

## A new paradigm in P&C Industry Pricing and Underwriting

### **Multivariate Analytics Produce Accurate Auto Rating Structures and More**

While the primary goal in using multivariate analytical techniques is to develop auto insurance rating structures that have a more accurate match of rate with risk, Property and Casualty Underwriters employing these techniques benefit also from strategic business insights that are a by-product of the process. The analyses undertaken to create MVA-based rating models generate key management reports and business measures that can be leveraged to significantly enhance underwriting and marketing effectiveness.

The development of predictive models for Auto insurance may take different paths, but ultimately result in multivariate equations for each line of coverage. Development may first involve the creation of "Theoretical Risk" models that represent the most accurate measure of risk. These models are developed using all available sources of data and the variables present within those data sets. Since these models will not be used for filing, they are developed without regulatory constraints or restrictions. Risk measures generated from this approach can be used to for portfolio analysis, profitability analysis, and as a key underwriting or marketing measure.

For pricing applications, Theoretical models are modified by the creation of "Filing Rate" models. Filing Rate models are created as the basis of a company's rate filing structure and therefore must be comprised of variables acceptable to the market and industry Regulators. Whether for Theoretical or Filing purposes, models may be designed to produce a "Claim Risk Score" (a numeric value representing expected losses) for each risk over its policy term or, as a differential score representing the difference, either more or less, between the risk being scored and the average risk in the portfolio.

In either case, whether for Theoretical or Filing purposes, these measures provide enormous potential as a tool for portfolio management and planning as well as the creation of tactical underwriting processes that will improve underwriting performance.

### **Portfolio Segmentation**

Table 1 below provides an illustration of results typical of the application of MVA tools against a large PPV portfolio. Each vehicle in the portfolio is scored and ranked from highest score (highest expected loss amount) to lowest score (lowest expected loss amount). For reporting purposes, the ranked vehicle listing is grouped into 20 buckets or "half-deciles", each representing 5% of the vehicles in the portfolio. Each half-decile from top (0-5%) to bottom (95-100%) is comprised of vehicles that are higher risks than those in the segment immediately below them. Based on the expected loss for the vehicle (Risk Score) and the premiums being charged for the risk, a loss ratio value ("Claim/Premium Ratio) is created and the portfolio can be segmented into any number of groups against which Pricing, Underwriting and Marketing strategies and tactics can be devised.

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**Table 1**

% of Vehicles	Min. Predicted Model Score	% of Actual Claim Losses	% of Actual Premiums	Average Claim Loss per Vehicle	Average Premium per Vehicle	Index of Claim Losses	Total Claim Losses in Interval	Total Premiums in Interval	# of Vehicles in Interval	Claim/Premium Ratio	"Value" Segment
0-5%	811	14.92	10.80	1,142	1,214	298%	\$ 10,507,136	\$ 11,164,292	9,200	0.94	1
5%-10%	705	10.73	8.82	821	991	215%	\$ 7,556,788	\$ 9,120,696	9,200	0.83	2
10%-15%	635	8.62	7.87	659	885	172%	\$ 6,066,020	\$ 8,139,240	9,200	0.75	3
15%-20%	581	8.32	7.16	636	804	166%	\$ 5,854,512	\$ 7,401,032	9,200	0.79	
20%-25%	536	7.59	6.64	580	747	152%	\$ 5,340,508	\$ 6,869,824	9,200	0.78	
25%-30%	496	6.70	6.24	513	702	134%	\$ 4,719,968	\$ 6,454,536	9,200	0.73	
30%-35%	460	5.70	5.77	437	648	114%	\$ 4,015,800	\$ 5,963,900	9,200	0.67	
35%-40%	426	5.25	5.42	402	610	105%	\$ 3,695,916	\$ 5,609,240	9,200	0.66	
40%-45%	395	4.01	5.13	307	576	80%	\$ 2,824,584	\$ 5,302,328	9,200	0.53	
45%-50%	364	4.60	4.76	352	535	92%	\$ 3,238,952	\$ 4,917,400	9,200	0.66	
50%-55%	333	3.60	4.48	275	503	72%	\$ 2,531,564	\$ 4,630,452	9,200	0.55	
55%-60%	303	4.19	4.18	320	470	84%	\$ 2,948,048	\$ 4,323,356	9,200	0.68	
60%-65%	273	2.85	3.90	218	438	57%	\$ 2,007,900	\$ 4,033,372	9,200	0.50	
65%-70%	242	3.68	3.61	282	406	74%	\$ 2,589,800	\$ 3,735,936	9,200	0.69	
70%-75%	211	2.31	3.33	176	375	46%	\$ 1,623,432	\$ 3,446,044	9,200	0.47	
75%-80%	178	2.09	3.01	160	338	42%	\$ 1,473,012	\$ 3,112,912	9,200	0.47	
80%-85%	144	2.12	2.69	163	302	42%	\$ 1,495,920	\$ 2,782,172	9,200	0.54	
85%-90%	104	1.26	2.36	96	265	25%	\$ 886,696	\$ 2,442,416	9,200	0.36	
90%-95%	53	0.81	2.07	62	232	16%	\$ 567,364	\$ 2,138,540	9,200	0.27	
95%-100%	-840	0.65	1.76	50	197	13%	\$ 457,700	\$ 1,815,712	9,200	0.25	
	321			\$ 383	\$ 562		\$ 70,401,620	\$ 103,403,400	184,000	0.68	4

