

How Might the Presentation of Liabilities at Fair Value Have Affected the Reported Results of U.S. Property and Casualty Insurers?

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List of Exhibits

5.4.1	Bar Chart — Variation in Average Time to Payment Across Company Groups	35
5.4.2	Dispersion Chart — Average Time to Payment by Company Group and Coverage Year	36-37
5.4.3	Bar Chart — Average Discount Factor by Product at Each Year-End, Calculated by Discounting the 2002 Reserves at Historical Interest Rates	40
5.4.4	Dispersion Chart — Average Discount Factors by Company Group at Each Year-End	40-41
5.5.1	Bar Chart — Empirical Pricing Risk Margins by Coverage Year for Composite of Selected Company Groups	46-47
5.5.2	Bar Chart — Empirical Pricing Volatility by Company Group and Coverage Year	48-49
5.5.3	Graph — Empirical Market Pricing Risk Margins Versus Pricing Volatility, Showing Empirical Observations, Approximate Market Line, and Selected Values.....	50
5.5.4	Bar Chart — Derived Market Reserve Risk Margins for Composite of Company Groups at Each Year-End, Using Two Alternative Risk Measurement Methods.....	52-53
5.5.5	Dispersion Chart — Derived Market Reserve Risk Margins by Company Group at Each Year-End, Using HFB Measurement Method.....	54-55
5.5.6	Table — Impact of Company Size on Measured Reserve Risk.....	55
5.5.7	Table — Stability of Market Reserve Risk Margins by Company Group.....	56
6.1.1	Bar Chart — Summary of Components of Fair Value at Year-End 2002.....	57
6.1.2	Bar Chart — Composite Fair Value Liabilities as Ratio To Nominal Liabilities, Using Two Alternative Risk Measurement Methods.....	58-59
6.1.3	Dispersion Chart — Ratios of Fair Values to Nominal Values by Company Group and Year-End, Using HFB Measurement Method	60-61
6.2.1	Table — 11-Year GAAP Income Statement for Composite of Company Groups, Recast to Fair Value Presentation Format, Matched Investment Strategy	68-70
6.2.2	Bar Chart — Investment Income Ratios to Earned Premium for Composite of Company Groups, Reported on a Marked-to-Market Basis, Matched Investment Strategy	63
6.2.3	Table — 11-Year Fair Value Income Statement for Composite of Company Groups, Matched Investment Strategy, Reserve Risk Measured Using HFB Method	71-73
6.2.4	Bar Chart — Operating Ratios: Fair Value Versus US GAAP for Composite of Company Groups.....	65-66
6.2.5	Table — 11-Year GAAP Income Statement for Composite of Company Groups, Recast to Fair Value Presentation Format, Long Investment Strategy	74-76
6.2.6	Table — 11-Year Fair Value Income Statement for Composite of Company Groups, Long Investment Strategy, Reserve Risk Measured Using HFB Method	77-79
6.2.7	Bar Chart — Comparison of Investment Income Ratio to Earned Premium for Workers Compensation Under Matched and Long Investment Strategies	67
7.1.1	Table — Correlations Between Reported Operating Ratios and Economic Margins, Under US GAAP and Fair Value	82
8.1.1	Table — List of Selected Company Groups, Including Market Share at Beginning and End of Study Period.....	84-85
8.1.2	Table — Chart of DPAC Ratios by Company and Year.....	90
8.1.3	Chart — Non-Tabular Discounts as Ratio to Reported Liabilities, by Company Group at Each Year-End	92
8.1.4	Table — Regulatory Financial Data for Composite of Company Groups, from Insurance Expense Exhibit.....	109-111
8.1.5	Table — <i>Pro Forma</i> Estimated GAAP Financial Data for Composite of Company Groups, in Traditional Format	112-114
8.2.1	Table — Bloomberg Interest Rates	97
8.2.2	Table — Federal Reserve Treasury Yields.....	98
8.2.3	Table — Interest Rates Used in Our Analysis	99

1. Executive Summary

The Tillinghast business of Towers Perrin was asked by the Casualty Actuarial Society to undertake a research project that analyzed the potential impact on the U.S. property and casualty insurance industry of converting from GAAP to fair value financial reporting. Fair value financial reporting has been an ongoing initiative by both the IASB and FASB. Specifically, we were asked to (i) examine the impact of this accounting change on a “typical” U.S. property and casualty insurer, (ii) identify the practical issues associated with the measurement of property and casualty insurance liabilities¹ on a fair value basis, and (iii) prepare a report that would help all parties to evaluate the extent to which fair value accounting meets its intended objectives of greater transparency, reliability and relevance than is achieved under current U.S. GAAP accounting. The Casualty Actuarial Society provided partial funding for our research.

Research Approach

To explore these issues, we constructed an historical database containing 11 years of published regulatory financial and actuarial data of a sample of insurance companies, for three major insurance products: Personal Auto Liability, Workers Compensation, and Medical Professional Liability. These products were chosen because they have distinctly different claim payment patterns and risk profiles. The financial data that we used are on a direct basis, prior to any reinsurance that the company may have purchased or sold. For each of the three products we restated the published direct regulatory results for each company over the 11-year period, ultimately producing *pro forma* financial statements for each product, company, and calendar year on both a current U.S. GAAP and a proposed fair value basis.

Sections 5.2 and 5.3 of the paper describe the data we used and the adjustments we made to convert the data from a regulatory to a U.S. GAAP basis. Since the regulatory data had some limitations, those sections also describe the assumptions that we made in the conversion process. Taken in the overall, we do not believe that these adjustments or assumptions are material to our overall conclusions.

Having developed a baseline set of GAAP financial data, we then sought to adjust that data, by restating the claim and defense cost liabilities to a fair value basis. Neither the IASB nor FASB have prescribed a specific approach for calculating the fair value of insurance liabilities. Thus, our charge was to design and test alternative *valuation methods* and report on the results, without opining on the appropriateness of any particular methods.

To convert the company financial statements to a fair value basis, we separately analyzed two key new elements required to convert the nominal values of claim and defense cost liabilities to fair value: the time value of money and market risk margins², observing how these two

¹ The FASB and IASB fair value projects have a long-term goal of valuing all financial assets and liabilities at fair value. The scope of the CAS-commissioned analysis was limited to understanding the impact of fair value accounting on property and casualty insurance claim and defense cost liabilities.

