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Insurance and Issues in Financial Soundness

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Abstract

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

This paper explores insurance as a source of financial system vulnerability. It provides a brief overview of the insurance industry and reviews the risks it faces, as well as several recent failures of insurance companies that had systemic implications. Assimilation of banking-type activities by life insurers appears to be the key systemic vulnerability. Building on this experience and the experience gained under the FSAP, the paper proposes key indicators that should be compiled and used for surveillance of financial soundness of insurance companies and the insurance sector as a whole.

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I. INTRODUCTION

Insurance is an important and growing part of the financial sector in virtually all developed and some developing countries. A resilient and well-regulated insurance industry can significantly contribute to economic growth and efficient resource allocation through transfer of risk and mobilization of savings. In addition, it can enhance financial system efficiency by reducing transaction costs, creating liquidity, and facilitating economies of scale in investment.

The insurance sector has traditionally been regarded as a relatively stable segment of the financial system. An absence of liquid liabilities on the balance sheets of insurers, at least as compared with banks, has saved insurance companies from the contagious runs that have frequently occurred in the banking sector. Recent changes in the insurance industry, however, appear to have increased the vulnerability of this sector, as well as the potential of insurance failures to have systemic implications. In particular, the assimilation of banking-type activities by life insurers and growing linkages between banks and insurance companies appear to be the key potential threats to financial stability.

Supervisors and regulators need to understand the potential implications of the insurance sector for financial and systemic stability, as well as the tools available for surveillance of insurers. At the same time, literature focusing on these issues is very limited. This paper aims at filling this gap by examining the potential sources of financial system vulnerability in the insurance sector. It provides a brief overview of the insurance industry, reviews the risks insurers face, and examines recent failures of insurance companies that had systemic implications. Building on this experience, and the experience gained under the Financial Sector Assessment Program (FSAP), the paper proposes key indicators that should be compiled and used for surveillance of financial soundness of the insurance sector.

Systemic concerns are different not only between banks and insurers but also between life and non-life insurance companies. Unlike life insurance companies, non-life insurance companies face a catastrophic risk. Failures of non-life insurance companies can create a situation in which certain services are interrupted due to a lack of insurance protection. When a non-life insurance company dominates the market, its failure can cause a significant and costly disruption. Even such disruption, however, is unlikely to lead to financial system instability. Indeed, the limited empirical evidence appears to confirm that failures of insurance companies are more likely to have systemic implications for the financial sector.

We find that most life-insurance company failures occurred after financial deregulation, economic expansion, and a large price fluctuation. Financial deregulation caused insurance companies to employ more bank-type products to compete with other financial institutions. These products exposed insurance companies to additional risk owing to return guarantees and made their liabilities more liquid. The need to achieve competitive returns and the optimism of economic expansion induced insurers to invest in risky assets such as commercial mortgages and junk bonds. As a result, insurers became more vulnerable to

economic shocks. Moreover, cross-holding of shares between banks and insurance companies and close business relationship between the two industries increased the risk of contagion.

There exist a number of different approaches and methods for surveillance and supervision of insurance companies, and both quantitative indicators and qualitative assessments are needed to properly evaluate the soundness of an insurance company.

This paper focuses on financial soundness indicators (FSIs) and suggests two sets of such indicators for insurance companies. FSIs are one of the major tools for surveillance and early supervisory intervention, and can be broadly defined as indicators compiled to monitor the condition of financial institutions and markets by measuring their financial strength and vulnerabilities.[2] FSIs identify trends and provide information so that the experience of different companies can be compared and outliers identified. A major effort—within the IMF and in other institutions—has recently been aimed at development of such indicators, as part of a broader effort to strengthen the surveillance of financial systems and enhance crisis prevention after the financial crises in the late 1990s; see, for instance, IMF (2000 and 2002a). Previous work has concentrated on the banking system, and the nonbank indicators have been left for further research.

The next section provides a brief overview of the insurance industry, reviews the role the insurance sector plays in the economy and the risks it faces, as well as recent developments in the sector. Section III then examines several insurance failures and their implications for financial system stability. Section V draws on the risks and reasons of failure and proposes two sets of FSIs to facilitate surveillance of the sector. Section VI concludes by describing the limitations of financial soundness indicators and suggesting directions for further research.

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[2]It is useful to distinguish FSIs from early-warning indicators, which act as a complementary surveillance tool intended to predict the probability of crises. In contrast, FSIs are focused on monitoring the financial strength of the sector—that is, its capacity to absorb shocks, and its vulnerabilities to different shocks while the probability of a shock occurring that could trigger a crisis can be monitored by using early-warning indicators and other macroeconomic and financial market data.

II. INSURANCE INDUSTRY AND THE RISKS IT FACES

This section describes the insurance industry and the risks it faces. We start with a short overview of the industry, continue with a brief analysis of the role insurance plays in the economy and conclude by discussing the risks insurers must deal with and by reviewing the recent developments that have implications for the risk profiles of insurance companies.

A. Brief Overview of the Insurance Industry

The insurance industry is different from other financial services in that its main role is to spread financial losses. Policyholders buy protection against the occurrence of defined events and insurers set reserves against the estimated total cost of claims.[3] Insurance is founded on probability theory, where the price (insurance premium) is set before knowing the exact cost of the product (insurance contract, or policy).

In line with Financial Stability Forum (2000), we can classify insurance into three major categories: (i) life insurance; (ii) non-life insurance; and (iii) reinsurance.

Life insurance offers a variety of products, with different degree of protection and investment components, including pensions, savings, permanent health and term assurance policies. The insurer's commitment may, therefore, be based on death, occurrence of a specific event (e.g., diagnosis of a specified illness), survival or inability to work due to health problems. Policies can offer guaranteed nominal or real yields or may be unit-linked and may include profit-sharing provisions.

In some developed markets, life insurance products function as contractual savings similar to deposits and in that respect the life insurance industry is concerned with asset accumulation in addition to risk transfer. Unit-linked type products, where the policyholder bears the investment risk, can be very similar to mutual fund products. In some countries, life insurers provide or manage pension funds, a supplement to the basic social security system.

Non-life insurance is also called property and casualty insurance, property and liability insurance or general insurance. In buying non-life insurance, the customer is buying financial protection against a specific insurable event, such as industrial injury. Policies are typically short-term (one year) indemnity contracts and normally there is no investment element or

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[3]This statement is true in general, but the accounting treatment of reserves, provisions or other risk buffers may vary. For instance, in the case of non-life insurers, accounting rules may limit the provision for claims to only cover insured events that have occurred and future claims liabilities are dealt with through the reporting of unearned premiums and by setting up a charge against capital.

expectation of financial return. Nevertheless, the liabilities arising from such contracts can continue for many years (e.g., an industrial injury or disease or a manufacturer's liability to customers).

Non-life insurance is classified along personal and commercial lines. Personal business (e.g., homeowners, automobiles) consists of a large number of low-value policies. Here, the ultimate cost of claims is easier to actuarially estimate, especially if the company has a stable renewal base. In contrast, commercial business (e.g., product liability, business interruption) is made up of a lower number of higher value policies, with customized terms for the largest customers, and is inherently more volatile.[4]

Reinsurance is insurance for insurance companies. Reinsurers protect against peak exposures and the volatility of underwriting results. They provide both expertise and underwriting capacity to the primary market and are often systemically important to the primary insurance market. There exist four broad categories of reinsurance: proportional, non-proportional, facultative and financial.[5]

Table 1 illustrates the size of the insurance sector and the share of life and non-life (direct) business in developed and emerging market economies that are members of the Organization for Economic Cooperation and Development (OECD).

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[4]Clearly, this holds when the companies have books of business of comparable size. A large company can have stable and predictable commercial lines so long as the book is sufficiently large and well diversified.

[5]Under the *proportional* contracts, the reinsurer follows the fortunes of the primary insurer. A typical proportional reinsurance contract is a quota share under which the reinsured cedes a specified percentage of its premium income to the reinsurer who undertakes to pay the same proportion of claims. A ceding commission is payable to the reinsurer. A reinsurer will not offer quota share protection unless it is confident about the underwriting abilities of the primary insurer. A typical *non-proportional* contract is an excess of loss protection where the protection has a defined limit and a deductible. The riskiness of this type of contract is a function of the type of business and the level of deductible. Both quota share and excess of loss contracts can cover specified lines or the entire book of business, in which case they are termed "whole account" protections. *Facultative* reinsurance contracts cover specified insurable interests, for example a fleet of aircraft or the professional indemnity for a large firm of auditors. Clearly, it is easier to control the risk associated with facultative contracts, but they are labor intensive and transaction costs are higher. *Financial* reinsurance contracts are profit smoothing mechanisms and are characterized by multi-year terms and very little transfer of indemnity risk. Nevertheless, reinsurers can move reserves for future liabilities off their balance sheets (and on to those of its reinsurers).

Table 1. Insurance Penetration: OECD 2000 Data

Direct Gross Premium as Percent of GDP	Total	Life	Non-Life
OECD (Organization for Economic Cooperation and Development)	9.1	5.3	3.7
EU15 (European Union)	9.2	6.0	3.3
NAFTA (North American Free Trade Agreement)	10.0	4.9	5.1
OECD countries with highest income per capita			
Luxembourg	30.4	26.5	3.9
Japan	13.2	10.0	3.2
United States	10.6	5.2	5.4
OECD countries with lowest income per capita			
Poland	2.9	1.0	1.9
Slovak Republic	3.1	1.3	1.8
Turkey	1.5	0.3	1.3

Source: OECD Insurance Statistics Yearbook, 2002 (Paris).

