The Capitalization and Portfolio Risk of Insurance Companies

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Insurance companies, by their nature, bear risks. Some of these risks depend on insurers' ability to anticipate the magnitude and timing of the losses that are covered by their policies. Other risks resemble those borne by other financial intermediaries. Because insurers hold portfolios of assets to pay their obligations, they assume the risk that the value of their assets may not exceed that of their contractual liabilities.

Recent failures of insurance companies raise questions about the financial condition of the insurance industries.[1] Many of the specific difficulties confronting insurance companies tend to be unique to each insurer or to its lines of business. In one general respect, however, the same difficulty that confronts thrift institutions, banks, and most other intermediaries also confronts insurers. The financial strategies of financial intermediaries in the United States presumed a stability of interest rates that began to break down in the late 1960s. Not only did rising interest rates during the past two decades tend to depress the value of the assets of all intermediaries, they also fostered competition among intermediaries as all sought new opportunities for profit.

In order to cope, many financial institutions assumed new bets by "reaching" for riskier assets offering higher yields or by operating with less capital per dollar of assets. To varying degrees, many insurance companies have adopted these strategies. Life insurance companies holding one-quarter of their industry's assets have relatively low capitalization, and companies holding more than four-fifths of industry assets have substantial investments in assets that currently are considered risky. Casualty companies representing approximately one-fifth of that industry's assets have comparatively little capital by historical standards, and companies representing three-fifths of industry assets would have low capital if interest rates were to rise substantially in the near future.

Of all the remedies inspired by the recent investigations of the insurance industries, none appears to be more important than raising

more capital. With more capital, the value of insurers' assets would exceed their contractual liabilities by a greater margin. As a consequence of the increasing volatility of the relative yields on assets and the increasing competition among financial intermediaries during the past two decades, insurers need to reduce their leverage if their contracts are to be as secure as they were supposed to be prior to the late 1960s.

Some remedies propose a greater reliance on guaranty associations to protect those who hold insurance contracts from the potential insolvency of their underwriters. These associations essentially allow the customers of insolvent insurers to draw upon the resources of other participating insurers to fulfill a portion of their unsatisfied claims. Consequently, guaranty associations inherently are no stronger than the capital of participating insurers. These associations, alone, cannot compensate for insurers' lack of capital unless they commit the government to indemnifying customers of insurance companies.

Regulatory reforms could do much to control the risks borne by insurers and those holding insurance contracts, but the potential efficacy of these reforms is limited. As financial intermediaries, insurers invest in some assets whose risks and returns are difficult for outsiders to assess. Furthermore, much of the risk borne by an insurance company arises from the blends of both assets and liabilities that constitute the company's balance sheet. Successful regulation could foster an adequate diversification of assets or the proper matching of assets and liabilities; yet, after a point, assessing adequacy and propriety requires the oversight and skills of a resident shadow management.

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The first section of this article discusses the risks inherent in financial intermediation. The second section describes the roles of life and casualty insurance industries in credit markets, discussing some of the changes in their aggregate balance sheets during the last three decades. The third section, using reports submitted to the National Association of Insurance Commissioners for 1990, examines the distribution of assets, capital, and liabilities among life insurance companies and among casualty insurance companies. This article concludes that many insurers must increase their capital to cope safely with the consequences of an enduring slump in the value of commercial real estate, a substantial decline in corporate profits, or a significant rise in credit market yields.

I. Financial Intermediation and Risk

Economic development and capital formation depend on the efficient transfer of resources from those who would save to those who would invest. In the United States, more than three-quarters of the funds transferred to investors in the form of credit market instruments or loans flow through financial intermediaries. On one hand, insurance companies, depository institutions, pension funds, and other intermediaries issue financial claims with features that appeal to savers; on the other hand, these intermediaries accept financial obligations from borrowers on terms that appeal to borrowers. Without this intermediation, each financial contract must accommodate at once the frequently disparate motives of savers and investors. 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.[2]

By design, intermediaries, which transform primary securities issued by investors into assets valued by savers, manage an unmatched book. To compensate for this risk, these intermediaries expect to receive a sufficiently large margin between the effective yields they offer savers and the effective yields they earn on their assets. Savers may be willing to earn a yield below that prevailing in financial markets

[1] See, for example, IDS (1990); U.S. Congress (1990); Stevenson (1990); Laing (1990); American Council of Life Insurance (1990); and Kramer (1990).

[2] See Gurley and Shaw (1955, 1956, 1960); Navin and Sears (1955); Baskin (1988); Jensen and Meckling (1976); Leland and Pyle (1977); Smith and Warner (1979); Diamond and Dybvig (1983); Diamond (1984); Fama (1985); Bernanke and Gertler (1987); Gertler (1988); and Hoshi, Kashyap, and Scharfstein (1989).

or to sacrifice liquidity in order to receive services not offered by primary securities or by mutual funds. Investors who are not recognized in public credit markets may be willing to pay greater yields or to accept terms more stringent than those prevailing in financial markets in order to cultivate a reliable source of funds. The more savers value competitive yields and the more investors can avail themselves of competitive yields, the more intermediaries' expected profit and capacity for bearing risk shrink.

The Role of Capital

The capacity of intermediaries to bear risk also depends on their leverage. With more equity capital and surplus per dollar of assets, intermediaries can honor their contracts despite deeper or longer financial setbacks. In principle, more capital could increase the odds of survival when expected profit margins are low compared to the volatility of profits. Yet, with lower profit margins, intermediaries ordinarily require greater leverage to maintain a competitive return on capital. From the viewpoint of their customers, increasing leverage under these circumstances would compromise safety and soundness.

