

**PROPERTY-CASUALTY RISK-BASED CAPITAL
REQUIREMENT—A CONCEPTUAL FRAMEWORK**

*Actuarial Advisory Committee to the NAIC Property &
Casualty Risk-Based Capital Working Group*

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A CONCEPTUAL FRAMEWORK

Prepared by the
Actuarial Advisory Committee to the
NAIC Property & Casualty Risk-Based Capital Working Group

Actuarial Advisory Committee Members

David G. Hartman, Chairman
Paul Braithwaite
Robert P. Butsic
Sholom Feldblum
Walter J. Fitzgibbon, Jr.
David P. Flynn

Patricia A. Furst
Allan M. Kaufman
Stephen P. Lowe
Daniel K. Lyons
Michael G. McCarter
Dale A. Nelson

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FOREWORD

This paper develops a conceptual framework for a risk-based capital requirement for property-casualty insurance companies. It has been written to assist the National Association of Insurance Commissioners (NAIC) as they work on developing appropriate risk measurements in the context of a series of initiatives designed to improve solvency regulation. We believe the NAIC will find this paper useful.

Risk-based capital is the theoretical amount of capital needed to absorb the risks involved in the operation of a business. Different companies face different risks and, therefore, should have different levels of capital based on those different risks, rather than on some arbitrary basis. The major areas of risk facing a property-casualty insurance company include asset risk, reserve risk, pricing risk and credit risk.

State regulators of property-casualty insurance companies have had two tools with which to monitor required capital. One is a statutory minimum capital and surplus requirement which has been characterized as unrealistic and archaic, and the other is a premium-to-surplus rule-of-thumb, which does not effectively reflect relative riskiness. Many regulators feel they lack the statutory authority to require a company to increase their capital until the company's surplus falls below the statutory minimum. A risk-based capital requirement would help raise that safety net up off the floor and could apply uniformly in all states as a threshold capital requirement.

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I. Statement of Purpose of a Risk-Based Capital Requirement for Property-Casualty Companies

There are two main purposes of a risk-based capital requirement:

1. Permitting Regulatory Attention

The risk-based capital requirement should help regulators to meaningfully discriminate between those companies needing regulatory attention due to potential capital inadequacy and those which do not require such attention.

2. Changing Company Behavior

The requirement will likely also lead company managements to modify their behavior so as to carry sufficient capital to avoid such regulatory attention.

It should be noted there is no simple way a formula can accurately discriminate under all circumstances. It must be used in conjunction with other regulatory tools and be subject to judgmental interpretation. It should also be remembered that meeting the risk-based capital requirement is not a guarantee of solvency.

Since the risk-based capital requirement will affect behavior, as explained in subsequent sections, care must be taken to assure that unintended changes in behavior do not occur. Implementation of any requirement will have broad ramifications with subtle potential consequences. The requirement is *not* intended to provide a capital base to be used as a measure of return on equity for rate regulation, nor for rating insurance companies.

It is in the public interest for the promises made by insurance companies to be fulfilled. Implementation of this new requirement should enhance that goal as well.

Given the above goals are met, a risk-based capital requirement represents a potentially significant improvement over current capital requirements, which do not effectively respond to the changing riskiness of an insurance company.

II. Historical Perspective of Risk-Based Capital

The NAIC Solvency Policing Agenda for 1990 as adopted in December 1989 has five main components:

- Financial regulation standards for effective solvency regulation
- Improved reinsurance evaluation
- More effective examinations
- Improved solvency analysis support
- Risk-based capital requirements

Through these initiatives, state regulators hope to enhance their ability to protect insurance consumers from the financial trauma of insurer insolvency.

In early September, 1990, the Examination Oversight Task Force concluded that risk-based capital requirements are preferable to the generally prevailing system of minimum capital and surplus requirements (summarized by state in Appendix 1). The current statutory minimum capital and surplus requirements provide very little help to regulators in regulating for solvency. While the specific minimums vary from state to state, they typically require companies to maintain only two to three million dollars of capital and surplus. Companies that meet these requirements can seek licenses in all jurisdictions. It is difficult for regulators to legally intervene in the affairs of a company once it is licensed until its capital and surplus falls below these minimums.

At their December, 1990, meeting, the NAIC charged two working groups (one life and one property-casualty) to develop risk-based capital formulas and to develop model laws to make the risk-based capital requirement operational. In addition to the formulas, there would be established a legal mechanism for regulatory intervention when capital and surplus falls below a threshold that is meaningfully related to the amounts and types of exposure faced by the individual company.

Here in the U.S., the regulators of the banking and thrift industries have recently begun phasing in a risk-based capital measure as one component of a new set of supervisory ratios which will be used to assess capital adequacy. The new standards are based on a framework, referred to by some as the Basle Accord, developed by an international group of bank regulators. (See Appendix 2 for a more detailed discussion of the development of and description of the new banking standards.)

The concept of risk-based capital has been considered for many years. More than 20 years ago the concept was discussed in the book *Insurance, Government, and Social Policy* edited by Spencer Kimball and Herbert Denenberg. Some European countries have had risk-based capital requirements for their domestic insurers for more than 20 years.

III. Bank/Thrift Comparisons to Insurance

Both banks and insurance companies collect money from customers and assume liabilities; this process creates pools of assets that they must invest and safeguard. In fact, banks and life insurers are viewed as competitors for some products. However, the differences in the liabilities assumed create some fundamental differences in these types of financial institutions. The differences between property-casualty insurers and other financial institutions may create the need for alternative approaches to risk-based capital.

Banks/thrifts and life insurers both assume liabilities that are reasonably definite in nature (e.g., deposits and death benefits). Both make their money by investing the funds they generate at rates higher than their cost. Both have customers with the option to withdraw funds. As a result, the principal risk faced by banks and life insurers stems from uncertainty in their ability to maintain investment spreads and in the potential to suffer disintermediation in times of changing interest rates.

This similarity is reflected in their financial structure:

- both have similar capital/asset ratios - 6.5% for commercial banks and 6.6% for life insurers (with MSVR as a liability for life insurers equal to 1.0% of assets) as of 12-31-90;
- both have liabilities that are interest sensitive;
- competitive pressures have forced both to increase their investment in riskier assets: high yield bonds, stocks, mortgage loans.

In contrast, the liabilities assumed by property-casualty insurers are indefinite. They make their money by careful risk selection and effective management of their claim liabilities, as well as effectively managing their assets. The principal risk faced by property-casualty insurers is usually considered to be the inherent uncertainty of the liabilities assumed.

The fundamental difference is also reflected in the property-casualty insurer's financial structure:

- property-casualty insurers have a higher capital to asset ratio than the other two types of institutions: 25% as of 12-31-90.
- property-casualty insurers have a different mix of assets than do life insurers and banks. At 12-31-90, property-casualty insurers held 60% of their assets in bonds (with 98% of these being investment grade), 15% in stocks and 2% in mortgages and real estate. Life insurers held 50% of their assets in bonds (including junk bonds), 4% in stocks and 21% in mortgages and real estate.

Asset Distribution of Insurers

	<u>Property-Casualty</u>	<u>Life</u>
Bonds	60%	50%
Stocks	15	4
Mortgages and Real Estate	2	21
Other	<u>23</u>	<u>25</u>
	100%	100%

Some banking industry regulators view their new risk-based capital requirements as being deficient because a measurement of interest rate risk is excluded. (In fact, thrift regulators are currently developing an interest rate component). This same reason would also make them deficient for application to the life insurance industry. Further, because the banks' risk-based capital measurements are slanted towards asset and off-balance sheet risks, there are some who believe that the banking industry's standards do not reflect fundamental differences in the operations of banks and insurers. Nor could they be properly applied to the property-casualty industry because they fail to measure certain significant risks which are unique to that industry.

IV. Underlying Principles

This section outlines a set of principles that should govern the development of any risk-based capital formula. These principles can be used to evaluate any proposed formula, and should apply to the final formula that is adopted. As a practical matter, the formula should come as close as is possible to satisfying all of them simultaneously.

The principles have been grouped into three areas: a) those relating to formula mechanics, b) those relating to behavior induced by the formula, and c) those relating to economic consequences of the formula.

The following set of criteria should apply to the final adopted risk-based capital formula.

A. Formula Mechanics

1. *The formula should be subjected to extensive testing that demonstrates its discriminatory value.*

When it is implemented, the formula is likely to identify some companies as being near or below whatever regulatory thresholds are selected. Thus, the formula will inevitably generate some controversy when it is introduced. Such controversy can only be dealt with effectively if the record reflects diligent testing and careful study designed to assure the formula's discriminatory value. Ideally, the formula should neither identify companies as weak when they are not, nor fail to identify companies as weak when they are. The latter is more serious to policyholders; however, the former will be very serious to shareholders and employees to the extent that it undermines public confidence in the company. While it may not be possible to validate every aspect of a proposed formula using historical data, the formula should produce results consistent with the historical experience of the industry.

Also, it would probably be wise to have initial formula testing done privately by regulators, prior to the formal public exposure period for any

tentative formula. Given the sensitivity of the results, it would be counter-productive to generate public controversy over the formula prior to the completion of this testing.

Additional comments on testing are included in Appendix 3.

2. *The formula should reflect individual company circumstance to the fullest extent practical.*

Companies differ considerably as to the types and volumes of exposures written, their experience with those exposures, their reliance on reinsurers to help them manage those exposures, and the type, quality and duration of the assets held to discharge the liabilities created by those exposures. While it will never be possible to reflect all of the nuances of these differences, it is important that the formula be responsive to those differences that are material. It is unlikely that the formula will have much real discriminatory power if it does not.

3. *The formula must be practical; users will need to recognize its limitations.*

The formula should focus on the major risk elements, recognizing that the benefits of measuring minor or very unusual risks may not be cost effective. Even the measurements of the major risks will only be approximate, again striking an appropriate balance between cost and benefit.

Users will need to recognize these limitations, and, after qualitative discussions with each company's management, be prepared to apply informed judgment in interpreting the results.

4. *The formula must be simple to explain.*

While details and mechanics of the formula may need to be somewhat complex, the basic formula must be intuitively sensible and simple. Company managements, regulators, and others must have a clear sense of why a particular formula result has occurred and what it means. Since the

formula will never be able to take into account a company's particular circumstance perfectly, some interpretation and judgment will be necessary.

5. *The formula should be evolutionary.*

To effectively serve its purpose, the formula and its accompanying parameters will need to be constantly reviewed, updated, and revised, if necessary, to reflect changing industry circumstance.

In addition, as risk concepts are more fully developed by the actuarial profession and others, they can be incorporated into the formula as innovations.

6. *The formula should produce reasonably consistent results from year to year, both for the industry in total and for an individual company.*

The formula will presumably be applied to company financial data at each year end. It is desirable that the indicated risk-based capital rise and fall with changing circumstance, both for the company and the industry as a whole. However, it is clearly undesirable for risk-based capital to change abruptly due to some discontinuity in the financial database to which the formula is applied. Stated simply, the turn of the page in a calendar from one year to the next should not cause an abrupt change in the amount of risk-based capital. It is also desirable to have risk-based capital levels respond *appropriately* to the underwriting cycle (i.e., risk-based capital should not fall just because rate levels decline and vice versa).

B. Induced Behavior

1. *The formula should motivate companies to "do the right thing."*

Solvency regulation tests can often have undesirable side-effects, due to their influence on company behavior. Sometimes, they create powerful disincentives for management to deal with financial problems in a forthright manner. For example, a company that needs to strengthen its loss

reserves knows that the strengthening may trigger several IRIS test failures. Rather than draw attention to itself, the company might choose to strengthen its reserves gradually in a manner that does not cause it to fail the IRIS tests, or enter into an uneconomic reinsurance transaction that masks the strengthening entirely. To the fullest extent possible, the risk-based capital formula should not encourage uneconomic activity or financial irresponsibility.

