Financial Innovation and Standards for the Capital of Life Insurance Companies

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Since their inception, insurance companies, banks, and other financial institutions have played prominent roles in our capital markets. These intermediaries have fostered saving and investment by issuing liabilities that appeal to savers in order to purchase the obligations of investors on attractive terms. Among financial intermediaries, life insurance companies traditionally have distinguished themselves by attracting long-term savings and by providing long-term financing for investment in real estate and durable equipment by businesses.

Because financial intermediaries must bridge the often disparate interests of savers and investors, the evolution of these institutions and their products depends on the opportunities created by the needs of their customers. To a degree, financial intermediaries have been coping throughout this century with the consequences of their own success. By supplying much of the financing needed to build our modern industrial corporations and by giving capital markets a good foundation, financial intermediaries have helped create enterprises that no longer depend so greatly on intermediaries for funds. Furthermore, as the nation has become wealthier and credit markets have become deeper, savers have become more willing to assume more risk in pursuit of a greater share of the returns from their investments. These demands, coupled first with rising interest rates between the late 1960s and the early 1980s, then with the capital gains that subsequently accompanied falling rates, precipitated many of the financial innovations of the last three decades. As rising interest rates depressed their profits, the capital per dollar of assets of many intermediaries fell for a time as they attempted to offer competitive terms for savings. Some, seeking to earn higher yields or to maintain their share of savings, also made riskier investments or sold riskier liabilities. In time, many adopted a "mutual fund" approach to their business as they unbundled their services.

After profits and capital ratios subsided for financial intermediaries during the 1970s, those who supervise and regulate these enterprises

adopted new methods of measuring and controlling the risks arising from financial intermediation. Regulators increasingly favored enforcing capital requirements that rise with an intermediary's holdings of certain risky assets, appraising risky assets according to their market values, and imposing prompt remedies when capital ratios become too low. These steps, of course, reinforce intermediaries' interest in redesigning their liabilities to resemble mutual funds, wherein savers implicitly provide the capital to support their investments. The returns on investments in many popular life insurance and annuity contracts, for example, depend on the performance of funds offered by life insurance companies to their policyholders.

Because the risks borne by an intermediary depend on the mix of its assets and liabilities, prudent standards for capital should weigh the characteristics of an intermediary's entire portfolio.

More stringent standards for capital may reduce the risk of insolvency, but they also can impose greater costs on financial intermediaries. For intermediaries that hold assets not traded consistently in public markets, the strategy of tying capital to holdings of certain risky assets, marking these assets to market, and requiring the sale of these assets when capital appears to be deficient can entail costs that exceed the benefits. The success of this strategy for managing risk depends greatly on the nature of the risks inherent in those assets deemed risky. The conflation of risk-based capital requirements and of marking risky assets to market is a conservative policy when the values of these assets tend to follow random walks. If, on the other hand, these values tend to revert to trends over time, this policy can increase rather than diminish the risks inherent in financial intermediation. In either case, requiring intermediaries to sell risky assets into illiquid markets tends to dissipate rather than preserve their capital. Finally, the linking of capital requirements to investments in specific assets and the marking of these assets according to their disposal values take a very narrow view of the risks inherent in financial intermediaries' balance sheets, a view that can either exaggerate or diminish the magnitude of these risks. Because the risks borne by an intermediary depend on the mix of assets in which it invests and the liabilities it issues to finance these assets, prudent standards for capital should weigh the characteristics of an intermediary's entire portfolio of assets and liabilities.

This article opens by briefly discussing the role of financial intermediaries in capital markets. The next three sections describe in more detail the distinctive features of life insurance companies. This discussion first examines how insurers have reshaped their liabilities to cope with the consequences of rising interest rates and increasing competition for savings during the past three decades. It also examines how insurers have restructured their assets. This discussion then analyzes the consequences of these financial innovations for the capital of the industry as well as the distribution of capital among life companies.[1] The following section examines the issues relevant for measuring and controlling the capital of life companies, describing when some of the more common approaches are likely to work best and when their costs are likely to exceed their benefits. The final section offers the conclusions.

I. Capital Markets and the Role of Financial Intermediaries

Economic development depends on the efficient transfer of resources from savers to investors. Although savers may finance investments by making loans directly to investors or by purchasing investors' offerings of stocks and bonds,[2] much of this financing passes through financial intermediaries. Insurance companies, banks, thrift institutions, pension funds, finance companies, and other intermediaries issue their own liabilities to savers, using the proceeds to acquire the debt and equity issued by investors.

Financial intermediaries create derivative securities, essentially transforming the obligations of investors into financial assets that appeal to savers. In doing so, intermediaries encourage capital formation by fostering saving on terms that entail a lower cost of capital for investors. Without intermediation, each financial contract between savers and investors must

[1] See also Kopcke and Randall (1991), for additional studies.

[2] Retained earnings, an important source of financing for investment, are purchases of equity undertaken for shareholders by established businesses.

Table 1
Total Domestic Wealth[a]

	1955	1965	1977	1985	1991
Trillions of Current Dollars:					
Total Domestic Wealth	1.5	2.5	8.3	16.7	21.4
Percent of Total Domestic Wealth:					
Residential Structures	23.2	22.5	23.7	22.9	24.4
Private Nonresidential Capital	20.9	21.9	23.7	24.6	25.5
Equipment	9.2	9.9	10.8	11.1	11.6
Structures	11.7	12.1	12.9	13.5	13.9
Inventories	8.1	7.2	6.2	5.4	5.1
Consumer Durables	10.2	9.5	8.7	8.3	10.0
Government Capital	17.1	17.0	14.6	13.3	13.4
Defense	5.8	4.5	2.2	2.1	2.4
Nondefense	11.3	12.5	12.5	11.2	11.0
Land	20.5	21.8	21.9	25.7	22.2
Net U.S. Invested Assets Abroad[b]	n.a.	n.a.	1.1	−.1	−.6
U.S. Assets Abroad	n.a.	n.a.	2.0	1.4	2.0
Foreign Assets in U.S.	n.a.	n.a.	.8	1.5	2.5

[a]Total Domestic Wealth includes only wealth within the borders of the United States for 1955 and 1965, owing to data limitations.
[b]Includes plant, equipment, and inventories.
n.a. = not available.
Source: Board of Governors of the Federal Reserve System, Flow of Funds; Data Resources, Inc.; U.S. Bureau of Economic Analysis, Foreign Direct Investment in the United States, and U.S. Direct Investment Abroad, various years.

reconcile their frequently disparate motives. Savers, who seek more than an attractive yield from their financial assets, also value attributes such as liquidity, assurance of their family's well-being in the event of sickness or death, or an annuity for the remainder of their lives after they retire. Investors, on the other hand, ordinarily seek obligations that conform more closely to the life spans of their assets or the patterns of their earnings and cash flows. While households have had limited interest in accumulating savings in 30-year debentures, steel manufacturers have had less interest in financing furnaces by issuing demand debt or options tied to the lender's life span. Intermediaries also serve savers and investors by evaluating investors' prospects, monitoring their performance, and providing both savers and investors a dependable access to funds on terms commensurate with their risks and returns.

Mismatched Books and the Role of Capital for Financial Intermediaries

The nation's tangible assets generally have a long life span (Table 1). During the past four decades, real estate—residential structures, nonresidential structures, and land—has represented about three-fifths of tangible assets. Business equipment and consumer durable goods represent about one-fifth of this wealth. Except for inventories, which now represent about one-twentieth of total assets, the stock of tangible assets is inherently illiquid. The nation as a whole cannot sell a substantial share of these assets very quickly, except perhaps at greatly depressed prices.

Although the nation essentially is committing itself to its fixed investments in real estate and durable goods, individual investors nonetheless may "liquidate" their investments by selling them to others at "fair" prices when a market exists and when buyers and sellers are equally well informed. These transfers are most facile, and investments appear to be most liquid, when incentives for installing new assets are most inviting. This apparent liquidity often diminishes greatly for many assets, especially those lacking dependable public markets, when business activity slumps.

The nation's tangible assets are essentially financed by households' savings. Some of this financing is direct, such as the ownership of residences or

Table 2
Composition of Household and Nonprofit Organizations' Assets

	1952–1955	1956–1960	1961–1965	1966–1970	1971–1975	1976–1980	1981–1985	1986–1990	1991–1993
Percent of Total Assets:									
Real Assets	36.2	35.9	34.0	34.1	38.0	42.1	41.8	39.5	37.0
Financial Assets	63.8	64.1	66.0	65.9	62.0	57.9	58.2	60.5	63.0
Percent of Financial Assets:									
Primary Securities	69.0	68.5	66.0	61.6	52.8	51.0	47.4	44.1	44.6
Equity	55.9	55.9	54.4	50.6	43.8	42.8	38.3	31.7	31.1
Corporate Equity	21.4	26.8	30.5	28.8	18.7	14.3	12.8	12.8	17.1
Noncorporate Equity	34.5	29.1	23.9	21.8	25.1	28.5	25.5	18.9	14.0
Debt Securities	12.5	11.5	10.0	9.2	7.7	7.4	8.0	9.3	8.6
Government Securities	7.7	6.1	4.6	4.0	2.9	3.0	3.5	3.3	2.8
Tax-exempt Securities	1.7	2.2	2.1	1.7	1.3	1.4	2.0	3.0	3.1
Corporate and Foreign Bonds	.6	.7	.6	.9	1.5	1.2	.3	.5	.6
Mortgages	2.3	2.4	2.5	2.1	1.6	1.6	1.5	1.3	1.0
Open Market Paper	.2	.2	.3	.5	.3	.3	.6	1.2	1.0
Intermediated Funds	30.3	31.5	34.6	39.1	47.3	48.4	52.2	57.1	58.4
Deposits	17.7	17.5	19.0	20.6	24.6	25.4	24.1	21.7	17.3
Money Market Mutual Funds	.0	.0	.0	.0	.0	.4	2.2	2.5	2.7
Pension Fund Reserves	4.7	6.3	8.0	9.4	11.7	14.1	18.3	23.5	26.9
Life Insurance Reserves	7.3	6.6	6.0	5.3	4.9	4.0	3.0	2.6	2.7
Mutual Funds	.6	1.1	1.6	1.8	1.3	.8	1.2	3.1	4.9
Bank Personal Trust	.0	.0	.0	1.9	4.7	3.8	3.4	3.6	3.8

Note: Columns do not add 100% because miscellaneous assets and security credit are not included.
Source: Board of Governors of the Federal Reserve System, Flow of Funds.

durable goods (Table 2). Most is indirect, taking the form of financial assets, which constitute about two-thirds of households' savings. In turn, about one-half of these financial assets are the liabilities of financial intermediaries, most of which are managed by depository institutions, life insurance companies, and pension plan advisors that frequently offer savers and investors contracts with guarantees of cash values or returns.

By design, many financial intermediaries bear risks in running mismatched books, risks arising from their writing liabilities with specific commitments that, in turn, are backed by their investments (directly or indirectly) in durable tangible assets. In order to fulfill their obligations to their customers, the return to and, therefore, the value of the investments behind intermediaries' assets must generally fulfill investors' expectations. In addition, savers may not attempt to withdraw a significant amount of their savings from these intermediaries when the earnings on their assets may be depressed too greatly or when new opportunities offer savers greater yields.

Financial intermediaries customarily diversify or hedge some of their risks. For example, life insurance companies purchase a variety of assets to achieve a stream of income that more closely matches the outlays required to meet their obligations. These companies also generally issue different types of insurance or investment contracts as well as maintaining other lines of business in order to manage better the volatility of their cash flows. Indeed, much of the financial innovation of the 1970s and 1980s reflected intermediaries' efforts to diversify their businesses and hedge their risks better through broader portfolios of assets and liabilities.

Other things equal, an intermediary's capacity for bearing risk diminishes as its capital diminishes or the difference between the yields on its assets and liabilities diminishes. Capital is the difference between the value of an intermediary's assets and that of its liabilities. The less capital per dollar of liabilities and hence per dollar of assets, the greater is the chance that relatively low returns on investments will prevent the intermediary from meeting its contractual obligations.

Intermediaries also expect to earn a sufficiently great margin between the yields they earn on their assets and the yields they offer savers—a portion of which may be regarded as an insurance premium—to accommodate the risks they bear. Mutual fund advisors, for example, invest negligible capital in their funds, earn a comparatively small margin, and retain relatively few risks.[3] Except for fees and commissions to defray the costs of selling their shares and managing their assets, mutual funds essentially pass the returns on their assets and the risks inherent in those assets to their shareholders. Insurance companies, on the other hand, maintain considerably more capital, anticipate earning substantial margins, and retain more risk by offering savers and investors contracts with specific guarantees and options. The more savers value competitive yields and the more investors can avail themselves of competitive terms for funds in public capital markets, the more intermediaries' potential profit and capacity for bearing risk shrink.

Much of the financial innovation of the 1970s and 1980s reflected the strategies taken by intermediaries in order to offer savers competitive returns.