With increasing leverage, the interests of those who own and manage insurance companies are less likely to coincide with the interests of their customers. Extraordinary losses or competitive pressures encourage insurance companies, like other intermediaries, to acquire assets promising greater yields and risks or to increase the volume of their underwriting relative to their surplus. These strategies increase both the odds that the contracts of weak insurers will not be honored in full and the odds that failing insurers will not recover. These risky strategies often are the most appealing for imperiled intermediaries, because the price of obtaining new capital can appear to be too expensive for the existing owners.

Regulation and Guaranty Associations

Because the interests of those who own and manage financial institutions do not necessarily coincide with the interests of their customers, intermediaries typically are regulated by public agencies. But this reliance on oversight by outsiders also can pose risks. Assessing the specific values of insurers' assets and liabilities or their inherent risks and returns is difficult for customers and regulators alike.[3]

Some proposals for reforming the regulation of domestic financial intermediaries advocate relaxing direct oversight in favor of more reliance on market discipline (caveat emptor). When customers and regulators cannot audit accurately the risks borne by intermediaries, direct oversight, including substantial capital requirements, achieves a higher degree of safety and soundness than alternative approaches.[4] Instead of asking outsiders to discipline intermediaries, regulations could encourage insiders to do so. Relatively high minimum capital requirements financed entirely by common stockholders or by surplus accounts encourage intermediaries to pursue financial strategies that are more sympathetic to the interests of their customers. If the ownership of an intermediary is to be transferred should it fail to meet its capital requirement (while the value of its capital is still considerable), then its owners and managers bear more of the burden of controlling its financial risks.

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Many insurance contracts are covered to some degree by guaranty associations in most states. Like deposit insurance for thrifts or banks, the strength of these associations depends on the ability of participating insurers to pay the necessary assessments. And, like deposit insurance funds, the failure of these associations may uncover an implicit put written on state or federal governments. In cases when the federal government provides disaster relief or catastrophic insurance coverage, insurers, their customers, and their guaranty associations possess an explicit put option. Sometimes this put is less obvious: insurers may be able to claim tax deductions or tax credits for assessments paid to guaranty associations.

[3] See Randall (1989). Assessing these risks also may be difficult for insiders; see Simons and Cross (1991).

[4] See Kambhu (1990), Jensen and Meckling (1976) and Galai and Masulis (1976).

Because of the ambivalent status of these associations, governments that bear the potential burden of this put option attempt to design regulations that limit the inevitable failure of insurers to isolated, manageable cases.

This put option on the government also has deeper consequences for regulation and economic policy.[5] Even if intermediaries hold well-diversified portfolios of assets, their financial condition is contingent on the stability of the prices of capital assets.

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For example, if economic policy does not ratify the expectations of investors who install an "excessive" number of factories or develop an "excessive" amount of real estate, then the subsequent collapse in the prices of capital assets could entail extraordinary losses among financial intermediaries. Accordingly, the success of "deposit insurance" ultimately depends on the ability of economic policy and financial regulation to avoid binges and purges, to foster a flow of investments generally consistent with the potential growth of the economy.

Neither regulation nor guaranty associations necessarily promote safety and soundness. At times, regulations limit either the assets intermediaries hold or the variety of liabilities they issue in a fashion that diminishes their efficiency, perhaps reducing their expected returns more than the potential variability of their returns.[6] At other times, intermediaries reporting substantial current returns (by undertaking a risky investment strategy not perceived as such by outsiders) may appeal strongly to customers and may not be examined closely by regulators; these institutions also may be allowed to carry less capital or surplus than their competitors.[7] To the degree customers believe that regulated intermediaries bear a seal of approval, and to the degree that intermediaries are covered by explicit guarantees or by an implicit put option onto the government, financial institutions can become less sound, unless regulators can assess accurately their financial strategies.

Charles Darwin Meets the Winner's Curse

Direct oversight by regulators may be necessary for achieving safety and soundness even if the interests of those who own or manage financial intermediaries coincide reasonably closely with the interests of their customers. Intermediaries and their customers are not exempt from winner's curses: An intermediary that bids on assets or offers products for what it thinks they are worth, "will, in the long run, be taken for a cleaning."[8]

As a consequence of chance and familiar waves in the pattern of economic development, at any time some assets will boast a recent record of consistently high returns with little apparent risk. The appeal of these assets can be considerable for intermediaries that need to restore or maintain a competitive rate of return on their portfolios. The need to offer customers competitive terms also encourages intermediaries to pay relatively high prices for these assets, whose returns appear to be great compared to their risks. For life insurers representing a substantial proportion of the industry's assets, commercial real estate, low-grade bonds, and venture capital investments appeared to be an attractive tonic for revitalizing overall returns on assets in the 1980s.

Many of the assets held by life and casualty insurers offer great returns because they are risky investments. The prices of risky assets that have enjoyed a good run ultimately are set by the most optimistic bidders, those who foresee the least risk. Intermediaries holding these assets appear to be more profitable than their competition, whereas intermediaries that do not emulate these winners may imperil their market share or their independence. This consequence may only be reinforced when customers are encouraged to discipline intermediaries: Those that offer relatively low yields and shun apparently successful strategies receive few rave reviews from analysts or financial advisers.[9] "Worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally" (Keynes 1936, p. 158).

[5] See, for example, Keynes (1936) and Minsky (1985).

[6] Regulations designed to make intermediaries more secure by limiting the liabilities they may issue and the assets they may hold might instead make both the economy and intermediaries less stable; see Kopcke and Rosengren (1989).

[7] See, for example, U.S. Department of the Treasury (1991).

[8] This observation is adapted from the words of Capen, Clapp, and Campbell (1971). See also Thaler (1988).

[9] See also Koeppel (1991).

