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# AVIATION LIFE INSURANCE

JAMES E. HOSKINS\*

The subject on which you have given me the honor to speak is especially appropriate to discuss at this meeting because of Hartford's deep interest in both aviation and insurance. We in the insurance companies are proud of our aeronautical neighbors, some of whose operations you inspected yesterday, and I hope that they in turn feel that we have taken a progressive attitude toward our mutual problems.

It happens that the first study of aviation statistics for the purpose of making life insurance rates was done by Hartford actuaries.<sup>1</sup> Our present knowledge has grown out of their pioneering work much as the modern air transport systems have evolved from the first air mail flights. After the stimulus which Lindbergh's flight and other events gave to aviation in 1927 the Actuarial Society of America in the following year appointed a committee on aviation to tabulate and interpret available data and to give the federal departments such assistance as they might desire for putting their statistics into a form applicable to life insurance. With the cooperation of the Commerce, Navy, and War Departments, the Aeronautical Chamber of Commerce, and various other organizations and private individuals, the committee has made a report to the members of the Actuarial Society each year since 1929, and has gradually, in the words of the Society's motto, substituted facts for appearances and demonstrations for impressions. Since the Society's membership includes actuaries connected with all the large life companies and many of the smaller companies, the facts are thus piped from their source to the point at which they will do the most good. I hope you will pardon my dwelling on the amount of study which insurance men have given to aviation, because there are still aviation men who appear to suppose that our knowledge is most elementary, and that we are applying to scheduled air transport pilots the results of statistics which include inexperienced, or even unlicensed, pilots.

Before I speak of what we have learned, may I take a moment to recall to you the fundamental principles of life insurance. Life

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1. Messrs. James S. Elston and Hartwell L. Hall made this study on behalf of The Travelers Insurance Company.

insurance, like practically all insurance, deals with a happening which is relatively unlikely—in this case, premature death,—which causes severe financial loss when it does occur, and which is about equally likely to happen to any one of a group of persons insured, as far as can be foreseen. These people, in effect, pool a part of their resources, and agree that a certain amount shall be paid out of the fund each year to the families of those members who die within the year. The company merely supplies the machinery for collecting the contributions and then paying them out. From the contributions it deducts the cost of managing the fund. It is important to remember that the insurance company does not create wealth; it merely distributes it. The money it pays out in claims it does not dig out of the earth or pick from trees or buy from the manufacturer; it was paid in by the customers, who have in a sense combined to share their misfortunes, and hire the insurance company to do the incidental work. In the last analysis the company can pay its claims only if its policyholders have paid in adequate contributions or premiums.

Bear in mind the requirement that death must be about equally likely to each man in the group—by “group” meaning those who pay the same rate of premium. This will be important in our consideration of aviation risks. For a man to enter the group whose chance of death is higher than that of the rest of the group is like introducing loaded dice into a game of chance. He *may* happen to live longer than some of those whose chance of death, as measured when the insurance was issued, was smaller, but the probabilities are in the other direction. If he asks to buy insurance for less than he would pay if the company insured only people with hazards similar to his own, then his position is no different than if he asked his fellow policyholders to help him pay his grocer’s bill. In either case he is paying less than value received and others must make up the difference.

Even this might be feasible if every man in the country were to buy insurance on a fixed plan and of a fixed amount. But the fact is that each individual is free to choose whether he will buy insurance, what kind he will buy, and how much. As might be expected, those who believe themselves to be in poor health, or unusually subject to the risk of accidental death, are more receptive to the insurance agent than is the average man, and are willing to buy larger amounts.

It would perhaps be possible for companies to insure any or all comers for any amount they are able to pay for, and find a rate

high enough to cover the resulting claims. This rate, however, would be so high as to be unfair to the great body of average policyholders. Moreover, if a single company tried this, it would attract only those who couldn't get insurance elsewhere, and even its high rates would not be high enough.

Nevertheless the companies are in the business of accepting applicants, not of rejecting. They make no money from plowing every third applicant under. In practice they set a standard which will admit the great majority of applicants, which is as liberal as possible without seriously overcharging the many average for the benefit of the few who are close to the borderline of the standard, and which is so chosen that the small proportion who are moderately worse than the average are balanced by others who are better than the average.