Overall, insurance penetration (gross premium as a percentage of GDP) in the OECD stood at 9.1 percent in 2000, but there were substantial differences among the OECD countries. Countries with higher GDP per capita tended to exhibit larger insurance penetration than countries with lower GDP. While Luxembourg can be considered an outlier due to its small size, Japan and the United States, as compared with Poland, the Slovak Republic, and Turkey, illustrate this point. At the same time, it appears that it is mainly the life industry that develops rapidly with higher GDP per capita.[6] The premium volume has grown faster than GDP recently, insurance penetration in the OECD increased from 8.1 percent of GDP to 9.1 percent in 1995–2000. The growth was particularly strong in the EU, where insurance penetration jumped from 7.0 percent of GDP in 1995 to 9.2 percent in 2000.

B. Role of Insurance in the Economy

Like banks and securities firms, insurance companies are financial intermediaries. It is therefore not sufficient to view the insurance sector simply as a pass-through mechanism for diversifying risk, under which the unfortunate few who suffer losses are compensated from funds collected from many policyholders.

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[6]See Enz (2000) for examination of an S-shaped relationship between per-capita income and insurance penetration.

The literature identifies several main contributions of insurance:[7]

1. Insurance promotes financial stability among households and firms by transferring risks to an entity better equipped to withstand them; it encourages individuals and firms to specialize, create wealth and undertake beneficial projects they would not be otherwise prepared to consider.

2. Life insurance companies mobilize savings from the household sector and channel them to the corporate and public sectors. The key difference between banks and insurance companies is that the maturity of bank liabilities is generally shorter than that of life insurance companies. This enables life insurers to play a large role in the long-term bond market. At the same time, life insurers' portfolios are typically more liquid than those of banks, which make them less prone to bank liquidity crises.

3. A strong insurance industry can relieve pressure on the government budget, to the extent that private insurance reduces the demands on government social security programs and life insurance can be an important part of personal retirement planning programs.

4. Insurance supports trade, commerce and entrepreneurial activity in general. Many sectors are heavily reliant on insurance; for example, manufacturing, shipping and aviation, the medical, legal and accounting professions, and (increasingly) banking through credit risk transfers.

5. Insurance may actually lower the total risk the economy faces since insurers have incentives to measure and manage the risks to which they are exposed, as well as promote risk mitigation activities.

A number of empirical studies show evidence that the development of financial intermediaries, including insurance, has a strong correlation with economic growth. Patrick (1966) suggests that financial sector can have either a supply-leading or demand-following relationship with economic growth. In the supply-leading view, economic growth can be induced through the supply of financial services, while in the demand-following view, the demand for financial services can induce growth of financial institutions and their assets.

Both supply-leading and demand-following finance are likely to coexist and Patrick (1966) suggests that causation runs from financial to economic development (supply-leading relationship) in the early stage of development while the direction of causation is reversed (demand-following relationship) in the later stage. Outreville (1996) examines factors that contribute to insurance growth by using cross-sectional data of 48 developing countries.

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[7]See, for instance, Carmichael and Pomerleano (2002).

Enz (2000) examines an S-shaped relationship between per-capita income and insurance penetration, by estimating a logistic demand function for insurance that allows income elasticity to change as the economy matures.

Many other researchers explored the question of how important the existence of financial sector development is to economic growth. By using panel data of 80 countries from 1960 to 1989, King and Levine (1993a and b) find that initial indicators of financial sector depth and banking activity predict subsequent levels of economic growth. Odedokun (1996) employs bi-directional Granger causality tests by using panel data of 71 countries during 1960s and 1980s and finds evidence that financial sector depth Granger-causes economic growth. Also, limiting the causality test to the insurance sector, Ward and Zurbruegg (2000) employ Granger-causality tests by using data of nine leading OECD countries during 1961–1996. They find that the insurance sector Granger causes economic growth in some countries, while the reverse is true in other countries.

The insurance sector can also contribute to the development of capital markets, by making a pool of funds accessible to both borrowers and issuers of securities. This is due to the fact that insurance companies have longer-term liabilities than banks. Catalan, Impavido, and Musalem (2000) study the relationship between the development of contractual savings (assets of pension funds and life insurance companies) and capital markets. By analyzing Granger causality between contractual savings and both market capitalization and value traded in stock markets for industrialized countries, they find that the growth of contractual savings Granger cause the development of capital markets.

C. Types of Risks Insurers Face

The risks insurance companies face can be broadly classified into three categories:
(i) technical risks; (ii) investment (asset) risks; and (iii) other risks.

Technical risks stem from the very nature of the insurance business; indeed, the major part of the risks to which an insurer is exposed is by the virtue of the policies it underwrites, the total of sums insured. Not all of these risks will crystallize into liabilities. Insurance liabilities are usually estimated by using actuarial or statistical techniques, which are based on probability theory using past experience and making assumptions about the future. If these calculations are incorrect, the consequences for the insurer may be significant; premiums may be insufficient and/or liabilities may be understated. Such conditions would distort insurer's true financial situation which could result in both solvency and liquidity problems.

There are several examples of technical risks. Underpricing risk occurs when premiums are too low to cover claims and insurer's expenses. Another risk is that of unforeseen or inadequately understood events,[8] including deviation risk, or the risk that actual development

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[8]There are two essential sources of underwriting pricing risk—errors in the core deterministic modeling parameters and unavoidable random error given the stochastic nature of the claims

of claim frequencies such as mortality, morbidity, and interest rates will deviate from actuarial assumptions, in addition to the risk of error.[9] Reinsurance risk occurs when there is insufficient reinsurance coverage, for example, a reinsurance company fails or there are other risks connected with reinsurance), or catastrophes (major earthquakes, floods or hurricanes affecting the financial and economic stability of countries).[10]

Asset risks affect the value, performance, returns, liquidity and structure of insurer's investment portfolio and debtors. It includes the market risk (changes in interest rates, equity and real estate prices and exchange rates fluctuations), credit risk (non-payment by counterparties) and liquidity risk. An insurer's exposure to credit risk arises from the creditworthiness of the debtors with respect to both premium income and reinsurance recoveries, as well as the concentration of debtors.

When analyzing market risk, both sides of the balance sheet need to be considered. In particular, it is necessary to identify the market risk that is a part of "risk pass through" products under which the policyholder bears the risks and gets the rewards from the risk of products under which the company bears the investment risks and rewards. Risk pass through products do not affect the risk profile of the company (except for reputation risk); these include unit linked products where the assets are held in the general assets of the company, group experience refund products, administration services only products and, to a certain extent, participating life insurance products.[11]

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generating process. While in theory it may be possible to distinguish errors due to insufficient use of available data by the insurer from errors that are completely random or could not be foreseen, making such a distinction in practice would be very difficult.

[9] Also, general insurers are vulnerable to changes in social, economic and judicial circumstances. For instance, interpretation of insurance contracts by courts may imply new liabilities for insurers that were not envisaged when premiums were calculated. Moreover, insurers sometimes fail to take into account the positive correlation between claims from different policies in case of a major event or life companies may use out-of-date demographic statistics.

[10] Insurance companies have had often insufficient capital for coverage of claims from catastrophic events. Governments and insurance companies have worked together to develop long-term compensation mechanisms such as tax-effective equalization provisions. The insurance industry is also developing alternative risk transfer mechanisms (e.g., catastrophe bonds) to transfer large risks to investors.

[11] If there is a track record of insurers reducing dividends as a result of adverse market developments.

An insurer may hold equities to match its long-term obligations; thus, life insurers and non-life insurers with long tail liabilities, for instance, asbestosis, could be particularly affected by fluctuation of equity prices. Mismatch in the duration of assets and liabilities can expose an insurer to interest rate risk. The rate of interest is, however, often an integral part of premium rate calculation and reserve estimation, so that interest rate risk can manifest itself in many ways and the total interest rate risk needs to be evaluated carefully.

Insurers—with the exception of life insurers effectively providing deposit taking services—are not exposed to highly liquid and potentially unstable liabilities that can cause problems in the banking system. On the other hand, the frequency, severity, and timing of claims or benefits are uncertain, so some degree of liquidity risk exists as well.

There are further risks which are specific to the financial sector and insurance industry, for example, group/conglomerate risk (conglomerates may increase the risk of contagion due to insufficient management coordination), legal risk involved with novel forms of alternative risk transfer and risks associated with electronic commerce. Other generic issues of concern are operational, economic or management risks.

D. Recent Developments in the Insurance Sector

The economic significance of the insurance sector has been increasing recently, with insurance companies constituting a growing part of the domestic financial sector in most developed and some developing countries. During the 1990s, total assets of insurance companies in developed countries grew faster than assets of banks. Insurance companies also became significant players in the international capital markets (see, for instance, IMF, 2002b for more information about the role of insurance companies in the capital markets).

The insurance sector's increasing importance has been fueled by the liberalization of financial systems, including privatization, financial consolidation, and the increase of the use of contractual savings products. Life insurers have effectively diversified into banking-type products and asset management (unit-linked) products, reflecting an increased appetite of clients to save and invest, in addition to buying protection. A number of factors contributed to increased demand for investment and saving products, including the desire to benefit from the recent equities boom and concerns over government pension provisions.

Furthermore, ties between insurers and banks have increased, either through bancassurance (combination of banks and insurers) or conglomerates (broader financial groups). In the past five years, many banks and insurers have joined forces, motivated by expected synergies, economies of scale and higher revenues from cross selling each other's products, especially in Europe.[12] While the extent of actual synergies remains to be seen, both bancassurance and

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[12]For instance, the most notable transactions cited by *The Economist* (December 14, 2002) have been the following: in 1997, Credit Suisse bought Winterthur (Switzerland's second-largest insurer), in 2000, Dutch ING bought ReliaStar (an American life insurer) and the

financial conglomerates pose new challenges for regulators.[13] Not only have insurers recently diversified into banking and asset management products, but also new, often complex and sophisticated, risk management products have been created. These new products create challenges for regulation and supervision in terms of understanding them, identifying their precise impact, and deciding on the most appropriate supervisory approach.

