

RISK CLASSIFICATION
STATEMENT OF PRINCIPLES

American Academy of Actuaries

Committee on Risk Classification

This booklet has been prepared for an audience generally familiar with insurance concepts and terms but not necessarily with the technical aspects of insurance.

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I. Summary

Insurance is a means for dealing with the economic uncertainty associated with chance occurrences. It does so by exchanging the uncertainty of the occurrence, the timing, and the financial impact of a particular event for a predetermined price.

To establish a fair price for insuring an uncertain event, estimates must be made of the probabilities associated with the occurrence, timing, and magnitude of such an event. These estimates are normally made through the use of past experience, coupled with projections of future trends, for groups with similar risk characteristics.

The grouping of risks with similar risk characteristics for the purpose of setting prices is a fundamental precept of any workable private, voluntary insurance system. This process, called risk classification, is necessary to maintain a financially sound and equitable system. It enables the development of equitable insurance prices, which in turn assures the availability of needed coverage to the public. This is achieved through the grouping of risks to determine averages and the application of these averages to individuals.

It is also important to understand what risk classification is not. Determining average experience for a particular class of risk is not the same as predicting the experience for an individual risk in the class. It is both impossible and unnecessary to predict experience for individual risks. If the occurrence, timing and magnitude of an event were known in advance, there would be no economic uncertainty and therefore no reason for insurance.

It is also not the purpose of risk classification to identify unusually good and bad risks or to reward or penalize certain groups of risks at the expense of others. Risk classification is intended simply to group individual risks having reasonably similar expectations of loss.

Difficulty in risk classification comes with the introduction of concepts such as “fairness” and “similar risk characteristics.” Each individual, each business, each piece of property is unique; to the extent that the risk classification process attempts to identify and measure every characteristic, it becomes unworkable. On the other hand, because there are differences in risk characteristics among individuals and among properties which bear significantly upon cost, to ignore all such differences would be unfair. Most of the controversy surrounding risk classification involves where the lines are to be drawn.

To achieve and maintain viable insurance systems, the process of risk classification should serve three primary purposes. It should:

- ! protect the insurance system's financial soundness;
- ! be fair; and
- ! permit economic incentives to operate and thus encourage widespread availability of coverage.

Striking the appropriate balance among these is not always easy; however, they are clearly in the public interest and are not incompatible.

The following basic principles should be present in any sound risk classification system in order to achieve the above purposes:

- ! The system should reflect expected cost differences.
- ! The system should distinguish among risks on the basis of relevant cost-related factors.
- ! The system should be applied objectively.
- ! The system should be practical and cost-effective.
- ! The system should be acceptable to the public.

Risk classification is only one factor in an entire set of factors which bear on private, voluntary insurance programs. Other factors--such as marketing, underwriting and administration--combine with risk classification to provide an entire system of insurance. Changing one factor has possible implications on other factors. Changes must be considered in the context of the entire system.

II. Economic Security and Insurance

Society requires various mechanisms for coping with the financial impact of chance occurrences, both natural and societal, the prospect of which generates economic insecurity.

A. Hazard Avoidance and Reduction

Some hazards may be avoided. For example, most of the chance of airplane accidents may be avoided by not flying. The incidence and severity of other hazards may be

reduced significantly by taking appropriate safety precautions. For example, the installation of smoke detectors or automatic sprinklers may reduce the chance of fire losses. However, the practical application of hazard avoidance and hazard reduction is limited. Although some financially insignificant hazards may be retained and offset by accumulated savings or reserves, the retention of major financial uncertainties may be undesirable and unwise. Accordingly, a number of programs which involve a transfer of financial uncertainty have been developed.

B. Transfer of Financial Uncertainty

Programs for transferring financial uncertainty include: sharing among families and friends; charitable activities by individuals and organizations; governmental assistance and insurance programs; self-insured group pension and welfare plans; and private insurance programs.