2. *The formula should not be susceptible to manipulation by changes in financial statement presentation.*

Differences in risk-based capital requirements should reflect meaningful differences in company circumstances, but should not differ merely because of different accounting treatment of items or different corporate structures. Differences which are not meaningful can occur because of flexibility in accounting practices (e.g., retrospective additional premiums) or extraordinary transactions (balance sheet reinsurance).

3. *Care must be taken to prevent the abuse of the risk-based capital formula.*

Concerns have already emerged that some groups may misuse the formula to serve their own agendas. For example, if the formula produces a *minimum* capital requirement, it is possible that some rate regulations may be proposed that allow only a return on that capital, thereby denying a fair rate of return on the capital above the minimum. The formula's intended application must be clearly stated to minimize potential abuses.

For example, if capital is denied a fair rate of return, that capital may exit the industry, reducing policyholder security, thus defeating the purpose of a risk-based capital requirement.

C. **Economic Consequences**

1. *The formula should recognize economic realities.*

Legislating the capital requirements of insurers, like legislating the price of bread, cannot be done without due consideration of the economic forces

of supply and demand. Capital will only flow into the insurance industry if those supplying the capital perceive the opportunity to earn a fair return.

Establishing capital requirements at higher than existing levels will not cause capital to magically flow into the insurance industry. It must be recognized that requiring higher levels of capital than currently exist (either for a particular line or in total for the industry) will necessitate higher prices to produce returns that attract that additional capital, or will restrict the availability of insurance.

This issue should not be underestimated. Some believe that the current credit crunch (an availability problem) is directly attributable to the introduction of risk-based capital requirements in the banking industry. They argue that the high capital requirements for loans have caused banks to invest more of their funds in other ways.

2. *The formula should maintain a "level playing field."*

As noted earlier, capital requirements have implications for prices and competitive position. Care must therefore be taken to assure that any risk-based capital formula does not create undesirable distortions in the marketplace. First, any formula should not place U.S. property-casualty insurers at an unfair competitive disadvantage with foreign insurers. As the insurance industry becomes increasingly global, this issue becomes very significant.

Similarly, any formula should not place the insurance industry at an unfair competitive disadvantage with alternative risk transfer mechanisms, nor should any formula unfairly disadvantage one segment of the industry over another: stock vs. mutual, primary vs. reinsurer, national vs. regional, small vs. large, multiline vs. specialty, new vs. established, etc.

Additionally, any formula should not produce differences between insurers due to organizational structure (e.g., holding companies, subsidiaries, etc.) which do not affect risk characteristics.

Finally, the level playing field issue extends to individual companies. Any formula should produce a result, and be compared to a base, that is consistently and equitably calculated for each insurer.

3. *The formula should measure risk consistently between the various components of the formula.*

The amount of risk-based capital for each source of risk (e.g., underwriting, investment, or credit) should be such that the risk of insolvency (or other applicable impairment) is directly proportional to that source of risk. For example, the amount of risk-based capital for asset risk should not be double the underwriting risk amount if their respective underlying risks are not related in that proportion. The allocation of risk-based capital should reflect reality. Failure to recognize the consistency of risk measurement may produce unintended market displacements, such as reduced product availability.

4. *Finally, those designing and using the formula should do so with the understanding that the intent is to minimize insolvencies (in the sense of insufficient assets to meet liabilities), not to prevent "failures".*

In a competitive market it is necessary (and desirable) that inefficient companies be driven from the market by competitors that are more efficient, innovative, and better managed. Companies that are forced to withdraw from the business are "failures". Because the current minimum capital requirements are so low, too many of these forced withdrawals are insolvencies. In essence, a risk-based capital requirement would raise the regulatory safety net off the floor, and place it at a level where intervention can occur prior to insolvency. Companies then would be forced to withdraw when their capital fell below the minimum, rather than at the point of insolvency. This would seem to represent a potentially significant improvement over the current system, which doesn't provide much room for anything other than a "hard landing".

The formula, and its regulatory implementation, should not attempt to prevent failures from occurring. Rather they should focus on minimizing the economic and social consequences of such failures when they occur.

V. Discussion of Risk and Risk-Based Capital

Definition of Risk

Risk is the possibility of suffering unexpected harm or loss. For financial statement items, risk is present when the realization of an asset or liability can produce a value different from its expected amount. Risk also exists if future events can lead to unexpected operating losses on new and renewal business not already reflected on the balance sheet. Financial statements contain elements that are either directly measurable (payroll taxes due and unpaid, for example) or estimates (e.g., loss reserves). Loss reserves may develop unfavorably, for instance, while payroll taxes remain fixed when reexamined. Stocks and bonds may fluctuate in value due to market conditions and provide less cash than expected if the company needed to sell those assets unexpectedly. Liabilities may be paid faster or slower than expected. Bonds may be called when interest rates fall, reducing expected investment income.

Bonds and real estate may similarly fluctuate in market value, even if accounting convention keeps their financial statement values constant. Conversely, change in an accounting value *per se* does not indicate risk; rather, it is the uncertainty in the actual realized value of the asset itself (represented by the accounting value) that conveys risk. For example, the ultimate value of a discounted unpaid loss may be known with certainty, but although its accounting measure will change (increase) through time, there is no risk present. On the other hand, an unpaid loss with a 50% chance of either a \$1,000 payment or no payment might carry a constant \$500 reserve for several years until the uncertainty is resolved.

Generally, the greater the spread of possible realizable values (in financial statement values or future operation) subsequent to the current valuation, the greater the risk.

Definition of Risk-Based Capital

Risk-based capital is the theoretical amount of capital needed to absorb the risks involved in the operation of a business. A higher risk business requires

more capital than does one of lower risk. More specifically, it is the amount of capital necessary to insure that the business has an acceptably low expectation of becoming financially impaired (the standard for this low expectation will be addressed later).

Measurement Bias

For financial statement items, measurement bias occurs when the recorded value differs from the anticipated realizable value. Two insurers may carry an identical financial statement element (usually an estimated item) at different amounts. For example, one insurer may record its loss reserves including a margin for adverse deviation, while another may discount its loss reserves to reflect the time value of money. Because different valuation standards may be used, it is useful to specify an *expected present value* benchmark: for an estimated financial statement quantity, expected present value is the mathematical average of the present value of all possible realizable values, weighted by the probability of each value occurring.

The difference between the carried and expected present value is a measure of the *bias*. In general, bias does *not affect the risk* of a financial item, because the *spread* of potential subsequent values does not depend on the valuation basis for the original estimate. However, if an item has a known bias, it may be necessary to adjust the financial statement value to remove the bias.

Bias may exist because 1) the valuation standard is conservative/liberal (e.g., ignoring salvage or income tax liability), or 2) the estimation process consistently overstates or understates the realizable value (e.g., reserves are set using a faulty method).

As an example, suppose two insurers with the same recorded total liabilities (including capital) have identical unpaid loss obligations: \$5,000 with 50% probability and \$15,000 with 50% probability; the expected value is \$10,000. Thus their ability to pay the loss would also be identical. However, the first insurer carries the reserve at \$11,000 and the second at \$9,000. The risk of adverse development relative to the unbiased \$10,000 reserve is identical for both insurers, but the second insurer would *appear* to have \$2,000 more capital to withstand the adverse development, while in fact it would not. Therefore, recognizing the bias is an important issue in setting risk-based capital.

Removal of Bias

Since the issue of bias is critically important in valuation, when establishing a risk-based capital formula designed for general application, financial statements should first be adjusted to remove any clearly identifiable bias. Then the application of a formula or other risk-based capital technique could assume that the relevant financial statement is free from bias.

The risk-based capital formula itself need not carry the burden of correcting any current deficiencies or conservativeness of statutory accounting or of any perceived weaknesses of a particular insurer's Annual Statement. However, there may be instances where the collective financial statement values of individual insurers are biased (for example, some analysts maintain that the property-liability industry's total reserves are chronically understated) but it is difficult to ascertain whether an individual company has a bias. In this circumstance, it might be proper to correct the bias using the risk-based capital formula.

Whether the risk-based capital formula should address these matters is an open issue. One view is that any changes to statutory accounting rules should be made separately, outside the formula. Weaknesses in individual insurers' reserving practices, for example, are to be addressed by the statement of actuarial opinion requirement on the loss reserves. Another perspective is that, as a practical matter, the effectiveness of reserve opinions has not been tested, and meaningful changes to statutory accounting rules may occur only in the distant future. Thus, it might be better to use the risk-based capital formula to help address financial reporting deficiencies, a core solvency concern.

When considering a risk-based capital requirement, one of the items to be considered is the Casualty Actuarial Society's *Statement of Principles Regarding Property and Casualty Valuations* (see Appendix 4). Also, the Actuarial Standard of Practice of the Actuarial Standards Board, *Performing Cash Flow Testing for Insurers*, adopted in July 1991, should be considered (see Appendix 5).

Risk Measurement

In simplest terms, a risk-based capital requirement must consider the size of an insolvency as well as its probability. The combination of these factors is the anticipated cost of the insolvency, or the *expected policyholder deficit*. By

relating this amount to the anticipated claims against the company's insureds, a consistent measure of risk can be maintained for all risk-producing items, either assets or liabilities. Risk measurement for single risk elements, along with the effect of combining risk elements, is addressed more fully in Appendix 6.

VI. Elements of Risk for Property-Casualty Insurance Companies

The generally recognized risk areas specific to property-casualty companies are shown in Table 1 below.

Table 1
Risk Areas

<u>Risk Area</u>	<u>Type of Risk</u>
Loss and LAE reserves	Chance of under-valuation (over-valuation) of liabilities from past business.
Pricing (Profitability)	Income (including investment income) from future business will be inadequate to cover claims and expenses because of catastrophes (hurricanes, earthquakes) or inadequate prices. This includes business already written but not earned.
Credit risk (ceded reinsurance, retro premiums due, etc.)	Defaults on amounts due from reinsurers, policyholders, etc.; over-estimates of amounts due.
Asset risks	Default of principal or interest, calls on bonds, fluctuation in market value.

Company characteristics that tend to affect these risks are shown in Table 2 below.

Table 2
Company Characteristics That Modify Risk

<u>Characteristics</u>	<u>Discussion</u>
Rapid growth	Loss of control. Increased pricing and reserve risk. Historical data shows that rapid growth is related to company failures.

Small size	Lack of credible experience; Greater effect of random fluctuation.
New company	Historical data shows that new companies fail more frequently than mature companies.
Asset/liability mismatch	Company is vulnerable to changes in interest rates.
Concentration/diversification	Increased (decreased) exposure to natural catastrophes (earthquake, hurricane, tornado, etc.) and pricing errors, regulatory or court decisions, etc.
Net retention	Higher retentions increase risk due to catastrophe or large claims. Lower retentions increase reliance on reinsurers; need for reinsurer profits to be included in prices.

General Business Risks

Listed below are examples of general business risks. These risks can be very significant, but the relative importance will vary widely from company to company. It may not be feasible to include all (or any) of them in a risk-based capital formula.

General Business Risks

1. Competitors will win customers away through superior service or lower prices.
2. Suits (EEOC, bad faith, etc.) will be initiated against the company.
3. Lease obligations will exceed future needs.
4. Pension and other post-retirement obligations will cost more than anticipated.
5. Legislative actions, court decisions or regulatory rulings will alter markets and/or competitive abilities or create or expand coverage.