These new products are usually called alternative risk transfer (ART) arrangements, even though no formal and precise definition exists. Here, we follow KPMG (2002) in using the term ART to include two types of arrangements: capital market innovations and financial reinsurance.[14] Financial reinsurance (reinsurance contracts resulting in virtually no transfer of insurance risk) has existed for a number of years, but market developments have led to a range of new products being created in recent years. Capital market innovations involve arrangements under which insurance risk is transferred, but which do not take the form of a conventional insurance contract.

Capital market innovations can be divided into three broad categories: securitization/bond structures, insurance derivatives, and contingent capital arrangements. Already the broad categorization suggests that there is great variation among particular arrangements. The common theme is that under these arrangements the amounts payable or receivable are contingent upon the occurrence of an adverse event, and the insurer's overall exposure to loss is thus reduced. In the securitization category, we may use the example of a catastrophe bond structure, where the interest payable and/or its redemption value is linked to the (non)occurrence of a specified adverse event.[15] As for insurance derivatives, there have been attempts to introduce catastrophe swaps and exchange-traded derivatives (like catastrophe options), but with limited success. Contingent capital instruments provide the buyer with the right to issue and sell securities at a fixed price for a fixed period of time if a predefined event occurs.

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financial services division of Aetna (an American health insurer), and in 2001 Allianz bought Dresdner Bank. For a recent discussion of some of the challenges of bancassurance, see Benoist (2002).

[13]For a comprehensive discussion of large complex financial institutions, including insurance-led groups and groups including insurance companies, and their potential implications for financial stability, see Miles (2002).

[14]Therefore, we ignore self-insurance and captive insurance arrangements involving firms other than insurance companies, which are sometimes also included in ART arrangements.

[15]In practice, the insurer or reinsurer establishes a special purpose vehicle (SPV), typically an independent trust that is authorized to write reinsurance in an offshore location. The SPV simultaneously issues the bonds and enters into a reinsurance contract with the insurance entity.

There exist four broad types of financial reinsurance: discounting covers, deposit arrangements, off-balance sheet funding contracts, and life funding arrangements. For example, under discounting cover, the reinsured is certain to make a recovery under the contract in excess of the premium paid and the contract, in effect, enables the reinsured to discount its reserves.[16] For more detailed description of the other types of financial reinsurance products see KPMG (2002) and references cited therein.

In one area, namely credit risk transfers, the two types of concerns described above—that is, new products with potentially poorly understood risks and a closer connection between banks and insurers—have converged. Credit derivatives business and credit risk transfers in general, have grown substantially during recent years, even though the precise amount of risk passed and assumed is not well understood in practice by regulators and supervisors. Some observers have argued that the (re)insurance industry itself might have been acting in a "naïve capacity" for banks in the credit derivatives market since insurers have not fully grasped the product that bankers mastered some time ago.[17]

E. Regulation and Supervision of Insurance

Insurance is a considerably heterogeneous industry. First, the structure of the insurance industry varies with the level of economic development. Insurance sectors in developed economies typically include different types of insurers—life and non-life insurers as well as reinsurers—which may be stand-alone companies, parts of groups or conglomerates and may conduct business internationally. In contrast, insurance sectors in developing countries are much simpler, smaller, and generally without any major international activities. Second, major insurance institutions in the same country or even in the same insurance market segment may have considerably diverse risk profiles due to the wide range of risks to which they can be exposed.

This heterogeneity and growing complexity of insurance complicates its regulation and supervision. Also, due to the rapid development of insurance sector, the advances in regulation during the last two decades have not kept pace with the structure of the industry. In many countries, for instance, financial conglomerates—including or led by insurance

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[16]Consider the following example given by KPMG (2002). An insurer has a long tail liability, for which it has reserved US$20 million on an undiscounted basis. The company could pay a US$1 million premium to a reinsurer and obtain US$2 million in excess of US$5 million of cover. The chances that the ultimate payment will not exceed US$7 million are close to zero so the company can be virtually certain it will ultimately recover US$2 million, even though there is some timing risk. The transaction enables the reinsured to reduce its net reserves by US$2 million in return for the payment of US$1 million.

[17]See, for instance, an article by Christopher Westfall in the December 13, 2002 issue of *Insurance Insider*.

companies—are subject to multiple regulatory agencies, a situation which creates coordination problems and may lead to problems of regulatory arbitrage or multiple gearing of capital.

Internationally, there is little consistency in regulation and supervision of the insurance industry, despite recent efforts of the International Association of Insurance Supervisors (IAIS). For example, there are great differences across developed countries in the crucial area of capital adequacy (the next section discusses this issue in more detail). Another example may be reinsurance supervision, where supervisory practices vary considerably even within the European Union, from supervision on the same basis as primary insurers to little or no supervision with no obligation for reinsurers to be licensed.

Given the fact that capital is highly mobile, the inconsistency of regulation and supervision creates the danger of formation of important centers of activity in jurisdictions, which are ill-equipped to monitor financial strength and risk profiles of insurers and reinsurers, with negative implications for financial stability.

III. INSURANCE FAILURES

In this section, we discuss the potential of insurance company's failure to disrupt financial stability and review several episodes of insurance failures.

A. Insurance Company Failures and Financial Stability

The insurance industry has traditionally been regarded as a relatively stable segment of the financial system. Considerably lower liquidity of liabilities has prevented contagious runs on insurance companies that have been seen in the banking sector. Nevertheless, insurance companies are not necessarily immune to crises, particularly when they assimilate banking-type activities and/or have close business relationship with banks, including cross-shareholding, placement of deposits, and credit risk transfers.

Baliño and Sundararajan (1991) define financial crisis in general as "a situation in which a significant group of financial institutions have liabilities exceeding the market value of their assets, leading to runs and other portfolio shifts, collapse of some financial firms, and government intervention." Hence the term crisis refers to "a situation in which an increase of nonperforming loans, an increase in losses (because of such problems as foreign exchange exposure, interest rate mismatches, and contingent liabilities), and a decrease in the value of investment cause generalized solvency problem in a financial system and lead to liquidation, mergers, or restructuring." These events usually follow a shock to the economy, and reinforce the subsequent decline in output.

Such a crisis situation can be caused and exacerbated by information asymmetry. The creditors of financial institutions face informational asymmetry with regard to financial soundness of these institutions. The costly liquidation and/or the payoff externality like a

first-come, first-served repayment make creditors rush to withdraw their money from the financial institution, when they believe that it is vulnerable to runs (self-fulfilling runs).[18] Moreover, when there are costs to collect and analyze information, creditors may be more inclined to follow others' behavior, even blindly (cascades).

Runs on individual financial institutions, which depend on the confidence of their creditors, can destabilize the entire financial system. Instability may result either from major macroeconomic or sector shocks (common shocks) or from the payment difficulties in one financial institution spread through the system, reflecting the financial interdependence among institutions (financial linkages). In addition, a failure of one financial institution may erode borrowers' ability to repay their debts to other financial institutions. The lack of adequate information about the soundness of various financial institutions may again cause creditors to lose confidence in the financial system as a whole when an individual institution fails (shift in sentiment).

The preceding discussion of financial crises can be extended to apply to insurance companies. However, compared to banking crises, the risk of bankruptcy contagion may be smaller for the insurance sector with traditional products. Bank deposits can be withdrawn in full amounts with minimum losses. Depositors may need to accept lower interest (costly liquidation) or to give up favorable future interest (foregone interest), but are more likely to withdraw their money swiftly when they think that the bank might go bankrupt. In contrast, the cancellation of insurance contracts requires policyholders to incur losses due to cancellation deductions or increased costs for policy replacement due to changes in insurability. In addition, the surrender and cancellation repayment of insurance products usually takes longer than the repayment of bank deposits. Overall, holders of traditional policies would give a second thought before rushing to withdraw their money from the insurance companies.

As we have discussed in the previous section, the life and non-life businesses differ considerably, and so do their risk profiles. The failure of a non-life insurance company could create a situation in which certain services are interrupted due to the loss of insurance protection for users of these services. In the case where an insurance company dominates the

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[18]Diamond and Dybvig (1983) provide the first coherent model to explain the fragility of a bank. They make the first-come, first-served sequential service constraint assumption. However, this assumption has been the subject of some debate in the literature, since it is not an optimal arrangement in the basic Diamond and Dybvig model. Instead, Allen and Gale (1998) model a bank run by assuming the available liquidity is divided equally among those withdrawing early. Chen (1999) analyzes information-induced bank runs where early withdrawal causes payoff externality. His model explains a run resulted from depositors' response to an early noisy signal due to the payoff externality imposed in the sequential service constraint of the deposit contract.

market, this could cause a significant and costly disruption of economic activity. However, even though costly and disruptive, the collapse of a non-life insurer is unlikely to jeopardize the stability of the financial system.

Indeed, as described in the next subsection, virtually all recent insurance failure episodes with (potential) systemic impact involved life insurers (or a direct link from an insurer to a bank). In most of the episodes we discuss, life insurance companies actually played a role similar to banks in their investment activity (Japan and Korea), sold deposit-like products (Jamaica and the United States), or exhibited equity or guarantee linkages to the banking sector (Jamaica and Japan). This appears to confirm that the recent trend of financial integration and convergence between insurance companies and banks introduced an important additional risk to the insurance sector.

Overall, there exist at least three ways in which problems emerging within the insurance industry can significantly disrupt financial stability:

- Some life insurers assimilate banking-type activities, on both sides of their balance sheet. Their products are effectively used as deposits, which introduces the potential for the same maturity mismatch and associated problems as in the banking sector.

- Linkages between insurance companies and banks are increasingly common. Failure of an insurer may dent confidence in a related bank and lead to contagion to the banking system. The insurance industry underwrites an increasing amount of credit risk and their failure thus may directly affect the quality of bank assets.

