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Economic Basics of Life Insurance

Overview and Learning Objectives

Chapter 1 explores the concept of risk pooling and the principles of life insurance. It then discusses the concept of human life value and the economic basis for the economic basis for the need for life insurance. It then focuses on the specific needs for life insurance and techniques that can be used for determining these needs.

By reading this chapter and answering the questions, you should be able to

1-1. Explain the concept of risk pooling.

1-2. Explain how the premium for yearly renewable term is determined.

1-3. Describe why the period for renewability for term insurance is limited.

1-4. Describe how the level premium insurance concept works.

1-5. Explain the concept of human life value and how it relates to the need for life insurance.

1-6. Apply the five-step process for estimating a person's economic value to the family.

1-7. List and explain the life insurance needs used by needs analysis to determine the need for life insurance.

1-8. Explain the process of providing for the post-death financial needs of survivors.

Chapter Outline

Basic Principles

Insurance has been defined in many different ways and from different institutional points of view. From an economic viewpoint, insurance is a system for reducing financial risk by transferring it from a policyowner to an insurer. The social aspect of insurance involves the collective bearing of losses through contributions by all members of a group to pay for losses suffered by some group members.

Insurance substitutes certainty for uncertainty through the pooling of hazards to which groups of people are exposed. Uncertain risks of individuals are combined, making the possible loss more certain, providing a financial solution to the problems created by the loss. Small, periodic contributions by the individuals provide a fund from which those who suffer loss may be reimbursed. Insurance thus manages the uncertainty of one party through the transfer of particular risks to another party who offers a restoration, at least in part, of economic losses suffered by the insured individual.

From a business viewpoint, insurance achieves the sharing of risk by transferring risks from individuals and businesses to financial institutions specializing in risk. Lastly, from a legal standpoint, an insurance contract or policy transfers a risk (for a premium) from one party, known as the insured or policyowner, to another party known as the insurer. By virtue of a legally binding contract, the possibility of an unknown large financial loss is exchanged for a comparatively small certain payment. This contract is not a guarantee against a loss occurring, but a method of ensuring that payment will be received for a loss that does occur.

Risk Pooling

Underlying all of these definitions is the concept of *risk pooling*, or group sharing, of losses. That is, persons exposed to loss from a particular source combine their risks and agree to share losses on some equitable basis. The risks may be combined under an arrangement

whereby the participants mutually insure each other, a plan that is appropriately designated "mutual insurance," or they may be transferred to an organization that, for a consideration called the "premium," is willing to assume the risks and pay the resulting losses. In life insurance, such an organization is a stock life insurance company. While several elements must be present in any sound insurance plan, the essence of the arrangement is the pooling of risks and losses.

Illustration of the Risk Pooling Concept

The simplest illustration of risk pooling involves insurance for one year, with all members of the group the same age and possessing roughly similar prospects for longevity. The members of this group might mutually agree that a specified sum, such as $100,000, will be paid to the designated beneficiaries of those members who die during the year, the cost of the payments being borne equally by the members of the group. In its simplest form, this arrangement might involve an assessment upon each member in the appropriate amount as each death occurs. In a group of 1,000 persons, each death would produce an assessment of $100 per member. Among a group of 10,000 males aged 35, 21 of them could be expected to die within a year, according to the *Commissioners 1980 Standard Ordinary Mortality Table (1980 CSO Table)*; if expenses of operation are ignored, cumulative assessments of $210 per person would provide the funds for payment of $100,000 to the beneficiary of each of the 21 deceased persons. Larger death payments would produce proportionately larger assessments based on the rate of $2.10 per $1,000 of benefit.

The CSO Mortality Table is used to calculate reserves and minimum cash values for state regulatory purposes. A new table, the 2001 CSO Mortality Table is currently being introduced and approved for use in the various states.

Example:	10,000 males aged 35 contribute to a life insurance pool. Twenty-one of the 10,000 are expected to die while aged 35 (based on 1980 CSO mortality table). If each of the 10,000 contributes $210 to fund death benefits (ignoring costs of operation), a death benefit of $100,000 could be paid for each of the 21 expected deaths.

The 1980 CSO mortality table lists different rates at each age for men and women. The rate per $1,000 of benefit for women aged 35 is $1.65 in the 1980 CSO table. Most large insurance companies base their rates on their own statistics rather than 1980 CSO. The companies that issue policies only to the healthiest applicants will have rates significantly lower than those of the CSO tables used for reserving purposes by the regulators. Even insurance companies issuing policies to applicants in average health usually experience rates lower than CSO rates.

We will first examine how the premium for a *Yearly Renewable Term (YRT)* insurance policy is calculated. YRT is the simplest form of insurance offered by regular life insurance companies. It provides insurance for a period of 1 year only but permits the policyowner to renew the policy for successive periods of one year each without the necessity of furnishing *evidence of insurability*. This means the policyowner can renew the policy without submitting to a medical examination or providing other evidence of good health, simply by paying the renewal premium.

Determining the Premium

The premium for yearly renewable term insurance is determined by the death rate for the attained age of the individual involved. (This ignores expenses of operation and interest earned on invested prepaid premiums, but the principle involved is still valid.) This is attributable to the fact that each premium purchases only one year of insurance protection. Moreover, each group of policy owners of a given age is considered to be a separate class for premium purposes; each group must pay its own death claims, the burden borne pro rata by the members of the group.

Because the death rate increases with age, the premium for yearly renewable term insurance increases each year.

Example: In a group of 100,000 women aged 25

- Mortality rate for females aged 25: 1.16 per 1,000
- Expected deaths from group: —116
- $1,000 death benefit per deceased=$116,000 in claims
- Each woman could contribute $1.16 and cover the death benefit amount (ignoring costs of operation)

To illustrate, the female death rate at age 25, according to the 1980 CSO Table, is 1.16 per 1,000. If an insurance company should insure a group of 100,000 women aged 25 for $1,000 each for one year, it could expect 116 death claims, aggregating $116,000. Because premiums are paid to the life insurance company in advance, the cost of the anticipated death claims would be distributed pro rata over the 100,000 policy owners, and a premium of $1.16 would be exacted from each policyowner. Note that:

- the premium is precisely the same as the death rate applicable to those insured
- those policyowners who, according to the mortality projection, will die during the year contribute on the same basis as those who will survive

The implication of the latter is that each policyowner pays a share of his or her own death claim. This is a principle that underlies all life insurance contracts. The proportion, however, varies with the type of contract, age at issue, and duration of the protection. The implications of the former are made clear in the following paragraphs.

If the 99,884 survivors of the original group of 100,000 policy owners should be insured for another year, they would be exposed to the death rate for persons aged 26, or 1.19 per 1,000, which would theoretically produce 119 deaths and claims totaling $119,000. That sum divided equally among the 99,884 participants would yield a share, or premium, of $1.19 per person. If the 99,765 women who survived the

first and second year should desire insurance for another year, provision would have to be made for $122,000 in death claims, necessitating a premium of $1.22 per person.

For the first several years, the premium would continue to increase slowly, being only $1.35 at age 30, $1.65 at age 35, and $2.42 at age 40. Thereafter, however, the premium would rise sharply, reaching $3.56 at age 45, $4.96 at 50, $7.09 at 55, $9.47 at 60, and $14.59 at 65. If the insurance should be continued beyond age 65, the cost would soon become prohibitive, soaring to $22.11 per $1,000 at age 70, $38.24 at 75, $65.99 at 80, and $116.10 at 85. The premium at 90 would be $190.75 per $1,000; at 95, $317.32. Finally, if a woman aged 99 should want $1,000 of insurance on the yearly renewable term basis, she would have to pay a premium of $1,000, since the 1980 CSO Table assumes that the limit of life is 100 years and that a person aged 99 will die within the year.

Limiting the Period of Renewability

If the surviving members of the aforementioned group should continue to renew their insurance year after year, the steadily increasing premiums would cause many to question the advisability of continuing the insurance. After a point, there would be a tendency for the healthy individuals to give up their protection, while those in poor health would continue to renew their policies, regardless of cost. This is *adverse selection* against the insurance company.

