

James M. Poterba

Annuities are contracts that provide periodic payments for an agreed-upon span of time. They include annuities certain, which provide periodic payouts for a fixed number of years, and life annuities, which provide such payouts for the duration of one or more persons (the annuitants') lives. The principal insurance role of annuities is to indemnify individuals against the risk of outliving their resources.

Annuities solve the problem of planning consumption in a world with uncertain lifetimes. In return for an initial capital payment, an annuitant is assured of receiving a constant income stream for the remainder of his life. The annuity provider can pool mortality risk across similar individuals and by can use the principal left behind by those who died sooner than expected to insure those who live unexpectedly long. As a result, the annuitant's payout from the annuity contract can, in theory, exceed what the income he could earn if he invested his annuity premium in a financial asset, such as a bond.

The annuity payout rate depends on both the annuitant's prospective mortality risk and on the rate of return that the annuity provider can earn on invested assets. Younger individuals, because they are expected to receive payments for a longer time period, receive lower annuity payouts than older annuitants for a given amount of capital invested. Higher rates of return generate greater income per dollar of capital for the insurance company, and therefore permit higher payout rates to annuitants.

Annuities are sometimes referred to as "reverse life insurance." With life insurance, the policyholder pays the insurer each year until he or she dies, after which the insurance company pays a lump sum to the insured's beneficiaries. With annuities, the lump-sum payment is from the annuitant to the insurance company before the annuity payout

begins, and the annuitant receives regular payouts from the insurer until death.

Most annuity contracts have an accumulation phase and a liquidation phase. During the accumulation phase, capital builds up; this capital is dispersed during the liquidation phase. In the case of the single-premium immediate annuity, there is no accumulation phase. Annuitants make lump-sum payments of the accumulated capital that they wish to draw down to the annuity provider. During the liquidation phase, the annuitants receive payouts contingent upon their survival or in accord with other terms specified in the annuity contract. In some annuity contracts, payouts are specified as a guaranteed minimum, with the opportunity for a dividend if mortality experience or rates of return on insurance company investments prove better than expected. Many annuity products exhibit long accumulation phases, so they operate in part as saving vehicles. Although annuities are unique in their provision of income streams contingent on remaining alive, they compete with other financial products as a means for asset accumulation.

Annuities have historically been offered by insurance companies, which pool the mortality risk across many individuals and thereby achieve a more predictable cash flow than if they offered an annuity to only one person. The same principles that underpin risk reduction in life insurance sales apply to the provision of annuity payouts. The annuity supplier must have sufficient capital and be sufficiently long lived to ensure that annuity payouts will still be paid if the annuitant lives for many years.

This paper describes the historical evolution of the annuity market in the United States. It is divided into six sections. The first provides a short history of annuities, focusing primarily on individual annuities. It also describes the regulatory setting in which annuities are traded. The next section describes the structure of individual annuity contracts, as well as the evolution of the market for these contracts in the last few decades. Section 3 considers group annuity plans, and describes their significance in the insurance marketplace. The fourth section considers variable annuities, which have grown very rapidly in the last decade. Section 5 examines annuities in their role as investment vehicles. There is a brief conclusion.

1 The History of Annuities: Ancients through the Current Day

Since uncertainty about length of life is a ubiquitous source of risk, financial contracts similar to annuities have a long history. James (1947) reports that ancient Roman contracts known as *annua* promised an individual a stream of payments for a fixed term, or possibly for life, in return for an up-front payment. Speculators who dealt in marine and other lines of insurance offered such contracts. A Roman, Domitius Ulpianus, compiled the first recorded life table for the purpose of computing the estate value of annuities that a decedent might have purchased on the lives of his survivors.

Single-premium life annuities were available in the Middle Ages, and detailed records exist of special annuity pools known as *tontines* that operated in France during the seventeenth century. In return for an initial lump-sum payment, purchasers of tontines received life annuities. The amount of the annuity was increased each year for the survivors, as they claimed the payouts that would otherwise have gone to those who died. When the second-to-last participant in a tontine pool died, the sole survivor received the entire remaining principal. The tontine thus combined insurance with an element of lottery-style gambling.

During the 1700s, governments in several nations, including England and Holland, sold annuities in lieu of government bonds. The government received capital in return for a promise of lifetime payouts to the annuitants. Murphy (1939) provides a detailed account of the sale of public annuities in England in the eighteenth and early nineteenth centuries. Annuities initially were sold to all individuals at a fixed price, regardless of their age or sex. As it became clear over time that mortality rates for annuitants were lower than those for the population at large, a more refined pricing structure was introduced.

In the United States, annuities have been available for over two centuries. In 1759, Pennsylvania chartered the Corporation for the Relief of Poor and Distressed Presbyterian Ministers and Distressed Widows and Children of Ministers. James (1947) explains that it provided survivorship annuities for the families of ministers. In Philadelphia in 1812, the Pennsylvania Company for Insurance on Lives and Granting Annuities was founded. It offered life insurance and annuities to the general public and was the forerunner of modern stock insurance companies.

During the nineteenth century, the market for annuities grew slowly while that for life insurance grew quickly. This disparity in part reflects the different risks that these insurance products address. Individuals who, if they died unexpectedly, would leave dependents in need of income support provide the traditional market for life insurance. Individuals who have no dependents or relatives to provide support if they outlive their resources provide the natural market for annuities. Extended families, common in the nineteenth century, provided an informal alternative to structured annuity contracts. The falling incidence of multigenerational households in the early twentieth century contributed to the growing demand for annuity products. Murphy (1950) notes that families and other informal arrangements provided some insurance against longevity; Kotlikoff and Spivak (1981) explore related issues conceptually.

Today, annuities represent an important line of business for U.S. insurance companies. Tables 2.1, 2.2, and 2.3 describe the significance of annuities in the U.S. insurance market during recent decades. Table 2.1 presents the value of insurance company payouts on life insurance policies and on annuities over the period 1940–99, converted to 1994 dollars using the Consumer Price Index. Although annuities represented less than 10 per cent of the combined payouts on life insurance and annuities in the period before World War II, they grew more rapidly than life insurance in the five decades tracked in the table. By the early 1990s, annuity payouts constituted nearly 40 per cent of combined payouts. They remained at this level throughout the 1990s.

Table 2.2 reports the premium income received by insurance companies for annuity policies over the 1951–99 period. The table shows both the substantial growth of real annuity premiums, particularly between 1951 and the mid-1960s, and the breakdown of annuity premiums between individual and group policies. Although premiums on group policies were three to five times greater than the premiums on individual policies throughout the 1950s and 1960s, individual annuities grew more rapidly from the 1970s until the mid-1990s. In 1994, premium income from individual annuities exceeded that from group annuities. In the last few years, group annuity premiums have again exceeded those from individual annuities. The long-term growth of individual relative to group annuity premiums reflects both the decline in the growth of defined benefit pension plans and the rapid expansion of individual annuity products, particularly variable annuities.

Table 2.1
Annuity vs. life insurance payouts (millions of 1994 dollars)

