A New View of the Requisites of Insurability

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I. Introduction

The question of what characteristics are requisites of an insurable risk is an old one. Yet, despite the expanding group of risks covered by insurance,[1] the question receives little critical attention.[2] The author attributes the stagnation to lack of research rather than to constancy of the requisites.

Determination of necessary characteristics of an insurable risk is important in a number of ways, including the following. One, the risk management tools of evaluation and decision-making presented to students of insurance are founded on such characteristics. Two, insurance regulation (particularly the state premium taxes on insurance) and tax deductibility requires ever-finer definitions of insurance. Three, some possibility exists that new "insurance" products cover potentially uninsurable risks. This note is an attempt to spur new interest in researching the issue of insurability. It is also intended as a possible aid to teachers of insurance.

II. Requisites of an Ideally Insurable Risk

The topic of the requisites of an ideally insurable risk is generally included in insurance and risk management texts. Thus, value seems to exist in

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[1] For examples, see [4], which is devoted to the topic of insurance on speculative risks.

[2] An exception is Berliner's book [3] in which nine criteria for insurability are defined, discussed,and quantified. Webb [26], in reviewing the book, states: "He [Berliner] quantifies all [but one] of the criteria, although some of his methods may be more theoretical than practical." This note is distinguished from Berliner's work in that: (1) the list of requisites upon which this piece is founded are those traditionally included in insurance education while Berliner's are not; and (2) an attempt is made here to be more practical than theoretical, i.e., what risks *are* insured and why. Any student of insurance would do well to include Berliner's book in a course of study.

consulting these writings for a "definition" of an insurable risk. As the first step in characterizing insurability, therefore, several insurance references were consulted [2, 9, 11, 12, 14, 15, 16, 22, 25]. These references provided lists of requisites of an ideally insurable risk, a special case of an insurable risk.

The complete list of requisites of an ideally insurable risk as given by the authors of these texts is as follows:

1. large number of homogeneous exposure units;
2. independence among exposure units;
3. calculable expected loss in monetary values;
4. definite loss as to time, place, amount, and cause;
5. fortuitous loss;
6. economic feasibility;
7. avoidance of catastrophe potential.[3]

The reader should note that this list of seven defines the IDEAL risk. None of the authors imply that any risk meets all seven characteristics. Yet, neither do the authors provide their readers with an indication of which, if any, of the requisites are essential for insurance. Thus, the author of this note will employ the given list as a standard against which to compare the mandatory requisites of an insurable risk.

The following pages will provide a discussion on various risks that fail to meet some of the requisites listed above. The discussion has two purposes: (1) to illustrate the disparity between the ideal and the practical; and (2) to evaluate which of the requisites are mandatory, and why.

A. Small Number of Homogeneous Exposure Units

Consider the need for a large number of homogeneous exposure units. Insurance products associated with the space shuttle program, the Olympic games, and the wedding of Charles and Diana violate this requisite, as do various products liability and medical malpractice exposures.[4] Yet, each such exposure has been subject to insurance.

These exposures are priced on judgment rates.[5] Longley-Cook[6] has expressed the thought that through experience rating almost all lines are based on judgment. Experience rating requires a determination of credibility;[7] and,

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[3] Several authors included #7 in requiring independence and economic feasibility.

[4] The requisite is violated because of the small (one) number of exposures.

[5] Rejda [22, pp. 533-40] states: "Judgment rating means that each exposure is individually evaluated, and the rate is determined largely by the underwriter's judgment."

[6] Longley-Cook [13, pp. 194-221] states: ". . . casualty underwriters consider each insured to differ from other insureds . . . Experience rating plans are used in almost all lines of casualty insurance to measure the peculiarities of individuals."

[7] Credibility has been defined "somewhat loosely as the amount of confidence the ratemaker has that the available statistics accurately indicate the losses to be anticipated in the future" (Webb et al. [27, p. 33]). For a more extensive discussion, see Kallop [10].

thus, some form of judgment is necessary in setting a standard of credibility. Nevertheless, a general attitude seems to exist that use of judgment rating is not as "scientific" as one would like for the insurance industry. For instance, Mehr and Cammack [15] imply that judgment-rated insurance is not insurance at all, but rather is gambling. The author of this note contends that distaste for judgment rating may be misplaced. A discussion of why follows.

