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Data Problems and Solutions

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Data Problems and Solutions

1. International Standards – Data Quality
2. US Standards – Data Quality
3. US Standards – Credibility
4. Quantitative Data
5. Qualitative Data
6. Small Data Sets
7. Q&A

International Standards

International Standard of Actuarial Practice 1 – General Actuarial Practice

Approved by the IAA Council 18 November 2012

Section 2.5 – Data Quality

2.5.1 Sufficient and Reliable Data – The actuary should consider whether sufficient and reliable data are available to perform the actuarial services. Data are sufficient if they include the appropriate information for the work. Data are reliable if that information is materially accurate.

International Standards

2.5.2 Validation – The actuary should take reasonable steps to review the consistency, completeness, and accuracy of the data used. These might include:

a. Undertaking the reconciliations against audited financial statements, trial balances, or other relevant records, if these are available;

b. Testing the data for reasonableness and against external or independent data;

c. Testing the data for internal consistency; and

d. Comparing the data to that for a prior period or periods.

The Actuary should describe this review in the report.

International Standards

2.5.3 Sources of data for Entity-Specific Assumptions – To the extent possible and appropriate when setting entity-specific assumptions, the actuary should consider using data specific to the entity for which the assumptions are being made. Where such data are not available, relevant or credible, the actuary should consider industry data, data from other comparable sources, population data, or other published data adjusted as appropriate. The data used, and the adjustments made, should be described in the report.

International Standards

2.5.4 Data Deficiencies – The actuary should consider the possible effect of the data deficiencies (such as inadequacy, inconsistency, incompleteness, inaccuracy, and unreasonableness) on the results of the work. If such deficiencies in the data are not likely to materially affect the results, then the deficiencies need not be considered further. If the actuary cannot find a satisfactory way to resolve the deficiencies, then the actuary should consider whether to:

a. Decline to undertake or continue to perform the actuarial services;

b. Work with the principal to modify the actuarial services or obtain appropriate additional data; and

c. Subject to compliance with the actuary's code of professional conduct, perform the actuarial services as well as possible and disclose the data deficiencies in the report (including an indication of the potential impact of those data deficiencies)

US Actuarial Standard of Practice 21 – Data Quality

In the process of review. What is below is what the Task Force sent to the ASB for review before release for comment.

Appropriate Data – Data suitable for the intended purpose of an analysis and relevant to the system or process being analyzed.

Data – Numerical, census, or classification information but not general or qualitative information. Assumptions are not data, but data are commonly used in the development of actuarial assumptions.

Data element – An item of information, such as date of birth or risk classification

US Actuarial Standard of Practice 21 – Data Quality

3.1 Overview - Data that are completely accurate, appropriate, and comprehensive are frequently not available. The actuary should use available data that, in the actuary's professional judgement, allow the actuary to perform the desired analysis. However, if material data limitations are known as to the actuary, the actuary should disclose those limitations, as described in section 4. The following sections discuss such considerations in more details.

US Actuarial Standard of Practice 21 – Data Quality

3.2 Selection of Data – In undertaking an analysis, the actuary should consider what data to use. The actuary should consider the scope of the assignment and the intended use of the analysis being performed to determine the nature of the data needed and the number of alternative data sets or data sources, if any, to be considered. The actuary should do the following:

a. consider the data elements that are desired and possible alternative data elements, and:

b. select the data for the intended purpose of the analysis with due consideration of the following:

1. whether the data constitute appropriate data;
2. whether the data are sufficiently current;
3. whether the data are reasonable with particular attention to internal and external consistency;
4. the degree to which the data are comprehensive;
5. any known, material limitations of the data;
6. the availability of additional or alternative data and the benefit to be gained from such data, balanced against the time and cost to collect and compile such data; and
7. sampling methods, if used to collect data.