In the past two decades, their mismatched books have taken a toll on many financial intermediaries. Rising interest rates depressed their margins as the returns offered on new investments exceeded those on many of their existing investments. Much of the financial innovation of the 1970s and 1980s reflected the strategies taken by intermediaries in order to offer savers competitive returns. As intermediaries sought assets with the greatest promise, their fortunes frequently flowed and ebbed with the value of investments in less developed countries, oil and gas enterprises, farm land, and commercial real estate. Assets increased more rapidly than capital for many intermediaries as they tried to maintain their share of the nation's savings despite the comparatively small margin between the yields on their assets and liabilities. During the 1970s and 1980s, as analysts became more concerned that the capacity for bearing risk was dwindling for many financial intermediaries, those who supervised these intermediaries adopted more formal capital requirements or increased existing requirements.

II. Liabilities of Life Insurance Companies

Since their inception, life insurance companies have managed substantial portfolios of long-term assets on behalf of those holding their life insurance, health insurance, annuity, and pension contracts. Currently, life insurers hold approximately $1.5 trillion in reserves to back the $11 trillion of life insurance in force in the United States and their other obligations (American Council of Life Insurance).

The life insurance industry comprises both stock and mutual companies. Mutual companies tend to be older and larger than stock companies, and they manage about two-fifths of the industry's assets. The financial capital of these companies, their surplus, comprises contributions by policyholders and retained earnings. Consequently, policyholders of mutual insurers generally receive shares of the earnings or surplus that these companies may approve for distribution. Stock companies tend to be younger than mutuals, and the assets of stock companies have grown more rapidly than those of mutuals in recent decades. The financial capital of stock companies comprises the proceeds from sales of equity and retained earnings. Accordingly, those who hold policies with stock companies are not buying an equity stake in the company, and the management of stock companies divides the net investment income from their assets between the interests of policyholders and stockholders.

Insurance Contracts and Savings

Since their inception, life insurers have cultivated their capacity for managing assets by offering savers a range of products, some of which verge on pure investment contracts. Although basic term or health insurance policies entail relatively little saving, policyholders may accumulate substantial savings in whole life policies, annuities, and investment contracts. The appeal of life insurers' contracts often depends on prospective yields on the investments

[3] Mutual funds and custodians cannot avoid all risks. Unavoidable errors in handling instructions or settling transactions, for example, create risks. Also, funds that value their reputation or that face savers' complaints may bear some of the risks arising from disappointing investments (credit, liquidity, or market risks).

backing them. Not only do the revenues and profits of insurers ordinarily increase with the yields on their assets, but policyholders also tend either to earn greater dividends or to pay lower net premiums as these yields rise.

That insurers' products are regarded, often greatly so, as investment contracts is both inevitable and proper. Insurers' assets both account for a substantial share of personal wealth and finance much of businesses' investment in plant and equipment. When yields are comparatively great, insurers are more willing to promote and customers are more willing to buy those contracts that accumulate assets most rapidly. Accordingly, life insurance companies, acting as financial intermediaries, help regulate the flow of financing for tangible investments depending on the yields businesses are willing to pay and the returns that savers require. By paying sufficient attention to the yields on their assets, insurers and their customers may allocate funds most efficiently to the most promising enterprises.

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Term Life and Health Insurance

Even term life and health insurance policies, which verge on pure options contracts, reflect the returns insurers earn on the funds they collect when they sell these contracts. Because of the lag between the collecting of premiums and the payment of claims, insurance companies hold these premiums on behalf of their customers until claims are paid. The premiums of policy owners, therefore, produce a portfolio of assets representing an accumulation of savings to defray the cost of future contingent liabilities. With popular group health plans, for example, if sponsors and insurers are reasonably certain of the magnitude and timing of claims, premiums are essentially the discounted values of the costs of paying these future claims and administering the plan. The rate of discount generally reflects the insurers' return on assets.

The premiums on term insurance contracts mostly depend on the probability of the insured's dying and the expenses for servicing the contract. For example, a company selling $100,000 annual term contracts to 35-year old males may expect 2 of every 1,000 clients to die during the year, an expected obligation of $200 for each such contract. To cover this obligation, expenses, commissions, and profit margin, the premium for these policies might be $250 (see, for example, Gregg and Lucas 1973). If the company collects the full premium at the inception of the contract, the reserve for this policy initially is $200. As the company pays its death benefits during the course of the year, this reserve falls to zero.

A company issuing many such term insurance contracts during the course of the year will tend to hold a fairly stable quantity of reserves, averaging $100 for each contract throughout the year, which engenders a stable portfolio of assets for the company to invest. Insurers ordinarily return a share of the yield on these assets to their policyholders by charging lower premiums than described in the foregoing example or by paying rebates and dividends on their policies.

Permanent, Universal, and Variable Life Insurance

The yield on life insurers' assets is of greater importance for permanent insurance contracts than it is for term policies, because these contracts combine life insurance with saving program that allows policyholders to accumulate wealth. Permanent life insurance contracts maintain a constant death benefit over many years without charging premiums that rise as the probability of death increases by setting a premium that initially is greater than that required by term insurance policies. During the early years of a permanent insurance contract, the policy accumulates cash value mainly because the premium exceeds the cost of insurance. In later years, the accrued earnings on previous years' cash values contribute to the growth of future cash values. As the cash value rises, the amount of pure insurance the company must provide diminishes. A $100,000 policy's premium is intended to achieve a cash value of $100,000 at the time the insured is 100, thereby eliminating the element of insurance. The greater the return on assets that insurers expect they will earn, the lower they need set their premiums to fund their permanent insurance contracts.

The premium on a permanent insurance policy entails a guarantee: policyholders' savings in the con-

tract will accrue income at a rate no less than the yield assumed by the insurer to set the premium. To limit the risk created by this guarantee, insurers ordinarily set their premiums by assuming they will earn returns nearer the lower range of their forecasts of prospective yields on their assets. Insurers also typically credit their policy owners with yields in excess of these guaranteed rates of return, so permanent insurance policies usually attain full funding well before the insured reaches 100 years of age. If the yields on the cash values of a company's permanent insurance policies were not competitive, new customers would favor other contracts, and existing policyholders would consider withdrawing their cash values. The more successful are the company's investments, the greater are its dividends or rebates, and the more attractive are its policies.

Life insurance companies, acting as financial intermediaries, help regulate the flow of financing for tangible investments, depending on the yields investors are willing to pay and the returns that savers require.

Basic whole life is only one form of insurance that accumulates cash values in addition to paying for pure insurance coverage. Life paid-up at 65, policies paid-up in 20 or 10 years, and single-premium policies charge greater premiums than whole life to build cash values more quickly, thereby increasing policyholders' commitment to an investment program. Conversely, modified life policies charge comparatively low premiums during their first few years, compensating for the loss of cash value by charging greater premiums in subsequent years.

Although life insurance contracts that accumulate cash values are nominally long-term agreements, they commonly allow policyholders to withdraw their cash value, either by taking policy loans or by surrendering their policies, which can be a valuable option. Older policies, in retrospect, often priced this option too cheaply by fixing the rate of interest on loans, often at 5 or 6 percent, and by not adjusting a policy's dividends to reflect the income on outstanding loans. Newer life insurance policies frequently charge prevailing rates of interest on such loans and adjust the return on a policy's cash value to reflect the rate of interest on any of its loans. Furthermore, those policies that quickly accumulate substantial cash values (such as single-premium contracts) also may impose redemption fees on early withdrawals of funds.

In addition to these traditional forms of permanent insurance, universal, variable, and universal-variable life policies have become more common since the 1970s. These newer contracts allow policyholders either a role in managing their cash values or freedom to alter their policy's terms, essentially by separating to a greater degree the insurance features and the investment features of the contract. With variable life, a portion of the cash value is invested in separate accounts—including equity, bond, or money market funds—rather than placed in the company's general investment portfolio; the death benefit varies with the value of these investments, but does not fall below a minimum guaranteed by the policy. Universal life allows policyholders to alter their death benefits comparatively easily and to vary the amount or timing of their payment of premiums; the rate of return accruing to cash values depends on prevailing rates of interest. Universal-variable life, combining features of universal and variable contracts, allows policyholders to choose, within limits, both the timing of payments and the funds in which the assets are invested.

Annuities and GICs

Life insurance companies also offer other financial services to their customers, including guaranteed investment contracts and annuities. Guaranteed investment contracts (GICs) are similar to medium-term notes. A saver might be offered a return of 9 percent for three years. These contracts most frequently are sold to pension and retirement plans sponsored by employers. The appeal of GICs rests on their high yields combined with their guarantee of principal, and their maturities force purchasers to review these investments comparatively frequently.

Annuities promise to pay their beneficiaries an income for a specific interval of time, often from retirement until death. Annuities may be funded by making installment payments over several years or by making a single payment (often by transferring funds from other investments, such as balances in permanent insurance policies or employers' thrift and pension plans). The value of annuities depends very much on the return that an insurer earns on its assets. The greater the yield, the smaller are the installments

required to fund a given annuity, and the greater are the income payments resulting from any given investment in an annuity. Annuities often allow policyholders the option to withdraw all or a portion of their cash values before the beneficiary begins receiving income payments from the contract. Though not so common in the past, annuities today generally impose redemption fees for early withdrawals, and the assets backing the annuities may be marked to current prices to value customers' withdrawals.

III. The Composition of Insurance Companies' Liabilities

During the first half of this century, the main business of life companies was the selling of life insurance, and the whole life policy was their most popular contract. By the mid-1950s, reserves against life insurance contracts accounted for almost three-quarters of the total reserves of life companies, and term insurance represented one-sixth of ordinary life insurance in force. The commitment to whole life insurance was sufficiently great that life insurance companies managed about one-fifth of all financial assets held by financial intermediaries, a share second only to that of commercial banks. Mutual life insurance companies, in turn, managed most of the industry's assets, having written nearly two-thirds of the life insurance in force.

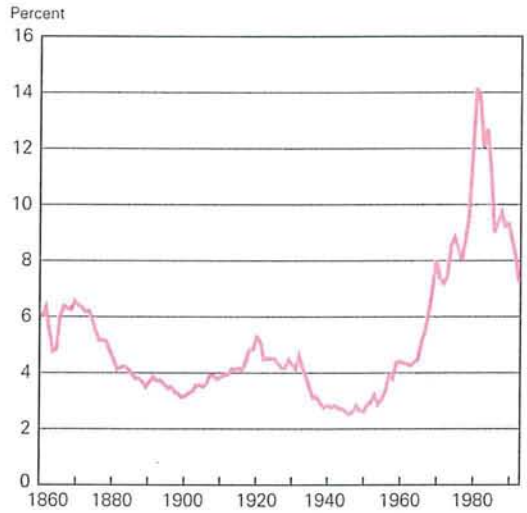
Between the 1950s and the 1980s, the competition that accompanied rising interest rates reshaped the life insurance industry. Today, as measured by reserves, the selling of annuities has supplanted the selling of permanent insurance policies. Reserves backing life insurance account for only about three-tenths of the total reserves of life companies, and term insurance accounts for just under one-half of ordinary life insurance in force. Although the assets backing annuities and other products have grown much more rapidly than life insurance reserves, life companies now manage only about one-eighth of all financial assets held by financial intermediaries, a share exceeded by those of commercial banks and pension fund advisors. Furthermore, stock companies, which currently manage about three-fifths of the life insurance industry's assets, have overtaken the mutual companies.

Life Insurance

Before the 1960s, interest rates generally varied between 3 and 6 percent in the United States (Figure 1). Insurers generally priced their permanent life contracts by assuming the return on their assets would average 3 or 4 percent over the life of the contract. This return was comparatively attractive for policyholders, partly because their returns were not taxed as income as they accrued, and partly because other, more lucrative means of accumulating wealth were lacking. The mutual fund industry was negligible, people's investing directly in stocks and corporate bonds had been limited,[4] the certificate of deposit had not yet been introduced, and savings accounts at banks and thrift institutions yielded little more if any than insurance contracts.