This natural selection tends to reduce diversity within the gene pools of intermediaries, making the financial system less robust. Moreover, to the degree the competitors that appear to be the fittest ultimately are victims of the winner's curse, earning inadequate returns for the risks they are bearing, the likelihood of systemic distress is greater.

II. Insurance Companies as Financial Intermediaries

Insurance companies manage approximately 16 percent of all the financial assets held by intermediaries in the United States (Table 1). The share of assets under their control is nearly as great as the share of assets held by the thrift institutions; only the share held by commercial banks is significantly higher.

Since the 1950s, casualty insurers' share of all financial assets held by intermediaries has remained constant, while the share managed by life companies has fallen by almost one-half. During the early 1950s, life companies alone managed about 21 percent of intermediaries' assets. Currently, their share is under 12 percent. About two-thirds of this decline occurred in the late 1960s and in the 1970s; since then, the share of life insurers has changed little.

The presence of insurance companies traditionally has been greatest in the bond and mortgage markets (Table 2). During the 1960s life insurers held about one-half of the outstanding corporate bonds. Although this share has fallen with the advent of mutual funds and the growth of pension plans, life companies still hold approximately one-third of corporate bonds. Over the past 30 years, life insurers consistently have held approximately 30 percent of commercial mortgages, while their shares of residential mortgages have declined because of the growth of the thrift industry. Casualty insurers hold approximately one-fifth of the outstanding municipal bonds.

Both life and casualty insurers invest more than one-half of their assets in longer-term securities bearing fixed yields (Table 3). Bonds account for almost 50 percent of life insurers' assets, and mortgage loans, four-fifths of which were commercial mortgages in 1990, account for another 20 percent. Together, real estate holdings and corporate equities, mostly the common stock of affiliates, represent less than 8 percent of life insurance assets.

Table 1
Allocation of Financial Assets among Financial Intermediaries
Percent of Total Financial Assets Held by Financial Intermediaries

Financial Intermediaries	1900	1912	1922	1929	1952–1955	1956–1960	1961–1965	1966–1970	1971–1975	1976–1980	1981–1985	1986–1990
Life Insurance Companies	10.1	13.0	12.2	14.4	21.1	20.2	18.0	16.0	13.4	12.1	11.4	11.6
Casualty Insurance Companies	2.9	3.2	4.1	6.2	4.4	4.4	4.3	3.8	3.7	4.1	4.1	4.5
Commercial Banking	64.1	65.5	64.7	52.7	47.2	40.8	37.1	37.5	39.2	37.9	34.8	30.9
Thrift Institutions	19.1	15.2	13.6	14.8	15.4	18.4	20.9	20.5	21.0	22.3	20.3	17.9
Pension Funds	—	—	.1	.4	5.6	8.4	10.8	12.4	13.5	15.3	17.1	17.6
Private	n.a.	n.a.	n.a.	n.a.	3.4	5.4	7.2	8.3	8.9	10.4	11.6	11.3
State and Local Government	n.a.	n.a.	n.a.	n.a.	2.2	3.0	3.6	4.1	4.6	4.8	5.5	6.3
Investment Trusts	—	—	.2	2.6	1.4	2.3	3.3	4.0	3.4	1.8	2.1	6.6
Mutual Funds	n.a.	n.a.	n.a.	n.a.	1.4	2.3	3.3	3.9	2.8	1.6	2.0	5.2
Finance Companies	—	—	—	2.2	3.7	4.3	4.6	4.7	4.7	4.8	4.9	5.1
Securities Brokers and Dealers	3.8	3.1	5.1	6.7	1.2	1.1	1.1	1.2	1.0	1.1	1.5	1.9
Money Market Mutual Funds	n.a.	n.a.	n.a.	n.a.	0	0	0	0	—	.7	3.8	3.8

Note: — = less than 0.05%
n.a. = not available.
Source: All data 1900 to 1929 from Goldsmith (1955) and Goldsmith (1958). All data 1952 to 1990 from the Board of Governors, Federal Reserve System, *Flow of Funds*.

Table 2
Insurance Companies' Holdings of Selected Financial Assets
Percent of Total Value Outstanding of Each Security

	1961–1965	1966–1970	1971–1975	1976–1980	1981–1985	1986–1990
Tax-Exempt Bonds						
Life Companies	4.5	2.7	1.9	2.2	1.8	1.3
Casualty Companies	11.9	11.8	14.5	21.2	19.3	18.7
Corporate Bonds						
Life Companies	50.7	42.8	34.9	34.8	33.7	31.9
Casualty Companies	1.9	3.2	3.3	4.5	3.9	4.6
Corporate Equities						
Life Companies	1.3	1.2	1.8	2.2	2.0	1.4
Casualty Companies	2.3	1.9	2.5	2.6	2.1	1.4
Commercial Mortgages						
Life Companies	30.5	31.3	28.9	30.2	29.4	27.1
Casualty Companies	.3	.3	.2	.3	.6	.8
Multifamily Mortgages						
Life Companies	19.7	26.3	21.5	16.4	11.9	8.9
Home Mortgages						
Life Companies	15.8	11.6	5.9	2.4	1.4	.7

Source: Board of Governors, Federal Reserve System, *Flow of Funds*; A.M. Best Company, *Best's Aggregates and Averages—Life/Health*, various years; and A.M. Best Company, *Best's Aggregates and Averages—Property/Casualty*, various years.

Casualty insurers invest almost 60 percent of their assets in bonds and another 10 percent in equities. Their holdings of mortgage loans and real estate are minimal. The average maturity of bonds in both life and casualty insurers' portfolios exceeds 10 years, and the average maturity of mortgages is approximately one-half that of bonds.