1. All Rate Making Involves Some Judgment: Large numbers greatly aid insurers in their predictions of losses, but insurers also have available other tools of prediction when those large numbers are not present.[8] For example, rating Columbia on her maiden voyage need not have been done from ignorance (and the author doubts such was the case). Despite the lack of knowledge concerning this particular type of craft, knowledge did exist with respect to NASA's experience, the loss control measures undertaken for the mission, and the types of difficulties that might arise in space travel. Judgment, of course, is required in weighting these bits of information, but so too is judgment required when rating fire insurance on a building made of some new material. The building's flammability is not known *a priori,* but is estimated from experience of similar buildings made of similar materials in similar locales. The information is likely more reliable (because other similar exposures exist and have been studied by insurers) on the building than on Columbia (where only components have been studied and insured), yet in neither case is rating devoid of judgment. Perhaps these two examples (Columbia and the new building) can be considered as extremes on a continuum of the extent to which judgment is required in rate-making. Pfeffer [18, pp. 183-4] addresses this issue as follows:

> . . . the task of rate-making — which is central to the insurance mechanism as well as to the industry — is not an automatic process, but involves the use of judgment at every stage of the statistical analysis. This is true whether rates are based on a formula or on a pure judgment basis. The validity of the sampling process is so questionable, that the "pure premium method" of rate calculations — the rate-making technique which approximates random sampling methodology more closely than any other — finds only a limited application. For many lines of insurance, "judgment rates" are employed because of heterogeneity of insured risks.

2. Bayesian Techniques are Available When Samples are Small: Another example that large numbers are not necessary in the insuring process is the use of experience and/or credibility rating in workers' compensation insurance. Philbrick [19] discusses the implementation of Bayesian techniques[9] for this

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[8] Pfeffer [18, p. 184] states: "The laws of large numbers, insofar as they relate to specific formalism, are of assistance where applicable, but they are not formally necessary for the insurance device."

[9] Bayesian statistical techniques differ from classical statistical techniques in that parameters are not considered fixed unknown quantities. Rather, parameters are regarded as random variables for which probability distributions can be expressed based on prior judgment. The prior (judgment) distribution then can be updated by consideration of sample information. See Theil [24, p. 664].

purpose. The discussion is worthwhile in the thought that not only should Bayesian techniques be used for credibility rating, but also that credibility rating should be applied to workers' compensation exposures for employers of all sizes (given some prior experience). Consistently good or poor experience of any/every employer, than, could be priced in the workers' compensation premium. Even though the alteration from manual rates is likely to be small for employers with few exposures, the widespread use of credibility rating would be expected to encourage safety. The advancement of computer technology ought to help make the application of credibility rating economically feasible. As such, small numbers of homogeneous exposures (or large numbers of heterogeneous exposures) may be insurable, given some basic information about the individual subgroups. Pfeffer [18, p. 63] presents the argument as:

> The use of credibility approach is a recognition of the fact that the laws of large numbers, which provide the rationale of the sampling technique require a set of conditions which are impossible of attainment.

Thus, where large numbers of homogeneous exposure units do not exist, the insurer can still rely on Bayesian techniques or judgment to estimate loss distributions. In this way, the requisite appears desirable but not mandatory. It may be true that if the insurer's portfolio of exposures is sufficiently large and diversified, various unique exposures are insurable, e.g., those exposures often insured by Lloyd's of London. Thus, one must consider the range of exposures, not merely the individual risks.

B. Non-Independent Exposure Units

In the author's opinion, if the law of large numbers is not employed, the need for independence does not necessarily exist. Independence alone does not make insurance feasible; yet, if it does not exist, insurance might be economically infeasible. That is, coverage may be too expensive (i.e., unaffordable) because of the catastrophe potential caused by dependence. If the dependence were estimable with reasonable accuracy, properly priced coverage could be made available. Still, the coverage might not be affordable.

The difficulty of economic infeasibility may be illustrated through contemplation of two insurers. Each provides coverage on like exposures with the same applicable probability distribution of losses. One insurer, however, sells insurance on dependent exposures. The other sells insurance on independent exposures. The second insurer would be able to sell the coverage at a lower cost because the expected total loss of the group of independent exposures is lower than that of the group of dependent exposures (because the probability of a catastrophic occurrence is lower). For instance, the total loss of an insurer selling only to homeowners in the Chicago area during Mrs. O'Leary's day must have been higher than that of an insurer selling to homeowners in many different geographical areas, even if they insured the same number of exposures, each of similar character. That is, dependence changes the probability distribution.

Even so, insurance does exist on dependent exposures. In fact, much insurance is sold on dependent exposures. For example, an automobile insurer has some probability of being the insurer for both parties in a two-party accident. Similarly, a property insurer likely provides coverage on neighboring properties where a fire at one would increase the probability of fire at the other (i.e., "exposure risk").

