

**Statistical Plans for  
Property/Casualty Insurers**  
*Virginia R. Prevosto, FCAS*

# **STATISTICAL PLANS FOR PROPERTY / CASUALTY INSURERS**

by Virginia R. Prevosto, FCAS, MAAA

## **Abstract**

This paper reviews the genesis for statistical plans in the property / casualty insurance business and the two basic types of statistical plans that are being used today. Most importantly, the author explains the key data elements collected in the statistical plans as they relate to the insurance product.

## **Biography**

Virginia R. Prevosto is an Assistant Vice President with Insurance Services Office, Inc.. She currently manages the Personal Lines Information Division at ISO that has responsibility for developing information products for both internal and external customers for personal lines. She also has management responsibility for the Fast Track Monitoring System and the Closed Claim Survey for Commercial General Liability. Her previous experience includes responsibility for the initial quality review of ISO's statistical plan data, administrative oversight of ISO's data quality programs, and personal property pricing.

Virginia is a member of the American Academy of Actuaries and a Fellow of the Casualty Actuarial Society. Ms. Prevosto is a Phi Beta Kappa graduate of the State University at Albany with a bachelor of science degree in mathematics, summa cum laude.

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## BACKGROUND

The need for aggregate insurance statistical data arises from two different arenas: a regulatory need for data and a business need for data.

### Regulatory Need for Data

Insurance regulators are entrusted with monitoring and regulating the insurance business in three areas:

1. *financial solvency and solidity of insurance companies* – to ensure that the insurance companies will be able to meet their obligations to policyholders;
2. *market conduct* – to ensure that insurers do not engage in unfair practices and that insurers fulfill the terms of their policies;
3. *rate regulation* – to ensure that rates meet statutory standards, that is, that rates are not inadequate, excessive, or unfairly discriminatory.

To carry out their first duty, insurance regulators collect data about a company's assets and liabilities and its financial performance during a year through the Annual Statement. The Annual Statement is a "snapshot" at one point in time of a company's financial condition on a calendar-year basis. It does not provide the detail necessary to match the losses and premiums together for comparable policies and to test the adequacy of the rates, as required by a regulator's third duty.

To carry out their second duty, insurance regulators conduct periodic market conduct examinations of individual insurers. During these examinations, regulators may review the underwriting practices and guidelines of the insurer, the accuracy of the rating of policies as compared to the approved manuals and forms on file with the insurance department, and the claim settlement practices of the insurer.

To assist regulators in carrying out their third duty, most state rating laws require companies to report statistical information on premiums and losses. Companies must file statistics annually

with the state insurance departments either through a statistical agent<sup>1</sup> or, where permitted, directly with the regulator.

Statistical agents, in turn, develop Statistical Plans that define the data elements to be collected (e.g., coverage, class, amount of insurance), the time frames to report (e.g., monthly, quarterly, annually), and the format or record layout. Since the business and regulatory need for data changes, statistical agents periodically review their plans and modify them as is necessary.

### **Business Need for Data**

The business of insurance is unique in terms of its need for data. In most businesses the cost of the products is known before the product is sold to consumers. In contrast, the insurance industry does not know its final cost to provide insurance coverage to its consumers until many years after the coverage is provided. To estimate the cost of providing insurance coverage for future policies, insurers review data from the policies written in the past, the losses paid or incurred on those policies, and the expenses to write and service those policies. But any one insurer may not have enough credible data for a particular policy type and/or classification of insured to perform an actuarial analysis. To provide a broader data base, the data on insurance underwriting operations – premiums collected and losses and loss adjustment expenses incurred – across insurers are also collected through the Statistical Plan mechanism.

### **Summary**

In summary, Statistical Plans are developed with a goal of providing a data base of homogeneous experience for comparable policies that fulfills both a regulatory need and a business need to correctly price the insurance product.