6. Mismanagement or fraud will damage the company.
7. Taxes and other governmental levies will rise.
8. Economic and/or social conditions will change in a manner detrimental to the company.

History of Failures

The A.M. Best Company recently completed a study of 302 insolvencies, which occurred from 1969 through 1990, in which they identified the principal cause of each failure. Those causes can be roughly cast into the risk framework above as follows.

	Number of <u>Companies</u>
A. Policyholder Obligations Larger than Anticipated	
Deficient Loss Reserves/Inadequate Pricing	86
Rapid growth	64
Significant Change in Business	26
Reinsurance Failure	21
Catastrophe Losses	<u>17</u>
	214
B. Asset Deterioration	
Overstated Assets	<u>30</u>
	30
C. Other	
Alleged Fraud	30
Miscellaneous	<u>28</u>
	58
Total	302

Risk Measurement

Measurement issues common to many of the generally recognized risk areas listed in Table 1 are the following:

1. Accuracy of financial statement estimates
2. Variation by line of insurance
3. Measurement base
4. Individual company experience
5. Usefulness of historical experience vs. need for judgment of the future

Accuracy of Financial Statement Estimates

Many of the most important financial statement values, loss reserves in particular, are based on estimates. The risk-based capital approach might involve steps which replace the company estimates by alternative estimates. Alternatively, the risk-based capital calculation might begin with the financial statement estimates prepared by company management. Revisions to those estimates, if appropriate, might derive from other forms of regulatory oversight.

Variation by Line of Insurance

Some risks, loss reserve adequacy and profitability for example, vary by type of company and by line of insurance. In those cases, the risk-based capital calculation should reflect that variation. For other risks, asset values for example, the risks do not vary by line of insurance. Those risks should be measured in the same way for all companies on a companywide basis.

Measurement Base

The risk-based capital factors should be applied to an appropriate base for the asset or liability whose risks are being measured. In many situations the measurement base will be the annual statement value of an item; bonds at amortized value, for example.

In some cases another measurement base might be considered. The measurement base for the loss reserve risk might be the held reserve or an alternative calculation of expected claim payout such as loss reserve plus Schedule P reserve (annual statement excess of statutory reserves over statement reserves), or loss reserve plus an alternative Schedule P-type reserve.

Individual Company Experience

To the extent credible, individual company experience should be considered when the risk-based capital calculation involves estimates of bias, for example in loss reserve or profitability risks. To be considered credible, a company's past experience must be demonstrably related to future experience during times of greatest risk.

Historical Experience vs. Judgment

It is desirable to give significant weight to historical experience to develop the risk-based capital factors. For reserve and profitability risk, historical experience can provide significant guidance depending on current and future conditions. However, the risk-based capital factors also need to consider data outside of the property-casualty insurance industry and leave room for informed judgments.

VII. SAP, GAAP and Risk-Based Capital

Once the risk-based capital amount has been calculated, the amount must be compared to a consistently calculated base. Statutory surplus might be that base, but may need adjustment.

To some degree, statutory accounting principles (SAP) can be viewed as a form of risk-based capital. SAP include conservatism which should be considered in the risk-based capital calculation to prevent "double counting" risk in certain areas, once by reductions in statutory surplus and once by a charge in the risk-based capital calculation. Five such areas are the following: 1) discounting of loss reserves, 2) statutory write-offs of recoverables, 3) deferred policy acquisition costs, 4) valuation of subsidiaries, and 5) salvage and subrogation.

These areas are discussed below:

Loss Reserve Discounting

SAP reserves are intended to be computed on a basis closer to nominal, than to present value basis. This creates an implicit capital margin equal to the difference between the two.

In recognizing the time value of money, the risk-based capital calculation should consider, among other things, the following: 1) the interest rates available during the experience period analyzed for purposes of selecting the risk-based capital factors, 2) the interest rates likely to be available in "normal" times, 3) differences in interest rate potential between short-tail lines of insurance and long-tail lines of insurance, and 4) risk adjustments to interest rates to reflect uncertainty about timing and amounts of loss payments.

SAP Treatment of Reinsurance Recoverables and Premium Receivables

Some ceded reinsurance is written-off for SAP purposes for non-collateralized unauthorized reinsurance and for reinsurers indicating late payment of recoverables. The risk-based capital charge for ceded reinsurance recoverable should not double-count these write-offs.

Similarly, premium receivables over 90 days past due are written-off for SAP and should not be double counted in any risk-based capital calculation.

Capitalization of Policy Acquisition Costs

SAP accounting does not allow acquisition expenses to be capitalized and amortized over the life of the policy. Stated differently, the unearned premium liability is gross, rather than net, of these expenses.

Valuation of Subsidiaries

Insurance subsidiaries are valued at SAP value rather than Generally Accepted Accounting Principles (GAAP) value or market value. The difference might be considered in evaluating risk-based capital risk charges for those types of assets.

Salvage and Subrogation

SAP accounting practices do not currently allow reduction of loss reserves for anticipated salvage and subrogation, while GAAP does. Recently it has been learned that some companies actually do reduce their statutory loss reserves for anticipated salvage and subrogation. The surplus of all companies should be stated consistently as possible--either all net of salvage and subrogation or all gross.

Differences in SAP by Company

SAP asset and liability values are not necessarily uniform among companies. For risk-based capital purposes, areas of significant differences should be removed.

First, some companies record reserves discounted for future investment income. This is particularly true of medical malpractice and workers' compensation lines of insurance. The amount of discount must be determined and SAP surplus should be reduced (or risk-based capital increased) by the amount of the discount. In many cases the discount amount is clearly disclosed in the Annual Statement. In some cases, the disclosure is not completely clear in the statement. Proper application of the risk-based capital rules may require

Annual Statement changes to make the disclosure of discounting uniform by company.

Second, the degree of conservatism included in loss reserves varies among companies. Actuarial opinions and increased regulatory attention to reserves may reduce the degree of variation among companies. Still there will be certain unquantifiable areas of exposure for the property-casualty industry, such as pollution claims reserves. Those steps are unlikely to eliminate the variation, some of which may represent legitimate management discretion.

Third, as noted above, some companies net anticipated salvage and subrogation out of reserves.

While it might be desirable to replace the held reserve with a standardized reserve, this may not be practical. There is no magic formula which will mechanically produce the correct reserve. However, the present Schedule P statutory reserve, or an improved Schedule P statutory reserve, could be used to help assure that reserves include a minimum level of conservatism. The risk-based capital charge might best be applied to the held reserve plus the applicable Schedule P statutory reserve.

Future of SAP

A major rationale for the use of SAP for insurance companies rather than GAAP is that SAP deliberately introduces conservatism into insurance accounting. SAP is sometimes characterized as "liquidation basis" accounting while GAAP is characterized as "going-concern" accounting.

The introduction of the risk-based capital process into statutory reporting provides the opportunity to re-think the use of dual accounting principles. The existing differences between SAP and GAAP could still be accommodated by recording those differences as required capital. For example, consider deferred acquisition expenses. SAP requires a 100% write-off of prepaid expenses. GAAP permits those expenses to be amortized if the business is projected to be sufficiently profitable. The SAP result could be achieved by requiring some risk-based capital charge for deferred acquisition expenses.

The ramifications of this concept cannot be fully explored in this white paper. The material above was presented merely to identify an area that might warrant further consideration.

The Canadian Model

The Canadian statutory annual statement is prepared on a GAAP basis (with bonds at amortized values and loss reserves at nominal values). The Blank includes what is called a "minimum asset test", which effectively is a minimum surplus test. This test compares assets available for test purposes (carried assets after some adjustments) to assets required for test purposes, which are the sum of carried liabilities (after some adjustments) plus the greater of:

1. 15% of loss reserves, or
2. 15% of written premium, or
3. 22% of claims incurred in the last year.

This summary oversimplifies the calculation. The details are contained in Appendix 7.

As a rule of thumb, as long as the margin is greater than 10% of the assets required for test purposes, the company does not receive extra regulatory attention. Perhaps a simplified model, such as this one which is used effectively in Canada, would be appropriate in the United States.

VIII. Ramifications of the Level of Risk-Based Capital

There are several approaches that could be followed in establishing risk-based capital standards from which the threshold for additional regulator attention for a company could be determined. Three of those approaches and their potential ramifications are as follows:

<u>Capital Standard</u>	<u>Hypothetical % of Companies Meeting Standard</u>	<u>Description</u>
Minimum Minimally Acceptable (shut-down level)	95-99%	Least amount allowable; regulatory control of company below this level
Prudent Margin Prudently Managed (normal level)	70-90%	No regulatory intervention required if company exceeds capital standard; long-term industry average surplus meets standard
Triple A Disaster-Proof (top-quality level)	1-5%	Able to withstand all reason- able worst-case scenarios; more than this amount rarely needed

The "Minimum" Capital Standard

This approach would set as the standard the absolute minimum capital a company could carry to be allowed to continue to conduct its business without imposed changes. Ideally, a very small percentage of all companies would fall below this minimum. This standard would have the advantage of reducing the potential impact on the public's perception regarding the industry's strength.

However, there are some potential disadvantages of such a standard, for example:

- A minimum standard could cause the industry's actual capital to gravitate downwards towards that standard, reducing the margins that companies would retain to cushion against unexpected events. Such an outcome might actually increase the potential for insolvencies.

This concern has also arisen in the banking industry. While a risk-based capital standard has been introduced for that industry which has been characterized as a "minimum", there are signs it is becoming, in effect, a target.

- Since insurers might not be allowed a reasonable rate of return on capital carried in excess of the standard, downward regulatory and consumer pressure on rates could result from any misperception that a company may have excess capital. This could in turn diminish the willingness of the industry to commit capital in excess of the published minimum standard.

The "Prudent Margin" Capital Standard

This approach would publish as the standard the indicated amount of capital necessary for a company to be permitted to operate its business free of regulatory intervention. This amount, at a reasonable margin above the minimum required to remain in business, could be considered a target amount. A majority of companies would likely currently exceed this level. The prudent margin standard would focus on the capital the average company should carry to minimize its long term risk of insolvency, provided that adverse outcomes are not substantially beyond what a prudent manager could reasonable anticipate.

A potential disadvantage of this standard could arise if an undue perception of the formula's precision is created, in turn creating an excessive reliance upon a pure formula approach for determining the capital needs of companies.

The "Triple A" Capital Standard

This approach would publish as the standard an indicated amount of capital

sufficient to absorb financial impacts from a scenario that is so pessimistic as to be considered highly unlikely. The indicated capital should be something obtainable, but would be at a level at which very few companies are currently capitalized. At its extreme, this standard might require a level of capital that would only be needed if very pessimistic assumptions were ultimately realized for essentially all of the insurer's assets and liabilities. If all companies were required to carry this much capital, and if the industry in general could secure such capital, then the risk of future insolvencies might be virtually eliminated.

However, the requirement that the capital markets provide sufficient capital for an environment free from all risk of insolvency is economically unrealistic. Further, since insurers and their investors will seek a reasonable return on each dollar of capital invested, upward pressure on rates will result to achieve the desired return. However, if public policy issues prevent the requested rate increases, the markets will be unwilling to provide the required capital. Ironically, an excessive capital requirement relative to the expected return could reduce the amount of capital invested in the industry, reducing availability.

Companies that are actually stronger than the formula suggests could find their public image severely tarnished. This may impair their ability to write profitable business and actually increase the risk of insolvency.

