

## CHAPTER 2

---

# AN OVERVIEW OF LIFE INSURANCE

**T**his chapter begins Part I, which is a seven chapter sequence on life insurance products, with emphasis on personal products. In this chapter, we explore the various means by which survivors deal with the financial consequences of death, followed by the advantages and costs of life insurance in this regard. We then provide an overview of the main types of life and health insurance policies sold by life insurance companies. There follows a short explanation of the ideal requisites for the private sector to provide insurance and an introduction to life insurance pricing.<sup>1</sup>

Death can create profound emotional distress and equally profound financial distress for families. If a family's economic livelihood depends on the wages of one person, that person's death could be financially devastating for the family. Dual breadwinner families are not immune to the financial consequences of one death.

Businesses can be similarly devastated by the death of key employees, especially in smaller and closely held firms. Many key employees have special knowledge, skills, contacts, persuasiveness, or other attributes that are difficult, if not impossible, to replace completely without substantially higher costs. Additional problems can arise when the deceased is also owner of a closely held business. Heirs may inherit stock for which no ready market exists and thus no means to realize its value. Problems are created, not only for the heirs, but for any surviving owners, and the potential exists for personal discord, management problems, and a forced sale at a distressed price. All owners have a motivation to provide the means to avoid these situations.

When advisors help clients quantify the financial consequences of death, as discussed in Chapter 20, either the client's resources are sufficient to avoid adverse consequences or they are not. If resources are insufficient, additional resources must be located. These resources can come from:

- relatives,
- savings/investments,
- employer-provided death benefits,
- government-provided death benefits, and
- individual life insurance

## MEANS OF DEALING WITH THE FINANCIAL CONSEQUENCES OF DEATH

### RELATIVES

Many individuals rely explicitly or implicitly on wealth transfer from their relatives or their spouse's relatives to protect their families from a meaningful reduction in living standard brought about because of the individual's death. In some circumstances, reliance on family assistance might be rational. In others, it may not. Unless the timing and amount of family assistance is known with certainty, the financial risk of death is not completely eliminated. Reliance on this strategy places the financial well being of the individual's surviving family at risk and beyond the family's immediate control to a greater or lesser degree.

### SAVINGS/INVESTMENTS

Loss exposures arising from the financial consequences of death can be retained or transferred. Meeting the death exposure via a savings program alone is tantamount to retaining the exposure in part until sufficient additional resources are accumulated. Retention is viable only to the extent survivors' financial requirements are satisfied. To the extent the savings program is incomplete, survivors must look to other resources. Other resources can be planned in conjunction with savings, and, as savings grow, reliance on other resources can be reduced.

We can think of this approach as having near term and longer term components. This approach is consistent with the view of those who advocate the purchase of term life insurance over cash value insurance, with the idea of saving the excess of the cash value policy's premium over the term premium. In practice, this approach requires financial discipline that many individuals lack.

### EMPLOYER-PROVIDED DEATH BENEFITS

The employment relationship often is a source of death benefits. Most employer-provided death benefits are provided through group term life insurance at low or no cost to the employee. Such plans enjoy favorable income tax treatment for the first \$50,000 of coverage. Supplemental life insurance is also sometimes made available. The employee usually pays the additional premium and is subject to the insurer's underwriting requirements. While available amounts may be larger than those provided under a tax-qualified group life insurance program, they ordinarily are not large.

Each of the above employer-provided death benefit plans can be important components for some individuals' financial plans; typically those in the lower income category. Because the death benefit is set by plan provisions, it does not necessarily address an individual's specific needs. For individuals with families or other substantial financial obligations, additional death benefit protection is almost always necessary.

Group term life insurance enjoys preferential tax treatment only if the plan provides nondiscriminatory coverage to all employees. Some highly compensated employees receive non-tax preferred benefits that are more generous. When cash value life insurance is used to fund the death benefit, cash values may also be used to provide retirement income. These plans are termed *nonqualified executive benefit arrangements*. While these plans do not enjoy the preferential tax treatment of group term plans, a different set of tax and other advantages accrues to the executive and the employer as discussed in Chapter 24.

### **GOVERNMENT-PROVIDED DEATH BENEFITS**

Government-provided death benefits are important components of many individuals' financial planning. Social Security provides such benefits in the U.S., and similar social insurance programs are common worldwide. We provide a short overview here of the benefits afforded under the social insurance plan in the U.S.

Death benefit payments to qualified U.S. beneficiaries take two forms. First, the spouse or ex-spouse of a deceased worker is entitled to receive monthly survivor benefits if (1) he or she has not remarried and is at least age 60 and (2) the worker was fully insured. A widow or widower, regardless of age, may also qualify to receive monthly benefits if he or she is caring for an unmarried, dependent child of the worker. The child must be under age 16 or have a disability that began before age 22.

In addition, dependent children are entitled to a monthly benefit if they are unmarried and (1) under age 18 (or under 19 if attending a primary or secondary educational institution on a full-time basis) or (2) any age and were disabled before age 22. Dependent parents who are 62 and over are each entitled to a benefit as well.

In addition to income benefits, a lump-sum death benefit of \$255 is paid on the death of the worker who was living with a spouse or who in death leaves a spouse or child entitled to monthly benefits. The Social Security law provides limitations on the maximum monthly benefits that can be paid to a family based on the earnings record of one person. It also requires that the decedent have worked in covered employment for certain minimum periods to qualify for the benefits. Finally, portions of the benefit payment are subject to income taxation for persons making more than specified maximums.

### **INDIVIDUAL LIFE INSURANCE**

Perhaps the most widespread means of funding for the financial consequences of premature death is through the purchase of individual life insurance policies. Life insurance with a death benefit equal to the amount needed to fill any financial gap is a perfect hedge against the financial consequences of death. The event that gives rise to the need also gives rise to the solution. If purchased in adequate amounts, life insurance, in purely economic terms, replaces the deceased individual's future earnings, thereby protecting the family or business from the adverse financial consequences of death.

Insurance companies determine whether to issue the requested insurance policy based on an application submitted by the proposed insured – typically through an insurance agent – and, if the amount applied for is large, on results of one or more physical examinations, laboratory tests, and other information. The application contains questions of an administrative nature and questions relating to insurability. The insurer's underwriter needs sufficient information to determine whether the proposed insured qualifies according to health standards (see Chapter 11) and whether the amount of insurance requested bears a reasonable relationship to the financial loss that the beneficiary would suffer on the insured's death. The underwriter also wishes to know the purpose for the insurance, that the policyholder and beneficiary designations are logical, and that an insurable interest is present (see Chapter 18).

## EVALUATION OF LIFE INSURANCE AS A FINANCIAL INSTRUMENT

In addition to its social advantages discussed in Chapter 1, life insurance offers several unique benefits to individuals relative to other financial instruments and means of dealing with the financial consequences of death. It also carries costs, but the costs of its utility to individuals are ordinarily reasonable when considered in the context of the potential consequences of death without insurance.

### ADVANTAGES

First, as noted above, appropriately planned life insurance is a perfect hedge against the adverse financial consequences of death. The event that gives rise to the need also gives rise to the solution. Second, life insurance enjoys preferential tax treatment under the U.S. *Internal Revenue Code* (IRC) not enjoyed by other financial instruments. The tax that otherwise would be due on the interest earned on life insurance cash values is either avoided altogether or deferred, provided the policy qualifies as “life insurance” under tax law (see Chapter 21). The tax is avoided altogether if the policy is retained until death. Because interest accrues on a tax-deferred basis, the cash value is greater than the after-tax value of equivalent taxable savings media for a term-plus-side-fund arrangement.