- Reinsurers occupy a position of systemic importance to the insurance industry, for both life and non-life business. Reinsurers play a significant role in absorbing the volatility in underwriting results and peak exposures to natural catastrophes in addition to the provision of capacity to the primary market. In effect, they supply quasi-capital to insurers. The failure of a large reinsurer could result in rapid contagion to the insurers, and the failure of multiple insurers would likely have the potential to significantly disrupt the banking system and financial markets.

Although the contagion effects from failures of insurance companies may not be as virulent as in the case of banks, they have significant potential to disrupt the financial system and negatively impact the real economy.

B. Lessons from Insurance Failure Episodes

In this section, we explore some of the recent insurance failures.[19] We have attempted to select the most relevant insurance failures from the financial stability point of view in order to draw first lessons from these failures and to illustrate some of the points made earlier in this paper. The list of insurance failures, however, is by no means complete and further research will be needed to examine individual failures, their causes, and their impact on financial stability in detail. Table 2 summarizes the selected failure episodes.

A prime recent example of a non-life insurer failure with widespread implications is that of Australian HIH. This company had been the second largest non-life insurance company in the country, and its failure in 2001—apparently due to a series of bad management decisions—led to the halting of unfinished construction projects and bankruptcy of small businesses (both with an adverse effect on employment). Furthermore, local and community organizations were endangered by public liability claims and a substantial portion of the country's professionals such as accountants, doctors, and lawyers lost their professional liability coverage.

Turning to life insurers, financial deregulation in Jamaica in the late 1980s enabled insurance companies to invest actively in real estate markets. At the same time, it opened the door to regulatory arbitrage and allowed an introduction of interest-sensitive policies. Increased competition made insurance companies introduce lump-sum, interest-sensitive products that guaranteed relatively high returns. After the government introduced a tight monetary policy during the mid-1990s, problems in the financial sector became evident, particularly in several insurance companies. These insurance companies demanded more credit from their associated banks in the same financial conglomerate, which had a negative effect on the banking system liquidity. In late 1996, starting with a collapse of an insurance company, liquidity and solvency problems spread widely across the financial industry.

Japan accelerated financial deregulation after late 1980s, which reduced the role of the rate-setting associations in the non-life industry, established a procedure for liberalizing premiums, and relaxed the terms under which non-insurance firms could offer insurance services. This deregulation increased competition in the insurance industry, and allowed insurance companies to increase lending to other sectors. When the recent prolonged Japanese recession struck, life insurance companies found it difficult to earn investment returns sufficient to match returns on liabilities. The problem has been that insurers provided policyholders with relatively high guaranteed rates of return in the late 1980s and in the 1990s and the subsequent decline of interest rates reduced investment returns to below those initial guaranteed rates. Cross-holding of securities between life insurers and banks and

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[19]This discussion relies on Das and Takeda (2001).

lending to banks were other sources of vulnerability. The problems of low interests rates and investment losses, as well as deterioration of client confidence, led to a collapse of eight mid-sized life insurers during 1997–2001.

Korea has also experienced problems in the insurance industry, which plays an important role of risk diversification for the real sector and channels the flow of savings into investments through financial and capital markets. Following the financial deregulation during 1980s and 1990s, the importance of the insurance sector, as well as other nonbank financial institutions, increased. Financial deregulation brought fierce competition into the industry. Korean insurers were functioning as quasi banks, intermediating capital to other sectors. The high proportion of loans in total asset made the insurers' balance sheets particularly vulnerable to economic downturn. Moreover, the life industry has had a relatively short maturity of policies, making it easy for policyholders to run on the insurers. The currency and financial crisis in 1997 hit Korea significantly, with a sharp decline of GDP and a rise in both inflation and unemployment. Debts of the corporate sector turned into massive nonperforming loans to the financial sector, including both banks and insurance companies.

In the United States, inflation and interest rates increased significantly from 1977–1981. This change made traditional life insurance products less attractive to policyholders and, at the same time, deregulation allowed financial institutions to offer higher-yielding investment products to customers. Life insurance companies responded to these changes and increasing competition by introducing interest-sensitive products and new, highly competitive, pension funding contracts, including universal life, single-premium deferred annuities (SPDAs), and guaranteed investment contracts (GICs). In order to fund the new products and earn profits, insurance companies invested in higher yielding (and thus more risky) assets. Nine large life insurance companies failed in 1991, mainly due to two problems: an overinvestment in real estate and junk bonds, and making available large amounts of contracts with promised fixed yields—annuities, GICs, and interest-sensitive life insurance products.

In the four life insurance failure episodes we have very briefly described, the following main factors played an important role: (i) financial deregulation and liberalization that allowed insurers to assimilate banking-type activities; (ii) large macroeconomic fluctuations both in output and price levels; and (iii) close business linkages between banks and insurers.

Table 2. Selected Insurance Failures

Country	Year	Company Name	Causes	Resolution
Australia	2001	HIH (non-life)	HIH was Australia's second largest non-life insurance company. It failed suddenly, apparently due to mismanagement. The crash had wide economic effects.	HIH was put into provisional liquidation, under which the provisional liquidators reviewed HIH operations and assessed its financial position. HIH continued to manage claims.
Canada	1994	Confederation Life Insurance Company	Confederation Life Assurance actively participated in the derivative markets through a subsidiary. As in the case in the U.S. crisis below, it provided a wide range of annuity and GIC products to policyholders. Partially due to a decline in the real estate market, Confederation Life had difficulty to meet the demand for matured GICs and faced potentially significant liquidity problems.	The regulator took control of the company. After nine years in the liquidation process, the estate of the company was able to meet 100 percent of its obligations to policyholders and a substantial percentage of the obligations to its investors.
Ethiopia	1997	Universal Insurance	Universal Insurance was started with borrowed funds. Once the company was given a license the individual gave the funds back to the lenders. Consequently, Universal Insurance was shut down.	The case is still in court.
Ireland	1985	Insurance Corporation of Ireland (non-life)	Insurance Corporation of Ireland (ICI) came close to formal liquidation due to poor underwriting in its London branch. Its failure caused a run on its parent company, Allied Irish Banks (AIB).	The regulator purchased the ICI from the AIB and appointed a new administrator.
Jamaica	1996–1999	Life of Jamaica Island Life Jamaica Mutual Life Assurance Dyoll Life Crown Eagle Life	During the early 1990s Jamaica liberalized its financial sector. Regulatory arbitrage and intense competition led to a tight connection between banks and insurers and an introduction of policies with guaranteed returns. Tightening of monetary policy made insurers unable to pay the guaranteed rates of return. Financial problems spread from insurers to the banking sector.	The government established an asset management company that issued non-tradeable notes to fill the balance sheet gaps.
Japan	1997–2001	Nissan Mutual Life Toho Mutual Life Daihyaku Mutual Life Taisho Mutual Life Chiyoda Mutual Life Kyoei Mutual Life Tokyo Mutual Life	Although it is difficult to generalize, many Japanese life insurers provided policyholders with relatively high guaranteed rates of return between the late 1980s and early 1990s. They also made large amounts of loans. A prolonged period of low interest rates, the stock market decline, and the increasing number of nonperforming loans in 1990s made it difficult for insurers to earn sufficient investment returns.	Except for Tokyo Mutual Life, policies of troubled insurers were transferred to foreign insurers, that is, Artemis, GE Edison Life, Manulife Century Life (currently Manulife), AIG, and Prudential. The regulator provided financial assistance to some troubled insurers through Life Insurance Policy-Holders Protection Corporation.

Table 2. Selected Insurance Failures (concl'd)

Country	Year	Company Name	Causes	Resolution
Korea	1998–2002	First Life Haedong Fire and Marine (non-life) Korea Life Handuk Life Kookmin Life Dongah Life Chosun Life Pacific Life Doowon Life Kukje Life BYC Life Taeyang Life Coryo Life KGI (non-life) HFS (non-life)	Korean life and non-life insurers operated similarly as banks. They made significant amounts of loans, 40-50 percent of total assets and sold policyholders short-term savings products. During the currency and financial crisis in 1997, insurance companies suffered from nonperforming loans and liquidity problems.	The regulator extended the bank deposit guarantee to insurance liabilities to prevent runs. Much of the industry has been restructured and recapitalized by the government and sold.
United States	1991	Mutual Benefit Life Executive Life First Capital Life Monarch Life Executive Life of NY Fidelity Bankers Life Guarantee Security Life	Many U.S. life insurers invested in real estate markets and junk bond markets in 1980s. They also provided policyholders GICs, 5-year term products with guaranteed rates of return. The collapse of the mortgage market in late 1980s made it difficult for the insurers to meet their liabilities. A decline of junk bond prices also harmed the insurers.	Measures varied across states. Overall, bankrupt insurers were forced to cease operations and their policies were transferred to sound financial institutions.

Financial deregulation and liberalization intensified the competition among financial institutions and enabled insurance companies to offer bank-type products and thus directly compete with other financial institutions. Insurance companies introduced short-term, and/or interest-sensitive products with guaranteed rates of return and such products substantially increased their vulnerability to adverse changes of economic fundamentals. Moreover, the banking-type products introduced maturity mismatches between assets and liabilities, a new exposure for traditional insurance companies.

Furthermore, insurance companies rushed to invest in more risky and high-yielding assets, including real estate and junk bonds, in order to meet the guaranteed rates of high return on liabilities. Once the economy plunged into recession, such risky investments became a heavy burden for the insurers. Financial deregulation may also contribute to regulation arbitrage between banks and other financial institutions, including insurance companies. Macroeconomic shocks then trigger insurance failures.[20]

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[20]Insurance insolvency, failure, and resolution are issues which have not yet been fully addressed at the international policy level. In this regard, further work is needed in areas such as: (i) early-warning indicators; and (ii) handling market exits (balancing the rights of

IV. ASSESSING FINANCIAL SOUNDNESS OF INSURANCE COMPANIES

Assessing financial soundness of individual insurers as well as insurance sectors as a whole is a complex task. The essential undertaking is to explore the risks to which insurers are exposed and their ability to endure them. The overall financial position of an insurance company depends on many factors, some of which are difficult to quantify, including the quality of its management, organizational structure and systems and controls in place. An assessment of financial soundness thus needs to take into account both quantitative and qualitative indicators to achieve an acceptable degree of reliability.