The Correspondence between Assets and Liabilities

The invested assets of insurance companies are financed principally by the premiums they have collected for writing their contracts and by capital or surplus, which represents the contribution of those who own the companies. Most of the assets of insurance companies are held in reserves to pay the claims of those holding their contracts.

Although life insurers anticipate paying most of their claims only after their contracts have been in force for many years, those who own these contracts often possess the option to borrow against their reserves (frequently at favorable rates of interest) or to cancel their contracts for cash. Recently, some life insurers have aggressively sold guaranteed investment contracts (GICs) in addition to their more traditional insurance and annuity products. Because GICs are comparatively short-term liabilities, which appeal to buyers mainly by offering a competitive rate of interest, insurers relying on these contracts reduce the average maturity of their liabilities.

The reserves of casualty companies are held mainly against homeowner, automobile, and commercial policies. Casualty insurers ordinarily expect to pay most of their claims within a few years of writing their contracts. Yet, when casualty companies can replace expiring contracts with new contracts and cover their claims by their flow of premium receipts, they may manage a relatively stable portfolio of assets over many years.

If yields on securities are relatively stable, insurers can comfortably regard their liabilities as being of long duration and invest them in long-term assets. Indeed, when the yields on longer-term securities exceed those on shorter-term securities, insurers can price their contracts most attractively by investing their assets in longer-term securities.

Should all yields rise significantly and remain high, however, established insurers cannot continue to offer competitive terms on existing contracts without diminishing their return on surplus. Casualty insurers, especially, may depend on the flow of premiums to pay claims, should the values of their assets fall at the same time that the magnitude of their losses unexpectedly rises. Under these circumstances, insurers could find themselves relying on comparatively short-term liabilities to finance long-term assets.

Table 3

Balance Sheets of Life Insurance Companies and Property and Casualty Companies

Percent of Total Assets

	1961–1965	1966–1970	1971–1975	1976–1980	1981–1985	1986–1990
Life Insurance Companies						
Assets						
Bonds	46.5	41.8	40.4	43.6	41.2	47.7
Government Bonds	8.8	5.9	4.7	6.4	10.1	12.8
U.S. Government	n.a.	n.a.	n.a.	n.a.	6.2	8.0
Special Revenue	n.a.	n.a.	n.a.	n.a.	2.1	3.5
Corporate Bonds	37.7	35.9	35.7	37.2	31.1	34.9
Utilities	n.a.	n.a.	n.a.	n.a.	9.0	7.6
Industrial	n.a.	n.a.	n.a.	n.a.	21.0	26.6
Corporate Stock	5.2	5.6	6.7	6.4	5.7	4.7
Preferred Stock	n.a.	n.a.	n.a.	n.a.	1.9	.8
Common Stock	n.a.	n.a.	n.a.	n.a.	3.9	3.9
Industrial	n.a.	n.a.	n.a.	n.a.	1.5	1.1
Affiliates	n.a.	n.a.	n.a.	n.a.	1.9	2.4
Mortgage Loans	36.1	37.2	32.3	27.4	22.5	19.6
Commercial Mortgages	9.6	11.7	13.9	15.6	15.2	15.4
Real Estate	3.1	3.0	3.0	2.7	2.5	2.3
Policy Loans	4.7	6.4	8.1	8.0	8.1	4.9
Separate Accounts Assets	n.a.	1.2	3.9	5.7	9.6	10.6
Other Assets	4.5	4.9	5.6	6.1	10.3	10.2
Liabilities						
Reserves	81.0	80.3	81.2	81.1	78.4	84.3
Life Insurance	58.0	56.1	53.5	45.0	32.0	24.0
Health and Disability Insurance	.8	1.3	2.0	2.6	3.3	3.0
Annuities and Supplemental Contracts	22.1	22.9	25.8	30.9	26.6	31.3
Separate Accounts	n.a.	n.a.	n.a.	n.a.	9.6	10.5
Other Liabilities	10.5	10.9	11.1	11.6	13.6	7.8
Capital and Surplus	8.5	8.7	7.6	7.1	8.0	7.9
Property and Casualty Companies						
Assets						
Bonds	49.5	50.7	52.3	63.2	56.6	58.8
U.S. Government	16.0	11.0	7.1	10.0	12.0	15.3
State and Municipal	15.4	14.2	15.3	13.3	10.4	9.2
Special Revenue	12.1	14.6	18.4	26.1	24.2	20.8
Industrial	5.3	10.2	10.8	12.8	9.4	12.6
Common Stocks	33.1	30.4	27.0	16.3	12.6	9.1
Preferred Stocks	2.6	2.7	3.5	3.4	3.6	1.9
Other Invested Assets	—	—	.1	.3	.6	.7
Mortgage Loans	.4	.4	.2	.3	.9	1.1
Real Estate	1.5	1.6	1.6	1.3	.6	.2
Other Assets	12.9	14.1	15.2	15.3	25.2	28.0
Liabilities	57.9	65.2	69.3	74.9	74.7	75.1
Losses	26.2	32.2	38.0	45.3	45.2	43.3
Loss Adjustment Expense	n.a.	n.a.	n.a.	n.a.	6.6	7.6
Unearned Premiums	25.2	25.6	23.3	20.5	17.5	16.2
Reinsurance Funds	1.2	1.5	1.2	1.2	1.4	1.4
Other Liabilities	5.4	5.9	6.9	7.9	6.5	5.2
Capital and Surplus	42.1	34.8	30.7	25.1	25.3	24.9

Note: — = less than 0.05%.

n.a. = not available.