If a qualifying policy is terminated during the insured’s lifetime, income tax will be owed to the extent that the cash value and any other amounts received under the policy exceed the premiums paid, which is the policy’s cost basis. However, tax will have been deferred for the holding period. Additionally, internal cost of insurance charges are paid with tax deferred earnings, and no adjustment to the tax basis is required if the policy is terminated.

Also, proceeds may be free of estate tax in well-planned situations. Thus, every dollar of such a policy’s death proceeds in the beneficiary’s hands could equal as much as two dollars of assets retained in the taxable estate (assuming a combined 50 percent federal and state tax rate). See Chapter 22.

Third, many life insurance policies today provide exceptional flexibility to address a client’s changing financial and personal circumstances:

- They are tax-favored repositories of easily accessed, liquid funds if a need arises. Yet the assets backing these funds are generally held in longer-term investments, thereby earning a higher return than investments of comparable liquidity.
- The policyholder usually can deposit additional funds into the policy to enjoy further tax leverage, to lower internal mortality charges, and/or to extend the length of time that the policy will remain in effect without further premium payments. Likewise, premiums for many policies can be skipped or reduced to accommodate changed circumstances if sufficient policy value exists to sustain the policy.
- Face amounts can be decreased if a reduced insurance need develops, with corresponding reductions in internal mortality charges or premiums, or amounts often can be increased subject to satisfactory insurability.

### COSTS

Life insurance is not without costs to individual purchasers. First, insurers necessarily incur operational expenses and taxes, and these must be paid via loadings in the policy. Such loadings vary over time, ranging, for example, from 100 percent

or more of the first year premium to 5-20 percent thereafter, depending on the type of policy and its pricing.

Second, as with all savings media, purchasers of life insurance defer the utility of current consumption (by paying premiums) to accrue savings for future consumption for either themselves (with respect to cash value insurance) or their beneficiaries (for term and cash value insurance). Life insurance differs from other savings media in that it usually is purchased for the benefit of others and only indirectly for the benefit of the person whose life is insured.

Third, the life insurance purchase decision can be complex. Even the comparatively straightforward decision to purchase life insurance to cover one's family may not be simple. Is insurance needed and, if so, in what amount, what type, and from whom should it be purchased? The decision requires analysis at each stage, and the customer typically is not well versed in life insurance. Information problems, discussed in Chapter 1, are significant.

Complexity can increase by orders of magnitude if the purchase is for estate liquidity or is to be used in business situations or complex family situations as discussed in Chapters 22 and 24. The decision involves the same types of issues as the family purchase and others as well: How best to structure the arrangement? How do we minimize income, gift, and estate taxes? How to maximize the possibility of all heirs feeling that they have been treated fairly? How do we go about ensuring that the insurance amount remains adequate over time and that the policy being considered offers needed flexibility for changing circumstances?

Life insurance is purchased by either individuals or organizations. As we know from Chapter 1, we refer to insurance purchased by individuals as personal insurance. When purchased by organizations, we refer to it as commercial insurance, and, if related exclusively to a group such as employees or society members, as group insurance. The premiums and coverage of personal insurance sales dominate group insurance sales in most markets worldwide, including the U.S. market.

Insurance companies sell policies whose benefit payments are contingent on the happening of some event. Historically, policies sold by life insurers involved only *life contingencies*, meaning that payments to policyholders or their beneficiaries were contingent on whether insureds lived or died. **Mortality tables** show yearly probabilities of death by age and usually other variables such as sex and smoking status and are necessary for pricing these policies.

Life insurance companies also sell policies whose payments are contingent on whether insureds become incapacitated, sick, or injured. **Morbidity tables** show periodic probabilities and durations of incapacity, sickness, or injury by age (or age brackets) and often other factors, such as smoking status, and are necessary for pricing these policies.

Typical policies sold by life insurance companies worldwide can be classified as either mortality based or morbidity based. Recall from Chapter 1 that we classified the life branch as selling insurance to cover (1) death before a certain age, (2) survival to a certain age, (3) incapacity, and (4) expenses or lost income from injury or disease. We can see that the first two classifications are mortality based and the last two are morbidity based.

## POLICIES SOLD BY LIFE INSURANCE COMPANIES

### MORTALITY-BASED POLICIES

Mortality-based insurance policies can be considered as falling into two classes: life insurance and annuities. Policies that pay a prescribed death benefit if the insured dies during the policy term are commonly labeled as life insurance or, in some countries, as life assurance. The latter term is commonly used in the U.K. and other Commonwealth countries. **Annuity contracts** (or **pensions** in some countries) are policies that promise to make a series of payments through systematic liquidation of principal and interest and possibly benefit of survivorship for a fixed period or over an annuitant's lifetime. **Endowments** are life insurance policies that pay a stated sum if the insured dies before a prescribed time period and usually the same sum if the insured survives the time period.

**LIFE INSURANCE** Life insurance policies pay a death benefit commonly as a stated sum of money – variously called the **face amount**, **sum assured**, or **death benefit** amount – on the death of the insured. As noted in Chapter 1, the insured is the individual whose death triggers payment of the face amount. The person who applies for the policy is the **applicant**. In most instances, the applicant is also the proposed insured, but sometimes the applicant may apply for the insured, as when a parent applies for a policy on a child's life. The applicant becomes the policyowner. Recall that the policyowner or policyholder is the person who can exercise all policy rights and with whom the insurer deals. The applicant names someone – the beneficiary – to receive the face amount on the death of the insured.

While thousands of different life insurance policies exist, all fall into one of two generic categories: term life insurance and cash value life insurance. **Term life insurance** pays the policy face amount if the insured dies during the policy term, which is a specified number of years, such as 10 or 20 years, or to a specified age, such as age 65. **Cash value life insurance** policies combine term insurance and internal savings – called the cash value – within the same contract; that is, they accumulate funds that are available to the policyowner, much as a savings account with a bank. Cash value life insurance is also sometimes referred to as **permanent life insurance**, meaning that it can remain in force for the whole of one's life (or to an advanced age).

All life insurance policies rely on the same pricing elements as we explore below. The details of how these elements function within a policy and the extent to which they are disclosed to the policyowner vary. The degree of disclosure or transparency within a policy depends on whether its pricing components are bundled or unbundled. With **bundled** policies, the policyholder is not informed as to how the premium is allocated to cover the insurer's operational expenses, taxes, and contingencies; to pay for the pure insurance component; to build cash values; or to support the scale of dividends for participating policies (discussed below). The policyholder pays an indivisible premium, receiving a bundle of benefits:

- a promise to pay a stated death benefit if the insured dies during the policy term,
- a promise to pay a stated value on policy surrender, for cash value policies,
- entitlement to receive (nonguaranteed) dividends declared by the insurer, for participating policies, and
- advice and administrative services of an agent and insurer.

Many contemporary policies are **unbundled**, meaning they disclose to the policyholder the portions of his or her premium that are allocated to pay for the costs of the internal insurance; to build cash values; and to cover the insurer's expenses, taxes, profits, and contingencies. Unbundled policies are also sometimes called **current assumption policies** as their values are derived from so-called current assumptions or more formally nonguaranteed policy elements, which are discussed below.

An insurance policy's stated annual cost of insurance rates, interest crediting rates, and loadings do not necessarily track its actual mortality, investment, and expense experience. Nonetheless, the policyholder is able to see how the premium is allocated among these policy elements.

**Term Life Insurance** Term life insurance policies **expire** if the insured survives the policy term, meaning that they terminate with no value. Term life insurance usually provides either a level or decreasing death benefit. Premiums either increase with age or remain level. Term policies with level death benefits and increasing premiums are commonly referred to as **renewable**, granting the policyowner the right to continue the life insurance policy for one or more specified periods merely by paying the billed premium. The premium ordinarily increases at each renewal. Thus, **yearly renewable term (YRT)** – also called **annual renewable term (ART)** – provides term insurance whose premiums increase yearly. These policies usually expire between ages 65 and 85 in the U.S. In Canada and other jurisdictions the term renewals may extend to age 100.