Figure 1

Interest Rate on Corporate Bonds



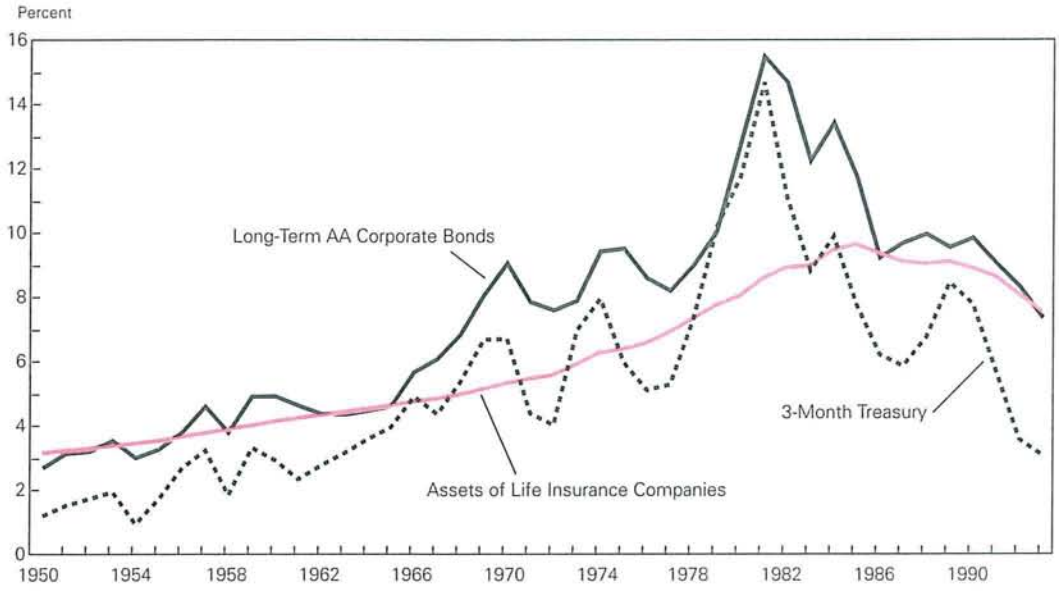
Note: For 1860 to 1900, the interest rate is for high-grade railroad bonds. For 1901 to 1940, the interest rate is for prime corporate bonds. For 1941 to 1993 the interest rate is for Moody's Aaa corporate bonds.
Source: Kopcke and Randall (1991) and Data Resources Incorporated.

As interest rates began ascending in the 1960s, the admonition to "buy term and invest the rest" became more compelling. The cash values of a new policy would be invested in the company's general account, and the return to these cash values would be dictated by the yields of the assets in this account. Accumulat-

[4] By the late 1920s, the proportion of the population directly owning bonds had risen to only 12 percent; about 8 percent for stocks (Carosso 1970, Baskin 1988). By comparison, the number of life insurance policies was almost 90 percent of the population, implying that many more savers held life insurance policies than held stocks and bonds. Direct investment in private securities advanced little during the Great Depression and World War II.

Figure 2

Returns on Life Insurance Company Assets



Note: Returns on long-term AA corporate bonds are based on reoffering yields of new corporate bonds rated AA by Moody's having original maturity of at least 20 years. Return for life insurance companies includes separate accounts after 1965. The annual data from 1950 to 1959 are linearly interpolated from the 1950, 1955, and 1960 levels.
Source: American Council of Life Isurance, *1994 Life Insurance Fact Book*; Data Resources Incorporated; and *The Analytical Record of Yields and Yield Spreads*, published by Salomon Brothers.

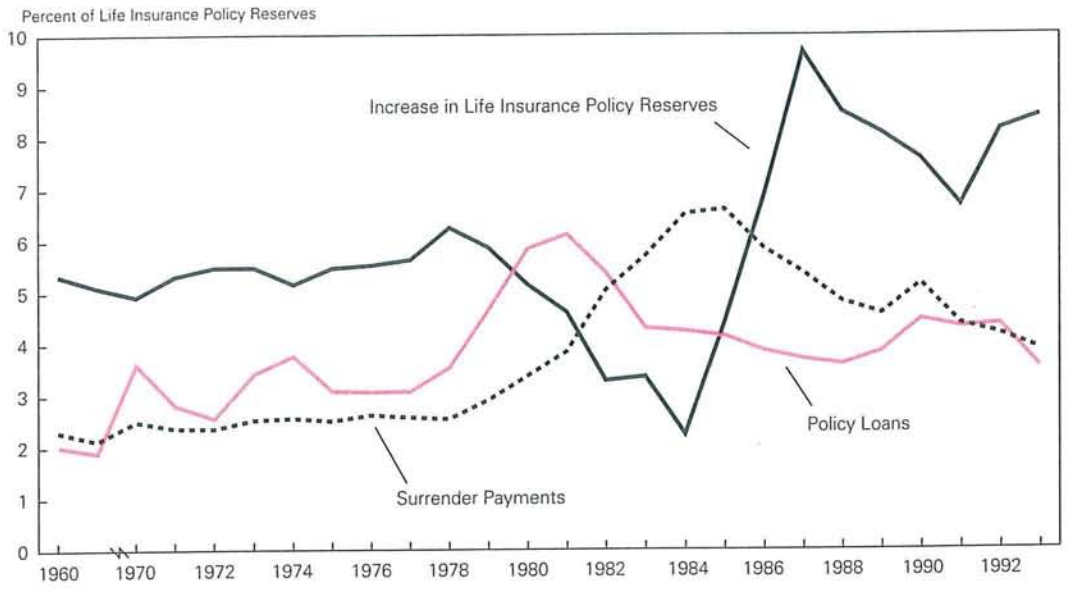
ing savings in permanent life policies lost its appeal because the yield on the seasoned bonds in life companies' general accounts could not match the returns available from other intermediaries (Figure 2). Between the mid-1960s and the early 1980s, the difference between the yield on insurance companies' investments and prevailing rates of interest on bonds tended to increase, culminating at almost 7 percentage points in 1981. Surplus and capital grew more slowly than assets for many established life insurance companies as interest rates rose. Nevertheless, newly formed and rapidly growing stock companies, which were unencumbered with sizable investments in low-yielding bonds, gained the advantage of promoting contracts that offered high yields coupled with the traditional benefit of deferred income taxes.

If their policyowners were to "invest the rest," then insurers would compete for these savings. Life companies promoted new policies in the 1980s that offered more competitive yields. During the early 1960s, insurers were allowed to establish separate accounts distinct from their general account. These accounts resemble mutual funds inasmuch as they ordinarily do not require the company to contribute capital, and the net income accruing to the accounts belongs to those who hold the contracts that are backed by the assets in these separate accounts. With the sales of universal and variable insurance policies linked to separate accounts, insurers allowed customers to invest their premiums at prevailing rates of return and to decide the allocation of their investments among accounts invested in money market securities, bonds, or equities. In 1982, universal and variable life policies represented a negligible proportion of the ordinary life insurance in force in the United States; by the early 1990s, their share had risen to more than three-tenths. In addition, many insurance agents became licensed to sell directly to their clients mutual funds and other securities, including those underwritten by subsidiaries of life companies.

Not only did rising interest rates deter sales of new permanent life contracts, they also encouraged

Figure 3

Reserves, Loans, and Surrender Payments



Source: *1994 Life Insurance Fact Book.*

some policyholders either to surrender or to withdraw funds from existing contracts. During the 1960s, policyholders generally could borrow against the cash values in their life insurance at fixed rates, less than 6 percent in most policies, while the returns on their accumulated cash values would continue to accrue at a rate dictated by the overall return on insurers' general accounts. In other words, those who wished to withdraw funds from their policies possessed an inexpensive option: they could borrow cheaply in order to acquire other assets without reducing the yield on their cash values noticeably.[5] Similarly, with rising interest rates, policies could be surrendered on comparatively favorable terms.

Triggered by high interest rates, policy loans and surrenders have reduced significantly life companies' cash flows. Policy loans rose from almost 4 percent of assets in 1955 to almost 8 percent of assets by 1970. During the 1970s, life companies increasingly tied their rates for policy loans to prevailing yields on bonds in order to deter the demand for loans against new policies. Nevertheless, in the 1970s the flow of policy loans and surrenders helped depress the growth of other investments by insurance companies, During the early 1980s, policy loans increased after interest rates rose sharply (Figure 3 and Figure 2); consequently, outstanding loans rose above 9 percent of insurers' assets. At nearly the same time, surrenders rose considerably, peaking in 1985. This greater volume of loans and surrenders diminished the growth of insurers' other assets between 1978 and 1986.

Although rising interest rates stanched life insurers' investing, falling rates have not yet fully restored this flow of funds. The volume of loans and surrenders has remained relatively high since the early 1980s, suppressing the flow of funds available for other investments. Falling interest rates have produced substantial capital gains in the stock and bond markets over much of the last 10 years. The prospect of these gains, made more accessible by flourishing mutual funds, attracted savings from life insurance companies as well as other intermediaries. Furthermore, some mutual funds, banks, and brokerage

[5] A single policyholder's borrowing alters the return on assets in the general account and the return on his policy's cash value insignificantly. Should many borrow, the company's investment income would fall substantially, thereby reducing the returns to all policyholders, including those who do not borrow.

houses now offer savers variable life insurance and annuity contracts with relatively low fees; the fund, bank, or broker manages the assets, while purchasing only the necessary coverage and administrative services from insurers.

Annuities and GICs

As rising interest rates depressed the demand for permanent insurance policies, the need for the investment program inherent in these policies also became less compelling with the growth of individual annuities and pension plans sponsored by employers. After World War II, businesses increasingly established defined-benefit pension plans for their employees. These plans may be managed by their sponsors, banks and trust companies, life insurance companies, or other investment advisors. Sponsors of these plans typically review their contracts with their managers frequently, and disappointing performances eventually entail a change of managers.

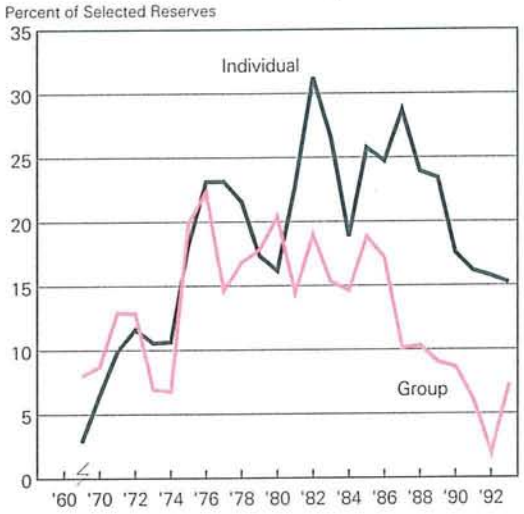
Life insurers initially attracted a comparatively small share of the funds flowing into pension plans, partly because regulations limited insurance companies' ability to invest in certain assets, including common stock. After legislation in most states allowed life insurance companies more latitude for the investments in their separate accounts for pension plans, and after the Employee Retirement Income Security Act (ERISA) of 1974 required most employers to increase the funding of their defined-benefit pension plans, the growth of reserves for group annuities with life insurers increased significantly (Figure 4). During the late 1970s and the early 1980s, the GICs issued by insurers helped attract a substantial flow of funds into defined-contribution plans sponsored by employers.

ERISA also allowed people not already covered by a pension plan to establish their own individual retirement account (IRA). In 1981, federal legislation both increased the maximum contributions permitted for IRAs and allowed people covered by an employer's pension plan to establish IRAs. During the early 1980s, insurers' sales of individual annuity contracts, especially single-payment deferred annuities, also increased rapidly, as insurers promoted the advantages of tax-deferred investments that earned the relatively high returns prevailing at that time. Consequently, the growth of reserves for IRAs and individual annuities at life insurance companies surged in the mid-1970s and again in the early 1980s.

Since the mid-1980s, sales of annuities have subsided. The growth of reserves for individual annuities has fallen much less than that of group annuities, partly because individual contracts are sold much like tax-sheltered mutual funds to people whose group coverage may no longer look so generous or so secure. But life insurers are not the sole vendors of these contracts. Mutual fund advisors, banks, and brokerage houses also are promoting their IRAs and annuities.

Figure 4

Increase in Annuity Reserves



Source: *1994 Life Insurance Fact Book.*

Increasing interest rates, greater competition, the termination of some group defined-benefit plans, and tax reforms have taken a toll on sales of annuities, especially group contracts. As interest rates rose in the late 1970s and early 1980s, employers increasingly turned from insured pension plans to trusteed plans as banks and other investment advisors offered more appealing returns at competitive fees. By the mid-1980s, insurers had successfully promoted GICs offering attractive yields, but by 1991 the sales of GICs had stalled after sponsors of pension plans became concerned about the safety of these investments.[6] The

[6] Insurers issued GICs bearing yields that often exceeded the average yield on assets in their general accounts. Nevertheless, insurers invested their proceeds from selling GICs in assets that promised returns that exceeded the cost of the GICs, assets such as commercial mortgages and junk bonds. The "collapse" of prices of real estate and junk bonds during the late 1980s and early 1990s raised fears about the condition of insurers that had issued GICs.

growth of reserves backing group annuities also fell as the number of people covered under group annuity contracts first grew more slowly during the late 1980s, then began to fall by the 1990s as a result of layoffs and the termination of some defined-benefit plans.

IV. Assets and Capital of Life Insurance Companies

Since their inception, life insurance companies have invested most of their assets in mortgages and bonds, which have long been regarded as suitable investments for the reserves and cash values backing permanent life insurance policies. By matching the predictable cash flows of long-term securities with the flows promised in long-term insurance and annuity contracts, insurers could confidently anticipate meeting their obligations as they came due. Furthermore, inasmuch as yields on longer-term securities generally exceed those of shorter-term securities, insurers could price their contracts most attractively by investing in bonds and mortgages, provided yields remained relatively stable. Investing predominantly in shorter-term securities would allow the company to profit should interest rates rise, but should interest rates decline, the return on assets would not be sufficient to provide adequate profits and to service the obligations to policyholders. Insurers investing predominantly in equities or in real estate would bear similar risks; a substantial slump in the value of these assets would diminish insurers' surplus and, possibly, their ability to fulfill their obligations to their policyholders.