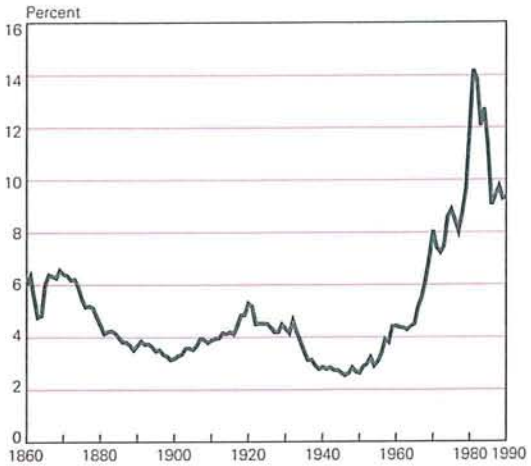
For 1961 to 1976, data for the property and casualty companies are on a nonconsolidated basis.

Source: For life insurance companies from 1960 through 1979, American Council of Life Insurance, *Life Insurance Fact Book*, various years. For life insurance companies from 1980 to 1990, A.M. Best Company, *Best's Aggregates and Averages—Life/Health*, various years. For property and casualty insurance companies, A.M. Best Company, *Best's Aggregates and Averages—Property/Casualty*, various years.

Although the history of interest rates during the century ending with the 1960s encouraged insurance companies to invest their reserves in long-term assets, their experience during the subsequent two decades undermined their confidence in this strategy. Between 1860 and 1960, interest rates on bonds were relatively stable (Figure 1). During the past three decades, however, a doubling of yields brought many changes to the insurance industries.

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 1990, the interest rate is for Moody's Aaa corporate bonds.
Source: Homer, Sidney, *A History of Interest Rates*, 1963, various pages and *Economic Report of the President*, 1990, p. 38.

The Performance of the Life Insurance Industry

Since the 1950s, the capitalization of life insurance companies as a whole has varied little, remaining near 8 percent of the value of their assets as reported on their books. But at times during the 1970s and 1980s, the yields on their bonds and mortgages were sufficiently below yields prevailing in credit markets that their capitalization would have been below zero had their assets alone been marked to market.

Although policy lapse rates and loans to policyholders increased during this interval, the vast majority of policyholders left their funds "on deposit" with life insurers through 1985, when the returns on insurers' assets once again compared favorably with the yields prevailing in credit markets. Nonetheless, life insurance companies' share of the flow of funds into intermediaries fell significantly beginning in the late 1960s.

Established insurers coped by promoting new liabilities or new lines of business, while new companies, unburdened by investments bearing low yields, expanded their share of the life insurance, annuity, and pension businesses. Life insurers also acquired new assets promising greater or more flexible returns, often accompanied by more risk. As a result of this experience of the past two decades, life insurers increasingly are promoting their liabilities as investment contracts, and those purchasing these liabilities increasingly value them mainly as financial investments.[10] These innovations may diminish life insurers' ability to bear risk in the future.

The Performance of the Casualty Insurance Industry

During the past three decades, the capitalization of casualty insurance companies fell more than two-fifths. In the early 1960s, the capital and surplus of casualty insurers averaged more than 40 percent of assets. After earning a low rate of return on surplus in both the mid 1960s and the mid 1970s, their capital and surplus fell below one-fourth of assets.

Though the average capitalization of casualty companies as reported on their books has not changed greatly since the 1970s, at times during the 1980s their capital would not have exceeded one-sixth of assets, had their assets alone been marked to market. Customers of casualty insurers cannot cash their policies, so marking only the assets of these insurers to market understates their capital and surplus. Nevertheless, during the 1980s persistent underwriting losses substantially depressed the return on surplus for casualty insurers as a whole. Since 1980, for example, the average return on surplus for casualty insurers has been less than that of banks (10 percent versus 12.8 percent), even though the return on surplus for casualty insurers has been more volatile. This performance may be attributed partly to established insurers' pricing existing and new contracts attractively in order to maintain their flow of premium receipts.

[10] Lautzenheiser and Barks (1991) also stress that life insurers extend generous options to their customers, allowing them to call their funds away from the company, often at the expense of customers who retain their contracts.

III. Financial Characteristics of Insurance Companies in 1990

Within the life and casualty insurance industries, the financial characteristics of each company can differ considerably from those for its industry. Though the aggregate statistics for life insurers show that the industry as a whole has not assumed great risks, companies holding one-quarter of the industry's assets have relatively low capitalization, and companies holding more than four-fifths of assets have substantial investments in risky assets. Casualty companies holding one-fifth of that industry's assets have relatively little capital by historical standards. If interest rates were to rise substantially in the near future, the capitalization of casualty companies holding more than three-fifths of the industry's assets would be less than one-half of recent industry averages.

In retrospect, many insurance companies carried too little capital in the 1970s to cover adequately the risks inherent in their balance sheets. The capitalization of these insurers is now less than that of the 1970s, while their risks have not diminished. By this standard, rather than any minimum acceptable ratio of capital to assets, the capital of many life and casualty insurers appears to be too low given the risks they are bearing.

Life Insurance Companies

Table 4 describes the distribution of assets in 1990 for the 61 largest life insurance groups, representing about 80 percent of the industry's assets. Almost one-quarter of the sample's assets were held by companies with capital and surplus less than 5 percent of assets (column 1). Approximately three-quarters of the sample's assets are held by companies for which capital and surplus is no more than 6 percent of assets. Weighted by assets, the median capitalization of life insurers in this sample is 5.6 percent.