Capital adequacy can be viewed as the key indicator of an insurer's financial soundness. Prudential standards recognize the importance of adequate capitalization and solvency is the key focus of insurance supervision. Unfortunately, no internationally accepted standards for capital adequacy of insurance companies exist.[21] The current IAIS guidance on solvency is set at a high level of generality, see IAIS (2002a). It requires capital adequacy requirements to be clearly defined, address minimum levels of capital that should be maintained and reflect the size, complexity and business risks of the insurance company. No specific guidance has yet been given as to how these key considerations are to be translated into concrete capital requirements.

In practice, regulators use two main models for capital adequacy, the fixed ratio model and risk-based capital models.[22] In the fixed ratio model, capital requirements are determined as a fixed proportion of some basis or proxy to risk exposure, often an item directly on the insurer's balance sheet or income statement. Examples may include a fixed percentage of

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policyholders, creditors, and shareholders), including the acceptability of specialist run-off managers and the cross-border implications of incompatible insolvency regimes. The IAIS has begun the process by the inclusion of a core principle on "winding-up and exit from the market" in the revision to the Insurance Core Principles for insurance supervision, but further detailed guidance is necessary for preventing and managing insurance insolvency, and to ensure orderly, equitable and transparent market exit processes.

[21]Nor are there accepted standards for accounting and reserving or provisioning. Since these directly affect capital adequacy, they need to be set before the capital standard can be established by the appropriate standard setter.

[22]In fact, there exists another, "risk or ruin" approach. The main criterion under this approach is preservation of an acceptable explicit probability of ruin or failure over some time horizon. Obviously, a number of approximations must be made to find a workable model and there is a certain degree of arbitrariness in setting the probabilities and time horizons. Finland could serve as an example of this approach. Since this methodology goes effectively beyond the risk-based capital model, we do not explore it here in more detail. For more information, see IAIS (2000b).

premiums written or outstanding claims for non-life insurers and technical reserves for life insurers. In risk-based capital models, the minimum capital requirement is built from a number of lower level ratios that reflect separate risk elements, including different insurance classes and asset risks. These formulas reflect the net risk exposures on both the asset and the liability sides of the balance sheet and some even reflect the degree to which risks on one side offset risks on the other side.

European regulators currently use the fixed ratio model, while regulators in the United States, Canada, Australia, and Japan have preferred the risk-based model. The risk-based model is superior from the theoretical point of view because it reflects the risks more precisely. On the other hand, the simplicity of the fixed ratio model is appealing in that it is considerably easier to achieve international comparability of indicators by using this approach. The current trend in thinking amongst supervisors is to move from the fixed ratio model to the risk-based model.

In a comprehensive analysis of an insurer's soundness, quantitative information often forms a point of departure. Indeed, the use of quantitative indicators allows supervisors to prioritize their work and focus on the most risky companies, and thus to achieve the most efficient use of their limited resources. Quantitative information about insurers can be divided into three broad categories: (i) financial soundness indicators (based on balance sheet and income statement data), (ii) stress test/risk models information, and (iii) additional, mostly off-balance sheet information.

We will address financial soundness indicators in considerable detail in the next section. The term stress testing refers, in general, to a range of techniques used to assess the vulnerability of a portfolio, company, or sector to major risk factors. The risks assessed by insurers include insurance risks, changes in macroeconomic factors, changes in market prices of assets or other exceptional but plausible events.[23] A stress test begins with the specification of the type of risks to be considered and the appropriate risk models that should be used. Stress tests can focus on an individual risk, for instance credit or interest rate risk, or consider multiple risks. The next element of a stress test involves deciding on the range of factors that should be included.

The stress test can involve estimation of an impact of a change in a single risk factor (sensitivity analysis) or the effect of a simultaneous move in a group of risk factors (scenario analysis). See KPMG (2002) for a comprehensive overview of risk models used by insurers. A limited questionnaire survey and discussions KPMG held with major insurance and reinsurance groups in Europe suggest that the key problems in the use of more sophisticated models are the availability of data and the difficulty of quantifying certain risks. There

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[23]IAIS (2002c), in a draft Guidance Paper on stress testing, lists the following risks to be considered: insurance risks (underwriting, catastrophe, and deterioration of technical provisions), market, credit, liquidity, operational, and group risks.

appears to a limited trend toward the use of probabilistic Dynamic Financial Analysis models by insurers for the purpose of capital adequacy and overall risk assessment. In general, there is very little industry-wide standardization due to a strong preference among respondents to develop risk modeling capabilities in-house.

Lloyd's Realistic Disaster Scenarios may serve as an example of stress tests focused on the insurance risks. Lloyd's syndicates are required to complete at least 8 of 16 specified scenarios. These scenarios, some of which are specified in significant detail, range from a U.S. windstorm and Japanese earthquake, through a marine event and aviation collision, to political risks.

All quantitative information relevant for an insurer's soundness, which is not routinely provided as a part of accounting data or stress test results, would be classified in the third category above. This may include the size to the risk exposures in each of the key risk categories: insurance, market, credit, and liquidity risks. For instance, in the insurance risk category, risk exposures by business category and geographical area measured by net premium, total sum insured or probable maximum loss. To be most useful, this information should include all off-balance sheet exposures, including derivatives trading. From the financial stability viewpoint, aggregate information on insurers' links to other segments is very important.

Even when all the quantitative information just described is available, it is necessary to realize that the soundness of an insurer depends on many factors that are difficult or impossible to quantify. These may include the above mentioned quality of management or appropriateness of organizational structure, but also issues related to complex transactions (e.g., alternative risk transfer arrangements described in the previous section), risk management systems, group issues or the insurer's relative position on the insurance market. Therefore, careful analysis of qualitative information relevant for a given insurer or insurance sector is very important for an accurate evaluation of its financial soundness.

V. FINANCIAL SOUNDNESS INDICATORS

In this section, we focus on one of the quantitative tools for evaluating financial soundness of insurers and insurance sectors—financial soundness indicators. Our goal is to identify the most relevant indicators about the financial health and soundness of insurance companies.

Insurers fail for a variety of reasons, but their failures are rarely sudden. Although a non-life insurer (e.g., one heavily exposed to property damage in a hurricane zone) may fail suddenly, this will likely be due to its having underwritten business in excess of the ability of its capital to cover risks and inadequate reinsurance. The same holds for a life insurer who may fail to deliver on guaranteed or promised benefits if those promises, made many years ago, are no

longer feasible under current conditions.[24] Both sets of conditions could, theoretically, be detected beforehand, because conditions in the insurance industry rarely change so quickly and dramatically to make an insurer insolvent overnight. The absence of sudden failures lends support to the use of financial soundness indicators that rely on accounting data for surveillance purposes, since problems will likely be reflected, at least to some degree, in recent historical data.

Several previous studies explored the usefulness of financial statement variables and insurer-specific ratios as explanatory variables in empirical models to differentiate between low- and high-risk insurers. Probably due to better data availability, most of these studies focused only on U.S. insurers, so little can be said in general.

For example, Babbel and Staking (1995) examine the relation between capital structure, interest rate sensitivity captured by duration, and market value in the U.S. property-liability insurance industry. They find that the market value of equity grows at first but then declines as the leverage increases, while it declines first and then increases as interest rate risk rises. Grace, Harrington, and Klein (1998) compare the power of risk-based capital and solvency screening to identify financially weak property-liability insurance companies in the United States. Cummins, Grace, and Phillips (1999) compare further the power of risk-based capital, solvency screening, and cash flow simulation to predict insolvencies in the U.S. property-liability insurance companies. Kim and others (1995) use a dynamic statistical model to predict failures of insurers, based on U.S. data for life insurers (1987–1990) and non-life insurers (1984–1990). They concluded that for non-life insurers, the variables important for prediction of a failure are the age of the company,[25] premium growth, investment performance, underwriting results, expenses, loss reserves, realized and unrealized capital gains, and reinsurance recoveries. For life insurers, the variables included the age of the company, investment performance, realized and unrealized capital gains, and the net operating margin.

A. Selection Criteria and Implementation Issues

While a large number of potentially useful indicators exist, operational considerations and the need to structure data imply a strong need to prioritize. In this section, we propose two sets of indicators for the periodic monitoring of insurers; the core set of essential FSIs, and an

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[24]For example, a life insurer may have guaranteed annuities benefits based on an assumption of a 10 percent return on investments between the inception of the policy and the delivery of the benefit. If returns had been much smaller than 10 percent, the insurer may not be able to fulfill its obligations as they fall due.

[25]It should be noted that the relevance of the age of the company has apparently been connected with the exposure to asbestos pollution and health hazard policies written in 1950–70s.

encouraged set that includes additional indicators useful for monitoring more specific areas of vulnerabilities.

Insurance risks and the causes of failure, which were described in the previous sections, were the starting point in developing the two sets of FSIs. We have also taken into account the first results of insurance assessments under the Financial System Assessment Program (FSAP)—see, for instance, IMF and World Bank (2001)—and reviewed insurance company indicators used by regulators (see, for instance OECD (2002) or NAIC (2002a and b)), credit agencies (S&P,1998, S&P, 1999, Fitch, 2001a, and Fitch, 2001b), and equity analysts and investors (Bloomberg and Datastream).