Certain basic distinctions can be made among these various programs. For example, charitable organizations and governmental assistance programs generally provide benefits based on demonstrated need, whereas self-insured group pension and welfare plans, and governmental and private insurance programs, provide benefits based on defined contractual rights.

C. Public and Private Programs

A comparison of governmental and private programs indicates both similarities and differences.

Both types involve the transfer of financial uncertainty from one party to another and the subsequent pooling of risks. In both cases, the exposure to loss by the sharing mechanism should be broad enough to assure reasonable predictability of the total losses.

On the other hand, governmental programs are provided by public law, whereas private insurance is provided through an individual contractual arrangement. Governmental programs usually are compulsory, while private insurance programs are often voluntary. Hence, competition plays a large and vital role in private insurance but little or no role in governmental programs. Governmental programs are often devised or needed to provide coverage for those hazards which cannot be effectively covered by the private insurance system. In governmental programs, the value or cost of benefits received by, or paid on behalf of, a class of recipients need not have any long-term relationship to the amounts paid into the program by that class. That is contrasted with private voluntary insurance programs, where such a long-term relationship is essential.

The private insurance programs are highly diverse. Coverage is available for a wide variety of risks, on an individual or group basis, with a variety of underwriting, marketing and pricing procedures. As a result, it is often difficult to make uniformly applicable general statements about private insurance programs.

III. The Need for Risk Classification

A. Rationale for Risk Classification

Though an individual exchanges the uncertainty of occurrence, timing and magnitude of a particular event for the certainty of a fixed price, that exchange in no way makes the uncertain known. Nor need it. The insurance program assuming the financial uncertainty is not able to fix the occurrence or, often, the magnitude of a specific risk merely because it assumes that risk. But it should find a way of establishing a fair price for assuming it.

One way to estimate a price is to rely exclusively on wisdom, insight and good judgment concerning the nature of the particular hazard involved and the exposure to loss. This usually is not the best method but sometimes is the only one available (as, for example, when insuring persons in new occupations which did not exist in the past, or persons in unusual occupations for which statistical histories are not meaningful).

A second, theoretically possible way to determine a fair price for the transfer is to observe the risk's actual losses over an extended period of time. This is often not appropriate, however. Such an approach offers no solution for risks such as those covered by life insurance, where actual observation would show no claims paid while the insured individual is alive but an immediate and substantial claim at the time of death. Many other risks have this similar characteristic; hindsight suggests there's little or no cost as the individual risk moves to a likely or even certain eventual occurrence. Other hazards change so gradually over the period of time needed for the observation that the information obtained by observing the past may not be applicable to the current or future exposure to financial uncertainty.

A third method is to observe the losses of groups of individual risks with similar risk characteristics, which frequently can be done over a shorter period of time. These groups are referred to as classes. While any individual risk in a given class is no more predictable than it was before the transferring or pooling of the risk occurred, a reasonable price may be established by observing the losses of the class and relating the price to the average experience of the class. This third approach is the one most often used for determining the value of the uncertainty transferred.

A major difficulty with this approach is the need to choose the relevant similar risk characteristics and related classes before the observation period. There often is not a clear-cut optimal set of characteristics. Over time, in a perfectly competitive market, the optimal set of characteristics tends to emerge through the competitive mechanism. However, in practice, perfectly competitive markets are seldom achieved, and the risk characteristics commonly used reflect both observed fact and informed judgment.

B. Three Primary Purposes of Risk Classification

A risk classification system serves three primary purposes: to protect the insurance program's financial soundness; to enhance fairness; and to permit economic incentives to operate with resulting widespread availability of coverage.

1. Protection of Program's Financial Soundness

The financial threat to an insurance program's solvency is primarily through a complex economic concept called adverse selection. It results from the interaction of economic forces between buyers and sellers of insurance. In markets where buyers are free to select among different sellers, normally with a motivation to minimize the price for the coverages provided, adverse selection is possible. In such markets sellers have a limited ability to select buyers and have a basic need to maintain prices at a level adequate to assure solvency.