Some companies go a step farther than this and set up special rates for groups of policyholders who do not qualify for the standard rate but whose chance of early death is still remote and whose expectancy is not much shorter than the normal. This insurance of special classes for various reasons is not undertaken by all companies.

Another factor to be considered is that life insurance is usually a contract running for a long period of years. The company must estimate the extent of any unusual hazard, not merely as it exists when the policy is issued, but over the term of the policy. If the hazard becomes permanently greater than the estimate, the company cannot alter the contract and must continue it at the original rate, but if it becomes permanently less, the policyholder is likely to expect a reduction in cost. In particular, in setting a premium rate for fixed base operators, we must expect that they will spend more time in the air as business improves than they have in the last few years.

In giving you this somewhat technical discussion, I realize that it is not a matter with which you are directly concerned, and that you have plenty to keep you busy in developing aviation without bothering about the conduct of the insurance business. I suspect, however, that pilots who have a fancied grievance against life insurance sometimes cry on your shoulder, and you are in a position to promote good will by showing them that after going into the matter you have found that the insurance companies' methods are fair to all concerned.

It has been suggested that the total number of pilots is still so small a proportion of the population that they could be insured at

the standard rate by increasing that rate only a trivial amount. That may be true. By the same reasoning the companies could insure everyone in the United States who is at the moment dying of some rare disease, say Rocky Mountain spotted fever, without material loss in the aggregate. This simply means discriminating in favor of those who are subject to a large but uncommon hazard and against those more numerous groups, like locomotive engineers or fat men, whose extra risk is less than that of aviators, but who pay without question the small extra premium customarily required. Moreover, the method would break down when the number of pilots increased beyond a certain point even though flying might be more safe by that time.

Again, it is sometimes argued that since a man insured at standard rates continues to be covered without extra charge if he subsequently becomes a pilot, then the company should not discriminate against the man who happens to be a pilot already. This can be disposed of in a moment by remarking that while the companies continue to cover policyholders who develop heart disease, and pay many death claims on that account, yet they are hardly expected to insure those whose hearts are bad when they apply for insurance.

From the fact that many commercial pilots in their thirties pay a rate about double the standard, an interesting suggestion has recently been made that a policy could be written at standard rates paying half the face value in event of an aviation fatality. On reflection we see that such a policy, paying full indemnity for natural deaths and half for aviation deaths, would call for not only the full standard premium, but also half the usual aviation extra charge, instead of eliminating the latter entirely.

Another important point is that the insurance company must figure its risk by the year. A transport pilot of long experience may be, and ought to be, safer to fly with than a private pilot with a couple of hundred hours, but if the former flies a thousand hours a year to the second man's fifty, he is a worse risk from the insurance company's viewpoint. For this reason airline pilots, for example, will pay a higher rate for insurance than some other classes whose skill is far less.

Still another fundamental principle is that insurance deals not with individuals but with groups. We don't pretend to know how long our applicant John Smith is going to live. But if we can get a thousand men of John's age whose chances of long life seem about as good as his, as far as we can see, we think we know how long they will live on the average, and about how many will die

each year, although without knowing which will be the first to go. Some companies have only one class, one scale of rates, and they accept only those risks who are good enough to qualify for that scale. Specifically they will not insure aviators (except with flying excluded—of which more later), or for that matter the members of any occupation which is materially more hazardous than the daily life of the average business man. At least these companies do not *discriminate* against aviators; they do not treat them any less favorably than other occupations of considerable hazard. In fact, by offering them partial coverage they treat them somewhat better. There are, however, a number of companies which have several scales of rates for policyholders with different degrees of risk, and most of these will insure those who fly, at appropriate rates. These rates have been determined with great care. No other occupation has a special committee of actuaries devoting themselves to its statistics, and in the case of no other occupation are the statistics reviewed as often as annually, to observe any real improvement in safety as soon as it occurs. The rates which result from these statistics are not entirely uniform between companies, for our committee is a fact-finding body and not a code authority, but the differences are no greater, I believe, than in the case of other special risks, and reductions have been promptly made effective whenever justified.