Starting from a relatively large set of indicators, we have then used the criteria of (i) analytical significance; (ii) achieving substantial information content with a limited number of indicators; (iii) availability; and (iv) relevance in most circumstances (i.e., not specific for a given country or line of business). The base data for the indicators must be capable of being aggregated into a country total to enable FSIs to be calculated for the sector.[26]

Many of the selected indicators are common for life and non-life insurance companies as well as for reinsurers.[27] The proposed indicators are also common both for developed and developing countries, even though the emphasis on specific indicators might differ slightly across countries depending on their degree of development.[28] Even though the selection and definition of indicators might be common, it is important to realize that different lines of business need to be analyzed separately and different benchmarks should be used. Furthermore, especially for life insurers, the focus should be on stress testing and development of the indicators over time rather than on static analysis. In general, the indicators should be compiled from data collected by the supervisors and stakes held in other insurers need to be consolidated.

A number of other aspects need to be taken into account when compiling and interpreting the indicators, including the quality of the underlying accounting data, the governance structure

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[26]Typically, for the FSIs to be useful, time series or peer data must be available. Most indicators are used over time to detect changes in trends or volatile results and outlier companies. In most cases, it is difficult to interpret the value of any indicator in a single point in time.

[27]In the core set, we specify whether a given indicator applies to life or non-life insurers. For reinsurers, the same indicators should be used, depending on whether they underwrite life or non-life business (except for management soundness indicators).

[28]For instance, asset quality and liquidity indicators might be of higher concern in developing countries due to less developed and less liquid financial markets and weaker credit control.

of insurance companies, and the quality of regulation and supervision. These factors differ widely across countries. Some developing countries, for instance, lack any substantial actuarial expertise and have only limited supervisory capacity, which has negative implications for data reliability. In many developed countries, the existence of complex financial groups complicates the analysis. Furthermore, regulations concerning investments and product specifications, including guaranteed rates of return, differ considerably across countries. Based on the experience under the FSAP, the quality and availability of data about the insurance sector is, in general, poorer than the analogous information about the banking sector.

The analysis and interpretation of financial soundness indicators can be supported by an evaluation of the Insurance Core Principles issued by the International Association of Insurance Supervisors, see IAIS (2000a). As we discussed above, financial soundness indicators cannot capture all aspects of the system important for financial stability because of the qualitative nature of some relevant information. To gain a better understanding of how to interpret FSIs, it is useful to complement the analysis with information describing more precisely the nature of the underlying data, the structure of the financial system and the characteristics of the institutions making up the system.

Although the Insurance Core Principles (ICPs) do not address issues concerning the robustness of the financial infrastructure directly, they provide information on the effectiveness of supervision and adequacy of macro-prudential surveillance. The assessment of the ICPs in the context of the FSAPs ensures that information relevant to the health of individual insurers is available in a standardized fashion for a large number of countries. This makes these assessments a good source of information to support the analysis of FSIs. For example, by clarifying the definition of data provided by institutions and used to compute FSIs, the assessments contribute to a more precise understanding of what is being measured by the FSIs. Appendix I suggests a link between the financial soundness indicators and the ICPs.

The selected indicators are presented within the CARAMELS framework, which adds the Actuarial and Reinsurance issues to the CAMELS (Capital adequacy, Asset quality, Management soundness, Earnings and profitability, Liquidity, and Sensitivity to market risk) methodology routinely used for banks.[29] It is important to note that the inherent differences between banking and insurance means that a number of the indicators used for banks are different in construction when used for insurers and many of them require different interpretation.

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[29]Both CAMELS and CARAMELS include both risk and risk management topics.

B. Core Set of Indicators

Capital adequacy

As mentioned above, capital adequacy can be viewed as the key indicator of an insurer's financial soundness. Indeed, perhaps the greatest risk to the financial stability of an insurer stems from writing business that is either too great in volume or too volatile for its capital base or otherwise whose ultimate result is too difficult to determine (e.g., asbestosis liabilities).

As described in the previous section, there is no accepted international standard for risk-based capital adequacy requirements. Since we need to be able to compare the FSIs across countries, the fixed ratio approach has been taken in the core set. Risk-based indicators are included in the encouraged set since they may be useful for comparing capital adequacy of insurers within countries.

For non-life insurers, we have included two capital adequacy ratios within the core set: net premium/capital and capital/total assets. The former reflects risks arising from underwriting operations and the latter reflects asset risk. Net premium is a convenient proxy for the quantum of retained indemnity risk, that is, risk the insurer retains after reinsurance, being the risk that must be covered by own capital.

These ratios are easy to calculate and require only information that should be readily available. On the other hand, they need to be interpreted with the knowledge of the risk characteristics of the business that the company or sector writes. For instance, per dollar of premium one would expect a company that writes homeowner insurance to have (and need) less capital than one that writes workers compensation. Thus, even when the statistics are aggregated at the industry level, one needs to interpret the results based on the composition of business. Also, trends rather than levels of data will tend to be more informative here, so at least a five-year history of data should be obtained.

For life insurers, we have also included two indicators within the core set, capital/technical reserves and capital/total assets, both ratios being functionally parallel to those of non-life insurers. Since the life business is longer term and generally more asset intensive, it is necessary to be cautious in comparing the capital/total assets ratios across life and non-life insurance companies separately. One of the major operational differences between the non-life and life businesses is that in the former, the term of the policy and the premium paying period are both short and typically one year, while in the latter, liabilities are generally long term, even though the premium paying period could be short or long.[30] Consequently, in the case of life business, premiums received in a given year are not such a convincing proxy for

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[30]In many markets single premium investment products are important for the life insurance industry.

risk assumed and reliance is placed on the fact that technical reserves properly reflect the ultimate liabilities. Nevertheless, this is not taken for granted, and the extent to which reserves need to be revised is tested by a core ratio under the Earnings and Profitability category. If it is apparent that technical reserves do not reflect the best estimate of future claims, these reserves should be adjusted for the purposes of calculating capital adequacy indicators. (Table 3.)

Table 3. Insurance Financial Soundness Indicators: Core Set

Category	Indicator	Non-Life	Life
Capital adequacy	Net premium/capital	X	
	Capital/total assets	X	X
	Capital/technical reserves		X
Asset quality	(Real estate + unquoted equities + debtors)/total assets	X	X
	Debtors/(Gross premium + reinsurance recoveries)	X	X
	Equities/total assets	X	X
	Nonperforming loans to total gross loans		X
Reinsurance and actuarial issues	Risk retention ratio (net premium/gross premium)	X	X
	Net technical reserves/average of net claims paid in last three years	X	
	Net technical reserves/average of net premium received in last three years		X
Management soundness	Gross premium/number of employees	X	X
	Assets per employee (total assets/number of employees)	X	X
Earnings and profitability	Loss ratio (net claims/net premium)	X	
	Expense ratio (expenses/net premium)	X	X
	Combined ratio = loss ratio + expense ratio	X	
	Revisions to technical reserves/technical reserves		X
	Investment income/net premium	X	
	Investment income/investment assets		X
	Return on equity (ROE)	X	X
Liquidity	Liquid assets/current liabilities	X	X
Sensitivity to market risk	Net open foreign exchange position/capital	X	X
	Duration of assets and liabilities		X

Due to the absence of internationally accepted standards and with the need for simplicity in mind, we define capital as total equity, or, the net asset value minus all intangible assets. This does not obviate the need to examine the quality of capital in further analysis, for instance by using information from supervisory sources.[31]

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[31]Once there is a broader agreement among insurance supervisors on solvency measurement (and thus also on the definition of capital), the analysis should focus more on the core capital, which has the highest capacity to absorb losses. For instance, a definition of capital roughly corresponding to Tier I capital according to the Basel Capital Accord might then be used.

Analysis of capital adequacy depends critically on realistic valuation of both assets and liabilities of the insurance company, since adjustments to both sides of the balance sheets directly affect capital. Any interpretation of the capital adequacy indicators thus needs to be treated as preliminary until both the quality of assets is examined and the level of technical reserves assessed.[32] This is particularly important for the ratios of capital/technical reserves (life insurers) and net premium/capital (non-life insurers), where insufficient reserving (life) and underpricing (non-life) would lead to distorted results.

Asset quality

On the asset side of the balance sheet, we explore the structure of assets and focus on the existence of potentially impaired assets, as well as on the degree of credit control the insurance company exercises. In the core set of indicators, we look at the share of real estate (both functional and investment), unquoted equities and receivables in total assets, because these asset classes have the largest probability of being impaired. Both real estate and unquoted equities are illiquid assets, with real estate often being difficult to value in less developed economies. Receivables may expose the insurer to a considerable credit risk and overstate assets if there are insufficient provisions for collection problems.

The second indicator, receivables (gross premium plus reinsurance recoveries) provides additional insight into the level of credit control.[33] High level of receivables relative to gross premium and reinsurance recoveries suggests that the credit policy of the insurer is weak; this would be of particular concern if receivables formed a relatively large proportion of assets.[34] The third core indicator, equities/total assets, reveals the degree of insurer's exposure to stock market risk and fluctuations of the economy. Equity investments that are on the balance

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[32]The basis on which actuarial (technical) reserves are set is particularly important. The interpretation of capital adequacy ratios will depend on whether the reserves include implicit margins, explicit margins or are intended to include no margin. Capital has to pick up the unexpected losses, the losses not provided for in the liability calculations and the losses not covered in the valuation of assets.

[33]Please note that we compare a stock variable (receivables) from the balance sheet and a sum of two flow variables from the income statement (gross premium plus reinsurance recoveries). Depending on data availability, it might be advantageous to disaggregate this ratio into two parts and examine the credit policy with respect to policyholders and reinsurers separately.

[34]This concern is particularly relevant for insurance companies in developing countries, where debtors tend to form a significant proportion of assets. Third party debtors are either policyholders in the case of premium income or reinsurers in the case of reinsurance recoveries. Both the creditworthiness of the counterparties and concentrations of credit risk need to be examined.

sheet of the insurer but in fact are part of risk pass-through products should be excluded. If the proportion of equities in total assets is significant, further examination of the portfolio composition is necessary, with special emphasis on the possible correlation of exposure on the asset and liability sides of the balance sheet.