In this example, using "Claim/Premium ratio as proxy for profitability, the portfolio was segmented into 4 groups with each representing a different level of profitability. A brief characterization of each segment might look like this:

**Table 2**

	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>	<b>Group 4</b>
<b>Segment Characteristics</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> 89% claims/prem. ratio</li> <li><input type="checkbox"/> Highest risk segment</li> <li><input type="checkbox"/> Negative contribution to the bottom line</li> <li><input type="checkbox"/> 10% of policies, 26% of losses and 20% of premiums</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> 73% claims/prem. ratio</li> <li><input type="checkbox"/> Medium to high risk</li> <li><input type="checkbox"/> Marginally profitable</li> <li><input type="checkbox"/> 30% of policies, 42% of losses and 39% of premiums</li> <li><input type="checkbox"/> Challenging to manage; some segments may be profitable, others not</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> 57% claims/prem. ratio</li> <li><input type="checkbox"/> Moderate risk</li> <li><input type="checkbox"/> Likely contributing profitably</li> <li><input type="checkbox"/> 45% of policies, 29% of claim losses and 35% of premium</li> <li><input type="checkbox"/> Most segments are profitable</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> 29% claims/prem. ratio</li> <li><input type="checkbox"/> Low risk vehicles</li> <li><input type="checkbox"/> Contributing profitably to the company</li> <li><input type="checkbox"/> 15% of policies, 3% of claim losses and 6% of premium</li> </ul>

These key segments can provide a framework for an operational structure, each with its own business strategy, marketing and sales objectives designed to improve the profitability of the portfolio as a whole.

**Table 3**

	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>	<b>Group 4</b>
<b>Competitive Actions</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Do not write business in this segment; undertake corrective underwriting and pricing actions</li> <li><input type="checkbox"/> Shed business from this segment and increase pricing</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Restore profitability</li> <li><input type="checkbox"/> Be slightly less competitive in this segment</li> <li><input type="checkbox"/> Improve accuracy of pricing</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Maintain profitability</li> <li><input type="checkbox"/> Grow business in this segment</li> <li><input type="checkbox"/> Marketing (policy acquisition and loyalty) and product development focus (additional revenue and customer loyalty)</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Be more competitive in this segment</li> <li><input type="checkbox"/> Grow business in this segment</li> <li><input type="checkbox"/> Marketing (policy acquisition and customer loyalty) and product development focus (additional revenue and customer loyalty)</li> </ul>

## Strategic Underwriting Processes

Given the variation in risk and profitability across each group, Underwriting processes and resources can be customized to meet business objectives designed for each segment. Risks within segments measured as having a higher expected loss ratio and likely to be unprofitable should follow a more thorough and exhaustive underwriting process than those that pose relatively less risk to the company. Assignment of more and greater underwriting expertise backed up by costly reports for those risks that require it, would result in a better assessment of

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risk and maximum capture of premium – overall a better matching of corporate expenses with losses – for more efficient and effective underwriting process that leads to lower loss ratios.

For the insured, added value is created by a more thorough assessment and understanding of coverage requirements for those that need it, and smoother and more efficient underwriting processes for those that warrant it.

A simplified view of this approach to the renewal book might look like the following:

**Table 4**

	<b><u>Group 1</u></b>	<b><u>Group 2</u></b>	<b><u>Group 3</u></b>	<b><u>Group 4</u></b>
<b><u>Underwriting Actions</u></b>	<ul style="list-style-type: none"><li>❑ Get off risk if possible</li><li>❑ Immediate intensive underwriting attention</li><li>❑ Ensure information and reports are current</li><li>❑ Modify segment underwriting rules and procedures</li><li>❑ Cede risks to risk sharing pool</li><li>❑ Initiate short-term pricing adjustments</li><li>❑ Establish segment cut-off score of 700</li></ul>	<ul style="list-style-type: none"><li>❑ Intensive underwriting efforts</li><li>❑ Policies that score between 699 and 400</li><li>❑ Care must be taken to avoid overly harsh or unfair actions among profitable segments</li><li>❑ Initiatives taken on policies at the profitable margin of this segment should more subtle</li></ul>	<ul style="list-style-type: none"><li>❑ Standard underwriting procedures</li><li>❑ Policies that score between 399 and 100</li></ul>	<ul style="list-style-type: none"><li>❑ Minimum underwriting action and review</li><li>❑ Policies that score less than 100</li></ul>