The withdrawal of the healthy members would accelerate the increase in the death rate among the continuing members and, unless ample margins were provided in the insurance company's premium rates, could produce death claims in excess of premium income. In this event, the loss would be borne by the company, because the rates at which the policy can be renewed are guaranteed for the entire period of *renewability*. It is for this reason that companies offering yearly renewable term insurance on an individual basis often place a limit on the period during which the insurance can be renewed.

Even without restrictions on the period during which the insurance can be renewed, yearly renewable term insurance is not usually feasible for long-term protection. Dissatisfaction with increasing premiums causes many policyowners to discontinue their insurance, often at a time when, because of physical condition or other circumstances, they cannot obtain other insurance. They are also likely to resent that after years of

premium payments at increasing financial sacrifice, the insurance protection is lost, with no tangible benefits for the sacrifice involved.

More important, however, is the fact that few, if any, individuals are able and willing to continue their insurance into the advanced ages where death is most likely to occur. Yet the great majority of individuals need insurance that can be continued until death, at whatever age it might occur. This need led to the development of level premium insurance.

Level Premium Plan

Level premium insurance is just what the name implies—a plan of insurance under which premiums do not increase from year to year but, instead, remain constant throughout the premium-paying period. It does not imply that the insured must pay premiums as long as he or she has insurance protection, only that all premiums required will be of equal size. (In modified life policies, the premium for the first few years of the contract is lower than that required for the remainder of the premium-paying period. There are also graded premium policies with increasing premiums over a period up to 20 years that are followed by level premiums thereafter.)

It must be apparent that if premiums that have a natural tendency to increase with each passing year are leveled out, the premiums paid in the early years of the contract will be more than sufficient to meet current death claims, while those paid in the later years will be less than adequate to meet incurred claims. This is a simple concept, but it has manifold ramifications and far-reaching significance.

With the level premium technique the redundant premiums in the early years of the contract create an accumulation that is held by the insurance company for the benefit and to the credit of the policyowners. (This is not a trust fund in the legal sense, which would require the insurance company to establish separate investment accounts for each policyowner and render periodic accountings.) This accumulation is called a *reserve,* which is not merely a restriction on surplus as in the ordinary accounting sense, but an amount that must be accumulated and maintained by the insurance company in order to meet definite future obligations.

Because the manner in which the fund is to be accumulated and invested is strictly regulated by law, the reserve is usually referred to in official literature as the *legal reserve.* Technically the reserve is a

composite liability account of the insurance company, not susceptible to allocation to individual policies, but for present purposes it may be viewed as an aggregate of individual accounts established to the credit of the various policyowners. In practice each policy is credited with a cash value or surrender value, which is not the same as the reserve but has its basis in the redundant premiums of the early years.

Term Policies

From the standpoint of an individual policy, the excess portions of the premiums paid in the early years of the contract are accumulated at compound interest and subsequently used to supplement the inadequate premiums of the later years. This process can be explained most simply in connection with a contract that provides protection for only a temporary period, as opposed to one that provides insurance for the policyowner's whole of life.

Figure 1-1 shows the level premium mechanism in connection with a term policy issued at age 25, to run to age 65. The level premiums to age 65 are based on the 1980 CSO Female Table and an interest assumption of 4.5 percent. In other words, it is assumed, with respect to the level premium calculations, that the reserves are invested at 4.5 percent, and with respect to the yearly renewable term premiums, that each premium earns 4.5 percent for one year before being disbursed in the form of death benefits.

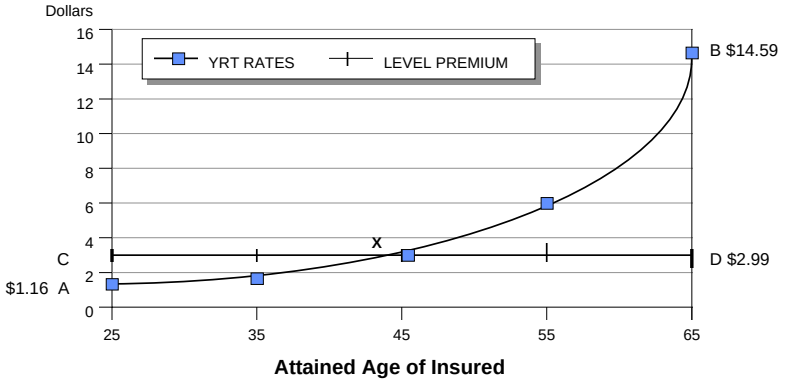
In this example no allowance is made for expenses, which makes it easier to understand. It also conforms to the legislative and regulatory approach of setting reserves strictly on the basis of interest and mortality without consideration of other operating costs.

In figure 1-1 the curve *AB* represents the premiums at successive ages that would be required to provide $1,000 of insurance from age 25 to age 65 on the yearly renewable term basis. The premium ranges from $1.16 at age 25 to $14.59 at age 65. The line *CD* represents the level premium that would be required to provide $1,000 of insurance from age 25 to age 65 on the *level term* basis. The amount of this level premium that would be paid each year through age 64 is $2.99. This exceeds the premiums that would be payable on the yearly renewable term basis prior to age 44 but is smaller than those payable thereafter.

The area *AXC* represents the excess portions of the level premiums paid prior to age 43; the area *BXD* represents the deficiency in premiums after that age. It is apparent that the second area is much larger than the first. The disparity in the size of the two areas is attributable to the fact

that the sums represented by the area *AXC,* which constitute the reserve under the contract, are invested at compound interest, and the interest earnings are subsequently used along with the principal sum to supplement the inadequate premiums of the later years.

FIGURE 1-1
Annual Premium Comparison
Level Term to Age 65 and Yearly Term



The reserve is completely exhausted at age 65 (the expiration of coverage), having been used to pay the policy's share of death claims submitted under other policies. In other words the reserve, including the investment earnings derived therefrom, is gradually used up after age 44 in the process of supplementing the then-deficient level premium. The reserve under this particular contract—term to 65, issued at age 25—reaches its maximum size at age 53, diminishing thereafter at an accelerating rate until exhausted at the expiration of the policy.

Ordinary Life Policies

The functioning of the level premium plan is even more striking—though more difficult to grasp—when applied to a policy providing insurance for the whole of life. A comparison of the level premium required under an *ordinary life policy* with that required on the yearly renewable term basis is presented in figure 1-2. An ordinary life policy is a type of whole life insurance for which level premiums are based on the assumption that they will be paid until the insured's death or the policy termination date of age 100, whichever comes first.

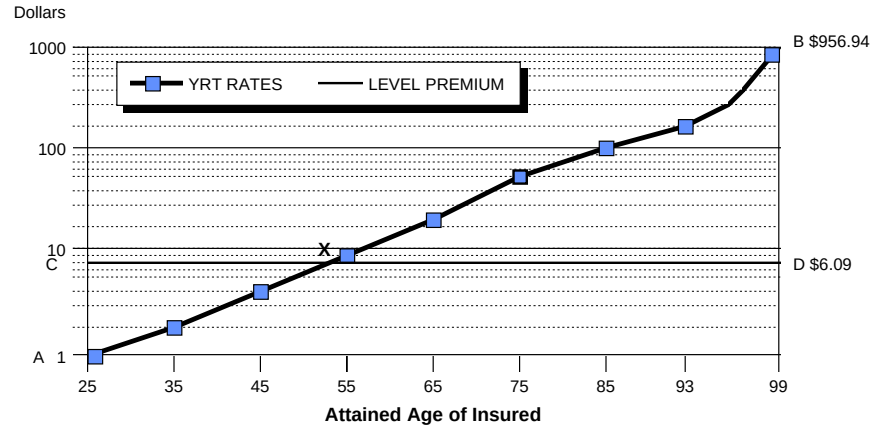
As in the case of figure 1-1, the age of issue is 25, and the premiums are based on the 1980 CSO Female Table and 4.5 percent interest, with no allowance for expenses. In this case, an annual level premium of $6.09 per $1,000 paid as long as the insured lives would be the mathematical equivalent of a series of premiums on the yearly renewable term basis, ranging from $1.16 per $1,000 at age 25 to $956.94 at age 99.

The 1980 CSO Female Table assumes that everyone who survives to age 99 will die during the year, producing a net premium on the yearly renewable term basis equal to the face of the policy, less the interest that will be earned on the premium during the year. In figure 1-2 line *CD* bisects the curve *AB* between the ages of 53 and 54.

