AIDS and the Limits of Insurability

J. D. HAMMOND
and ARNOLD F. SHAPIRO

Pennsylvania State University

ACQUIRED IMMUNE DEFICIENCY SYNDROME (AIDS) is one of the newest insurance concerns. Similar to many others, it was unforeseen and, moreover, its ultimate impact is not yet known nor its etiology fully understood. Its management by all involved organizations and individuals may be affected as much by perceptions as by reality. Both buyers and sellers of insurance are deeply concerned since the ramifications of AIDS directly affect life, health, and liability insurance.

An article which addresses the insurance dimensions of a fatal disease of possible epidemic proportions would seem to offer the prospect of great simplicity and unusual brevity. After all, if a loss is certain in some reasonably short interval, isn't it reasonable to think that insurance against such a loss would be unavailable or at least very expensive? At some point in the insurability of risks, that may well be true. Determination of that point, to the detriment of the buyer and the frustration of the insurer, may not be clearly identifiable. Frustration besets the insurance underwriter because standard or acceptable risks may be rejected. The rejected applicant is without insurance and, furthermore, is without a satisfactory alternative, perhaps involuntarily assuming the risk which was sought out for transfer. That situation is common to all segments of the insurance market. No insurance

The Milbank Quarterly, Vol. 64, Suppl. 1, 1986

segment or "line" is without a class of uninsurables and, moreover, any particular cause of loss is quite likely to produce differing populations of policyholders subject to that loss, but with varying probabilities. Thus, pricing differentials for a given cause of loss, among different risks, would not be unexpected. What is or should be expected, is that such differentials reflect truly differing probabilities.

Our purpose in exploring the insurance aspect of AIDS is not to engage in empirical research for the derivation of insurance cost estimates nor to survey the risk selection (underwriting) practices and criteria of those insurers whose portfolio of risks includes some element of AIDS. Others are developing data which portray the frequency rates of the disease as well as estimates of its severity. A survey of underwriting practices, particularly on a sensitive subject, is not apt to be productive. Though we will have reason to comment on both of these, they are not the principal focus. Those directly dealing with the medical and economic management of the disease, however, as well as the public at large, have every reason to know the underpinnings of the insurance technique, what can reasonably be expected of it, and to know its limitations. Where the technique fails, public alternatives may be called for.

The question of whether losses are insurable is capable of examination and so is the concept of an actuarially fair price. In the sections which follow, the criteria for insurability will be reviewed. Similarly, the problems of moral hazard and adverse selection are examined within the context of the insurance technique. The concepts of insurability are uniformly applicable to any line of insurance as well as to either group or individual underwriting. Within the context of this article, they apply uniformly to AIDS across life, health, and liability insurance. Our article, however, will focus only on life and health insurance with distinctions from time to time as appropriate. Although the liability insurance dimensions of AIDS are new, they show no evidence of being more severe than many other liability exposures. It is unfortunate that the new exposure appears at a time when liability insurance and the tort system are under fire, but that should not deter liability underwriting for AIDS, per se. Pricing fundamentals relevant to any insurance exposure are likewise made part of the review. Finally, tentative observations are offered relative to the insurability of AIDS, the principal one being that economic losses from AIDS cannot adequately be addressed by the insurance technique. No attempt is made to

evaluate welfare or social insurance alternatives or loss prevention programs, although the limitations of the insurance technique will ultimately make them of increased importance.

Insurability and the Insurance Technique

In its simplest form, insurance is a technique to redistribute the economic consequences of losses from victims to the entire membership of an insured group, with each member paying the average cost of loss rather than the individual. Conceptually, the technique is not dependent upon a particular method of financing. Modern management of the insurance technique may rely upon individual premiums for individual insurance, premiums paid by a third party—such as employers for group insurance plans—or upon self-insurance. The latter, in its purest form, involves no transfer of financial risk to an insurance company although the insurance technique remains operative. Group and self-insurance are both important for the economic losses associated with health care and loss of life.

Casual observation suggests that insurance is not available for all loss exposures. Life insurers typically do not issue contracts beyond some limiting age nor to the terminally ill, and private flood insurance on real property generally is not available. In both of those instances there are simply no sellers and no market exists. In other instances, insurance is available but only at a high price and perhaps from only a few sellers. By high price, we do not necessarily mean more than an individual is willing to pay but rather a fair rate which is a significant percentage of the value of the insured item.

Whether a particular loss exposure is insurable, therefore, reflects both market and actuarial criteria. Our review of those criteria draws upon the detailed analysis of Berliner (1982) who has identified nine criteria, not all independent of one another, which define insurability. We shall not replicate the depth of that analysis, will combine some of the criteria, and will comment on each as they relate generally to AIDS.

Randomness

Perfect predictability is the antithesis of randomness. Random losses are accidental, beyond the control of the insured, and are completely

independent from other random losses. (The requirement that losses be beyond the control of the insured is seldom met perfectly and some losses may be totally within the control of the insured. Pregnancy, for example, has been mandated as a disability.) From a risk-classification standpoint, all insureds within a given classification should have the same probability of loss. As discussed later, an underwriting portfolio of risks which is heterogeneous with respect to loss probabilities is not in equilibrium.

AIDS victims or even those likely to manifest the disease present higher probabilities of death or sickness than those not so affected. The disease is certainly accidental in its result, in the sense that no one intends to contract the disease. It does, however, seem to be at least partly within the control of possible victims or transmitters. An unsuspecting blood recipient who receives the disease in a normally safe setting has considerably less control over that result than intravenous drug users or those engaging in unsafe sexual practices. While the absence of randomness does not imply uninsurability, the greater the insured's control over the probability of loss, the more likely is that result.