Of course there are some applicants whose flying is hard to classify, and we may seem to treat them as individuals, although what we really do is to put them into a hypothetical class and consider what would happen if we insured a thousand men like them. This has been referred to as the Darius Green method of underwriting, which I take it is the aeronautical equivalent of the horse and buggy age. In due time we shall have enough information to classify them as accurately as I believe we are now classifying the more usual classes of fliers. In every case we are acting on the best available information, and are not, as is sometimes stated, charging more than we would if we had a greater spread through insuring more fliers. Since we have access to government statistics covering all pilots, we are not handicapped by the fact that our insurance experience on them is still rather limited.

As an example of the principles on which rates are made, it has been found that in airport hops and cross-country taxi flying over a recent period of years, there have been pretty consistently about 8 pilot deaths for each 100,000 hours flown. If pilots engaged mainly in these classes of operation may be expected to average 300

hours a year during their flying career—perhaps less in depression years and more in boom years—then you will see that each member of this group must contribute \$24 a year for each \$1,000 he owns to pay for the death claims arising from air accidents. This is practically all extra hazard due to occupation, inasmuch as the chance that the average man on the street, with no present interest in aviation, will eventually be killed while flying as a commercial pilot, is negligible. Hence, under these conditions the actual premium charged should be about \$24 more than the standard rate. (In practice, there would be other factors to consider. For instance, the company will have some extra expense in handling these special classes, but, on the other hand, would gain from the fact that pilots are subject to periodical physical examination. We are discussing now the general methods of rate making rather than the rates actually produced.)

Now it is obvious that a class of pilots which theoretically requires an extra premium of \$24 a \$1,000 does not come within the scope of insurance at standard rates. Nor, for that matter, do any of the classes which have been investigated.

I mention this to give you an insight into our methods, not to bore you with a schedule of our various statistics and ratings. You may be interested, however, in a few of our tentative conclusions.

It appears that the most dangerous time in a pilot's career is not while he is taking instruction or in the early part of his solo flying, but for a period after he receives an advanced license or military rating. At first he knows he is green and plays safe; eventually he gains skill; but there is an intermediate time when his self-confidence exceeds his ability.

Pilots who have been involved in an accident in recent years or have been disciplined for a serious violation of air regulations have a greater chance of a fatal crash than those who have not, although they might be expected to have become especially careful. Whether this indicates in some cases a lack of physical or mental aptitude is an interesting question.

No great difference has been observed between the younger pilots and those of more mature years. Perhaps this might not be true but for the care exercised in licensing pilots.

Airplane owners and non-owners show no great difference in risk, if all other things are equal.

The kind of flying is very important. Those kinds which are most closely supervised, either by yourselves and Uncle Sam, or by responsible owners, are clearly the safest, such as airline and mili-

tary flying, and airplanes owned by corporations for business use. In the case of airline pilots, however, this is offset by their large number of annual hours in the air.

The average amount of flying in the course of a year is by far the most important factor affecting the insurance company's problem of charging for a year's insurance.

While we find some groups of pilots much worse than the average, we find none much better than the average. In other words, there seem to be a few who are impossible as insurance risks, and a lot who are nearly as good as the best. I know there are those who disagree with this, and we are constantly studying the matter. All scientific conclusions are tentative, and subject to change as our knowledge expands. And may I remind you that I am speaking from the standpoint of the insurance company, which asks, how safe is this man in a year of actual flying, not how safe would he be in a single hand-picked flight.

As you know, Connecticut has a system of supervision over flying which I understand is unique, involving monthly inspections of aircraft and unusually close contact of the inspectors and flight surgeons with the individual pilots. Our committee has been privileged to review the Connecticut accident records from the founding of the department. We compared the number of casualties to Connecticut pilots with the number which would have occurred if these pilots had been subject to the same accident rates as prevailed in the entire country. The Connecticut accident rate turned out to be about 20% below normal. Now we actuaries are reputed to be cautious, and when we see a flock of white sheep from a distance, we will concede only that they are white on one side. So we are not ready to draw definite conclusions from statistics involving only thirty or forty casualties. But off the record, I don't blame Mr. Morris if he feels happy over the showing.