Use of the Capital Standard

Whichever standard is chosen, regulatory responses may be triggered when the capital a company falls below a given threshold, which may be stated in terms relative to specified percentages of the standard. For example, if the prudent margin standard is used and a company's capital falls below a threshold of, say, 75% of the standard, the regulator could establish on-site monitoring, more frequent financial analyses, and other measures as deemed appropriate. If the company's capital fell below 50%, stronger action, including a cease and desist order, could be indicated. In a similar fashion, if the minimum standard is used and a company's capital is at perhaps 110% of the standard's indication, the regulator could establish on-site monitoring, etc. Note that the percentages given are for illustration only.

If regulatory responses are triggered by set percentages of the standard, then the economic impact on the industry will depend on the combined effect of the standard and the percentages used. Conceptually, the combined effect of the standard and percentages used should generate the same regulatory response for a given level of capital regardless of which standard is chosen. Therefore, the decision regarding which standard is chosen should depend on which standard provides the best tool for regulatory purposes and which also minimizes the potential for public misperceptions arising from the standard published.

Consistency Considerations

Whatever standard is selected, there are significant advantages to having a comparable standard to that adopted by the Life Risk-Based Capital Working Group and consistency with similar standards for property-casualty companies worldwide. For example, consider the possible consequences if the formula for property-casualty companies applies a 10% factor to common stock investments in calculating risk-based capital but the formula for life companies applies a 5% factor. This would tend to cause a parent company with both life and property-casualty operations to shift all stock holdings to the life subsidiaries. This would reduce risk-based capital for the parent as a whole even though this shift in assets would not change the parent's fundamental risk characteristics.

**CAPITAL AND SURPLUS REQUIREMENTS
FOR MULTI-LINE PROPERTY-CASUALTY INSURERS**
(Excluding Title, Mortgage Guaranty, Home Protection, Legal Expenses,
Residual Value, Credit Unemployment and Health Care Services
Contractors Lines)

As of 11-1-91

<u>STATE</u>	<u>CAPITAL REQUIREMENT</u>	<u>SURPLUS REQUIREMENT</u>	
Alabama	\$ 500,000	\$ 500,000	(See Note 1)
Alaska	\$3,000,000	\$3,000,000 \$2,250,000	(Initial) (Maintained)
Arizona	\$1,000,000 (See Note 2)	\$ 500,000	
Arkansas	\$1,250,000 (See Note 3)	\$1,250,000	(See Note 3)
California	\$2,600,000	\$2,600,000	
Colorado	\$2,000,000 (Total Capital and Surplus)		(See Note 4)
Connecticut	\$2,000,000	\$2,000,000	
Delaware	\$ 500,000	\$ 250,000	
District of Columbia	\$ 300,000	\$ 300,000	
Florida	\$2,500,000 (Total Capital and Surplus)		(Initial)
	Total maintained capital and surplus must be at least:		
	\$1,300,000 (Until 12-31-92)		(See Note 5)
	\$1,500,000 (Thereafter)		(See Note 5)
Georgia	\$1,500,000	\$1,500,000	(or 50% of Capital)
Hawaii	\$2,500,000	\$1,250,000	(See Note 6)
Idaho	\$ 650,000	\$ 650,000	

<u>STATE</u>	<u>CAPITAL REQUIREMENT</u>	<u>SURPLUS REQUIREMENT</u>	
Illinois	\$1,000,000	\$1,000,000 \$ 500,000	(Initial) (Maintained)
Indiana	\$1,000,000	\$1,000,000 \$ 250,000	(Initial) (Maintained)
Iowa	\$2,500,000	\$2,500,000	
Kansas	\$ 900,000	\$ 600,000	
Kentucky	\$1,000,000	\$2,000,000	
Louisiana	\$ 650,000	\$1,350,000 \$1,000,000	(Minimum Surplus) (Operating Surplus)
Maine	\$2,500,000	\$2,500,000	
Maryland	\$1,500,000 (See Note 7)	\$2,250,000	(See Note 8)
Massachusetts	\$2,100,000	\$4,200,000	
Michigan	\$1,000,000 (See Note 9)	\$ 500,000	(See Note 9)
Minnesota	\$1,000,000	\$1,000,000 \$ 500,000	(Initial) (Maintained)
Mississippi	\$ 600,000	\$ 900,000	
Missouri	\$1,200,000	\$1,200,000	
Montana	\$ 800,000	\$ 800,000	
Nebraska	\$2,000,000 (Total Initial Capital and Surplus)	\$2,000,000	(Maintained)
Nevada	\$ 500,000	\$1,000,000	
New Hampshire	\$ 400,000	\$ 400,000	
New Jersey	\$2,000,000	\$1,000,000	

<u>STATE</u>	<u>CAPITAL REQUIREMENT</u>	<u>SURPLUS REQUIREMENT</u>	
New Mexico	\$ 700,000	\$ 700,000	(Initial)
	Insurer shall maintain an aggregate of capital and surplus of \$2,400,000 if earned or received premium volume in previous calendar year was \$5 million to \$10 million Insurer shall maintain an aggregate of capital and surplus of \$2,700,000 if earned or received premium volume in previous calendar year was \$10 million to \$25 million Insurer shall maintain an aggregate of capital and surplus of \$3,000,000 if earned or received premium volume in previous calendar year was over \$25 million		
New York	A multiple-line P&C company must maintain paid-in capital of \$1,000,000 and surplus to policyholders of \$3,200,000		(See Note 10)
North Carolina	\$1,800,000	\$2,700,000 \$ 450,000	(Initial) (Maintained)
North Dakota	\$ 500,000	\$ 500,000	
Ohio	(A) \$2,500,000 (Total Capital and Surplus)		(See Note 11)
	(B) \$5,000,000 (Total Capital and Surplus)		(See Note 12)
Oklahoma	\$ 500,000 (Aggregate Capital and Surplus)	At time of initial authorization, shall also possess expendable surplus of not less than \$250,000	
	<u>Workers' Compensation:</u>		
	\$5,000,000 (Minimum Aggregate Capital and Surplus)		
Oregon	\$1,000,000 (Total Capital and Surplus)		(See Note 13)
	<u>Workers' Compensation:</u>		
	\$3,000,000 (Total Capital and Surplus)		
Pennsylvania	\$2,350,000 (See Note 14)	\$1,175,000	(See Note 14)
Rhode Island	\$1,000,000	\$2,000,000	
South Carolina	\$1,500,000 (See Notes 15 and 16)	\$1,500,000 \$ 375,000	(Initial) (Maintained) (See Notes 15 and 16)

<u>STATE</u>	<u>CAPITAL REQUIREMENT</u>	<u>SURPLUS REQUIREMENT</u>
South Dakota	\$ 400,000	\$ 400,000
Tennessee	\$1,000,000	\$1,000,000
Texas	\$1,000,000 (See Note 17)	\$1,000,000 (See Note 17)
Utah	\$2,000,000	The greater of: (a) \$1,500,000 or (b) net total of \$.50 per \$1,000 life insurance amount at risk, plus 10% earned disability premiums, plus 15% net workers' compensation and other liability premiums earned, plus 20% medical malpractice premiums earned, plus 10% of net premiums earned on lines of insurance not set forth, plus 5% admitted value of common stocks and real estate, plus 2% admitted value of all other invested assets, less any mandatory security valuation reserve being maintained, and less minimum required capital
Vermont	\$2,000,000 (See Note 18)	\$3,000,000 (See Note 18)
Virginia	\$1,000,000	\$3,000,000
Washington	\$3,000,000 (See Note 19)	\$3,000,000 (See Note 19)
West Virginia	\$1,000,000 (See Note 20)	\$1,000,000 (See Note 20)
Wisconsin	\$2,000,000 (See Note 21)	\$1,000,000 (See Note 21)
Wyoming	\$2,000,000	\$2,000,000

NOTES

- Note 1 - If insurer has not transacted business for five years, it is required to maintain surplus of \$750,000.
- Note 2 - Director may require additional capital based on type, volume and nature of business conducted.
- Note 3 - Commissioner may require insurer to possess and maintain additional capital and surplus in addition to that required, based on types, volume or nature of business transacted by insurer.

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- Note 4 - Companies licensed prior to 7-1-91 shall have until 12-31-92 to increase their total capital and surplus to this amount.
- Note 5 - Or alternative calculation, based on liabilities.
- Note 6 - Additional amount required of new insurers after 7-1-88, and of all insurers after 7-1-93.
- Note 7 - Applies to insurers commencing business on or after 7-1-91. On or after 7-1-2001, any insurer qualified to engage in business prior to 7-1-91 shall possess and maintain paid-in capital in an amount not less than 150% of that required of insurers commencing business on 6-30-91.
- Note 8 - Vehicle liability insurers commencing business prior to 7-1-66 also must maintain \$300,000 additional surplus.
- Note 9 - Amounts are the minimums required for an initial certificate of authority. The insurance department has the authority to require additional surplus. After licensure, \$1,000,000 must remain unimpaired.
- Note 10 - Applies to insurers writing the following lines: Miscellaneous property; water damage; burglary and theft; glass; boiler and machinery; elevator; animal; collision; personal injury liability; property damage liability; workers' compensation/employer liability; fidelity and surety; credit; title; motor vehicle and aircraft physical damage; marine protection and indemnity; fire; and marine and inland marine.
- Note 11 - For insurers writing fire; allied lines; farmowners' multiple peril; homeowners' multiple peril; ocean marine; inland marine; earthquake; group accident and health; credit accident and health; accident and health; auto liability; auto physical damage; aircraft; glass, burglary and theft; boiler and machinery; and credit, not less than \$1,000,000 shall be paid-in capital and not less than \$1,000,000 shall be contributed surplus.
- Note 12 - For insurers writing commercial multiple peril; financial guaranty; medical malpractice; workers' compensation; other liability; fidelity; surety; and any other risk other than life insurance, not less than \$2,000,000 shall be paid-in capital and not less than \$2,000,000 shall be contributed surplus.
- Note 13 - A domestic insurer applying for its original certificate of authority in this state shall possess at the time of authorization additional capital and/or surplus of not less than \$500,000.
- Note 14 - The Insurance Commissioner has discretion to require additional amounts. Because Section 503 of Pennsylvania's Insurance Department Act requires insurers to maintain the minimum required capital and surplus unimpaired at all times, the Insurance Commissioner will require newly incorporated insurers to demonstrate possession of surplus over the statutory minimum amount. The exact amount of additional surplus will be dependent upon the financial forecasts included in the insurer's business plan.

- Note 15 - The Insurance Commission may require additional initial capital and surplus based on type or nature of business transacted.
- Note 16 - An insurer licensed prior to 7-1-91 which does not meet minimum requirements shown must maintain at least the capital shown on its 1990 annual statement and surplus in an amount of at least 25% of such capital.
- Note 17 - The Texas Board of Insurance may adopt rules, regulations and guidelines requiring an insurer to maintain capital and surplus levels in excess of the required statutory levels, based upon nature, type and volume of risks, company's portfolio and company's reserves.
- Note 18 - The Commissioner may prescribe additional capital or surplus for all insurers, based upon type, volume and nature of insurance transacted.
- Note 19 - Applies to insurers authorized on or after 7-1-91.
- Note 20 - Insurers are required to maintain \$2,000,000 statutory surplus.
- Note 21 - The Commissioner may reduce required amount.

Risk-Based Capital Requirements in the Banking Industry

The Basle Capital Framework

U.S. banking agencies first issued a risk-based capital proposal in 1986. While initial reaction was favorable, many reviewers felt that, without similar requirements for foreign competitors, the proposed requirements would put U.S. banks at a competitive disadvantage. In light of these concerns, the U.S. banking agencies began working with the Bank of England on the development of a common approach. A joint proposal was published in 1987. The Committee on Banking Regulations and Supervisory Practices (frequently referred to as the "Cooke Committee" or the "Basle Supervisors Committee") subsequently took the U.S./U.K. proposal under consideration and addressed the possibility of expanding the agreement to include all 12 of the countries represented on the Committee.