Yearly-Term versus level Premium for life for Female Aged 25

- Annual level premium of $6.09 per $1,000 of coverage
- Exceeds yearly term cost of $1.16 per $1,000 coverage at age 25
- Level premium will exceed the yearly term premium until the insured reaches her mid-50's
- Beyond age 55, the level premium of $6.09 per $1,000 of coverage will be less than the cost of yearly term coverage per $1,000
- By age 99, the yearly term premium of $956.94 per $1,000 of coverage greatly exceeds the $6.09 cost per $1,000

FIGURE 1-2
Annual Premium Comparison
Whole Life and Yearly Term



The disparity between the areas bounded by *AXC* and *BXD* is very much greater in this case than in figure 1-1. Even more amazing,

however, is the fact that the excess premiums (area *AXC)* in the early years of an ordinary life contract (or, for that matter, any type of insurance contract except term) will not only offset the deficiency in the premiums of the later years when the term premium is in the hundreds of dollars, but with the aid of compound interest will also accumulate a reserve equal to the face of the policy by the time the insured reaches the terminal age in the mortality table.

This is in contrast to the level premium term contract, under which the reserve is completely used up at the expiration of the contract. The difference is because the risk (probability of occurrence) under a contract providing protection for the whole of life is one "converging into a certainty," while the risk under a term policy is a mere contingency—one that may or may not occur. Under a whole life contract, provision must be made for a death claim that is certain to occur, the only uncertainty being the time it will occur.

By the time an insured has reached 99, the reserve under his or her policy must have accumulated to an amount that, supplemented by the final annual premium and interest on the combined sums for the last 12 months of the contract, will equal the face amount of the policy. This must be the case if each class of policyowners is to be self-supporting, since there are no other funds for the payment of the claims of the last members to die. In effect, such policyowners pay off their own death claims, in addition to paying their share of the death claims of all other members of the group. It should not be surprising, therefore, that the aggregate premiums paid by long-lived persons can exceed the face amount of the policy.

The manner in which the level premium arrangement makes provision for a risk converging into a certainty is explained more thoroughly in the next section.

Effect of Level Premium Technique on Cost of Insurance

Under a level premium type of contract, the accumulated reserve becomes a part of the face amount payable upon the death of the insured. From the standpoint of the insurance company, the effective amount of insurance is the difference between the face amount of the policy and the reserve. Technically speaking, this is the *amount at risk.* As the reserve increases, the amount at risk decreases. The significance of this relationship under discussion is that as the death rate increases, the

amount at risk (the effective amount of insurance) decreases, producing a *cost of insurance* within practicable limits.

The cost of insurance is an actuarial term referring to the sum obtained by multiplying the death rate at the insured's attained age by the net amount at risk. This is the amount a policyowner must pay for protection. It is the sum that each policyowner must contribute as his or her pro rata share of death claims in any particular year. This process is illustrated in table 1-1.

As stated earlier, the net level premium for an ordinary life contract on a female issued at age 25, calculated on the basis of the 1980 CSO Table and 4.5 percent interest, is $6.09. Since the death rate at age 25 is 1.16 per 1,000, about $5 of the first premium is excess and goes into the policy reserve. If the policyowner should die during the first year, the company would use the $5 in settling the claim and would have to draw only $995 from the premiums contributed by the other policyowners in the age and policy classification of the deceased. This would mean that each member's pro rata share of death claims in the first year would be only $1.15 (1.16 x 0.995), instead of $1.16, the yearly renewable term premium for $1,000 of insurance at age 25 (with no allowance for interest).

By the end of the 5th year, the reserve, or accumulation of excess payments, will have increased to $22 per $1,000, which sum would be available for settlement of a death claim under the policy. The net amount at risk would have decreased to $978, which would necessitate a contribution from the other policyowners (and the deceased) of only $1.27, instead of the yearly renewable term premium of $1.30. The reserve will have grown to $139 per $1,000 by the end of the 20th year, which would reduce the cost per $1,000 from $3.32 to $2.86. By the time the insured has reached 65, the reserve under the policy will have accumulated to $397, and the actual amount of protection will have shrunk to $603.

A death claim in the 40th year of the contract would be settled by payment of the $397 in the reserve and $603 from the current year's premium payments (of all the policyowners). The pro rata share of each policyowner for all death claims during the year would be only $7.99, as compared to $13.25 if no reserve had been available. The influence of the reserve on the cost of insurance is even more striking at the advanced ages.

TABLE 1-1
Influence of the Reserve on Cost of Insurance, Ordinary Life Contract for $1,000 Issued at Age 25; 1980 CSO Female Table and 4.5 Percent Interest

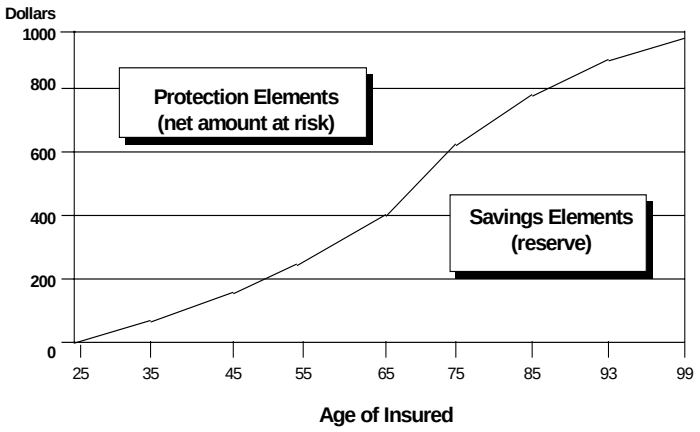
Year	Attained Age at Beginning of Year	Reserve End of Year Even Dollars	Net Amount at Risk	Death Rate per 1,000	Cost of Insurance
1	25	$ 5	$995	1.16	$1.15
5	29	22	978	1.30	1.27
10	34	55	945	1.58	1.49
20	44	139	861	3.32	2.86
30	54	252	748	6.61	4.94
40	64	397	603	13.25	7.99

The true nature of level premium insurance should now be apparent. Under the level premium plan, a $1,000 policy does not provide $1,000 of insurance. The company is never at risk for the face amount of the policy—even in the first year. The amount of actual insurance is always the face amount, less the policyowner's own accumulated excess payments. The accumulation is the reserve for insurance company purposes but the cash value (slightly less in early years) for policyowner purposes. Because the excess payments may be withdrawn by the policyowner at any time through the cash surrender or loan privilege, they may be regarded as a savings or accumulation account. Thus, a level premium policy does not provide pure insurance but a combination of decreasing insurance and increasing cash values, the two amounts computed so that in any year their sum is equal to the face amount of the policy. This is illustrated in figure 1-3 for an ordinary life policy of $1,000 issued at age 25. The calculations are based on the 1980 CSO Female Table and 4.5 percent interest.

The area below the curve represents the reserve under the contract or, as mentioned above, the policyowner's equity in the contract. The area above the curve represents the company's net amount at risk and the policyowner's amount of protection. As the reserve increases, the amount of protection decreases. At any given age, however, the two combined will equal the face amount of the policy. By age 95 the protection element of the contract has become relatively minor, and by age 100—the end of the contract—it has completely disappeared. At age

100, the policyowner will receive $1,000, composed entirely of the cash value element.

FIGURE 1-3
Proportion of Protection and Savings Elements in Ordinary Life Contract, Issued at Age 25; 1980 CSO Female Table and 4.5 Percent Interest



This combination of protection and accumulated cash values is characteristic of all level premium plans with the exception of most term contracts. Fundamentally, one contract differs from another only in the proportion in which the two elements are combined. This basic truth should be kept in mind as the study of contract forms is undertaken.

Yearly term insurance is all protection and has no cash value, while single premium life insurance is at the other end of the spectrum with the highest cash values and lowest proportion at risk. Accumulated cash values should be thought of as some degree of prefunding. Single-premium policies are fully prefunded, and lower-premium policies that develop cash values are only partially prefunded. The shorter the premium-paying period, the higher the relative proportion of cash value to death benefit.