In fact, the need to consider both sides of the balance sheet simultaneously is more general. While the indicators of asset quality are the same for both life and non-life insurers, they need to be evaluated in connection with the associated liabilities and in the context of business. For instance, it would be reasonable for a life insurance company or a non-life company with long tail liabilities to have a relatively larger proportion of assets invested in more risky (e.g., equities) or less liquid (e.g., real estate) assets than a non-life insurer with short-term business, as the yield on these assets can be expected to better match the future outturn of longer term obligations. Also, some risk management tools and hedging strategies, including the use of derivatives, might lower the aggregate (matched) risk, even though they may appear to add risk if analyzed separately.[35]

For life insurance companies, which sometimes assimilate banking activities on the asset side of their balance sheet by direct lending to financial and nonfinancial companies, we include the most widely used indicator of loan quality—nonperforming loans to total gross loans. Table 4 shows that loans other than mortgages form a substantial part of investments by life insurers in some countries, for instance Japan or Korea. As discussed in Section III, this asset class has been one of the key problems in insurance failures in these countries. As an illustration, we provide the structure of investments of life and non-life insurance companies in selected OECD countries in the following table.

The data reveals a substantial degree of variation across the countries. The share of equities, for instance, varies from over 62 percent in the U. K. life sector to less than 1 percent in Turkish life companies. Also, direct lending by life insurers (approximated by loans other than mortgage loans) is substantial in Germany, Korea, and Japan and negligible in the other countries. Availability of investment opportunities, local regulations and the competitive situation in the financial sector will be among the key factors influencing composition of insurance company's assets in a particular country.

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[35]Here, stress testing, briefly discussed in the previous section, provides a useful complementary tool to assess the level of risk exposure.

Table 4. Outstanding Investment by Direct Insurance Companies, 2000
(In percent)

	Germany	Korea	Japan	Luxembourg	Poland	Turkey	United Kingdom	United States
Life insurers								
Real estate	3.1	9.0	4.3	0.1	1.2	2.5	5.9	1.1
Mortgage loans	10.2	8.4	...	0.0	0.7	0.0	0.1	11.5
Shares	6.6	5.1	17.5	46.2	2.9	0.9	62.6	6.8
Bonds	7.4	28.9	37.7	45.8	73.4	92.3	27.3	69.9
Loans other than mortgage loans	46.3	28.0	26.1	0.1	2.0	0.6	1.0	5.0
Other investments	26.4	20.6	14.4	7.8	15.2	3.8	3.1	5.6
Total of life investments	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-life insurers								
Real estate	3.7	12.1	5.4	2.6	3.9	23.9	2.1	1.1
Mortgage loans	2.0	5.4	...	0.1	0.2	0.0	0.4	0.2
Shares	13.9	8.4	34.7	21.3	12.2	28.6	30.6	30.6
Bonds	9.7	36.3	30.3	57.7	53.9	44.9	59.5	60.3
Loans other than mortgage loans	44.8	10.4	14.4	0.0	1.3	...	2.3	0.0
Other investments	25.9	27.4	14.6	18.4	28.5	2.8	5.0	7.8
Total of non-life investments	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: OECD Insurance Statistics Yearbook, 2002 Edition.

Reinsurance and actuarial issues

The risk retention ratio (net premium/gross premium) is included for both life and non-life business. It reflects the overall underwriting strategy of the insurer in that it shows what portion of risk is passed on to the reinsurers. Overall, insurer's capital and reinsurance cover need to be capable of covering a plausible severe risk scenario. If the insurer relies on reinsurance to a substantial degree, it is critical that the financial health of its reinsurers is examined.

At the industry level, this ratio indicates the risk bearing capacity of the country's insurance sector; however, any international comparison needs to take into account the fact that some countries impose a requirement to reinsure a pre-determined percentage of business with a state-owned reinsurance company.

Table 5 depicts the retention ratio in selected OECD countries. On average, non-life insurers rely on reinsurance considerably more than life insurers—non-life primary insurers pass on almost 20 percent of direct premium, while the analogous indicator for life insurers is below

the 5 percent mark. There is also a substantial, but not dramatic, variation across OECD countries; the range of the retention ratio is approximately 70–90 percent for non-life insurers and 80–100 percent for life insurers.

Table 5. Retention Ratio
(Net written premiums/total gross premiums, 2000)

	Total	Life	Non-Life
Germany	84.0	92.8	78.0
Korea	95.3	99.0	85.5
Japan	95.5	98.5	87.0
Luxembourg	87.6	90.5	68.2
Poland	84.1	97.9	77.1
Turkey	87.4	99.4	85.0
United Kingdom	90.8	97.0	74.6
United States	89.6	91.4	87.8
OECD average	**88.5**	95.9	**80.5**
OECD minimum	78.4	82.2	68.2
OECD maximum	96.4	100.0	89.9

Source: OECD Insurance Statistics Yearbook, 2002 Edition.

Although key for determination of financial soundness of insurers, the quantification and assessment of insurance liabilities is extremely difficult to verify without full information and a detailed analysis of each company. Without such information and analysis, reliance must be placed on management, actuaries, auditors, and regulators.[36] Financial soundness indicators may provide only limited insight here and, based on trends and peer comparison, flag the need for further analysis.

Regarding the adequacy of technical reserves, the core set includes one indicator for each non-life and life insurance companies. For non-life companies, it is the ratio of net technical reserves to the average of net claims paid in last three years—what is called the survival ratio. This indicator may be viewed as showing the quality of the company's estimate of the value of reported and outstanding claims.[37] A peer group analysis—within a given market or across markets—may reveal that some companies hold substantially lower reserves relative

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[36]For more information about quantification assessment of insurance liabilities, see IAIS (2002b).

[37]Note that, in most countries, technical reserves for non-life insurance are the estimated liability for incurred (reported and unreported) claims; unearned premiums are reported separately and catastrophe insurance reserves are a charge to capital.

to average claims in recent years. This would then trigger more detailed inquiry into the reasons for relatively lower reserves and, if these cannot be explained by the composition of business or other factors, then there must be doubts about the adequacy of technical reserves and the techniques and assumptions used for their calculation. The ratio of net technical reserves to average of net premium received in last three years is an analogous indicator for life insurers. In general, reserves should increase in step with the volume of long term business taken on, abstracting from shifts in business composition.

Management soundness

Sound management is crucial for financial stability of insurers. It is very difficult, however, to find any direct quantitative measure of management soundness. We propose the use of two indicators of operational efficiency because the efficiency of operations is likely to be correlated with general management soundness. Unsound efficiency indicators could flag potential problems in key areas, including the management of technical and investment risks.

The two indicators are gross premiums per employee and assets per employee. Gross premiums are used because they are a reflection of the overall volume of business activity. The analysis needs to reflect the difference in results that single premium versus annual premium business will have on this indicator. It also needs to take into account that insurers may use different distribution channels to sell their products and sometimes may spin off their distribution into subsidiaries or other companies in a group. In general, internet and call-centre distribution is cheaper than using brokers or agents, and if possible, these factors should be borne in mind when interpreting the results. The two indicators are the same for both life and non-life insurers, but clearly the benchmarks and peer groups will be different since the life business is more asset-intensive and its distribution costs are usually front-loaded into the initial year(s) of the contracts.

Earnings and profitability

Earnings are the key and arguably the only long-term source of capital. Low profitability may signal fundamental problems of the insurer and may be considered a leading indicator for solvency problems. Therefore, considerable attention is given to this area so that seven indicators of earnings and profitability are included in the core set.

For non-life insurers, the loss ratio (net claims/net premium) is an important indicator of whether their pricing policy is correct, while the expense ratio (expenses/net premium) adds the aspect of operating costs into the analysis.[38] It is important to note one technical detail: while the loss ratio has *earned* net premium in the denominator (and, on an accrual basis, net claims are directly related to the denominator); the expense ratio is commonly defined with *written* net premium in the denominator (and, again, the expenses other than claims are directly related to the denominator).

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[38]Ideally, the loss ratio should be analyzed at the level of individual classes of business.

Then, the combined ratio, defined as the sum of the loss and expense ratios, is a basic, commonly used measure of profitability (but note that it is not mathematically symmetric due to the different denominators). This indicator measures the performance of the underwriting operation but does not take into account the investment income. It is not uncommon to see combined ratios of over 100 percent and this may indicate that investment income is used as a factor in the setting of premium rates. Prolonged triple-digit combined ratios, in an environment of low or volatile investment yields, signal a drain on capital and the prospect of solvency problems. Another indicator, investment income/net premium, focuses on this second major revenue source—investment income. Return on equity then indicates the overall level of profitability.

The interpretation of underwriting results for non-life insurers, as summarized by the combined ratio, must take into account their strong cyclical pattern. As shown in Swiss Re (2001), the non-life insurance market is characterized by periods of high premium rates (hard markets) and low premium rates (soft markets). These cycles have been detected in all major developed markets; their average length is approximately six years and they are becoming increasingly correlated across markets.

Industry sources suggest that companies often charge a premium that is below what they feel is the economic value of the risk in soft markets because of two reasons. First, other companies are often doing the same and no company wants to be an outlier. Second, each company feels that it is cheaper to retain market share by subsidizing pricing for a short period (in particular when income is supplemented by strong investment income) than to charge economic premiums and later be forced to spend money to rebuild market share. Most arguments cited by industry insiders involve retaining market share, company size and reputation and this often includes retaining agent and broker allegiance as much as customers.