² In this paper we refer to this margin as a market risk margin; others refer to it as a market value margin.

elements vary by product, by company and over time³. We found that, depending on the relative magnitude of the two elements, the fair value of claim and defense cost liabilities could be lower or higher than their nominal value.

Our starting point was the *pro forma* GAAP claim and defense cost liabilities for each company group, product and annual statement date. We assumed that the reported amounts represent the best estimate of the nominal ultimate liabilities as of each financial statement date. Development of the adjustment for the time value of money required making assumptions as to the timing of expected future cash flows associated with the liabilities and making selections of appropriate interest rates. Traditional actuarial approaches were applied to each company group's data to develop the expected future cash flows. The cash flows were then discounted at risk-free rates based on yield curve data relating to U.S. Treasury securities.

While discounting for the time value of money and the use of U.S. Treasuries as a proxy for risk-free rates might seem relatively straightforward, there are a number of implementation issues in the context of fair value — all of which must be resolved prior to implementation. These issues are discussed in Section 5.4 of the paper. One issue is that the articulated fair value principles express a strong preference for “market-based” assumptions over “entity-specific” assumptions. A key question is therefore whether the expected pattern of future claim payments should be derived from entity-specific data, or by some other means. A second issue is the determination of the risk-free rate. While interest rates on government debt have generally been accepted as risk-free, a wide range of recent academic research is coming to the view that such rates are not the best proxy for risk-free rates.

For each of the insurance products, we also developed a market risk margin reflecting the additional amount that marketplace participants would demand as compensation for taking on the risk associated with the claim and defense cost liabilities. (Of necessity, this is a theoretical exercise, as there is no robust secondary market for such liabilities.) We calculated the market risk margins for each product, company, and statement date using a two step process: first we measured empirically the margins available in the market for pricing risk (i.e., the amount of risk that exists before the claims have occurred); then we measured the amount of reserve risk that remains once the claims have occurred and assumed that the market would demand the same margin per unit of risk in a reserving context as it did in a pricing context. To quantify the empirical pricing market risk margins, we analyzed the observable insurance pricing margins, based on the prices that insurers actually charged at the time the policies were sold. To measure the amount of risk associated with each company's claim and defense cost liabilities, we applied two alternative approaches: an analytic approach published by Mack and a stochastic simulation approach published by Hodes, Feldblum and Blumsohn.

In developing the market risk margin, there are also a number of implementation issues that must be resolved prior to implementation. The FASB and IASB have indicated that fair value estimates must include an element representing the premium that market participants would demand for risk, and that the risk premium must reflect real markets, including any imperfections in such markets. However, they have not defined risk mathematically or

³ We did not analyze the impact that an adjustment for the credit standing of the company would have on fair values (as some have proposed), as this element was outside the scope of the CAS-commissioned study.

prescribed how it should be measured. There is currently a wide divergence of opinion as to what risks should be included and how market risk margins should be determined. The main areas of disagreement are (a) the degree to which market imperfections exist, and therefore the degree to which they need to be reflected in fair value estimates; and (b) the definition of *systematic risk*, and how it should be measured and incorporated into fair value measures. Financial economists define systematic risk narrowly as equity market volatility, and argue that all other risks are diversifiable by investors, such that investors will not require a risk premium for those other risks. In their view, only risk that is correlated with equity market returns requires a risk premium. Others view equity market risk as one instance of systematic risk, with risk margins driven by a number of systematic elements: central bank monetary policy, interest rates, consumer price inflation rates, steel prices, energy prices, levels of economic activity, unemployment rates, government fiscal policy, and so forth. In addition markets in the real world are not perfect, such that the ability to diversify all of the non-equity risk may be limited.

The IASB is debating (along with the FASB) whether a fair value risk adjustment should include or exclude any risk that is not correlated with the equity market. This is a critical issue that will materially affect the fair value of property/casualty claim and defense cost liabilities. For example, under a narrow definition of systematic risk, earthquake insurance coverage would not require any risk premium — because earthquakes are not correlated with equity market returns. In contrast, under a broader definition of systematic risk, earthquake insurance coverage might attract a large risk premium — because even after it is diversified by issuing many policies, earthquake claim experience is highly volatile, exposing the insurer to the potential for massive losses.

In Section 5.5 of the paper, we discuss risk margin issues in detail. In calculating our risk margins we chose an approach that adopts the broader definition of systematic risk and measures risk empirically in terms of the amount of volatility in the ultimate claim costs for a portfolio of insurance contracts. Our chosen approach is illustrative and should not be interpreted as an endorsement of any particular view on the systematic risk issue. However, since it is based on empirical margins observed in the insurance market, it largely finesses these theoretical issues, capturing implicitly any market imperfections and reflecting the manner in which insurance risk is actually priced by the market.

Our analysis indicates that the resolution of the many implementation issues that we have identified will materially affect how the fair value of claim and defense cost liabilities will compare to their nominal values. In addition, because different methodologies produce different results, variations in implementation approaches by company will affect comparability across companies.

Impact of Fair Value on Financial Results

Applying the discount for the time value of money and the two alternative market risk margins to each company's GAAP claim and defense cost liabilities, we restated balance sheets and income statements to a hypothetical fair value basis and compared them to the corresponding GAAP results. The results are presented in Section 6. In summary, we observed the following:

- The magnitude of the changes from nominal to fair value liabilities varies significantly by product line, but is generally consistent with accepted perceptions of the characteristics

of these three products. For Personal Auto Liability, the combination of relatively low reserve risk and historically low interest rates causes the fair value to be close to the nominal value at year-end 2002; in a more normal interest rate environment the fair value of claim and defense cost liabilities is typically 4% to 5% below the nominal value. For Workers Compensation, while the amount of reserve risk is relatively low, the longer claim payout pattern creates a much deeper discount, causing the fair value of the liabilities to be substantially lower than the nominal value; typically 11% to 12% below the nominal value. For Medical Professional Liability, the measured reserve risk is sufficiently high that it almost offsets the discount, resulting in a fair value liability that is marginally below the nominal value at year-end 2002; typically fair values will be only 7% to 8% below the nominal value.