Maximum Possible Loss

The maximum possible loss is simply that maximum loss which could occur. For a single building, disregarding indirect losses, it is the replacement cost of that building. For a single individual, it is the best estimate of the earnings associated with that human life and the potential medical costs which would be associated with a prolonged—perhaps permanent—stay in a medical care facility. (While society generally does not place a maximum value on a human life, insurable value can be thought of in terms of capitalized value.) The amount can be estimated as well for one individual as well as for any other.

From the individual perspective, the loss can be estimated as well for an AIDS victim as for the victim of any other disease. Because the disease is nearly always fatal, with most victims dying within five years of onset, maximum loss estimation is even somewhat simplified. A greater problem exists in trying to estimate the ultimate spread of the disease: the potential collective of victims. This level of uncertainty over the collective loss maximum represents a potential catastrophe

hazard of sufficient or even uncertain severity and is likely to prompt underwriting caution.

Risks with catastrophe potential, of course, may be underwritten. Earthquake and war-risk insurance are examples, but high rates and limited amounts of insurance are likely reflections of the underlying potential for large loss.

Average Loss Amount and Average Time between Two Loss Occurrences

Insurance premiums are always the product of two separate statistical distributions, one for claim frequency and the other for claim severity.

A claim is the occurrence of any insured event, regardless of its magnitude. Severity is the size of the event, and is most conveniently measured by dollars. For health insurance, any accident or sickness is an event. Its magnitude is measured by dollars expended, ranging from zero for minor discomfort to huge amounts for major claims. For life insurance, the event occurs but once and its severity, from an insurance standpoint, is simply the face amount of life insurance payable.

A risk exposure may be insurable for a very short interval, but not for a long one. An AIDS victim selected at random, for example, could probably be underwritten for life insurance for a short interval. If not hospitalized at the time of random selection, the individual could probably be underwritten for those costs as well, but again, for some short interval. Generally, risks which produce relatively small average losses combined with relatively high frequency are more insurable (more predictable) than those with opposing characteristics. If losses from AIDS are not small and are unpredictable, even among infected individuals, loss amounts will be uncertain and premium estimation difficult.

Insurance Premium

Insurability is constrained as the required premium increases in amount. The pure premium is equal to the expected value of the annual loss and, as a buffer against insurer ruin, must contain a contingency loading to provide for adverse fluctuation in claim results. The greater

the uncertainty, the higher the required contingency loadings. Both the life and health insurance exposures now associated with AIDS pose numerous uncertainties, both with respect to the probability of infection and the probability of contracting the disease once infected. Where the presence of the disease is verified, uncertainty may be reduced, but the expected value of both life and health losses increases.

Moral Hazard

If an insured, as a result of insurance coverage, becomes indifferent to whether or not a loss occurs, or even has less incentive to avoid the insured event than before, moral hazard is present. At the extreme, the presence of insurance may even prompt the insured to bring about the event's occurrence, arson being a convenient example. The presence of moral hazard alters the underlying probabilities of loss on which the insurance premium was originally based.

There is normally strong incentive to avoid or prevent a fatal illness, particularly where preventive efforts are conveniently available. On the other hand, the presence of health insurance may make some individuals seek more medical care than they otherwise would. There is no a priori reason, however, to believe that propensity to be stronger with AIDS than with any other major illness. The Stiglitz expression of moral hazard—the more complete insurance coverage is, the less incentive individuals have to avoid the insured event (Stiglitz 1983)—seems less applicable to a fatal disease than to the more common varieties of economic losses.

Public Policy and Legal Restrictions

The collective conscience of the community or society can act either to make insurance inappropriate (e.g., to cover gambling contracts or entrepreneurial risks) or to demand insurance coverage which might otherwise be unavailable. This might be the case, for example, if all high-risk groups were denied insurance coverage. Nine states, for example, require health insurance pools where insurers share coverages for individuals unable to obtain coverage in the normal insurance market. In addition, states mandate that automobile insurance coverage be provided for those risks rejected by standard underwriting practices.

Whether at-risk groups are offered insurance coverage for AIDS may be affected by statutory restrictions on underwriting. Both California and Wisconsin prohibit the underwriting use of the HTLV-III/LAV antibodies screening test for AIDS. Although no complete record of court cases is available at this writing, insurer rejections of at least some at-risk groups may bring courtroom repercussions. The ultimate effect of such public or legal actions on insurer underwriting policy is uncertain, except to say that if one source of underwriting information is barred to insurers, the use of proxy variables for underwriting parameters will almost certainly follow.

Cover Limits

Limitations on the amount or terms of coverage may make a risk insurable. Some combination of increased premium rates and decreased insurance coverage is common throughout insurance underwriting as an alternative to rejection of the risk.

Risk Classification

An insurance market without some form of risk classification by insurers is rare and may not exist at all. Certainly, no examples from the private sector come conveniently to mind. Risks are grouped so that each classification is relatively homogeneous in the sense that each insured unit within the class faces approximately the same probability of loss. This basic principle of risk classification is often controversial and frequently misunderstood. Yet, traditional equity considerations underlying insurance principles mandate that each risk requiring insurance should be priced to reflect directly its own probability of loss. Again, average cost of loss is substituted for individual; the more homogeneous the risks, the more equitable is the classification.

High-risk insurance buyers, of course, would likely find a single classification system attractive, so long as insurance prices are set to reflect the average cost of the loss. In such a system, high-risk buyers receive insurance at an effective discount, thanks to the subsidy provided by lower-risk buyers. While an insurance system based on a single classification (or perhaps more accurately, no classification at all) is an extreme example of cross-subsidies among risks of differing values,

classification disputes in multiple-classification systems produce similar concerns and, in recent years, have proved contentious issues for insurers, regulators, and buyers. At the extreme, some classification techniques have excluded buyers from access to insurance, so-called "redlining" being a controversial example of some years back. Property risks situated within a specified area were simply excluded on the basis of the perceived risk characteristics of a geographical area.