Initial premium rates per unit of coverage are lower for term life insurance than for other life products issued on the same basis. The increasing premiums, however, escalate at an increasing rate with policy duration. Term product prices are more easily compared than are prices of other life products, as term policies are usually structurally simpler than other policies. Term products usually have no cash values (i.e., internal savings) and often no dividends (see below), thus permitting policy price comparisons on the basis of premiums alone. As a consequence, buyer information problems are less with term insurance, thus rendering the term market more competitive.

**Cash Value Life Insurance** Unbundled cash value policies often distinguish between a policy's savings element before and after deduction of a surrender charge. The **cash value** is a life insurance policy's internal savings before deduction of any surrender charges or policy loans. With unbundled policies it is also called the **policy value, account value, accumulated value, and the gross cash value**. Unless stated otherwise, we will use these four terms as synonyms for a policy's cash value; i.e., the policy value before deductions. A **surrender charge** (also called a **back-end load**) is the amount assessed against a policy's cash (account) value as a type of penalty for early policy termination. The savings element after deduction of any surrender charge is called the **cash surrender value, surrender value, or sometimes, simply cash value**.

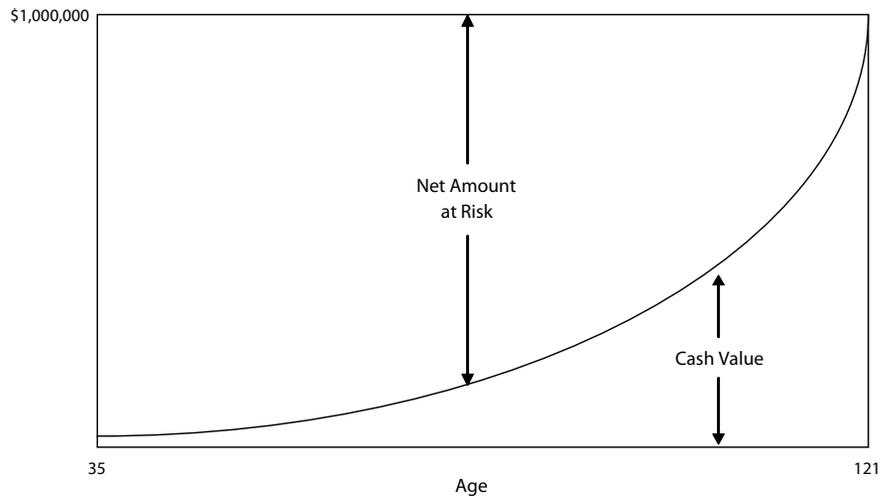
Any surrender charge usually declines over time, such as 10 to 15 years, and ultimately ceases such that the surrender value equals the cash or account value. A surrender charge allows the insurer to recover from owners who surrender their

policies some of the significant costs of policy issuance without penalizing policyowners who do not surrender their policies. Some unbundled policies also feature an explicit **front-end load** which is deducted from premium payments for expenses, taxes, contingencies, and sometimes profits.

Bundled cash value policies feature no explicitly specified charges or loads, with the cash value shown in the contract also equal to the cash surrender value, in the absence of outstanding policy loans. Bundled cash value policies nonetheless typically penalize early policy cash values and assess front-end loads; they simply are not explicit as with unbundled policies.

All cash value policies can be considered as a combination of YRT insurance and a savings account, such that the combination always precisely equals the policy's stated death benefit. Thus, for policies with level face amounts and increasing cash values, the amount of term insurance purchased each year decreases by precisely the same amount of the cash value increase. The difference between the policy death benefit and the cash value or policy reserve is called the **net amount at risk** (NAR). (Some policies have a level NAR rather than a level death benefit, as discussed in Chapter 3.) This concept is illustrated in Figure 2-1.

**Figure 2-1** Illustration of a Level-Premium Cash Value Policy Funded to Age 121, \$1,000,000 Face Amount



A cash value policy with a \$1.0 million level death benefit and level annual premiums produces increasing cash values each year and, therefore, a NAR that decreases each year by precisely the same amount as the cash value increases.

Two types of internal charges are assessed annually under all cash value policies. The charges are explicit under unbundled policies but not under bundled policies. First, a charge is assessed to pay for the policy's internal term insurance – the NAR. This charge, called the **cost of insurance** (COI), is the internal age-based rate assessed against each life insurance policy based on its net amount at risk, to cover its share of mortality charges for the period. Second, a **loading charge**

is assessed to cover some or all of an insurer's future expenses, taxes, profits (or surplus accumulations), and contingencies. These charges also may be labeled as **expense charges, fees, and/or policy loads**.

Cash value policies typically contain guaranteed maximum COI and loading charges, either explicitly stated in the policy or implicit in the guaranteed cash values of bundled policies. Most insurers assess stated COI charges at less than the maximum permitted. As with other savings media, interest is credited yearly or more frequently to the cash value. In most non-variable (see below) policies, a minimum interest rate is guaranteed to be credited, but the insurer commonly credits a higher rate.

The gross premiums paid by policyholders for most bundled cash value life insurance policies are calculated using the maximum COI and loading charges and minimum guaranteed interest rates. In other words, the premiums are set conservatively. Because of conservative pricing, the policies as a group are expected to experience (1) lower mortality rates, (2) higher investment earnings, and/or (3) lower expenses than those built into policy pricing. The excess amounts from these expected favorable deviations of actual experience from that assumed in pricing can be returned to policyholders. These surplus funds are returned to policyholders in the form of **dividends**, the pro-rata share of divisible surplus paid by an insurer to the owners of its participating policies. They are also called **bonuses** in some countries.<sup>1</sup> These policies are classified as **participating** (par) or as being **with bonus** – meaning that they are entitled to receive dividends declared by the insurer.

**Nonparticipating** (nonpar) or **without bonus** policies are not entitled to receive dividends declared by the insurer. Traditionally, all nonpar policy elements (premiums, cash values, and death benefits) were fixed at issuance and never changed. Today, many nonpar policies provide some means of passing onto policyholders the insurer's favorable operating experience in a similar way that par policies allow participation in the insurer's results. We cover these issues in Chapters 3, 4, and 16.

Thousands of variations of cash value policies exist, consistent with insurers' product differentiation and market segmentation strategies to gain market power. To aggravate an already tough lemons problem for the customer (as discussed in Chapter 1), terminology is not always standard. We can, however, take a shortcut through this maze. Virtually every cash value policy falls into one of three categories, even if the policy is not labeled as such: (1) universal life insurance, (2) whole life insurance, or (3) endowment insurance.

*Universal Life Insurance* **Universal life (UL) insurance policies** are characterized by flexible premium payments and adjustable death benefits whose cash values and coverage periods depend on the premiums paid. The policyholder, not the insurer, determines the magnitude of the premium payment. If premiums paid and interest credits exceed current policy charges, the cash value is increased by the excess inflow. If policy charges exceed the sum of premiums paid and interest credited, the excess charges are deducted from the cash value, leading to a cash value decline. Because of this premium flexibility and death benefit adjustability, policyholders effectively design their own policies to reflect their own needs

and financial circumstances. The UL policy can be changed as those needs and circumstances change.

UL policies are usually nonparticipating (i.e., they are not eligible for policy dividends), but they routinely share in the insurer's operational results via nonguaranteed policy elements other than dividends. **Policy elements** are the pricing components of policies and include the premiums, benefits, values, credits, and charges under a life insurance policy. **Nonguaranteed policy elements**, also called **current assumptions**, are policy elements that are not guaranteed and that the insurer may increase or decrease as long as policy guarantees are respected and commonly include mortality and loading charges, interest crediting rates, dividends, and sometimes the policy premium.