Further Significance of Level Premium Plan

The impact of the level premium plan is felt by nearly all operations of a life insurance company. It accounts for a major portion of the composite assets of the United States life insurance companies that exceed $3.1

trillion and are increasing at more than $100 billion per year. The other main contributor to this asset growth is the reserve component for annuities and pension plans. The investment of these funds has presented the life insurance institution with one of its most challenging problems but, at the same time, has enabled the institution to contribute in a most material way to the dynamic expansion of the American economy.

The level premium plan underlies the system of cash values and other surrender options that has made the life insurance contract one of the most flexible and valuable contracts in existence. It has caused the life insurance contract to be regarded as one of the most acceptable forms of collateral for credit purposes. Despite these positive contributions—and the complications introduced into company operations—the greatest significance of the plan lies in the fact that it is the only arrangement under which it is possible to provide insurance protection to the uppermost limits of the human life span without the possibility that the cost will become prohibitive.

Major Contributions to Life Insurer Assets from level Contributions

- Cash values of life insurance
- Annuities
- Pensions and other qualified plans

Human Life Value

The economic values of a human life are the basis for the need for life insurance, and help determine the amount of life insurance needed by an individual or a family. Life insurance is concerned with the economic values of a human life, derived from that person's earning capacity and the financial dependence of others on that earning capacity. A human life has an economic value only if some person(s) or organization depends upon or expects to receive some monetary benefit through that life. The following discussion explains how the *human life value* is determined, the specific needs for life insurance, and the methods used to calculate the amount of life insurance needed by individuals and families.

The Concept of Human Life Value

A human life possesses many values, most of them irreplaceable and not easily measured. These values are founded on religious, moral, and social relationships. From a religious standpoint, for example, human life is regarded as immortal and endowed with a value beyond the comprehension of mortal man. In a person's relationship with other human beings, a set of emotional and sentimental attachments is created that cannot be measured in monetary terms or supplanted by material things. A human life may be capable of artistic achievements that contribute in a unique way to the culture of a society.

Such values, however, are not the foundation of life insurance. Although not oblivious to these values—in fact, the life insurance transaction has strong moral and social overtones—life insurance is concerned with the economic value of a human life, which is derived from its earning capacity and the financial dependence of other lives on that earning capacity. Because the economic value may arise out of either a family or a business relationship, it seems advisable to discuss the functions of life insurance under two headings: family purposes and business purposes.

Source of the Economic Value of the Human Life

In terms of its physical composition, the human body is worth only a few dollars. In terms of earning capacity, however, it may be worth millions of dollars. Yet earning power alone does not create an economic value that can logically serve as the basis of life insurance. A human life has an economic value only if some other person or organization can expect to derive an economic advantage through its existence.

If an individual is without dependents and no other person or organization stands to profit through his or her living either now or in the future, then that life, for all practical purposes, has no monetary value that needs to be perpetuated. Such an individual is rare. Most income producers either have dependents or can expect to acquire them in the normal course of events. Even those income earners with no family dependents often provide financial support to charitable organizations. In either case, a basis exists for life insurance.

Preservation of Family's Economic Security

In many cases an income producer's family is completely dependent on his or her personal earnings for subsistence and the amenities of life. In other words, the "potential" estate is far more substantial than the existing estate—the savings that the family has been able to accumulate. The family's economic security lies in the earning capacity of each income earner, which is represented by his or her "character and health, training and experience, personality and power of industry, judgment and power of initiative, and driving force to put across in tangible form the economic images of his mind," said S. S. Huebner in 1950.

Over a period of time, these economic forces are gradually converted into income, a portion of which is devoted to self-maintenance, a portion to support of dependents, and if the income is large enough, a portion to savings to meet future needs and contingencies. If the individual lives and stays in good health, the total income potential will eventually be realized, all to the benefit of the family and others who derive financial gain from his or her efforts. If an income earner dies or becomes permanently and totally disabled, the unrealized portion of his or her total earnings potential will be lost, and in the absence of other measures, the family will soon find itself destitute or reduced to a lower income than it previously enjoyed.

This need not happen, however, since there are contracts that can create a fund at death at least to partially, and possibly to fully, offset the lost income of the insured. Those contracts, of course, are life insurance. By means of life insurance, an individual can assure that the family will receive the monetary value of those income-producing qualities that lie within his or her physical being, regardless of when death occurs. By capitalizing (creating a fund large enough to generate investment income approximating the salary or wages of the individual) this life value, an income earner can leave the family in the same economic position that they would have enjoyed had he or she lived.

The Moral Obligation to Provide Protection

Most people assume major responsibility for the support and maintenance of their dependent children during their lifetime. In fact, they consider it one of the rewarding experiences of life. In any case, the law attaches a legal obligation to the support of a spouse and children. Thus if there is a divorce or a legal separation, the court will normally decree support payments for dependent children and possibly alimony for the dependent spouse. In some cases such payments, including alimony, are to continue beyond the provider's death, if the children are still dependent or if the alimony recipient has not remarried. In such event, the parent and ex-spouse are required to provide life insurance or to set funds aside in trust.

Nevertheless, it takes a high order of responsibility for a parent to voluntarily provide for continuation of income to dependents after his or her own death. It virtually always involves a reduction in the individual's own standard of living. Yet few would deny that any person with a dependent spouse, children, or parents has a moral obligation to provide them with the protection afforded by life insurance, as far as his or her financial means permit.

In his book Life Insurance, Dr. S. S. Huebner said the following concerning the obligation to insure:

> From the family standpoint, life insurance is a necessary business proposition that may be expected of every person with dependents as a matter of course, just like any other necessary business transaction which ordinary decency requires him to meet. The care of his family is man's first and most important business. The family should be established and run on a sound business basis. It should be protected against needless

bankruptcy. The death or disability of the head of this business should not involve its impairment or dissolution any more than the death of the head of a bank, railroad, or store. Every corporation and firm represents capitalized earning capacity and goodwill. Why then, when men and women are about to organize the business called a family should there not be a capitalization in the form of a life insurance policy of the only real value and goodwill behind that business? Why is it not fully as reasonable to have a life insurance policy accompany a marriage certificate as it is to have a marine insurance certificate invariably attached to a foreign bill of exchange? The voyage in the first instance is, on the average, much longer, subject to much greater risk, and in case of wreck, the loss is of infinitely greater consequence.

The growth of life insurance implies an increasing development of the sense of responsibility. The idea of providing only for the present must give way to recognition of the fact that a person's responsibility to his family is not limited to the years of survival. Emphasis should be laid on the "crime of not insuring," and the finger of scorn should be pointed at any man who, although he has provided well while he was alive, has not seen fit to discount the uncertain future for the benefit of a dependent household . . . Life insurance is a sure means of changing uncertainty into certainty and is the opposite of gambling. He who does not insure gambles with the greatest of all chances and, if he loses, makes those dearest to him pay the forfeit.

Measurement of Monetary Value

It seems agreed that an individual should protect his or her earning capacity for the benefit of dependents by carrying life insurance in an appropriate amount. The question logically arises at this point as to how much is an "appropriate" amount.

One method of determining how much life insurance a person should carry is called the *human life value approach*. It is based on the proposition that a person should carry life insurance in an amount equal to the *capitalized value* of his or her net earnings. Under this theory, a person should capitalize this economic value at an amount large enough

to yield, at a reasonable rate of interest, an income equal to the family's share of those earnings.

In an attempt to obtain the same general result, others have recommended that a person capitalize this value at a figure large enough to yield an annual income equal to a specified percentage, such as 50 percent, of those personal earnings at the time of the provider's death. In response to the significant inflation in recent decades, some suggest capitalizing the worker's full income (or more) so that the income portion that would otherwise have gone to income taxes and the insured's self-maintenance can be used to offset general price inflation.

All of these approaches are based on the assumption that the income from personal efforts will not end. All would preserve the capitalized value of a portion of those earnings into perpetuity. Such an assumption is theoretically invalid. Personal earnings are subject to termination at any time by the producer's death or disability and, in any case, will generally not continue beyond the date of retirement. Therefore, in capitalizing the earnings of an individual, their terminable nature can be taken into account.