Although the banking industry had had various forms of capital standards for many years (usually measured by capital to asset ratios), the regulators were concerned about decreasing capital ratios and, in the case of U.S. thrifts, hundreds of insolvencies. Their objective was to strengthen the soundness of the international banking system and to encourage the establishment of uniform minimum capital standards among the major industrial countries.

The initial standards were amended in July 1988 and were then endorsed by the Group of Ten Central Bank Governors (representatives of the major industrialized countries). They have become known as the Basle Capital Framework or the Basle Accord.

United States Regulatory Standards

United States banking and thrift regulators soon adopted risk-based capital standards which were consistent with the Basle Capital Framework. The Federal

Reserve Board (the Fed), which regulates state member banks and bank holding companies, issued guidelines for banking organizations. The Office of the Controller of the Currency (OCC) issued guidelines for nationally chartered banks. The Office of Thrift Supervision (OTS) issued guidelines for thrift (savings and loan) institutions. The Federal Deposit Insurance Corporation (FDIC) issued guidelines for non-federal member banks and state chartered institutions. All four sets of guidelines are very similar.

In adopting risk-based capital measures, the Fed, the OCC, the OTS and the FDIC shared the objective of the Basle Committee for more consistency in worldwide capital adequacy standards. They also wanted to make regulatory capital requirements more sensitive to differences in risk profiles among banks, to factor off-balance sheet exposures into the assessment of capital adequacy and to minimize disincentives to holding liquid, low-risk assets.

The "interim final" rules for thrifts were put into place on 12-7-89; interim minimum requirements for banking organizations became effective on 12-31-90, with final measures for the entire industry to be in place by 12-31-92.

The risk-based capital requirement is just one measure in a new set of capital standards. The new requirements contain two components for banks and three for thrifts. The components which are applicable to both banks and thrifts are:

Leverage Ratio Standard: Tier 1 (or Core) capital must be at least 4% (for thrifts) or 6% (for banks) of adjusted total assets.

Risk-Based Capital Standard: Tier 1 plus Tier 2 (Supplementary) capital must be at least 8% of *risk-adjusted* assets.

In both of these standards, lower percentage requirements are being utilized prior to 12-31-92.

The third component, which applies to thrifts only, is:

Tangible Capital Standard: Tangible capital must be at least 1.5% of adjusted total assets.

Risk-adjusted assets for the second component are computed by assigning weights, ranging from 0% to 100% for banks and from 0% to 200% for thrifts, to the various categories of assets and off-balance sheet items. The dollar amount of each asset is then multiplied by the risk weight, and the resulting weighted values are summed to arrive at total weighted-risk assets.

As described above, the risk-based capital requirements include risk from assets and off-balance sheet items (such as letters of credit) but exclude such items as interest rate risk, liquidity risk, market risk, and operational risk. For this reason, the calculated risk-based capital requirement is treated as a minimum and banks are expected to maintain capital positions above the minimum ratio. An institution which does not meet the minimum, or whose capital is otherwise considered inadequate, is expected to develop and implement a plan, acceptable to its regulator, for achieving adequate capital within a reasonable time frame.

Outlook for Banks

The risk-based capital requirements have just recently been enacted and they are being gradually phased in. Therefore, it is premature to predict what their ultimate impact will be. Early indications (from a *Brookings* study) are that the majority of banks will meet the requirements. However, recent articles in *The Wall Street Journal* indicate that the new requirements have already caused many banks to change their investment policies by shifting assets out of corporate loans (which carry the maximum 100% risk weight) and into government securities (which require little or no capital under the formula). It is speculated that banks' growing investment in government securities has helped to keep interest rates low. On the other hand, the Federal Reserve Board and

the Bush Administration have become concerned that the decrease in bank lending is contributing to the current credit crunch. They have begun discussing the possibility of easing some of the capital requirements in order to quicken the economic recovery. (Under the risk-based capital guidelines, the Fed may modify the rules in order to reflect significant changes in the economy, financial markets, banking practices, etc.)

Outlook for Thrifts

The outlook for thrifts is different, however. A study appearing in the Fall 1990 edition of the *FDIC Banking Review* indicated that a third of all thrifts which were not already in conservatorship would fail to meet the interim standards and 46% of non-conservatorship thrifts would not meet the final ultimate requirements. (If these companies which failed the requirements were measured by assets, rather than by number, the percentages would increase to 44% and 70%, respectively). Thrifts which fail to meet the standards will come under significant regulatory pressure to increase capital by selling or securitizing high-risk assets, attracting outside capital, or merging with healthier thrifts. Such activities will put them into competition with the Resolution Trust Corporation (RTC), which is attempting to do the same things for thrifts which are already in conservatorship, and could make the RTC's job more difficult.

Further Study

The regulators of the banking and securities industries have held informal talks over the last two years regarding minimum capital standards for debt and equity securities. Because traditional distinctions between banks and securities firms are quickly eroding, some feel there is a need for common standards. Securities regulators have made a formal proposal to the Basle Supervisors Committee, and it is expected that discussion of the proposal will begin in November. The main impact of the plan on banks would be to address the effect of market risk factors on capital standards.

Testing of the Formula

When it is implemented, the risk-based capital formula is likely to identify some companies as being near or below whatever regulatory thresholds are selected. As a result, such companies may be faced with the difficult task of raising capital to avoid forced reductions in business or perhaps even being forced out of business altogether. Thus, the formula will inevitably generate some controversy when introduced. Such controversy is likely to focus on several issues including whether the formula has identified the appropriate companies as being undercapitalized, and whether the degree of under-capitalization is correct. The controversy would likely be intense at both a state and federal level if the impact on the industry were to be so major as to cause significant market dislocations, and if numerous policyholders were to be affected through sharply increased prices and the unavailability of necessary coverages. Such controversy can only be dealt with effectively if the record reflects diligent testing and careful study by experienced professionals to assure the formula's effectiveness.

In structuring the testing approach to be used, the following guidelines should be applied.

1. *The predictive capability of the formula should be tested.*

One of the main purposes of a risk-based capital requirement is to help regulators to meaningfully discriminate between companies needing regulatory attention due to potential capital inadequacy and those companies which do not require such attention. Accordingly, the formula should be retrospectively applied to a large group of companies (perhaps all) wherever possible to past annual statements to evaluate how effective and how timely it would have been at predicting the insolvencies that have actually occurred in prior years. The formula's responsiveness to the various phases of the underwriting

cycle should also be evaluated. Should the formula fail to indicate a problem at least one year before an insolvency occurred, or if such a potential was identified but masked by numerous other companies being incorrectly identified as well, then adjustments to the formula will be indicated. Should data regarding prior company failures prove insufficient for adequate testing, simulation techniques to allow scenario testing should be applied to evaluate how the formula responds to changing conditions. For example, illustrative companies could be generated with high growth rates and a developing reserve inadequacy problem for the more recent accident years to see how quickly the formula responds in detecting an emerging problem.

Test Procedure 1

- A. Identify companies which have failed or merged in anticipation of failure during the period of 1980-1990.
- B. Based upon historical results, identify how effectively the formula detected emerging problems.

Data may need to be extracted from a variety of sources to accomplish this task in addition to standard NAIC materials. Perhaps companies should be requested to supply supplementary data on diskettes.

These steps will identify the ability of the formula to predict "false positives" as well as "true positives."

- C. Based upon a random, credible sample of companies which have remained solvent in the test period, identify how effectively the formula detected solvent and strong companies.

Use NAIC and/or A.M. Best data tapes with request to individual company to correct any errors that may be revealed in the data.

2. *The formula should be tested for reasonable consistency in results from year to year, both for the industry in total and for an individual company.*

The formula will be significantly reduced in value as a regulatory tool if it produces results that fluctuate wildly from one year to the next and for reasons not clearly associated with changes in risk. For a given company, the indicated capital requirement should only change dramatically in one year's time if there has been an identifiable and material change in the company's financial condition, size, mix of business, or mode of operation during that year. Accordingly, the formula should be retrospectively tested to evaluate its stability over time, and to judge whether changes in results are reasonable in light of changes in conditions including the effects of the underwriting cycle. Such retrospective testing should at a minimum be applied to three successive prior years' statements.

Test Procedure 2

- A. Calculate the ratio of risk-based capital to statutory capital and surplus for each of the three year-ends. Rank companies on the difference between the highest and lowest values of these three ratios. Use NAIC or A.M. Best data tapes to analyze variation in both absolute and relative terms.

- B. In case of unusual year-to-year variations, identify what changes in the formula would be needed to reduce or eliminate them.
3. *Results of the formula should be evaluated in private prior to its implementation to gauge whether the results among industry peers are reasonable.*

No formula can remove the need for applying informed judgment when reviewing the capital needs of property-casualty insurance companies. Scrutiny should be performed of the formula's results for groups of companies that are deemed similar in operation and risk to evaluate whether the comparative results by company appear reasonable given all available empirical and subjective information. Groupings could be small vs. large, multi-line vs. specialty, national vs. regional, stock vs. mutual, primary vs. reinsurer, new vs. established, etc. If the results appear counter-intuitive, adjustments to the formula may be indicated.

Test Procedure 3

- A. Compare the historical ratings by Best's and other rating agencies, IRIS test results, etc., to the companies identified in Section 1 and determine if this comparison identifies any additional risk factors not incorporated in the formula.
- B. Review differences developed in 1 and determine if they are reasonable. If unreasonable, identify what changes in the formula would be needed to eliminate unreasonable differences.

4. *The formula should be evaluated critically as to its possible economic effects on the industry and how it might shape company behavior.*

The manner in which the risk-based capital formula determines capital requirements will likely affect behavior that may vary by type of insurer. One result may be that companies will adjust financial statement items where flexibility exists in order to minimize capital requirements. Testing should include a thorough evaluation of ways in which a company could attempt to manipulate the results of the formula, with adjustments then being made to the formula where indicated. It should also evaluate the extent to which equal risks result in equal capital requirements and whether there are any differential effects by industry segment.

Test Procedure 4

- A. Designate a group of professionals to evaluate, both qualitatively and to the extent possible quantitatively, the effects across segments of the property-casualty industry and how individual companies may react.
- B. For each significant effect identified, the group would develop any modifications in the formula necessary to eliminate or minimize undesirable effects or incentives that might arise.

Other Considerations

Since the implications of the formula's results will be both important and sensitive, extensive testing should be performed in private and the results communicated to affected companies before the formula's parameters and its results become public knowledge. Further, since objectivity

in testing is crucial, the testing should be performed by an independent body of insurance professionals that would work with both Actuarial and Accounting Advisory Committees to the NAIC Working Group, as well as with a designated group of regulators.

As the testing is in process, and results are reviewed, more tests will become evident. At the conclusion of each thorough round of testing, changes to the risk-based capital formula may be indicated. It is likely that such changes could be major after the first round of testing, with subsequent rounds demonstrating a decreasing number of indicated adjustments. While such a process may become time-consuming, its importance in avoiding undesirable effects on the industry should not be overlooked.

Final Test

Using the tentative final formula as confirmed by the NAIC Working Group leader, project the distribution of companies that would result from its application. Set minimum, prudent and strong company thresholds based upon findings.