**Guaranteed policy elements** are those that are fixed and guaranteed and that the insurer may not change. For example, an insurer may guarantee to credit an interest rate to policy cash values of not less than 3.0 percent (the guaranteed interest rate) but may currently credit 5.0 percent (the nonguaranteed interest rate). Because of lower interest rates experienced since the turn of the century, many companies have lowered current and guaranteed interest crediting rates on new policies and lowered current crediting rates on existing policies.

With most policies, the insurer may increase the interest crediting rate as it wishes, and policyowners expect increases as the insurer's investment returns increase. Similarly, the insurer ordinarily may decrease the interest crediting rate as it wishes but can never reduce it below the guaranteed crediting rate. It is worth noting that such a long interest rate guarantee – spanning the entire duration that a policy is in effect, potentially many decades – is almost never found in other financial instruments and legally impermissible for deposits with other financial intermediaries.

A UL policy's first year cash value is derived from the amount remaining after deducting charges for COI and loadings from whatever premium the policyholder decides to pay at policy inception. The insurer credits interest to the balance to yield the cash value at the end of the year. The internal operations of UL policies including the interest crediting rates and charges for COI and loadings are disclosed in periodic statements to the policyowner.

*Whole Life Insurance* **Whole life (WL) insurance** typically requires the payment of fixed premiums and promises to pay a fixed death benefit whenever the insured dies and, therefore, is life insurance intended to remain in effect for the insured's entire lifetime. WL policies often are participating, but nonpar policies also exist. Most nonpar WL policies contain nonguaranteed elements similar to those found in UL policies. For some nonpar policies, all policy elements are guaranteed and fixed (i.e., the policies have guaranteed policy elements only), with no means of policy values being changed because of changing insurer operational results. For both universal life and whole life policies, the policy values are credited with interest based on the performance of underlying investments, typically investment grade fixed-income instruments managed by the insurance company, and supported by a guaranteed minimum credited interest rate.

Unlike UL policies, premiums for WL insurance policies (1) are directly related to the amount of insurance purchased, (2) must be paid when due or the policy will terminate, and (3) are calculated to ensure that the policy will remain

in effect for the entire lifetime of the insured, which often is assumed to be age 100 or 121. If the insured does not die during the policy term and lives to the terminal age underlying policy pricing, the policy may endow, with the face amount paid as if the insured had died. With some whole life policies – called **ordinary life** or **level-premium whole life** – uniform premiums are assumed to be paid over the entirety of the insured's lifetime.

We can think of the necessary annual premium to fund an ordinary life policy as being equal to the level amount that would have to be paid into a UL policy over the WL policy term (e.g., to age 100) to cause the UL policy cash value to equal the face amount at age 100, relying only on guaranteed policy elements to derive that premium; i.e., using the guaranteed interest rate and guaranteed COI and loading charges.

Other whole life policies – called **limited-payment whole life** – provide that premiums will be paid over some period shorter than the insured's entire lifetime, such as to age 65 or for a set period such as 10 years. The necessary annual premium to fund the policy equals the level amount that would have to be paid into a UL policy over the premium-paying period to cause its cash value to equal the face amount at the end of the policy term (e.g., age 100), using the guaranteed interest rate and COI and loading charges. The shorter the premium-paying period, the higher must be each year's premium. The higher is each year's premium, the greater will be the cash value, other things being the same. In turn, the lower will be the policy's internal COI charges.

Of course, the policy remains in effect after all premiums have been paid – it is said to be **paid up**, meaning that no further premiums need be paid and the contract is guaranteed to remain in effect for the insured's entire lifetime. Thus, the WL policy with the lowest premium (and lowest cash values) is ordinary life as premium payments are stretched over the whole of life. The WL policy with the highest premium (and highest cash values) is **single premium whole life insurance** under which only a single (large) premium payment is made at policy inception.

Cash value policies are also available as variable WL and UL life insurance. **Variable life insurance** (also called **unit linked life insurance**) is either a bundled or unbundled life insurance policy under which the policyowner allocates premium payments to separate accounts offered by the insurer. **Separate accounts** are mutual fund-type accounts maintained by life insurers to hold investments backing the policy reserves; the cash values and death benefits are directly determined by the performance of assets held in those accounts. They are separate from the insurer's general account assets. The policyowner carries 100 percent of the investment risk, unlike the situation with non-variable policies.

*Endowment Insurance* As noted above, most whole life policies endow at a very advanced age. In practice, policies endowing at earlier ages are termed **endowment insurance** and make two mutually exclusive promises: to pay a stated benefit if the insured dies during the policy term or if the insured survives the stated policy term. Historically, this benefit equaled the policy face amount and, if paid on survival, the policy was said to **endow**.

Thus, an endowment at age 65 policy pays the face amount if the insured dies before age 65 or pays the same amount if the insured survives to age 65. Very little endowment insurance is sold in the U.S. today because of adverse tax treatment,

but it remains popular in many other markets worldwide. WL and UL policies can endow if the policy remains in force until the end of the mortality table used to calculate policy reserves, which is age 100 for older policies and age 121 for newer policies.

**ANNUITIES** Life insurance has as its principal mission the creation of a fund. An annuity's function is the systematic liquidation of a fund. Most annuities sold by life insurers are also accumulation instruments, but this is the mechanism for developing the fund to be liquidated. The purpose of most annuities is to protect against the possibility of outliving one's income – the opposite of life insurance.

Technically, an **annuity** is any series of periodic payments. An annuity contract promises to make a series of payments through systematic liquidation of principal and interest for a fixed period or over a person's lifetime. A **life annuity** is any annuity whose payments are contingent on whether the annuitant is alive. The person whose lifetime is used to measure the length of time that benefits are payable is the **annuitant** who typically is also the income recipient. Thus, a **whole life annuity** is a life annuity payable for the whole of the annuitant's life, irrespective of how long that may be. In contrast, an **annuity certain** makes payments for a set period of time without reference to whether the annuitant is alive.

Each payment under a life annuity is a combination of principal and interest income and a survivorship element. Although not completely accurate, we can view the operation of a whole life annuity as follows: if a person dies precisely at his or her life expectancy, he or she would have neither gained nor lost through utilizing a life annuity. Those annuitants who die before attaining their life expectancies would not have received payments equal to the expected actuarial value of their contributions. The unpaid amounts are retained by the insurance pool to provide continuing income to those who outlive their life expectancies. As no one knows into which category he or she will fall, the arrangement is equitable and succeeds through the operation of the law of large numbers (see below).

Insurers offer a variety of options as to how annuity payments can be made. Most insurers also include a provision in their contracts to the effect that they will provide any other payment option that is mutually agreed upon by the insurer and the contract owner.

Annuity benefits can be expressed in fixed or variable units. Fixed annuities are much like bank savings accounts. The insurer guarantees to credit a minimum interest rate to the cash value during the accumulation period, but usually credits a higher rate. In addition, a minimum annuity payout is guaranteed.

Variable annuities feature separate account-backed cash values that are similar to mutual funds. With a **variable (unit-linked) annuity**, cash values and benefit payments vary directly with the performance of assets held in one or more separate accounts. In the absence of optional benefits, variable annuities do not contain minimum investment guarantees. The contract owner typically bears the investment risk and receives the return actually earned on invested assets, less charges assessed by the insurance company.

### **MORBIDITY-BASED POLICIES**

Individuals face three broad categories of potential economic losses associated with the health risk. First, they can incur medical expenses when injured or sick.

Second, they may incur expenses to provide long term care if mental or physical illness, injury, or old-age frailty prevents them from engaging in the activities of daily living. Third, poor health or incapacity also can be so debilitating as to prevent employment – which means a reduction or even elimination of wages. Medical expense insurance, long term care (LTC) insurance, and disability income insurance policies, respectively, are designed to meet each of the three loss exposures.