The technically accurate method of computing the monetary value of a person is too complex for general use. It involves an estimate of the individual's personal earnings for each year from his or her present age to the date of retirement, taking into account the normal trend of earnings and inflation. From each year's income the cost of self-maintenance, life insurance premiums, and personal income taxes is deducted. The residual income for each year is then discounted at an assumed rate of interest and against the possibility of its not being earned. In the latter calculation, the three contingencies of death, disability, and unemployment have to be considered. The sum of the discounted values for each year of potential income is the *present value* of future earnings or the monetary value of the life in question. *Present value* is equivalent to the given sum to be received in the future, discounted (reduced) by an interest rate representing what could be earned on that money if it was received today instead of in the future.

When determining the economic value of a human life for purposes of insuring that value against loss by death, one should consider the projected flow of income to the family rather than the probability of the provider's death. The objective is to determine the present value of the income flow to the family if the family provider survives to the end of his or her income-producing period since ideally insurance will be

sufficient to permit the family to enjoy the same standard of living that it would have enjoyed had the provider(s) not died.

Five-step Procedure for Estimating Economic Value

A reasonably accurate estimate of a person's economic value for purposes of life insurance can be derived by a simple-to-understand method that can be used by anyone with access to a computer, a financial calculator, or compound-interest discount tables. There are five steps in this procedure:

1. Estimate the individual's average annual earnings from personal efforts over the remaining years of his or her income-producing lifetime.
2. Deduct federal and state income taxes, life insurance premiums, and the cost of self-maintenance.
3. Determine the number of years between the individual's present age and the contemplated age of retirement.
4. Select a reasonable rate of interest at which future earnings will be discounted.
5. Multiply (1) minus (2) by the present value of $1 per annum for the period determined in (3), discounted at the rate of interest selected in (4).

In the first step an effort should be made to anticipate the pattern of future earnings. In the majority of cases, particularly among semiskilled and clerical workers, earnings will reach their maximum at a fairly early age, perhaps around 40, and will remain at that level (except for inflation adjustments) until retirement. The earnings of professional people continue to increase until about age 55, after which they level off or decline somewhat unless they are adjusted for inflation. The earnings of still other groups may continue to rise until shortly before retirement. It is difficult to estimate accurately the average annual income that can be expected. Inflation, technological change, and increased global competition are accelerating the rate of change and our society's economic volatility.

The costs in the second step are also difficult to estimate, but income taxes and the cost of self-maintenance can be approximated within a reasonably close margin of error unless Congress makes a drastic change in the future tax rates. The purpose of step (2) is to discount the funds that serve purposes other than supporting one's dependents and to arrive at the family's share of the breadwinner's personal earnings. The

determination of the income tax liability, life insurance premiums, and the cost of self-maintenance can be dispensed with if the individual can estimate what portion of personal earnings currently goes to the support of the family. In the typical case it is probably relatively accurate to assume that about half of the provider's gross personal earnings is devoted to the support of the family. In the low-income brackets, the percentage is undoubtedly a little higher but in no event more than two-thirds; in the higher-income brackets, the percentage might be lower than one-half.

The purpose of step (3) is to determine how long the family can expect to receive the income projected in step (2), ignoring, for reasons indicated above, the probability that the individual may die before reaching normal retirement age.

Elements of Economic Value Estimates

- Average annual earnings estimate
- Taxes, self-maintenance costs, life insurance premiums
- Remaining years in workforce before retirement
- Estimated interest rate applicable to future working years

The rate of interest selected in step (4) should be in line with the rate generally payable on proceeds left with the insurance company since it is usually a conservative estimate of conditions over the relevant future period. Another acceptable interest rate estimate is the rate used by the Pension Benefit Guaranty Corporation (PBGC is a federal agency located in Washington, DC) for valuing defined-benefit pension liabilities.

Calculating Present Value

The *present value of $1 per annum*, the only new element involved in step (5), is obtained directly from a financial calculator or a computer using financial software. Alternatively it can be derived from a compound-discount table that shows the present value of a series of future income payments—specifically, $1 per annum—for various periods of time and at various rates of interest.

Example: **Examples of present values of $1 per annum**

- Forty annual payments of $1 at the end of each year with an interest rate of 0.0 percent are equal to $40 today.
- Forty annual payments of $1 at the end of each year with an interest rate of 5.0 percent are equal to $17.16 today.
- Forty annual payments of $1 at the end of each year with an interest rate of 4.5 percent interest are equal to $18.40 today.

The entire process of computing the monetary value of a human life can be illustrated with the following example:

Example: Angus McDonald is a married male, aged 35, with gross annual earnings of $40,000 (expected level to retirement) and with an assumed $20,000 available annually to support his family. Angus plans to retire at age 65. The assumed interest rate is 5.0 percent. Thirty years of $1 payments has a present value of $15.37. Applying the five-step procedure produces these results.

1. The average annual future earnings are $40,000.

2. The portion of the average annual future earnings available to the family per year is $20,000.

3. The number of years to retirement is 30.

4. The assumed interest rate is 5.0 percent.

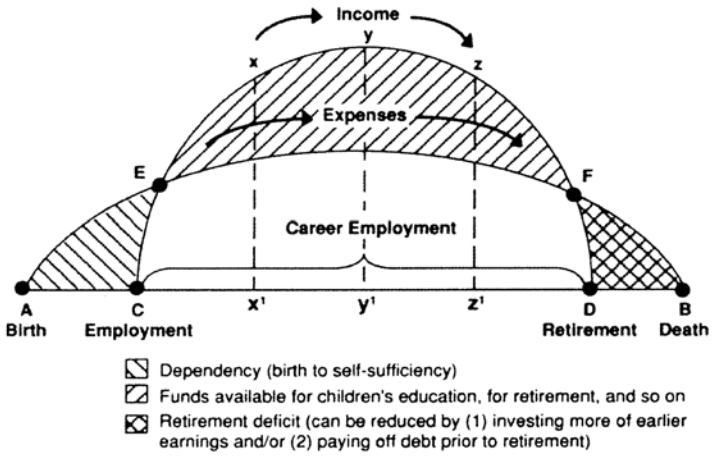
5. The calculations to determine the present value of future earnings to the family are $40,000 less $20,000 equals $20,000 x $15.37 = $307,400.

Diminishing Nature of the Economic Value

The economic value of an income earner tends to diminish with the passage of time. His or her earning level may continue to increase for a certain period or indefinitely, but with each passing year, the remaining period of productivity becomes shorter. Each year of income that is realized means that there is less that remains to be earned. Because an individual's economic value is nothing more than the unrealized earning capacity represented by native ability and acquired skills, his or her value must diminish as potential income is converted into actual income. This principle is illustrated by the diagram in figure 1–4.

The chord (a straight line joining two points on a curve) *AB* represents the lifetime of an individual born at point *A* and dying at point *B*. The chord *AB* also represents the cost of maintenance and, during his or her productive years, the individual's income tax liability. The arc *CD* represents earning capacity. During the period *A to C*, there are no earnings, but there are costs of maintenance represented by the triangle *AEC*. Earnings commence at *C*. The area of arc *CD* that extends above arc *AB* represents earnings in excess of taxes and the cost of self-maintenance. Point *D* marks the age of retirement, and the area *DFB* symbolizes the second major period in the individual's life, during which the cost of self-maintenance exceeds his or her income.

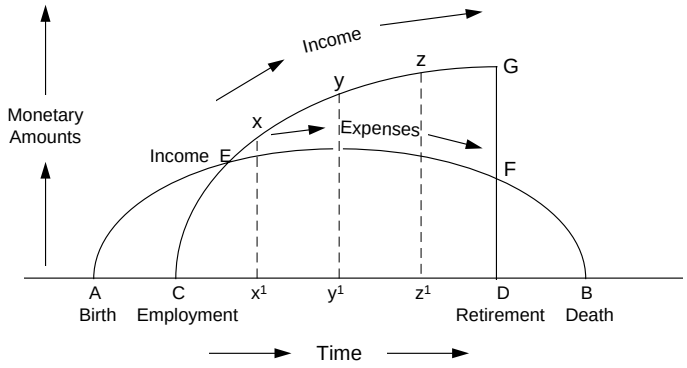
FIGURE 1–4
Hypothetical Illustration of Economic Value of a Human Life



In figure 1–4 the monetary value of the individual is at its peak at point *E* since net earnings are just commencing. At the point where xx^1 intersects the arcs, the earnings rate has increased, but potential future earnings have declined. The earnings potential shows further decreases at yy^1 and zz^1; at point *F*, it has shrunk to zero.