| Year | Life insurance payouts | Annuity payouts | Annuity payouts as percentage of total [(2)/((1) + (2))] |
|------|------------------------|-----------------|--|
| 1940 | 26,355 | 1,864 | 0.07 |
| 1945 | 20,194 | 1,779 | 0.08 |
| 1950 | 20,947 | 2,012 | 0.09 |
| 1955 | 27,015 | 2,772 | 0.09 |
| 1960 | 36,514 | 4,158 | 0.10 |
| 1965 | 47,630 | 6,120 | 0.11 |
| 1966 | 49,760 | 6,557 | 0.12 |
| 1967 | 51,932 | 7,095 | 0.12 |
| 1968 | 53,827 | 7,474 | 0.12 |
| 1969 | 54,976 | 7,758 | 0.12 |
| 1970 | 54,767 | 8,102 | 0.13 |
| 1971 | 54,384 | 8,513 | 0.14 |
| 1972 | 56,574 | 9,323 | 0.14 |
| 1973 | 57,717 | 10,130 | 0.15 |
| 1974 | 54,450 | 10,080 | 0.16 |
| 1975 | 52,018 | 10,102 | 0.16 |
| 1976 | 52,627 | 11,517 | 0.18 |
| 1977 | 51,868 | 12,889 | 0.20 |
| 1978 | 51,748 | 13,335 | 0.20 |
| 1979 | 50,734 | 15,418 | 0.23 |
| 1980 | 50,118 | 18,348 | 0.27 |
| 1981 | 51,331 | 19,611 | 0.28 |
| 1982 | 54,064 | 19,692 | 0.27 |
| 1983 | 57,021 | 20,196 | 0.26 |
| 1984 | 60,690 | 25,566 | 0.30 |
| 1985 | 62,367 | 29,300 | 0.32 |
| 1986 | 61,710 | 30,629 | 0.33 |
| 1987 | 61,454 | 31,715 | 0.34 |
| 1988 | 60,706 | 32,173 | 0.35 |
| 1989 | 60,777 | 35,141 | 0.37 |
| 1990 | 63,277 | 36,933 | 0.37 |
| 1991 | 59,810 | 39,838 | 0.40 |
| 1992 | 60,733 | 39,662 | 0.40 |
| 1993 | 61,176 | 41,356 | 0.40 |
| 1994 | 67,618 | 40,412 | 0.37 |
| 1995 | 71,665 | 47,100 | 0.40 |
| 1996 | 75,723 | 48,260 | 0.39 |
| 1997 | 74,445 | 50,839 | 0.41 |
| 1998 | 79,046 | 54,913 | 0.41 |
| 1999 | 84,099 | 55,612 | 0.40 |

Source: American Council on Life Insurance (2000), pages 100–101. Consumer Price Index values are used to convert entries to 1994 dollars. Annuity payouts excludes “surrender values under annuities,” which is only published in years after 1994. Life insurance payouts include payments to beneficiaries, surrender values under life insurance, policy dividends, matured endowments, and “other payments.”

Table 2.2
Annuity premium income of life insurance companies (millions of 1994 dollars)

| Year | Individual annuity | Group annuity |
|------|--------------------|---------------|
| 1951 | 1,209 | 4,272 |
| 1952 | 1,377 | 4,722 |
| 1953 | 1,433 | 5,152 |
| 1954 | 1,296 | 5,370 |
| 1955 | 1,317 | 5,810 |
| 1956 | 1,254 | 5,796 |
| 1957 | 1,177 | 6,254 |
| 1958 | 1,180 | 6,127 |
| 1959 | 1,203 | 6,411 |
| 1960 | 1,268 | 5,451 |
| 1961 | 1,399 | 5,471 |
| 1962 | 1,478 | 5,785 |
| 1963 | 1,871 | 6,572 |
| 1964 | 2,129 | 7,018 |
| 1965 | 2,580 | 8,060 |
| 1966 | 2,756 | 8,268 |
| 1967 | 3,024 | 8,836 |
| 1968 | 3,307 | 9,448 |
| 1969 | 3,455 | 11,747 |
| 1970 | 3,669 | 10,553 |
| 1971 | 4,420 | 13,559 |
| 1972 | 5,176 | 14,347 |
| 1973 | 5,598 | 17,018 |
| 1974 | 5,788 | 17,486 |
| 1975 | 7,343 | 20,677 |
| 1976 | 9,677 | 26,712 |
| 1977 | 11,140 | 25,505 |
| 1978 | 10,131 | 27,033 |
| 1979 | 10,164 | 26,480 |
| 1980 | 11,331 | 29,035 |
| 1981 | 16,788 | 28,206 |
| 1982 | 23,353 | 29,887 |
| 1983 | 20,850 | 24,629 |
| 1984 | 22,418 | 38,756 |
| 1985 | 28,793 | 45,493 |
| 1986 | 35,307 | 77,861 |
| 1987 | 44,039 | 71,624 |
| 1988 | 54,887 | 74,581 |

Table 2.2 (continued)

| Year | Individual annuity | Group annuity |
|------|--------------------|---------------|
| 1989 | 59,089 | 78,444 |
| 1990 | 60,845 | 85,487 |
| 1991 | 56,220 | 78,251 |
| 1992 | 64,800 | 75,309 |
| 1993 | 78,957 | 81,491 |
| 1994 | 80,832 | 73,016 |
| 1995 | 75,204 | 80,253 |
| 1996 | 79,443 | 87,155 |
| 1997 | 83,247 | 99,089 |
| 1998 | 86,403 | 122,206 |
| 1999 | 102,903 | 137,586 |

Source: American Council on Life Insurance and author's calculations.

The data in table 2.2 may understate the actual significance of annuity contracts. Murphy (1950) notes that virtually all permanent life insurance contracts other than term life accumulate cash value. This accumulated value can be used to purchase an annuity. Such policies are classified as life insurance policies, but they can also be viewed as partly annuity products. Provisions regarding withdrawals and annuity conversions are almost always specified in the life insurance policy at the time of purchase.

The growth in annuity products shown in the premium data of table 2.2 is also reflected in the reserves held by insurance companies. Table 2.3 presents detailed information on reserves for both annuity policies and life insurance policies. These data, from the American Council on Life Insurance (2000), suggest that total annuity reserves were less than half of life insurance reserves in the mid-1960s. They have nevertheless grown more rapidly than life insurance reserves, so that by the 1990s, annuity reserves were more than twice the value of life insurance reserves. In part, this reflects the growth of term life insurance, for which reserve requirements are lower than for other types of life insurance. Within the annuity market, individual annuities have grown more rapidly than group annuities.

Annuities are sold in regulated markets. Until 1850, there was little regulation of the insurance industry in the United States. Several insurance scandals led to pressure for regulation, and in 1850, New

Table 2.3

Life insurance company reserves for annuities and life insurance policies (millions of 1994 dollars)

| Year | Individual annuity | Group annuity | Supplemental annuity | Life insurance |
|------|--------------------|---------------|----------------------|----------------|
| 1967 | 25,508 | 116,300 | 15,465 | 444,469 |
| 1968 | 26,694 | 121,171 | 15,384 | 447,073 |
| 1969 | 25,651 | 126,128 | 14,810 | 444,662 |
| 1970 | 26,564 | 129,289 | 14,241 | 441,238 |
| 1971 | 28,031 | 139,607 | 14,299 | 445,211 |
| 1972 | 30,366 | 152,373 | 14,003 | 455,036 |
| 1973 | 31,671 | 153,036 | 13,581 | 449,880 |
| 1974 | 31,618 | 147,019 | 12,562 | 426,009 |
| 1975 | 34,296 | 159,786 | 11,798 | 413,649 |
| 1976 | 39,999 | 182,328 | 11,494 | 412,735 |
| 1977 | 46,330 | 190,061 | 11,167 | 409,369 |
| 1978 | 52,442 | 224,436 | 10,806 | 404,284 |
| 1979 | 55,363 | 237,858 | 10,183 | 384,389 |
| 1980 | 56,768 | 252,717 | 9,386 | 356,109 |
| 1981 | 63,299 | 262,653 | 8,751 | 337,690 |
| 1982 | 78,378 | 294,906 | 8,689 | 328,539 |
| 1983 | 96,276 | 330,137 | 8,745 | 329,012 |
| 1984 | 109,879 | 363,388 | 8,323 | 322,440 |
| 1985 | 133,646 | 417,640 | 8,188 | 325,066 |
| 1986 | 163,772 | 480,935 | 8,494 | 340,718 |
| 1987 | 203,647 | 511,994 | 8,818 | 360,516 |
| 1988 | 242,971 | 543,920 | 9,200 | 375,954 |
| 1989 | 286,545 | 566,810 | 9,495 | 387,706 |
| 1990 | 319,874 | 584,803 | 9,659 | 395,437 |
| 1991 | 357,231 | 596,454 | 9,706 | 404,841 |
| 1992 | 402,096 | 591,271 | 9,912 | 425,056 |
| 1993 | 450,632 | 617,236 | 10,206 | 447,457 |
| 1994 | 482,172 | 612,394 | 22,989 | 468,469 |
| 1995 | 557,513 | 601,343 | 24,551 | 496,712 |
| 1996 | 587,801 | 652,506 | 26,078 | 525,546 |
| 1997 | 639,649 | 703,281 | 26,246 | 559,578 |
| 1998 | 693,866 | 768,254 | 28,135 | 596,289 |
| 1999 | 777,432 | 807,391 | 28,781 | 627,651 |

Source: American Council on Life Insurance and author's calculations.