### MEDICAL EXPENSE INSURANCE

Healthcare expenses are most commonly financed by government programs, by employers, and by personal financial resources, as we discuss in Chapter 7. In many markets, individuals and families purchase individually issued medical expense insurance policies – commonly called simply health insurance – because no third-party financing is available or to augment or replace governmental or employer-provided coverage. Individuals in many markets can secure individual coverage from managed care organizations, such as health maintenance organizations, preferred provider organizations, and point-of-service plans, but most such coverage is employer-based. These are covered in Chapter 7.

Coverage under individually issued medical expense insurance policies may parallel that available through group health insurance. They may cover inpatient and outpatient hospital services, physician and diagnostic services, as well as specialty services such as physical therapy, radiology, and prescription drugs. More commonly, this coverage is more restrictive and, depending on the market, such policies usually are more expensive in comparison to employer-provided and subsidized health insurance. Deductibles and other co-payments often are higher with individual policies than under group insurance.

Individual health insurance policies can be issued on a guaranteed or nonguaranteed renewable basis. With **guaranteed renewable health insurance policies**, the insured has the contractual right to continue the policy by the timely payment of premiums, usually to a specified age, such as 65, but the magnitude of future premiums usually is not guaranteed. With **nonguaranteed renewable health insurance policies**, the insurer may unilaterally refuse to renew the policy, sometimes subject to restrictions.

**LONG TERM CARE INSURANCE** The second major type of health risk faced by individuals and families stems from the possibility of becoming unable fully to care for oneself. Most often, such incapacity is associated with the aging process; illness or injury may also be a cause.

In most countries, substantial portions or the totality of such care is provided by family members or financed through the individual's or family's resources. The common external sources of LTC financing include (1) government, (2) group plans, and (3) individual insurance policies issued by commercial insurers. Coverage through the first two sources is common in many markets, although benefits may be limited. Government funding of LTC expenses accounts for the great majority of coverage in developed countries. Individual LTC policy coverage is not widespread in any market but is growing in many.

Private LTC insurance pays for services when the insured is unable to perform certain specified activities of daily living without assistance, such as bathing,

eating, dressing, toileting, and transferring to and from bed. These policies also may pay benefits when the insured requires supervision due to a cognitive impairment such as Alzheimer's disease.

LTC insurance in some markets pays only for skilled care in a nursing home following a period of hospitalization. Generally, however, coverage extends to an array of services that promotes independent living, including personal care, assisted living, care management, support for family caregivers, home modifications, homemaker services, and hospice care, in addition to institutional care.

Coverage varies by market and also by the method of benefit payment. Some policies pay a fixed daily benefit for nursing home confinement. Others pay a fixed daily benefit regardless of whether the insured incurs LTC expenses, provided eligibility requirements are met. Still others reimburse for incurred expenses, up to the policy daily maximum.

Individual LTC policies typically are offered on a guaranteed renewable basis. Applications for individual LTC insurance are carefully underwritten by insurers. Long term care benefits often are also available as riders to life insurance policies, as discussed in Chapter 5 and annuity policies as discussed in Chapter 6.

**DISABILITY INCOME INSURANCE** Disability can seriously affect a worker's and a family's lifestyle and savings plans. For example, the U.S. *Department of Housing and Urban Development* estimates that 46 percent of foreclosures on home mortgage loans are caused by disability versus only 2 percent caused by death. The need for external sources of disability income typically declines with age, ideally disappearing at retirement when adequate non-employment income should be sufficient to maintain the individual or family. During the working years, most individuals require substantial external coverage.

The three major sources of external finance for the disability exposure – ignoring family and friends – are (1) government, (2) group plans, and (3) individual disability income insurance policies. The most common external sources of disability income in developed countries are social insurance programs. Additionally, many employers provide disability income benefits to employees who are unable to work because of sickness and injury, often funded via group insurance policies purchased from commercial insurers. Insurers also sell individual disability income insurance policies, although group coverages predominate.

Disability income insurance policies are designed to provide monthly benefits to replace lost income when the insured is disabled as a result of sickness or injury. Policies sold to individuals may be issued on a guaranteed renewable basis, with some policies issued on a basis that not only guarantees the insured the right to continue the policy but also guarantees future premiums – called **noncancellable and guaranteed renewable** – or simply **noncan** policies.

The benefit amount is typically stated in terms of a fixed monthly sum. The insurance usually is written on a valued basis, which means that it is presumed to replace the monetary loss sustained by the insured. Insurers limit the amount of insurance that they will sell to an individual such that disability income from all likely sources would replace a maximum proportion (e.g., 60 to 80 percent) of gross wages. This is the most important method of controlling the moral hazard problem discussed in Chapter 1. The benefit period is the longest period for which benefits will be paid. Typical benefit periods are two or five years or to age 65.

Insurers are in the business of assuming risks transferred to them by their insureds.<sup>2</sup> However, they do not accept all risks that individuals and corporations wish to transfer. A risk *should* meet several requirements for it to be considered insurable in the private market. The word “should” is emphasized, because exposures covered by insurers seldom meet all requirements perfectly. Generally, the more inconsistent is a given exposure class with the requirements, the less likely it is to be insurable in the private market. The requirements for an ideal insurable risk include:

- large number of independent and homogeneous exposure units,
- accidental losses,
- losses easily determinable as to time, amount, and type, and
- economically feasible premiums.

#### LARGE NUMBER OF INDEPENDENT, HOMOGENEOUS EXPOSURE UNITS

An **exposure unit** in insurance practice and theory is a person, place, or thing exposed to the possibility of loss. In life and health insurance, it refers to a life. Similar exposure units are grouped to form **insurance pools** (also called **risk classes**). Insurance companies specialize in forming insurance pools. Each insurance pool ideally should be composed of exposure units that are independent and homogeneous.

**INDEPENDENT EXPOSURE UNITS** Two random variables (e.g., exposures units) are **independent** if the relationship between them is such that the occurrence of an event affecting one has no effect on the other variable. For example, two individuals located in different cities ordinarily are considered independent of one another. Events and activities affecting one person mostly have no effect on the other person. If, however, the two individuals were on the same flight to Singapore, a crash will affect both of them. For this exposure, they are interdependent.