Figure 1–4 is diagrammatic and obviously unrealistic. Neither earnings nor maintenance expenses follow a symmetrical curve. For example, the childhood period starts with a highly unsymmetrical outlay for maternity costs. Income is also likely to commence earlier than at point *C*, particularly among lower-income groups, and under no circumstances is it likely to decline so gradually to the age of retirement. In most occupations people reach their maximum earnings in their 40s, and earnings decline only slightly to retirement, when they terminate abruptly. Figure 1–5 shows a fairly typical pattern of earnings among clerical and professional groups.

FIGURE 1–5
Typical Pattern of Earnings



Bases for Insurance

These diagrams roughly illustrate the economic foundation of three broad categories of life insurance. The first is represented by the area *AEC*. During this period the individual's needs are met by the parents or other persons responsible for the child's welfare. If the child dies before

becoming a producer, the investment in nurturing, maintenance, and education is sacrificed. This can be a sizable sum, especially if the child has been educated at private schools. Various studies have shown that the cost of rearing a child to age 18 ranges from 1.5 times to 3.25 times the parents' average annual income. At today's prices the cost may be even higher. While most parents regard these expenditures as one of the duties and privileges of parenthood and justifiably shrink from labeling them as an investment to be recovered in the event of the child's death, such costs do create a substantial insurable value. This value can logically serve as one of the bases for juvenile insurance—a strong segment of the life insurance business.

The second category of insurance is portrayed by the area EGF. The surplus earnings represented by this area are the source of support for the individual's dependents and a broad measure of the economic loss to the family if the producer(s) should die. A portion of these earnings will go toward insurance premiums, and another portion should be set aside for both spouses' old-age needs, but the share that is destined for the care and maintenance of the family should be capitalized and preserved for the family through the medium of life insurance. This is family insurance in the purest sense.

Finally, the individual's retirement needs are represented by the area *DFB.* Although the income vacuum may be partially filled by federal OASDI (Old Age, Survivors, and Disability Income)—Social Security—benefits, pension plans and other tax-qualified plans (such as profit sharing, income deferral, and thrift or savings), and individual investments, the most realistic source of funds to cover any income shortage is through investment income, life insurance and annuities. This remaining need can be satisfied with group life insurance through employment and/or a personal insurance program. For long-term planning purposes, however, individuals should not rely on group life insurance for any more than the funds that can—and will—be kept in force after an unforeseen job loss. Individuals should check their employer's plan to find out how much of the group life insurance they can convert to individual insurance after termination of employment.

Needs Analysis

The human life value approach produces a present value for a person at a given point in time. This method may not fully anticipate other needs

that arise with the death of a person. An estimate of these additional concerns is obtained through a *needs analysis approach* to the question: How much life insurance is enough? The needs analysis approach is a way of determining how much life insurance a person should carry by analyzing the various needs a family or other dependents would experience if the income producer died.

It would be difficult, if not impossible, to prepare a list of all needs that might possibly arise after the death of the income producer. Family circumstances differ, and a list of needs that would be appropriate for one family might be quite unsuitable for another. Moreover, within any particular family, the needs picture changes from time to time. The most that can be attempted in this section is to outline the general categories of needs that are likely to be found in any family situation. These categories are discussed in the order in which they arise, which in most cases is also the order of importance.

Cleanup Fund

The death of an insured family member usually terminates an income stream that the family has relied upon. The costs of daily living for survivors, final expenses for the deceased insured, and emergencies, repairs and replacements associated with events surrounding the family member's death, death taxes, and the cost of estate administration (including executor's or administrator's fee, appraisers' fees, and legal fees) create an immediate need for funds. Mortgages might well be included in the list, but in view of their size and the special problems frequently encountered in their connection, they are usually treated as a separate need.

One of the goals of proper planning is to make sure the emergency fund is adequate to meet the survivors' needs until life insurance proceeds and other potential sources of funds become available.

Families having an adequate source of emergency funds in liquid holdings, such as money market funds, mutual funds, bank balances, cash management accounts, life insurance cash values, and so forth, may easily meet any need for immediate cash following the death. However, the need for additional funds becomes urgent if the family does not have an emergency fund or has depleted it prior to the death.

Readjustment Income

Few individuals are able to leave an estate, including life insurance, substantial enough to provide their dependents with an income as large

as they enjoyed while the income earner was alive. This means that an adjustment will generally have to be made in the family's standard of living. To cushion the economic and emotional shock, however, it is desirable to postpone that adjustment for a period following the income producer's death. The length of the period depends largely on the magnitude of the change that the family will have to make in living standards. If the surviving spouse must refresh or acquire skills to gain employment, a longer period may be needed. Whatever the duration, the income during this readjustment period should be approximately equivalent to the family's share of the producer's earnings at the time of his or her death.

Income During Dependency Period

After the expiration of the readjustment period, income should be provided in a reduced amount until the children, if any, are able to support themselves. Two concepts are involved: how much income should be provided and for how long.

As a minimum, there should be enough income that the family can remain intact and the surviving spouse can devote adequate time to the care and guidance of the children during their formative years.

The most important determinants of the income's duration are the present ages of the insured's children and the type of education they will receive. In any case, income should continue until the youngest child is 18. If there are several children, the income can be reduced somewhat as each reaches the age of self-sufficiency. If the children are to receive a college education, income will have to continue for a longer period. For planning purposes, the immediate death of the income producer is assumed. The projected income is then presumed to be needed for a period equal to the difference between the present age of the youngest child and the age at which the child is expected to become self-supporting.

Life Income for Surviving Dependent Spouse

After the children have become self-supporting, the widow(er) will still have needs as an individual and will require an income from some source.

If the surviving spouse is a full-time homemaker until the children finish at least part of their education, he or she may subsequently be able to obtain employment, but the earning power for people entering the workforce at that age will have declined substantially. After the birth of

children, for example, a wife sometimes gives up her job or the opportunity to become self-supporting. As the years pass, whatever occupational skills she may have possessed may have diminished and she will most likely have to return to the labor market as a middle-aged woman with deficient skills. Under such circumstances, employment opportunities are limited. Many individuals feel a moral obligation, therefore, to provide their spouses with incomes that will continue throughout the remaining years of their lives. The income may be modest, but it can be the difference between complete dependency on welfare services and reasonable self-sufficiency.

Special Needs

There are certain needs that are not found in every family situation and, even when they are found, are not likely to enjoy as high a priority as those previously discussed. Three of the most prominent of these are mortgage redemption, educational, and emergency needs.

Mortgage Redemption Needs—Home ownership is usually burdened with a mortgage and it is highly probable that a balance will still be outstanding upon the death of a person with dependent children. In some cases, of course, the widow(er) may want to sell the house and move into a smaller one or into an apartment, and it would not be essential to provide funds for the liquidation of the mortgage. In many cases, however, it is contemplated that the survivors will continue to occupy the family residence, and funds to pay off the mortgage may be needed. If the family can occupy the home free of a monthly mortgage payment, it will greatly reduce the amount of income that they would otherwise require.

Elements of Needs Analysis

- Cleanup fund
- Readjustment income
- Income during dependency period
- Life income for surviving dependent spouse
- Special needs
- Mortgage redemption needs
- Educational needs
- Emergency needs

Educational Needs—The income provided for a surviving spouse during the period when the children are dependent should normally be adequate for secondary school expenses, as well as for general maintenance. If a college education for one or more of the children is envisioned, however, additional income will be needed. There is no question that a college or professional education is beyond the means of many dependent children who lose an

income-earning parent.

Emergency Needs—From time to time in the life of a family, unforeseen needs for money arise because of illness, surgery, major dental work, home repairs, or many other reasons. It is unrealistic for the family income providers to leave enough income for the family to subsist on only if everything goes well and no unusual expenditures are incurred. Therefore, a liquid fund should be set up from which additional income can be provided if and when it is needed. Some financial planners suggest that the emergency fund often warrants a higher priority than income for dependents. The actual setting of priorities is properly the responsibility of the income earner(s).