The table also subdivides the sample of life insurers according to their investments in real estate, equity, low-grade bonds, and mortgages. For example, companies with capital to asset ratios below 5 percent hold 24.9 percent of the sample's assets. The entries in the first row of columns 2, 3, and 4 (which sum to 24.9 percent) partition this share according to investments in risky assets: 22.2 percent of assets are held by companies for which capitalization is less than 5 percent *and* for which investments in real estate, equity, low-grade bonds, and mortgages are greater than three times capital and surplus. Similarly, the entries in the first row of columns 5, 6, and 7, columns 8, 9, and 10, or columns 11, 12, and 13 (each group of three columns summing to 24.9 percent) partition the share of assets held by the compa-

Table 4
Allocation of Assets among Life Insurance Companies, 1990
Percent of Total Assets

Life Insurance Companies, Grouped by Capital and Surplus as a Percentage of Assets	Total (1)	Risk Assets: Total Risk Assets (percent of capital and surplus) <100 (2)	100–300 (3)	>300 (4)	Real Estate, Equity and Other Assets (percent of capital and surplus) <50 (5)	50–100 (6)	>100 (7)	Bonds Below Investment Grade (percent of capital and surplus) <50 (8)	50–100 (9)	>100 (10)	Mortgages (percent of capital and surplus) <100 (11)	100–300 (12)	>300 (13)
(1) <5	24.9	0	2.7	22.2	7.7	5.7	11.6	7.7	15.2	2.0	2.0	1.5	21.5
(2) 5–6	49.2	1.2	.9	47.0	1.0	9.3	38.8	21.5	23.3	4.4	4.5	1.7	43.0
(3) 7–10	18.2	1.9	1.4	14.8	1.9	9.5	6.7	16.7	0	1.4	3.3	9.2	5.7
(4) >10	7.7	.5	6.4	.8	2.2	5.5	0	7.7	0	0	4.0	3.7	0
Total	100	3.7	11.5	84.8	12.8	30.0	57.1	53.7	38.5	7.8	13.8	16.1	70.1

Note: Risk assets include: real estate, common equity, bonds below investment grade, mortgages, and "other assets," which comprise mostly real estate limited partnerships and venture capital investments. The real estate, equity, low-grade bonds, mortgages, and other assets shown are assets explicitly reported in general accounts, Schedule BA, Part I, and Schedule D. Short-term assets include: cash, bonds with a maturity of less than one year and short-term investments. Separate accounts are not included in either total assets or total liabilities. Data are for the 61 largest life insurance groups, representing about 80 percent of industry assets. Numbers may not add to totals because of rounding.

Source: National Association of Insurance Commissioners (NAIC) Database of Annual Statements.

nies with low capitalization according to their investments in specific assets: 7.7 percent of assets are held by companies for which capitalization is less than 5 percent *and* for which investments in real estate and equity are less than one-half of capital and surplus, for example.

Most of the assets of insurers are held by companies for which capital and surplus is between 5 and 6 percent of assets (Table 4, row 2). Although these companies have assets invested in real estate, equities, and low-grade bonds, these investments generally are not as great as their investments in mortgages, four-fifths of which are commercial loans. Whereas together these companies hold 49.2 percent of the industry's assets, 43.0 percent of industry assets are held by these insurers for which mortgages are at least three times capital and surplus (row 2, last column); only 4.4 percent of assets are held by these insurers for which holdings of low-grade bonds exceed capital and surplus (column 10); but 38.8 percent of assets are held by these insurers for which real estate and equity exceed capital and surplus (column 7).

Real estate, equity, low-grade bonds, and mortgages currently are regarded as risky assets because the potential losses on these assets seem to be too great compared to their returns and because the assets and liabilities of insurers are not adequately diversified to cope with these losses. If the duration of insurance contracts matched that of insurers' assets and the penalties for customers' recalling funds from those contracts were sufficiently large (marking cash values to market, rear-end load charges), then the yields on insurers' liabilities would be linked more closely to the yields on their assets. In these circumstances, the value of insurers' liabilities would tend to vary with the value of their assets, and their capital would be relatively stable. Instead, many insurance contracts are of short duration, and many longer-duration contracts impose negligible penalties on customers who call their funds out of the contracts by means of loans or cancellations. Indeed, the premium that insurers "charge" for writing this call option often is negative.[11] Accordingly, insurers' capital might fall when the yields on their commercial mortgages, for example, fail to meet expectations or match the yields expected from other assets. The consequences of these potential losses are magnified by insurers' relatively high degree of leverage.

More than four-fifths of the assets of the sample of life insurers are held by companies for which real estate, equities, low-grade bonds, and mortgages are more than three times their capital and surplus (Table 4, column 4). Among these companies, risky assets are more than 6.6 times capital and surplus. Should the value of these assets fall by one-tenth, for instance, the capital of these companies would fall by two-thirds. In this event, almost four-fifths of the entire sample's assets would be held by companies for which capital would be less than 4 percent of assets, and almost one-half held by companies with capital less than 2 percent of assets.

That the value of risky assets could fall by one-tenth or more for companies that have invested more than three times their surplus in these assets is not a remote concern. Real estate and mortgages represent more than 80 percent of the risky assets held by these companies (Table 4, columns 4 and 13). About one-half of this real estate and these mortgages have been acquired since 1983. From 1983 to 1986, the Russell-NCREIF index of office property values rose about 15 percent; since then, this index has fallen and is now approximately 20 percent below its value of 1983. Consequently, the potential losses for life insurers that are greatly committed to office properties could amount to one-tenth of their risky assets. Insurers committed to retail or warehouse properties have fared better so far. Between 1983 and 1990, the value of retail properties increased 40 percent and ware-

Table 5
Allocation of Assets among Life Insurance Companies Relying on Guaranteed Investment Contracts (GICs), 1990
Percent of Total Assets

Life Insurance Companies, Grouped by Capital and Surplus as a Percentage of Assets	Total (1)	GICs Relative to Capital and Surplus <50 (2)	50–100 (3)	100–300 (4)	>300 (5)
(1) <5	24.9	9.2	5.4	1.6	8.9
(2) 5–6	49.2	19.5	1.6	5.1	23.0
(3) 7–10	18.2	5.2	0	8.7	4.2
(4) >10	7.7	4.6	.6	1.3	1.2
Total	100	38.5	7.6	16.7	37.3

Note and Source: See Table 4.