- The magnitude of the fair value adjustments vary over time and across companies, reflecting differences in interest rates — and also reflecting differences in expect claim payment patterns and the measured amount of reserve risk. Claim payment patterns vary by company, due to real differences in the make-up of the customers that they insure. There is also some variation in company-specific patterns over time due to the volatility of the actuarial data used to develop the expected payment pattern; this latter variation is probably spurious, contributing “noise” to the measurement of the fair values. More significantly, there is variation in the measured amount of reserve risk — between the two methods that we used, and for a particular company over time. More research into the measurement of risk is required, to avoid spurious variation in market risk margins over time and across companies.
- Of course, some of the variation in the measured amount of reserve risk should be expected across companies, reflecting differences in the characteristics of their insureds. However, we encountered several companies for which the measured amount of reserve risk is actually greater than the amount of market pricing risk — implying that these companies will, in theory, need to report a loss at the time the business is written. (That is, because the fair value of their liabilities will exceed the fair market premium for the contracts.)
- Some have suggested that fair value be implemented on the asset side of the insurer’s balance sheet, without a corresponding implementation on the liability side. Our results demonstrate quite concretely that this will introduce significant volatility into the reported income for each product line — even in situations where a cash-flow matched investment strategy is employed.
- Our results also demonstrate that if fair value is implemented for assets and liabilities, then the volatility of the investment returns is offset by contra-volatility in underwriting. To obtain a meaningful measure of performance, it will be necessary to look at the two sources of income in an integrated way. We have attempted to construct a financial statement presentation that is a first step in this direction.

Conclusions and Implications

Our research into the measurement of the fair value of property and casualty claim and defense cost liabilities offers several insights into the extent to which fair value accounting meets its intended objectives.

Reliability

It is an open question whether the estimation of discounts and market risk margins can be sufficiently reliable to support their inclusion in fair value estimates. The empirical data upon which these estimates rely are unstable, requiring a significant amount of judgment. Additionally, the particular method chosen to determine the market risk margin can yield substantially different results, suggesting that variation in the market risk margins across companies might be more reflective of the chosen method than of true differences in risk profiles. To achieve consistency, consideration will need to be given to some level of standardization in the implementation of fair value.

The implementation of fair value may not actually move reported results materially closer to economic reality. A primary goal of fair value is to move the financial reporting of financial instruments closer to market values, resulting in financial statements that are closer to the underlying economic reality, increasing their transparency. As part of our work, we estimated the true economic margins earned on each product for each coverage year, using after-the-fact experience reflecting the actual claim payments and interest rates. The correlation between U.S. GAAP operating ratios and these economic margins is quite low, suggesting a lack of transparency in the reported results. (In other words, the GAAP results do not provide the user with a true measure of the economic performance during the period.) However, the correlations between the fair value operating ratios and the economic margins are not materially better than those relating to U.S. GAAP, suggesting that the move to fair value may not materially increase transparency. This is because claim reserves are subject to considerable uncertainty, with significant potential for estimation error, and this phenomenon does not disappear with the adoption of fair value principles. Stated quite simply, the issue is whether it adds value to refine an estimated liability by incorporating fair value economic elements when the underlying estimate of the nominal liability is so uncertain.

Relevance

The preparation of fair value estimates is complex and will take considerable education of actuaries and others – both to develop the estimates and to use them. The current use of nominal estimates has a substantial advantage over fair values, in that nominal estimates are easy to understand. In addition, testing the adequacy of nominal estimates is straightforward. External users do this routinely, using information published by each company. In contrast, the time-value-of money and market risk margin elements add significant complexity, requiring a greater level of sophistication. How quickly and easily fair value measures can become relevant to both internal and external users of financial statements is a point of critical debate.

Of course, the use of fair values will move financial reporting closer to underlying economic reality. Few would dispute that market prices include elements for the time value of money and margins for risk-taking, either explicitly or implicitly. Many believe that a closer correspondence between economic performance and financial reporting will improve decision-making, by removing incentives to manage towards accounting income rather than economic value creation.

Cost

The additional analysis and assumptions required to support fair value estimates will result in a substantial investment by preparers of financial statements. While our results might be interpreted as a proof-of-concept, demonstrating that the data and methods necessary to perform the calculations can be developed, there will need to be significant further research and development on methodology prior to implementation. In addition, the data that we used were not perfectly suited to the task. For example we used some data that were net of reinsurance, where direct data would be more appropriate. In some areas, additional history for the time-series data would also be desirable. Further investment, to develop the data and refine the methodologies, will need to occur prior to implementation.

The fair value calculations are complex, and will require that informed judgments be made at several critical junctures. Preparation of fair value estimates for property and casualty insurance liabilities will therefore require the ongoing use of trained experts.

2. Introduction

2.1 Goals of the Paper

This paper is intended to address the following questions:

- How would a typical U.S. property and casualty insurance company's financial statements be impacted by the change in accounting from current U.S. GAAP to the International Accounting Standards Board's (IASB's) or the Financial Accounting Standards Board's (FASB's) proposed fair value accounting paradigm?
- What are the practical issues associated with the measurement of property and casualty insurance claim and defense cost liabilities on a fair value basis?
- How useful would the resulting property and casualty insurance company financial statements be, and would the change to fair value achieve the desired objectives of greater relevance, reliability and transparency?

To answer these questions, we have attempted to restate the historical published financial results of a sample of insurance companies over the past 11 years to illustrate how those results might have looked if their claim and defense cost liabilities (referred to by many within the industry as loss reserves) had been presented at fair value. Rather than restating the financial results for the entire company, we have restated each company's published results for three major insurance products (Personal Auto Liability, Workers Compensation, and Medical Professional Liability) using publicly available information drawn from each company's financial reports to regulators. (U.S. regulators require insurers to report detailed financial results by product line.) For each of the three products we restated the published results for each company, ultimately producing *pro forma* financial statements for each product and company on both a current U.S. GAAP and a proposed fair value basis. By focusing on these three lines, we are able to compare and contrast the impact of fair value accounting on (a) insurance products where claims are paid relatively quickly versus products where they are paid out over an extended period of time, and (b) insurance products with relatively low volatility in claim experience versus products with high volatility.