More recently, the use of sex as a rating variable has been questioned and, in some court decisions, outlawed as a classification variable. The issues have not been on whether or not loss probabilities between sexes differ but whether the use of sex as a classification variable is fair to the individual, even though sex may strongly appear to be a causal and not a proxy variable affecting the probability of loss. Similar questions have arisen with respect to urban-rural differentials in automobile insurance pricing.

Our purpose here is not to analyze the actuarial equity of existing classification systems but rather to review the concepts underlying any risk-classification system. (One of the most thorough reviews of risk-classification concepts and practices is found in Cummins et al. 1983. Although the book focuses on life insurance, its review of concepts is relevant to any form of insurance.) The concepts are vital since the absence of risk classification implies that any risk would have access to insurance merely by paying a kind of global or collective coverage rate. All evidence suggests that such a condition would not hold in the absence of compelling legislation.

Recent developments in the analysis of insurance markets and buyer behavior offer insights into the market impact of risk-classification systems. This review is instructive and provides a useful construct on which to analyze conflicting aims between insurance buyers and insurance sellers. We shall not review all of the possible conflicts but will focus on those which are characterized by imperfect information such that insurers know less about underlying loss probabilities than do potential buyers. Although several situations fit easily into that condition, adverse selection is of special significance.

Adverse Selection

We shall use the Dionne (1983) formulation of adverse selection in defining it as "a problem of misallocation of resources explained by

a situation of asymmetrical information between the insured and the insurer." That formulation is broad but its focus is on those situations where the insured has no incentive to reveal information that would allow estimation of loss probabilities. Adverse selection refers to selection of the insured against the insurer. Selection of the insured against himself, that is, revealing information which would jeopardize the application for insurance, is clearly a problem for the applicant but not for the underwriter. Other things being equal, a person who tested positive for HTLV-III antibodies, for example, would likely have no incentive to reveal that information when applying for life or health insurance. Neither would the individual have the incentive to reveal such test results to a prospective employer. Moreover, there is the distinct possibility that at-risk individuals might choose to forgo even voluntary testing rather than lie to prospective employers or insurers, thus making public health benefits more difficult to achieve. Where information asymmetry exists, high-risk buyers will continue to remain part of a class in which they benefit from the presence of low-risk buyers.

A certain amount of subsidizing is bound to occur in practice, of course, but when it begins to exceed tolerable levels, it begins to interfere with the insurance mechanism. In general, if the subsidization is enough to prompt standard or low-risk individuals to transfer their coverage to another insurer or to withdraw from the insured group, tolerable levels have been exceeded. At the extreme, adverse selection can lead to insurer ruin either through inadequate rates, large insurance purchases by high-risk individuals, or perhaps the withdrawal of standard risks from the market. Both adverse selection and moral hazard, though the latter is not an important issue in the AIDS epidemic, affect the allocation of risks and cost within an insurance market and both affect the way by which insurers would prefer to price and classify risks.

Risk Classification and Imperfect Information

When identification of risk characteristics which help to estimate loss probabilities are foreclosed or restricted to the insurer, underwriting decisions must be made on the basis of incomplete information. That condition may arise if insureds conceal information or if legislation or public policy restricts its use. A risk-classification variable is therefore

lost and the boundary defining a particular class becomes wider than it otherwise would have been. If insurers, for example, were unable to use an HTLV-III antibody test as a risk-identification factor, a single class containing both infected and noninfected individuals results, with the latter group paying more than the expected value of the loss and the former less. In a competitive market, that condition would not prevail and no equilibrium would exist. Charging all insureds, without classification, the average rate is referred to by Cummins et al. (1983, 36) as a pooling equilibrium, a condition which will not hold with imperfect information and insurance firms which act independently. In the prior example, it would be easy for another firm to offer a discount to noninfected individuals, creating a second classification and eliminating the cross-subsidy resulting from pooling. A recent example is the segregation of insureds into smoking and nonsmoking groups. Higher mortality costs, reasonably well-estimated, can be associated with smoking. The separate classifications do not necessarily imply that nonsmokers would have withdrawn from an existing broader classification but it did present a market opportunity for insurers to develop in the sale of new contracts. Some firms have tried to market AIDS-specific insurance contracts but with little success, apparently because of the stigma attached to the purchase of such coverage.

Risk classification is, therefore, an inevitable result of a competitive market and individuals with varying loss probabilities. Its objective aim is to have each classification pay its own way, neither more nor less. If rates for a particular classification prove inadequate, then those rates are increased and not those of another class. De facto, some complex issues of subsidies across different insurance classifications may exist. If regulation, for example, were to hold rates to inadequate levels on personal lines, it is conceivable that unregulated commercial lines might take up the slack. The proposition has not been empirically verified nor tested.

Conflicts over the use of classification variables can become controversial. The Commonwealth of Pennsylvania, for example, is currently in conflict among the state Supreme Court, governor, and legislature over whether or not automobile insurers should be permitted to continue the use of sex as a classification variable. Conflicts frequently arise when the classification variable is a proxy for some causal factor, not used because of measurement difficulties. In some instances, the sub-

stitution of the proxy variable is acceptable. Age, for example, is a partial proxy for driver experience in automobile insurance, is far easier to measure, and is generally acceptable.