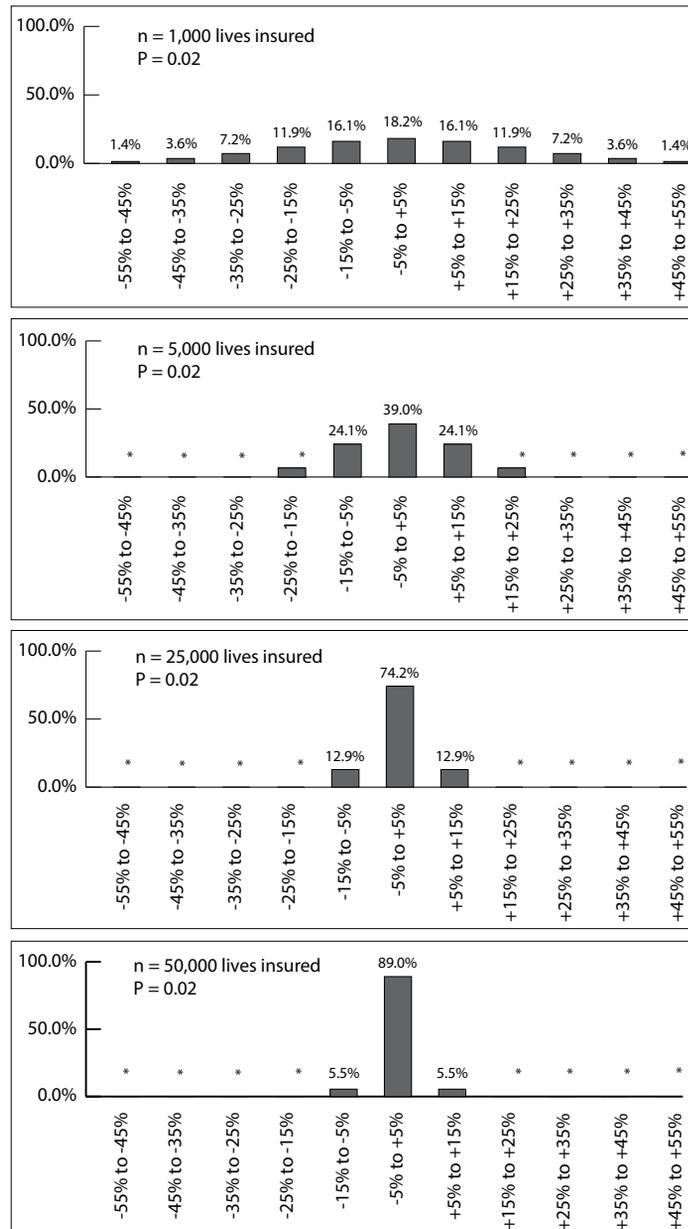
Ordinarily insurers are able to diversify risk by forming large pools of exposure units that are statistically independent of one another thereby lowering the average risk per exposure unit in the pool. However, when the exposure units in insurance pools are all subject to the possibility of suffering losses due to a single catastrophic event, the risks are systematic and are no longer statistically independent. In this case, the exposure units are interdependent or correlated. When risks are correlated, the benefits of diversification across exposure units are reduced or eliminated, and private markets may not be able to accept such a risk transfer. Except for pandemics (and nuclear annihilation!), the death exposure largely meets the independence criterion within groups of insureds.

**HOMOGENEOUS EXPOSURE UNITS** Random variables are said to be **identically distributed** or **homogeneous** if their probability distributions prescribe the same probability to each potential occurrence, which renders the distributions' expected values and variances equal. This condition is important because it allows insurers to charge each independent and identically distributed (IID) insured the same premium.

In reality, few exposure units are truly homogeneous, and insurers group similar exposure units into a class and charge pooled premiums. Life insurers are

## REQUISITES FOR PRIVATE INSURANCE

**Figure 2-2** Relative Variations of Actual from Expected Claims as a Function of Number of Lives Insured



\*Probabilities are less than 1.0 percent

When the numbers of lives insured are 1,000, 5,000, 25,000, and 50,000, the probability of actual claims being within 5.0 percent of expected claims is 18.2 percent if 1,000 lives are insured, 39.0 percent if 5,000 lives are insured, 74.2 percent if 25,000 lives are insured, and 89.0 percent if 50,000 lives are insured. Although not shown in the chart, the probability of actual claims being within 5.0 percent of expected claims is greater than 99.99 percent if 1,000,000 lives were insured.

largely able to accommodate this condition by creating insurance pools of insureds who are roughly of the same health and the same age, sex and smoking status.

**LARGE NUMBER OF EXPOSURE UNITS** To function properly, private insurance must also have a sufficiently large number of exposure units to permit predictability. This predictability comes about because of the **law of large numbers** which holds that, as the number of units or trials taken becomes large, (1) the variation of actual from probable experience decreases and (2) each additional unit lowers the variation in outcome. Thus, the average loss for a pool of IID exposure units tends to fall closer and closer to the expected value of losses as more exposure units are added to the pool. It is the fundamental reason that insurance pools can spread, share, and reduce risk. Individuals acting alone cannot.

We can see this result easily in a simple example. Suppose that a hypothetical life insurance company insures the lives of a certain number of persons in a single year and that the probability that any one of the insureds will die that year is 2.0 percent. The expected number of claims is, therefore, 2.0 percent of the total number of insured lives. The actual number of claims may be more or less than the expected number. According to the law of large numbers, if the number of insureds is large enough, actual claims should show only a small relative deviation from expected claims. Using probability theory, one can calculate the probabilities of various deviations from expected claims, depending on the number of insureds. Figure 2-2 on the preceding page shows the probability of various deviations according to an increasing number of lives insured.

Thus, the law of large numbers allows insurers to pool IID exposures, which lowers the average risk contribution in the pool. Pooling IID exposures has a second effect that gives pools a comparative advantage in managing risk. This effect, known as **pooling of resources**, means the larger the number of fairly priced exposure units in an insurance pool, the greater the likelihood that the insurer's premium receipts and investment income will be sufficient to pay all claims that arise during the coverage period, *ceteris paribus*.

To show this effect, consider the following example.<sup>3</sup> Assume an insurer has established an insurance pool of IID exposures with a loss probability of 20 percent and so the probability of not having a loss of 80 percent. If a loss occurs, the insurer pays £5,000. Thus, the expected value of the loss (and the actuarially fair premium) is £1,000 [ $0.2 \times £5,000$ ]. Finally, assume the insurer charges a 40 percent loading, making a gross premium of £1,400. Figure 2-3 illustrates this concept graphically.

### ACCIDENTAL LOSSES

Economic loss is caused by events that are either foreseeable or not. Ideally, exposure units should be subject to accidental or unintentional loss causing events. There are three reasons for this preference. First, when the insured has some control over either the likelihood of a loss occurring or its severity, problems of moral hazard may arise. Second, from a societal viewpoint, it is not good public policy to allow policyholders to collect insurance proceeds for losses that they cause intentionally.

Figure 2-3

## Probability of Ruin and the Pooling of Resources Effect

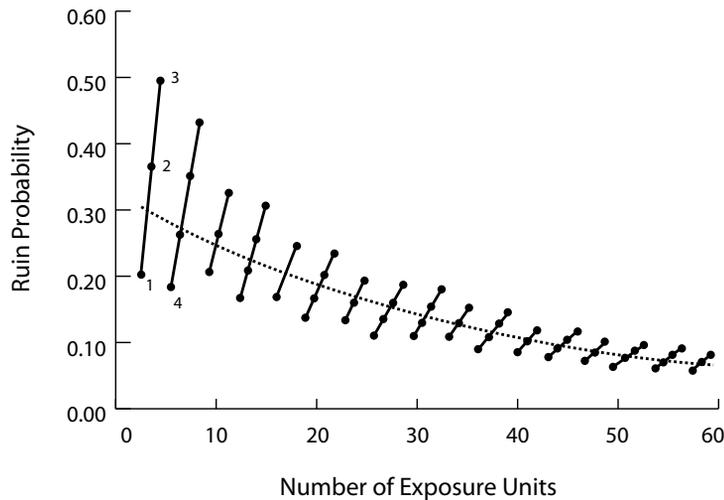


Figure 2-3 shows the probability of ruin for the insurance pool as a function of the number of exposure units in the pool. Ruin occurs when total insured losses exceed total premiums paid into the pool. With only one exposure unit in the pool, the probability of ruin equals 20 percent, which is exactly the probability of the insured suffering a loss. The reason for this result is that the pool contains only £1,400 and, if an insured suffers a loss, the loss will be £5,000 thereby bankrupting the pool. When a second exposure unit is added to the pool (shown as “2” on the left-most vertical line), pool resources increase to £2,800, but the probability of ruin actually increases. Of course, the pool cannot pay a full claim until its resources are greater than £5,000, which occurs when the fourth exposure unit is added to the pool and can be seen in Figure 2-3 by the discontinuity of the graph between the third (shown as “3”) and fourth (“4” on the second line) exposure unit. This pattern continues until the positive effect of adding additional resources to the pool overwhelms the negative effect of adding an additional exposure unit to the pool. The ruin probability becomes closer and closer to zero as the number of exposure units in the pool becomes very large.