By performing illustrative fair value calculations on a set of companies, we can understand and explore, at a practical level, the implementation issues that would arise for preparers of financial statements if the fair value proposal was adopted for property and casualty insurers. In addition, our analysis provides empirical evidence as to the likely magnitude of two of the key building blocks of fair value: time value of money and market risk margins. We analyze how these two components vary by product, by company and over time.

Finally, we examine the impact that reporting on a fair value basis would have on the published performance of the sample companies and explore the implications for users of financial statements of a change to fair value in property and casualty insurance. The paper is intended to help all parties in their evaluation of the extent to which fair value accounting meets its intended objectives, i.e., greater transparency, reliability and relevance to the users of financial information.

As discussed more fully in subsequent sections, our research project was intentionally limited in its scope. Rather than attempting a comprehensive analysis, we have intentionally limited

our focus to a subset of key issues. *Perhaps most importantly our goal was not to develop a definitive methodology for measuring the fair value of insurance policy liabilities; while the methods presented are reasonable and consistent with our interpretation of fair value concepts, they are intended only to be illustrative of the types of calculations that could be performed by preparers of financial statements using available data, and some of the practical issues that they will face.*

Writing this paper has posed a daunting challenge, due to the diversity of potential readers. Some may have expertise in financial accounting principles, but have only a limited knowledge of the property and casualty insurance industry. Others may have a deep knowledge of the insurance industry with a more limited background in financial accounting, particularly in the emerging area of fair value. This situation has caused us to include more in the paper than any individual reader might find necessary. Section 2.4 provides a roadmap to the paper; we would encourage readers to review it and develop a strategy for reading the paper that suits their circumstance. This should help to make the paper more digestible.

2.2 Who We Are

Towers Perrin is a global professional services firm that helps organizations around the world optimize performance through effective people, risk and financial management. The Tillinghast business of Towers Perrin provides global actuarial and management consulting to insurance and financial services companies and advises other organizations on risk financing and self-insurance. We help our clients with issues relating to mergers, acquisitions and restructuring; financial and regulatory reporting; risk, capital and value management; and products, markets and distribution.

We are the largest employer of property and casualty actuaries and operate a global practice through a network of 42 offices in 20 countries. Our actuaries hold leadership positions in professional organizations, have contributed extensively to the actuarial literature and are frequent speakers on leading-edge subjects.

The authors, Robert F. Conger, James D. Hurley, and Stephen P. Lowe, are all principals and consulting actuaries with Tillinghast. Each has been a consultant for roughly 20 years and has helped a variety of insurance company clients with financial reporting issues, particularly in the context of property and casualty insurance claim reserves.

In addition to the three authors, the project team included a number of individuals who worked very hard in a very short timeframe to develop the underlying data, program the calculations, and assist in the drafting and editing of the paper. Consulting actuaries Emmanuel Bardis, Christina Gwilliam, and Joseph Lebens supported the analysis effort by designing the discounting and risk margin calculations, reviewing the detailed results, and preparing initial drafts of the analysis sections; Jeanne Hollister provided project management; and Julian Leigh and Peter Wright served as peer reviewers. Michele Bacik assisted in the accounting research and prepared an initial draft of the background sections. Benoit Derval, Richard Hayes, Feng Sun, and Yi Zhang performed the extensive data extractions and manipulations. Without the effort of this team, the paper would not have been possible.

2.3 Funding for the Study

The Casualty Actuarial Society provided initial seed funding for this research project. In addition, the CAS established a project steering committee that provided constructive

suggestions and editorial advice. The authors are grateful for this support and assistance as well.

2.4 Roadmap to the Paper

The balance of the paper is divided into six sections, each of which is described below.

- The *Background* section of this report discusses the definition of fair value, how fair value might be applied in a property and casualty insurance context, the status of fair value deliberations at the two principal accounting standards bodies (the IASB and FASB), and the accounting principles relevant to the evaluation of the fair value proposal. This section will be primarily of use to those readers who are not familiar with financial accounting and the emerging fair value proposal. With the possible exception of Section 3.2, which discusses fair value in the context of property and casualty insurance, this section can be skimmed or skipped entirely by those familiar with fair value.
- The *Scope of Inquiry* section describes how the scope of our research was limited, either by design to focus our inquiry, or by practical considerations such as available data, time and resources. Understanding these limitations is important, as they provide important context to our conclusions.
- The Research Approach section:
 - Describes the database used for analysis purposes and the sources of the information in that database.
 - Describes the GAAP adjustments that we made for each of the selected companies, to convert the published results from a regulatory accounting basis to a current U.S. GAAP basis.
 - Discusses alternatives for selecting interest rates and claim payment patterns and describes our approach to calculating a discount for the time value of money applicable to the claim and defense cost liabilities associated with each product. The results of these calculations are shown and analyzed.
 - Discusses alternatives for calculating market risk margins and describes two alternative approaches selected for illustrative purposes. The results of applying these two calculation approaches are shown and analyzed.
- The *Impact of Fair Value on Reported Financial Results* section presents and analyzes the impact of adjusting the claim and defense cost liabilities from a nominal to a fair value basis. The overall magnitude of the fair value adjustments, and the variation between products, across companies and over time are presented and analyzed. The composite financial results presented on a fair value basis are displayed and compared to the results on a U.S. GAAP basis. The range of impacts between companies and the progression of results from year to year are analyzed. The interaction between underwriting and investment is analyzed by comparing results under two alternative investment strategies.
- Finally, the *Conclusions and Implications* section (a) discusses the degree to which the results of our study suggest that fair value estimates either pass or fail the tests of improved transparency, reliability and relevance; and (b) identifies issues that are likely to arise if fair value accounting were adopted for the property and casualty insurance industry.

- A *Technical Appendix* provides additional details as to the development of the financial data, the time-value-of-money adjustment, and the market risk margin.

3. Background

3.1 Definition of Fair Value

In order to gain insights on the impact and implications of implementing fair value on the U.S. property and casualty insurance industry, we first need to have a good understanding of how “fair value” is defined, and what differentiates it from current accounting practices under generally accepted accounting principles (“GAAP”) in effect in the United States today.