Before 1900, the mortgage obligations of farmers and homeowners along with the bonds issued by railroads, canals, and governments accounted for most of the assets held in the general accounts of life insurance companies. During the last three decades, bonds gradually surpassed mortgages, while commercial mortgages displaced farm and residential mortgages, as employment shifted, in stages, from agriculture to manufacturing and then to service industries (Table 3). Also, as life companies promoted their variable insurance and annuity products, assets held in separate accounts have increased significantly since the late 1970s.

Bonds and Mortgages

Before the 1980s, mortgages represented just over one-third of insurers' assets, but, by the early 1990s, they had fallen to nearly one-sixth of assets. At the same time, insurers' investments in bonds rose from just over two-fifths to more than one-half of their assets. These figures overstate the shift from mortgages to bonds, however. Since the mid-1970s, insurers have increased greatly their investment in the mortgage-backed securities issued by agencies sponsored by the federal government, which are classified as bonds on insurers' balance sheets.[7] Life companies also have purchased mortgage-backed securities from other underwriters. Accordingly, almost three-tenths of insurers' assets, directly or indirectly, were invested in mortgage loans in the early 1990s, while bonds not backed by residential mortgages represented just over four-tenths of assets.

This commitment to bonds and mortgages also is evident in credit markets. Life insurance companies hold about one-third of the corporate bonds issued in the United States (Table 4, upper panel), and in the past 15 years, they have supplied about three-tenths of the net new funds raised through bonds issued by corporations (lower panel). Since the 1960s, the share of outstanding residential mortgages held by life companies has fallen significantly, as they have essentially ceased acquiring these securities directly. Instead, as insurers turned to mortgage-backed securities, their holdings of the outstanding issues of federally sponsored credit agencies have increased substantially since the 1970s. Insurers recently have supplied about one-fifth of the net new funds for these securities.

While the importance of residential mortgages waned during the 1960s and early 1970s, life insurance companies increased their investments in commercial mortgages (Table 3). Since the late 1970s, commercial liens have represented about one-sixth of their assets. Despite this relatively constant share during the past 15 years, insurers' holdings of commercial mortgages essentially doubled between 1984 and 1990 as assets also doubled. The growth of the volume of life companies' investments in commercial mortgages closely matched that of the market for these loans over the past three decades, because insurers have held about three-tenths of outstanding commercial mortgages since the early 1960s (Table 4, upper panel).

[7] The consequences of competition and financial innovation are not limited to the liabilities of insurance companies. With the ascendancy of thrift institutions and mortgage pools after World War II, mortgage-backed securities became less expensive than the mortgage loans themselves for insurance companies to acquire, manage, and trade.

Table 3
Balance Sheet of Life Insurance Companies
Percent of Total Assets

	1960–1964	1965–1969	1970–1974	1975–1979	1980–1984	1985–1989	1990–1993
Assets, Billions of Current Dollars	134.1	178.0	237.1	357.6	594.1	1045.8	1577.7
Bonds	47.4	42.6	40.2	43.4	40.9	47.2	52.3
Government Bonds	9.2	6.4	4.8	6.2	8.7	13.0	15.8
US	n.a.	n.a.	n.a.	n.a.	5.0	8.5	7.8
Special Revenue	n.a.	n.a.	n.a.	n.a.	1.9	3.1	6.5
Corporate Bonds	38.2	36.2	35.5	37.2	32.2	34.1	36.5
Utility	n.a.	n.a.	n.a.	n.a.	9.2	7.9	7.1
Industrial	n.a.	n.a.	n.a.	n.a.	21.8	25.4	28.9
Corporate Stock	4.8	5.6	6.5	6.4	5.6	3.8	3.0
Preferred Stock	n.a.	n.a.	n.a.	n.a.	2.1	.9	.6
Common Stock	n.a.	n.a.	n.a.	n.a.	3.5	2.9	2.4
Industrial	n.a.	n.a.	n.a.	n.a.	1.6	1.2	.9
Affiliates	n.a.	n.a.	n.a.	n.a.	1.4	1.3	1.3
Mortgage Loans	35.5	37.5	33.3	28.2	24.0	20.1	15.8
Commercial Mortgages	9.2	11.3	13.3	15.4	15.6	15.5	12.6
Real Estate	3.1	2.9	3.0	2.9	2.5	2.4	2.4
Policy Loans	4.6	5.8	7.9	8.0	8.5	5.4	4.2
Separate Account Assets	n.a.	1.2	3.5	5.1	9.1	10.9	14.3
Common Stock	n.a.	1.0	2.8	3.2	3.5	4.6	6.3
Bonds	n.a.	.2	.5	1.4	3.7	3.8	4.4
Mortgages	n.a.	.0	.1	.1	.4	.4	.3
Other Assets	4.5	4.8	5.5	6.0	9.4	10.3	8.0
Liabilities							
Reserves	81.4	80.2	81.0	81.6	68.9	72.7	73.5
Other Liabilities	10.2	11.0	11.0	11.4	14.6	10.2	6.0
Separate Accounts	n.a.	n.a.	n.a.	n.a.	9.1	10.8	14.2
Capital and Surplus	8.4	8.8	7.8	6.9	7.5	6.3	6.4

n.a. = not available.
Source: For data from 1969 to 1979, *Life Insurance Fact Book*, various years. From 1980–1993, *Best's Aggregates and Averages*, various years.

Capital and Surplus

The assets of life insurance companies are investments made on behalf of their policyholders and owners. The owners' stake is the capital and surplus, or simply capital, which essentially is the difference between the value of the companies' assets and their liabilities.[8] This capital also is a financial insurance reserve that protects the interests of policyholders. With more capital per dollar of assets in their general fund, life companies more likely can meet their obligations to their policyholders despite possible losses on their investments. Although the average capital-asset ratio for the industry has remained fairly constant, near 9 percent, during the past two decades, companies with capital ratios no greater than 6 percent held approximately one-half of the industry's assets from 1984 to 1990 (Table 5). By 1993, this median capital-asset ratio had risen to 7.7 percent.

For most of this century, the principal source of new capital for established life insurance companies and the life insurance industry has been retained earnings. During much of the past two decades, however, the growth of insurers' assets exceeded the capacity of their retained earnings to accumulate capital commensurately. For example, since 1984, insurers' assets have grown about 11 percent annually. Yet, the contributions of retained earnings would have allowed capital to grow less than half this rate (Figure 5, upper panel). Consequently, the capital ratios for

[8] Capital, as defined here, is the capital and surplus of insurers' general accounts plus asset valuation (previously, security valuation) reserves.

Table 4
Life Insurance Companies' Holdings of Selected Financial Assets
Percent of Total Value Outstanding of Each Security

Assets	1960–1964	1965–1969	1970–1974	1975–1979	1980–1984	1985–1989	1990–1993
Treasury Securities	2.5	1.7	1.2	.9	1.8	2.9	2.9
Agency Securities	1.0	.9	1.1	2.6	5.2	7.4	10.4
Tax-Exempt Bonds	4.7	2.9	2.0	2.1	1.8	1.2	1.1
Corporate Bonds	51.5	44.6	34.7	33.8	34.1	31.1	32.4
Corporate Equities	1.2	1.3	2.5	3.4	3.2	2.9	2.4
Commercial Mortgages	29.7	30.8	28.8	29.0	30.0	26.4	27.7
Multifamily Mortgages	18.6	25.5	22.2	16.7	12.5	8.6	9.3
Home Mortgages	15.9	11.9	6.5	2.6	1.5	.7	.4

Life Insurance Companies' Purchases of Selected Financial Assets
Percent of Total Purchases of Each Security

Assets	1960–1964	1965–1969	1970–1974	1975–1979	1980–1984	1985–1989	1990–1993
Treasury Securities	−6.5	−7.0	−1.0	.5	5.1	1.4	5.3
Agency Securities	.9	.9	1.1	6.5	9.3	8.6	19.4
Tax-Exempt Bonds	2.1	−1.4	.6	2.1	1.0	.1	2.5
Corporate Bonds	36.8	22.4	21.1	41.3	28.1	33.0	30.5
Corporate Equities	18.7	31.9	26.6	27.3	n.m.	n.m.	6.5
Commercial Mortgages	28.6	34.0	24.4	33.9	22.0	29.7	n.m.
Multifamily Mortgages	22.5	37.6	11.3	−1.2	−.5	6.6	n.m.
Home Mortgages	6.9	−1.1	−5.4	−.7	−.4	−.2	−.2

n.m. = not meaningful (both numerator and denominator are negative).
Source: Board of Governors of the Federal Reserve System, Flow of Funds.

some established insurers subsided by the mid-1980s, and the issues of new equity by stock companies became an important source of capital for the industry. During the 1980s, insurers also increasingly sold variable contracts, which accumulate assets in separate accounts rather than general accounts, thereby lessening their need to raise capital. Recently, some mutual companies also have either converted to stock companies to raise new capital or explored the merits of doing so.

Table 5
Capital Asset Ratio For Life Insurance Companies

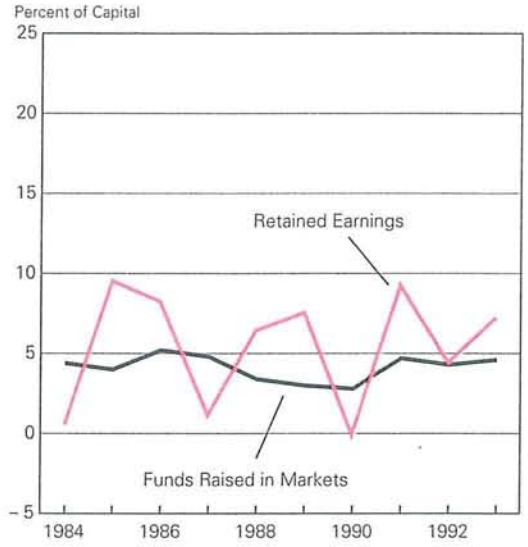
	Median	Mean
1984	5.6	8.6
1985	5.8	8.9
1986	6.2	9.2
1987	6.3	9.0
1988	6.0	8.9
1989	6.1	9.0
1990	5.9	8.6
1991	6.7	9.5
1992	7.1	9.7
1993	7.7	10.2

Source: See Appendix.

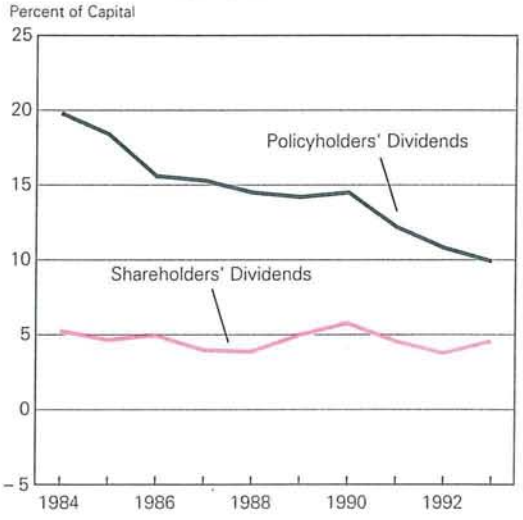
Insurers might have increased their retained earnings by increasing their premiums or by reducing the dividends paid to policyholders and stockholders, but the exigencies of competition deterred this approach (Figure 5, lower panel). Shareholders' dividends remained fairly constant throughout the 1980s, while policyholders' dividends only declined as interest rates fell. If insurers could attract at least their customary share of households' savings—by offering competitive prices and returns, especially on annuities—then the resulting accumulation of assets bearing higher yields eventually might boost both retained earnings and capital ratios. During much of the 1980s, insurers promoted GICs, which were popular with defined contribution pension plans. Although a liability of insurers' general accounts, GICs bore a competitive rate of interest which often matched or exceeded the average rate of return on the assets in general accounts. Nevertheless, these investment contracts would profit insurers if the yields on new assets added

Figure 5

A. Sources of New Capital for Life Insurers



B. Dividends Paid to Policyholders and Shareholders



Source: See Appendix.

to general accounts exceeded the yields on GICs. Accordingly, GICs often financed the acquisition of commercial mortgages, lower-grade bonds, and other investments that promised particularly high returns.

Distribution of Capital and Assets

That the discrepancy between the average and the median capital-asset ratios for the life insurance industry became substantial by the 1980s, then diminished during the early 1990s, indicates that the distribution of capital ratios among companies changed markedly over the past two decades.

In the 1980s, the distribution of capital among life insurance companies had become skewed. Although the average capital ratio was almost 10 percent in 1986, companies with capital ratios at least as great as 10 percent held only about one-fifth of the industry's assets, while companies with capital-asset ratios below 5 percent also held about one-fifth of assets.[9] As insurers promoted new liabilities backed by the assets in their general accounts between the early 1970s and the late 1980s, many did not increase their capital commensurately. As liabilities and assets increased more rapidly than capital, insurers could have diminished their risks either by purchasing "safer" assets or by selling "safer" liabilities. Some companies took neither step.