The cyclical pattern of premium rates has received considerable attention in the literature and Swiss Re (2001) cites two main hypotheses explaining it—"rational markets with imperfect foresight" and the "capital constraint hypothesis." The first, which best explains the cyclical pattern in continental Europe, argues that delays in transmission of information and time lags within the regulatory processes cause lags in price adjustment, which can exacerbate market swings. The second, explaining cycles in the United Kingdom and the United States, suggests that cycles are caused by impediments to capital flows, which create alternating periods of excessive and insufficient capital. The development of asset prices is one of the factors influencing insurance market cycles under both hypotheses: a drop in asset prices can set off a hard market, just as high prices during an asset price bubble can induce a soft market.

For life insurers, the expense ratio (expenses/net premium) can be used as well, with different benchmarks. Instead of the loss ratio, we include revisions to prior year technical reserves/technical reserves for life insurers, effectively a charge to current profits due to

deviations of reality from past actuarial assumptions.[39] This measures the extent to which the company or sector is able to measure output accurately. Also for life insurers we look at investment income to investment assets (as opposed to investment income/net premium for non-life insurers)—as an indicator of the success of their investment policy—since life companies function to a large extent as asset managers. Both investment income and investment assets related to risk pass-through products need to be analyzed separately. We have chosen return on equity, again, as an indicator of the overall profitability of life insurers.

Liquidity

The frequency, severity and timing of insurance claims or benefits is uncertain, so insurers need to plan their liquidity carefully. Liquidity is usually a less pressing problem for insurance companies, at least as compared to banks, since the liquidity of their liabilities is relatively predictable. Further, although the link between illiquidity and insolvency, through the loss of confidence and runs, is less marked in insurance, a loss of confidence in an insurer nearly always causes policyholders to cancel cover, demand a return of unexpired premium, and seek insurance elsewhere.

We have chosen one simple indicator for both life and non-life insurers, the ratio of liquid assets to current liabilities. All liabilities with maturity shorter than one year, including insurance product liabilities under which policyholders are able to surrender the policy and receive a cash payment, should be included in current liabilities. This is particularly important for life insurers, which—as we have seen in some of the failure episodes described above—sometimes offer deposit-like products and become exposed to the maturity mismatch risk. Liquid assets include cash and cash equivalents, government bonds, and quoted corporate bonds and equities. While there may be problems with information availability and the lack of objective thresholds for liquidity, illiquid corporate bonds and equities should be excluded from liquid assets, even if they are quoted. In general, such holdings should be considered illiquid if they are too large to be unloaded quickly under normal market conditions.

Sensitivity to market risk

Market risk, as applied to insurers, is identical to that applied to the banking sector. Insurers hold and manage significant portfolios of assets which are invested to cover future claims and returns to shareholders. Some of the products that insurance companies sell pass the risk on to policyholders; thus the characteristics of these products need to be reflected in considering market risk to which the insurer is exposed. Investment portfolios, whether held

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[39]The use of fair market basis for valuing liabilities in some countries needs to be reflected in interpretation of this indicator.

in banks or insurers, are vulnerable to changes in asset prices. Losses may result from a collapse in equity values, sudden changes in interest rates, a reduction in real estate values or, in the case of multi-currency portfolios, a currency depreciation.

Two indicators, which measure insurer's exposure to foreign exchange and interest rate risks are included in the core set: net open foreign exchange position to capital and duration of assets and liabilities. Nevertheless, sensitivity to market risk can be best assessed by stress testing the relevant features of the company and sectoral balance sheets.

C. Encouraged Set of Indicators

Indicators included in the encouraged set provide important additional information and should be compiled and used as much as the level of development and information availability in a given country allows. The list of encouraged indicators, which are described briefly here, can be found in Table 6.

Just as in the case of the core indicators, the encouraged indicators fall within the CARAMEL framework, with additional categories for indicators based on stock market information and indicators related to group exposures.

In the **capital adequacy** category, use of risk-based capital adequacy ratios are recommended, where available, for comparison of insurers within a given jurisdiction. In addition, the cover of solvency margin—the ratio of actual capital to the minimum capital required by regulator—can also provide an insight into the level of capitalization, but its use is complicated by differences in regulatory approaches.

Concerning **asset quality** and **reinsurance and actuarial issues**, geographical and sectoral distribution of investments and underwritten business can provide important information about the insurer's risk exposure. The remaining indicator, position in financial derivatives, further hints on the risk management strategy of the insurer.

Two expense ratios, operating expenses/gross premium and personnel expenses/gross premium, are included as indirect indications of **management soundness**. Earnings per employee, return on assets and return on revenue (only for non-life insurers) provide further information about **earnings and profitability**; and we include two additional **liquidity** indicators—liquid assets/total assets and liquid liabilities/total liabilities—into the encouraged set. The latter should be used for life insurance companies to detect one of the key vulnerabilities created by the assimilation of banking activities—deposit-type products with short maturity or with low penalties for early surrender.

Table 6. Insurance Financial Soundness Indicators: Encouraged Set

Category	Indicator	Non-Life	Life
Capital adequacy	Cover of solvency margin	X	X
	Risk-based capital adequacy ratios	X	X
Asset quality	Asset/liability position in financial derivatives to total capital	X	X
	Investments: geographical distribution	X	X
	Investments: sector distribution	X	X
Reinsurance and actuarial issues	Underwritten business: geographical distribution	X	X
	Underwritten business: sector distribution	X	X
	Underwritten business: distribution by main business lines	X	X
Management soundness	Operating expenses/gross premium	X	X
	Personnel expenses/gross premium	X	X
Earnings and profitability	Earnings per employee (Net profit/number of employees)	X	X
	Return on assets (ROA)	X	X
	Return on revenue (net income/ total revenues)	X	
Liquidity	Liquid assets/total assets	X	X
	Liquid liabilities/total liabilities		X
Market-based indicators	Market/book value	X	X
	Price/earnings (P/E) ratio	X	X
	Price/gross premium	X	X
Group exposures	Group debtors/total assets	X	X
	Group (premium + claims)/total (premium + claims)	X	X

The stock market may be an additional source of useful information for insurance companies with quoted shares. In particular, low market valuation may indicate that the quality of earnings or equity (capital) is relatively poor and therefore the assets, liabilities and business exposure need to be examined closely. Three standard **market-based indicators** are included in the encouraged set: market/book value, price/earnings (P/E), and price/gross premium ratios.

Regarding **group exposures,** insurance companies are often a part of a broader financial or conglomerate group. Transactions with companies in the group can distort the financial position of an insurer. Problems may include double or multiple gearing of capital, opaque risk transfers between companies or excessive concentration of underwriting to one client. While very detailed information is needed to detect specific problems stemming from transactions with related companies, two indicators are included in the encouraged set, which flag the importance of group exposures. These are the proportion of group debtors to total assets and the proportion of business from group companies (premium and claims) to the total business of the insurer.

VI. CONCLUSION

This paper explores insurance as a source of financial system vulnerability. It provides a brief overview of the insurance industry and reviews the risks it faces, as well as looking into several recent failures of insurance companies that have had systemic implications. Assimilation of banking-type activities by life insurers appears to be the key systemic vulnerability. Building on this experience, and the experience gained under the FSAP, the paper proposes the key financial soundness indicators that should be compiled and used for surveillance of financial soundness of the insurance sector.

We find that recent life insurance failures occurred after financial deregulation, economic expansion, and a large price fluctuation. Financial deregulation caused insurance companies to employ more bank-type products to compete with other financial institutions. Economic expansion induced insurers to invest in risky assets such as real estate and junk bonds. The resulting maturity mismatch between assets and liabilities and illiquidity of assets made insurers vulnerable to economic shocks including large price fluctuations. In addition, cross-share-holdings between banks and insurance companies and close business relationship between the two industries increased the risk of contagion.

Financial soundness indicators are useful for monitoring and surveillance, but certainly are not the only tool that should be used. Indeed, they can serve only to indicate whether problems are developing or have already manifested themselves. FSIs are the starting point for more detailed analysis and obtaining the qualitative information—including, for instance, details of ownership arrangements—which is necessary to provide context and to help interpret them. Furthermore, their limitations must be recognized, and the user must be aware of data accuracy and underlying assumptions, particularly in the key area of technical reserves and the overall regulatory and supervisory environment insurers operate in.

The contribution of FSIs is, to a large extent, based on their use in peer-group analysis. While it is often possible to perform such analysis within a given country, there are currently no benchmarks that would help analyze insurance sectors across different countries—this is due to limited availability and inconsistency of data. Substantial further work will be required to create a dataset of insurance indicators that would be useful as benchmarking tool. A compilation guide for insurance indicators may be the major first step in this direction.

There are many topics for further research. First, more empirical research is needed on insurance failures and the crises and factors causing them, as well as the causality between insurance failures and financial or economic crises. Second, we need to know more about both the current and optimal arrangements of insurance regulation and supervision so that these two elements can support the healthy development of the insurance sector and prevent crises even as the complexity of insurance and financial products grows. Issues of complex financial groups and, in particular, the linkages between banks and insurers would be a related topic. Third, additional theoretical and empirical work is needed on the relationships among the FSIs, their signaling value and their links to macroeconomic variables.

FINANCIAL SOUNDNESS INDICATORS AND INSURANCE CORE PRINCIPLES

| Financial Soundness Indicators (FSIs) | Insurance Core Principle (ICP) Number | | Information Content of the ICP |
	Revised 1/	Current	
Capital adequacy	23	8	Capital adequacy.
	20	7	Loss provisioning.
	5, 17	15, 16, 17	Consolidated supervision.
	21, 22	6,9	Asset valuation.
Asset quality	21, 22	6, 9	Investment policy.
	21	6	Bad debt provisioning.
	18		Large exposures.
	18		Correlated risk.
	5, 17	15, 16, 17	Consolidated supervision.
Earnings, profitability, reinsurance, and actuarial issues	1, 18, 19		Risk and underwriting management.
Liquidity	21	6	Country and other risk.
Sensitivity to market risk	11, 21		Market risk.

1/ The Insurance Core Principles (ICPs) are currently being revised; information in this table is based on draft revised ICPs as of end-May 2003.

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