Some misclassification is inevitable with any classification scheme. Assume, for example, that the frequency of deaths at a given age was distributed as shown in curve A of figure 1, for classification A, the standard group, the frequency of death for classification B, the high-risk group, as is shown in curve B. If the cutoff for being classified as an A was a point x, it is clear from the figure that some As would be misclassified as Bs and some Bs would be misclassified as As. It is the former which is questionable from a public policy perspective, and the latter from an insurance perspective.

Risk classification is an essential element of an insurance market and is accepted as such, despite disagreements over classification boundaries and the variables used to define them. Additional concerns may also arise over the investigations and questions used to determine the risk-classification status of an individual. Information gathering by insurers, life insurers in particular, is detailed and beyond the scope of our review. Nonetheless, it is necessary to point out that segment of information gathering which can affect potential AIDS victims. (For a full review of risk classification and underwriting practices in life insurance, see Cummins et al. 1983.) That part of

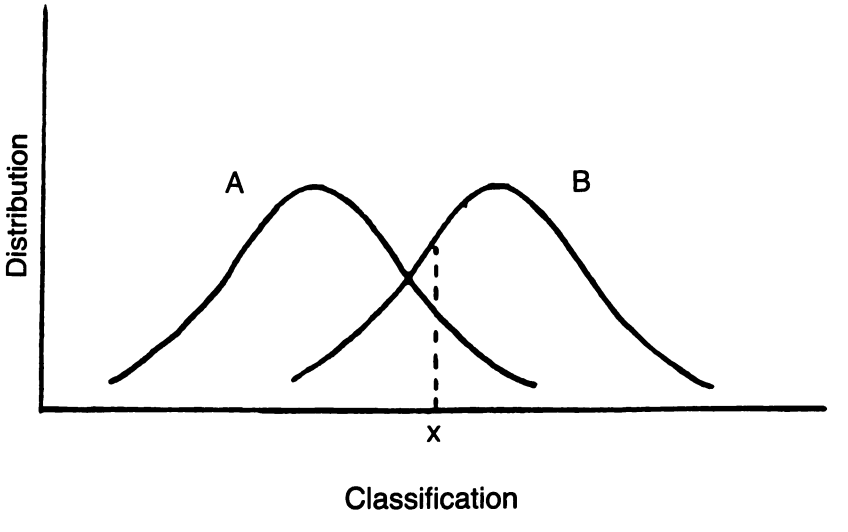

FIG. 1. Risk-classification Distribution of Two Groups.

the process falls under underwriting inquiry into "character and morals." Generally, the use of character and morals has been declining as a result of restrictions on information gathering and social pressures (Cummins et al. 1983).

Traditionally, the underwriter, under the character and morals category, has sought information on such things as drinking or drug abuse, prostitution, records of aggression and violence, and the like. At the time of the Cummins investigation, homosexuality was generally not considered as a negative underwriting factor for life insurance, having no bearing by itself upon mortality. The presence of AIDS may alter those assessments, particularly in the absence of a definitive test for the presence of HTLV-III virus. Statutes forbidding the use of such tests may well prompt some insurers to review their neutral stance toward sexual preference information, viewing homosexuality as a proxy variable for positive HTLV-III test results. That action, in turn, would probably precipitate litigation and additional legislation barring sexual preference as an underwriting factor.

Insurance Pricing

In a sense, any risk is insurable at a price, the upper price bound simply being the value of the unit exposed to loss. The authors are unaware of insurance transactions at such prices. However, the aircraft hull insurance premium for a transatlantic crossing in the early days of aviation insurance was 105 percent of the value of the plane (Kulp and Hall 1986). While such pricing obviously covers the maximum possible loss, it is not descriptive of the actuarial principles which normally underlie the estimation of premiums.

In its simplest form, the insurance premium is divided into two components: one to provide for operating expenses and the other for losses. Profit can be modeled as a random residual depending upon actual claims experience, or an expected amount can be incorporated into the rate structure. The simplest pricing model, therefore, would be one which focuses on losses only, leaving expenses to be allocated later. The resultant premium is described as a pure or net premium and would be set equal to the expected value of the loss.

Insurance pricing, however, brings the risk that actual claims will exceed those which are expected. So that the insurer's probability of

ruin can remain at some acceptably low level, the pure premium requires the addition of a contingency loading to deal with the probability of adverse outcomes, so that

$$P = E(L) + e$$

where P is the augmented pure premium, E(L) the expected value of the loss, and e the error term or contingency loading. Generally, if the pure premium is based upon a small number of observations, or perhaps even none at all (in which case loss estimations are entirely judgmental such as with the space shuttle before the Challenger disaster), the likelihood that actual results will differ considerably from those expected is quite high.

Though there are numerous examples of insurance written for loss exposures characterized by small numbers or scant experience, premiums for such exposures may often be a high percentage of the value being insured. Underwriters have reported, for example, that with the loss exposures associated with early off-shore drilling operations, the premiums were about 10 percent of the amount of insurance purchased—a 10 percent rate. War-risk insurance in the Persian Gulf, when it was being written, was quoted at rates of about 25 percent or more of a ship's value. Increased liability insurance costs of recent months are not inconsistent with the basic pricing model.

Life insurance pricing is similar to the nonlife examples noted above with the obvious exceptions being that the claim is a certainty and only the interval in which the claim will occur is uncertain. Even the amount of the claim is fixed in advance, the typical life insurance contract being written for a fixed value. The probability of the life insurance claim, of course, increases with age and modern mortality tables end at age 100. (If the insured survives to the limiting age of 100, the face of the contract is paid. The insured is, in a sense, statistically dead.) The life insurance risk is generally thought of as long-term although contracts for short intervals—term insurance—are extremely common. Nonetheless, a clear understanding of the force and variation in mortality is essential if costs are to be accurately allocated among the insured and liabilities are to be accurately estimated. Underestimation of liabilities in a long-term contract may be revealed only gradually and at varying ages, requiring periodic assessments of trends as well as year-to-year fluctuations. Even short-term contracts of life insurance are often renewed by the insured, exposing the insurer

to adverse selection and, even if not, still requiring revisions in rates with each renewal.