- For regulatory purposes, the statistical plans collect historical insurance company experience by state, by class, and by coverage. The minimum requirements for the regulatory needs are included in the *National Association of Insurance Commissioners (NAIC)– Statistical Handbook of Data Available to Insurance Regulators*.
- For the business purpose of pricing the insurance product, the Insurance Services Office, Inc.'s (ISO) Statistical Plans go beyond the regulatory mandated data elements (or standard data elements) and collect both additional detail within the standard data elements and additional or new data elements to perform research and development to better refine the rating or classification of insurance policies and to provide advisory prospective loss costs. By aggregating the data together from many insurers, the resulting ISO data base provides a larger, more credible data base than any one insurer can do alone.

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<sup>1</sup> An organization, such as Insurance Services Office, Inc. (ISO) or the National Association of Independent Insurers, that helps companies satisfy legal requirements for reporting data. The statistical agent processes data submitted by companies and reports it on their behalf to state insurance departments.

## TYPES OF STATISTICAL PLANS

Two basic types of statistical plans exist: summary-based plans and transaction-based plans.

### Summary-based Statistical Plans

To balance the regulatory need for aggregate information against the cost of compiling detailed information on millions of policies, the premium and loss data in these type plans are collected on a summarized basis. That is, prior to submitting its data to the statistical agent, an insurer summarizes its data as required by the plan. For example, the data may be summarized by line of business, by state, by class, and by coverage. For losses, data may be summarized at a pre-determined basic-excess limit split.

As the data are already summarized over the required data elements prior to submission to the statistical agents, the compilation of the data into a standard set of reports by the statistical agent is fairly straight forward. However, by their very nature, these plans are less flexible than transaction-based plans and are best used when the data requirements are static. For example, if the data were already collected with the losses reported on a basic limit of \$25,000 and, as an actuary, you are asked to price the basic limit at \$100,000, the data you need would not be available. It may be necessary to re-collect the data summarized on a different basic limit basis.

In most instances, summary-based statistical plans do not provide the detail required for an "extension of exposure" adjustment to the premium side of the ratemaking formula. Thus, this type of statistical plan usually restricts the actuary to an "on-leveling" approach to ratemaking.

### Transaction-based Statistical Plans

While fulfilling the regulatory need for data, transaction-based statistical plans collect more detailed information to support the business need for data. For these type plans, transaction level records are sent to the statistical agent, which eliminates most summarization at the insurer level. Conceptually, each time an insurer writes a policy or has a mid-term endorsement,<sup>2</sup> it generates one or more premium transaction records. These records contain the dollar amount of the premium (positive or negative) and substantial information about the risk's characteristics. On the loss side, an insurer generates transaction records every time it pays a loss, including partial payments, or establishes a loss reserve as a result of a claim. Similar to the premium transactions, the loss records contain the same risk characteristics (to enable to match the loss records with the corresponding premium records), plus some loss-specific data elements, such as type-of-loss and claim count.

Generally, for the transaction-based statistical plans, the premium and paid loss data are usually collected quarterly, but it may also be collected on a monthly basis. For outstanding losses, the data are always captured on a quarterly basis evaluated at the end of the quarter. Within these

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<sup>2</sup> An endorsement whose effective date is after the policy effective date, but before expiration. The endorsement may change either coverage or classification.

accounting period submissions, the premium and loss transactions represent all the activity that the insurer had during the accounting period regardless of the policy or accident year.

## **RELATIONSHIP OF STATISTICAL PLANS TO INSURANCE RATING ELEMENTS**

The primary purpose of statistical plans is to aggregate historical insurance statistics into a data base of homogeneous experience to assist with the analysis of insurance costs so that rates are not excessive, inadequate, or unfairly discriminatory. To fulfill this basic test for insurance rates, data must be collected and analyzed for each of the significant rating criteria. There is a direct correlation between the rating manuals, applications, or rating worksheets for a line of insurance and the statistical coding that is required to gather the data for a homogeneous data base. This linkage is frequently referred to as the "code-as-rated" concept.

This is best explained by an example. For Homeowners insurance, one of the major rating elements is the policy form being issued to the insured. The corresponding statistical plan data element would be the policy form data element with statistical plan codes that have a one-to-one correspondence to the standard policy forms.