In many cases, these economic forces are in equilibrium; occasionally, they are not. The freedom of choice and the economic incentive of price may create a dramatic movement of buyers to different sellers within an insurance market, or even movements into or out of a market. This relocation is the concept of adverse selection, which creates economic instability and can threaten the insurance program's financial stability.

In the early 1900's some assessment societies offered life insurance benefits to members without making price distinctions on known mortality differences for different age groups. Some younger members of those groups were gradually attracted to lower priced competitors, while others decided not to insure at all. This opting out resulted in higher prices for remaining members. Some of those remaining then opted out. An upward spiral of higher prices resulted for the fewer remaining older lives.

Risk classification is one means of minimizing the potential for adverse selection. It reduces adverse selection by balancing the economic forces governing buyer and seller actions.

Risk classification is not the only answer to controlling adverse selection. In certain

types of governmental insurance, where participation is mandatory and choices are restricted or non-existent (e.g., social security), adverse selection is controlled by a restriction of the buyer's freedom. In a competitive environment, however, risk classification is the primary means to control the instability caused by adverse selection.

2. Enhanced Fairness

Since adverse selection occurs when the prices are not reflective of expected costs, a reasonable risk classification system designed to minimize adverse selection tends to produce prices that are valid and equitable--i.e., not unfairly discriminatory. Differences in prices among classes should reflect differences in expected costs with no intended redistribution or subsidy among the classes.

Ideally, prices and expected costs should also match within each class. That is, each individual risk placed in a class should have an expected cost which is substantially the same as that for any other member of that class. Any individual risk with a substantially higher or lower than average expected cost should be placed in a different class.

3. Economic Incentive

Any economic system that relies primarily on private enterprise for the distribution of goods and services relies on companies and individuals to seek out potential customers and develop means of successfully selling and servicing the needs of those customers. The companies that prove to be the most successful in servicing customers' needs will be rewarded with the largest proportion of the potential customers.

Insurers offering private, voluntary insurance programs are no different in this regard. They have incentives to expand their markets and to achieve a high penetration of the markets they choose to serve.

In developing marketing strategies, and in pricing the products needed in their markets, insurers need a risk classification system that will permit them to offer insurance to as many of their potential customers as possible, while at the same time assuring themselves that their prices will be adequate to cover the customers' financial uncertainty that they assume.

Generally, competition for the lower cost risks will be the most intense. Therefore, prices for these better risks must be different from the prices charged the higher cost risks within that market. Also, insurers generally desire to sell insurance to the higher cost risks within the same market, in order to achieve better market penetration. Increased market penetration provides economies of scale in the marketing or

distribution function, and it also makes it possible for an insurer to provide better service to risks in areas where they are more plentiful. Therefore, insurers need the ability to price insurance in accordance with the expected costs of each identifiable class of risks within their markets.

To be more successful than its competitors would motivate an insurer to become more refined in its risk classification system and thus its pricing structure, so that it could serve both lower cost and higher cost risks in the marketplace. Thus, there is an incentive for risk classifications, as used by competitive insurance programs, to become more refined and to more accurately reflect the differentials in expected costs among identifiable classes of risks.

Economic incentive also requires the risk classification system to be efficient. The additional expense of obtaining more refinement should not be greater than the reduction in expected costs for the lower cost risk classification. Thus, there is a practical limit to the incentive to add refinements to the classification system.

In general, economic incentive operates over time to favor classification systems that result in a price for each risk which most nearly equals the expected cost associated with the class to which that risk is assigned.

There is a close, and reinforcing, relationship among these three primary purposes of risk classifications. Each is a distinct purpose, yet the system which serves any one tends to serve the other two as well.

IV. Considerations in Designing a Risk Classification System

The ability of any risk classification system to achieve the three described primary purposes is substantially influenced by many factors. In particular, this ability is inextricably tied to these many design considerations.

A. Underwriting

Development of an appropriate risk classification system is done without specific regard to any of the individual risks to be assumed. It is done a priori and establishes the framework within which underwriting can be performed.