During the late 1980s insurers had increased their investments in assets regarded as risky for backing contracts with fixed commitments, particularly those issued by companies whose capital ratios (and capacity for absorbing losses on their investments) were comparatively low. In 1990, the companies with the least capital tended to hold more of these risky assets per dollar of capital (Figure 6, upper panel, and Table A1 in the appendix). The companies with capital-asset ratios below 7 percent and risky assets at least five times capital (those near the back left corner of the chart) held nearly one-half of the industry's assets. For these companies, the median ratio of mortgages to assets was nearly 30 percent; the median for the remainder of insurers was only 16 percent. This additional investment in mortgages accounted for most of the relatively high ratios of risky assets to capital.

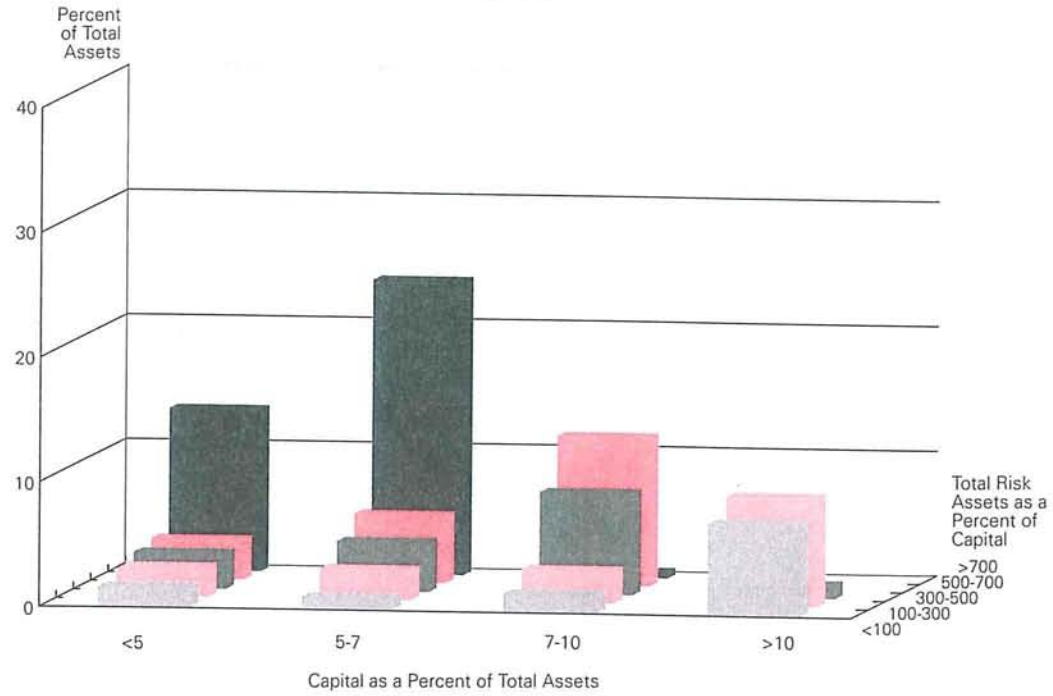
Many of the companies for which assets increased more than capital during the 1980s also relied on the sale of liabilities that, under the circumstances, were considered risky. For example, by 1990, companies

[9] The average capital ratio is the industry's capital divided by its assets, which equals the weighted mean of the capital ratios for each insurer with weights equal to each company's share of the industry's assets. This average ratio is much greater than the median because almost 40 percent of the companies, holding only 1 percent of the industry's assets, have capital ratios exceeding 50 percent. These outliers raise the average without altering the median.

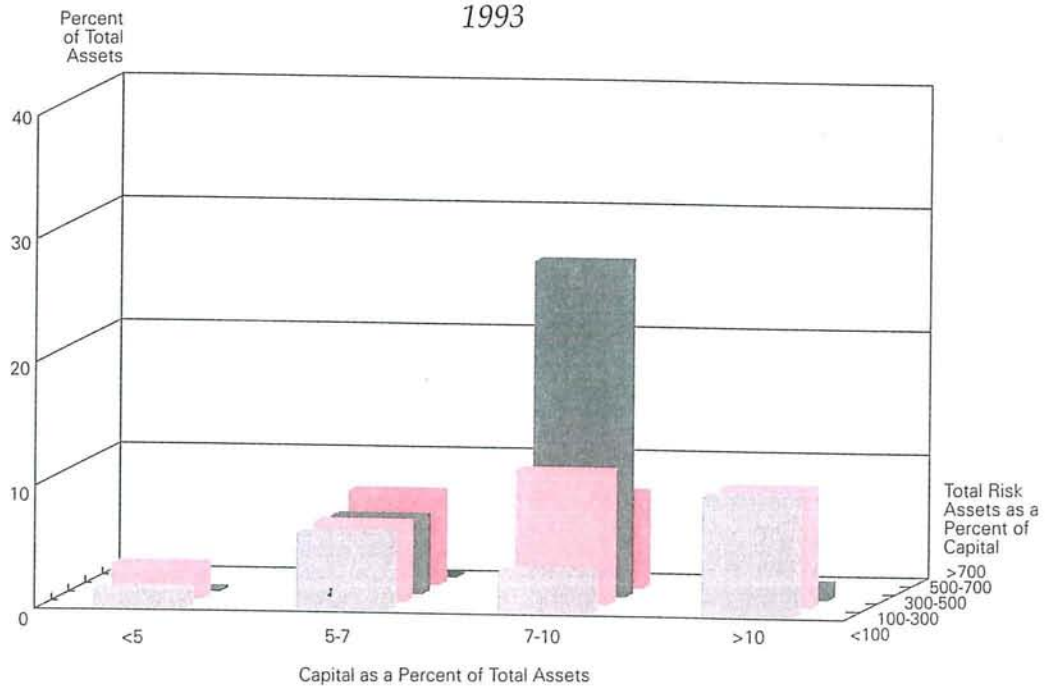
Figure 6

Capital and Risk Assets of Life Insurance Companies

1990



1993



Source: See Appendix.

issuing GICs with capital-asset ratios below 7 percent held almost 40 percent of the industry's assets (Figure 7, upper panel). Within this group, companies for which GICs also were more than three times capital held about one-quarter of the industry's assets. For most of the companies issuing GICs, these relatively short-term liabilities were more than twice as great as their holdings of short-term assets, thereby raising concerns about liquidity for those companies that could not replace their GICs as they matured.

The distribution of capital ratios among life insurance companies has changed markedly over the past two decades, as evidenced by the discrepancy between average and median capital-asset ratios.

As many insurers issued more GICs, they also increased their investments in commercial mortgages—assets with stated maturities similar to those of GICs. Just over one-quarter of the industry's assets were held by companies for which GICs exceeded three times capital and for which risky assets exceeded five times capital. Should the return on commercial mortgages fall short of expectations and should insurers not find other lenders to take over their loans at maturity, then insurers might be compelled to renew their GICs, paying yields which could be too great compared to their return on assets. About one-half of insurers' commercial mortgages were acquired after 1983. From 1983 to 1986, indices of commercial property values and rents rose substantially. By the early 1990s, many of these indices had fallen 20 percent or more below their values of 1983, indicating that both the value of the collateral and the return on the property backing insurers' mortgages had fallen significantly (Shulman 1990 and Borman 1991).

By 1993, after the median capital ratio for the industry had risen nearly 2 percentage points, the distribution of capital among insurers became less skewed. Although insurers were able to retain more earnings and issue more equity as interest rates fell in the late 1980s and early 1990s (Figure 5), capital ratios rose mostly because the rate of growth of their reserves and assets subsided after the mid-1980s (Figure 4). Capital per dollar of assets for many companies, especially those with the lowest ratios, had risen significantly and their blends of assets and liabilities appeared to entail less risk. Most companies, especially those with relatively low capital, reduced their investments in mortgages, real estate, and low-quality bonds. By 1993, companies for which risky assets exceeded five times capital and for which capital-asset ratios were less than 7 percent held less than one-thirteenth of the industry's assets (Figure 6). Moreover, the outstanding GICs of most companies were no longer so great compared to their capital (Figure 7). Only about one-fifteenth of the industry's assets were held by companies for which GICs exceeded three times capital and for which risky assets exceeded five times capital.

V. Standards for the Adequacy of Capital

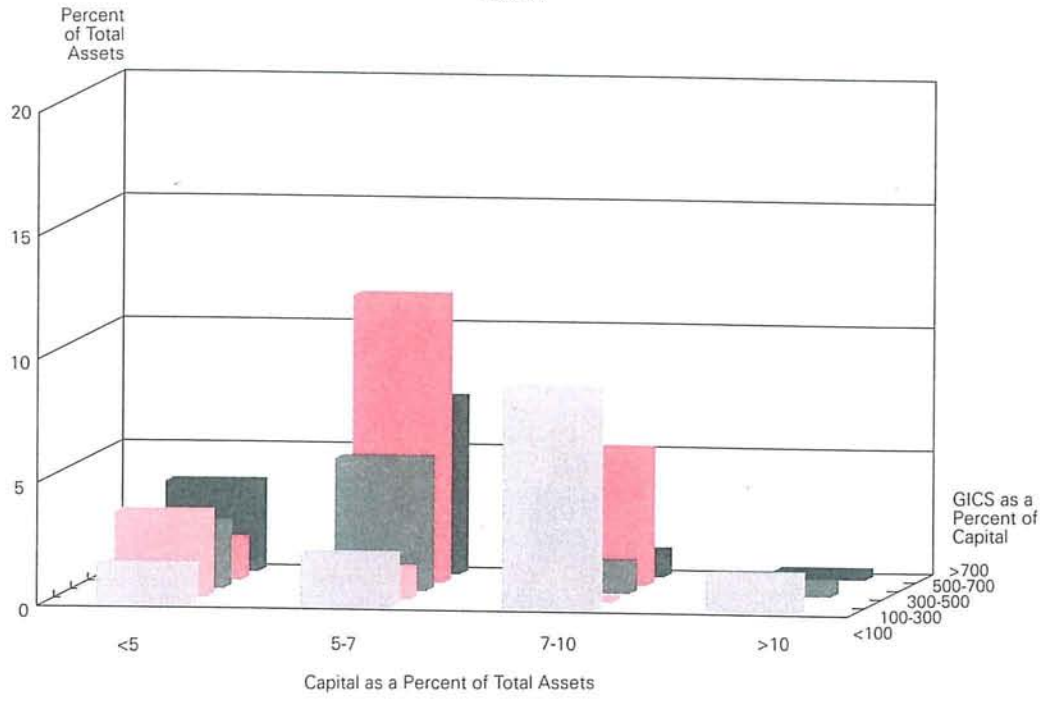
Probability theory has long observed that the risks inherent in forecasting mortality and morbidity threaten the solvency of any insurer whose access to capital is limited (Peirce 1878). During the past century, both theory and practice have shown that these failures can be infrequent, isolated events when insurers maintain adequate capital and underwrite their policies prudently. As financial intermediaries, insurers also bear risks arising from their issuing guaranteed liabilities backed by assets whose returns are not guaranteed. With adequate capital and a prudent matching of their assets to their liabilities, these risks, too, may seldom threaten the solvency of insurers.

To measure and control properly the risks arising from financial intermediation, regulators and risk managers increasingly favor risk-based capital requirements, appraising assets according to their market values and taking prompt remedies when capital ratios become too low. If, for example, an intermediary holds only bonds with a negligible risk of default and with cash flows that closely match those entailed by its obligations, then its capital per dollar of assets need only satisfy some minimum capital requirement. If, instead, the intermediary invests in designated risky assets, then it would hold additional capital in proportion to its investment in these assets. Risk-based capital requirements essentially increase the price of holding those assets designated as risky. This price is greatest when these requirements force intermediaries to raise more capital. It is least when intermediaries easily can accommodate these requirements within their customary capital positions.

