

About the Author



Robert J. Walling, III
FCAS, MAAA

Mr. Walling is a Principal and Consultant in Pinnacle's Bloomington, Ill. headquarters. He is a Fellow of the Casualty Actuarial Society (CAS) and a member of the American Academy of Actuaries.

Mr. Walling is a frequent industry speaker on predictive modeling, commercial lines ratemaking, captive insurance and medical malpractice topics.

In the area of predictive modeling, Mr. Walling has been involved in:

- *Ratemaking analyses including implementation of rate relativities and underwriting scorecards;*
- *Claims studies and utilization reviews;*
- *Agency management analyses;*
- *Evaluations of experience and schedule rating plans;*
- *Analyses of closed claim databases; and*
- *Territory refinement analyses.*

Mr. Walling holds a B.S. in Mathematics Education from Miami University.

Commercial Auto Predictive Modeling: The Time Is Now

By Robert J. Walling, III, FCAS, MAAA

The time has come for commercial auto insurance to benefit from the same predictive modeling techniques and strategies that have been a boon to personal lines insurance products.

Personal auto insurance rating has been revolutionized by decades of enhancements such as independent vehicle symbols, liability symbols, zip code territory rating, motor vehicle record (MVR) scoring and credit scoring. Now, commercial auto rating plans can enjoy greater predictive risk accuracy as well.

Insurers already pursuing such sophisticated rating plans are realizing the advantages. By taking a closer look at the risks themselves, insurers are able to determine more accurate "walk-away" prices and more detailed price points. One national commercial insurer, for instance, began using vehicle identification numbers (VINs) to improve commercial auto classification much as it does for personal auto. The insurer implemented this new policy after discovering that Peterbuilt semi-tractors were being misclassified as "Light" trucks. Pricing was adjusted accordingly.

Another company found that commercial auto policies charged

between 25% and 40% of personal auto rates when it compared commercial auto rates for private passenger-type vehicles to personal auto rates for similar drivers and vehicles. The percentage differences were mainly due to the personal auto rating plan's pricing of vehicle characteristics (i.e. luxury and sports cars) and driver characteristics (e.g. youthful drivers and moving violations).



Commercial auto rating plans can enjoy greater predictive accuracy

Building a Better Class Plan

An actuarially sound rate is required to be "not excessive, not inadequate, and not unfairly discriminatory." Classification plays an important role in commercial auto rating because it is the primary means of measuring differences in expected losses between risks based on "fair" criteria.

Desirable rating characteristics are:

1. **Objective** – not subject to judgment
2. **Verifiable** – capable of being validated by a reliable source
3. **Cost Effective** – accessible at an economically viable cost
4. **Predictive** – accurately differentiating loss potential.

The problem is, several commercial auto rating factors do not fully satisfy these criteria. For example, vehicle use can be quite subjective. Vehicle weights, ages, costs new and radius of operations are frequently not verified. Driver MVRs can be cost prohibitive.

The most abused elements of most commercial auto rating plans are vehicle use and industry (secondary class). ISO-based rating has three vehicle use categories: Service (drive to job site only); Retail (delivery to homes); and Commercial (all other). These create at least two problems. For starters, since they are not verifiable, these risks become “Service” when more competitive pricing is needed and “Commercial” when premiums are increasing. Secondly, they are not homogeneous. “Commercial,” for example, contains so many different underlying uses it does not effectively differentiate risk. Meanwhile, secondary classification codes do show differences by insured industry. They are often underutilized, however, because secondary class is often not verified and often results in higher rates. Thankfully, there are alternatives.

Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes offer readily available and verifiable solutions to both vehicle use and secondary classification. Every U.S. company is assigned a single, verifiable SIC and NAICS code. Commercial auto analyses suggest materially different loss expectations by industry class. Figure 1 shows an illustrative

example of SIC relativities from a commercial auto predictive modeling application.

It Ain't Heavy, It's Extra-Heavy

Other rating factors are being refined as well. Consideration of vehicle weight can be improved for the level of refinement and verifiability. ISO's class plan has four vehicle weight classes: Light, Medium, Heavy and Extra-Heavy. Alternatively, the Interstate Commerce Commission (ICC) developed eight weight classes that do a much better job of grouping similar vehicles that are readily verifiable using VINs. This verifiable approach to vehicle weight also addresses popular misconceptions regarding specific vehicle types. The most common misperception is

that all pick-up trucks are “Light.” In truth, most large pickup trucks have gross vehicle weights well in excess of the “Light” limit of 10,000 pounds.

VIN decoding software for commercial autos can validate VINs and provide correct ICC weight class. VIN decoding also provides verifiable vehicle age and original cost new (OCN) estimates. VIN-based OCNs, however, do not include vehicle modifications made post-production (e.g. cranes, mobile equipment, refrigeration or specialized containers).

For private passenger types of vehicles, characteristics can be better reflected by using personal auto insurance product vehicle symbol relativities or simplified vehicle characteristic factors. These factors include: model year, vehicle segment (compact, midsize, full size, luxury), high performance surcharges and protective device credits.