### Optimizing Renewals

As policies renew, each year brings changes to the characteristics of the risks on those policies, ultimately resulting in higher or lower risk to the company. Even if a policy renews without overt changes in vehicles, drivers, or coverage, the passing of time generates change intrinsically that ultimately impacts risk. Drivers grow older and more experienced; vehicles age; and the characteristics of populations change. These changes impact the Score for each risk and are the basis for organic changes of risk within a portfolio. More significant changes to an individual or policy Risk Score can act as a barometer for underwriting review and intervention. Either due to the level of risk (policies with the highest scores would warrant re-underwriting annually) or year over year change in score, underwriting activities could be triggered automatically based on a pre-set score value.

A specific example of this approach would be the use of Claims Risk Scores as a tool to assign vehicles to the risk sharing pool. Companies using these tools generally outperform other insurers that do not.

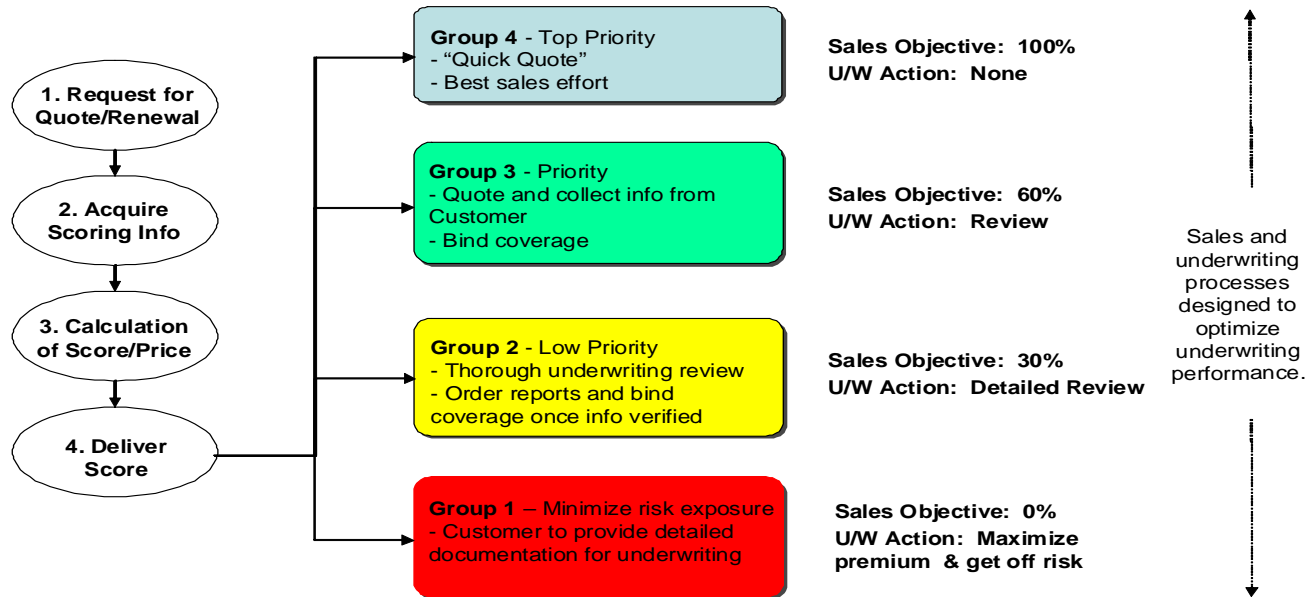
This approach would ensure valuable underwriting resources are allocated where they are most required (the highest risks), and efficiencies in sales and underwriting processes are gained where indicated (the lowest risks). This means that ongoing, renewal business is monitored and actions undertaken to continually improve the quality of the renewal book.

### New Business Acquisition

Although new business represents only a small proportion of the overall portfolio, it generally comes with greater risk and uncertainty. Scoring each new risk at the quote stage of a policy can provide the underwriter and broker with a powerful tool to create a more accurate initial assessment of the risk and guide underwriting and sales activities that are appropriate for the risk. In the new business process outlined below, each piece of new business is scored driving

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sales and underwriting activities that work toward a common goal – improving portfolio underwriting performance.



The process is designed to ensure that new business is acquired in the most optimal fashion; the most profitable business is delivered in the most efficient manner; that underwriting and distribution channels are working in alignment.

### Conclusion

While MVA techniques are increasingly being adopted to sharpen rating structures, the information created as a by-product of the analytical process yields significant value. Business insights generated from the model development process can be used as a basis for portfolio management initiatives. Business processes for new business and renewals can be modified/created to improve underwriting efficiency and effectiveness.

Through better risk selection, management and pricing, insurers can improve underwriting performance and achieve long term competitive advantage.