American Academy of Actuaries Webinar:

Risk Classification & the New Academy Monograph

Risk Classification Work Group

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A Public Policy Monograph On Risk Classification

Section I: Financial or Personal Security Systems
Section II: Expected Cost
Section III: Risk Classification
Section IV: Considerations in Designing a Risk Classification System

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Introduction

- The Monograph was developed by the Academy's Risk Classification Work Group at the request of the Academy's Risk Management and Financial Reporting Council
- Its purpose is to provide background and information to the public on risk classification and the design and management of risk classification systems
- This Monograph also provides a systematic development of these concepts for actuaries and other professionals in a form applicable to all areas of practice
- It is **not** a standard or practice and is not binding upon any actuary
- It is intended to be objective without proposing any social or political points of view by describing those features that are necessary for the success of any financial or personal security system
- The Monograph is on the Academy website: http://www.actuary.org/pdf/finreport/RCWG_RiskMonograph_Nov2011.pdf

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About the Monograph (and this presentation)

- Careful definition of terms was a goal of the Monograph
- Risk classification is not an end in itself—it is important to understand the systems that incorporate risk classification and their purposes before discussing risk classification itself

A few key words and phrases were defined for use in the Monograph

- A *financial or personal security system (security system)* is a private or governmental arrangement that is intended to offer a means to mitigate the impact of unfavorable outcomes on some or all of the members of an at-risk group through advance risk transfer
  - Uncertainty about the future affects everyone
  - These systems or mechanisms have been developed to address concerns over the uncertainty of future events that could have a negative personal or financial impact

A few key words and phrases were defined for use in the Monograph (cont'd)

- A *peril* is a cause of possible injury or loss at times in the future
  - When a peril exists, no one knows which of the possible outcomes will occur
  - It is often possible to describe the possible outcomes that could occur and to estimate the probability of each outcome

A few key words and phrases were defined for use in the Monograph (cont'd)

- The term *risk* is used in the Monograph to mean a situation, created by a peril, that gives rise to a defined set of potential outcomes and the probability of occurrence associated with each outcome
  - Can be *monetary* or *non-monetary*
  - The possible outcomes for a monetary risk are the amounts that must be paid at each future time

A few key words and phrases were defined for use in the Monograph (cont'd)

- Example: the risks associated with the possibility of a house fire
  - The non-monetary risks include the risk of physical damage to the structure and the risk of inconvenience and emotional upset
  - The monetary risks include the risk of incurring expense to repair the structure
  - The list of possible outcomes for the risk of physical damage to the structure could be infinitely long

A few key words and phrases were defined for use in the Monograph (cont'd)

- The *severity* of a particular outcome of a monetary risk is the monetary loss associated with the outcome
- If the monetary loss consists of a series of payments, the severity is the *current monetary value* of the payments at the time the event occurs—
- That is, the amount of money that is needed at the time the event occurs to provide for current and future payments

A few key words and phrases were defined for use in the Monograph (cont'd)

- The *risk probability* of an outcome associated with a monetary risk is the probability that the outcome occurs at a particular time and is of a particular severity
  - This reflects both the outcome's timing and severity
  - For life insurance, the risk probability for the outcome "benefit payable at age 60" is the probability that the insured dies at age 60, and the severity is the face amount of the policy
  - The risk probabilities associated with providing major medical insurance reflect the probabilities of suffering various illnesses and injuries, and the severity depends on the amounts and timing of the resulting payments

A few key words and phrases were defined for use in the Monograph (cont'd)

- A *risk subject* is a person or thing, or a collection of persons or things, associated with a risk
  - The unmodified word "risk" often is used for both risks and their risk subjects
  - These terms are carefully distinguished in the Monograph
  - Numerous risks could be associated with the same risk subject
  - A person could be, simultaneously, the risk subject for life insurance risk, for workers' compensation risk, and for non-monetary risks such as the risk of personal unhappiness

Transfer of risk

- Mitigation of the adverse consequences of an uncertain event often is provided by families, friends, privately funded charities, or government assistance, among others
- Mitigation also is provided by governmental or private insurance programs or prepaid service plans