Hampshire became the first state to appoint a commissioner of insurance. Many other states followed suit in the next two decades, and by the early 1870s the insurance industry in virtually all states operated under regulatory control, as described by Trieschmann and Gustavson (1995). The primacy of state regulation of insurance markets was confirmed when the U.S. Congress passed the McCarran-Ferguson Act in 1945. State insurance regulations are not uniform, and this can affect the scope of annuity products available to consumers in different places. Greene (1977) attributes the slow early growth of variable annuities, after their introduction by TIAA in 1952, in part to the requirement that such products receive regulatory approval in each state.

Insurance regulation arose historically in part because of the complexity of insurance products and the relative lack of sophistication on the part of many insurance buyers. Most annuities, like whole life insurance, involve investment decisions as well as decisions about mortality risk. Insurance regulation restricts the types of policies that can be offered, determines how policies can be explained to potential buyers, and sets limits on what constitutes an acceptable expense. There are also regulations on the capital that insurance companies must have and on the types of investments that they can purchase with assets that are held against future policyholder claims. Insurance regulations are designed to increase the safety and security of income streams purchased by policyholders.

Black and Skipper (1994) discuss the investment regulations that affect insurance companies, in particular the presence of "legal lists," which describe the set of securities that insurers may invest in and the fraction of their assets that may be held in different securities. These regulations have implications for the rates of return that insurance companies can offer on fixed annuity products, since they typically restrict the amount of high-risk (and potentially high-return) securities in insurance portfolios. The foregoing regulations apply to fixed annuities. Group fixed annuities are subject to additional regulations from the provisions of ERISA, largely concerning the structure of contract terms for these products.

Variable annuities are regulated differently than fixed annuities, with insurers maintaining separate asset pools as reserves against variable annuities. This prevents poor returns on the variable annuity portfolio from affecting the capital base for other insurance company products. Variable annuities, because of their investment component, are also regulated in part under the federal securities law. These products

are subject to provisions of the Securities Act of 1933, the Securities Exchange Act of 1934, and the Investment Company Act of 1940.

2 Individual Annuities

Understanding the growth of the individual annuity market requires recognizing the range of annuity products available to individuals and the risks the products are designed to insure against. Individual annuity products differ in their provisions for asset accumulation and in the terms under which the accumulated principal is dispersed during the liquidation phase. This section describes the primary types of individual fixed annuities and summarizes the growth of the individual annuity market in the United States.

2.1 *Typology of Individual Annuities*

Annuities can be categorized along many dimensions, including the number and timing of premiums, the number of lives covered, the nature of the payouts, and the date at which benefits begin. There are several methods of paying premiums: single premium, fixed annual premium, and flexible premium annuities are all available. Annuities can insure a single life, or they can insure multiple lives (joint life annuities). They can begin payouts immediately after the premium is paid (immediate annuities), or after some waiting period, sometimes involving many years (deferred annuities). The payouts may take the form of a life annuity without refund, they may offer a guaranteed minimum payout, or they may offer the annuitant a flexible structure of periodic withdrawals.

The simplest individual annuity contract is a single-premium immediate annuity. In return for a single premium payment, the annuitant receives a guaranteed stream of future payments that begin immediately. These payments can end when the annuitant dies (a simple life annuity), when both the annuitant and a coannuitant, such as a spouse, have died (a joint life survivorship annuity), or at the later of a fixed number of years or the date of death of the annuitant (life annuity with stipulated payments certain).

These different annuities address different insurance needs. A simple life annuity is primarily designed to insure annuitants against outliving their resources; a joint life survivorship annuity addresses this risk and also provides retirement income for dependents. The “payout

certain” annuity is often attractive because potential annuitants are unwilling to turn over a capital sum to an annuity provider and risk dying shortly thereafter without receiving many annuity payments. The “fixed payments certain” product overcomes this inhibition by ensuring that payments will be made to the annuitants’ beneficiaries for at least a fixed period. The level of the annuity payout associated with a “fixed payments certain” contract is lower than that for a simple life annuity.

In addition to the immediate annuities described above, there are also deferred annuities. A single-premium deferred annuity, for example, includes a waiting period between the premium payment and the beginning of annuity payouts. The promised stream of payments for a given premium is greater for a single-premium deferred annuity than for a single-premium immediate annuity, since the premium is invested and earns returns between the date when it is paid and the date when the payouts begin.

A variant on such an annuity, one that provides for multiple premium payments, could represent a saving plan for an individual who plans to use an annuity to draw down accumulated resources. This is known as an annual-payment annuity. It specifies a stream of premiums that the policyholder will pay during the policy’s accumulation phase. At the conclusion of this phase or possibly some years afterward, the policy enters its liquidation phase and the annuitant and beneficiaries begin to receive payouts from the accumulated principal. While these products are available, single-premium deferred annuities have been the dominant contract in the individual annuity market for the last few decades.

One of the most popular annuity products is the flexible-premium deferred annuity, which permits annuitants to make cash contributions at times of their choosing and allows the accumulated value of these premium contributions to be converted to an annuity at some future date or specified age of the annuitant.

2.2 *The Growth of the Individual Annuity Market*

While the earlier discussion noted that annuities have a long history, the annuity business was a small share of the insurance market until the Great Depression. Data compiled by the Temporary National Economic Commission (TNEC) (1941) suggest that, over the period 1866–1920, annuity premiums averaged only 1.5 per cent of life

insurance premiums received by U.S. insurance companies. The Great Depression, and the associated financial panic and bank failures, led many investors to seek reliable investment vehicles for their savings. Individual annuities, many offered by insurance companies with long and stable financial histories, were such vehicles, and they grew rapidly during the 1930s. TNEC (1941) data show that 68 per cent of all annuity premiums received between 1913 and 1937 were received between 1933 and 1937. In 1934–36, the premium income on newly issued individual annuities exceeded that on newly issued ordinary life insurance for the 26 large companies studied by the TNEC.

As a share of payouts, reserves, or total premium income, annuities were still a small part of the insurance business in the 1930s. TNEC (1941) data suggest that they accounted for 1.79 per cent of all insurance company disbursements over the 1929–38 period, compared with 24.3 per cent for death claims and 23 per cent for policy surrender values. Annuities accounted for a greater share (8.56 per cent) of premium income during this period, and individual annuities accounted for 80 per cent of annuity premiums. In 1938, annuity reserves were \$2.67 billion, compared with \$16.83 billion in life insurance reserves.

Although the individual annuity market grew rapidly in the 1930s, it represented only a small fraction of the insurance industry at the end of this period. Many firms that had sold policies during that decade subsequently experienced losses on their annuity contracts, for two reasons. First, the rate of return earned on insurance reserves fell during the early 1930s. Long-term interest rates on Moody's AAA corporate bonds averaged 4.68 per cent between 1928 and 1932 but 3.45 per cent between 1933 and 1940. The real interest rate was much greater than the nominal rate in the early 1930s. The consumer price index fell 20.3 per cent between 1928 and 1932, raising the real return to lenders. Long-term interest rates fell below 3 per cent in the late 1930s. Because annuities had been sold assuming that prevailing interest rates from earlier periods would remain in force, the drop in rates led to investment earnings below what was needed to service these contracts. Campbell (1969) reports that the net earnings rates of life insurance companies reached a high of 5.05 per cent in 1930 but declined for nearly two decades afterward, falling to 2.88 per cent in 1947. This was reflected in the poor profitability of annuity contracts.

A second factor in annuity losses was the longevity of annuitants relative to the assumptions that insurance companies used in pricing

their annuity contracts. Gilbert (1948) and the TNEC (1941) explain that the mortality tables that life insurance companies used to price annuities were revised several times during the 1930s to reflect the lower mortality risk for annuitants than for the general public. The life tables in use particularly overstated the mortality experience of female annuitants at the beginning of the 1930s.