Underwriting is the process of determining the acceptability of a risk based on its own merits. In contrast to the assignment of a risk to a class based on general criteria, the underwriting process involves an evaluation of the individual and possibly unique characteristics of each risk.

The design of a risk classification system must recognize that it is applied through the underwriting process. In practice, the application of the underwriting function controls the practical impact of the classification system, and misapplication of the classification system in the underwriting process will achieve results different from those intended.

B. Marketing

The establishment of a class and a price for that class does not necessarily mean that many risks that would be assigned to that class will participate in the insurance program. The insurer's marketing program has an important influence on its mix of business--i.e., what products are sold and to whom. In particular, if those who market private, voluntary insurance products are to be held accountable for the program's ultimate economic soundness, arbitrary restrictions on or adjustments to the risk classification system by others may produce unintended changes in the mix of business.

C. Program Design

Certain elements of the design of an insurance program relate quite directly to risk classification.

1. Degree of Choice Available to the Buyer

The design of a risk classification system is affected by the degree to which the insurance program is compulsory or voluntary. For programs which are largely or entirely compulsory and where there is no voluntary choice among competing institutions, broad classifications are sometimes used, the extreme being a single class.

Conversely, where participation in the insurance program is voluntary, or where there is a voluntary choice among competing institutions or plans, a system that classifies risks more broadly than competing systems could invite adverse selection.

2. Experience Based Pricing

Some insurance programs provide for price adjustment after the insurance is acquired, based at least in part on the risk's actual emerging experience.

In the case of insurance purchased by or through an organization, such as an employer or association, for a specific group of individuals, this price adjustment is referred to as an experience rating adjustment. If the number of

individual risks in the specific group is large enough to produce credible experience data, only that groups' actual experience is used. If the group's data is not adequately credible, its experience is merged with that from other comparable groups and the collective experience is used to adjust the price.

In the case of insurance purchased for an individual risk, not grouped risks, the price adjustment is made by adjusting the premium paid or by paying a dividend. These adjustments are determined by collecting the experience of the several individual risks in what is defined as a dividend or equity or experience class. The classes used for collecting this experience may or may not be the same as the risk classes established and utilized for the original pricing.

To the extent that prices are adjusted based on a risk's emerging actual experience after the insurance and its initial price have been established, less refined initial risk classification systems are needed. The experience rating refunds, premium adjustments or dividends ultimately produce a refined classification system, reflecting at least in part the actual experience of the specific risk.

3. Premium Payer

Under some insurance programs (typically group insurance), the individuals insured do not pay the entire price. Such a separation between payer and insured can affect the risk classification system in various ways.

If the price is paid by other than the individual insured, the classification system is generally a matter of indifference to that individual. It is possible that broad classification systems may be appropriate, since the distinction between payer and insured can operate to reduce the likelihood of adverse selection.

D. Statistical Considerations

Risk classification systems are generally based, whenever possible, on statistical analysis, modified by informed judgment. Accordingly, certain considerations of a statistical nature are involved in designing such a system.

1. Homogeneity

The expected costs for each of the individual risks in a class should be reasonably similar. In a given class, there should be no clearly identifiable subclasses with significantly different potential for losses. Significantly dissimilar

risks should be assigned to different classes.

The concept of homogeneity is based upon expected costs as viewed when the risk is originally classified. It does not suggest the system can or should precisely anticipate the subsequent actual claim experience of a given insured risk. The occurrence, timing and magnitude of an unforeseen event for a specific risk cannot be predicted in advance. Thus, it is inevitable that not all risks in a class will have identical actuarial claim experience. Instead, the individual risks' claim experience will be statistically distributed around the average experience for the class. The concept of homogeneity in no way is comprised by this inevitable outcome.

By the same token, differences in expected costs between classes do not preclude the actual claim experience of some risks in one class from being the same as the actual claim experience of risks in another class. This overlap phenomenon is both an anticipated and, indeed, statistically inevitable ramification of any sound risk classification system.