[11] Consider the rational behavior of customers who buy the shares of a "mutual fund" that invests in stocks and bonds while always declaring a net asset value of $1. See also footnote 10.

Table 6
Allocation of Assets among Life Insurance Companies That Issue Guaranteed Investment Contracts (GICs) and Hold Risk Assets, 1990
Percent of Total Assets

Life Insurance Companies, Grouped by Risk Assets as a Percentage of Capital and Surplus	Total (1)	GICs Relative to Capital & Surplus: 50–100; GICs Relative to Short-Term Assets: <50 (2)	50–200 (3)	>200 (4)	100–300; GICs Relative to Short-Term Assets: <50 (5)	50–200 (6)	>200 (7)	>300; GICs Relative to Short-Term Assets: <50 (8)	50–200 (9)	>200 (10)
(1) <100	1.2	0	0	0	0	0	0	0	0	1.2
(2) 100–300	4.2	.4	.6	0	0	1.4	.5	0	0	1.2
(3) >300	56.1	5.4	1.2	0	0	5.1	9.7	0	13.2	21.6
(4) Total	61.5	5.8	1.8	0	0	6.5	10.2	0	13.2	24.0

Note and Source: See Table 4.

house properties appreciated just over 20 percent; since 1990, their values have fallen only about 10 percent.

Life insurers also assume risk by financing their assets with short-term guaranteed investment contracts (GICs). Even if a company were to invest only in high-grade bonds, by relying on GICs for financing, it risks losing capital should interest rates rise. Should the company invest in riskier assets, those holding its GICs might not renew their contracts if the value of these assets were to be questioned. While GICs are the most visible source of short-term financing for life insurers, their permanent life and annuity contracts also grant their customers options to withdraw funds from the company should these contracts become sufficiently unattractive.

Almost four-tenths of the assets of life insurers were held by companies for which outstanding GICs were at least three times their capital in 1990 (Table 5, column 5). If these funds were invested in short-term, high-grade securities, this reliance on GICs would not be an issue. Yet, as much as one-third of the assets of the industry were held by insurers whose GICs were twice as great as their short-term assets (Table 6, row 4, columns 4, 7, 10). Of these companies, insurers representing two-tenths of the industry's assets not only issued GICs exceeding three times their capital and surplus, but also invested three times their capital in real estate, equities, low-grade bonds, and mortgages (row 3, last column).[12]

Casualty Insurance Companies

Table 7 describes the distribution of assets, according to capitalization and return on surplus, for the 60 largest casualty insurance groups, representing about 90 percent of the industry's assets in 1990. Only about 43 percent of the industry's assets were held by companies for which capital and surplus exceeded 20 percent of assets. Only one-third of these, in turn, reported a return on surplus exceeding 9 percent. Four-tenths of the industry's assets were represented by companies for which capital and surplus was less than 20 percent of assets while, at the same time, returns on surplus were less than 9 percent.

In comparison with the standards that prevailed before the late 1970s, much of the casualty insurance business is undercapitalized. Those insurers with capital and surplus amounting to less than 20 percent of assets may be vulnerable either to unexpectedly large underwriting losses or to a substantial increase in interest rates.

For example, if bond yields were to rise 3 percentage points and dividend-price ratios on equity

[12] Commercial mortgages, constituting four-fifths of total mortgages, represent most of these "risky investments." Some analysts contend that the funds raised by selling GICs were invested in commercial mortgages. Although the maturities of the GICs and these mortgages are similar, the value of commercial mortgages is questionable, because of high vacancy rates and low rents. See Shulman (1990) and Borman (1991).

Table 7
Distribution of Assets among Casualty Insurance Companies, 1990
Percent of Total Assets

Casualty Insurance Companies, Grouped by Capital and Surplus as a Percentage of Assets	Actual for 1990				Higher Interest Rate Alternative
	Return on Capital & Surplus				
	<9	9–15	>15	Total	
	(1)	(2)	(3)	(4)	(5)
(1) 1–10	10.8	0	0	10.8	30.2
(2) 11–15	8.4	0	2.2	10.6	33.2
(3) 16–20	20.6	4.0	10.7	35.2	14.0
(4) 21–25	10.7	6.1	1.1	17.9	6.1
(5) 26–30	2.3	.4	5.8	8.5	2.4
(6) 31–35	.4	1.1	.4	1.9	11.8
(7) >35	14.1	1.0	0	15.1	2.3
Total	67.2	12.6	20.2	100.0	100.0

Note: For the calculation of the higher interest rate alternative, see Appendix 1. Data are for the 60 largest casualty insurance groups, representing about 90 percent of industry assets.
Source: National Association of Insurance Commissioners (NAIC) Database of Annual Statements.

were to rise 1 percentage point, the median ratio of capital to assets (weighted by assets) for casualty insurers could fall from 20 percent to 14 percent. Under these circumstances, about three-tenths of the industry's assets would be held by companies with capital and surplus less than 10 percent of assets (Table 7, last column), and almost two-thirds by companies with capital and surplus less than 15 percent of assets.

The capital of casualty insurers is sensitive to changes in yields because the average maturity of their bonds exceeds 10 years and the average maturity of their loss payments is approximately 2.5 years. In essence, with rising interest rates, established insurers sell their bonds at a loss to pay current claims. If these insurers retain their bonds and avoid reporting their capital loss after yields rise, then they will report a substandard rate of return on investments over the next decade. If they also price their new policies very attractively in order to increase their cash flow, they may report substandard underwriting income. Whether or not established insurers sell their bonds after interest rates rise, the consequences ultimately are the same for their ratios of capital and surplus to assets.