Gilbert (1948) compares the 1868 American Experience Table of Mortality, long a standard reference in the insurance industry, and the "expectation" table adopted in 1938 for annuity purposes. The tables show large gains in life expectancy at extreme ages, especially for women. The 1868 table combined both men and women to yield a life expectancy of 8.48 years at age 70. In contrast, the 1938 table shows a life expectancy of 15.62 years for female annuitants at age 70. The inappropriately high mortality assumptions built into annuities sold at the beginning of the 1930s contributed to the losses on these products later in the decade.

The annuity contracts that grew in popularity during the 1930s emphasized the role of annuities as retirement savings and investment vehicles. Annual-premium retirement annuities—contracts that allowed individuals to make premium contributions each year, to accumulate a capital fund, and then to choose from a number of payout options at the date of their retirement or another advanced age—expanded particularly rapidly. Retirement annuities were attractive retirement saving vehicles for several reasons. They offered returns that were often greater than those available elsewhere for small investors. They provided an option to purchase an immediate single-premium annuity at a future date, typically at terms specified at the beginning of the accumulation period, if the participant decided that was the best way to decumulate assets. Perhaps most important, annuities were supplied by secure financial institutions. Gilbert (1948) notes that even though surrender charges could sharply reduce the return on these products for those who redeemed them before maturity, this did not prevent the rapid expansion of the deferred annuity market in the 1930s.

Annuity premiums for a given payout steam increased during the 1930s. Gilbert (1948) reports that in 1930 Aetna Life Insurance Company would sell a \$100 immediate annual annuity to a 65-year-old man (woman) for a premium of \$925 (\$1,040). By 1940, the premiums had increased to \$1,220 (\$1,435).

The individual annuity market expanded throughout the postwar period. As the data in table 2.2 show, individual annuity premium

payments increased almost every year. However, comparing these premium payments with a yardstick for the size of the economy, such as gross domestic product, can be more revealing. Individual annuity premiums were 0.064 per cent (six one-hundredths of 1 per cent) of GDP in 1951. They declined to 0.053 per cent in 1961, then began to increase: to 0.110 by 1971, 0.339 per cent in 1981, 0.903 per cent in 1991, and 1.2 per cent in 1999. The early 1960s thus marked the beginning of the growth phase for individual annuities, with much of the growth concentrated in the period since the late 1970s, and much of the growth in the 1990s in the market for variable annuities.

2.3 Characteristics of Annuity Buyers

Survey data on the owners of nonqualified annuity products, such as the information collected and reported in Gallup (1996), provide some insight on the individuals who purchase these policies. In 1993, the average age of individual annuity holders was 63, and half of these policyholders were retired. Less than one-quarter were under the age of 54, so annuities are primarily a product that attracts buyers who are at or near retirement age. More than three-quarters of the annuity policyholders had annual incomes of less than \$75,000 per year. The majority of those with annuities reported that they planned to use their annuities for retirement income.

The characteristics of annuity products that attract current buyers vary. Roughly three-quarters cite tax benefits associated with annuities as a primary reason for purchasing their policy. Another two-thirds per cent cite the safety and reliable income associated with an annuity, and more than half indicate that the long-term saving plan associated with an annuity product was an important attraction. A substantial fraction, nearly half, of all annuity holders report that they used a one-time income receipt, such as an inheritance, to purchase their annuity.

3 Group Annuity Plans

The Metropolitan Life Insurance Company pioneered the group annuity market, which is linked to corporate defined benefit pension plans, in the early 1920s. James (1947) explains the early growth of this business. Life insurance companies began underwriting group life, health, and disability policies for large corporations in the years after

World War I. Providing life annuities to retirees was a natural extension of this business.

Most early corporate pensions were financed on a pay-as-you-go basis, with the firm making payments to beneficiaries from current earnings. In 1921, Metropolitan began to write small contracts to manage corporate pension programs, collecting contributions while workers were employed and, in return, paying out benefits when they were retired. Metropolitan introduced its own retirement pension program in 1925 and began actively marketing group annuities, the name for structured pension programs, in 1927. In the first year of operation, Metropolitan sold only 30 contracts for group annuities, covering fewer than 40,000 individuals.

The group annuity market suffered from the same difficulties as the individual annuity market in the early 1930s, with low investment returns leading to losses on group annuity contracts. This experience, coupled with the passage of the Social Security Act of 1935 and the associated promise of a minimal retirement benefit for workers, led to slow growth of group annuities. By 1941, James (1947) reports, only 269,101 individuals were covered by group annuity policies with Metropolitan Life Insurance Company.

The typical policy in the early 1940s, which Dublin (1943) describes, required employer and employee contributions during the employee's active service. The employee was eligible to receive an annuity beginning at age 65, with some provisions for retirement at other ages. At retirement, the employee could typically choose between a lump-sum payout of his total contributions, and the "paid-up option" in which these contributions were used to purchase a life or joint life annuity. Employer contributions were usually applied to purchase an annuity. The goal of most group annuity plans was to provide, in conjunction with individual benefits from Social Security, a retirement income that replaced between 40 and 60 per cent of the retiree's earnings from employment.

The group annuity business grew rapidly in the late 1940s and throughout the 1950s. In 1958, 3.9 million workers were covered in various types of group annuity plans. This number grew to 38 million by 1988. It declined to about 31.1 million by 1999. At one time essentially all group annuities were associated with defined benefit pension plans, though not all defined benefit plans were administered through group annuities. In more recent years, group annuities have also been used in conjunction with defined contribution plans. Hoffman and

Mondejar (1992) provide data on the assets of insured and noninsured private pension funds. In 1950, insured pension fund assets were 40 per cent of the total assets of private pension funds; this fraction declined gradually to 31 per cent by the end of the 1980s. The broad trends in this ratio are sensitive to the mix of defined benefit and defined contribution pension plans.

3.1 *Typology of Group Annuity Products*

Group annuity contracts take several forms. The first type to achieve popularity was the *deferred group annuity contract*. An employer purchasing such a contract makes periodic payments to an insurance company, which applies these payments to the purchase of deferred annuities for covered workers. The purchase price of these annuities is specified by the employer's contract with the insurance company, so the insurer indemnifies the employer against changes in rates of return, mortality risk, or other factors that could alter the pricing of deferred annuities. Maclean (1962) reports that such policies were often structured so that the employer received a dividend from the insurance company if mortality experience or investment returns proved to be more favorable than the initial contract anticipated. The employer did not pay more, however, if supplying deferred annuities turned out to be more expensive than the insurance company had originally anticipated. This type of contract covered 71 per cent of the individuals with group annuity contracts in 1950 but declined to only 48 per cent a decade later.

A key attraction of deferred group annuity contracts is that employees know they have a certain pension income, which is guaranteed by the insurance company writing the annuity contract. Managers in turn know that they have met their future pension obligations in full. Because some workers will not remain with the firm long enough to collect pension benefits, however, fully funded deferred group annuity contracts require the employer to set aside funds for future pension liabilities that may not materialize. These contracts also give employers little flexibility in choosing the funding level for their pension.

A second type of group annuity contract, the *deposit administration contract*, grew in popularity during the 1950s. This type of contract offers more flexibility in the timing of employer contributions and a more direct link between employer cost and the mortality or turnover experience of employees than does the deferred group annuity con-

tract. The insurer holds contributions to the deposit administration plan in an unallocated fund. The insurer promises a minimum return on this fund. When an employee retires, the insurer withdraws an amount sufficient to purchase an immediate fixed annuity for the amount/of the retiree's assured retirement benefit from the fund account. The insurer does not indemnify the employer against changes in the price of fixed annuities. Although the insurance company bears all risks of mortality and rate-of-return fluctuations for retired employees, the employer bears these risks for employees who have not yet reached retirement.

The employer may be able to contribute less to the reserve fund than the required contributions under a deferred group annuity contract. Deposit administration plans expanded very rapidly in the 1950s, from covering only 10 per cent of all individuals in insured pension plans in 1950 to covering 31 per cent by 1959.