2. Credibility

A general statistical principle is that the larger the number of observations, the more accurate are the statistical predictions that can be made. Therefore, it is desirable that each of the classes in a risk classification system be large enough to allow credible statistical predictions about that class. This does not necessarily mean that each class must be large enough to stand on its own. Accurate predictions for relatively small, narrowly defined classes often can be made by appropriate statistical analysis of the experience for broader groupings of correlative classes.

3. Predictive Stability

A major consideration in the construction of risk classification systems and the determination of prices for risks in the classes is the prediction of future costs. To this end, it is important that elements of a risk classification system be useful for predictive purposes. The predictive capability must be responsive to changes in the nature of insurance losses, yet stable in avoiding unwarranted abrupt changes in resulting prices.

Some statistical tools exist for measuring the historical predictive stability of specific risk classification variables. But the actuary must also exercise judgment in evaluating noninsurance trends which might reduce the future

effectiveness of predictive power or the practicality of obtaining risk classification information. An example of changing predictive value might be seen in the recognition of the impact of automobile bumpers meeting certain federal safety standards. At one time very few cars had safe bumpers; now, most do.

These statistical considerations--homogeneity, credibility and predictive stability--are somewhat conflicting. For example, increasing the number of classes may improve homogeneity, but at the expense of credibility. Consequently, there is no one statistically correct risk classification system. In the final analysis, the system adopted will reflect the relative importance ascribed to each of these considerations. The decision as to the relative weights to be applied will, in turn, be influenced by the nature of the risks, the management philosophy of the organization assuming the risk and the judgment of the designer of the system.

E. Operational Considerations

1. Expense

One important element of a risk classification system is its operational expense. These expenses include those for obtaining and maintaining the data required to establish classes, for assigning each risk to a class, and for determining a price for each class. For reasons of efficiency and competitiveness, the expenses should be as low as possible, while effectively permitting the system to minimize adverse selection and maximize equity.

Further, the cost of utilizing a given variable for classification purposes should be reasonable in relation to the benefits achieved, for the insurance program and those insured.

2. Constancy

It is desirable that the characteristics used in any risk classification system should be constant in their relationship to a particular risk. This constancy should prevail over the period covered by the insurance contract or, alternatively, over the period for which a class is assigned. This does not preclude the possibility of periodic

reclassification of the risk to take into account changes in the magnitude of the classification characteristics. However, the lack of constancy in such a characteristic tends to increase the expense and reduce the utility of that characteristic, thus reducing the reliability of the classification system.

3. Availability of Coverage

It is also desirable to provide all of the individuals or groups desiring to transfer financial uncertainty the ability to obtain coverage. This means that it is desirable to have a classification system which maximizes the availability of insurance. To the extent that the classification system properly reflects the expected costs of each class and determines the price accordingly, overall availability of coverage should be enhanced.

It should be recognized, however, that in some instances the expected cost for the highest cost risk class may be of such a magnitude as to make the price, from a practical standpoint, unaffordable for some insureds. On balance, however, a more refined risk classification system properly matching expected cost and price paid will, in the long run, enhance rather than inhibit availability of insurance through the voluntary market.

There are instances where the risk classification system may actually define some risks as necessarily uninsurable. However, even under such circumstances it may be possible to minimize the size of the uninsurable class by requiring a specific limitation on the coverage available to the otherwise uninsurable risk. For example, if an individual has been totally disabled by back trouble several times in his life, an insurer might require exclusion of disability caused by back trouble from coverage as a pre-condition for issuing a new disability policy.

4. Avoidance of Extreme Discontinuities

There should be enough classes in the system to establish a reasonable continuum of expected claim costs but few enough so that differences in prices between classes are reasonably significant. Particular attention is often required in defining classes at the extreme ends of the range, in order to reduce large differences in anticipated average claim costs between the extreme class and the adjacent class.

5. Absence of Ambiguity

The definition of classes should be clear and objective. Once a factual assessment of an individual risk has been made, no ambiguity should exist concerning the class to which that risk belongs. The classes should be collectively exhaustive and mutually exclusive.

