

*Results of the International Survey on
Ratemaking Principles and Methods Used in
Other Countries*

Gregory S. Wilson, FCAS, MAAA,
on the behalf of the CAS Ratemaking Committe

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The CAS Committee on Ratemaking is responsible for furthering and disseminating ratemaking theory and principles, and identifying topics for research and discussion. The Committee sought information about ratemaking internationally and specifically about actuarial participation in this area. It was felt that there are common concerns and problems with the insurance industry around the world, and that sharing information and jointly collaborating in some areas of research would prove beneficial to all that participate.

In 1996 the Committee, under the guidance of Pamela Sealand Reale, FCAS and Steven M. Visner, FCAS, designed a survey that was sent to the president of the local actuarial society, as indicated in the international directory maintained by the International Actuarial Association. The survey is attached as Exhibit 1. An initial test survey was sent to six countries, four of which responded. After reviewing the initial results, the survey was sent to an additional thirty-five countries. Thirteen countries responded, bringing the total to seventeen. The following table identifies the countries that responded:

Responses Received		
Test Group		
Australia	Mexico	
China	South Africa	
Full Mailing		
Norway	India	Portugal
Switzerland	Finland	Netherlands
Japan	Czech Republic	Ireland
New Zealand	Austria	Pakistan
United Kingdom		

Much of the information obtained from the survey was presented at the 1997 ratemaking seminar by Pam and Steve. Following is an itemization of the questions and answers from the survey, as well as an overall summary and future plans:

1. How is property and casualty and/or general insurance sold?

Private insurance companies sell Property/Casualty insurance in the majority of countries responding to the survey. Insurance in some instances is sold by the government in the following six countries:

Switzerland	"Fire insurance for buildings is compulsory in some states (cantons)."
New Zealand	Accident compensation and limited coverage for earthquake
Australia	Compulsory third party insurance is sold as a separate contract, usually by a government insurer.
South Africa	Third party liability auto insurance is funded by a fuel levy.
India	All non-life insurance is nationalized.
Pakistan	Risks pertaining to government or government owned organizations must be insured with the National Insurance Corporation, which is owned by the Federal Government of Pakistan.

2. Who determines the property and casualty rates?

Rates are determined by private companies without government approval in most countries. Government approval is generally required for all lines in Japan, India, South Africa and China.

3. What roles do actuaries/non-actuaries play in developing the rates?

This question was a free form response in the original survey. Those responses varied from little actuarial involvement in South Africa to significant involvement in Australia. Many of the companies responding to the full mailing have actuaries and non-actuaries sharing various roles. There was no actuarial involvement in New Zealand, India and Pakistan, where the non-life actuarial profession was either non-existent or in its infancy.

The following comments were received:

Switzerland	"Actuaries are usually not involved in data gathering, but actuaries say which data should be gathered and which data are needed for ratemaking; actuaries are also responsible for design of the statistics to be done for calculation purposes."
New Zealand	Practical actuarial experience in general insurance is limited. Actuaries are involved with the Accident Compensation Organization financial planning, rate setting process. They have also been involved with the Earthquake Commission.
Norway	Every non-life insurance company is required by law to have an appointed actuary. One of the responsibilities of the appointed actuary is to set premiums and thus set the rates.
Japan	These functions are not necessarily done exclusively by admitted actuaries, but those who engage in such operations are practically expected to have some actuarial knowledge. Actuaries are involved with Accident Compensation Organization financial planning, rate setting process. They are also involved with the earthquake commission.
India	The non-life business has been nationalized and is written by the General Insurance Corporation of India through its four subsidiaries. No actuaries work in this company at the present time.
Netherlands	

"Most actuaries in non-life (including econometricians acting in the non-life actuarial

field) have an advisory role within their companies. The final responsibility for the actual commercial rating is taken by management."

4a. Are there any published statements of principles or generally accepted actuarial methods for property and casualty insurance ratemaking?

No country has comprehensive statements of Principles or Generally Accepted Methodologies. Australia has standards that are limited to the New South Wales Compulsory Third Party Liability coverage, Mexico has standards, which apply to personal lines, as well as lines with excess agreements, and Portugal has standards in its Bonus-Malus system.

5. How are the risk classification systems developed? (Different responses for different types of insurance may be appropriate.)

Risk classification systems in most countries are developed by private companies with no governmental approval. Those countries where governmental approval of rates is required also have requirements for governmental approval of classification systems.