Essential to success in providing coverage on such dependent exposures seems to be the calculability of dependence, control over the probability of loss, and affordability of the resulting premiums. The experience of Itel and Lloyd's of London in providing insurance against computer obsolescence demonstrates the catastropic potential where dependence and non-fortuity are present. If the dependence had been calculated (assuming possibility of such a calculation), the risk of computer obsolescence might have been insurable. The insurance contract in this particular circumstance would have needed to include contract provisions such as deductibles and coinsurance to dissuade moral hazard (see D below). Yet, even if all these elements were present, the insurance might not have been affordable to a sufficiently large number of insureds such that the transactions costs would be covered. Thus, insurability requires not only the willingness of insurers to provide coverage, but also the ability of insureds to buy it. In this sense, the requisite of independence appears to be mandatory only to the extent of maintaining economically feasible premiums.

C. Indefinite Loss

The problem of incalculability of dependence is similar to the problem of incalculability of loss due to indefiniteness. A pressing issue in insurance is that of occupational disease. One difficulty in insuring against the financial consequences of occupational disease arises from its indefinite nature. How does one use loss control against unknown hazards? How can insurers estimate future losses for diseases not yet identified? What is an occurrence with respect to asbestosis? What is the amount of monetary loss from an occupational disease? What should be paid on a claim caused only in part by the covered peril? These questions and numerous others are currently before the United States' judiciary. The answers will determine insurer financial responsibility for policies written decades ago. The insurability of these risks is in doubt because the value of the loss is nebulous. Hence, prediction of loss distributions is badly hampered. Further, where indefinite (i.e., incalculable) loss distributions exist, determination of proper premiums, reserves, and so forth becomes nearly impossible. This scenario differs from those given in the discussion of large numbers of homogeneous exposure units in that the *valuation* (severity) of loss is unknown as well as the probability (frequency) of loss. In the previous examples, only the probability of loss was problematic, and the measurement of loss was possible.

Conversely, one might question the applicability of insurance when some of the facts about a loss are already established. This circumstance occurred when MGM purchased back-dated coverage after the fire of November 21,

1980 at the MGM Grand Hotel in Las Vegas. Eighty-four persons were killed in the fire. Smith and Witt [23] contend the coverage, despite its lack of fortuity, remains insurance because of the financial risk involved. The risk derives from the uncertainty as to timing and magnitude of legal liability. Smith and Witt's contention seems to indicate that insurance could be purchased on cost-plus contracts because the timing and ultimate amount of payment are uncertain. The insurance product traditionally has not been used for such business risks (from the viewpoint of the insured) because of the control over the loss held by the insured.

D. Non-Fortuitous Loss

A loss governed by the insured is considered "non-fortuitous."[10] The loss covered by MGM's retroactive insurance policy is an example of a non-fortuitious loss. The loss was non-fortuitous because MGM maintained control over the settlement of suits (rather than giving that control to the insurer as is normally done). As noted on page two, fortuity is listed by the referenced authors as a requisite of an ideally insurable risk. Fortuity is required as a mechanism of abating the incidence of moral hazard.

Moral hazard can be defined as "the intangible loss-producing propensities of the individual assured" [6]. It exists if fraud exists, such as when an insured intentionally causes loss in order to collect insurance recoveries, such as arson-for-profit schemes. It also exists (and is sometimes termed "morale hazard" although the author includes it here in the general category of moral hazard) when carelessness or lack of concern for loss control exists. Examples include (1) when insureds fail to question physicians' charges because they are paid by an insurer, (2) when insureds inflate auto repair claims for service on pre-accident needs, and (3) when insureds fail to act as cautiously in preventing loss as they would if insurance did not exist. These are but a few examples of moral (and morale) hazards. The fashion in which MGM settled claims relating to the back-dated coverage is a specific example of moral hazard. Once MGM had coverage on the loss that had already occurred, the incentive to minimize the outflow of dollars to victims was eliminated. Thus, MGM settled claims more quickly and for amounts greater than had been anticipated by the insurers.

Moral hazard has received much attention in the finance and economics literature [see, e.g., 1, 7, 8, 17, 20, 21]. Yet, little attention has been given moral hazard in the context of insurability of a risk. Pauly [17], however, makes an intriguing remark concerning the impact of moral hazard on insurability. He discusses the importance of moral hazard with respect to price elasticity of demand for the insured service. The greater the elasticity, the stronger the moral hazard. The insurance company's objective, then, is to measure this elasticity and include a "coinsurance" provision in the policy such that the insured's incentive to cause loss is minimized. Pauly then states:

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[10] Non-fortuitous is considered synonymous with non-accidental.

"It is incalculable moral hazard that makes a risk uninsurable." He makes no statement concerning the other requisites. Pauly apparently discounts these other requisites as manageable if moral hazard is measurable.