Although there is currently not one standard definition of “fair value,” the definitions proposed by the International Accounting Standards Board (IASB)⁴ and the Financial Accounting Standards Board (FASB)⁵, are among the most commonly quoted. While not identical, the IASB and FASB definitions can be thought of as slightly different variations on the same general concept.

In 1999, the IASB released an insurance issues paper in which it defined “fair value” as:

“The amount for which an asset could be exchanged or a liability settled between knowledgeable, willing parties in an arm’s length transaction.”⁶

The definition above was subsequently codified in IAS 39. FASB, in a Preliminary Views document also released in 1999, proposed the following alternative definition:

“Fair value is an estimate of the price an enterprise would have realized if it had sold an asset or paid if it had been relieved of a liability on the reporting date in an arm’s length exchange motivated by normal business considerations. That is, it is an estimate of an exit price determined by market interactions.”⁷

More recently, FASB has modified its “fair value” definition in an update summary of Board decisions regarding its Fair Value Measurement project, defining fair value as:

“The amount at which an asset or liability could be exchanged in a current transaction between knowledgeable unrelated willing parties when neither is acting under compulsion.”⁸

⁴ According to the IASB web site, “The International Accounting Standards Board is an independent, privately funded accounting standard setter based in London, U.K. Board members come from nine countries and have a variety of functional backgrounds. The Board is committed to developing, in the public interest, a single set of high quality, understandable and enforceable global accounting standards that require transparent and comparable information in general purpose financial statements. In addition, the Board cooperates with national accounting standard setters to achieve convergence in accounting standards around the world.”

⁵ From the FASB web site, “Since 1973, the Financial Accounting Standards Board has been the designated organization in the private sector for establishing standards of financial accounting and reporting in the United States. The mission of the Financial Accounting Standards Board is to establish and improve standards of financial accounting and reporting for the guidance and education of the public, including issuers, auditors, and users of financial information.”

⁶ IASC, *Issues Paper* (November 1999), p. A181.

⁷ FASB, *Reporting Financial Instruments and Certain Related Assets and Liabilities at Fair Value* (1999), paragraph 47.

⁸ FASB, *Project Updates — Fair Value Measurement — Last Updated: October 1, 2003* (www.fasb.org, 2003), p. 4.

While not explicitly stated in the previous definitions, the general concept of fair value implies a three-level hierarchy of methods for measurement as originally proposed by the Joint Working Group of Standard Setters (“JWG”)⁹ and subsequently affirmed by FASB and the IASB¹⁰. Within this hierarchy, estimates of fair value should be determined at the highest level that is practically implementable:

- *Level 1:* The estimate of fair value should be determined *directly* — by reference to the current observable (quoted) market prices of identical assets or liabilities, whenever those prices are available in a sufficiently active market.
- *Level 2:* If an estimate of fair value cannot be determined directly, then the estimate of fair value should be determined via *proxies* — by reference to current observable (quoted) market prices for similar assets or liabilities, i.e., those that are reasonably comparable, having similar characteristics and cash flows that would respond similarly to changes in economic conditions, such that any differences are objectively determinable.
- *Level 3:* If an estimate of fair value cannot be determined directly or via proxies, then the estimate of fair value should be determined via *valuation methods* — using generally accepted analytic approaches predicated on theoretical market pricing models. Such estimates should be based on the results of multiple valuation techniques, with the choice of techniques depending on the circumstances and whether the information necessary to apply a particular technique is available. The use of multiple techniques necessitates a reconciliation of differing results, helping to reveal biases in the assumptions and increasing the reliability of the estimate.

Both the IASB and FASB proposals indicate a clear preference for the use of observed market values over valuation estimates. Further, if valuation estimates must be used, the methods for developing those estimates should be consistent with the market. FASB has explicitly indicated that all estimates of fair value should maximize market inputs (observable market prices and market assumptions) drawn from the appropriate reference market, and that, in general, the more market inputs used the more reliable the estimate.¹¹

The critical implementation issue for fair value is the development of market-consistent valuation methods for assets and liabilities for which market values are not observable, either directly or by proxy.

FASB has suggested that valuation methods can take several forms:¹²

⁹ The Joint Working Group of standard setters was formed in 1997 for the purpose of developing a coherent framework for accounting for financial instruments measured at fair value. The JWG consists of nominees of accounting standard setters or other professional organizations in Australia, Canada, France, Germany, Japan, New Zealand, the United Kingdom, the United States, and five Nordic countries; as well as the International Accounting Standards Board. In December 2000, the JWG issued a draft standard for financial instruments and similar items that focused on fair value accounting. FASB news release, *FASB Publishes Special Report of the Joint Working Group of Standard Setters on Financial Instruments* (Jan. 5, 2001).

¹⁰ IASB, *International Accounting Standard 39*.

¹¹ FASB, *op. cit.*, p. 5.

¹² FASB, *op. cit.*, p. 6.

- *Market methods*, for example, valuations based on multiples drawn from transactions involving comparable assets or liabilities;
- *Income methods*, for example, present value techniques or option pricing models;
- *Cost methods*, for example, the replacement or reproduction cost of an asset in comparable condition.

For all of these methods, the valuations should incorporate market assumptions that marketplace participants would theoretically use in pricing (examples could be market interest rates, equity prices, option prices, etc.). An entity may use its own internal assumptions as a practical expedient to the extent that market information is unavailable or too costly. Similarly, the valuation methods used by the preparer should be consistent with techniques used by marketplace participants to negotiate prices for the class of asset or liability being valued. To the extent that there is no generally accepted marketplace method, an internally developed method may be used by the preparer – provided that the method is consistent with accepted economic methodologies and the results are tested against observable market values wherever possible.¹³

Presumably, a litmus test for any valuation method would be whether it produced market values when applied to assets or liabilities where a market value was observable.