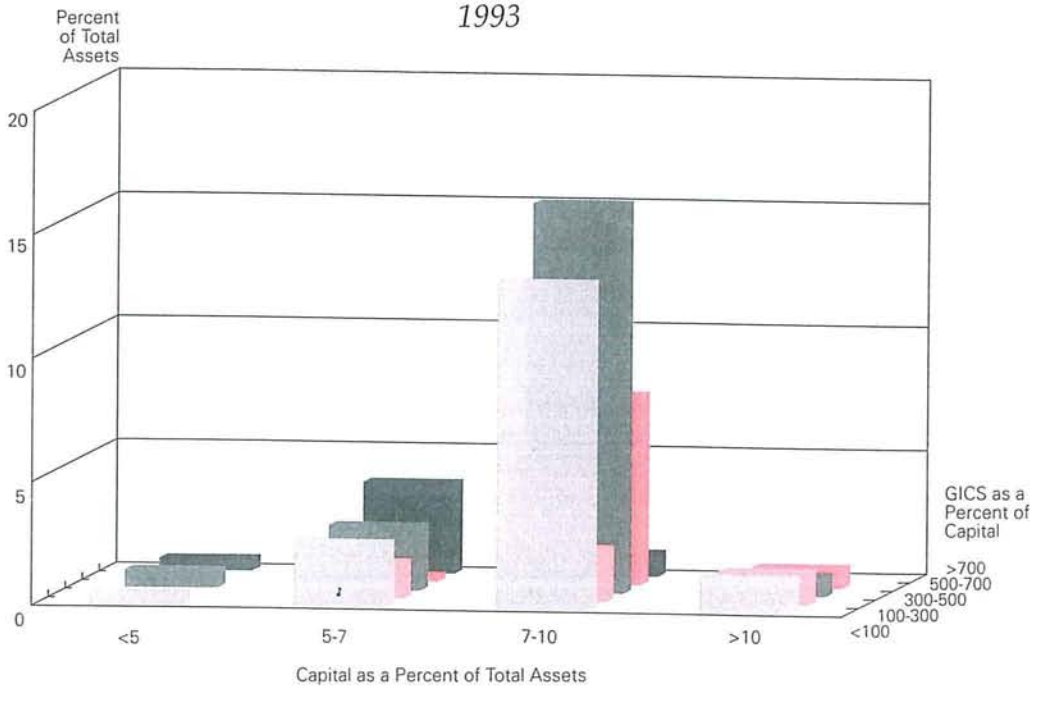
Figure 7

Capital and GICs of Life Insurance Companies

1990



1993



Source: See Appendix.

The details of statutory capital requirements for life insurance companies often vary from state to state. Nonetheless, the asset valuation reserves as defined in the Annual Statement adopted by the National Association of Insurance Commissioners generally apply uniform standards for risk-based capital to life insurance companies. These reserves equal a prescribed proportion of a company's investment in various assets, a proportion which varies by type of asset and by the rating of the asset. In 1988, companies maintained mandatory valuation reserves against equities and bonds. By 1993, valuation reserves were extended to mortgages, real estate, and other invested assets. Reserve ratios varied from 1 percent on highest quality bonds to 20 percent on the lowest quality; from 3 percent on the highest quality preferred stock to 22 percent for the lowest quality; from 15 percent to 30 percent on common stock, depending on the nature of the investment; and from 1.75 percent to 10.5 percent on mortgages, depending on the life company's past experience. Reserves were generally 7.5 percent against real estate and 20 percent against certain other assets, such as venture capital funds and limited partnerships. For life insurance companies, the additional burden of posting these reserves is relatively modest. In 1993, for example, the asset valuation reserve accounted for approximately one-sixth of the capital of the life insurance industry.

The success of any rule defining capital requirements depends greatly on the characteristics of the risks inherent in so-called risky assets.

The success of any rule defining capital requirements depends greatly on the characteristics of the risks inherent in so-called risky assets. Greater capital requirements ultimately impose greater costs on insurers' policyholders and shareholders, costs that can exceed the benefits of holding more capital once requirements become sufficiently great compared to the risks embedded in insurers' balance sheets. The case for substantial capital requirements is strongest when insurers hold unhedged risky assets for which: (a) returns are driven by random walks, (b) expected returns are low relative to the volatility of returns, and (c) dependable markets or appropriate hedges are lacking, trading is at best sporadic, and prices either are difficult to obtain or are potentially very volatile. Should the values of risky assets tend to revert to trends, however, then the case for maintaining substantial capital requirements and for marking these assets to market becomes less compelling.

When the Values of Risky Assets Are Governed by Random Walks

If the values of risky assets are driven by random walks, then the consequence of "news" is no more likely to increase the value of these assets more than previously expected than it is likely to decrease their value more than expected.[10] Accordingly, after a sequence of unexpected losses, these assets are no more due for redeeming gains than they are due for continuing losses (Cootner 1964, Merton 1990).[11]

A very conservative policy for managing the risk inherent in these assets might require that capital equal 100 percent of the value of risky assets (Friedman 1959, Tobin 1985, and Litan 1987). Only shareholders' funds would be invested in risky assets. Whenever a company's investment in risky assets exceeds its capital, the company has placed some of the funds backing its obligations to its policyholders in these assets. In this case, should the value of the risky assets fall sufficiently, the company's obligations would exceed its resources. If none of a company's obligations to its policyholders is invested in assets that follow random walks, the company's assets almost surely will exceed the value of its obligations over time. Therefore, a 100 percent capital requirement essentially would eliminate the risk of insolvency with minimal monitoring and intervention.

[10] A pure random walk would be symmetric: the odds that the value of the asset would increase 5 percent in the next year, for example, equal the odds that its value would decrease 5 percent. The discussion here allows for a colored random walk with drift. The value of an asset is expected to increase at a specific rate each year (its expected return), and the news may add or subtract 5 percentage points, for example, from this return with equal probability. Furthermore, the news that raises (or lowers) the asset's return in one year also may raise (or lower) returns in subsequent years, albeit by an amount that diminishes with time.

[11] Investments in specific equities, new ventures, or real estate are traditional examples of assets whose values are capable of rising very high or of vanishing over time. The returns on low-grade bonds are not governed by random walks, strictly speaking, unless they are convertible into equity. Nevertheless, these bonds share many of the risks of equity, and the odds of low-priced junk bonds' reverting to par are not comparable to those for high-grade bonds (Rosengren 1993).

The need for 100 percent capital requirements against the values of assets governed by random walks diminishes as risk managers monitor the performance of these assets more frequently and, when necessary, promptly require the company to raise new capital, to hedge its risks, or to sell some of these risky assets. Should substantial losses on these assets greatly reduce a company's capital-asset ratio, the chance that especially high returns on these assets subsequently would raise this ratio might be little greater than the chance that especially low returns would lower this ratio further.[12] Accordingly, as the value of a company's assets approaches that of its obligations, the odds of imminent insolvency increase, and conservative risk managers justifiably might require that risky assets be replaced by safer assets. Although shareholders would sacrifice relatively little by retaining the risky assets and taking the chance that their value will appreciate, this reduction of risk is prudent from the viewpoint of policyholders, because there is little to gain and much to lose by retaining these assets.[13]

With this strategy of prompt intervention, the magnitude of capital requirements depends on the frequency with which risky assets are reassessed according to their market prices or their disposal values. The more frequently these assets are appraised and the less volatile are the prices of these assets, the more capital requirements might be reduced. For example, if the value of a portfolio of assets seldom changes more than 10 percent between reviews and its assets always may be sold promptly at their prevailing prices, then a 20 percent capital requirement might provide adequate security.

Capital requirements also may be reduced to the degree the expected returns on risky assets are great compared to the volatility of their returns. (See Box.) The random walks of assets typically comprise two elements: a volatility describing the magnitude of random gains and losses, and a drift describing the expected rate of appreciation. As the drift increases compared to the volatility, the odds diminish for accumulating a given net loss during a specific interval of time. Consequently, an insurer requires less capital per dollar of assets, other things equal, to maintain a given degree of security as the expected return on its portfolio increases relative to the volatil-

[12] Because the values of risky assets are expected to increase with time (the drift), the odds that capital erodes further are less than the odds that capital increases. The greater is the drift, the greater the odds favoring an increase in capital.

[13] In many states policy owners are covered by guaranty plans: unsatisfied claims are covered to a substantial degree by assessing other insurers. Often, these other insurers can claim tax credits for their assessments. To the degree policy owners are protected in this way, the burden of losses is transferred to other insurers, state governments, and taxpayers.

Risk and Standards for Capital

Suppose a financial intermediary manages $1 billion in assets; $100 million represent the shareholders' stake, and $900 million represent the contributions of savers who hold the contracts of the intermediary. The intermediary invests $600 million in safe assets, yielding 7 percent. The remaining $400 million is invested in risky assets whose unconditional expected rate of return is 10 percent. Savers expect to earn a competitive rate of return, 7 percent annually, on their contracts. The expected return on assets (.6 times 7 percent, plus .4 times 10 percent) less the yield paid to savers (.9 times 7 percent) is 1.9 percent of assets annually. Therefore, the rate of return on capital is expected to be 19 percent.

In every year, the intermediary's liabilities increase at least 7 percent, reflecting the rate of return credited on savers' contracts. As time passes, the gains and losses on risky assets will alter the intermediary's ratio of capital to assets as well as its ratio of risky assets to total assets. After favorable returns increase the values of risky assets, thereby raising the capital-asset ratio above 10 percent, the intermediary sells more contracts in order to restore a 10 percent capital-asset ratio. The intermediary also invests the proceeds from savers as required in order to restore the 40 percent risk-asset ratio. After unfavorable returns depress the capital-asset ratio below 10 percent, the intermediary sells no new contracts. It also neither purchases nor sells any risky assets. If the intermediary increases its liabilities even modestly faster than 7 percent when its capital ratio is below 10 percent, then the frequency of its insolvency increases greatly in both of the simulations discussed below.

Risky Assets Follow a Random Walk

The returns on risky assets (r_t) follow a colored random walk. One year's news (η_t) not only alters

returns in that year, but also alters returns in future years, albeit this influence decays 40 percent per year (an autocorrelation parameter of 0.6). The unconditional standard deviation of the effect of news on each year's return (the volatility of ϵ_t) is 6 percent:

$$r_t = .10 + \epsilon_t$$
$$\epsilon_t = .6\epsilon_{t-1} + \eta_t$$
$$\eta_t \sim N(0, .06^2(1 - .6^2)).$$

Because of the autocorrelation parameter, the return on risky assets tends to follow a smoother cycle rather than a sharp zig-zag pattern around 10 percent from one year to the next. The value of the intermediary's risky assets (V^r) follows a lognormal random walk that is determined by the returns on these assets,

$$V_t^r = V_{t-1}^r \exp(r_t).$$

Given the initial conditions described above, Figure B1 shows a simulation of the capital-asset ratio for this intermediary. In longer versions of this simulation, the capital-asset ratio reaches zero, on average, about once every 150 years.

If the target capital-asset ratio is doubled to 20 percent, thereby reducing the ratio of risky assets to capital from 4 to 2, the capital-asset ratio reaches zero only about one-third as frequently as it does in the initial simulation. The consequence of increasing this target is tantamount to shifting the graph in Figure B1 up by 10 percentage points.

The capital-asset ratio also reaches zero about one-third as frequently as it does in the initial simulation if the difference between the expected return on risky assets and the return on safe assets is doubled (holding the ratio of the volatility on risky assets to their expected return constant at 0.6).

The intermediary's capital-asset ratio almost always remains above zero if, when the values of risky assets fall sufficiently, it sells enough risky assets to prevent its ratio of risky assets to capital from rising above the initial value of 4.

If, in the preceding case, the intermediary's sales of risky assets temporarily reduce their prices almost 10 percent, then the capital-asset ratio reaches zero no less frequently than in the initial simulation. In this case, when the capital-asset ratio declines as risky assets suffer a sequence of losses, it does not fall as much as that shown in Figure B1, but this ratio also recovers less quickly in subsequent years.

If the autocorrelation parameter is zero, then the capital-asset ratio does not reach zero as frequently as it does in the initial simulation unless the volatility of returns (the common standard deviation of η_t and ϵ_t) is nearly as great as the expected rate of return, 10 percent.

Risky Assets Revert to Trends

The underlying value of risky assets increases 10 percent annually, but the value of these assets in any year may be greater or less than this trend, depending on the news (ϵ_t, as described above).

$$V_1^r = V_0^r \exp(.1) \exp(\epsilon_1)$$
$$V_2^r = V_0^r \exp(.2) \exp(\epsilon_2)$$
$$V_3^r = V_0^r \exp(.3) \exp(\epsilon_3)$$
$$V_t^r = V_{t-1}^r \exp(.1) \exp(\epsilon_t - \epsilon_{t-1}).$$

Because of the influence of past news lingers in ϵ_t, the values of risky assets tend to cycle around their underlying values: once the values of risky assets fall below trend in any year, they likely will remain below trend in the next year. The standard deviation of $\epsilon_t - \epsilon_{t-1}$ is 5.4 percent.

Figure B2 shows a simulation of the capital-asset ratio, assuming the value of risky assets revert to trend as given above. Compared with Figure B1, this second graph of capital-asset ratios seldom strays very far from its target of 10 percent for very long. Longer versions of this simulation show that the odds of this ratio's falling below 4 percent are almost negligible.