Transfer of risk (cont'd)

- These mitigation options differ in that some provide some degree of *advance risk transfer*—a specific commitment by one party to mitigate the impact of certain risks that face another party—while others do not involve any such advance commitment
- While both approaches can mitigate the negative consequences of uncertain events, programs based on advance risk transfer also can mitigate the uncertainty the individual faces before any loss has occurred and thus may provide an enhanced sense of security

Transfer of risk (cont'd)

- A private or government-sponsored arrangement that is intended to offer a means to mitigate the impact of unfavorable outcomes on some or all of the members of an at-risk group through advance risk transfer is called a *financial or personal security system (or security system)*
  - A group of individuals or entities facing possible unfavorable outcomes arising from one or more specified uncertain events is called an *at-risk group*
  - A security system *covers* or *provides coverage for* those who participate in the system, the *participants*

Transfer of risk (cont'd)

- A *coverage provider* is an entity associated with a security system that agrees to take actions that mitigate the unfavorable outcomes of specified risks through advance risk transfer in return for payments or other consideration—examples are insurance companies, pension plans and pre-paid health plans
- The coverage provider is the entity that bears the risk—for example, under cost-plus insurance, the plan sponsor is the coverage provider, not the insurance company that administers the claim payments

Transfer of risk (cont'd)

- For a specific coverage offered by a coverage provider, the *terms of coverage* is a description of the rights and responsibilities of the coverage provider and of the participants to whom it provides coverage
  - A *covered event* is an event with one or more outcomes that require the coverage provider to take mitigating actions involving monetary payments or the provision of goods or services, as provided under the terms of the coverage

Transfer of risk (cont'd)

- A *covered risk* associated with a security system is a risk for which the possible outcomes are the mitigating actions that would be undertaken by a coverage provider upon the occurrence of one or more of the system's covered events

Compulsory and Voluntary Systems

- Definitions of compulsory and voluntary
  - *Compulsory systems* provide coverage for a specified group and all members of the group are required to participate
  - In a *voluntary system*, the individual has the right to choose whether or not to participate
  - In *compulsory systems with elements of choice* participants are required to participate, but are allowed to make certain choices about coverage or coverage providers

Compulsory and Voluntary Systems (cont'd)

- Government systems—compulsory versus voluntary (and in between)
  - Government-sponsored systems often are compulsory, but may be voluntary with respect to some benefits or other provisions (e.g., Medicare Part D prescription drug benefit)
  - Some are voluntary systems (e.g., flood insurance)
  - Some systems do not fit neatly into either category (e.g., Medicaid and workers' compensation)
- Private systems—usually voluntary, but can be compulsory
  - Auto insurance mandate
  - Patient Protection and Affordable Care Act coverage mandate with penalty

Individual Choice in a Financial or Personal Security System

- Voluntary Systems—choices and options
  - Participation—Continuity is an issue
  - Benefit levels—How much and when triggered
  - Riders or other bells and whistles—How do cost and access/quality vary?
- Compulsory systems—mandated coverage versus non-participation
  - Does the system allow any choice—and is the tax or penalty used to enforce a mandate actually strong enough?
  - Participation options are desirable but expensive—must balance of risk and reward

Individual Choice in a Financial or Personal Security System (cont'd)

- Compulsory systems with elements of choice
  - Examples: ability to choose whether to participate in some aspects of the system, what service provider to use or what levels of benefits to include
  - Type of provider—Selection and adverse selection in getting a product/service
  - Type of coverage—Selection and adverse selection in choosing coverage
  - Allowing participant choice can introduce adverse selection into a compulsory system

The Role Of Competition

- *Fully competitive system*: A financial or personal security system with multiple coverage providers that are free to offer terms of coverage, including prices, of their own choosing; potential participants free to choose among these options
- *Single-provider system*: A security system with only one coverage provider—therefore by definition not a fully competitive system

The Role Of Competition (cont'd)

- Advantages of fully competitive systems: Rates tend to be lower and options are frequently more varied and available
- Advantages of systems that are not fully competitive: May be better to provide coverages that require subsidies (if, for example, coverage is not affordable for participants with certain risks), where the cost of subsidies cannot be allocated equitably among coverage providers or participants
- Advantages of single-provider compulsory systems: May have administrative cost advantages and advantages related to participation/selection

The Role Of Competition (cont'd)

- In comparing the advantages and disadvantages of competitive and single-provider systems, consider not only the stated goals of the systems, but also the incentives and constraints that each system establishes for coverage providers, participants and other interested parties.