A third class of group annuity contract, first offered in 1950 and one of the most popular in subsequent years, is the *immediate participation guarantee* (IPG) contract. This is a variant of the deposit administration contract, with a fund account maintained by the insurer but with even more direct links between the mortality experience of covered employees, returns on investment, and the pension costs of the employer. With an IPG plan, if the employer maintains a fund account balance large enough to fund the guaranteed annuities for all retirees, then the employer's account is credited with the actual investment experience of the insurer, and the actual payments to retirees are withdrawn from this account. In this way the employer is essentially self-insuring the mortality experience of retirees and receiving actual rather than projected investment returns. If the employer's fund balance drops below the amount needed to fund the required guaranteed annuities, however, then the plan becomes a standard deferred annuity contract, and the insurer uses the account balance to purchase guaranteed individual annuities for all participants in the pension plan. Provided the account balance is high enough, the employer bears the investment and mortality risks associated with the plan. The insurer assumes these risks if the account balance falls below the threshold.

The rules governing an employee's participation in defined benefit private pension plans vary from employer to employer, with corresponding effects on participation in associated group annuity programs. Several common features nevertheless deserve comment. First, when firms introduce these plans, they typically purchase deferred

annuities for the pension liabilities associated with prior service of current employees. Second, if employees vested in a pension plan die before the plan's retirement age, their contributions will be returned, in most cases with interest; the employer's contributions to the pension plan will not be returned. Third, an employee who leaves the firm before reaching retirement age may choose to withdraw the current value of his or her pension benefit as a lump sum or to receive the benefits due at retirement age. With the advent of Individual Retirement Accounts and other self-directed retirement income accounts in the early 1980s, workers who were leaving the firm were able to roll over their accumulated pension wealth into another retirement saving account.

3.2 Group Annuities and Pension Policy in the United States

Group annuity contracts grew rapidly during the 1950s and 1960s. They were originally linked to defined benefit pension plans. These plans typically offer a retirement benefit specified by a formula depending on years of service and salary history. Their growth continued as employment at firms with defined benefit pension plans increased and as various legislative changes raised the fraction of the workforce at these firms that was covered by a pension. For a variety of reasons, however, the growth of defined benefit plans slowed and then reversed during the 1980s. Defined contribution plans, which permit employers to make contributions to an investment account maintained on behalf of the worker but which do not promise any particular stream of post-retirement benefits, have grown rapidly. In the late 1990s, the rate at which defined benefit plans were created fell sharply, while defined contribution plans continue to be created. This implies a changing role for group annuities, and prospectively greater use of these policies in conjunction with defined contribution plans.

Table 2.4 shows substantial changes in the relative flows of contributions to defined benefit and defined contribution pension plans during the 1980s. The table shows the number of defined contribution and defined benefit pension plans, participants in these plans, and contributions to these plans, during the period 1975–96. The number of defined contribution plans more than doubled between 1975 and 1982 and then rose another 50 per cent between 1982 and 1989. The number of defined benefit plans increased during the 1975–82 period,

but the increase was slower than that for defined contribution plans. Between 1982 and 1991, however, the number of defined benefit plans actually *declined*, with the 1991 number more than 40 per cent below the peak. The number of participants peaked in 1984, and the number of active participants (those who were not retired) peaked in 1981. In contrast, the number of defined contribution plan participants increased throughout the 1980s, although more slowly than the number of plans.

The last column in table 2.4 tracks contributions to defined contribution and defined benefit pension plans. The disparity between the contribution series is even more dramatic than that between the number of participants or the number of plans. In constant 1989 dollars, defined contribution plan contributions increased from \$35.4 billion in 1980 to \$89.7 billion in 1991 and \$143.9 billion in 1996. Much of this growth reflects rising contributions to voluntary retirement saving programs, such as 401(k) plans. Contributions to defined benefit plans, however, peaked at \$64.1 billion in 1980 and 1981 and then declined. Their level has fluctuated during the last decade, with a high of \$52.1 billion in 1993, and a low of \$23.0 billion in 1990. Defined benefit contribution levels are affected by fluctuations in asset values. When asset values in existing plans rise, the amount that firms need to contribute to cover their future liabilities declines, so contributions may also decline.

The shift from defined benefit to defined contribution pension plans was the result of several coincident developments, including regulatory changes and a shift in employment growth from industries that historically offered such plans (manufacturing) to industries that did not (services and trade). The changing regulatory treatment of defined benefit and defined contribution pension plans began with the Employee Retirement and Income Security Act of 1974 (ERISA). ERISA imposed minimum plan standards for participation, vesting, and retirement, as well as requirements for funding past service liability. It also established the Pension Benefit Guaranty Corporation (PBGC) to insure pension benefits to employees in defined benefit plans and financed this insurance program with taxes on existing plans. ERISA placed a lower regulatory burden on defined contribution plans, which were subject only to the same minimum plan standards that affected defined benefit plans. Post-ERISA legislation has raised PBGC premiums, required faster funding of liabilities, and penalized employers for claiming excess assets of terminated defined benefit plans.

Table 2.4
Trends in pension plans, participants, and contributions

| Year | Plans | Participants | Contributions |
|-----------------------------------|-------|--------------|---------------|
| <i>Defined contribution plans</i> | | | |
| 1975 | 207.7 | 11.5 | 29.5 |
| 1976 | 246.0 | 13.5 | 30.9 |
| 1977 | 281.0 | 15.2 | 32.5 |
| 1978 | 314.6 | 16.3 | 35.0 |
| 1979 | 331.4 | 18.3 | 35.4 |
| 1980 | 340.8 | 19.9 | 35.4 |
| 1981 | 378.3 | 21.7 | 38.7 |
| 1982 | 419.5 | 24.6 | 40.0 |
| 1983 | 426.6 | 29.1 | 44.9 |
| 1984 | 435.4 | 32.9 | 51.8 |
| 1985 | 462.0 | 35.0 | 61.3 |
| 1986 | 545.0 | 36.7 | 66.0 |
| 1987 | 570.0 | 38.3 | 66.0 |
| 1988 | 584.0 | 37.0 | 68.0 |
| 1989 | 599.0 | 36.5 | 73.2 |
| 1990 | 599.2 | 38.1 | 79.9 |
| 1991 | 597.5 | 38.6 | 89.0 |
| 1992 | 619.7 | 42.4 | 105.9 |
| 1993 | 618.5 | 43.6 | 118.3 |
| 1994 | 615.9 | 44.8 | 125.9 |
| 1995 | 623.9 | 47.7 | 144.3 |
| 1996 | 632.6 | 50.6 | 143.9 |
| <i>Defined benefit plans</i> | | | |
| 1975 | 103.3 | 33.0 | 55.8 |
| 1976 | 114.0 | 34.2 | 62.1 |
| 1977 | 121.7 | 35.0 | 63.8 |
| 1978 | 128.4 | 36.1 | 52.5 |
| 1979 | 139.5 | 36.8 | 69.3 |
| 1980 | 148.1 | 38.0 | 64.1 |
| 1981 | 167.3 | 38.9 | 64.1 |
| 1982 | 175.0 | 38.6 | 62.2 |
| 1983 | 175.1 | 40.0 | 57.6 |
| 1984 | 168.0 | 41.0 | 56.3 |
| 1985 | 170.2 | 39.7 | 48.4 |
| 1986 | 172.6 | 40.0 | 37.6 |
| 1987 | 163.1 | 40.0 | 32.5 |
| 1988 | 146.0 | 40.7 | 27.6 |
| 1989 | 132.5 | 40.0 | 24.7 |

Table 2.4 (continued)

| Year | Plans | Participants | Contributions |
|------|-------|--------------|---------------|
| 1990 | 113.1 | 38.8 | 24.2 |
| 1991 | 101.8 | 39.0 | 30.1 |
| 1992 | 88.6 | 39.5 | 39.8 |
| 1993 | 83.6 | 40.3 | 60.7 |
| 1994 | 74.4 | 39.7 | 46.6 |
| 1995 | 69.5 | 39.7 | 50.9 |
| 1996 | 63.7 | 41.1 | 45.3 |

Note: The number of plans is measured in thousands, participants in millions, and contributions in billions of 1989 dollars, converted from current dollars using the Consumer Price Index. Data are drawn from U.S. Department of Labor (2000) and earlier issues of the same publication.