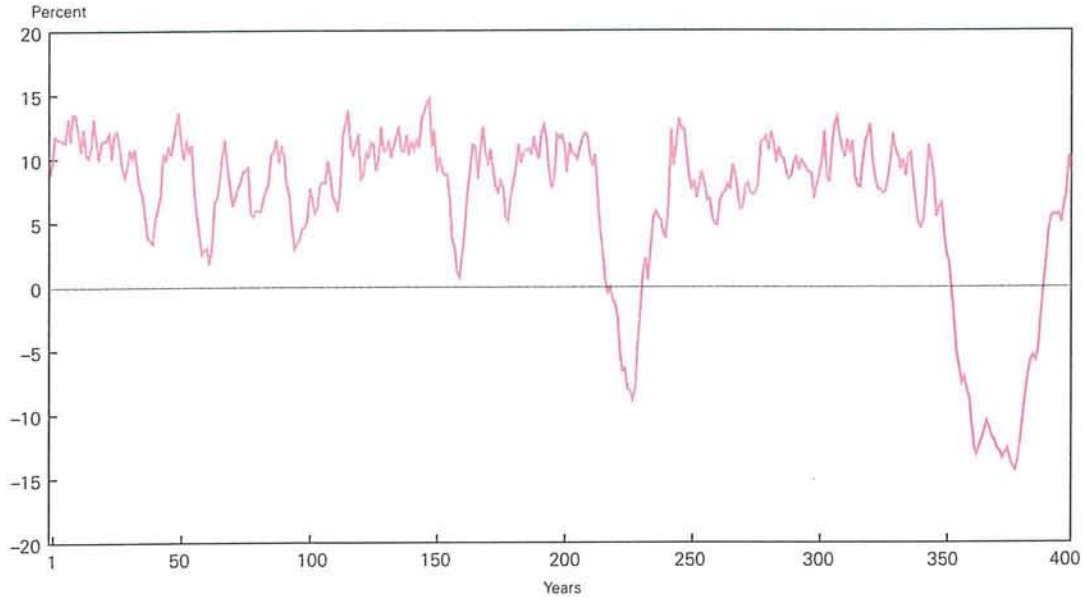
Even if the target capital-asset ratio is halved to 5 percent, thereby increasing the ratio of risky assets to capital from 4 to 8, the capital-asset ratio very rarely reaches zero.

The capital-asset ratio also seldom falls to zero if the difference between the expected return on risky assets and the return on safe assets is reduced to only 1 percentage point by reducing the unconditional expected return on risky assets to 8 percent (the ratio of the volatility on risky assets to this expected return remains constant at 0.6).

If the volatility of returns on risky assets is doubled, 12 percent rather than 6 percent, then the capital-asset ratio falls to zero as frequently as it does for the simulation shown in Figure B1.

Figure B1

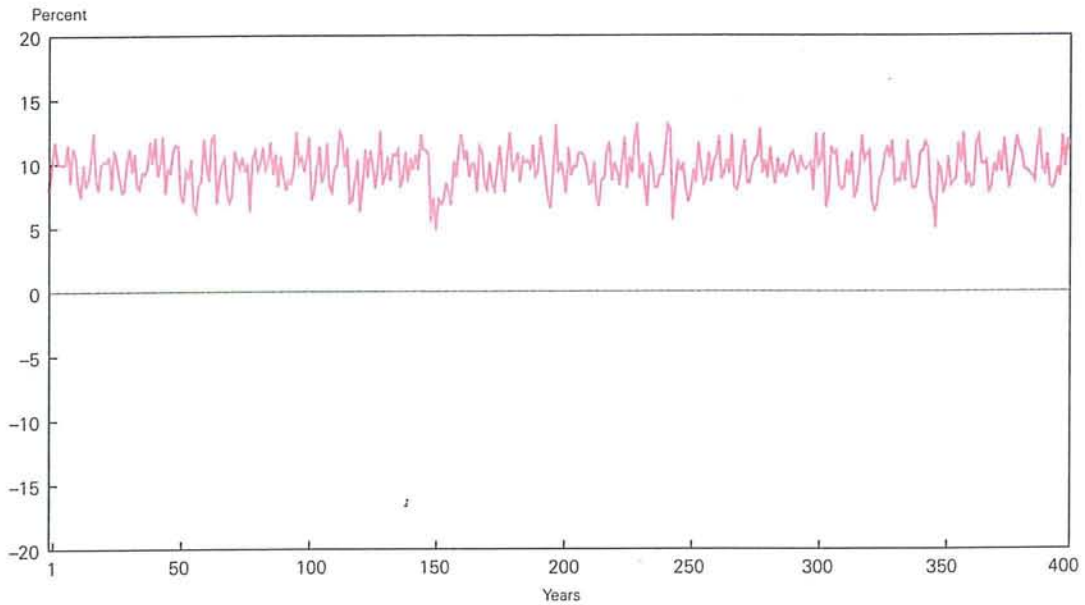
Capital-Asset Ratio with a Random Walk



Source: Author's calculations.

Figure B2

Capital-Asset Ratio with Trend Reversion



Source: Author's calculations.

ity of its returns. Finance theory predicts that assets with greater expected returns ordinarily have greater undiversifiable risks; otherwise, investors would bid up the prices, thereby bidding down the returns of assets offering unusually high returns. But, financial intermediaries presumably exist partly to acquire assets and to issue liabilities that are not priced efficiently in capital markets, perhaps for want of adequate public information, or perhaps because these assets are less suitable for other portfolios.[14]

Financial intermediaries presumably exist partly to acquire assets and to issue liabilities that are not priced efficiently in capital markets.

A comprehensive measure of the capital of financial intermediaries comprises both the funds contributed by shareholders (the capital reported on their books) and the value of any additional margin they may earn from buying assets and issuing liabilities that are not priced efficiently in public markets. The lower is this margin, other things equal, the greater book capital must be in order to maintain the same degree of financial security for those holding the liabilities issued by financial intermediaries. A principal concern of regulators and risk managers, supporting their interest in greater capital requirements, is that the competition accompanying recent financial innovations has diminished both book capital and margins for most intermediaries, including many life insurance companies.

When the Values of Risky Assets Revert to Trends

Although the return on assets whose values revert to trends may be very volatile in the short run, over longer periods their returns may be predicted with much greater certitude than the returns on assets driven by random walks. Unlike the case for random walks, once the value of a trend-reverting asset deviates from its trend, the odds of its returning increase with time, while the odds of its straying further diminish. Other things equal, capital requirements for insurers financing these assets with suitable liabilities need not be as great as those warranted for assets governed by random walks. Furthermore, should capital fall, the need to mark assets to market and to enforce remedies to rebuild capital promptly becomes much less compelling when the values of risky assets do not stray off course indefinitely.

The value of a diversified portfolio of real estate investments, for example, might revert to trend more than it might follow a random walk.[15] Because developers and investors tend to err when forecasting rents and the demand for space many years in advance, the supply of space at times exceeds demand at prevailing rents; at other times, it may fall short of demand. Following a surfeit of building, rents tend to fall, and the value of existing real estate can fall well below the construction costs for new real estate for several years. Nevertheless, after a hiatus in new development, the existing space is absorbed, and rents eventually recover. As long as new construction is expected to resume in the future to satisfy new demand, the value of existing real estate is more likely to rise to match its replacement cost than it is to fall a commensurate amount.

In the long run, the rate of return to patient investors reflects the rate of change of replacement costs and the cost of capital more than it reflects the vagaries of the real estate cycle. Investors who acquire real estate when values exceed trend risk earning below-average returns. Those who invest when values are comparatively low may earn above-average returns. But, the rates of return to all investors converge to the trend rate of return as their holding periods increase.[16]

[14] The assets that different intermediaries may purchase and the liabilities that they may issue often are limited by regulations, by contracts, or by customs. Also, because neither all investors nor all investments are treated the same in federal, state, and municipal tax codes, not all investors view all investments in the same way after allowing for taxes. Even the prices of assets traded in public markets apparently may not be priced efficiently from the viewpoint of all investors (Abel 1991).

[15] Tobin's q is the ratio of the value of businesses' tangible assets in financial markets (the value of their stocks, bonds, and loans) to the replacement value of these tangible assets. Once q has fallen well below unity or risen well above unity, the odds of its straying further away from unity apparently diminish over time. In other words, the replacement value of the nation's tangible assets may anchor the values of financial assets in broadly diversified portfolios. See also Poterba and Summers (1988) or Fama and French (1988).

[16] The replacement value of tangible assets is not necessarily known with great certainty in advance. Although the trend returns for these assets vary with economic conditions, uncertainty in forecasting these trends is small compared to the uncertainty in forecasting the market values for these assets. Moreover, the replacement value of tangible assets relative to the overall prices of goods and services is unlikely to follow a random walk: very high prices for these assets, for example, tend to attract new producers, which ultimately increases the odds of falling relative supply prices compared to the odds of prices' rising further.

The distinction between assets whose values are governed by random walks and assets whose values revert to trends is not sharp. The values of some assets may exhibit characteristics of both processes, and the enforcement of capital requirements can determine the degree to which one or the other dominates. For example, financial intermediaries often hold assets that lack dependable public markets, assets whose values also might be driven by random walks. If, in the normal course of events, these values should happen to fall enough to depress the capital of intermediaries, thereby triggering substantial sales, this divestiture could temporarily elicit "fire sale" prices in illiquid markets. Once the liquidation by intermediaries is complete and transactions recover, the values of these assets would revert to "normal."

Other things equal, capital requirements need not be as great for trend-reverting assets as for assets governed by random walks in order to achieve the same amount of protection for policyholders. (See Box.) The longer the interval of time, the closer the correspondence between actual and expected returns on these assets tends to become. Accordingly, when insurers match trend-reverting assets to policies with sufficiently long maturities (including the terms of any embedded put options extended to policyholders), they bear comparatively little risk provided their policies' guaranteed yields are fixed according to the longer-run yields they expect to earn on their assets.[17]

The need to mark assets to market and to enforce the prompt sale of assets when capital falls also is less urgent for managing the risks inherent in trend-reverting assets. Should the value of these assets fall substantially, thereby reducing an insurer's capital-asset ratio, the chance that especially high returns eventually would raise this ratio increase with time, while the chance that especially low returns would reduce the ratio further diminishes with time. Therefore, when the value of a company's assets approaches that of its obligations and its liabilities are of sufficiently long duration, the expected losses due to insolvency may be low compared to the expected gains from retaining these assets. Whereas measuring the value of a company's capital by marking risky assets to market might be a fair appraisal when assets follow random walks, this strategy can substantially understate the value of the company when assets tend to return to trends. Indeed, if the conflation of capital requirements and market valuation force insurers to sell or hedge risky assets when their values are lower than average, then these techniques for managing risk, which are conservative for contending with random walks, can reduce the expected value of capital and policyholders' investments when the values of risky assets tend to be governed by trends (DeAngelo, DeAngelo, and Gilson 1994). If the requisite sales are too great or the markets too illiquid, then these techniques may increase rather than diminish the risks inherent in financial intermediation. These techniques also tend to increase the volatility of returns on risky assets, undermining the contribution of intermediaries to financial markets.

Risky Assets and the Value of Capital

In principle, no single asset is inherently risky or safe. An apparently risky asset, when held in properly diversified portfolios, can increase investors' expected rates of return while not increasing the volatility of their returns. Moreover, an apparently risky portfolio of assets, when matched with suitable liabilities, can promise attractive returns on capital at relatively low risk.

Therefore, insurers' capital requirements should take into account the characteristics of a company's entire portfolio of assets and liabilities. These requirements ought not depend only on the expected returns, variances, and covariances for the various assets held by an insurer; they also should depend on the characteristics of the liabilities used to finance or hedge these assets. The capital required for the assets and liabilities allocated to separate accounts or mutual funds—wherein policyholders are granted minimal, if any, guarantees of the value of their investments—can be negligible even though these assets might be invested in equities. Similarly, the capital required for the general account's portfolio, other things equal, should diminish as the characteristics of the account's liabilities correspond better with those of its assets. For example, a portfolio of bonds, which can be risky for a company issuing short-term investment contracts, is not so risky for an insurer issuing longer-term fixed-rate contracts with adequate protection from policyholders' exercising their put options (including policy loans).

[17] The duration of liabilities must be "sufficiently long." A policyholder who can borrow against his policy may be inclined to do so whenever the current values of even strongly trend-reverting assets are low compared to the values of the company's liabilities. Funds withdrawn are "insured" against losses. If the penalties for these withdrawals are not very great, neither is the cost of taking this insurance. Should many so insure themselves, they could create a run that could impair the company's performance or threaten its solvency.

To assess the capital of insurers, their entire portfolio should be marked to market. The marking of risky assets to market values while reporting the values of other assets and liabilities according to other rules misstates the capital of insurance companies. If insurers held only high-grade bonds, and if these investments produced cash flows that matched closely the cash flows entailed by their obligations, then this misstatement might not be important. In these circumstances, if the prices of high-grade bonds fell with rising interest rates, the present value of an insurer's liabilities would fall by a matching amount, and the lower prices of bonds would not reduce the capital of insurers.[18] Nevertheless, not marking all assets and liabilities to market can bias the measurement of capital. If, for instance, the values of risky assets fall when interest rates rise, then ignoring the decline in the value of liabilities while marking down the value of risky assets understates capital. Also, even if insurers hold only high-grade bonds, to the degree the cash flows of these bonds do not correspond closely with the cash flows of insurers' obligations (taking into account any policyholders' put options), the value of capital changes with interest rates.

Proper standards for capital ought to reconcile the demand for financial insurance by policyholders with shareholders' willingness to supply this insurance.