Characteristics of Successful Financial or Personal Security Systems

- General purpose of a financial or personal security system: To provide a means by which the impact of unfavorable outcomes of uncertain events can be mitigated through advance risk transfer
- Since security systems are used to provide mitigation for a wide variety of risks, the criteria for determining whether a security system is successful must vary from system to system

Characteristics of Successful Financial or Personal Security Systems (cont'd)

- Three criteria necessary (but not necessarily sufficient) for success:
  - Coverage is *widely available* to those in the at-risk group who desire it.
  - The terms of coverage, taken as a whole, are *sufficiently acceptable* to those eligible to be participants.
  - The system will have access to sufficient resources to *fulfill its promises*.

Characteristics of Successful Financial or Personal Security Systems (cont'd)

- What are some of the critical issues related to each of the success criteria?
  - Wide availability of coverage: How does this differ, if at all, by level of risk?
  - Terms of coverage: What do participants with different levels of risk think of the coverage terms, including price?
  - Fulfilling promises: Does the system treat future generations equitably?

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The Importance of Expected Cost

- Expected cost:
  - Each outcome of a covered risk has an *expected cost* equal to the current monetary value of the outcome times its risk probability
  - The *expected cost of providing coverage for a covered risk* is the sum of the products of current monetary value of each outcome and the outcome's risk probability
- Example: Disability income policy
  - Outcomes are possible streams of benefit payments that will be paid if disability occurs
  - For each possible outcome (stream of payments), there is a risk probability
  - The severity of each outcome is the current monetary value that the coverage provider places on the stream of benefit payments
  - The expected cost is obtained by (1) multiplying the severities by the risk probabilities and (2) summing
- In most cases, both severities and risk probabilities must be estimated.

The Importance of Expected Cost (cont'd)

- Expected-cost-related pricing
  - *Price for coverage*: amount paid by or on behalf of a participant in order to receive coverage for a risk
  - May be set by market forces or regulated
  - If prices reflect expected costs (augmented by provisions for fluctuations, uncertainty regarding the estimation of costs, expenses, and profit or contributions to surplus—the *necessary additional provisions*), they are *expected-cost-related*

Expected cost and the price for coverage

- "Assessment societies" did not base price of coverage on expected cost
  - Paid benefits upon deaths of members by assessing all members an equal amount
  - The expected cost of coverage for each member was dependent on his or her age and health status
  - The assessment (the "price of coverage") was not
  - Assessment societies eventually failed
- Life insurance companies based price on expected cost
  - Many life insurers have existed for over 150 years in US

Expected cost and the success of Security Systems

- Success Criterion #1: Making coverage *widely available* to those in the at-risk group who desire it
  - Competitive systems: if prices are expected-cost-related, all risks are desirable to coverage providers
  - Single-provider systems: if prices are expected-cost-related, estimates of the level of contributions needed to provide the promised coverage will tend to be more accurate, allowing for increased participation without fear of deficits

Expected cost and the success of Security Systems (cont'd)

- Success Criterion #2: Providing terms of coverage that, taken as a whole, are *sufficiently acceptable* to those eligible to be participants
  - If the security system's prices are reasonably proportional to expected costs of coverage, the system has achieved *individual equity*
  - If the system charges some more and some less than expected cost, it is using *internal subsidies*—often not well-received: example, airline fares
  - Resources in addition to payments by participants are *external subsidies*—may be proportional to expected costs, or not

Expected cost and the success of Security Systems (cont'd)