Finally, for losses that are not accidental and occur naturally over time, such as depreciation of a corporation’s plant and equipment or wear and tear of a consumer’s automobile, budgeting for eventual repair or replacement of the property is less expensive than the purchase of insurance. Such contingencies are not considered to be insurable as they are certain to occur.

The human body, as with all living things and like manufacturing facilities, equipment, and automobiles, has a limited useful life. In reliability theory terminology, the body follows a failure law that is a combination of an aging failure distribution that exhibits an exponential increase in failure rates and a non-aging failure distribution largely independent of age (see Gompertz discussion in Chapter 15).

Death is certain to occur, yet insurance is routinely provided against its adverse consequences. This is because death has both foreseeable and unforeseeable dimensions. We know that we will die, eventually. We just do not know when. We mostly insure against the “not knowing when” dimension. We also can make provision against the “eventually” dimension. Both (1) cash value life insurance

and (2) term life insurance combined with a systematic plan of savings can address the unforeseeable risk of *untimely* death, as well as the certainty of death in the long run. In essence, the unforeseeable risk is insured via pure life insurance, either term or the net amount at risk with cash value insurance.

The foreseeable economic consequences of certain death are budgeted through the gradual increase in cash values and corresponding decrease in the net amount at risk within a cash value insurance policy or through systematically accumulating investment funds that gradually replace term insurance death benefits. The latter is a buy-term-and-invest-the-difference strategy. Both approaches can be viewed as sinking funds to replace the (economically) “failed” body.

#### **PAYMENT AMOUNTS EASILY DETERMINABLE**

An actuarially fair premium cannot be derived if losses cannot be defined precisely. Whenever a claim is filed, the details of the insured loss as to its time, place, and amount must be determinable and verifiable to establish whether the claim should be paid and its amount. Life insurance and annuity claims typically are simple, but claims for health, long term care, and disability income insurance are often complex. Further, any costs incurred by the insured or beneficiary, such as time away from work during this claims process, lowers the expected utility of insuring. Likewise, any direct costs incurred by the insurer during the claims settlement process is passed onto insureds as higher premium loadings.

#### **ECONOMICALLY FEASIBLE PREMIUMS**

The final characteristic of ideal insurable exposures is that the premium must be economically feasible. On the one hand, the **risk premium**, the additional amount that rational, risk-averse individuals will pay to purchase insurance in excess of the expected value of the loss, must not be too large. On the other hand, the owners of private insurance companies require that insurance rates be high enough to give them a competitive return on their investments. These two offsetting influences define the range of economically feasible premiums.

Many factors affect this range. For example, the degree of competition in an insurance market, the threat of new entrants, and the price and/or threat of alternative products and substitutes all have a direct effect on the insurer’s ability to set prices. Likewise, the bargaining power of customers, the degree to which they face risks, and their attitudes toward risk affect customers’ abilities to define the upper limit of the range of feasible premiums.

We follow the above overview of the policies sold by life insurance companies and requisites for their risks to be insurable with an introduction to life insurance pricing. Our purpose is to explain broadly the objectives that drive insurer pricing and to explore briefly the elements that constitute pricing. Detail is provided in Chapters 15 and 16.

#### **PRICING OBJECTIVES**

All insurers strive to ensure that the rates charged for their products are (1) adequate, (2) equitable, and (3) economically feasible. Each is discussed below.

## **INTRODUCTION TO LIFE INSURANCE PRICING**

**ADEQUACY** Insurance company rates must be sufficient to fund the benefits promised under its insurance products. Rate inadequacy can lead to financial problems and possible insolvency. Rate adequacy means that, for a given block of policies, total premium payments collected now and in the future by the insurer, plus the investment earnings attributable to any retained funds, should be sufficient to fund current and future benefits promised and related expenses, taxes, contingencies, and profits. A **block of policies** ordinarily constitutes all policies issued by the insurer under the same schedules of policy elements and on the same policy form.

An insurer cannot know with certainty the degree of rate adequacy until the last policy in a block has terminated. Because individually issued life insurance and health insurance may be issued at rates and on terms and conditions that may be guaranteed for many years, the issue of rate adequacy is especially important in establishing initial premium levels or pricing elements.

Life and health insurance rates are regulated to ensure adequacy in some countries, although the trend worldwide is toward deregulation of rates. Life and health insurance premium adequacy is regulated indirectly in the U.S. through the requirements of minimum reserves. Generally, life insurance rates are unregulated as long as they are sufficient to meet reserve requirements, but health insurance rates often are subject to control if regulators determine them to be too high.

**EQUITY** Rates charged for life and health insurance should be equitable to policy-owners. Equity means assessing charges and credits or premiums commensurate with the expected losses and other costs that insureds bring to the insurance pool. Stated differently, no expected *ex ante* subsidization should exist of any insured by any other insured.

The achievement of equity is a goal to be sought. In an imperfect world, it cannot be attained absolutely. Concepts of equity must give way to practical realities, and insureds are classified in similar, but not identical groups. These realities include the fact that the larger the number of insurance pools – also called classifications – the greater the expense in administering the pool. Also, a large enough group is necessary to permit reasonable prediction of losses within each classification. A precise assessment of the extra cost that each insured brings to the pool usually is not feasible.

As discussed in Chapter 11, the pursuit of equity is one of the goals of underwriting. **Underwriting** is the process by which insurers decide whether to issue insurance to a person and the terms and prices. Life insurers strive toward equitable treatment of insureds by varying life and health insurance rates by factors such as age, sex, plan, health, and benefits provided. Generally, a greater degree of refinement in rate classes – and therefore more actuarial equity – exists for life insurance than for health insurance. Actuarial equity is sometimes in conflict with concepts of social equity. For example, some persons believe it to be socially unacceptable to charge different life and health insurance rates to otherwise identically situated men and women, although they exhibit clear differences in expected mortality and morbidity.

**ECONOMICALLY FEASIBLE** Life and health insurance insurers must establish rates that are judged by the marketplace as being economically feasible if they are to sell their policies. This criterion means that, among other factors, rates should

not be excessive in relation to the benefits provided. If the rate adequacy criterion can be considered as establishing a conceptual floor for rates, this criterion can be considered as establishing a conceptual ceiling. Many countries and U.S. states define excessiveness with respect to some health insurance policies. These jurisdictions often provide that the insurer must reasonably expect to pay or actually pay in claims at least a certain minimum percentage (e.g., 80 percent) of the premiums collected.

Prices charged for life and health insurance in the U.S. and many other countries vary from company to company and, with some companies, prices are high. Even so, competition within insurance markets worldwide is keener than in times past, thus discouraging excessive prices. Simply put, in competitive markets life insurance companies are not likely to sell much insurance if the rates they charge or their charges and credits are uncompetitive.

### PRICING ELEMENTS

Life insurance pricing involves numerous factors and decisions by company actuaries, but these four pricing components are key:

- mortality charges,
- interest credits,
- loading charges to cover expenses, taxes, profits, and contingencies, and
- persistency.

These policy pricing components will be more or less important in particular policies. For example, the interest component will be less relevant for term policies, whereas the mortality component will be highly relevant. Conversely, the interest component is highly relevant to high cash value policies, such as endowments and limited payment policies, with the mortality component usually less so.

The many variations of these components are mixed by actuaries in innumerable ways to develop different versions of the same generic policy types mentioned above as well as products with special attributes, thereby rendering them more relevant to certain target markets and uses. Each variation carries different opportunities for gain (and loss) by the insurer and costs and benefits for the policyholder.

The four pricing components, whether unbundled or not, are necessary to develop policy pricing. With bundled policies, while no allocation of the premium among policy elements is ordinarily provided to the policyholder and no disclosure typically is made of the current assumptions as to mortality, interest, and expenses underlying policy dividends, the components are there. With unbundled policies, the components are more evident. Neither bundled nor unbundled policies disclose how persistency influences policy pricing and values, for reasons explained below.