You are concerned, as we are, with the safety of the passengers as well as of the pilot. The life insurance company's problem is different from that of the individual passenger. The latter may be satisfied to know that in traveling between two points by air, the odds are immensely in favor of his making the trip safely and are nearly as great as in some other customary modes of travel. The life insurance company, however, figures not by the trip but by the year. The much greater speed of air transportation makes it possible for an individual to travel far more miles a year than in any other way. This in itself would raise the cost of the travel hazard to the life insurance company, in the case of a policyholder regu-



larly traveling by air, above the hazard of travel by, say private automobile, even if all other things were equal. This points to the conclusion that if air travel is to be taken for granted by life insurance companies as automobile travel is, than the fatality rate *per 1000 hours* must be reduced to a comparable point.

Over the last five years the passenger death rate in scheduled flying has been nearly 4 per 100,000 passengers carried. Expressed in another way, the odds are over 25,000 to 1 against being killed on a trip by air transport, and several thousand to 1 that the traveler will reach his destination in good condition, since non-fatal injuries are also comparatively few.

Since the average trip in this period was about three hours long, the death rate has been about  $1\frac{1}{2}$  per 100,000 passenger hours. To put it still another way, in a group of policyholders who each travel 100 hours a year on the airlines, the death claim cost to the life insurance company on account of air transport accidents will average \$1.50 a year for each \$1,000 of insurance. This is practically all extra cost caused by the aviation hazard, since the normal chance that a business man will meet accidental death in the course of 100 hours costs the insurance company only about \$.01 for each \$1,000 insured. Considering that the standard rate of premium averages perhaps \$30 per thousand of insurance, and may go as low as \$10 for short term insurance, it is easy to understand that a life insurance company may feel that it has not sufficient leeway to absorb a mortality cost as great as \$1.50 above the normal. Yet 100 hours represents less than 20 round trips of average length, and there are many business men who fly as much as this. A much greater amount of business travel by air in the course of a year is easily possible. This explains why many companies charge a rate higher than the standard when the policyholder customarily flies more than a limited number of hours a year even in the safest and best regulated kind of flying.

To speak of the attitude of insurance toward those who fly is too broad an expression. We really mean those who fly quite a bit. When a man takes only an occasional passenger trip, we are not concerned. We have no attitude toward him. We don't speak of him as an aviation risk. It is only when the applicant's flying is frequent, or promises to become so, that we put him in a different class from his fellows who travel in the subways. A few companies, my own among them, have gone a step farther and adopted the view that airline travel is a normal incident of modern business. They classify the airline passenger according to his regular occupa-

tion, as a manufacturer, a lawyer, or a salesman, just as he classifies himself, and not as an aviator.

The fact that some life insurance companies charge a special rate for policyholders who frequently use the airlines does not imply that the risk of air travel is great, but merely that the total risk of such a man is above that of the average policyholder. If the risk were really large, life insurance could not be bought on any terms. As I have said, the chance of a fatal accident in an airline trip is very small, and even when a man makes a hundred trips or more in a year, the odds are much against his meeting an accident in that time. A life insurance premium rate which exceeds the normal by \$2.50 or \$5.00 per thousand on account of the aviation hazard is not inconsistent with this. It obviously represents odds of several hundred to one against death in a year as a result of air travel.

The comparative safety of the airplane and other vehicles is often discussed. According to the latest available figures, the average number of passenger miles per fatality is a little less on the airlines than in private automobiles; that is, the airlines are almost but not quite so safe as the average private car—an average based on the record of both careful and reckless drivers.

In the perhaps more relevant comparison with other public carriers, busses appear more than ten times as safe as airlines, and railroads thirty to forty times as safe. If we count all injuries, not merely deaths, the lead of the busses and trains would be cut down somewhat. It has been said that in a trip of say, two hundred miles, the chance of injury to *someone* is greater if the trip is made by auto than if by airline. This is due largely, however, to the absence of pedestrians in the air.

The question is sometimes asked why a life insurance company even inquires as to the amount of business flying an applicant does, whether on the airlines or in a plane owned by his own firm, considering that he is not asked how much he travels by automobile and that the safety of airline travel is approaching that of automobile travel on the basis of miles covered. The answer lies in the fact that the air traveler is able to cover a much greater distance in the course of a year. From the standpoint of impressing the passenger with the safety of aviation it may be sufficient merely to bring the fatality rate per 1000 miles down to that of other regular means of travel. From the standpoint of life insurance, however, the fatality rate on the basis of *hours of travel* must be brought within hailing distance of the comparable rates for other carriers. We have spoken of the average claim cost for 100 hours