Retirement Needs—Retirement planning is a contingency that the financial planner and estate planner must anticipate. This contingency determines the type of insurance the worker should purchase. If the family needs are met with cash value life insurance (assuming adequate funds for premiums), the cash values under this insurance can supplement other retirement income sources to take care of the postretirement needs of the insured and the spouse, if still living.

Monetary Evaluation of the Cash and Income Needs

It is interesting to compare the monetary value of the above needs with the economic value of the human life computed earlier. For purposes of comparison, assume—as in the earlier illustration—that the family head is a male aged 35, has gross annual earnings of $40,000, and devotes $20,000 per year to his family. Assume further that he has a wife aged 30 and two children, ages 2 and 5, and that an income of $1,700 per month is to be provided during the first 2 years, $1,460 per month during the next 14 years, and $971 per month thereafter for the life of the surviving spouse.

In computing the present value of the foregoing series of income payments (*income needs*), it is advisable to treat them as a life income of $971 per month payable from the surviving spouse's age 30 with an additional income of $240 per month for 16 years and another $50 per month for 2 years. On the basis of the 1983 Individual Annuity Table and 4-percent interest, a life income of $971 per month for a female aged 30, with payments guaranteed for 20 years, has a present value of approximately $220,000. Provision must be made for guaranteed payments during the children's dependency, since in the event of the

widow's early death, the income to the children will be reduced from $971 per month to $489 ($729 per month during the first 2 years). Guaranteed installments are available only in multiples of 5 years (up to 20 years), and at age 30, a 20-year guarantee can be obtained at a sacrifice of only 1 cent per $1,000 of principal sum, compared to the cost of a 15-year guarantee that would be one year short of the 16-year dependency period. The present value on a 4-percent interest basis of $489 per month for 16 years is $69,263, and the present value of $240 per month for 2 years is $5,526. The present value of the family's income needs when the figures are rounded to the nearest hundred dollars is $294,800.

The total increases when the *cash needs* (cleanup fund and mortgage redemption fund, educational needs, and emergency needs) are added. Even if no provision is made for the children's college education, a cleanup fund of $20,000, a mortgage redemption fund of $80,000, and an emergency fund of $30,000 will increase the total to $424,800. If $80,000 is provided to each of the children for a college education, the total income requirements reach $584,800.

Example:	Married male aged 35, spouse aged 30, children ages 2 and 5	
	Income needed first 2 year	$ 1,700 per month
	Income needed next 14 years	$ 1,460 per month
	Income thereafter for surviving spouse	$971 per month
	Assumed interest rate	4.0 percent
	Cleanup fund	$ 20,000
	Mortgage redemption fund	$ 80,000
	Emergency fund	$ 30,000
	Education fund for children	$ 160,000
	Combined needs (rounding to nearest $100)	$ 584,800

It is not likely that these needs will have to be met entirely through personal life insurance. If the individual in the example is covered under the federal OASDI program (Social Security) with benefits approaching the maximum—which, in view of his earnings, is very probable—nearly two-thirds of the income needed until the youngest child is 18 will be provided by the federal government (assuming the widow will not

remarry and both children survive the period). This would reduce the personal insurance requirements by approximately $170,000.

If the husband had attained "fully" insured status for Social Security at the time of his death—also a reasonable assumption—the widow at age 62 would become entitled to a life income of $800 per month, which would reduce the personal insurance requirements by another $29,600. The individual may also be covered by group life insurance, with benefits of possibly $150,000 or more. Therefore, it is not beyond the realm of possibility that all the needs, including those requiring lump-sum payments, may be met in full with the purchase of $235,000 of additional life insurance.

The retirement needs of the husband do not impose additional quantitative requirements. If the husband purchases $300,000 of life insurance (roughly the equivalent of the income needs computed earlier) on the ordinary life plan (the lowest premium type of permanent insurance) before age 35, it will have accumulated at least $125,000 in cash values by age 65. This will provide him with a life income, with payments guaranteed for 10 years, of more than $1,012 per month. If his wife is also alive and in need of old-age protection, the accumulated sum could be converted into a joint-and-last-survivor annuity, which would provide a lower (a 7.5 percent to 14 percent reduction) income per month as long as either the husband or the wife survives.

Such an income, supplemented by federal OASDI benefits and possibly retirement benefits from an employer pension plan, should meet their old-age needs with ample margins. (If the insured keeps premium outlays down through a liberal use of term insurance, the cash values available at age 65 will be reduced accordingly.)

Amount of Insurance Needed

Ideally, the life of each productive member of society should be insured for an amount equal to his or her full economic value, as measured by contributions to those who depend on that income. Upon the death of the income producer, the insured sum should then be liquidated in a manner consistent with the purposes for which it was created, meeting the various needs in the order of their importance. If the insured lives to retirement, the sums accumulated through premium payments may be used, with the exception of amounts required for cleanup and other necessary purposes, to satisfy the postretirement needs of the insured and his or her spouse.

As a practical matter, attaining this ideal is difficult, even when death benefits available under the federal OASDI program and employer benefit plans are taken into account. The basic obstacle is that when both the economic value and the needs are at their maximum—at younger ages—the funds available for premium payments are at their minimum. In the lower income groups, the bulk of the family income is spent on the necessities of life; very little is saved. As the family income rises, aggregate expenditures for consumer goods increase, but they constitute a smaller percentage of total income. Thus, more money is available for insurance premiums and other forms of savings. By that time, however, the need for insurance may have declined somewhat.

Amount of Insurance Needed

- Estimated economic value or amount needed to fund desires
- Less amounts already available (Social Security, investments, existing benefits and so on)
- Equals the unfunded amount that can be made up with life insurance

Various formulas have been developed in an attempt to establish the proper relationship between family income and the amount of insurance to carry. A rule of thumb that has gained some acceptance is that 10 percent of gross family income should be devoted to life insurance premiums. Although this ratio is probably unrealistic at lower income levels, it becomes attainable as the income level increases. Another rule states that the typical wage earner should carry insurance equal to some specified multiple of annual gross income, while persons in the higher income brackets should capitalize a higher multiple of annual earnings. Such rules of thumb are too simplistic because they do not take into consideration either (1) accumulated assets or (2) family composition and objectives.

Shortcoming of Rules of Thumb

- They do not recognize accumulated assets.
- They do not recognize individual family circumstances or family objectives.

An attempt to determine life insurance needs that does not rely upon a fair amount of client information is of questionable worth. The rule-of-thumb approach ignores information about the specific needs of the client's dependents, how much the client has already accumulated, and any existing external sources of finance such as trusts and inheritances. The simplistic rule-of-thumb approach can err in either direction; that is, it can either overinsure or underinsure the client.

Simplistic rules of thumb may perform a positive function if they are the only approach or logic that motivates the client to purchase needed insurance. Sometimes clients do resist providing the information necessary for an appropriate and thorough analysis of their needs.

In this chapter it is assumed that clients are serious about their financial future and that the financial services professional has established enough trust for the information-gathering and analysis process to proceed. Problem solving in this arena requires complete and accurate information about current income, potential future income, accumulated assets, investments, pensions, and other qualified plan holdings. In addition, it is important to develop a profile of the client's priorities and goals or objectives. A fair amount of time and energy is often spent in gathering the necessary information before any steps can even be taken toward analysis and recommendation.

The conceptual approach to determining needs is very easily explained. The client's desires must be translated into estimated costs, and then those costs must be evaluated to determine how much of the funding is already in place. Any deficit between the intended goals and objectives and current financial sources usually creates a candidate for life insurance. Life insurance provides a means of completing the financing of family goals and objectives that individuals work toward during their lifetime. In essence, life insurance can be a personally arranged and collectively financed means of replacing lost income, and in some ways it is analogous to trusts and inheritances in wealthy families.

Deriving Components of Need

Post-death Financial Needs—Post-death financial needs are conveniently separated into two main categories:

1. cash (lump sum) needs at death
2. ongoing income

The amounts associated with each of these categories vary widely from one individual to another and from one family to another. Reliance on general guidelines rather than on individual evaluation increases the likelihood that important and potentially costly needs may be overlooked or ignored.

Because the purpose of life insurance is to fund the unfunded portion of these objectives, it is important to consider any and all existing funds that can provide part or all of these needs. For simplicity and efficiency, most planners suggest using some target percentage of the insured's current income as the target income level rather than calculating a

composite of each individual anticipated need component. It is often suggested that the survivor(s) will need about 70 percent of the predeath income to carry on after death.