- Success Criterion #2 (cont'd):
  - Considerations of *social adequacy* may be in conflict with individual equity
  - Even if these considerations are considered critical and result in prices that depart from individual equity, acceptance of the system can be enhanced by demonstrating that the departures are not arbitrary—example, US Social Security benefits

Expected cost and the success of Security Systems (cont'd)

- Success Criterion #3: Ensuring that the security system has access to sufficient resources to *fulfill its promises*
  - If prices do not reflect expected costs, the security system may be subject to *adverse selection:* an action taken by a participant that is based on information unavailable or not used by coverage provider and that is perceived to confer an economic benefit on the participant—Can arise from:
    - intentional withholding of information by (prospective) participant
    - inability or unwillingness of provider to use information
    - prices that appear to low or too high to participants—*if* they have a choice (i.e., if system has "elements of choice")

Expected cost and the success of Security Systems (cont'd)

- Success Criterion #3: Ensuring that the security system has access to sufficient resources to *fulfill its promises*

Expected cost and the success of Security Systems (cont'd)

- Success Criterion #3 (cont'd):
  - Adverse selection can lead to a *price spiral:*

    a repetitive process that occurs in voluntary security systems and compulsory security systems with elements of choice when an upward adjustment of prices intended to remedy a shortfall in resources leads to an exodus of risks having expected cost lower than price, and thus to a continued shortfall

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The need for risk classification

- Basing prices for coverage on expected costs, augmented by any necessary additional provisions, helps a financial or personal security system satisfy the three criteria cited previously as necessary for success

The need for risk classification (cont'd)

- The expected cost of coverage plus the cost of the additional provisions need to be estimated based on available information
  - Need monetary value of the various possible outcomes and their corresponding risk probabilities
  - Statistical methods are generally used and produce better results when observations are made on a large group

The need for risk classification (cont'd)

- Need to group risks to better utilize statistical methods
- Groupings can be simpler for life insurance policies, since the risk probabilities are similar for fairly wide ranges of severities (face amounts)
- For other coverages such as disability income or major medical groupings that are more complex, may need to estimate average costs of possible outcomes directly from cost data

The need for risk classification (cont'd)

- *Risk classification* is a process by which such grouping is accomplished
- A *risk class* is a set of covered risks grouped together by a coverage provider based on its knowledge or belief that some or all of the risk probabilities of the possible outcomes associated with each risk in the class are substantially similar

The need for risk classification (cont'd)

- As long as the risk probabilities remain stable over a given time frame, historical data may provide a basis from which a reasonable estimate of the risk probabilities for the risks in the risk class can be derived
- A system that involves specifying a set of risk classes, together with a procedure to assign each covered risk to one of the risk classes, is called a *risk classification system*

Risk characteristics

- Risk classification typically involves the identification of certain characteristics of the risk subject associated with the risk
  - For many risks one can observe qualities, often quantitative, that provide useful information about the likelihood of various outcomes associated with the risk—these are *risk characteristics*
  - Some qualities, such as age, state of health of a person or solidity of construction of a car, *provide useful information* about the risk probabilities
  - Other qualities, such as color of eyes, *do not provide useful information* about the likelihood of outcomes of a risk

Risk characteristics (cont'd)

- For a given risk, there is often more than one risk characteristic that provides such useful information
  - For the risk faced by the sponsor of a pension plan, for example, the risk characteristics of a given retiree might include the age, gender and health of the recipient, among other factors
  - Relevant risk characteristics of the principal driver may include driving experience, driving record and geographic location of principal residence

Risk characteristics (cont'd)

- The ways risk characteristics are used in a risk classification system vary
  - A value often is determined for each risk characteristic and the set of these values determines the risk class to which the risk is assigned
  - Determining a value for some risk characteristics such as age or gender is straightforward and objective, while in other cases such as certain medical conditions, judgment is required

Number of Risk Classes, Adverse Selection and Individual Equity

- Risk classes: In the process of designing a risk classification system, the selection of the number of risk classes to use is pivotal
  - Choosing a small number of large risk classes
  - Choosing a large number of small risk classes
- Credibility: Fewer classes means more data per class
- Homogeneity: More classes means sufficient similarity of risks within risk classes means prices reflect greater individual equity. Fewer classes can mean more internal subsidies.
- Limits on homogeneity and individual equity: Dynamics, complexity/simplicity, and regulation can all act as limits.