Life insurance pricing, then, must directly reflect those characteristics of the insured that permit reasonable prediction of mortality rates. If the force of mortality cannot be forecast or forecast only with great uncertainty, pricing and liability-estimation difficulties result. The price could incorporate the contingency loading associated with high uncertainty but, as with other coverages under similar circumstances, the resultant premium would likely be so high as to be unattractive and unfeasible.

Health insurance pricing is essentially similar to many of the pricing dimensions noted above. Disability, however, may or may not occur. If it does, its duration can be as long as the duration between onset and death. The disability interval, therefore, can take on several values as can the costs which are associated with the disability—medical care and loss of income.

The AIDS Risk and Insurance

Others continue to research medical and epidemiological dimensions of AIDS. Although there seems to be reasonable agreement on the characteristics of the disease and the ways by which it is transmitted, greater uncertainty appears to exist about its ultimate cause and the numbers of individuals likely to be infected before the progression of the disease through the population stabilizes. Nonetheless, the known characteristics of the disease are sufficient to permit insurability issues and concepts to be addressed.

The nature of the economic or insurable loss associated with AIDS is no different from other fatal diseases. Medical care costs and lost income exist just as clearly in this disease as with any other. What is less certain is the ultimate magnitude and frequency of such losses. Moreover, the probability of survival, no matter when the disease is detected, currently appears to be close to zero. Researchers to date, however, have provided details which would be relevant to any assessment of whether the insurance technique is appropriate for redistributing the economic losses from the disease and whether or not the existing insurance market can participate in the risk-management strategies required to manage its impact. Our discussion will be based upon

the known characteristics of the disease as identified by the research of others.

Frequency, Severity, and Uncertainty

Data on actual and projected AIDS mortality have been widely reported (Curran et al. 1985; *Wall Street Journal* 1985; Kreiger and Caceres 1985). Both the number of fatalities and the rate of increase in mortality since 1981, when the disease was first reported, have been widely discussed. Both insurance buyers and sellers continue to comment about availability, price, and risk classification.

The epidemiology of the disease, at least as it is presently known, bears considerable relationship to actuarial and insurability concepts. Basic to any insurance is the estimation of loss probabilities, both as to the likelihood of occurrence and with respect to the possible values of the loss, once it occurs. At this point of understanding about AIDS, considerable uncertainty exists about its spread and ultimate magnitude. The incubation period for the disease is unknown and may well be quite long, at least over one year. Further, of those individuals infected, some will develop the disease and some will not. Although one can identify the probability of infection as some general function of the number of contacts with infected persons who are able to transmit the virus, that relationship does not yet produce the evidence reasonably associated with actuarial estimation and is, at best, a weak basis of developing insurance prices.

Because of the long incubation period and uncertain probability estimates, the number of AIDS cases that will occur, even among those individuals who are infected, is unknown. Estimates of the maximum possible loss are confounded not only by this uncertainty but also by the lack of evidence that the spread of infection has been controlled. Thus, it is not unreasonable to believe that the number of AIDS cases will continue to increase and perhaps progress beyond those urban areas where prevalence is relatively high. (Considerable details concerning the transmission of AIDS are presented in Kuller 1986.) Mortality and morbidity estimates may also be distorted by inaccurate reporting of the disease. Physicians may not recognize AIDS as the cause of death or may be reluctant to report it, choosing instead some final precipitating disease out of the complex.

The epidemiological uncertainties surrounding AIDS are almost certain to promote conservative underwriting responses in life and health insurance markets. Though not unexpected and perhaps not unreasonable, such underwriting concerns can and should be addressed logically so as to forestall ultraconservatism or even underwriting panic and to avoid the problems and appearance of being arbitrary or dogmatic.

AIDS and the Insurance Technique

Forgoing speculation or inferences about insurer underwriting in the face of a new and fatal disease, the insurance technique context of the disease can be easily conceptualized.

The incidence of AIDS within the insurable population may be represented as shown in figure 2. The figure is not to scale. The outer boundary shows the universe of potential insureds who may be infected with the HTLV-III virus and who may ultimately succumb to AIDS. Within that universe, a major distinction is between high-risk groups and others. From an actuarial perspective, the infected group should be charged a higher premium since an insured from that group is more likely to present a claim. In principle, this is no different than charging a higher premium to a young inexperienced driver than to a mature experienced one, since the former is more likely to be involved in an accident.

Were it not for adverse selection, the conceptual costing problem would be straightforward. If, for example, the premium for the infected group should be m times the premium for the general population, and a proportion, equal to k, of the insureds belonged to the infected group, the insurer would be indifferent between charging each group its appropriate premium or charging an average premium to everyone. Thus, the insurer could charge a premium of P to a member of the general population and a premium of mP to a member of the infected group or a uniform premium per individual equal to

$$(1 - k) \times P + k \times m \times P.$$

Assuming the distribution of the insured did not change, the total premium received by the insurer would remain constant and, other things being equal, the premiums charged would be sufficient to cover the losses of the group.

That risk-sharing scheme, however, requires the participation of the general population of the insured. Whatever underwriting is done is for the benefit of the existing insured, so that a conscious effort is made for each to pay the fair share of the cost. The limiting case is where there would be no price differentiation on the basis of propensity to AIDS. Conceptually, the subgroups would merge into a single group containing all risks. If the premiums were properly adjusted and the loss exposure not adversely affected, no conceptual problem would be presented from an insurance point of view. In the absence of compulsion, however, the adverse-selection barrier would not be overcome. This was somewhat the situation before AIDS was identified as a problem. The distinguishing feature, however, was that the total premiums collected did not contemplate the extra cost due to AIDS.