6a. Are there any published statements or principles of generally accepted actuarial methods for property and casualty risk classification systems?

There are generally no published statements or principles for property and casualty risk classification systems.

6b. If the answer to 6a. is "Yes," please identify and attach a copy:

There were no responses to this question.

7. What is the primary source of data used in ratemaking?

In most countries, private companies use their own experience, supplemented by industry data where available. In Japan and New Zealand, governmental statistics are used for some lines.

The following additional comments were received:

Switzerland	Beside industry and company statistics, general economic data is used. Note that there is no access to personal data about policyholders because of legal data protection.
Austria	Industry data is from the Austrian Association of Insurance Companies.
New Zealand	Also use overseas experience for commercial ratemaking. Government statistics are used particularly in health and re accidents. (classified as work-related, motor vehicle related or other) and earthquake losses.
China	Industry data is from the Insurance Institute of the Republic of China.
Mexico	Data used depends on the size of the insurance company. Larger companies use their own experience, smaller companies use the Mexican Association of Insurance Companies (AMIS) data.
India	The Tariff Advisory Committee gathers statistics and advises the nationalized insurer on the rates.
Netherlands	"In foregoing years, ratemaking advice (net risk premium level) was given by CVS (statistical bureau). But now, due to further tariff-segmentation and differentiation more and more large companies do their own research, using mostly their own portfolio data."

Pakistan	For tariff lines, premium and claim data filed with the Insurance Association of Pakistan (IAP) are used. For non-tariff lines, companies rely on their own experience supplemented by guidance from professional reinsurers. Commercial Property: Fire, Auto and Marine use IAP data, while other property rates are made from insurer's own experience.
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8. What publications are typically used to disseminate research on ratemaking issues?

There are a variety of publications used in the different countries. Most of the European respondents use the ASTIN Bulletin, along with the Scandinavian Actuarial Journal and bulletins published by their own societies. The majority of the remaining countries rely primarily on bulletins published by their own societies, with the exception of South Africa that relies on overseas publications, if at all.

9. Are you aware of any research on ratemaking issues done in your country that would be of interest to CAS members?

Only six of the countries that answered this question are doing research that they feel would benefit the CAS. The following two were specific about the research being done:

Japan	<u>Methodologies of Earthquake Risk Evaluation Applied to Earthquake Insurance</u> —how to reflect catastrophe losses in ratemaking for insurance policies covering natural disaster such as earthquake, flood, etc.
United Kingdom	"Statistical Motor Rating: Making Effective Use of Your Data," Brockman & Wright, <u>Journal of the Institute of Actuaries</u> , 119, III. <u>Pricing in the London Market</u> , General Insurance Study Group (GISG) 2995 convention.

10. Do actuaries in your country: (a) Utilize research published by the CAS? (b) If so, how and what? (c) Utilize the CAS Ratemaking Principles or the ASB Standards of Practice? (d) If so, how and what?

10a&b. Five countries utilize research published by the CAS and four are not sure. Japan and the Czech Republic use Foundations of Casualty Actuarial Science, Austria and the Czech Republic use the Forum, Finland uses various CAS publications and the United Kingdom uses the Thomas Mack chain ladder method.

10c&d. Only Japan reports that they utilize any CAS principles or ASB Standards of Practice. They use the Statement of Principles Regarding Ratemaking, as well as the ASB Standards of Practice #12 on Risk Classification and #13 on Trending Procedures.

11. Does a rating bureau or similar organization exist in your country? If yes, please describe its function.

Nine countries report having a rating bureau or similar organization. Many of the European respondents report that the influence of the rating bureaus seems to be declining due to recent legislation regarding competition. Following are the specific responses:

Finland	"The central association of the Finnish insurance companies has a bureau called Insurance Data LTD, which basically is a rating bureau. However, recently the role of Insurance Data has diminished. The role of Insurance Data is "strongest" in Workers' Comp."
New Zealand	"Insurance Council of New Zealand does this as one of its services to members."