The Cost of Capital

From the viewpoint of policyholders, capital is a kind of financial insurance that protects insurance companies' guarantees to their customers. Shareholders require a greater return on their investment in the company than do policy owners, because this insurance shifts much of the risk of insurers' investments from policy owners to shareholders. This difference in returns essentially reflects the premium that policyholders pay to shareholders for this financial insurance. Proper standards for capital ought to reconcile the demand for financial insurance by policyholders with shareholders' willingness to supply this insurance. Although a company with less capital bears a greater risk of insolvency, a company with too much capital may founder by not offering its customers sufficiently attractive returns.

If the assets and liabilities of life insurance companies were traded in perfect markets among investors who were equally well informed and whose assessments of potential returns on those assets and liabilities were similar, then the overall cost of funds for insurance companies would vary negligibly with capital requirements.[19] Greater capital requirements, other things equal, might force a company to depend more on equity financing and less on funds raised from those holding life, health, and annuity contracts. Although shareholders, who bear greater risks, generally require a greater return on their investment than do policyholders, the weighted average cost of funds need not increase for the company in these circumstances. As long as the company's blends of assets and of contractual commitments remained the same, the potential volatility of returns to shareholders and policyholders would diminish with more capital. Consequently, the rates of return required by shareholders and policyholders would fall enough to offset the consequences of an increasing dependence on equity financing.

Without perfect markets and agreement among investors, however, greater capital requirements can raise the cost of capital for insurance companies. Investors not privy to the information available to insurers assess the expected returns or the volatilities of the companies' portfolios differently than the com-

[18] The gains and losses on bonds resulting from changes in interest rates ordinarily could alter the book value of insurers' capital, because their accounts do not simultaneously recognize the matching gains or losses on their liabilities. Consequently, the National Association of Insurance Commissioners' Annual Statements include interest maintenance reserves (IMR) to capture any such realized gains or losses and to amortize them into investment income over the remaining life of the assets that were sold. In this way, the IMR insulates insurers' current investment income and capital from this accounting for gains and losses on assets only. This use of the IMR is most appropriate if the durations of the assets that are sold match the duration of liabilities.

[19] This essentially is an application of the Modigliani-Miller Theorem: the cost of funds for the insurer does not depend on its leverage, but rather the risks embedded in its portfolio of assets. This conclusion also requires that the returns to equity holders and policyholders be taxed the same. To the degree equity holders' effective tax rates are greater—due to their receipt of unsheltered cash dividends and due to the added burden of capital gains taxes on retained earnings—then the cost of funds rises with capital ratios.

panies' managers. Often the assessments of "outsiders" are too pessimistic, and among outsiders, shareholders often are better informed than policyholders. For this reason, among others, life insurance companies and other financial intermediaries traditionally have profited by transforming the obligations of investors into financial assets that appeal to savers: customers generally value the guarantees and options embedded in intermediaries' contracts more than management believes these features cost. If outsiders are inclined to bid too little for an insurer's assets, the cost of equity financing—the terms at which shareholders are willing to make a leveraged investment in the company—frequently appears too expensive to the company's managers.

Equity financing usually becomes especially expensive at those times when insurers most need new capital, after the returns on insurers' assets fail to achieve expectations or insurers' margins and earnings subside. Therefore, when insurers raise new capital in times of duress, times when outsiders are most inclined to question the past decisions of management, policyholders may pay too great a premium for their financial insurance. The consequences in this case are similar to those that occur with the forced sale of risky assets in illiquid markets.

Greater capital requirements can lower policyholders' expected returns not only by increasing insurers' cost of capital but also by diminishing shareholders' expected rate of return from operations. Life companies derive a share of their profits from the business of underwriting life, health, and annuity contracts. More capital per dollar of assets entails more capital per dollar of liabilities, thereby diminishing the rate of return on capital from their operations, other things equal. Greater capital requirements, consequently, encourage insurers to increase premiums or to write contracts that accumulate fewer assets in their general accounts. Currently, policies that accumulate assets in insurers' separate accounts appeal most to those customers who believe the net premium on variable contracts is comparatively low as a result of the unusually large returns on stocks and bonds that generally have prevailed since the 1970s. These customers, for the time being, essentially are willing to provide capital on comparatively cheap terms by bearing much of the risk from investments in separate accounts. Also, some insurers have reduced their need to raise capital by writing the basic insurance coverage for mutual funds, banks, and others that promote their own variable insurance and annuity contracts.

VI. Conclusion

Since their inception, financial intermediaries have been evolving from specialized businesses to enterprises offering a variety of financial services. Rising interest rates impelled this evolution during the past three decades as most financial institutions promoted new products to remain competitive. As intermediaries attracted new business, their assets grew more rapidly than their net investment income and capital. The life insurance industry was no exception. This erosion of capital per dollar of assets for life insurers, like that of many other intermediaries, concerned those who supervise these companies, because insurers representing much of the industry placed a greater share of their assets in investments commonly regarded as risky. Furthermore, many of these companies had issued liabilities with potentially short maturities to finance their assets.

Since the early 1980s, most financial intermediaries have increased their capital-asset ratios. Many financial intermediaries, including life insurance companies, also implicitly raised capital from their customers by promoting a "mutual fund" business strategy. Beginning with investment advisors and trusts, then spreading to insurance companies, pension funds, and banks, intermediaries have sold accounts wherein savers expect to earn greater returns by bearing more of the risks of the investments backing their contracts.

For the time being, the mutual fund strategy appeals both to insurance companies and savers. Life insurers have not needed to raise so much capital to support contracts whose funds were invested in separate accounts. Savers have held a greater claim on the net income on assets that were acquired mostly after interest rates peaked in the early 1980s. Although this strategy has flourished with the comparatively great returns (at seemingly little risk) on publicly traded securities during the past decade, its roots run deeper. As savers have become wealthier, investors more familiar, and capital markets broader and more resilient, the opportunities for financial intermediaries to earn substantial margins have tended to diminish. In other words, the customers of financial intermediaries are less willing to pay for the services of their capital.

To cope with a diminishing margin between their return on assets and their cost of funds, financial intermediaries also had pursued more aggressively investments that seemingly were not priced efficiently by other investors, particularly investments in real estate, highly leveraged enterprises, and new ven-

tures. Novel investments, of course, pose new risks and new lessons for intermediaries. Even if they could comprehend and control these risks sufficiently well to earn consistently above-average returns, such investments increasingly are subject to criticism by analysts and supervisors who have become wary of financial intermediaries' capacity for bearing risk during the past two decades. During the 1950s most intermediaries resided within granite walls; today, they occupy glass towers.

To measure and control the capital of financial intermediaries, analysts, regulators, and managers increasingly have favored linking capital requirements to investments in risky assets, appraising assets according to their disposal values, and enforcing prompt remedies when capital ratios become too low. The consequences of such policies, however, depend greatly on the characteristics of the assets and liabilities that constitute intermediaries' balance sheets. These policies work best when insurers hold unhedged assets whose values are governed by random walks, assets that may be sold at little cost in liquid markets. These policies work poorly if assets are hedged, if markets for risky assets are illiquid, or if the values of these assets tend to revert to trends over time.

Standards for capital should take into account an insurance company's entire balance sheet, not just its holdings of risky assets. An insurer's need for capital is assessed best by weighing the combined risks in all its assets and liabilities. For example, an insurer that invests in real estate may need to hold somewhat more capital, other things equal, than another that holds only government bonds. But, the need for this additional capital may be very much less for a company that finances its investment in real estate with long-term contracts than it is for a company that relies on short-term contracts or contracts that allow savers to withdraw their funds with little penalty. A lower guaranteed rate of return in a company's long-term liabilities also diminishes its need for additional capital. Just as an insurer's need for capital depends on the risk in its entire balance sheet, proper measures of its capital also depend on the values of all its assets and liabilities. Marking only risky assets according to their disposal values, while reporting other assets and liabilities according to other rules, can greatly misstate the financial condition of life insurance companies.

Capital requirements, other things equal, impose costs on insurance companies and their clients, costs that may be regarded as an insurance premium against insolvency. Critics of supervisory policy contend that these costs were not sufficiently great in the past; they neither deterred the taking of excessive risks by some financial institutions nor compensated for their subsequent losses. Nevertheless, capital requirements that rise with insurers' investments in specific assets increase the cost of holding those assets, thereby discouraging life companies from acquiring those assets that concern supervisors and analysts so greatly. Furthermore, to the degree policyholders are less willing to pay for the services of insurers' capital, insurers become even more likely to shun those assets that require more capital. Often these risky assets are those that are priced least efficiently in public markets, the type of asset that has been the traditional domain of insurers and other financial intermediaries. Consequently, capital requirements linked to investments in specific assets encourage insurers to purchase safer, publicly traded securities or to make loans underwritten according to common rule books. The appeal of these comparatively lucid investments is reinforced by the need to mark risky assets to market and the potential need to sell these assets in times of duress.

To the degree intermediaries increasingly favor more familiar assets, they substitute the capital of investors whose securities trade in public markets for their own capital. Those generally high-grade investors, in turn, assume more of the responsibility for financing the riskier investments of less familiar enterprises through acquisitions, joint ventures, or other arrangements. Ultimately, this line of financial innovation would continue to expand the role of nonfinancial corporations as financial intermediaries who allocate the nation's savings among investors who lack standing in public capital markets.

Appendix

Table A1
Allocation of Assets among Life Insurance Companies, 1990
Percent of Total Assets

Life Insurance Companies, Grouped by Capital as a Percentage of Total Assets	Total	Total Risk Assets					Real Estate, Equity and Other Assets			Bonds Below Investment Grade			Mortgages		
		Percent of Capital													
		<100	100–300	300–500	500–700	>700	<50	50–100	>100	<50	50–100	>100	<100	100–300	>300
<5	22.7	1.4	2.4	2.8	3.2	13.0	11.0	2.0	9.7	6.0	7.4	9.3	4.8	2.9	15.0
5–7	36.1	.8	2.4	3.9	5.4	23.5	4.9	9.6	21.7	21.6	9.7	4.8	4.3	3.9	27.9
7–10	24.4	1.3	2.6	8.1	11.9	.4	4.3	5.3	14.8	13.7	9.7	1.0	2.7	8.4	13.3
>10	16.9	7.2	8.7	1.0	.0	.0	9.5	5.2	2.2	16.1	.7	.0	12.7	4.1	.0
Total	100.1	10.7	16.1	15.8	20.5	36.9	29.7	22.1	48.4	57.4	27.5	15.1	24.5	19.3	56.2

Table A2
Allocation of Assets among Life Insurance Companies, 1993
Percent of Total Assets

Life Insurance Companies, Grouped by Capital as a Percentage of Total Assets	Total	Total Risk Assets					Real Estate, Equity and Other Assets			Bonds Below Investment Grade			Mortgages		
		Percent of Capital													
		<100	100–300	300–500	500–700	>700	<50	50–100	>100	<50	50–100	>100	<100	100–300	>300
<5	4.4	1.4	2.8	.1	.0	.0	3.6	.7	.0	3.8	.0	.6	3.0	1.3	.1
5–7	26.4	6.1	6.4	6.2	7.5	.2	13.5	3.7	9.2	22.5	3.8	.1	6.9	7.7	11.8
7–10	48.8	3.3	10.8	27.1	7.7	.0	6.1	16.3	26.5	47.6	1.2	.0	5.5	33.4	9.9
>10	20.4	9.6	9.6	1.2	.0	.0	9.8	7.6	3.0	20.3	.2	.0	15.8	4.5	.1
Total	100.0	20.4	29.6	34.6	15.2	.2	33.0	28.3	38.7	94.2	5.2	.7	31.2	46.9	21.9

Data Sources

Data for Tables 5, A1, and A2, and Figures 5, 6, 7, come from the National Association of Insurance Commissioners (NAIC) release of company data reported in Annual Statement format. Separate account assets are excluded. The capital and surplus, explicitly stated on the Liabilities, Surplus and Other Funds page of the Annual Statements, are adjusted by adding the asset valuation reserve and the difference between separate account liabilities and assets to create a measure of capital.

For Figure 5, retained earnings equals the sum of income after unrealized capital gains and losses, change in non-admitted assets and related items, and aggregate write-ins for gains and losses in surplus, less dividends to stockholders, from the Summary of Operations page. Payments to shareholders and policyholders are explicitly stated in the Summary of Operations. Capital raised in markets combines capital changes paid in, which take into account face value of capital issues, and surplus adjustments paid in, the amount above face value capital issues receive.

In Tables A1 and A2 and Figure 6, risk assets include common stock, real estate not occupied by the company, mortgages, other invested assets, and bonds below investment grade (class 4 through class 6). These data are explicitly stated on the Assets page of the Annual Statements, except for the bonds, which are taken from Schedule D-Part 1A for 1990 and Schedule D-Part 1A-Section 1 for 1993.

Guaranteed interest contracts, found on the Liabilities, Surplus and Other Funds page, is used as a measure for

guaranteed investment contracts (GICs) in Figure 7. Short-term assets include cash on hand and deposits found on the Assets page, plus collateral loans, mortgage loans, other short-term investment assets and investments in parent subsidiaries and affiliates from Schedule DA-Part 2, and total bonds with maturities of under one year, found on Schedule D-part 1A for 1990, Schedule D-Part 1A-Section 1 for 1993.

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