As discussed previously, the desire to segregate the infected group would not be as great were it not for adverse selection. As noted, an insurer which did not classify the insured, while others did, would be left with an inordinate proportion of the infected group and total insurance premiums which would be inadequate and capable of producing financial ruin.

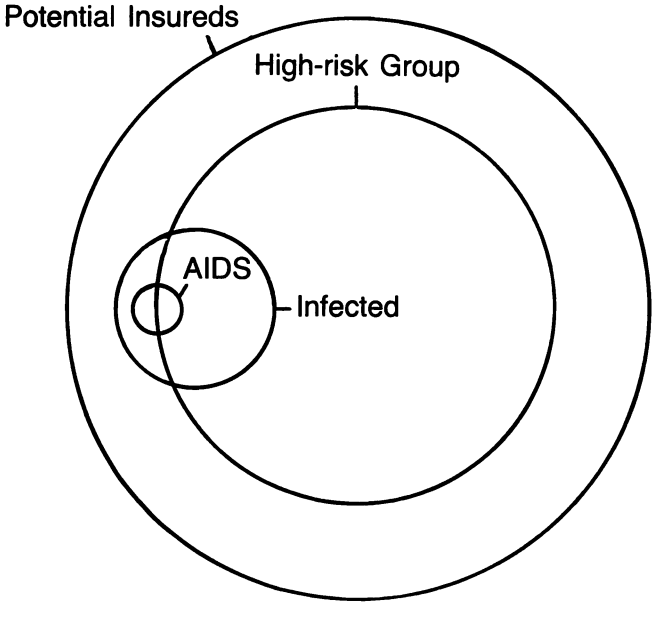

FIG. 2. Incidence of AIDS within the Insurable Population.

Claims Experience

Insurance claims resulting from AIDS are only beginning to be assessed and evidence available at this point is scattered and inconclusive. The following life insurance claims data were reported by the American Council of Life Insurance in its report at the National Association of Insurance Commissioners meeting in December 1985 (Blaine, Iuculano, and Clifford 1986). In 1984 one life reinsurer reported 17 AIDS death claims amounting to $3.6 million and representing 4.5 percent of its total death claims on ordinary life business. Its average AIDS claim was $250,000, compared to an overall average of $50,000. Another life insurer had, by December of 1985, reported 60 life and health insurance claims for a total of $3.5 million, with one for $1,000,000. A third life insurer reported 20 such death claims totalling $2.5 million that amounted to over 3 percent of its death claims during a portion of 1985. Another major life insurer, not mentioned as part of the above report, has reported $1.1 million in death benefits on 17 policies it believes were held by AIDS victims. Those payments averaged $65,000 but ranged from $1,000 to $500,000 (*Wall Street Journal* 1985).

Information on the age of such policies is not conveniently available. It would be interesting to know whether such contracts were issued since the onset of AIDS, as well as other characteristics which might be indicative of adverse selection and information asymmetry. Informal and anecdotal reports to the authors have indicated that such policies are generally no more than two or three years old, with both insured and beneficiary being single males. We should note, of course, that such evidence is inconclusive of adverse selection and that other economic variables may be involved. Young professionals with higher than average incomes, often single, may be expected to purchase larger than average amounts of insurance.

Data on medical care costs associated with AIDS have been analyzed in at least two studies. The first study, by the Centers for Disease Control, estimated the average hospital cost for each AIDS patient to be $147,000. A second study by Scitovsky, critical of the first, estimated total health care costs to be much lower than even the hospitalization cost estimate, with total costs of about $90,000 to $100,000, and perhaps even as low as $60,000 or $70,000. Scitovsky et al. (1985) estimated the San Francisco costs to be much lower,

about $28,000. The lower figure, says Scitovsky, likely reflects that city's differences in case mix (there are fewer IV drug abusers), use of clinical services for hospitalized patients, and its well-developed out-of-hospital services. The data do not indicate the extent to which such costs were borne by insurance or other third-party arrangements. Because the number of AIDS cases will continue to increase, insurance claim payments from that cause are also certain to increase. At least for present policy holders, those payments were not directly contemplated in the rate structure underlying present premiums.

Insurance Underwriting

The identification of risk characteristics that affect the probability of loss is inherent in the insuring process and necessary for the proper risk classification noted previously. At the extreme, the characteristics may make the risk uninsurable (Berliner 1982), itself a sort of classification. Ideally, the underwriting criteria used to classify risks should be accurate, objective, conveniently determinable, and economically feasible. Objective data are not always available, however, and subjective evaluation becomes increasingly important and sometimes dominant.

By conservative estimates, a male aged 30 has about a .01 chance of dying within five years, based upon the 1958 CSO mortality table. (Because the values of that table are very conservative, the actual rate will be less than that shown.) AIDS mortality data do not yet permit similarly precise estimates, but it is clear that mortality rates for infected individuals would be much higher. One set of data suggests that someone infected with the AIDS virus may have a .10 chance of dying within five years (American Council of Life Insurance 1985). For those with the disease, the probability of death within five years of onset is close to 1.0. According to studies cited by Kuller, the estimated three-year incidence of AIDS among seropositive homosexual men ranged from .342 in Manhattan to .125 among Queens, New York, intravenous drug users (Kuller 1986). Such studies invite questions about whether groups which are high-risk with respect to AIDS are, from an actuarial standpoint, higher risks than other groups such as smokers, drinkers, active-sports participants (skiers, motorcyclists, etc.) avocational fliers, or even drug users. Definitive differential data are not available to make valid comparisons. However, the groups

noted are insured by some life insurers, not by others, but those who are will be charged a higher than standard premium (Cummins et al. 1983). With AIDS, the level of risk within high-risk groups may be sufficiently high or even uncertain, that it is not presently ratable, and therefore not insurable. (In terms of our earlier review of insurance pricing, the error term on the premium equation might be so high as to make the premium economically unfeasible.)