Finally, the IASB and FASB have each indicated that valuation approaches based on expected cash flows need to include adjustments for both the time value of money and the risk that is associated with the cash flows. For example, IASB has made the following statements:

- “An undiscounted measure is inconsistent with fair value”.
- “The measurement of fair value should include an adjustment for the premium marketplace participants would demand for risks and mark-up in addition to the expected cash flows”.¹⁴

FASB now refers to these valuation methods as *expected present value approaches*¹⁵, and has clarified that the valuation may adjust for risk either (a) by explicitly adjusting the cash flows for risk (i.e. substituting certainty equivalents) and discounting at a risk-free rate; or (b) by adjusting the discount rate.¹⁶

Risk can be separated between elements that are diversifiable through the “law of large numbers”, and those that are non-diversifiable, or systematic. While there is general agreement that perfectly competitive markets do not reward risk that is diversifiable, there is less agreement as to how this economic principle should be applied in the context of fair value. Some take the view that the only systematic risk that is relevant is the equity risk that an investor faces, and therefore that the systematic risk associated with any portfolio of

¹³ FASB, *op. cit.*, p. 6.

¹⁴ International Accounting Standards Committee, *Insurance Contracts — Phase I* (August 13, 2003).

¹⁵ FASB, *op. cit.*, p. 3.

¹⁶ Presumably FASB would also consider a third alternative approach, by adjusting the probabilities of the cash flows (i.e., making them risk-neutral) and discounting at the risk-free rate, as also consistent with fair value concepts.

financial instruments should be measured by the degree to which that portfolio's performance is correlated with the performance of the equity market. Others take a broader view that equity market risk is but one manifestation of systematic risk. The IASB and FASB have debated whether all types of systematic risk, or only risk that is correlated with equity market risk, should be used in these valuations.

3.2 Fair Value in a Property and Casualty Insurance Context

In addition to understanding the conceptual underpinnings of the fair value proposal, it is important to also understand the application of fair value within the specific context of U.S. property and casualty insurance companies.

Both the FASB and IASB fair value projects have a long-term goal of valuing all financial assets and liabilities at their estimated fair value (subject to the resolution of implementation issues, particularly relating to concerns regarding the reliability of the estimates). In the context of property and casualty insurance, this would include invested assets, insurance policy liabilities, and several other insurance-related asset and liability classes.

Measuring the fair value of invested assets does not pose any special or industry-specific issues for property and casualty insurers, as these types of assets are found on the balance sheets of many other types of entities.

Property and casualty insurance policy benefit liabilities include (a) *claim liabilities*, reflecting the estimated cost of payments directly to claimants under the coverage provided by the policy; (b) *defense cost liabilities*, reflecting the estimated cost of providing contractual services related to the claims, such as legal, investigation, and court costs; and (c) *claim adjusting cost liabilities*, reflecting the estimated administrative costs associated with processing the claims.

Offsetting these policy benefit liabilities are anticipated subrogation and salvage recoveries from third parties, deductible recoveries from the insured, and recoveries from reinsurers.

In addition to policy benefits, assets or liabilities may exist for additional or return premiums on policies where the premiums are contractually adjusted retrospectively based on an audit of the insured's actual exposure during the period, or based on the actual claim experience.

In addition to contractual returns of premiums, some insurers also pay dividends to policyholders after the policies have expired. These dividends have the same economic substance as return premiums, however they are not contractual. Under current U.S. GAAP, insurers typically accrue a liability for the policyholder dividends that they expect to pay.

The major point of difference between current accounting and the proposed fair value approach for property and casualty insurance companies is the valuation basis for policy benefit liabilities. Under current U.S. GAAP, these liabilities are normally estimated using an undiscounted value of the best estimate of future payments, without an explicit discount for the time value of money or a margin that compensates for risk.¹⁷ If the fair value proposal is implemented, then these two elements would need to be explicitly measured and

¹⁷ Alternatively, one could posit that under current accounting these two elements are assumed to precisely offset one another.

incorporated into the valuation of policy benefit liabilities. Depending on the relative magnitude of the two elements, the fair value of these liabilities could be lower or higher than their nominal value.

In current GAAP financial statements, policy benefit liabilities are segregated between liabilities for policy benefits already incurred on coverage already provided, and liabilities for future policy benefits on coverage that will be provided. The former is covered by the *loss and loss adjustment expense reserves*; the latter by the *unearned premium reserve*, which incorporates provisions for underwriting expenses, policy benefit liabilities and return premium liabilities. However, under the proposed fair value approach (as we interpret its application) the segregation of policy benefit liabilities between past and future coverage would end; the policy benefit liabilities associated with all contracts issued would be presented as a unified financial statement element.

Traditional insurance accounting under current U.S. GAAP reflects a deferral-and-matching approach: premiums are earned ratably over the term of the insurance contract, with the associated underwriting expenses and policy benefits incurred as the coverage is provided. As policies are written, an unearned premium reserve equal to the full expected policy premium is established. The unearned premium reserve is then reduced pro rata over the term of the policy to achieve level premium revenue¹⁸. Because the unearned premium is gross of policy acquisition expenses that are front-ended, a deferred policy acquisition cost asset is also established at policy inception and amortized over the term of the policy. The net effect of this approach is to defer the recognition of revenue, expense and profit until the coverage has actually been provided.

The proposed fair value approach represents a radical departure from the traditional deferral-and-matching approach. The unearned premium reserve liability and deferred policy acquisition cost asset would no longer be elements of the balance sheet (under our interpretation). Premiums would presumably be taken into revenue as the contracts are written. To the extent that the fair value of the associated policy liabilities is less than the premium after expenses, an immediate gain would be recognized; to the extent that the fair value of policy liabilities is greater, an immediate loss would be recognized. *In essence, under fair value companies will report on the profitability of the policies issued (i.e., written) during the period, rather than on the coverage provided. This will necessitate greater reliance on pricing assumptions in financial reporting.*

One might argue that the premium (net of policy acquisition and other underwriting costs) is the market value of the associated policy liabilities at the time of issue (assuming the market meets the fair value criteria), such that no gain or loss should be recognized immediately. (The IASB has described this approach as an “entry” fair value system.) However, this argument only defers the question for a short while. At some point after issue, an estimate of the fair value of the policy benefit liabilities must be determined that reflects the claim experience that has emerged subsequent to the issuance of the policy (in other words, the valuation must shift from an “entry” to an “exit” fair value). Those arguing against an “entry” fair value approach point out that most insurers would have an estimate of the policy benefit liabilities, reflecting their view of the adequacy of market prices, at the time of

¹⁸ Technically, the premiums are to be earned over the period of risk, in proportion to the amount of insurance protection provided. While it is often the case that the amount of protection provided is level over the contract period, this is not always the case.

issue. Given the historical cyclical nature of price adequacy in the property and casualty insurance markets, an estimate of the fair value of the policy benefit liabilities that is independent of the premium may be more representationally faithful. Reported income would then reflect management's best estimate of the margins on the business written during the period.