The "code-as-rated" concept is usually the best method for collecting insurance data. Since the elements are used in rating the policy, they are available and are of a higher quality. The "code-as-rated" concept cannot and should not always be followed. Three examples where it may not be followed are:

1. Extra detail collected – no rating distinction exists but a data element is established to determine if a future rating consideration may be appropriate, e.g., make/model of car for no-fault pricing for Personal Auto. Another example of this is collection of data for Homeowners insurance by zip code, which is not currently used by ISO in calculating advisory prospective loss costs.
2. State regulatory authorities require a data element to be captured and maintained. For example, statistics must be collected on Massachusetts Tenant Relocation Expense for any line of insurance that has a liability component.
3. Less detail collected – coverages are combined in statistical plan coding but not in rating due to an overwhelming consideration for labor or record saving needs. Examples of this situation include policies with multiple locations and additional coverage for Fire Department Service Charge.

## STATISTICAL PLAN DATA ELEMENTS

This section reviews most of the typical *transaction-based* statistical plan data elements from a conceptual standpoint but does not discuss the specific code values.

**Date Fields** – Statistical plans collect various distinct dates on each transactional record:

### Accounting Date

*definition:* This is the date (quarter or month and year) the transaction was entered on the company's financial books and is required on both premium and loss records.

*function:* The statistical agent uses this field for processing control purposes and for reconciling the statistical data reported to the statistical agent to the insurer's annual statement, State Exhibit of Premiums and Losses (Statutory Page 14 Data).

### Inception Date

*definition:* This is the date (month and year) when the policy is coded. Typically, this is the date on which coverage begins, but the two dates can differ. (See example #2 below.) This field is required on both the premium and loss records.

*function:* The inception date on the transactional records is key to the initial quality checks that will be performed. Since statistical plans are periodically modified to reflect current and upcoming needs, the inception date on both the premium and loss records indicates which set of statistical plan codes were valid at the inception of the coverage. All loss records for that policy should carry the same inception date as the corresponding premium records under which the loss was paid.

This field is also used to assign premium and loss records to the proper policy year (if statistics are compiled on this basis).

### Effective Date and Expiration Date

*definition:* These are the dates on which coverage begins and ends, respectively. They are required fields on premium records.

*function:* These fields are used to calculate the term of the policy, to earn the reported written premium over the policy term, and to allocate the earned premium to the proper calendar-accident years (if statistics are compiled on this basis).

## Date of Loss

*definition:* This is the day on which the loss occurred.

*function:* For calendar-accident year statistics, the loss date determines the assignment of the loss or allocated loss adjustment expense (paid and/or outstanding) to the proper accident year.

There are other date-related fields on the statistical plan records, but they vary by line of insurance and relate to various rating variables within the line. Examples of these include: year of construction for personal property lines; a car's model year for Personal Automobile; and date of entry into claims-made for General Liability.

### **Examples of Date Field Coding**

**Example #1:** A homeowner has applied for insurance and is accepted by the ABC Insurance Company. The policy is recorded by the ABC Insurance Company on its financial books in December, 1995, for a Homeowners policy with a one year term beginning February 15, 1996. The following information is recorded on the premium transaction record:

Accounting Date = 12/95  
Inception Date = 2/96  
Effective Date = 2/96  
Expiration Date = 2/97

When this record is received by the statistical agent, the reported written premium and the detail information provided on the transaction record are processed as follows:

- For reconciliation to Statutory Page 14 Data of the annual statement, the written premium on this record along with other premium records from the ABC Insurance Company carrying an accounting date of 1995 is aggregated together and compared to its 1995 annual statement.
- All the codes entered on the premium transaction record are validated against the statistical plan codes in effect on 2/96.
- The written premium is earned into the 1996 and 1997 calendar-accident years appropriately.