Because AIDS is invariably a fatal disease, it is hardly unreasonable for an insurer to want to know its likelihood and certainly its presence. To act otherwise is to conflict with basic risk-classification concepts. Presently, insurers would like to be able to rely upon the HTLV-III antibody test mentioned earlier. The test is inexpensive but controversial because of the potential to produce false positive results and, for that matter, false negatives as well. A confirmatory Western Blot test is necessary to be conclusive, but is considerably more expensive than the HTLV-III antibody test. Moreover, questions about privacy rights and issues have been raised. On the other hand, predictive tests are of use to other than life and health issues. Blood or plasma donors may be asked to undergo such tests not only as a basic loss prevention but to forestall possible questions of liability for a hospital supplying contaminated blood.

Individuals who have tested positive for AIDS antibodies or who believe they have greater than average chances of contracting the disease are likely to have a high demand for the appropriate insurance coverages. It is interesting to note that such tests may contribute to the informational asymmetry noted earlier. Test results are available to the individual but not to the insurer, a condition that may either indicate or worsen adverse selection. The life insurance claims data noted earlier suggest the possibility that such individuals purchase higher than average amounts of insurance. If true, that outcome would be consistent with the adverse-selection concepts outlined earlier. There are other variables, of course, which may also increase the amount of insurance coverage. Income is a prominent example.

Group Insurance

Heretofore, the conceptualization of insurance issues and related institutional comments have made no distinction between insurance underwritten for a group of individuals and that underwritten for a

single individual. In principle, the concepts of insurability, risk classification, adverse selection, and insurance pricing are equally applicable to both the group and the individual as underwriting units. For AIDS exposure, however, the group insurance technique, by reducing or even eliminating the underwriting focus on individuals, becomes extremely important as a risk-sharing mechanism. Moreover, from a practical standpoint, group insurance plays a significant role in providing much of the coverage on the lives and health of the nation's population.

Group insurance underwriting, in either life or health insurance, substitutes review of group characteristics in place of those of the individual. Thus, factors such as the size of the group, its industry affiliation, and claims experience become major focal points. With only a few exceptions, insurance can be offered without requiring individual employees to prove insurability. With either life or health insurance, members of a small group (typically under 50 to 100 employees) may be asked to show insurability as will employees who choose to participate in the group plan after initially declining to do so. Declining to participate would be associated with contributory plans where employees share part of the cost. There would be no reason to refuse coverage where all costs are borne by the organization—the so-called noncontributory plans. Concerns about adverse selection, common in individual underwriting, are considerably reduced through group insurance. Individuals typically do not choose the amount of coverage or join the organization just for the insurance. Similarly, the primary purpose of the organization is not to provide insurance; it was formed for another purpose. Finally, cost increases are typically borne by the organization, thereby assuring that healthy or standard-risk individuals will remain part of the insured group. Even with contributory plans, employee contributions generally remain stable. Large groups may have a sufficiently large experience base to permit self-insurance by the organization or experience rating by an insurer. Small groups not qualifying for experience rating would be pooled together, with similar risks across different firms being charged the same rate.

With large groups which are self-insured, the employee is in the position of looking to the employer for both insurance and employment; the employer is also the insurer. Where the group plan is experience rated by an insurer, the economic impact will be quite similar. The possible effect of that duality upon the AIDS victim is clear; to lose

the job because of the disease may be to lose insurance coverage as well. There are increasing pressures for employers to continue insurance on terminated employees, at least for limited periods of time. Individuals have normally had the opportunity to convert their group coverages to individual contracts at the individual rates prevailing for the coverage. Whether AIDS victims can be terminated from employment or whether they may enjoy some protection as handicapped persons are questions that are apt to increase in importance. If retained as employees, group insurance costs will increase and economic pressures on the organization will mount.

There is as yet no way to estimate precisely the increased group insurance costs associated with AIDS. Whatever those costs are, the insurance cost-management alternatives are limited. Cost increases will be borne by owners through lower earnings, by customers through higher prices, or by employees through lower wages or increased contributions to plan costs. Any one or any combination of these could be sufficiently large as to jeopardize continued employment of AIDS victims. Even if retained, it is conceivable that coverage for the disease and even related conditions could be curtailed.

Thus, the group insurance mechanism offers a mixed blessing. Group underwriting normally proves a means by which high-risk individuals are absorbed into a larger insured group. On the other hand, the presence of large plans may make the employer the employee's insurer, creating conflicts of the kind just noted. Even with small group plans, large cost increases from AIDS and related diseases may prompt more detailed and increased underwriting reviews of individuals within the group.

Concluding Observations

Were it possible to identify all of those with AIDS antibodies, it would, at least conceptually, be possible to formulate the group as a separate risk classification. The resultant premium would likely be high and perhaps more than such individuals would be willing to pay, but identification of a high-risk group appears feasible within very broad limits, perhaps too broad for actuarial purposes. The conceptual possibility of using antibody testing as a screen is severely compromised on two counts. First, a negative result offers no assurance that an individual has not been recently infected; it may indicate only that he/she has not yet seroconverted. Similarly, it offers no assurance

that the individual will not become exposed shortly after testing. Second, it is not, at the moment, without controversy and would not be absent from public policy concerns associated with privacy rights and the potential harm caused by a misclassification resulting in an uninsurable status and, at the least, amplified anxieties.