Number of Risk Classes, Adverse Selection and Individual Equity (cont'd)

- Adverse Selection
  - Fewer risk classes and less homogeneity can create adverse selection, because participants for whom the price for coverage exceeds expected cost will be motivated to discontinue coverage and participants for whom price is less than expected cost will be motivated to continue
  - This effect can (and likely will) grow over time
  - Put in perspective of financial or personal security systems (i.e., pension plans, Medicaid)
  - Constraining provider ability to determine risk classes can lead to adverse selection

Dynamic Aspects of Risk Classification

- Risk probabilities and expected costs change over time (e.g., mortality, product standards and safety, etc.)
- Examples of changes that affect risk characteristics (e.g., cost relationships by age, salary, charges for services, types of services)

Risk Classification and the Estimation of Expected Cost

- Estimates of risk probabilities:
  - Historical data on the risk itself is best *if* risk classes are homogeneous and stable *and* data is *sufficient* and *relevant*
  - Historical data from other sources—same criteria
  - Studies of a single risk characteristic—must also study interactions with other risk characteristics
  - Judgment of a professional
- An effective risk classification system facilitates accurate estimates of risk probabilities and thus of expected costs

Risk Classification and the Success of Security Systems

- Success Criterion #1: Wide availability of coverage
  - In competitive systems, if providers are free to set up their own risk classification systems, the differences of judgment will lead to a spectrum of prices for each risk
  - In single-payer system, an effective risk classification system can result in increased accuracy of cost estimates, giving a clearer picture of the coverages that can be offered and how external subsidies can best be employed to increase availability and affordability—thus this is useful, even if prices do not reflect risk classification

Risk Classification and the Success of Security Systems (cont'd)

- Success Criterion #2: Broad acceptability
  - Risk classification can be used to demonstrate that the system exhibits individual equity, or to show that departures to achieve social adequacy are not arbitrary
  - In competitive systems, risk classification can bring prices closer to expected cost by reducing uncertainty for coverage providers—thus providing more coverage for less aggregate cost—example: preferred term life insurance rates

Risk Classification and the Success of Security Systems (cont'd)

- Success Criterion #3: Ability to fulfill promises
  - An effective risk classification system can be used to set expected-cost-related prices and thus control the adverse selection that occurs when high-cost risks and low-cost risks pay the same price
  - Even if prices are not expected-cost-related, an effective risk classification system facilitates more accurate estimation of resource needs

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Establishment of Risk Classes

- Identification of risk characteristics—
  - Objective determinability
  - Controllability
  - Avoidance of Overly Large Discontinuities
  - Correlation and causality

Establishment of Risk Classes (cont'd)

- Absence of ambiguity
- Homogeneity and credibility
- Expense and practicality

Panel Discussion: Social, Legal, and Regulatory Considerations

- Concerns about risk classification
  - Philosophical—Is it ever acceptable to "classify" people? Is correlation enough to establish a risk characteristic? What is "causality"?

Panel Discussion: Social, Legal, and Regulatory Considerations (cont'd)

- Concerns about risk classification
  - Practical—What can be done if predictive capability is perceived to be insufficient in a given situation; e.g., travel to regions newly engulfed in war or to regions where the traveler might be exposed to a new strain of infectious disease?

Panel Discussion: Social, Legal, and Regulatory Considerations (cont'd)

- Risk adjustment—What is "risk adjustment"? Can it solve the problem of unaffordability of coverage for some risks? What are its limitations?

Panel Discussion: Social, Legal, and Regulatory Considerations (cont'd)

- Legal and regulatory constraints on risk classification—What are the implications of constraints? If a constraint is deemed necessary, what can be done to avoid unacceptable or undesirable consequences? Example: Restriction on use of pre-existing conditions in determining eligibility for or cost of health care coverage.

Questions?

For More Information/Feedback

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