IV. Conclusion

Examples of the gambler's ruin extending back more than a century have prominently featured insurance companies.[13] Probability theory has long taught that the risks inherent in forecasting deaths and casualty losses eventually can undermine any insurer whose access to new capital is limited. During the past century, both theory and practice have shown that the inevitable failures among insurers can be infrequent, isolated occurrences when insurers maintain adequate capitalization and manage their underwriting prudently.

Insurers also bear risks arising from their roles as financial intermediaries. These risks, too, entail an inevitable gambler's ruin that may be especially threatening for highly levered insurance companies that have assumed substantial risks in their portfolios of assets and liabilities. The risks arising from intermediation can even be of more concern to insurers and their public regulators than the underwriting risks posed by unusually large claims. Unusually great storm damage in an East Coast city probably will not threaten insurers representing a substantial portion of the casualty industry's assets; the specific risks covered by most insurers generally are very different.[14] But, should many insurers be highly levered and their reserves in similar assets, then an event like rising interest rates or declining real estate values may imperil companies repre-

[13] See, for example, Peirce (1878).

[14] Some underwriting risks arising from unforeseen diseases such as AIDs or from unforeseen liabilities such as environmental pollution can pose more widespread problems for the insurance industries.

senting a substantial proportion of their industry's assets.

Traditionally, both life and casualty insurance companies have invested their policyholders' reserves in long-term securities. This strategy provided businesses with a substantial flow of long-term financing at attractive prices. This strategy also allowed insurers to offer their customers relatively attractive returns on their contracts, because the yields on long-term securities exceeded those of shorter-term securities.

Though this strategy was attractive, it also was risky. The increase in yields during the 1970s and 1980s left insurance companies and their policyholders holding assets offering below-market rates of return. Insurers that no longer offered their customers a competitive rate of return lost business, whereas insurers that continued to offer their policyholders competitive returns, absorbing the losses themselves, diminished both their return on capital and subsequently their capital relative to their assets. Some insurers attempted to increase their return on surplus by acquiring a riskier portfolio of assets or by writing a substantial volume of new contracts in order to invest the proceeds in new long-term securities. Any of these steps increases the odds of insurers' failing to honor their contracts fully because of unexpected underwriting losses or unexpected increases in rates of interest.

In retrospect, 20 years ago insurers carried too little capital to cover adequately their bets against rising interest rates. Today, the capitalization of most insurers is less than that of the 1970s, while the risks inherent in their assets and liabilities have not diminished.

Insurance regulators currently are designing capital requirements that depend on the specific assets held by insurers. "Risky" assets require more capital than "safer" assets. To the degree these requirements are a preliminary step toward increasing the capitalization of those companies managing risky portfolios of assets and liabilities, they will promote safety and soundness within the insurance industries. But, if these requirements are regarded as a remedy in themselves, they may not achieve their goals and they may impede the efficient operation of credit markets.

Capital requirements eventually should depend on the risks and returns inherent in an insurance company's overall balance sheet, not the classifications of specific assets. Assets, by themselves, are neither risky nor safe.[15] An apparently risky asset, when held in a properly diversified portfolio, can increase an insurer's expected rate of return while diminishing the potential variability of its returns. A supposedly safer asset, when held in an undiversified portfolio, can increase risk at the expense of expected returns. Furthermore, even an apparently safe portfolio of assets may pose substantial risks for insurers when the financial characteristics of their assets differ greatly from those of their liabilities. Consequently, recent requirements that encourage insurers to assess their contract offerings and their investment strategies under a variety of economic assumptions suggest a promising method for evaluating the adequacy of their capital.

[15] See, for example, Chirinko and Guill (1992).

Appendix: Calculations for Table 7

Using the NAIC reports for each of the 60 largest casualty groups for 1990, the change in capital and surplus equals the change in the value of the groups' bonds, plus the change in the value of common stock, less the change in the value of the groups' expected loss payments.

The change in the value of the bond portfolio when interest rates increase 3 percentage points equals

$$\Delta B = \left\{ \sum_{t=1}^{m} (C + X(1-X)^{t-1})/(1 + C + .03)^t + (1-X)^{m-1}/(1 + C + .03)^m - \sum_{t=1}^{m} (C + X(1-X)^{t-1})/(1+C)^t - (1-X)^{m-1}/(1+C)^m \right\} * B.$$

B is the value of bonds held by the group,
M is the average maturity of bonds (from Schedule D of the NAIC Annual Statement),
C is the average coupon payment on bonds (interest income on bonds divided by B), and
X is the rate at which bonds are prepaid (.05).

The change in the value of common stock when dividend-price ratios rise 1 percentage point equals

$$\Delta S/S = -((D/P)^{-1} - ((D/P) + .01)^{-1}) * (D/P).$$

S is the value of common stocks held by the group, and
D/P is the dividend-price ratio for those stocks.

The change in the value of loss payments when interest rates increase 3 percentage points equals

$$\Delta R/R = -((1.09)^{-D} - (1.12)^{-D}) * (1.09)^{D}.$$

R is losses and loss adjustment expenses, and
D is the average maturity of loss payments (from Schedule P of the NAIC Annual Statement).

The typical profile of payments for a given year's losses is the average of the profiles of reported payments, beginning with 1980. Then, taking into account the vintages of reserves and the profiles of their remaining payments (calculated from the typical profile), D is the weighted mean of the timing of expected future payments. Because D estimates the average maturity of payments, the foregoing formula (a duration equation using an initial return of 9 percent) tends to overstate the change in the value of these liabilities. This bias, which is small because D is near 2.5, tends to reduce the estimated loss of capital.

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