annual travel by airline as being about \$1.50 per \$1,000 of insurance. The corresponding figure for private automobile travel is about \$.15. It should be remembered that in the case of automobile travel the hazard is not all extra hazard inasmuch as automobile travel is so common as to be part of the normal risk of the average man. The standard rate for life insurance includes the cost of the average amount of automobile traveling by the average policyholder. Few men, if any, travel so much by automobile in a year that the excess of their risk over the average is more than the company can absorb. If the time comes when the air lines are as universally used as private automobiles, then probably no extra life insurance rate will be charged for air travelers, unless their use of aviation is much above the average, and perhaps not even then. But unless air safety is still further improved by that time, this merely means that the standard rate would have to be increased, so that when measured against today's rate there would still be an extra charge caused by air travel. The comparison just made between the respective insurance costs of a given number of hours of travel by air and by motor indicates that if the air hazard is to be ignored in life insurance as is the hazard of automobile travel, then the fatality rate must be reduced to something like one-tenth of its present size. Even this improvement would leave the fatality rate per million passenger miles not quite as good as the record of busses and would leave it considerably less favorable than that of the railroads. This refers to scheduled flying. In less supervised types of flying an even greater improvement is necessary. Here is a definite and, let us hope, attainable goal.

I have intimated that insurance applicants connected with aviation are occasionally issued a policy which differs from the normal policy in that the death benefit is reduced if death occurs as a result of aviation. Sometimes in these special policies<sup>2</sup> full coverage is given for flight as an airline passenger, and sometimes for any fare-paying travel.

The reasons why life insurance companies write policies which exclude the hazard of death while engaged as a pilot, and not policies which exclude the hazard of employment as, say, a railroad switchman, are these: first, purchasers of large policies are more likely to be engaged in flying than in any other hazardous pursuit; second, men now in business or professional positions are more likely to take up aviation than they are to turn to some other hazardous occupation or sport; third, the difference in risk between

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2. See *Fred M. Glass*, "Aeronautic Risk Exclusion in Life Insurance Contracts," dealing in part with these restricted policies, in 7 *JOURNAL OF AIR LAW* 305 and 560 (1936).

the best and worst pilots is unusually great, so that there is sometimes difficulty in classifying an applicant. Companies which have only one scale of premiums, namely, the normal or standard scale, therefore use this exclusion clause in order to give at least partial coverage to applicants whom their agents meet in the ordinary course of business and who turn out to be interested in aviation. Other companies use it in cases where the hazard is too great to be covered by any reasonable extra premium or where there are unexpected difficulties in assessing the proper rate or where the applicant thinks the rate quoted is excessive and requests a restricted policy at standard rate. Inasmuch as insurance rates for the principal classes of pilots are based on official statistics, they cannot properly be called "excessive." A high rate is not necessarily an excessive rate. In this case it merely corresponds to a high risk. A pilot who asks for insurance thus restricted is betting it is unlikely that his death when it occurs will be in an air accident. For some years ahead the odds are against him; if a pilot dies young, it is more likely to be in an air accident than from natural death--and if he loses, the loss will fall on his family. Life insurance is one of the things that is paid for whether you have it or not. The only choice is whether it is to be paid for now by an able-bodied man with a job, or later by his widow and orphans. The higher the premium rate, the more urgent the need for making provision.

Some companies therefore take the attitude that the interests of the beneficiary should be protected against the bad judgment of the policyholder. These companies confine the use of the exclusion rider largely to applicants who have discontinued flying but where the permanence of the change is in doubt. Under these conditions if the policyholder carries out his intention to cease flying there is in effect nothing excluded. If he resumes flying he can obtain full coverage at the appropriate price. (Even this exclusion rider, by the way, is not permitted in some states. In these states the company must either reject the application in cases where a rider would otherwise be used or resort to a very clumsy substitute which meets legal requirements.)

Finally, what can you as supervising authorities do to advance the day when flying need no longer be considered as a special insurance hazard? The most obvious answer is to stop the accidents. Beyond that, seize every opportunity to urge the pilots, air passengers, and the aviation industry to help us classify and rate properly, by furnishing all information that may be asked for by yourselves, by the Department of Commerce, or by our committee.

Thank you for the privilege of telling you what we are doing to keep pace with the advance of air transportation.