**Example #2:** A business requires insurance and applies to the XYZ Insurance Company for a General Liability policy. The insured is accepted and annual gross sales (used as the rating basis) is estimated at \$1,000,000. The policy is recorded by the XYZ Insurance Company on its financial books in November, 1994, for a General Liability policy with a one year term



beginning March 1, 1995. According to the terms of the policy, there will be quarterly audits of the insured's gross sales – that is, a first quarterly audit would cover the policy term from March 1, 1995 to May 31, 1995; a second quarterly audit would cover the policy term from June 1, 1995 to August 31, 1995; etc.. Audits are completed and recorded fifteen (15) days after the close of the period. The following information is recorded on the premium transaction records:

		First Quarterly Audit - Premium <u>Record</u>	Second Quarterly Audit - Premium <u>Record</u>	Third Quarterly Audit - Premium <u>Record</u>	Fourth Quarterly Audit - Premium <u>Record</u>
Accounting Date	11/94	6/95	9/95	12/95	3/96
Inception Date	3/95	3/95	3/95	3/95	3/95
Effective Date	3/95	3/95	6/95	9/95	12/95
Expiration Date	2/96	5/95	8/95	11/95	2/96

When these five transaction records<sup>3</sup> are received by the statistical agent, the reported written premiums and the detail information provided on these transaction records are processed as follows:

- For reconciliation to Statutory Page 14 of the annual statement, the written premiums on these records along with other premium records from the XYZ Insurance Company carrying accounting dates of 1994, 1995, and 1996 are aggregated and compared to its 1994, 1995, and 1996 annual statements, respectively.
- All the codes entered on the premium transaction records are validated against the statistical plan codes in effect on 3/95.
- The written premiums are earned into the 1995 and 1996 calendar-accident years appropriately. If ratemaking for General Liability had continued on a policy year basis, the written premium on these records would be assigned to policy year 1995. (In late 1995, ISO moved from a policy year basis to an accident year basis for General Liability ratemaking.)

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<sup>3</sup> A sixth record should also be reported in these situations that reverses the premium reported on the "deposit premium record."

**Amount Fields** – Statistical plans collect the following amount fields:

Written Premium

*definition:* This is the actual premium paid by the insured for the coverage being reported on the transaction record. The premium is reported on a direct basis and is **NOT** net of reinsurance.

*function:* This field is used for reconciling the statistical data reported to the statistical agent to the insurer's annual statement (Statutory Page 14 Data) and for statistical agent filings.<sup>4</sup> For ratemaking lines of insurance where an "on-leveling" approach is used, the written premiums are adjusted to a common rate level for the development of advisory prospective loss costs.

Loss – Indemnity Amount

*definition:* This is the amount of money paid or that is expected to be paid (the outstanding amount<sup>5</sup>) by the insurer to, or on behalf of, the policyholder under the coverage indicated by the statistical codes on the transaction record. The loss is reported on a direct basis (**NOT** net of reinsurance) and is net of salvage and subrogation. Salvage and subrogation, that is recovered after the loss has been paid and reported to the statistical agent, must still be reported (and sometimes separately identified). This is easily done as a negative paid loss.

*function:* This field is used for reconciling the statistical data reported to the statistical agent to the insurer's annual statement (Statutory Page 14 Data), for statistical agent filings, and for the development of advisory prospective loss costs.

Loss – Allocated Adjustment Expense Amount

*definition:* This is the amount of money paid or that is expected to be paid (the outstanding amount) by the insurer for legal and other related costs associated with settling the specific claim under the coverage indicated by the statistical codes on the transaction record. Under the ISO statistical plans, only allocated loss adjustment expenses are reported, on a direct basis and **NOT** net of reinsurance. This data element is only collected in the statistical plans for the liability lines of insurance. For the property lines of insurance, data from the Insurance Expense Exhibit are used.

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<sup>4</sup> Statistical agent filings are the annual aggregate data compilations by line of insurance that the statistical agent files with the state insurance department on behalf of its statistical reporting insurance companies to fulfill their regulatory obligation to report statistical information on premiums and losses.

<sup>5</sup> Under the ISO statistical plans, the outstanding amounts are the amounts an insurer estimates it will pay in the future related to a specific claim. These loss reserves reported to ISO are the case-base reserves and do not include reserves for IBNR.

*function:* This field is used for statistical agent filings and for the development of advisory prospective loss costs.