Projecting future cash flow and deducting the existing sources of income are the first steps in determining the income deficit. The next step is to find the present value of all those future income needs. This calculation can be done in many different ways and with many different levels of specificity. Often it is broken up into component segments so that the income deficit will be the same throughout that particular component period. If the calculation is done that way, the final calculation of the total income need is the sum of the present values of each of the separate, individually calculated segments.

Most financial advisors suggest that these components be kept at a minimum and that simplifying assumptions be made whenever possible or appropriate in order to keep this estimation process from becoming too cumbersome and time consuming. It is important to remember that this is still an estimation process intended to simulate unknown future occurrences. The estimates are made without the benefit of knowing what future inflation rates and investment returns will be. Financial advisors and insurance agents are no more omniscient than economists are when it comes to estimating future investment income and inflation rates.

In fact, some advisors suggest that all values should be done in current dollar amounts and with no discounting applied to future income periods. They maintain that such discounting merely complicates an imprecise estimation process and that ignoring inflation as well will probably make the estimates somewhere near what will ultimately happen. There is much merit in these suggestions. An inordinate amount of time and resources can be spent trying to estimate to the penny future income flows. Computers make it possible to estimate every last detail in fractions of a cent. However, just because a computer spits out numbers with four-decimal-place accuracy or more does not mean that those numbers will actually unfold in the future.

Liquidating Approach

- All investment income is distributed
- Part of the investment capital is being distributed with each payment
- Intent is to nearly exhaust the investment fund at the end of recipient's life
- Requires estimation of the remaining lifetime

After future income needs have been estimated and combined into a total, there is another important step that must be completed to translate this need into a stated funding objective. Future income

payments can be comprised solely of investment earnings on a capital sum, or they can be a combination of investment earnings and liquidation of part of the capital sum. The advantage of using investment earnings only to supply such income streams is that the capital sum is not being depleted, and consequently a termination date on the income stream is not necessary. This means that individuals relying upon the income will not outlive their income stream. The disadvantage of this strategy is that it takes more money in the capital fund to fully fund this approach than it takes to fund a program that relies on liquidation of part of the principal.

A serious shortcoming of the liquidating approach is that the fund will eventually be totally dissipated. The strategy requires estimating the insured's likely maximum age at death and planning liquidation for that date or later. Any liquidation planning predicated on the beneficiary's death at an early age runs a high risk of liquidating the proceeds while the beneficiary is still dependent on them. As one famous agent likes to put it, they run out of money before they run out of time. Financial advisors are well advised to plan for a liquidation in such a way that the beneficiary is likely to run out of time before he or she runs out of money.

Nonliquidating Approach (Capital Needs)

- Benefit payments are completely derived from investment income
- Investment fund is not diminished
- Benefits can be paid as long as needed
- Requires larger investment fund than that for a liquidating approach
- Much simpler to calculate

There are essentially two ways of eliminating this potential problem associated with liquidating the principal sum over the beneficiary's lifetime. One approach is to use policy proceeds at death to provide a life income through policy settlement options or separate annuity contracts. These arrangements guarantee lifelong income payments regardless of how long the recipient lives. The other approach (nonliquidating) is the previously mentioned capitalization at a high enough level that all the income benefits can be provided from the investment income only.

Within the life insurance industry the liquidating approach is often referred to as the *financial needs analysis*, and a nonliquidating approach is often referred to as the *capital needs analysis*.

Another advantage of the nonliquidating approach is the simplicity of calculating the needed capital fund. The desired income level is easily capitalized by dividing that income amount by the applicable interest rate representing the after-tax investment return anticipated on the capital sum. For example, if $100,000 per year is desired, and the capital sum generating those income payments can realistically expect to generate a 5 percent return after taxes, a $2 million fund is sufficient. This is

determined by taking the desired income amount and dividing into that the realistic estimate of the after-tax investment return rate. In our example it was .05, or 5 percent. That division yields the $2 million capital fund amount needed. Obviously, the lower the after-tax investment return rate, the higher the capital fund needed to throw off the same amount of income. Similarly, higher marginal tax rates will lower the after-tax return rate and increase the size of the fund needed to generate the income.

Chapter One Review

Key terms and concepts are explained in the glossary. Answers to the review questions and the self-test questions follow the Glossary.

Key Terms and Concepts

risk pooling
1980 CSO Table
yearly renewable term insurance
evidence of insurability
adverse selection
renewability
level premium insurance
reserve
legal reserve
level (premium) term
ordinary life policy
amount at risk
costs of insurance
human life value
human life value approach
capitalized value
present value
present value of $1 per annum
needs analysis approach
cleanup fund
readjustment income
dependency period
income needs
cash needs
financial needs analysis
capital needs analysis

Review Questions

1-1. Explain the concept of risk pooling and how it relates to life insurance.

1-2. Explain how the premium for Yearly Renewable Term (YRT) is determined.

1-3. Explain why the period for renewal is limited in term policies.

1-4. Explain how the level premium insurance concept works.

1-5. Explain the concept of human life value and how is relates to life insurance.

1-6. Explain the five-step process for estimating a person's economic value for purposes of life insurance.

1-7. List and explain the six life insurance needs used to determine the amount of life insurance a person should carry.

1-8. Explain the process of providing for the post-death financial needs of survivors using financial needs analysis and capital needs analysis.

Self-Test Questions

Instructions: Read the chapter first, then answer the following 10 questions to test your knowledge. Circle the correct answer, then check your answers in the answer key in the back of the book.

1-1. When planning for post-death income needs, the liquidating approach, using both principal and interest from life insurance proceeds, is known as the:

(A) capital needs analysis approach
(B) financial needs analysis approach
(C) human life value approach
(D) capital conservation approach

1-2. The human life value approach is based on

(A a person's eligibility for social security income
(B) the amount of life insurance he or she owns
(C) the standard of living he or she wishes to have
(D) the capitalized present value of potential lifetime earnings

1-3. In a level premium ordinary life policy, the net amount at risk

(A) increases each year
(B) decreases each year
(C) remains the same over time
(D) could increase or decrease based on investment returns

1-4. Which of the following is a characteristic of an ordinary life policy?

(A) It is the most expensive form of cash value insurance.
(B) It matures at age 65.
(C) It has an increasing cash value and decreasing risk amount.
(D) Both the cash value and amount at risk increase annually.

1-5. Which of the following statements concerning yearly renewable term is correct?

(A) The insurance company may experience some adverse selection at renewal time.
(B) The premiums do not increase from year to year.
(C) Evidence of insurability must be furnished at the time of each renewal.
(D) The insured can renew the policy each year by completing a medical exam.

1-6. The tendency for healthy individuals to give up their insurance as its costs increase while those in poor health to continue to renew it regardless of its cost is referred to as

(A) risk pooling
(B) risk tolerance
(C) adverse selection
(D) yearly renewable term

1-7. Which of the following statements concerning the capital needs analysis approach to calculating the insurance need on the family income earner is (are) correct?

I. Divide the income amount by the applicable interest rate representing the after-tax investment return anticipated on the capital sum.
II. The lower the after-tax investment return rate, the higher the capital fund needed to provide the same amount of income.

(A) I only
(B) II only
(C) Both I and II
(D) Neither I nor II

1-8. Which of the following statements concerning the readjustment period for survivors after a wage earner's death is (are) correct?

I. The length of the period should be less than one year.
II. The income during this period should be approximately equivalent to the insured's earnings at the time of death.

(A) I only
(B) II only
(C) Both I and II
(D) Neither I nor II

1-9. All of the following statements concerning yearly renewable term insurance are correct EXCEPT

(A) The premium is determined by the death rate at the insured's attained age.
(B) The policyowner must furnish evidence of insurability to renew coverage.
(C) The right to renew coverage may be limited to a specified age or a specified period.
(D) The face amount of the coverage is paid to the beneficiaries at the death of the insured.

1-10. All of the following statements concerning risk pooling are correct EXCEPT

(A) It involves combing risks by persons exposed to loss from a particular source.
(B) It involved sharing losses on some equitable basis.
(C) It is one important element that must be present in any sound insurance plan.
(D) It is used only when the insurance is issued by a mutual company.