It would not be possible to ignore completely any classification factors designed to identify individuals at high risk for AIDS. The result would be the unstable market equilibrium described previously. At some point, the low-risk insured would withdraw from the classification. Unless legislatively compelled otherwise, the market would develop a separate classification for the low-risks, leaving the high-risks in a classification with an inadequate rate and an insurer confronted with an increased chance of ruin.

Even if blood-screening tests were made illegal, insurance sellers in their efforts to avoid underpricing high-probability risks might attempt to switch to other, probably less exact, means of identification. Single males in San Francisco, for example, might not be sought out by either life or health insurers. Moreover, accurate classification of the AIDS risk is made even more difficult because of an incubation period of long but uncertain length.

AIDS would appear to lack several characteristics of insurable risks. Its attack does not, at this time, appear to be random within the general population, and the problem of adverse selection seems significant. Its maximum possible loss, for an exposed individual, may be similar to that of diseases which are insurable but, in the aggregate, that value will likely become quite high and, most important, occurring within short intervals. Premium rates for high-risk groups would have to be quite high, almost certainly beyond the level of economic feasibility.

Health insurance coverage for AIDS is strongly affected by group insurance or plans which are self-funded by the employer. Thus, the AIDS victim's employer and insurer are one, possibly placing both job and insurance in jeopardy. Fortunately, medical care costs for AIDS appear to meet enough insurability criteria to make pooling feasible, either through group coverages or maybe even through individual insurance, perhaps with the help of state-level pools. Hospitalization costs may well be lower than initially thought, with community and home care assistance helping to control such costs.

At this point, available data do not permit final judgment but, conceptually, the pooling mechanism—legislated (such as the health

insurance pools of 9 states) or voluntary—offers promise for hospitalization costs. We should note, however, a perhaps disappointing characteristic of the insurance technique; it does not reduce economic losses, only redistributes them. Pooling mechanisms might still require coverage limitations and higher rates.

The hope for new individual life insurance coverage appears scant. Coverage for existing insureds, however, remains in place. The probability of loss for exposed groups appears so high as to make the required premium beyond the level tolerable to nearly any individual. Moreover, applicants for insurance at high rates are quite apt to present higher-than-average risks, even within a high-risk classification, the adverse-selection problem becoming dominant.

The controversy over screening tests, principally the HTLV-III/LAV antibody test is understandable. The tests may produce inaccurate results which are potentially detrimental to both insurance buyers and sellers. Still, their use coupled with innovative underwriting might protect both interests. AIDS, for example, might be excluded from individual insurance coverage for, say, five years. Retroactive premium adjustments for five-year survivors might be feasible. Similarly, coverage amount limitations might be removed at appropriate intervals and in appropriate amounts. Such attempts to provide coverage, however, are presently hampered, even overpowered, by the uncertainties involved in forecasting claims experience.

Although the insurance technique is inherently flawed in its ability to redistribute economic losses which are deficient in meeting the insurability criteria reviewed earlier, group insurance seems to offer the best hope for accommodating at least a portion of the insurable loss costs associated with AIDS. In some measure, those costs can be passed to some combination of owners, workers, and customers. Because individual insurance offers less promise, public programs and loss-prevention efforts provide an alternative to address those costs which remain.

References

American Council of Life Insurance. 1985. Report to the Life Insurance (A) Committee of the National Association of Insurance Commissioners on Acquired Immunodeficiency Syndrome. *Proceedings of the National Association of Insurance Commissioners* 1: 627–29. Reno.

Berliner, B. 1982. *Limits of Insurability of Risks*. Englewood Cliffs, N.J.: Prentice-Hall.

Blaine, J.H., R.P. Iuculano, and K.A. Clifford. 1986. Insurance Issues Related to AIDS. Paper presented at a seminar "AIDS: Issues in the Workplace," Tallahassee, Florida, January 9.

Cummins, J.D., B.D. Smith, R.N. Vance, and J.L. VanDerhei. 1983. *Risk Classification in Life Insurance*. Boston: Kluwer-Nijhoff.

Curran, J.W., W.M. Morgan, A.M. Hardy, H.W. Jaffe, W.W. Darrow, and W.R. Dowdle. 1985. The Epidemiology of AIDS: Current Status and Future Prospects. *Science* 229(4720):1352–57.

Dionne, G. 1983. Adverse Selection and Repeated Insurance Contracts. *Geneva Papers on Risk and Insurance* 8:(6):316.

Kreiger, T., and C.A. Caceres. 1985. The Unnoticed Link in AIDS Cases. *Wall Street Journal*. October 18.

Kuller, L.W. 1986. The Epidemic of AIDS: A Failure of Public Health Policy. Paper presented at the American Association for the Advancement of Science Symposium "AIDS Epidemic: Uncertainty, Risk and Civil Liberties," Philadelphia, May 26.

Kulp, C.A., and J.W. Hall. 1986. *Casualty Insurance*. 4th ed. New York: Ronald Press.

Scitovsky, A.A., M. Cline, and P.R. Lee. 1985. Medical Care Costs of AIDS in San Francisco. Paper presented at the annual meeting of the American Public Health Association, Washington, November 19.

Stiglitz, J.E. 1983. Risk, Incentives, and Insurance: The Pure Theory of Moral Hazard. *Geneva Papers on Risk and Insurance* 8(6):5–6.

Wall Street Journal. 1985. Employers and Insurers Have Reasons to Fear Extensive Epidemic. October 18.

Address correspondence to: J.D. Hammond, Ph.D., William Elliott Professor of Insurance, Pennsylvania State University, 509A Business Administration Building, University Park, PA 16802.