4 Variable Annuities

Both the individual and group annuity markets have changed over time, from markets primarily for fixed annuities to markets with growing use of variable annuities. Fixed annuities provide a guaranteed nominal payout during their liquidation phase. They distribute a given principal across many periods, but in most cases they do not provide a constant real (i.e., adjusted for inflation) payout stream if the price level changes. Inflation-indexed annuities have been marketed in the United States by some insurance companies, since the U.S. Treasury issued inflation-indexed bonds in 1997. When inflation is low, the real value of the annual distribution will not vary much over the liquidation period. But even modest inflation rates, if they persist throughout the liquidation period, can lead to substantial erosion in the real value of annuity payouts. At an inflation rate of 3 per cent per year, for example, the real value of annuity payouts in the first year of an annuity liquidation period is more than twice that of the same nominal payout 24 years later. At an inflation rate of 6 per cent per year, the real value of payouts is halved in only 12 years.

Variable annuities provide one way of addressing the risk of purchasing power erosion that is associated with fixed nominal annuities. Unlike fixed annuities that promise a constant nominal payout, variable annuities provide an opportunity to select a payout that bears a fixed relation to the value of an asset portfolio. If these assets tend to rise in value with the nominal price level, then the payout on the

variable annuity will adjust to mitigate, at least in part, the effects of inflation. Because variable annuities are defined in part by the securities that back them, they are more complex contracts than fixed annuities. In spite of their complexity, however, they have become one of the most rapidly growing annuity products in recent years.

Variable annuities are structured to have both an investment component and an insurance element. During the accumulation phase, premium payments are used to purchase "investment units," the price depending on the value of the variable annuity's underlying asset portfolio. For example, if this portfolio consists of common stocks and if share prices are high when a premium payment is made, then this payment will buy relatively few units, and vice versa. During the accumulation phase, variable annuities resemble mutual funds in many respects, although there are differences. Mutual fund providers explicitly manage the assets in many recent variable annuity products. The dividends, interest, and capital gains on the assets that underlie the investment units are reinvested to buy additional investment units.

When the accumulation phase of the variable annuity ends, the accumulated value of the investment units is transformed into "annuity units." This transformation occurs as if the accumulation units were cashed out and used to purchase a hypothetical fixed annuity. The annuitant does not receive a stream of fixed annuity payments, but this hypothetical annuity plays an important role in computing actual payouts. The payout amount for the hypothetical annuity is used to credit the annuitant with a number of annuity units. Many variable annuities also allow annuitants the option of choosing a fixed annuity stream, or some combination of a fixed stream and a variable stream of payouts.

The actual variable annuity payout in each period depends on the number of annuity units that the annuitant is credited with, and, over some range of asset returns, on the value of the assets in the variable annuity's underlying portfolio. If the value of this portfolio rises by more than the increase implicit in the assumed interest rate, after the annuitant has converted to annuity units, for example because of rising nominal prices, then the payout will rise during the payout phase. If the value of the underlying assets falls, however, the value of the payout will also decline. The variable annuity's possibility of fluctuating payments is both an attraction (it provides potential protection against rising consumer prices) and, for some potential buyers, a disadvantage (the nominal payout stream is not certain).

Several product innovations during the last two decades have expanded the menu of investment options available for variable annuities. First, the range of portfolio investments that can be held through variable annuity policies has increased. Although the first variable annuities focused exclusively on diversified common stock portfolios, policies now offer variable annuities tied to more specialized portfolios of equities as well as to bonds or other securities. Variable annuities typically allow policyholders to move their assets among various policy sub-accounts, usually with different investment objectives, without fees or penalties. Second, virtually all variable annuities now offer lump-sum withdrawal options after the policy has reached a specified maturity date, as well as the possibility of withdrawing the principal in a set of periodic lump-sum payments. These features make it possible to use variable annuities as an asset accumulation vehicle without necessarily purchasing an annuitylike payout stream when the accumulation phase is over. This is because variable annuity contracts contain a purchase rate guarantee. Finally, some no-load mutual fund families have begun offering variable annuities in conjunction with some insurance companies in recent years. Schultz (1995) reports that investment management expenses for funds associated with variable annuities that invest primarily in diversified U.S. equity portfolios average 0.76 per cent per year, which combines with the 1.23 per cent average annual insurance expenses on these variable annuity products for a total expense ratio of 1.99 per cent. Variable annuities and other investment alternatives are compared in more detail below.

Variable annuities were introduced in the United States by the Teachers Insurance and Annuities Association-College Retirement Equity Fund (TIAA-CREF) in 1952. The first variable annuities were qualified annuities that were used to fund pension arrangements. Variable annuities grew slowly during the next three decades—in part, as Green (1977) explains, because of the need to obtain regulatory approval for these products from many state insurance departments. Because variable annuities are usually backed by assets, such as corporate stocks, that do not guarantee a fixed minimal payout, the reserves that back these policies are maintained in separate accounts from the other policy reserves of life insurance companies. Maclean (1962) notes that no major insurance company other than TIAA-CREF had issued a variable annuity policy as of 1960, primarily because state laws prohibited insurers from supplying a new class of products backed by

common stock assets that were segregated from the insurer's other assets. Campbell (1969) provides a detailed account of the introduction and growth of variable annuity products, with particular attention to the regulatory hurdles that had to be cleared to market these products.

The slow growth experienced in 1950s and 1960s has been reversed in recent years. The growth rate of variable annuity premiums during the last decade has been second only to health insurance premiums among insurance products. Between 1989 and 1993, individual annuity premiums (measured in 1994 dollars) increased from \$58.6 to \$71.8 billion, largely as a result of growth in variable annuity sales. Since 1993, the growth has accelerated. The annual average percentage growth rate of variable annuity sales over the 1989–1999 period was an astonishing 32.8 per cent.

Table 2.5 chronicles the growth of the number of variable annuity policies. Although the number of policies has risen quickly, most of these policies are not yet mature, so payouts have not increased commensurately. Most variable annuity policies are currently in the accumulation phase. One open question is whether a substantial fraction of the assets currently accumulating in variable annuity contracts will ultimately be used to purchase life annuity contracts, or whether it will be withdrawn as lump sums or in other forms.

Table 2.5 shows only 670,000 contract owners in variable annuity policies in 1977, compared with 3.7 million in individual fixed annuity policies that year. By 1993, the number of variable contract owners had increased to 5.25 million, and the number of fixed contract owners had grown to 21.5 million. Both variable and fixed annuities grew rapidly between the late 1970s and late 1980s. In more recent years, variable annuities have grown faster than fixed annuities as table 2.5 illustrates. By 1999, the number of variable annuity policies was 17.5 million, compared with 26.2 million fixed annuity policies.

Both individual and group variable annuity policies have grown during the 1990s. Table 2.6 presents information on the reserves held for variable annuity policies. The early growth of variable annuity policies was concentrated in group policies. As recently as the late 1960s, more than 95 per cent of the reserves for variable annuity policies were held in group policies. Individual variable annuity policies, however, have grown more quickly than group policies during the last two decades. The policy reserves for individual variable annuity policies surpassed those for group policies in 1987; by 1996, individual variable annuity reserves were more than twice those for group policies.

Table 2.5
Fixed and variable individual annuities in force, 1977–1999 (millions)

| | Fixed | Variable |
|------|-------|----------|
| 1977 | 3.68 | 0.67 |
| 1978 | 4.24 | 0.69 |
| 1979 | 4.49 | 0.72 |
| 1980 | 5.40 | 0.76 |
| 1981 | 6.11 | 0.80 |
| 1982 | 7.69 | 0.90 |
| 1983 | 8.55 | 1.03 |
| 1984 | 9.47 | 1.20 |
| 1985 | 10.00 | 1.46 |
| 1986 | 10.88 | 1.91 |
| 1987 | 12.07 | 2.29 |
| 1988 | 14.16 | 2.73 |
| 1990 | 16.31 | 2.91 |
| 1991 | 17.34 | 2.84 |
| 1992 | 19.29 | 3.93 |
| 1993 | 21.50 | 5.25 |
| 1994 | 23.83 | 6.49 |
| 1995 | 23.06 | 7.64 |
| 1996 | 23.87 | 8.16 |
| 1997 | 28.90 | 7.40 |
| 1998 | 25.96 | 14.60 |
| 1999 | 26.20 | 17.46 |

Source: American Council on Life Insurance, *Life Insurance Fact Book*, various issues. Statistics exclude supplementary contracts.