US Actuarial Standard of Practice 21 – Data Quality

3.3 Reliance on Data Supplied by Others – In most situations, the data are provided to the actuary by others. The accuracy and comprehensiveness of data supplied by others are the responsibility of those who supply the data. The actuary may rely on data supplied by others, subject to the guidance in 3.5, unless it is or becomes apparent to the actuary during the time of the assignment that the data contain material errors or are otherwise unsuitable for use in the actuary's analysis. The actuary should disclose reliance on data supplied by others in an appropriate actuarial communication, as described in Section 4.

US Actuarial Standard of Practice 21 – Data Quality

3.4. Reliance on Other Information Relevant to the Use of Data – In many situations, the actuary is provided with other information relevant to the appropriate use of data such as contract provisions, plan documents, and reinsurance treaties. The validity and comprehensiveness of such information are the responsibility of those who supply such information. The actuary may rely on such information supplied by others, unless it is or becomes apparent to the actuary during the time of the assignment that the information contains material errors or is otherwise unreliable. The actuary should disclose reliance on such information supplied by others in an appropriate actuarial communication, as described in Section 4.

US Actuarial Standard of Practice 21 – Data Quality

3.5 Review of Data – A review of data may not always reveal existing defects. Nevertheless, whether the actuary prepared the data or received the data from others, the actuary should perform a review, unless, in the actuary's professional judgment, such a review is not necessary or not practical. In exercising professional judgment, the actuary should consider the purpose and nature of the assignment, any relevant constraints, and the extent of any checking, verification, or audit of the data that has already been performed.

US Actuarial Standard of Practice 21 – Data Quality

When determining the nature and extent of such a review, the actuary should address the following:

1. Data Definitions – The actuary should make a reasonable effort to determine the definition of each data element used in the analysis.

2. Questionable Data Values – The actuary should review the data used in the actuary's analysis for the purpose of identifying data values that are materially questionable or relationships that are materially inconsistent. If the actuary believes questionable or inconsistent data values could have a material effect on the analysis, the actuary should consider further steps, when practical, to improve the quality of the data. Any unresolved questionable data values that have a material effect on the analysis and any steps taken to improve the data should be disclosed in summary form, as described in section 4.

3. Review of Prior Data – If similar work has been previously performed for the same or recent periods, the actuary should consider reviewing the current data for consistency with the data used in the prior analysis. If the actuary does not have the prior data, the actuary should consider requesting the prior data.

US Actuarial Standard of Practice 21 – Data Quality

If, in the actuary's professional judgment, it is not appropriate to perform a review of the data, the actuary should disclose that the actuary has not performed such a review, the reason the actuary has not performed such a review, and any resulting limitation on the use of the actuarial data work product, as described in Section 4.

US Actuarial Standard of Practice 21 – Data Quality

3.6 Limitation of the Actuary's Responsibility - The actuary is not required to do any of the following:

a. determine whether data or other information supplied by others are falsified or intentionally misleading;

b. develop additional data compilations solely for the purpose of searching for questionable or inconsistent data; and

c. perform an audit of the data.

US Actuarial Standard of Practice 21 – Data Quality

3.7 Use of Data – Because data that are completely accurate, appropriate, and comprehensive are frequently not available, the actuary should make a professional judgment about which of the following are applicable:

a. the data are of sufficient quality to perform the analysis;

b. the data require enhancement before the analysis can be performed, and it is practical to obtain additional or corrected data that will allow the analysis to be performed.

c. judgmental adjustments or assumptions can be applied to the data that allow the actuary to perform the analysis. If the actuary judges that the use of the data even with adjustments and assumptions applied, may cause the results to be highly uncertain or contain a material bias, the actuary may choose to complete the assignment but should disclose the potential existence of the uncertainty or bias, and, if reasonably determinable, the nature and potential magnitude of such uncertainty or bias, as described in section 4.

d. if the actuary believes that the data are likely to contain material defects, the actuary should determine, if practical, the nature and extent of any checking, verification or audit of the data that have been performed. Then, if, in the actuary's professional judgment, a more extensive review is needed, the actuary should arrange for such a review prior to completing the assignment; or

e. if, in the actuary's professional judgment, the data are so inadequate that the data cannot be used to satisfy the purpose of the analysis, then the actuary should obtain different data or decline to complete the assignment.