The radius of operations rating characteristic presents difficult challenges. First, radius is as hard to verify in commercial auto as personal auto (“you don't drive more than 15 miles to work do you?”). Second, ISO price breaks at 50 and 200 miles appear arbitrary and do not suit all states equally. (Is driving within a fifty mile radius in Rhode Island comparable

Figure 1 - Illustrative SIC Rate Relativities

SIC	Factors	Descriptions
171X	1.10	Plumbing/HVAC
173X	0.85	Electrical Contractors
175X	1.00	Carpentry
179X	0.95	Other Contractors
27XX	0.85	Printing/Publishing
507X	0.95	Hardware Wholesaler
514X	1.10	Grocery Wholesaler
571X	0.85	Home Furnishings
581X	0.95	Restaurants
64XX	0.85	Insurance Agents
65XX	1.05	Real Estate
721X	1.25	Laundry/Dry Cleaning
734X	1.20	Building Services
737X	1.10	Computer Services
80XX	1.05	Health Services

to the same radius of operations in Montana?) For insureds specializing in trucking, data on miles driven annually may present an available and verifiable replacement that is actually available and verifiable. Unfortunately, a broadly applicable, readily available and verifiable tool to improve radius of operations rating does not exist...yet.

Another challenge in commercial auto rating is reflecting differences in premium due to the number of insured vehicles. In most states, "Fleet" is defined as insureds with five or more powered units. Smaller risks are "Non-fleet." While differences between expected loss costs between small and large risks are intuitive, why make a distinction only at five vehicles? It seems to be a somewhat arbitrary and simplistic approximation of a more complex relationship. Predictive modeling results suggest a more sophisticated approach (see Figure 2).

It's Not What, But Who

Commercial auto pricing can also be improved by using underwriting scorecards that focus on "who" the insured is and not "what" is being insured. Using this approach, both driver and owner characteristics are being incorporated into these plans.

Commercial auto pricing for driver characteristics has borrowed liberally from personal auto rating refinements, such as driver age and driving record. Reflecting these characteristics in commercial auto can present challenges such as:

- 1. Drivers vs. Vehicles** – Commercial auto risks often have more drivers than vehicles.
- 2. Periodic vs. Dedicated Drivers** – MVR scores of dedicated drivers are more predictive than occasional drivers.
- 3. MVR Ordering Criteria** – Annual MVRs on all drivers may be cost prohibitive.

A common approach to the driver/vehicle mismatch considers overall driver averages. Figure 3 shows

Figure 2 - Commercial Auto Pure Premium Relativities by Fleet Size

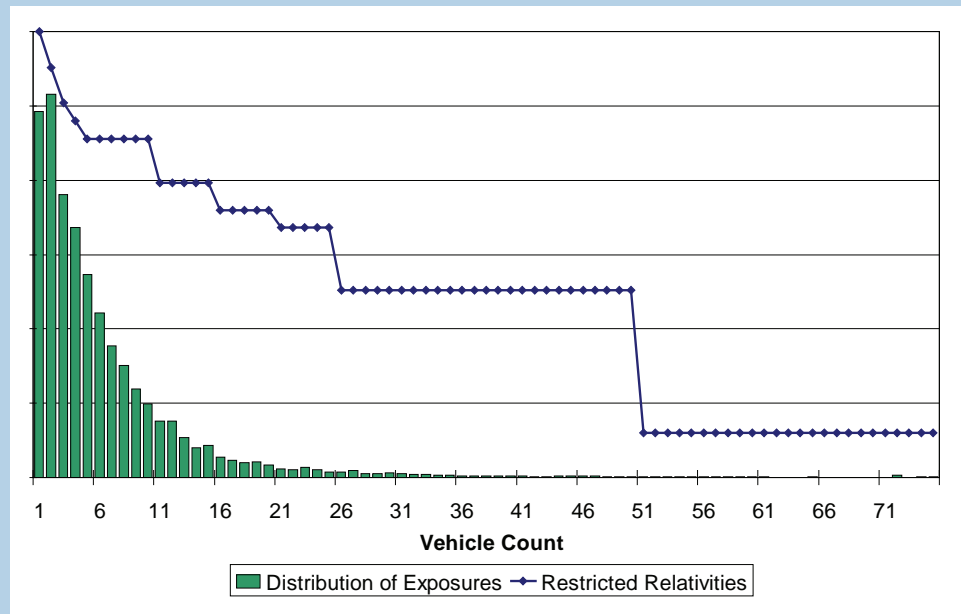
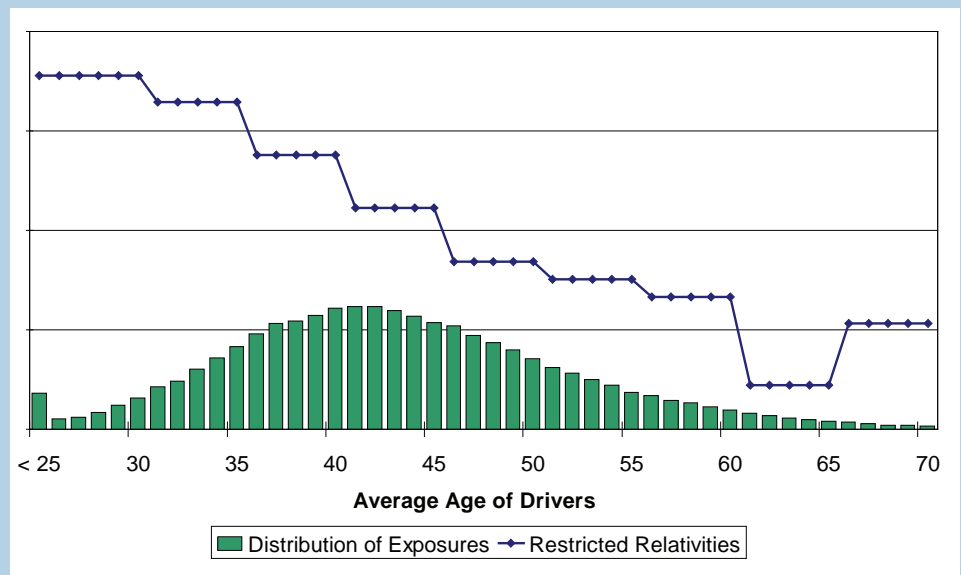