**Classification or Rating Variables Fields** – For each line of insurance or module in the statistical plan, the data elements related to the classification or rating of that line of insurance are collected. For a transaction-based statistical plan, there is a direct correspondence between the transaction or statistical record and the policy or coverage being provided by insurers. It is these data elements that allow ISO, as an advisory rating organization, to analyze the data it receives and develop advisory prospective loss costs and other rating and classification factors, such as, increased limit factors. For a summary-based statistical plan, data may not be collected by each rating element that are noted below.

For **Homeowners insurance**, the major rating elements and the corresponding ISO statistical plan data elements are listed below.

<u>RATING ELEMENTS</u>	<u>DATA ELEMENT</u>
Location of risk	State, territory
Policy form	Policy form
Construction	Construction type
Public protection <sup>6</sup>	Protection code
Policy Limits	Exposure (Amount of insurance–Coverage A)
Deductible	Deductible type and size

Other information is also collected, such as policy form edition, number of families, and Coverage E limits.

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<sup>6</sup> For property rating for the peril of fire, the insurance industry refers to a Public Protection Grading that is assigned to each responding fire department. The grading is based on the fire suppression capabilities of the community and considers many variables.

For **General Liability insurance**, the major rating elements and the corresponding ISO statistical plan data elements are listed below.

**RATING ELEMENTS**

Location of risk  
Coverage (e.g., premise/operations)  
Type of risk  
Policy limit  
Deductible  
Trigger (occurrence vs. claims-made)  
Rating basis (e.g., payroll, square feet)

**DATA ELEMENT**

State, territory  
Subline code  
Classification code  
Limit identifier, limit codes  
BI, PD deductible code  
Coverage code  
Exposure

Other information is also collected, such as type of policy (monoline vs. commercial multi-peril) and rating modification resulting from application of Rating Plans.

For **Personal Automobile insurance**, the major rating elements and the corresponding ISO statistical plan data elements are listed below.

<u>RATING ELEMENT</u>	<u>DATA ELEMENTS</u>	<u>COVERAGE</u>		
		<u>LIABILITY</u>	<u>NO-FAULT</u>	<u>PHYSICAL DAMAGE</u>
<b>Insured(s) information:</b>				
• Location of risk (garage)	State, territory	x	x	x
• Standard/non-standard	Type of business	x	x	x
• Driver(s)	Classification code based on "class plan" in effect, e.g., <ul style="list-style-type: none"> <li>• sex, age, marital status</li> <li>• owner/principal operator</li> <li>• accident/convictions</li> </ul>	x	x	x
<b>Coverage information:</b>				
• Policy form	Type of policy (e.g., PAP)	x	x	x
• Coverage(s)	Subline code Coverage code <ul style="list-style-type: none"> <li>• no-fault</li> <li>• o/t collision</li> <li>• collision</li> </ul>	x	x	x
• Policy limit	Limit (by coverage)	x		
• Deductible	Deductible (by coverage)	x	x	x

<u>RATING ELEMENT</u>	<u>DATA ELEMENTS</u>	<u>COVERAGE</u>		
		<u>LIABILITY</u>	<u>NO- FAULT</u>	<u>PHYSICAL DAMAGE</u>
<b>Vehicle information:</b>				
	Symbol			x
	Model year			x
	VIN <sup>7</sup>			x
	Vehicle performance <sup>8</sup>	x	x	x
<b>Discounts:</b>				
	Driver training <sup>#</sup>	x	x	x
	Good student <sup>#</sup>	x	x	x
	Defensive driver <sup>#</sup>	x	x	x
	Anti-lock brake	x (BI,PD)		
	Multi-car <sup>#</sup>	x	x	x
	Anti-theft device			x (OTC)
	Passive restraint	x (med. pay only)	x	

Other research data elements are also collected for Personal Auto: zip code of the location of the risk (garage), number of vehicles/operators, date licensed, number of convictions/accidents, and VIN for liability and no-fault.

<sup>7</sup> The VIN (vehicle identification number) is used in rating to find the correct Symbol for the car at the time of policy issuance. For the "extension of exposure" ratemaking technique, the current symbol for the vehicle must be used which is not necessarily the same symbol at policy inception.