STATEMENT OF PRINCIPLES REGARDING PROPERTY AND CASUALTY VALUATIONS

(AS ADOPTED SEPTEMBER 22, 1989)

The purpose of this Statement is to identify and describe principles applicable to property and casualty valuations. The Statement establishes fundamental concepts for research and education regarding valuation techniques. The principles in this Statement provide the foundation for actuarial procedures and standards of practice regarding valuations. These principles apply to valuations regarding any risk bearer of property and casualty contingencies.

This Statement consists of three parts:

- I. Definitions
- II. Principles
- III. Discussion

I. *Definitions*

Valuation is the process of determining and comparing, for the purpose of assessing a risk bearer's financial condition as of a given date, called the valuation date, the values of part or all of a risk bearer's obligations and the assets and considerations designated as supporting those obligations.

A valuation is carried out in accordance with specified rules or assumptions selected or prescribed in accordance with the purpose of the valuation.

A **risk bearer** is a person or other entity that is exposed to the risk of financial losses that may arise out of specified contingent events during a specified period of exposure.

Cash flows are receipts or disbursements of cash.

An **asset** is cash held or any other resource that can generate receipts or reduce disbursements.

An **obligation** is a commitment by or requirement of a risk bearer to make disbursements with respect to financial losses arising out of specified contingent events or with respect to any type of other expense or investment commitment.

A **consideration** is a receipt or a reduction in disbursements in exchange for accepting the risk of financial losses that may arise out of specified contingent events during a specified period of exposure.

II. *Principles*

1. Every obligation, consideration or asset, with the exception of cash held, is associated with one or more items of cash flow.
2. The value of every item of cash flow depends upon the following valuation variables, each of which may involve uncertainty:
 - a. the occurrence of the item of cash flow,
 - b. the amount of the item of cash flow.

- 38 c. the interval of time between the valuation date and the date of occurrence of
39 the item of cash flow, and
- 40 d. a rate of interest related to the interval of time between the valuation date and
41 the date of occurrence of the cash flow.
- 42 3. The degree of uncertainty affecting each valuation variable for any item of cash flow
43 associated with a given asset, obligation or consideration depends upon:
- 44 a. the nature of the asset, obligation or consideration,
- 45 b. the various environments (e.g. regulatory, judicial, social, financial and
46 economic environments) within which the valuation is being performed, and
- 47 c. the predictive value of the data used to estimate the valuation variables associ-
48 ated with each item of cash flow.
- 49 4. In general, the values of items of cash flow associated with a given asset, obligation
50 or consideration, and the values of assets, obligations and considerations themselves
51 are not only uncertain, they are also not independent of each other. Consequently,
52 the degree of uncertainty relative to the combined value of items of cash flow or of
53 assets, obligations and considerations reflects the uncertainties affecting the underly-
54 ing valuation variables and arising out of the interaction of those variables in the
55 process of combination.
- 56 5. The value of an asset, obligation or consideration is equal to the combined values of
57 its constituent items of cash flow.
- 58 6. The result of a valuation is the combined value of the assets, obligations and consider-
59 ations involved in the valuation with due recognition of the offsetting characteristics
60 of receipts and disbursements.
- 61 7. These valuation principles apply to any valuation whether it involves a risk bearer's
62 total assets, obligations and considerations as of a given valuation date or only identi-
63 fied segments of the risk bearer's assets, obligations and considerations including:
- 64 a. commitments made on or before the valuation date, or
- 65 b. the commitments in (a) and commitments projected to be made after the
66 valuation date, or
- 67 c. only those commitments projected to be made after the valuation date.

68 III. Discussion

69 Although no valuation methodology is appropriate in all situations, a number of considera-
70 tions commonly apply. Some of these considerations are discussed in this section. These discus-
71 sions are intended to provide a foundation for the development of actuarial procedures and
72 standards of practice.

73 Data

74 Data to be used in valuation include descriptions of the characteristics of the risk bearer's
75 assets, obligations and considerations. The descriptions should be sufficiently detailed to permit
76 reasonable projections of cash flows from these assets, obligations and considerations.

Appendix 4

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VALUATION PRINCIPLES

The actuary may use a risk bearer's own experience relative to its assets, obligations and considerations if this provides a basis for developing a reasonable indication of the future. Moreover, the actuary may use external data drawn from relevant experience of the insurance industry, other financial institutions or surrounding environments.

Organization of Data

Organization of data for valuation is affected by the characteristics of the assets, obligations and considerations involved and the characteristics of the valuation variables connected with them.

Much of the data organizational work relative to obligations and considerations begins with data used in connection with the reserving and ratemaking processes. However, it may be necessary to adjust the results of those processes so as to take into account differences between cash flow dates and the various dates used in those processes. It may also be necessary to identify any relevant expenses that fall outside the data used in the reserving and ratemaking processes and reflect them in the valuation process. It is important, too, to identify potential adjustments to considerations like retrospective premiums or audit premiums that may be received or paid in the future.

If a valuation deals with detailed analyses of cash flows, data organization relative to assets involves principally the work of classifying the assets and developing projections of contractual or anticipated cash flows from them. It is also often necessary to divide assets into classes of investment by such things as time to maturity or quality and to project flows of anticipated receipts into particular classes of investment in accordance with an assumed investment strategy.

Homogeneity

Valuation accuracy is often improved by dividing the data on assets, obligations and considerations into groups exhibiting similar characteristics. Homogeneous groupings recognize, when appropriate, the interrelationships between those assets, obligations and considerations.

Credibility

Credibility is a measure of the predictive value attached to a body of data. Credibility is increased by defining groups of assets, obligations or considerations so as to increase their homogeneity or to increase the volume of data relative to the groups. Increasing homogeneity may fragment the groups to such an extent that their predictive value is reduced to an unacceptable level. Each situation requires balancing homogeneity and the volume of data.

Operating Conditions

Operating conditions should be reflected in valuation. Operating conditions include mix of business, underwriting, claims handling, marketing, accounting, premium processing, portfolio of investments, investment strategy, and reinsurance programs.

Environmental Conditions

Environmental conditions should be reflected in valuation. The regulatory, judicial, social, financial and economic environments are some of the major ones to be considered.

Losses and Loss Adjustment Expenses

The major obligations of a risk bearer are usually those relating to the future payment of losses and loss adjustment expenses. When these obligations are estimated for purposes of a valuation, their future development may be a factor for consideration. Development of losses

119 and loss adjustment expenses is defined in the Casualty Actuarial Society's Statement of
120 Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves.

121 **Rules and Assumptions**

122 The objective of a valuation is to produce an assessment of a risk bearer's financial condi-
123 tion that will be useful for the purpose for which the valuation is performed. The purpose of the
124 valuation affects the rules and assumptions used.

125 Cash flow analyses produce projections of receipts and disbursements. These analyses are
126 conceptually the most fundamental of the forms of valuation. The other forms of valuation can
127 be derived from cash flow analysis by suitable selection of rules and assumptions relative to the
128 valuation variables.

129 Balance sheets and income statements are often produced internally by a risk bearer using
130 rules and assumptions established by its management to assess financial strength and earning
131 performance.

132 Appraisals are intended to help determine the value of all or a part of a risk bearer's assets,
133 obligations and considerations related to property and casualty contingencies, taking into
134 account not only financial statement items but also off-balance-sheet items such as investment
135 in staff, leases and so on. Appraisals are usually made in connection with mergers and acquisi-
136 tions and the sale of parts of a risk bearer's business.

137 GAAP accounting rules or assumptions are intended to produce financial statements that
138 the financial community believes are useful for assessing a risk bearer's earning capacity.

139 Statutory accounting rules or assumptions are intended to produce financial statements
140 that regulators believe are useful for assessing whether an insurer's financial condition warrants
141 its being allowed to write insurance.

142 The value of any of the valuation variables with respect to a given set of items of cash flow
143 may be determined on the basis of any set of rules and assumptions that is appropriate to the
144 purpose of the valuation. Rules and assumptions relative to different classes of assets, obligations
145 or considerations need not necessarily be consistent with each other as long as the differences
146 are consistent with the purpose of the valuation, or the effect of the inconsistencies is not great
147 enough to invalidate the valuation.

148 Assumptions are based on a reasonable review of whatever appropriate facts are available
149 supplemented by the actuary's experience and judgment as necessary. Rules are helpful to the
150 assurance of appropriately consistent treatment of facts and assumptions in valuation. Both rules
151 and assumptions can be helpful to achieving a result with a degree of refinement consistent with
152 the purpose of the valuation. Anticipated changes in operating and environmental conditions
153 should be reflected in the rules and assumptions applied to a valuation.

154 **Valuation Variables**

155 The valuation variables of occurrence, amount, interval of time and rate of interest
156 describe the quantitative characteristics of all cash flows for purposes of financial analysis. All
157 of the valuation variables are conceptually involved in the determination of the values of all
158 assets, obligations and considerations. The roles of the valuation variables in the determination
159 of values may be limited by the selection of rules or assumptions.

160 The value of any item of cash flow changes with the passage of time. This implies that
161 valuations of the same sets of items of cash flow performed at different valuation dates will in
162 general produce different results. It further implies that a valuation of one set of items of cash

VALUATION PRINCIPLES

- 250 i. simply because of a change in the interest environment, or
251 ii. because a change in the interest environment brings about a change from
252 expected experience as to the occurrence, amount or timing of items of cash
253 flow connected with assets, obligations or considerations.
- 254 There are several factors that affect interest risk:
- 255 a. Mismatch of asset and obligation cash flows—this factor relates to the develop-
256 ment of an excess of a risk bearer’s receipts over its required disbursements or
257 vice versa.
- 258 If an excess of receipts over required disbursements develops, the risk bearer
259 may not be able to invest the excess cash at yields that will produce future cash
260 flows large enough to meet its obligations as they mature. This is “reinvest-
261 ment” risk.
- 262 If an excess of required disbursements over receipts develops, the risk bearer
263 may have to borrow or liquidate assets with yields below then current market
264 rates to make up the difference. Borrowing at a relatively high interest rate, or
265 inability to invest the difference at then current market rates produces a reduction
266 in the risk bearer’s future profits. This is “market” risk.
- 267 b. Changes in the timing of receipts and disbursements—this factor relates to the
268 preference of borrowers to prepay debt carrying high rates of interest when rates
269 go down and to defer repayments of debt carrying low rates of interest when
270 rates go up. For risk bearers of property and casualty contingencies, this risk
271 affects mainly their assets.
- 272 c. General economy—this factor relates to the way in which things such as liquid-
273 ity, inflation, demand for cash to fund expansion, government debt, trade
274 imbalances and distortions in the yield curve affect the general level of interest
275 rates.
- 276 d. Trends—this factor relates to changes over time in the interest valuation vari-
277 able and in the degree of uncertainty affecting it and how those changes affect
278 the other asset and obligation valuation variables.

279 **Interaction with Other Professionals**

280 The uncertainties that affect other actuarial fields, such as ratemaking and reserving, also
281 affect valuation. In addition, valuation is affected by uncertainties met in other fields, such as
282 marketing, underwriting, finance, regulation, risk management and so on. This implies that profes-
283 sionals working in other fields can be helpful in gathering information and developing rules
284 and assumptions to be used in valuation.

285 **Actuarial Judgment**

286 It is important to apply actuarial judgment based on education and experience in selecting
287 and organizing data and making rules and assumptions to be used in the valuation process and
288 in assessing the reasonableness of the results.