5 Annuity Products as Investment Vehicles

Different types of annuities are designed to achieve different objectives, and there are trade-offs in the comparison of annuity products with other investment and insurance vehicles. Variable annuities are the annuity products that compete most directly with other investment alternatives. The central trade-offs that investors must evaluate are the insurance benefits that annuities offer, the costs of potential annuity surrender charges, the potential tax advantages to investing through annuities, and the different transaction costs and investment options associated with various financial products. Several features of annuities, such as their management expenses, their surrender charges, and

Table 2.6
Life insurance company variable annuity reserves (millions of 1994 dollars)

| Year | Group policies | Individual policies |
|------|----------------|---------------------|
| 1970 | 9,223 | 581 |
| 1971 | 11,069 | 1,311 |
| 1972 | 12,790 | 2,239 |
| 1973 | 13,400 | 2,849 |
| 1974 | 12,303 | 2,960 |
| 1975 | 15,911 | 4,377 |
| 1976 | 18,184 | 5,958 |
| 1977 | 19,042 | 6,431 |
| 1978 | 18,230 | 7,094 |
| 1979 | 15,976 | 8,144 |
| 1980 | 17,920 | 8,673 |
| 1981 | 17,683 | 9,445 |
| 1982 | 17,547 | 10,481 |
| 1983 | 19,617 | 13,252 |
| 1984 | 22,449 | 14,370 |
| 1985 | 25,589 | 20,559 |
| 1986 | 30,166 | 28,105 |
| 1987 | 30,726 | 35,612 |
| 1988 | 33,619 | 41,469 |
| 1989 | 37,275 | 49,867 |
| 1990 | 38,239 | 54,141 |
| 1991 | 41,170 | 57,984 |
| 1992 | 43,239 | 79,512 |
| 1993 | 56,052 | 114,534 |
| 1994 | 65,639 | 145,523 |
| 1995 | 80,744 | 196,109 |
| 1996 | 107,423 | 233,273 |

Source: American Council on Life Insurance, *Life Insurance Fact Book* (various issues) and author's calculations. Data for years after 1996 are not reported in a format comparable to the earlier years.

their tax treatment, affect their attractiveness from the standpoint of investors.

The management expenses associated with variable annuities typically average between 100 and 150 basis points per year, substantially higher than the comparable expenses for many mutual funds. Variable annuities are therefore most attractive to individuals who value the insurance associated with them and who are prepared to pay for this insurance, or who value the tax-deferred "inside build-up" associated with these accounts.

Surrender charges illustrate the complex pricing of annuities. These charges, found in many but not all deferred annuity contracts, stipulate that an annuitant who decides to cancel the policy before its maturity date (typically five or ten years) must pay a fee to the insurer. Insurers justify these provisions as needed to recover the commission and other production costs associated with annuity products. When assets are held in an annuity product for a long period until the maturity date, the insurer can cover these costs through the annual management fees and expenses of the annuity. When the annuity contract is terminated prematurely, however, the total collected from such management fees is reduced, and the insurer collects a surrender charge to compensate for these lost fees.

The combination of surrender charges and income tax penalties for premature withdrawal of annuity assets makes long-term investors who do not expect to need their invested assets in the short term the natural market for deferred annuities. Black and Skipper (1994) report a standard surrender charge of 5–10 per cent of the accumulated value, typically with a declining schedule and ceasing after a fixed period of years. These charges can substantially reduce the rate of return on annuity assets for those who terminate their contract prematurely. In addition, annuity holders under the age of 59 who make premature withdrawals from either qualified or nonqualified annuities face a 10 per cent federal income "penalty tax" on their withdrawals. This tax applies only to the income that has been accumulated in the annuity contract. These withdrawal penalties, which are very similar to those on early withdrawals from qualified retirement plans, further encourage annuity investors to accumulate for the long term and reduce the return earned by those who withdraw their assets.

Surrender charges were more prevalent in the 1930s and 1940s than at present. In fact, some annuity products marketed in recent years do not include surrender charges. Pallay (1995) estimates that

approximately one-fourth of annuity reserves are currently accounted for by annuities with no surrender charges, although some of this includes contracts on which surrender charges have expired.

At a time when surrender charges were more prevalent, Gilbert (1948) illustrated their effect on the returns earned by those who terminate their annuity contract before maturity. He focused on a typical deposit annuity in the 1940s, which imposed a loading charge as well as an early surrender charge. If the annuitant could directly earn the 3 per cent rate of return assumed in the annuity, then the capital fund an investor could build by contributing premium contributions to a personal account would grow faster than the surrender value of the annuity. In each of the first 11 years of a typical annuity policy, Gilbert (1948) showed, the surrender value was less than the sum of the nominal premiums that the annuitant had paid. Whether an individual can match the return promised in annuity contract depends on existing investment opportunities and the degree to which the insurance firm offering the annuity provides valuable investment direction.

It should be noted that annuities are not the only products with surrender fees. Some mutual funds impose a special charge on investors who withdraw their assets before a specified holding period. The nature of surrender charges and their effect on the investment return for these products are important factors to consider in comparing annuities with other financial products.

The tax treatment of annuities is an attractive feature that has undoubtedly contributed the most to their recent growth. The income on assets held in a deferred annuity account is not taxed until the payout phase, which can be many years after the income accrues. Annuities therefore afford an opportunity for asset accumulation at the pretax rate of return.

People planning for retirement may purchase annuities with pretax or after-tax dollars. As with qualified pension plans, annuities that are part of a qualified retirement plan may be purchased with pre-tax dollars; "nonqualified" annuities are purchased with after-tax dollars.

Between the time the annuity is purchased and the time the contract owner receives payouts, no taxes are due on the dividends, capital gains, or interest earned on the assets in the annuity portfolio. When payouts are received, taxes are due on the difference between the annuity payouts and the annuitant's policy basis. The key tax principle is the derivation of an exclusion ratio, an estimate of the ratio of

the annuitant's investment in the contract to the total expected payouts on the contract. The exclusion ratio is multiplied by the annuity payout in each period to determine the part of the payout that can be excluded from taxable income.

The opportunity to defer taxes on the investment income from assets held in annuities is a powerful tool for building asset balances. Consider, for example, a 35-year-old evaluating various retirement saving options, with retirement beginning at age 65. Assume further that this individual plans to invest in an asset with an expected return of 7 per cent per year and that investment income faces a marginal tax rate of 28 per cent.

Under these assumptions, an investment of \$10,000 at age 35 will cumulate to \$45,356 ($= \$10,000 \cdot e^{0.07 \cdot 30}$) at age 65, assuming that each year's asset income is fully taxed and that the after-tax income is reinvested. If the same \$10,000 were invested in a way that permits tax deferral on asset income, for example in an annuity product, and if the pretax rate of return on this investment equaled that on the taxable investment, then the principal would cumulate to \$81,662 at age 65. Assuming that the withdrawals from this account would be taxed at the 28 per cent marginal tax rate and that they would be taken as a lump sum at retirement, rather than spread over the annuitant's remaining life (which would permit further asset appreciation), the after-tax value of this account would be \$61,596 $= 10,000 + (1 - 0.28) \cdot (81,662 - 10,000)$. This amount is 35.8 per cent greater than the amount in the after-tax investment. If the annuitant faces a marginal tax rate that is lower after retirement than while working, the implied rate-of-return advantage on the tax-deferred annuity vehicle will be even greater.

Table 2.7 presents additional comparisons between the return to investments that offer tax deferral and investments that do not. It considers individuals with four different return horizons (10, 20, 30, and 40 years) and assumes four different rates of return (3, 5, 7, and 9 per cent per year). The table reports the percentage increase in the value of an investment for an individual in the 28 per cent marginal tax bracket, the 39.6 per cent tax bracket, and a 20 per cent marginal tax rate on investment income. The latter category might be representative of an investor who received investment income primarily in the form of capital gains during a period when capital gains tax rates were substantially lower than ordinary income tax rates.