Norway	<p>"Association of Norwegian Insurance Companies: they represent its members and take care of their interests in relations with the authorities and other institutions. They also gather data on premiums and claims by lines of business and data on causes for fire."</p>
Japan	<ol style="list-style-type: none"> (1) "Computation of and filing rates with the Minister of Finance. (2) Evaluation of loss experience and risks, and research and study of other matters relevant to rates. (3) Research and study of the policy conditions and various underwriting terms. (4) Research and study of the matters concerning valuation of the objects of insurance. (5) Compilation of insurance statistics. (6) Research and study of the matters concerning damage and its prevention and mitigation."
Australia	<p>"Insurance Statistics Australia' goes some way toward fulfilling the functions of an independent rating bureau."</p>
Mexico	<p>The Mexican Association of Insurance Companies (AMIS) sets certain procedures or standards to determine rates.</p>
India	<p>"There is a Tariff Advisory Committee who collects the statistical data and advises the General Insurance Corporation of India on the rates for various classes of non-life business."</p>
Netherlands	<p>"In the Netherlands, we have CVS, the Center for Insurance Statistics, which gathers all relevant industry data for most non-life classes of business. With the aid of actuarial committees, they analyze all the data and report about risk premium rating system that are applicable. However, due to European legislation as regards competition, more and more research on rating transfers to companies and the influence of CVS seems to lessen. Notice that non-life insurance in Holland is a totally free market with high level of competition."</p>
Ireland	<p>For Private Auto, statistics are assembled for all insurers (processed by U.K. ABI).</p>

Pakistan	<p>"Insurance Association of Pakistan. All reputable insurance companies (other than National Insurance Corp.) belong to the IAP. The IAP sets minimum tariffs for Fire and Allied perils, Motor, Marine and Workers' Compensation. Member companies must charge at least the minimum tariff. Consequential loss (business interruption), engineering, burglary and some other lines are non-tariff, so companies can set their own rates. All rates (whether tariff or non-tariff) must be filed with government. Prior approval is not needed but government has the right to object."</p>
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12. Are there any areas where joint research, related to insurance pricing, would be beneficial between actuaries of your country and the CAS?

The following responses were received:

Switzerland	<p>European and American actuaries could only profit by having closer contacts. Research in actuarial science has a long tradition in Switzerland. Some favorite areas of study are credibility theory, mathematical statistics, extreme value theory, modern financial mathematics, calculation of total claim distribution, concepts on risk adjusted capital.</p>
Austria	<p>Credibility rating in non-life; risk classification in car insurance.</p>
Finland	<p>Personal auto, personal home.</p>
Japan	<p>"Joint research for selecting risk classification factors by different types of insurance policies."</p>
Czech Republic	<p>Mathematical modeling for dynamic solvency testing.</p>
Portugal	<p>Workers' Compensation, Auto Insurance.</p>
Netherlands	<p>"Dutch non-life actuarial profession is relatively very young and small. Most research is done at the University of Amsterdam (Goovuerts, Kaas, Dannenburg) which is reported in Astin Colloquia."</p>
United Kingdom	<p>Rating of Excess of Loss Reinsurance Long tail/Liability business Catastrophes</p>

13a. Describe the process for admission to the actuarial society in your country, along with the ratemaking topics the actuary needs to master for admission.

There is a wide range of requirements for admission to the actuarial society of the various countries, ranging from exams and university training in the Netherlands and United Kingdom to no specific requirements in Portugal.

Following are the specific responses by country:

Switzerland	<p><u>"Ordinary Member"</u>: admission by the board of the Swiss Association of Actuaries (SAA), conditions:</p> <ul style="list-style-type: none">(i) university degree in actuarial science, OR university degree in mathematics and 3 years of experience in actuarial duties, OR experience as staff-member in actuarial duties (at least 10 years) AND in any case:(ii) recommendation by 2 experienced members of the SAA <p>SAA Actuary SAA: (e.g. "full member" in the sense of the IFAA) admission by the board of the Swiss Association of Actuaries (SAA), conditions:</p> <ul style="list-style-type: none">(i) ordinary member of the SAA(ii) examination (in preparation actually)"
Austria	<p>"A full degree in mathematics and an additional education in insurance mathematics OR a full degree in insurance mathematics and three years of practical working experience."</p>
Finland	<p>"First you have to be graduated from a university with main degree in mathematics. Besides that you must have at least one year working experience on actuarial matters. On top of that, qualified actuaries must pass a series of postgraduate examinations (which on the average take 2-3 years to accomplish)."</p>
New Zealand	<p>"FFA, FIA, FSA, FIAA--effectively eligibility to be a Fellow of the NZ Society requires qualification as a Fellow of an overseas actuarial examining body. Most such bodies now include some knowledge of general insurance including ratemaking in their examination systems."</p>