Figure 3 - Average Driver Age Pure Premium Relativities



model output demonstrating the impact of average driver ages on pure premiums. This approach using averages can also be weighted to give more importance to dedicated drivers.

Predictive models can also help with developing MVR reordering criteria based on driver age (e.g. all drivers under 25); current score (e.g. all drivers with > 2 points); and/or tenure (order MVRs on all new drivers). These criteria can enhance cost effectiveness without materially impacting accuracy.

Credit scoring is another approach from personal lines insurers that is being successfully adopted

by commercial auto insurers. Applying credit to commercial auto insurance faced several challenges. Initially, getting a high enough “hit rate” of credit scores for commercial auto policies of small businesses was challenging. Vendors have significantly reduced the number of small business “no hit” and “thin” files by blending commercial credit data with personal credit scores of small business owners. This approach works well when a business has a small number of primary owners.

Factors such as years of risk, years in business, hours of operation, on-site ownership, mandatory drug screening, and employee turnover rates have all been included in analyses.

The new “who” characteristics are often implemented using an underwriting scorecard. These scorecards are either filed as an addition to the rating plan or treated as tiering criteria within underwriting guidelines. This second approach takes advantage of the flexibility created by

multiple company rating tiers and schedule rating plans. Typically, this results in recommended tier (e.g. -15% deviation company) and a suggested schedule rating modification (e.g. -10%).

Underwriting scorecards have several advantages. First, they consider multiple factors at once. Second, implementing a scorecard within underwriting guidelines allows a company to preserve its competitive advantage longer.

Finally, scorecards serve as the basis for a feedback loop to underwriters, agents and insureds providing information on the basis for the pricing decision (e.g. average driver age and MVR points resulted in a higher premium). This can increase underwriter and agent confidence in the scorecard and provide insureds with characteristics they can control to reduce future premiums (e.g. excluding drivers with poor MVRs).

Figure 4 - Credit Scoring as Part of an Underwriting Scorecard

Credit Score	Exposure	Indicated Relativity	On Balance Indicated	Score Points
Adequate	503,000	1.000	1.002	49
Borderline	215,000	1.060	1.062	11
No Score	127,000	1.030	1.032	19
Preferred	149,000	0.850	0.852	74
Deficient	37,000	1.100	1.102	0
	1,031,000	0.998	1.000	

Figure 4 shows how five bands of credit scores could be incorporated into a predictive model to develop rating relativities. In this example, the indicated relativities have been scaled so they can be included in an underwriting scorecard.

Using scores that blend personal and commercial data introduces additional regulatory scrutiny. As a result, some commercial lines insurers are using an alternative approach that incorporates specific credit information, rather than a score, into their underwriting scorecards. Examples include: number of transactions, total balance overdue, number of public records/collections, average number of days balance overdue and number of inquiries.

Further, insurers are finding that internal financial information captured over the course of an insured relationship can be used on renewal policies. Internal data, such as premium financing experience, (e.g. late payments), payment “in full” at inception, and difficulty recovering deductibles all have potential as rating characteristics.

Many additional “who” characteristics, beyond driving record, driver age and credit, are also being incorporated in commercial auto rating plans.

Conclusion

Predictive modeling applications for commercial auto insurance allow insurers to take advantage of the innovations developed by Progressive and other personal auto insurers. But this is only the beginning. Insurers who incorporate a wide variety of vehicle, driver and owner characteristics into rating plans significantly improve their understanding of expected losses. By equipping underwriters with new objective information and more accurate manual premiums, they will be empowered to determine better risk selection and final pricing for their companies.

This monograph is Part 1 in a 3-Part Series on Commercial Lines Predictive Modeling. For more information, contact Robert Walling at (309) 665-5010 or write rwalling@pinnacleactuaries.com.