The entries in table 2.7 correspond to the 35.8 per cent figure reported above. They are the additional value, in percentage terms, which an

Table 2.7
Comparison of rates of return on tax-deferred and taxable investments

| Rate of return | Time horizon | | | |
|---------------------------|--------------|----------|----------|----------|
| | 10 years | 20 years | 30 years | 40 years |
| Marginal tax rate = 28% | | | | |
| 3% | 0.9% | 3.3% | 7.3% | 12.6% |
| 5% | 2.4 | 8.9 | 19.0 | 32.7 |
| 7% | 4.5 | 16.8 | 35.8 | 61.4 |
| 9% | 7.3 | 26.8 | 57.3 | 99.4 |
| Marginal tax rate = 39.6% | | | | |
| 3% | 1.1% | 4.2% | 9.3% | 16.3% |
| 5% | 2.9 | 11.4 | 25.4 | 45.2 |
| 7% | 5.6 | 22.2 | 49.9 | 90.3 |
| 9% | 9.3 | 36.5 | 83.7 | 155.8 |
| Marginal tax rate = 20% | | | | |
| 3% | 0.7% | 2.6% | 5.5% | 9.4% |
| 5% | 1.8 | 6.7 | 14.0 | 23.4 |
| 7% | 3.4 | 12.4 | 25.5 | 42.2 |
| 9% | 5.5 | 19.4 | 39.6 | 65.6 |

Source: Author's calculations. Each entry shows the value of $100 * (1 + (1 - \tau)(e^r - 1)) / e^{r(1-\tau)T}$. The numerator reflects the value of an asset that accumulates at a pretax rate of return r for a period of T years, and is taxed at maturity at a rate τ on the difference between its maturity value and initial investment. The denominator is the value of an asset that grows at an after-tax rate of return $r(1 - \tau)$ for T years.

investor who invested in a tax-deferred rather than taxable format would have at the end of the investment horizon. The disparities are largest when the investment horizon is long, when the rate of return is high, and when the marginal tax rate is high. In some cases, particularly those with long investment horizons and high assumed tax rates and rates of return, the principal at retirement from investing in a tax-deferred account can be more than double that of investing through a taxable account.

6 Conclusion

Annuities were a small share of the U.S. insurance market until the 1930s, when two developments contributed to their growth. Flexible-payment deferred annuities, which include a saving component as well as an insurance component, expanded rapidly as concerns about the

stability of the financial system drove investors to products offered by long-standing and reputable insurance companies. In addition, the group annuity market for corporate pension plans began to develop in the 1930s; it became the largest part of the U.S. annuity market in the years following World War II. The market for individual annuities expanded in the 1970s and early 1980s. The most recent development in the annuity marketplace was the expansion of variable annuities in the late 1980s and 1990s. These products, which combine the investment features of many mutual funds with certain insurance elements and which qualify for the tax deferral accorded to investment income on life insurance products, have attracted a substantial and growing volume of premiums in recent years.

The demand for annuity products is concentrated at advanced ages. The Gallup (1996) survey data show that more than three-quarters of nonqualified annuity buyers are at least 55 years old. Growing attention to these products is suggested by the aging of the U.S. population: the proportion of the U.S. population over the age of 65 has grown from 6.8 per cent in 1940 to 11.3 per cent in 1980, and is projected at 12.2 per cent in 2000 and 16.2 per cent in 2020. A central issue for the future is how prospective changes in federal programs that affect the well-being of the elderly, notably Medicare and Social Security, will alter private financial arrangements. Whether potential reductions in these "annuitized" benefit streams will lead to increased private demand for annuity contracts remains an open issue.

References

- Abel, Andrew. 1986. "Capital Accumulation with Adverse Selection and Uncertain Lifetimes." *Econometrica* 54: 1079-1098.
- Black, Kenneth J., and Harold D. Skipper, Jr. 1994. *Life Insurance*. 12th edition. Englewood Cliffs, NJ: Prentice-Hall.
- Campbell, Paul A. 1969. *The Variable Annuity: Its Development, Its Environment, and Its Future*. Hartford: Connecticut General Life Insurance Company.
- Covaleski, John M. 1994. "Baby Boom's Explosion in Annuities." *Best's Review: Life and Health* (November), 45-111.
- Dublin, Louis I. 1943. *A Family of Thirty Million: The Story of the Metropolitan Life Insurance Company*. New York: Metropolitan Life Insurance Company.
- Friedman, Benjamin, and Mark Warshawsky. 1988. "Annuity Prices and Saving Behavior in the United States." In *Pensions in the U.S. Economy*, ed. Zvi Bodie, John Shoven, and David Wise. Chicago: University of Chicago Press, 53-77.

- Gallup Organization. 1994. "Survey of Non-Qualified Annuity Owners." Princeton, N.J.: Gallup Organization.
- Gentry, William M. 1994. "Annuity Markets and Retirement Saving." In *Proceedings of the National Tax Association-Tax Institute of America*. Columbus: National Tax Association, 178-183.
- Gentry, William M., and Joseph Milano. 1994. "Taxes and the Increased Investment in Annuities." Mimeo, Duke University Department of Economics.
- Gifford, Donald W. 1974. "A Note on Loading Charges for Variable Annuities: Comment." *Journal of Risk and Insurance* 41: 523-526.
- Gilbert, E. Albert. 1948. *Insurance and Your Security*. New York: Rinehart and Co.
- Greene, Mark R. 1973. "A Note on Loading Charges for Variable Annuities." *Journal of Risk and Insurance* 40: 473-478.
- Greene, Mark R. 1977. *Risk and Insurance*. 4th edition. Cincinnati: South-Western Publishers.
- Harwood, E. C., and Bion H. Francis. 1942. *Life Insurance from the Buyer's Point of View*. Cambridge: American Institute for Economic Research.
- Hoffman, Arnold J., and John P. Mondejar. 1992. "Pension Funds and Financial Markets, 1950-1989." In *Trends in Pensions 1992*, ed. John A. Turner and Daniel J. Beller. Washington: U.S. Government Printing Office.
- James, Marquis. 1947. *The Metropolitan Life: A Study in Business Growth*. New York: Viking Press.
- Kotlikoff, Laurence J., and Avia Spivak. 1981. "The Family as an Incomplete Annuities Market." *Journal of Political Economy* 89: 372-391.
- LIMRA International. 1994. *U.S. Individual Annuities: Third Quarter 1994*. Hartford: LIMRA International.
- Lonkevich, Dan. 1994. "Greenspan's Stance Worries Insurers." *Best's Review/Life and Health* 95 (November): 51-55.
- Maclean, Joseph B. 1962. *Life Insurance*. 9th edition. New York: McGraw Hill.
- Murphy, Ray D. 1939. *Sale of Annuities by Governments*. New York: Association of Life Insurance Presidents.
- Murphy, Ray D. 1950. "Significant Annuity Developments." In *Life Insurance Trends at Mid-Century*, ed. David McCahan. Philadelphia: University of Pennsylvania Press, 84-99.
- Pallay, Gary S. 1995. "Outlook Remains Good for Variable Annuities." *Best's Review: Life/Health* 96 (January): 50-53.
- Schultz, Ellen E. 1995. "With Annuities, One Golden Egg Doesn't Mean Snap Up the Carton." *Wall Street Journal*, 5 October 1995, p. R13.
- Temporary National Economic Commission. 1941. *Concentration of Economic Power*. Washington: U.S. Government Printing Office.
- Trieschmann, James, and Sandra Gustavson. 1995. *Risk Management and Insurance*. 9th edition. Cincinnati, Ohio: South Western College Publishing.

- U.S. General Accounting Office. 1990. *Tax Treatment of Life Insurance and Annuity Accrued Interest*. Washington: U.S. General Accounting Office.
- U.S. Department of Labor. 2000. *Private Pension Plan Bulletin: Abstract of 1996, Form 5500 Annual Reports*. Washington: U.S. Department of Labor, Office of Research and Economic Analysis.
- Variable Annuity Research and Data Service. 1994. *The VARDS Report* (January).
- Warszawsky, Mark. 1988. "Private Annuity Markets in the United States, 1919-1984." *Journal of Risk and Insurance* 40 (September): 518-528.