Thus, the behavior of MGM can be explained by Pauly. He would likely argue that the company acted in an economically rational manner, minimizing its own costs of lost good will, without regard to the insurers' costs. Further, Pauly would argue that had the back-dated coverage contained incentives to minimize claims under the policy (such as co-payments), the difficulties encountered by insurers could have been made manageable. Thus, traditional thinking that non-fortuity is a requisite of insurability may be erroneous. Of course, one must consider the public policy of providing coverage on *intentionally caused losses*. Such coverage likely would not be desirable. The point, rather, is that policies may be provided where some control is maintained by the insured, if the impact of moral hazard were calculable and incentives to minimize insured claims were adequate.

E. Small Potential Loss and High Probability of Loss (Economically Infeasible)

Moral hazard is not the only difficulty associated with business (or "speculative") risks such as MGM's financial risk noted above. Speculative risks also violate the requisite of economic feasibility (so may dependent risks as previously mentioned). Business risks, including the costs of poor investment decisions, depreciation, and losses due to strikes, generally exhibit high probability of occurrence, and may or may not be of large potential. Because of the resulting dollar trading between insurers and insureds when frequent losses are involved, this type of risk traditionally is considered uninsurable. That is, the premium is large relative to the amount of loss. Spreading of losses among insureds, therefore, does not occur. Rather, each insured pays (approximately) for its own losses, plus some percentage of the insured's expenses.

Examples do exist, nonetheless, where insurance is provided on "quasi-speculative" risks. Generally, however, these are risks of large magnitude and low frequency. For instance, business interruption insurance protects against lost income caused by specified perils. Similarly, product recall insurance protects the insured against losses that could occur without physical damage to the product such as were incurred by Johnson & Johnson in recalling its Tylenol products. Even more striking are the products that provide protection against loss of salvage value on capital goods, loss of tax benefits from leasing agreements, and loss of business due to customer insolvency.[11]

The requisite of economic feasibility has already been discussed in other sections of this note. Its absence is problematic not only with low severity losses that have high frequency. Economic infeasibility also poses difficulties

[11] See [4].

where statistical dependence in the loss distributions of the exposure units insured is strong, where moral hazard is extensive, and where the possibility of a catastrophic loss is relatively large. Thus, the importance of economic feasibility abounds throughout each of the other requisites of insurability, and seems to act as a necessary, but not sufficient, condition. That is, because the requisites of an ideal risk all involve economic feasibility, it is considered necessary for the broader category of an insurable risk. Yet, the mere existence of economic feasibility does not necessarily make the risk insurable.

F. Avoidance of Catastrophe

The author argued above that a number of the listed requisites are mandatory to the extent they minimize the catastrophe potential. As such, large numbers of homogeneous exposure units are desirable for purposes of prediction, particularly prediction of the probability of ruin. Yet, insurers are able to cover heterogeneous exposures as a portfolio, given a reasonable estimation of the portfolio's loss distribution. Cummins and Freifelder [5] present this idea in discussing Maximum Probable Yearly Aggregate Loss estimators (MPY). It is not essential to estimate the distribution of each exposure; rather, the distribution of the portfolio is sufficient. Further, reinsurance may be employed where an undesirably large potential loss to an individual insurer exists.

Likewise, non-fortuity could render an exposure catastrophic. Yet, if the moral hazard is measurable, and public policy permits the coverage, the existence of non-fortuity would not preclude insurability. That is, if the insurer can measure the loss distribution of its portfolio and charge an affordable premium for coverage, the characteristic of fortuity is not a mandatory requisite.

Similar to economic feasibility, then, avoidance of catastrophes permeates the application of all the listed requisites of insurability. Thus, if the other characteristics are reasonably met, the requisite of avoiding catastrophes is met by default.

III. Conclusions

The introduction of this note listed seven characteristics generally considered requisites of an ideally insurable risk. The remainder of the note detailed circumstances in which the requisites were violated, and evaluated the relative importance of each.

In the author's opinion, the absolute requirement of insurability is predictability of the distribution of the insurer's loss portfolio. Hence, large numbers of homogeneous exposure units may be desirable, but not mandatory. Independence is required to the extent dependence is unmeasurable and reinsurance is unavailable. Losses must be sufficiently definite and measurable to permit predictability. The impact of moral hazard must be adequately calculated for the inclusion of proper incentives to avoid/minimize losses. And,

exposures must be such that premiums are economically feasible.[12] In essence, if the loss distribution (including elements of dependence and moral hazard) is reasonably predictable, the risk is insurable. Whether or not insurance is present depends on the availability of reinsurance, and the willingness of policyholders to pay the premium.

Perhaps students of insurance would be aided by inclusion of these thoughts in their course work. It may help them bridge the gap between the ideal and the practical, and to place the various requisites in an order of importance. It may also help those involved in making public policy to understand the bounds of the insurance device.

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[12] Economic feasibility requires reasonable losses *and* expenses That is, life insurance would be economically infeasible for someone age 99 because expected losses and expenses would likely exceed the amount of insurance.

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