re-underwriting by staff underwriters costs from \$100 to \$200 and leaves most rating errors uncorrected.

## **Toward Rating Integrity**

Our research has shown that effective control of rating error has three necessary components:

1. Management Commitment
2. Error Evaluation
3. Mobilization of New Technologies

## **Management Commitment to Rating Integrity**

The first necessary step to rating accuracy is to make it a priority. Lax underwriting is easy—underwriting discipline is difficult. In the absence of strong direction and commitment from above, day-to-day underwriting and sales operations tend to slip into a pattern of tolerating and then ignoring rating errors.

## **Evaluation of Rating Error**

The second step toward rating integrity is to evaluate current rating error. Over a decade of conducting premium audits has convinced us that every carrier is indeed unique. The amount and kind of rating errors varies by factors unique to each carrier: rating factors used in their plan, existing verification systems, characteristics of the book of business, geographic location, distribution channels, systems history, regulatory environment, relationships with sales agents, and underwriting standards. It is necessary for carriers to conduct a thorough analysis to determine their particular rating error profile.

## Mobilization of New Technologies

The lessons from failures of mail and telephone questionnaires point to the solution. A four-part approach addresses the problems:

- 1) **Automated Error Detection:** It is necessary to move beyond shotgun approaches to correcting rating error and mobilize verification databases and pattern detection technology to target likely errors. Hundreds of databases exist that can aid in detecting rating errors. For example, it is possible to determine whether the address is a mail drop, such as *Mail Boxes Etc.* Similarly, we have used geographic databases to identify policies with farm use discounts in downtown Chicago. In addition, underwriting data can be subject to pattern analyses to identify potential errors. For example, decodes of work phones to addresses can be used to validate reported commute distances. Each pattern is associated with the probability of a rating error. Patterns can be quite complex involving many variables such as—in households with a named insured 42 to 55 years old, both husband and wife rated, more vehicles than adult drivers, and a ZIP code associated with three to five bedroom homes, there is a 65 percent chance of a youthful operator. Automated error detection combines technologies of statistical pattern analysis, expert systems, and database verifications to provide an in-depth review of every policy at a low unit cost.
- 2) **Custom Underwriting Plan to Correct Likely Errors:** The optimal correction method varies by type of error. Some errors, such as giving a factory installed airbag discount on a 1965 Chevy, can be corrected directly. Most likely errors require direct customer contact to update and verify questionable information. For such errors, it is necessary to develop custom interview scripts. For example, if the automated policy analysis discovered that a policy garaging address was associated with a contracting business and the insured vehicle was a three-quarter ton truck rated for pleasure use, a re-underwriting script should be developed that asks specific questions about that vehicle and its potential business use. The script should display knowledge of the issue so that misreporting becomes much more difficult.
- 3) **Cooperative, Not Adversarial, Customer Relationship:** It is commonly assumed that most rating error results from intentional misreporting to avoid premium. This is not necessarily the case. The average insured is unlikely to know what constitutes business use of their vehicle. They may not understand which members of their households should be rated on a policy and which should not. The definition of “principle user” of a vehicle is not always clear. In the example of annual mileage, most insureds do not have good estimates of how many miles they drive. They do know that the higher estimate of annual mileage they give, the higher premium they will be charged. Therefore, many insureds report an estimate at the low-end of what they think is the likely range of their actual mileage.

The most effective approach is to work with the insured to obtain correct information. To determine annual mileage and commute habits, automated mapping tools should be used to determine accurate commute distances. That information, in turn, can be employed to help build total mileage estimates based on vehicle usage for shopping, vacations, and so on.

Follow-up verifications have demonstrated such guided interviews reduce errors more than 80 percent.

- 4) **Modern Phone Center Technologies:** The fourth element of successful re-underwriting in personal lines is the mobilization of modern phone center technologies. Efficient out-going call centers can overcome the inefficiencies inherent in re-underwriting by staff underwriters. Fully scripted interviews preclude the need for highly trained underwriters to complete the calls. Scripts must be carefully written to promote a cooperative and non-adversarial customer relationship. Supporting systems can make available to interviewers mapping and other tools to support full error detection and correction. Calls can be rotated by time-of-day and day-of-week to provide maximum opportunities for successful customer contact. Interviewers fluent in multiple languages can respond to the range of customer needs.

## **Rating Integrity and Competitive Advantage**

To this point, I have emphasized the large costs of rating error. In a market economy, all business challenges create business opportunities: Those carriers that successfully address rating integrity will enjoy large advantages in profits and competitive position.

Consider a hypothetical auto carrier—ACME Insurance. ACME writes one billion in private passenger auto each year. They have the average rating error level of ten percent and have an average profit as a percent of premium of four percent or \$40 million.

ACME has aggressive growth plans of 25% in the next two years. If all goes well, ACME will maintain the current loss ratio and grow profit along with premium from \$40 to \$50 million. Such aggressive growth may place large strains on ACME's organization in sales, claims, underwriting and marketing. Associated growth costs and risk associated with rapid growth make the profit goal of \$50 optimistic.

As an alternative, should ACME lower its rating error 25% from 10 to 7.5%, profits would rise from \$40 to \$65 million; more than twice the profit gain from 25% growth. Further, the costs, risk and organization strains of enhanced rating integrity are much lower than rapid premium growth. Finally, goal is not unduly aggressive. We have worked with companies that have lowered their rating errors more than 50%.

As a third alternative, ACME could pursue the dual goals of 25% growth and 25% rating error reduction. If successful, profits would grow from \$40 million to \$81 million. To achieve the same profitability through growth alone would require that ACME more than double premium written. The large profit increase arises from the fact that the advantages of quality and quantity gains are multiplicative and not simply additive.

Table 2 illustrates the alternatives.

*Table 2: ACME Insurance Planning Alternatives*

Alternatives	Premium	Rating Error	Profit Margin	Profit
Current Situation	\$1 Billion	10%	4%	\$40 Million
25% Growth	\$1.25 Billion	10%	4%	\$50 Million
25% Error Reduction	\$1 Billion	7.5%	6.5%	\$65 Million
Combined	\$1.25 Billion	7.5%	6.5%	\$81 Million

## Conclusions

Rating error is a major source of premium loss costing private passenger auto lines nearly \$13 billion per year. Additional costs include loss of risk control, moral hazard costs, unfair premium burdens on low risk customers, and unfair competitive positions for honest sales agents.

Emerging information systems and call center technologies offer effective solutions. Those carriers that successfully adopt these technologies are likely to experience significant gains in profits, competitive position, and risk management.

On a positive note, rating error is a good problem to have; unlike all other major challenges facing the P&C industry, rating error more than pays for itself to correct. With the average rating correction holding for 3.5 years, error correction re-underwrites commonly achieve 500 to 700 rates of return, a fantastic investment.

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