Currently, under U.S. GAAP the claim and defense cost liabilities are typically presented net of anticipated subrogation and salvage recoveries, and anticipated deductible recoveries (except for Workers Compensation deductibles, for which the right of offset does not exist). This presentation approach is considered to be consistent with the entity's focus on the net cost of the claims. However, in contrast, the claim and defense cost liabilities are presented gross of anticipated reinsurance recoveries, with the latter presented as an offsetting asset. It is not clear whether the fair value proposals will require the complete separation of the policy benefit liabilities into gross and recoverable components, or whether the current status quo will continue.

Insurers typically purchase reinsurance to protect themselves against adverse fluctuations in claim experience. In addition, some contracts are shared via reinsurance pools, in which participants take a pro-rata share of the insurance policies placed in the pool. Under current U.S. GAAP, the anticipated recoveries under these contracts are recorded as an asset. Currently, the valuation of reinsurance recoveries is consistent with the valuation of the underlying policy benefit liabilities: both are recorded at their nominal best estimates. With the possible exception of an adjustment for third-party credit risk, we would hope that if fair value is implemented, the valuation of anticipated reinsurance recoveries would continue to be consistent with the underlying liabilities. Inconsistent treatment between the underlying policy liabilities and reinsurance recoverables could be particularly problematic for reinsurance pools.

Presumably, just as premium revenue will shift from an earned to a written basis and the unearned premium reserve will be replaced by a unified policy benefit liability, reinsurance premium costs will be similarly transformed under fair value. Reinsurance premiums paid to reinsurers will be expensed at the time the reinsurance policy is issued, and an offsetting policy benefit asset will be established reflecting the fair value of recoveries anticipated under the contract.

In addition to policy liabilities, many property and casualty insurers enter into contingent commission agreements with third parties involved in the sales of their products. Under these agreements, the producers receive additional incentive payments if they meet certain contractual performance targets as to the volume and profitability of the business they generate. Performance targets may relate to more than the current year. Current accounting practice is to accrue for the expected (nominal) cost of contingent commissions, so as to achieve an approximate matching of revenue and expense. The fair value proposals would presumably require that these liabilities be measured via expected present value approaches (given the absence of any market values), and that accruals be accelerated to coincide with the issuance of the underlying insurance policies. Contingent commissions are also common on reinsurance contracts; in this context they operate much like retrospective premium adjustments.

3.3 Estimating the Fair Value of Policy Benefit Liabilities

We can state unequivocally that there is no secondary market for property and casualty policy benefit liabilities associated with claims that have already occurred¹⁹ — at least not a market with “knowledgeable, willing parties motivated by normal business considerations at prices determined by market interactions”. Policy benefit liabilities are sometimes commuted by mutual agreement between the insured and insurer; however, such commutations inevitably involve special circumstances. Occasionally an insurer will seek to purchase a portfolio loss reserve transfer from a reinsurer, which would indemnify the insurer for the actual settlement costs associated with a defined segment of business or category of claims. These portfolio transfers do not provide an indicated market value because (a) the risk transfer is normally incomplete, because there are aggregate limits on recoveries under the contract; (b) while the contracts may transfer some risk they do not transfer the liability, which remains with the originating insurer; (c) there are usually only a handful of reinsurers quoting on the deal; and (d) the insurer is often in distress, and therefore not motivated by normal business considerations.

Many have asked why a secondary market for property and casualty insurance liabilities has not emerged. Most industry experts would agree that three factors prevent the formation of such a market:

1. *Legal Impediments* – Policy benefit liabilities are generally not transferable from one insurer to another without the express consent of the insureds and/or claimants. While this would not preclude transfer of risk via contracts of indemnity, it does create a serious impediment to the full transfer of liability.
2. *Uniqueness of Insurance Portfolios* – Portfolios of insurance contracts are not homogeneous. Even within a given product line they differ because of differences in company marketing practices, underwriting policies, policy forms, coverage terms, and claim handling strategies. They also differ due to external factors such as the state of jurisdiction. For example, even in a relatively homogenous product line such as Personal Auto insurance, the claim and defense cost liabilities associated with a policy sold to an unmarried youthful operator in New Jersey will be markedly different than one sold to a middle-aged married head-of-household in Iowa. The former policy will typically have lower limits of liability and higher deductibles on physical damage; its claims will be more frequent, and will be settled in a more liberal court environment. These differences are even more pronounced with commercial insurance products than with personal insurance, because the former are more specialized to the business needs of the insured.
3. *Information Asymmetry and Anti-Selection* – Potential purchasers of property and casualty claim and defenses cost liabilities do not have access to an insurer’s private information, from which to gauge its unique characteristics. In theory, such information could be provided, but the cost of producing and analyzing it would make any transaction uneconomic. In addition, most potential purchasers would have legitimate concerns regarding anti-selection, perceiving that the insurer was

¹⁹ Such transactions are referred to within the insurance industry as *retroactive transfers*.

attempting to lay off its most problematic claims. As a result, potential purchasers would feel the need for careful review of private information to protect themselves.

The lack of observable market values for property and casualty policy benefit liabilities necessitates the use of 'Level 3' valuation methods to estimate their fair value. This will require that valuation methods and assumptions consistent with fair value principles be developed and implemented. Since policy benefit liabilities are acquired and held (rather than traded), the estimate of fair value may need to incorporate an element for their illiquidity. A similar (and hopefully internally consistent) approach will be necessary for estimating the fair value of reinsurance recoverable assets. An additional factor in the valuation of reinsurance recoverables will be the credit risk of the counter-party reinsurer.