ACTUARIAL STANDARD OF PRACTICE NO. 7

(Revised)

PERFORMING CASH FLOW TESTING
FOR INSURERS

PREAMBLE

Section 1. Purpose, Scope, and Effective Date

- 1.1 Purpose - This standard of practice sets out recommended practices and considerations that bear on the actuary's professional work in the area of cash flow testing, also referred to as cash flow analysis, whenever projections and comparisons of cash flows are performed for an insurer.
- 1.2 Scope - This standard applies to cash flow testing for life, health, property, or casualty insurers. Cash flow testing may be part of many types of analyses, such as:
- Determination of reserve adequacy
 - Pricing studies
 - Evaluations of investment strategy
 - Financial projections or forecasts
 - Actuarial appraisals
 - Testing of future charges or benefits that may vary at the discretion of the company (e.g., policyholder dividend scales and other non-guaranteed elements of insurance and annuity contracts)

Elements of cash flow testing include asset cash flows, obligation cash flows, and the economic and operating assumptions affecting cash flows.

- 1.3 Effective Date - This standard of practice is effective October 17, 1991.

Section 2. Definitions

- 2.1 Asset - Any tangible or intangible resource that can generate receipts or reduce disbursements.
- 2.2 Asset Risk - The risk that the amount or timing of items of cash flow connected with assets will differ from expectations or assumptions as of the valuation date for reasons other than a change in investment rates of return. Asset risk includes delayed collectibility, default, or other financial nonperformance.
- 2.3 Cash Flow Testing - The process of projecting and comparing, as of a given date called the valuation date, the timing and amount of asset and obligation cash flows after the valuation date.
- 2.4 Cash Flow - Any receipt or disbursement of cash.
- 2.5 Insurer - An entity that accepts the risk of financial losses or, for a specified time period, guarantees stated benefits upon the occurrence of specific contingent events.
- 2.6 Investment-Rate-of-Return Risk - The risk that investment rates of return will depart from expectations or assumptions as of the valuation date, causing a change in the amount or timing of asset or obligation cash flows.
- 2.7 Obligation - Any tangible or intangible commitment by, requirement of, or liability of an insurer that can reduce receipts or generate disbursements.
- 2.8 Obligation Risk - The risk that the amount or timing of items of cash flow connected with obligations will differ from expectations or assumptions as of the valuation date, for reasons other than a change in investment rates of return or a change in asset cash flows.
- 2.9 Scenario - A set of economic and operating assumptions on the basis of which cash flow testing is performed.

Section 3. Background and Historical Issues

Actuaries have been performing financial projections for many years. Various cash flow elements have often been an integral part of these projections. The large increase in the level and volatility of investment rates of return that occurred in the 1970s and 1980s caused significant swings in asset values, as well as changes in cash flow expectations. In addition, fluctuating operating results have led to increased attention to improving the measurement of the financial security of insurers. As a result of these changes, cash flow testing has become an increasingly important aspect of actuarial work.

Some states require comparison of asset and obligation cash flows related to items contained in the statutory financial statement. Other instances where cash flow testing is used include internal financial or investment planning, rate of return calculations, and assessments of an insurer's ability to meet its obligations as they come due.

Common approaches to cash flow testing typically follow these steps:

- Identify which assets and obligations are to be included in the cash flow test
- Select and validate models for assets and obligations
- Select an appropriate scenario or set of scenarios, either deterministic or stochastic
- Project the cash flows of the selected assets and obligations
- Develop conclusions based on analysis of the cash flow projections

There are variations on this process. For example, if cash flow testing is used to test the effects of changes in investment strategy, specific assets may not be identified in the initial step of the process. It may be sufficient instead to test on the basis of variations in asset portfolio characteristics such as yield and duration.

STANDARD OF PRACTICE

Section 5. Analysis of Issues and Recommended Practices

- 5.1 Scope of Cash Flow Test - A cash flow test may involve part or all of an insurer's obligations that are outstanding as of the valuation date or come into existence subsequently. The obligations and the assets to be included in the cash flow test should be specifically identified.
- 5.2 Allocation of Assets - In the case of a cash flow test involving only a portion of the assets or a portion of the obligations, the actuary should disclose whether the adequacy of any remaining assets to support the remaining obligations has been examined and if not, why not.

The actuary should be satisfied that the same block of assets is not being improperly used to support different blocks of obligations, either within the cash flow test being performed or in that test and one or more contemporaneous tests.

- 5.3 Scenarios - The scenario is a key element of cash flow testing. Often, more than one scenario will be analyzed. Scenarios may be generated by either deterministic or stochastic methods.
- 5.3.1 Range of Scenarios Consistent with Purpose of Test - In some situations, the scenario(s) to be tested may be specified by the client or employer, or by regulation. In other situations, the actuary may develop the scenario(s). In all cases, the actuary should be satisfied that the scenario testing reflects a range of conditions that is consistent with the purpose of the cash flow test.
- 5.3.2 Number of Scenarios - In determining the number of scenarios that will reflect a range of conditions that is consistent with the purpose of the cash flow test, the actuary should consider the relative importance of the investment-rate-of-return risk, asset risk, and obligation risk.
- 5.3.3 Disclosure of Limitations - When the actuary draws conclusions from the cash flow test, any limitations due to the number, types, or likelihood of scenarios used should be disclosed.
- 5.4 Projection of Asset Cash Flows - In order to project an insurer's asset cash flow, the actuary should consider the assets' characteristics as well as the insurer's investment strategy. The actuary should be satisfied that the model used to reflect these considerations produces reasonable estimates of expected asset cash flows.
- 5.4.1 Asset Characteristics - The characteristics of an asset affect the timing and amounts of its cash flow items. The cash flows of some assets are relatively immune to external factors and can be predicted on the basis of asset structure alone (e.g., high-quality non-callable bonds). The cash flows of other assets (e.g., callable bonds, mortgage-backed securities, common stocks, or premium receivables) are highly influenced by external events, and their analysis must be based on a combination of their structure and external factors. The actuary should consider the following issues in making cash flow projections:
- a. Variation - The extent to which the expected cash flows vary due to changes in the scenarios
 - b. Quality - The asset quality rating as it relates to the risk of delayed collectibility, default, or other financial nonperformance
 - c. Associated Costs - The costs of maintaining the assets or of converting the assets into cash
 - d. Experience - The historical experience of similar assets, to the extent such experience is credible and relevant to the projection of future cash flows

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- e. Other Factors - Other factors that have a material effect on asset cash flows, particularly those factors that have an effect on asset risk or investment-rate-of-return risk.
- 5.4.2 Investment Strategy - The actuary should consider the insurer's strategy concerning asset management and the effect that this strategy will have on the projection of asset cash flows. Strategy considerations that might affect the projection include use of positive cash flows, funding of negative cash flows, policies and practices relative to the sale of assets prior to maturity and the disposal of assets with declining values, and receivable collection practices.
- 5.5 Projection of Obligation Cash Flows - In order to project an insurer's expected obligation cash flow, the actuary should consider the obligations' characteristics as well as the insurer's policies concerning the management of its obligations. The actuary should be satisfied that the model used to reflect these considerations produces reasonable estimates of expected obligation cash flows.
- 5.5.1 Obligation Characteristics - The characteristics of an obligation affect the timing and amounts of its cash flow items. The actuary should consider the following factors in the cash flow projection:
- a. Variation - The extent to which the expected cash flows vary due to changes in the scenarios
 - b. Nonperformance Risks - The risk of reinsurer insolvency or other nonperformance by reinsurers; if it is not practical to model these risks, they should be disclosed if the potential risks could be material
 - c. Experience - The historical experience of similar obligations, to the extent such experience is credible and relevant to the projection of future cash flows
 - d. Other Factors - Other factors that have a material effect on obligation cash flows, particularly those factors that have an effect on asset risk, obligation risk, or investment-rate-of-return risk.
- 5.5.2 Management Policy - The actuary should consider management policy concerning the settlement or payment of obligations, and the effect that this policy will have on the projection of obligation cash flows. Considerations that might affect the projection include claim settlement and benefit payment practices, expense-control strategies, company philosophy relative to the determination of policyholder dividends and charges or benefits that vary at the discretion of the company, as well as any relationships between management policy and the scenarios.

- 5.6 Determination of Assumptions - No model can fully take into account all the uncertainties and interdependencies affecting an insurer's future cash flows. This implies the need to make simplifying assumptions in developing the specifications of a cash flow testing model.
- 5.6.1 Sensitivity Testing - The actuary should consider the sensitivity of the model to the effect of variations in key assumptions, and should be satisfied that the issue of sensitivity testing has been adequately addressed. In determining whether sensitivity testing has been adequately addressed, the actuary should consider the intended purpose and use of the testing and whether the results reflect a reasonable range of variation in the key assumptions, consistent with that intended purpose and use.
- 5.6.2 Internal Consistency - The actuary should analyze the assumptions with regard to the interrelationships between the scenarios and other assumptions to assure internal consistency.
- 5.6.3 External Requirements - The actuary should consider how laws, regulations, and other external requirements relating to such things as financial statements and operating ratios, federal income taxes, insurer capitalization, and distribution of an insurer's earnings to policyholders or shareholders may affect future cash flows or constrain the range of possible scenarios. These factors should be appropriately reflected in the model.
- 5.7 Development of Conclusions - The cash flow test is the combination and analysis of the asset and obligation cash flow projections. This analysis may involve the discounting or accumulating of cash flows or a year-by-year comparison. Generally, cash flow projections are performed for a given time period. The actuary should consider the possible effect of cash flows beyond such a time period in analyzing results.

In developing conclusions, the actuary should be satisfied that the results of cash flow testing are reasonable. In determining whether the results are reasonable, the actuary should consider the intended purpose and use of the cash flow testing and the degree of uncertainty in the cash flow projections due to asset, obligation, and investment rate-of-return risks.

Any material limitations of the conclusions presented by the actuary should be described.

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Section 6. Communications and Disclosures

- 6.1 Reliance on Another - The actuary may not be qualified to measure the expected cash flows of all assets and obligations. In such instances, the actuary may make use of another person's work, or of other information provided by another person. The actuary should be guided by Interpretative Opinion 3(a)(4), "Reliance on Another," of the Guides and Interpretative Opinions as to Professional Conduct of the American Academy of Actuaries.
- 6.2 Actuarial Report - A written actuarial report is recommended as a means of documenting the assumptions, techniques, and conclusions reached when providing a professional recommendation or opinion.
- 6.3 Special Communications and Disclosures - The actuary's report relative to the results of the cash flow test should contain the following:
- a. Specific identification of the insurer's obligations that are to be involved in the test and the assets that are to be dedicated to financing those obligations
 - b. The scenario(s) used, the likelihood of the scenario(s), and the rationale behind the methodology used to develop the scenario(s)
 - c. Description of the model used in the cash flow test, including the sources of the data and the key assumptions
 - d. Conclusions related to sensitivity testing
 - e. Disclosure of the source of or basis for any material assumption on which the actuary expresses no opinion as to appropriateness. The actuary should be guided by Interpretative Opinion 3(c)(1), "Conflict with Professional Judgment."
- 6.4 Deviation from Standard - An actuary who uses a procedure which differs from this standard must include, in any actuarial communication disclosing the result of the procedure, an appropriate and explicit statement with respect to the nature, rationale, and effect of such use.

Using the Expected Policyholder Deficit Risk Measure to Determine Risk-Based Capital Factors

The expected policyholder deficit (EPD) risk measure can be used to consistently assess insolvency risk in such a way that a standard level of protection is provided to all classes of policyholder and insurers. The EPD measure can apply equally to all risk elements, whether assets or liabilities.