Each pricing component and its variations are based on actual experience, usually from the insurer itself but sometimes from actuarial consulting firms, public sources, industry-wide data, or reinsurers. The actual results experienced by an insurer as to mortality, investment returns, expenses, taxes, and persistency are called **experience factors** by actuaries and insurance regulators. From these experience factors, actuaries derive actual mortality charges to be levied against policies, interest rates to be credited to their cash values, and loading charges to be levied, irrespective of whether they are stated this way or are disclosed.

The gross premiums for many bundled par cash value policies are calculated using the maximum mortality and loading charges and minimum guaranteed interest rates, resulting in comparatively high, conservatively set premiums, as noted earlier. Some portion of the surplus resulting from lower mortality rates, higher investment earnings, and/or lower expenses than those built into the policy's premiums and values are paid to policyholders in the form of dividends.

Participating life insurance historically has been associated closely with mutual (i.e., policyholder-owned) insurance companies and nonpar has been associated more closely with stock (i.e., stockholder-owned) insurers. In fact, most par insurance is still sold by mutuals and most nonpar by stocks, although each may sell the other form in the U.S.

**MORTALITY CHARGES** That mortality is a component of life insurance pricing is self evident. It is the job of actuaries to estimate the likelihood of paying death claims under policies each year and devise an equitable means of assessing each policy for its proportionate share of these claims via mortality charges. Mortality charges are assessed on each policy's net amount at risk, irrespective of whether they are disclosed or identified as such to the policyholder; i.e., whether the policy is bundled or unbundled. The total yearly (or monthly) charge is the product of that year's (or month's) NAR in thousands and the mortality charge COI rate per \$1,000 for the insured's attained age, sex, and other rating and classification factors. We can think of this charge as paying for the policy's internal YRT insurance.

In the U.S., all UL and WL unbundled policies – both variable and not – contain a set of explicitly stated, guaranteed maximum mortality charges that may not be exceeded. Bundled policies do not contain a set of explicitly stated, guaranteed maximum mortality charges, but they can be constrained to assess charges no higher than those used to derive guaranteed cash values, depending on some technical operational details of the policy. Most insurers assess mortality charges at less than the maximum permitted, with the current charge explicitly stated with unbundled products and not so stated with bundled products.

**INTEREST CREDITING RATE** The interest rate credited to policy cash values is another policy element in life insurance pricing. The ultimate cost of life insurance products can be highly dependent on the insurer's investment returns, which, in turn, drive the interest rate credited on policy cash values. Insurers that earn above average returns can price products more favorably than those that do not. Insurers that earn below average returns may not be able to retain customers in a competitive market.

**LOADING CHARGES** Insurers incur expenses in the marketing, underwriting, and various other processes necessary for the successful prosecution of their business. They also must pay taxes to the federal government as well as to the states in which they conduct business. Finally, they wish to accumulate surplus to allow for unforeseen contingencies and must produce an economic profit for their owners. These elements are appropriately charged against the policies to which they relate. In determining the charges for these elements, actuaries make estimates of future expenses, taxes, profits (or surplus accumulations), and contingencies to develop the set of charges defined above – called variously *loading charges*, *expense*

*charges, fees, and policy loads* – intended to compensate the insurer for some or all of these elements.

In the U.S., unbundled policies contain a set of guaranteed maximum loading charges that the insurer may assess. Insurers may charge less than the maximum permitted. Bundled policies contain no stated guaranteed maximum charges but are constrained as to how much they can assess policies by virtue of having guaranteed gross premiums.

**PERSISTENCY** **Persistency** is the percentage of life insurance policies not terminated by lapse or surrender. A **lapse** is the termination of a life insurance policy and the insurer's obligations after expiration of its grace period (see Chapter 5) for failure to pay a premium necessary to maintain it in full effect. The premium not paid may have been that required on a scheduled basis, as with fixed premium contracts, or it may have been one that was needed to ensure an adequate account value to maintain a UL policy in force. A lapse also occurs when a policyowner ceases to pay premiums and allows some insurance to remain in partial effect under one of the so-called nonforfeiture options (see Chapter 5). A **surrender** is the voluntary termination of a life insurance policy by its owner for its cash surrender value.

Persistency is the measure of an insurance company's retention of its business. In general, the higher a company's persistency, the greater is the amount of surplus funds created over time as regards properly priced policies. These surplus funds can be used to enhance policyholder benefits, insurer profits, or both.

Persistency is not a policy element as are mortality charges, interest credits, and loading charges, but is important as assets that insurers accumulate from a block of policies do not precisely equal the liabilities that arise from those policies. When the accumulated assets arising from a group of policies are allocated proportionately among those policies, we get each policy's share of assets or what is called its **asset share**. The asset share is a conceptual segmentation of the insurer's general account investments accumulated on behalf of a group of policies; it does not affect individual policies or the insurer's obligations.

If a policy is surrendered and its asset share is less than its cash surrender value, the surrender imposes a cost on the insurer, directly reducing the insurer's surplus and is termed **surplus strain**. Conversely, if the asset share is greater than the surrender value, the surrender results in a gain – termed a **surrender gain**. For example, assume that a group of identical policies was issued exactly one year ago, and an annual premium of \$1,000 was paid at that time by each policyholder. Assume further that the insurer incurred \$1,200 in outlays for each policy's share of death benefits and acquisition expenses of selling, underwriting, administering, and issuing the policy last year. (Expenses after the first year are substantially lower.)

Thus, the insurer had a cash inflow of \$1,000 per policy and an outflow of \$1,200 (ignoring interest) per policy, resulting in a \$200 drain on the insurer's assets during the first year of each policy. Stated differently, each policy's first year share of assets or asset share is a deficit: -\$200.

Assume now that several policyholders surrender their policies at the end of the first policy year and each is paid \$300 as its surrender value. This \$300 must be paid from the insurer's assets. Thus, each of these policies has imposed a cost of

\$500 (\$200 + \$300) on the insurer or, more accurately, on persisting policyholders of the group. The greater the number of first year policy surrenders for this block of policies, the greater the costs imposed on remaining policyholders, because the asset share ends up being less than the cash value by \$500.

Our simple example reflects reality more closely than the reader may suspect. It is routine that policies' first year asset shares are less than their first year surrender values, and common for the asset share to be less than the surrender value for three or more years. All policies that lapse or are surrendered before the asset share deficit is recovered impose costs on persisting policyholders as reflected in the underlying product pricing. Similarly, in later years the asset share usually exceeds the surrender value and a surrender gain will benefit persisting policyowners, the insurer, or both.

#### ENDNOTES

- 1 This chapter draws in parts from Harold D. Skipper and W. Jean Kwon, *Risk Management and Insurance: Perspectives in a Global Economy* (Malden, MA: Blackwell Publishing, 2007), Chapters 19, 20, and A6 and Harold D. Skipper and Wayne Topping, *The Advisor's Guide to Life Insurance* (Chicago; American Bar Association, 2011), Chapters 1 and 6.
- 2 This section draws from Richard D. Phillips, "The Economics of Risk and Insurance: A Conceptual Discussion" in Harold D. Skipper, ed. *International Risk and Insurance: An Environmental-Managerial Approach*. Boston: Irwin/McGraw-Hill, 1998, Chapter 3.
- 3 This example draws from M. L. Smith and S. A. Kane, "The Law of Large Numbers and the Strength of Insurance" in Gustavson, S. G., and S. E. Harrington eds., *Insurance, Risk Management, and Public Policy: Essays in Memory of Robert I. Mehr* (Boston: MA: Kluwer Academic Press, 1994).