Norway	"The degree of cand. scient. from the University with both life and non-life topics and a thesis relevant to insurance mathematics, is required (corresponds to a Masters degree). A written application describing your background along with a recommendation from 2 members, is also required. Must be elected at an ordinary meeting."
Japan	"Passing the examination of eight subjects (six subjects in basic course and two subjects in advanced course) is the prerequisite to become a fellowship actuary of the IAJ. One of the two subjects in the advanced course deals with practical methods of insurance business operations including ratemaking principles and methods."
India	There are no society actuaries currently involved in ratemaking for general insurance. Hence, it does not appear that there is property/casualty representation in their society.
Portugal	"We launched a program to the formation (?) of non-life actuaries: risk theory, statistics and probability, numerical methods and simulation, regression models, statistical time series, claims reserving, credibility theory, a priori tarification (?), posteriori tarification (?), reinsurance. The program is not yet compulsory but many members are attending it."
Netherlands	"Rules have changed recently. Full membership can only be obtained by actuaries, graduated at University OR finishing a long-lasting special course outside University, combined with a post-university course (2 years)."
Ireland	"Any full member of an actuarial association in any E. C. country who works in Ireland in an actuarial capacity can apply to become a fellow member of the society."
Pakistan	"The Pakistan Society of Actuaries relies on the examination system of the UK Institute of Actuaries and the US Society of Actuaries. The UK Institute has a compulsory exam on general insurance. The SOA's system is well known to the CAS. The PSOA hopes eventually to conduct examinations for its own Fellowship."

United Kingdom	"Members admitted as students only if they have a mathematical education (e.g. mathematics degree). There are then 9 exams to pass. The 3 most relevant exams are subject C (Statistics), G (General Insurance), as well as a Fellowship paper."
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13b. Are there non-members of your actuarial society who would also be referred to as actuaries? If so, what qualifications do they have?

Many of the respondents exclusively use the title actuary to mean a member of the society. However, there are several that call a variety of non-members actuaries. These may include students, teachers and economists. Following are the responses received from each country:

Switzerland	"The legal requirement for Pension Schemes Experts is to pass successfully the examination organized by the SAA; this examination is open to any applicant. Pension Scheme Experts (PVE) is a title recognized by federal legislation."
Norway	"The actuarial title is not protected by law in Norway any longer. What we call an actuary is a person with a degree of cand. scient. with what we call an actuarial competence as described under 13a above. Therefore, there are actuaries that are not members of the actuarial society."
Portugal	Usually they are teachers of actuarial science not working outside of universities.
Netherlands	"In non-life, we have a number of econometricians, working in the actuarial field (and even sometimes acting as the certifying actuary), which are affiliate members of the Institute of Actuaries."
Ireland	"The society has associate members who do not engage in actuarial work in Ireland, or who are students of the Institute or Faculty in the U. K."

14. What are currently the most significant ratemaking issues within your country?

Following are the responses:

Switzerland	Generalized linear models; credibility; total claim distribution; extreme value theory; financial mathematics.
Austria	Car insurance
Finland	"With the decreasing significance of the rating bureau, companies must learn to stand on their own feet; ratemaking in motor third-party liability."
New Zealand	Catastrophe; human rights acts issues (discrimination on age/race/disability); distribution.
Norway	Workers' Compensation.
Japan	"Most reasonable ratemaking systems not contradictory to Anti-Monopoly Law under the current rate deregulation environments."
Netherlands	"The trend to more differentiation in several classes of business. The impact of privatization of significant parts of social insurance."
Ireland	Level of competition; introduction of new low cost direct insurers; self-insurance for commercial risks.
Pakistan	Rate adequacy in auto insurance; ratemaking of property and casualty companies is primitive. There is a shortage of actuaries due to complacency of companies.
United Kingdom	Neural network technology Integrating technical rates with market rates, using price elasticity models.

SUMMARY

The results of the survey clearly indicate a significant amount of interest in casualty actuarial topics outside the United States and Canada. While some

countries have knowledge of CAS activities, there are a large number of countries where there is a lack of familiarity with the CAS.

There was clearly a great deal of interest throughout the international actuarial community in sharing information with the CAS in the area of ratemaking. The Committee on Ratemaking intends to work within the CAS and with ASTIN to encourage the sharing of ratemaking research internationally.