<sup>8</sup> Also collected via the classification code in some class plans.

\* These rating variables may also be collected via the class code in some class plans.

Many of the above classification or rating data elements are self-explanatory, such as state or policy limit. One data element that is key to the extension of exposure ratemaking technique is *exposure* that is addressed below.

### Exposure

*definition:* The extent of risk or the rating basis for the policy.

*function:* Since the ratemaking method for many lines of insurance is based principally upon the use of exposures (that is, the extension of exposure method), it is essential that the statistically reported exposure be recorded accurately and in the necessary detail.

For General Liability, risks fall into two broad categories with respect to exposures:

1. fixed exposure base – risks for which the exposure base is a definite known quantity at the inception of the policy, for example, square feet.
2. variable exposure base – risks for which the exposure base is an indefinite known quantity at the inception of the policy, for example, gross sales or payroll. For these risks the reported exposure is the exposure for the period of coverage of the transaction being reported.

For Homeowners, two measures of exposure are used: (1) amount-of-insurance years which is generated from the Coverage A amount of insurance on the statistical record and the term of the policy implied from the effective date and expiration date on the statistical record; and (2) house-years which is also generated from the unit transaction records based on the term of the policy implied from the effective date and expiration date on the statistical record.

For Personal Automobile, ISO generates the exposure, that is, car-years (or car-months), respectively, from the unit transaction records based on the term of the policy implied from the effective date and expiration date on the statistical record.

## **SPECIAL STATISTICAL PLAN RULES**

**Audited Policies** – The final premium for some policies – mainly in the commercial lines – is based on exposures that are not fully determined until the end of the policy period. For example, insurance rates for many classes in General Liability use gross receipts or payroll as the rating basis or exposure. At policy inception, insurers charge a provisional or deposit premium. After expiration of the policy, the insurer will audit the insured's business records to determine the actual gross receipts or payroll.

For statistical reporting purposes, transaction-based statistical plans may provide various options for such policies. In each case, the ultimate policy premium and exposure must be reported in full detail. Any statistical records previously submitted to the statistical agent with the provisional or deposit premium must be offset or reversed when the final premium and exposure are reported.

**Endorsements** – Endorsements effective at policy inception or during the term of the policy (a.k.a., mid-term endorsements) that involve adding or deleting a risk, classification, or coverage with a corresponding premium adjustment must be reported as a separate premium record with full statistical detail. Other endorsements that do not fit the above description may be coded one of two ways: (1) coded in full statistical detail, or (2) coded in less than full statistical detail as required by the Statistical Plan. Examples of these endorsements include: for Homeowners insurance, deductible changes during the policy term; for Personal Automobile, changing the location of risk but within the same rating territory.

## **OTHER ISSUES**

**Catastrophe losses** – With the heightened awareness within the insurance industry and the regulatory community of the significant impact on the financial health of insurance companies that natural disasters such as hurricanes and earthquakes can have, the ISO Statistical Plans were modified to collect additional data elements for the lines of insurance exposed to such hazards. Under this modification, the following data elements were added: zip code of the location of the risk, the day of loss (in addition to the month and year), expanded cause of loss detail, and the Building Code Effectiveness Grading Schedule<sup>9</sup> code.

**Informational Value Reporting (IVR)** – In the past statistical plan data elements were restricted in size – beginning with the 80-column punch card of the 1960s to today's 300-byte layout. In order to pack all the information needs into these spaces, statistical plan codes were used to capture values, such as deductible amount, in less space. In the future as technology allows, statistical plans will migrate to the IVR concept. For example, deductibles could be reported as amounts, not codes, eliminating the translation to code step which may also improve the quality of the data.

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<sup>9</sup> Similar in concept to the Public Protection Grading, the Building Code Effectiveness Grading Schedule assigns a grade to each building code jurisdiction that measures the resources and support available for building code enforcement and evaluates how those resources apply to the mitigation of insurance losses due to natural hazards, such as hurricane.