To illustrate, suppose that an insurer has the following balance sheet:

<i>Assets</i>		<i>Liabilities</i>	
Investments	\$13,000	Loss Reserve	\$10,000
		Capital	\$3,000

The realizable value of the investments is \$13,000, known with certainty. However, the unpaid loss can be one of three different values, each with a particular probability:

<u>Loss Amount</u>	<u>Probability</u>
2,000	.2
10,000	.6
18,000	.2

The expected value of the loss is \$10,000. This is the amount that would be recorded as an unbiased reserve. Therefore, the capital of this company would be assets minus the reserve, or \$3,000. The expected policyholder deficit can be readily calculated:

Insurer A

	<u>Asset Amount</u>	<u>Loss Amount</u>	<u>Probability</u>	<u>Claim Payment</u>	<u>Deficit</u>
	13,000	2,000	.2	2,000	0
	13,000	10,000	.6	10,000	0
	13,000	18,000	.2	13,000	5,000
Expected Value	13,000	10,000		9,000	1,000
Capital:		3,000 (= Assets - Expected Loss)			
EPD/Expected Loss:		.10			
Capital/Expected Loss:		.30			

If the loss is \$2,000 or \$10,000, the assets are sufficient to pay the claim. However, if the loss is \$18,000 (which happens 20% of the time), the deficit is \$5,000. Its expected value is $.20 \times 5,000 = \$1,000$, which is 10% of the expected loss.

The 30% ratio of capital to expected loss is the relevant factor for a risk-based capital program whose aim is to provide policyholder security equal to a 10% expected deficit. Another insurer with a different amount of losses, but having the same probability distribution, would still require capital equal to 30% of expected losses in order to provide the same 10% level of protection.

Insurer B

	<u>Asset Amount</u>	<u>Loss Amount</u>	<u>Probability</u>	<u>Claim Payment</u>	<u>Deficit</u>
	1,300	200	.2	200	0
	1,300	1,000	.6	1,000	0
	1,300	1,800	.2	1,300	500
Expected Value	1,300	1,000		900	100
Capital:		300	(= Assets - Expected Loss)		
EPD/Expected Loss:		.10			
Capital/Expected Loss:		.30			

Let's extend the preceding numerical example to assets. Insurer C has a known loss of \$5,000 about to be paid, but its \$6,000 of assets are risky:

Insurer C

	<u>Asset Amount</u>	<u>Loss Amount</u>	<u>Probability</u>	<u>Claim Payment</u>	<u>Deficit</u>
	12,000	5,000	.1	5,000	0
	6,000	5,000	.8	5,000	0
	0	5,000	.1	0	5,000
Expected Value	6,000	5,000		4,500	500
Capital:		1,000	(= Assets - Expected Loss)		
EPD/Expected Loss:		.100			
Capital/Assets:		.167			

Here the policyholders will come up short the 10% of the time when assets turn out to be worth nothing. The deficit in this case is \$5,000, giving an EPD of \$500. Here the ratio of capital to assets needed to provide the 10% EPD/Expected Loss is 16.7%. This is less than the capital factor for losses in the Insurer B example because the assets are not as risky as the losses.

Effect of Combining Risk Elements

When two risk elements are combined, the risk-based capital equals the sum of the separate risk-based capital amounts only if their realizable values are *positively correlated* (in fact, the correlation must be perfect). For example, suppose the losses for insurers A and B are actually separate lines of business for another insurer (Insurer D). Assume that if Insurer A has a \$2,000 loss then Insurer B has a \$200 loss. Similarly, the \$10,000 and \$1,000 losses are matched, as well as the \$18,000 and \$1,800 losses. The risk-based capital needed for a 10% EPD/Expected Loss is calculated below:

Insurer A + B

	<u>Asset Amount</u>	<u>Loss Amount</u>	<u>Probability</u>	<u>Claim Payment</u>	<u>Deficit</u>
	14,300	2,200	.2	2,200	0
	14,300	11,000	.6	11,000	0
	14,300	19,800	.2	14,300	5,500
Expected Value	14,300	11,000		9,900	1,000
Capital:		3,300	(= Assets - Expected Loss)		
EPD/Expected Loss:		.10			
Capital/Expected Loss:		.30			

The \$3,300 of capital equals the sum of the separate risk-based capital amounts of \$3,000 and \$300.

Combining the risk elements will *reduce* the risk-based capital if the elements are *independent*. For example, suppose that the value of the loss for Line A does not depend on the value for Line B. Then we have the following possible total losses with their associated probabilities:

<u>Loss Amount</u>			<u>Probability</u>		
A	B	Combined	A	B	Combined
2,000	200	2,200	0.20	0.20	0.04
2,000	1,000	3,000	0.20	0.60	0.12
2,000	1,800	3,800	0.20	0.20	0.04
10,000	200	10,200	0.60	0.20	0.12
10,000	1,000	11,000	0.60	0.60	0.36
10,000	1,800	11,800	0.60	0.20	0.12
18,000	200	18,200	0.20	0.20	0.04
18,000	1,000	19,000	0.20	0.60	0.12
18,000	1,800	19,800	0.20	0.20	0.04

Adding the \$13,000 and the \$1,300 asset amounts and using the above combined losses and probabilities, we can determine the expected policyholder deficit for the total of the two lines:

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	<u>Asset Amount</u>	<u>Loss Amount</u>	<u>Probability</u>	<u>Claim Payment</u>	<u>Deficit</u>
	14,300	2,200	0.04	2,200	0
	14,300	3,000	0.12	3,000	0
	14,300	3,800	0.04	3,800	0
	14,300	10,200	0.12	10,200	0
	14,300	11,000	0.36	11,000	0
	14,300	11,800	0.12	11,800	0
	14,300	18,200	0.04	14,300	3,900
	14,300	19,000	0.12	14,300	4,700
	14,300	19,800	0.04	14,300	5,500
Expected Value	14,300	11,000		10,060	940
Capital	3,300				
EPD/Loss	0.300				
Capital/Loss	0.085				

Notice that the \$940 expected deficit for the combined lines is less than the sum of the individual expected deficits (\$1,100). This produces an 8.5% EPD/Expected Loss protection level, compared to the 10% value for the separate pieces. To reach the same 10% level as before, we do not need the amount (\$3,300) of capital obtained by adding the separate amounts of risk-based capital.

	<u>Asset Amount</u>	<u>Loss Amount</u>	<u>Probability</u>	<u>Claim Payment</u>	<u>Deficit</u>
	13,500	2,200	0.04	2,200	0
	13,500	3,000	0.12	3,000	0
	13,500	3,800	0.04	3,800	0
	13,500	10,200	0.12	10,200	0
	13,500	11,000	0.36	11,000	0
	13,500	11,800	0.12	11,800	0
	13,500	18,200	0.04	13,500	4,700
	13,500	19,000	0.12	13,500	5,500
	13,500	19,800	0.04	13,500	6,300
Expected Value	13,500	11,000		9,900	1,100
Capital	2,500				
EPD/Loss	0.100				
Capital/Loss	0.227				

As shown here, we only need \$2,500 in capital, which is 22.7% of expected losses. This compares to the 30% factor required for the losses taken separately.

Using a similar analysis, it can be easily shown that if assets and liabilities are independent, the risk-based capital factor for their combination will also be less than the sum of the separate risk capital amounts. In general, risk-based capital cannot be properly determined unless we know whether risk elements are independent or whether they are correlated.

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Insurer

Year

MINIMUM ASSET TEST

Reference Page			Current Year	Prior Year
			(01)	(02)
			\$'000	\$'000
1. Assets Available for Test Purposes				
05	Total Assets	01	413,068	378,808
08	Less: Non-Admitted Assets	02	11,506	6,990
08	Investment Valuation Reserve and Reserve for Foreign Exchange Fluctuations	03	4,922	1,108
	Non-admitted portion of shares of property & casualty Insurers (attach details)	04	0	0
05	Deferred Policy Acquisition Expenses	05	19,414	19,400
	.....	06	0	0
70	Plus: Excess of Market Value over Book Value (page 70, line 08, column 03)	07	0	0
	.....	08	0	0
	Equals: Assets Available for Test Purposes	09	377,226	351,310
2. Liabilities for Test Purposes				
06	Total Liabilities	10	300,512	279,937
08	Plus: Hall Insurance Surplus Fund	11	0	0
08	Reserve for negative non-cancellable accident and sickness liabilities	12	0	0
08	Reserve for Reinsurance Ceded to Unregistered Insurers (page 50, line 09, column 10)	13	2,926	2,982
50	.....	14	0	0
	.....	15	0	0
	Equals: Liabilities for Test Purposes	16	303,438	282,919
3. Reinsurance Ratio (Accident and Sickness claims are excluded from the calculation)				
40	Gross claims incurred during preceding 12 months (page 40, line 19, column 08 plus column 09)	17	100,527	107,595
40	Portion of (line 17 in respect of reinsurance ceded during preceding 12 months (page 40, line 19, column 10)	18	6,886	27,173
	Reinsurance Ratio: lesser of (line 18 / line 17 x 100) and 50%	19	7.00	25.00
4. Margins Required for Test Purposes				
(a) Accident and Sickness Policies				
45	Margin on claims (15% of unpaid claims and adjustment expenses other than those in respect of instalment claims)	20	15	28
43	Plus: Margin on unearned premiums (15% of unearned premium other than those in respect of non-cancellable policies or, if applicable, page 60, line 15, column 05)	21	0	26
	Equals: Margin required for Accident and Sickness policies	22	15	52

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Insurer

MINIMUM ASSET TEST - Continued

Year

Reference Page		Current Year (01)	Prior Year (02)
		\$'000	\$'000
	4. Margins Required for Test Purposes (cont'd)		
	(b) Policies other than Accident and Sickness Policies		
	(i) Unpaid Claims and Unearned Premiums		
36	Margin on claims (15% of unpaid claims and adjustment expenses)	26,793	23,716
39	Plus: Margin on unearned premiums (15% of unearned premiums or, if applicable, page 69, line 14, column 05)	7	231
50	Excess of "Required Coverage" over "Reserve" for Reinsurance Ceded to Unregistered Insurers (page 50, line 99, column 31 minus column 10)	805	817
	Equals: Margin required for Unpaid Claims and Unearned Premiums	27,605	24,764
	(ii) Premiums Written		
40	Basic margin (15% of gross premiums written during preceding 12 months)	30,761	30,213
	Plus: Supplementary margin on gross premiums (lesser of 5% of gross premiums written during preceding 12 months and \$500,000)	500	500
	Equals: Gross margin	31,261	30,713
	Less: Margin reduction for reinsurance (Gross margin x Reinsurance Ratio)	2,168	7,478
	Equals: Margin required for premiums written	29,073	23,035
	(iii) Claims Incurred		
16	Basic margin (22% of average annual gross claims incurred during preceding 36 months)	22,895	23,700
	Plus: Supplementary margin (lesser of 7% of average annual gross claims incurred during preceding 36 months and \$500,000)	500	500
	Equals: Gross margin	23,395	24,200
	Less: Margin reduction for reinsurance (Gross margin x Reinsurance Ratio)	1,638	6,050
	Equals: Margin required for claims incurred	21,757	18,150
	5. Excess of Assets Available Over Assets Required		
67	Liabilities for test purposes (page 67, line 14)	303,438	282,919
67	Plus: Margin required for Accident and Sickness policies (page 67, line 22)	15	52
	Margin required for policies other than Accident and Sickness policies (the greatest of above, lines 04, 09 and 14)	29,073	24,764
	Equals: Assets required for test purposes	332,526	307,735
67	Assets available for test purposes (page 67, line 09)	377,226	351,310
	Excess of Assets Available over Assets Required for Test Purposes	44,700	43,575
	Authorized Adjustments	0	0
	Adjusted Margin	44,700	43,575