US Actuarial Standard of Practice 21 – Data Quality

3.8 Provision of Data – If an actuary provides data to be used by other actuaries in an actuarial work product or assumes the responsibility for such a provision of data, the actuary should follow the same practices that the actuary would follow if using the data.

US Actuarial Standard of Practice 21 – Data Quality

3.9 Documentation – The actuary's documentation should include the following:

a. the process the actuary followed to evaluate the data, including the review and any consideration of prior data;

b. a description of any material defects the actuary believes are in the data;

c. a description of any adjustments or modifications made to the data that are expected to have a material effect on the analysis, other than routine corrections made by reference to source documents, including the rationale for any such adjustments and modifications; and

d. any other documentation necessary to comply with the disclosure requirements of section 4.

US Actuarial Standard of Practice 25 – Credibility Procedures

2.4 Relevant Experience

Sets of data, that include data other than the subject experience, that, in the actuary's judgment, are predictive of the parameter under study (including but not limited to loss ratios, claims, mortality, payment patterns, persistency or expenses). Relevant experience may include subject experience as a subset.

2.7 Subject Experience

A specific set of data drawn from the experience under consideration for the purpose of predicting the parameter under study.

US Actuarial Standard of Practice 25 – Credibility Procedures

3.3 Selection of Relevant Experience

The actuary should exercise professional judgment and use care in selecting and using relevant experience. Such relevant experience should have characteristics similar to the subject experience. Characteristics to consider include items such as demographics, coverages, frequency, severity, or other determinable risk characteristics that the actuary expects to be similar to the subject experience. If the proposed relevant experience does not meet and cannot be adjusted to meet such criteria, it should not be used.

The actuary should consider the extent to which subject experience is included in relevant experience. If subject experience is a material part of relevant experience, the actuary should use professional judgment in deciding whether and how to use that relevant experience.

In some instances, no relevant experience is available to the actuary. In this situation, the actuary should use professional judgment, considering available subject experience, in setting an estimate of the parameter under study.

Quantitative Data

Need to understand the underlying risks

Types of data

- Exposure data
- Underwriting data
- Pricing data
- Claim data
- Outside data

Availability

Quality

Reserving is pricing after the fact, so there should be communication between underwriting, sales, claims, and the actuary

Qualitative Information (Not Numbers)

Why it matters

Varies in availability

Varies in quality

Examples

- Claim Audit reveals potential excess claims not reported to the excess insurer
- Talk with Producers reveals acceleration in claim reporting
- Talk with claim personnel reveals what is really going on with changes in claim closure patterns

Reported Claims Example

Reported Claims					
	Months from Beginning of Accident Year				
Acc. Year	12	24	36	48	60
2010	1000	1200	1250	1275	1300
2011	1100	1250	1275	1300	
2012	1200	1250	1275		
2013	1250	1275			
2014	1275				

Closed Claims With Loss Example

Closed Claims With Loss					
	Months from Beginning of Accident Year				
Acc. Year	12	24	36	48	60
2010	200	300	500	600	700
2011	200	300	500	600	
2012	300	350	600		
2013	300	400			
2014	300				

Closed Claims With No Loss Example

Closed Claims With No Loss

	Months from Beginning of Accident Year				
Acc. Year	12	24	36	48	60
2010	800	750	700	650	600
2011	800	750	700	650	
2012	700	700	600		
2013	700	650			
2014	700				

Total Closed Claims Example

Total Closed Claims					
	Months from Beginning of Accident Year				
Acc. Year	12	24	36	48	60
2010	1000	1050	1200	1250	1300
2011	1000	1050	1200	1250	
2012	1000	1050	1200		
2013	1000	1050			
2014	1000				

Open Claims Example

Total Open Claims					
	Months from Beginning of Accident Year				
Acc. Year	12	24	36	48	60
2010	0	150	50	25	0
2011	100	200	75	50	
2012	200	200	75		
2013	250	225			
2014	275				

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Questions and Answers

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