6. Manipulation

The system should minimize the ability to manipulate or misrepresent a risk's characteristics so as to affect the class to which it is assigned.

7. Measurability

The variables used for classification should be susceptible to convenient and reliable measurement. Age, sex, occupation and geographic location are examples of factors that are generally reliably determinable. Moral character, driving pattern and psychological characteristics are examples of factors that are not currently so readily determinable.

F. Hazard Reduction Incentives

Risk classification systems can be designed to provide incentive for insureds to act to reduce expected losses and thus operate to reduce the overall costs of insurance in total. For example, recognizing sprinklers for classifying risks for fire insurance coverages may encourage their installation and thereby reduce expected losses. Or reduced life insurance prices for non-smokers may encourage people not to smoke, thus reducing the hazard of premature death caused by diseases linked to smoking.

Such incentives are desirable, but not necessary, features of a risk classification system. Although worth pursuing, it must be recognized there are limits to which a risk classification system can be extended in an attempt to solve society's problems and still serve the necessary and useful purposes for which such a system is designed.

G. Public Acceptability

Any risk classification system must recognize the values of the society in which it is to operate. This is a particularly difficult principle to apply in practice, because social values

- ! are difficult to ascertain;
- ! vary among segments of the society; and
- ! change over time.

The following are some major public acceptability considerations affecting risk classification systems:

- ! They should not differentiate unfairly among risks.
- ! They should be based upon clearly relevant data.
- ! They should respect personal privacy.
- ! They should be structured so that the risks tend to identify naturally with their classification.

Laws, regulations and public opinion all constrain risk classification systems within broad social acceptability guidelines. Legislative and regulatory restrictions on risk classification systems must balance a desire for increased public acceptability with potential economic side effects of adverse selection or market dislocation.

H. Causality

Scientists seek to infer some cause and effect relationship in natural phenomena, in order to attempt to understand and to predict. It is philosophically satisfying to some when data exhibit such a cause and effect relationship.

Risk classification systems provide a framework of information which can be used to understand and predict future insurance costs. If a cause and effect relationship can be established, this tends to boost confidence that

such information is useful in predicting the future and will produce some stability of results. Thus classification characteristics may be more acceptable to the public if there is a demonstrable cause and effect relationship between the risk characteristics and expected costs.

However, in insurance it is often impossible to prove statistically any postulated cause and effect relationship. Causality cannot, therefore, be made a requirement for risk classification systems.

Often causality is not used in its rigorous sense of cause and effect but in a general sense, implying the existence of a plausible relationship between the characteristics of a class and the hazard insured against. Living in a river valley would not seem to cause a flood insurance claim, but it does bear a reasonable relationship to the hazard insured against and thus would be a reasonable basis for classification.

Risk classification characteristics should be neither obscure nor irrelevant to the insurance provided; but they need not always exhibit a cause and effect relationship.

I. Controllability

Controllability refers to the ability of a risk to control its own characteristics as used in the risk classification system. While controllability is in many cases a desirable quality for a characteristic in a risk classification system to have, because of its close association with an effort to reduce hazards and the resulting general acceptability by the public, it can easily be associated with undesirable qualities, such as manipulation, impracticality and irrelevance to predictability of future costs.

Judgment must be used when considering the controllability of a classification variable. Both positive and negative aspects must be evaluated.

V. Conclusion

The classification of risks in order to group those with similar risk characteristics is fundamental to any true insurance system. This done to determine average claim costs and to apply those averages to individual risks.

If a viable insurance system is to be achieved, those who design, manage and regulate risk classification systems must recognize three major purposes of such systems: to

protect the insurance system's financial soundness; to be fair; and to permit economic incentive to operate. Striking the appropriate balance as risk classification designers pursue these major purposes is not always easy; but these legitimate needs are in the public's best interest and are not incompatible.

It's essential to recognize that any risk classification system is only part of an entire insurance structure and does not operate in a vacuum. The many factors which bear on the design of the system and its effective utilization include the many discussed in this Statement of Principles.