3.4 Status of IASB and FASB Deliberations

Both the FASB and the IASB have been involved in long-term efforts to develop and implement fair value concepts in the accounting for financial assets and liabilities. While both have made progress in their respective efforts, the move toward fair value has been slowed by complicating factors, including the need to address issues and concerns raised by key stakeholders, as well as the limited resources of the two organizations against the sheer magnitude of the effort. As of the time this paper is being written (March 2004), both organizations remain committed to moving their projects forward -- though both recognize that implementation will not happen quickly or easily.

Financial Accounting Standards Board

The 1980s Savings and Loan crisis served as the impetus for the move to fair value accounting in the U.S. Leading up to the crisis, banks were not required to record their assets at market value, allowing troubled banks to sell those assets with market values higher than their recorded book values while continuing to hold those assets with market values below book value. Many of these banks eventually became insolvent.²⁰

In 1986 FASB embarked on a long-term project concerning the accounting for financial instruments that has evolved into its current fair value project. The FASB's Statement of Financial Accounting Concepts No. 7, released February 2000, addressed how to estimate the fair value of these liabilities.

In October 2002, FASB, with the endorsement of the SEC, signed a memorandum of understanding with the IASB to "seek to reduce the existing differences between International Financial Reporting Standards and U.S. GAAP in order to accelerate progress towards the attainment of global accounting standards."²¹

More recently, in June 2003, FASB decided to add a separate fair value measurement project to its agenda to address concerns preparers, auditors and others have expressed about their ability to apply fair value measurement principles. The preparers' concerns are mainly driven

²⁰ CAS Task Force on Fair Value Liabilities, *White Paper on Fair Valuing Property/Casualty Insurance Liabilities* (Casualty Actuarial Society, 2000).

²¹ Jerry Dickenson, "The Search for an International Accounting Standard for Insurance", *The Geneva Papers on Risk and Insurance Issues and Practice – Special Issue* (International Association for the Study of Insurance Economics, February 2003), p. 17.

by the fact that, to date, FASB has provided only limited application guidance for measuring fair value. The FASB's near-term objective with the fair value measurement project is "to develop a Statement that will establish a framework for measuring fair value under other pronouncements that require fair value measurements, codifying the guidance for measuring fair value in those pronouncements."²² The Statement will be focused on how, not when, to measure fair value; FASB has said it will continue to address the matter of when on a project-by-project basis. The Fair Value Measurement Statement exposure document is expected to be completed by the second quarter of 2004.

Longer term, FASB's objective is to "improve its conceptual framework, developing conceptual guidance for its use in determining "when" to measure fair value that will focus on how the qualitative characteristics of relevance and reliability should be applied in making that determination."²³ At this point, no timeframe has been given for completion of FASB's longer-term objective.

International Accounting Standards Board

The IASC (predecessor to the IASB) commenced its project on the development of an international accounting standard for the recognition and measurement of financial instruments in April of 1997.

In November of 1999, an Advisory Group to the IASC published an issues paper focused solely on insurance accounting, including the IASC's preliminary conclusions. One hundred thirty-eight (138) responses to the issues paper were received -- including a substantial one from the International Actuarial Association. In general, accounting firms and consulting actuaries tended to be broadly in favor of the Board's conclusions, while insurance companies, their in-house accountants and actuaries, and insurance regulators tended to be against.²⁴

The responses to the issues paper were analyzed and incorporated into a Draft Statement of Principles (DSOP), which was not formally published but was placed in the IASB's web site in 2001. The DSOP produced much debate and adverse reaction, especially from the insurance industry and insurance regulators.

Though the IASB had made relatively fast progress with the Draft Statement of Principles, there has been a considerable slowdown since then. However, the project remains an important priority for the IASB -- partly due to a policy decision approved by the EU Parliament in March 2002 that requires listed companies to adopt "EU approved" international accounting and reporting standards ("IAS" / "IFRS") in the preparation of their consolidated financial statements from 2005 onwards. To date, the EU has not approved the two standards on financial statements, IAS 32 and IAS 39, in part because of concerns over fair value accounting.

Notwithstanding the EU deadline, the IASB has accepted that given the many constraints, a comprehensive IFRS on insurance liabilities will not be in place by 2005. In recognition of

²² FASB, "Project Update", *op. cit.*, p. 2.

²³ *Ibid*

²⁴ Dickenson, *op. cit.*, p. 26.

the enormity of the task, in May of 2002 the IASB split the fair value project into two phases, so that some parts of the insurance accounting initiative could be put in place by 2005 without delaying the rest of the project.

Phase 1, a stepping stone to Phase II, will operate as an interim standard and come into effect for financial years ending on or after 1 January 2005. An exposure draft (ED5) of the Phase I standard was published in July 2003, with comments requested by 31 October 2003. The Board plans to complete a final Phase I IFRS by 31 March 2004.

Key issues to be addressed by the IASB during Phase I include:

- i. definition of an insurance contract;
- ii. unbundling; and
- iii. asset classification and asset-liability mismatch.⁷

During Phase I the current local-country GAAP will continue to apply to all contracts that fall within the IASB definition of an insurance contract, subject to certain prohibitions (for example, catastrophe reserves) and requirements. Extensive disclosure requirements are also proposed for Phase I, but these no longer include the fair value of insurance liabilities. For all other contracts (i.e., insurance contracts that contain insufficient risk to qualify as an insurance contract), another IFRS (most probably IAS 39) will apply. IAS 39, first issued in 1998 and revised in December 2003, is similar to U.S. FAS 115 in that it requires “investments in a ‘trading portfolio’ to be held at fair value.” However, unlike FAS 115, it creates an exception to fair value accounting for “any equity instrument...that does not have a quoted market price in an active market and whose fair value cannot otherwise be measured.”²⁵

Phase II will involve the development of a full insurance IFRS; implementation prior to 2008 now appears unlikely. Phase II is expected to include a comprehensive analysis of all aspects of recognition and measurement including disclosure and presentation. In January of 2003, the IASB tentatively agreed on key features of a measurement model to be developed in Phase II. Since then, however, constraints have prevented the IASB from continuing work, though it intends to return to Phase II in the second quarter of 2004 when it will revisit the tentative conclusion reached.

3.5 Considerations in Evaluating the Fair Value Proposal

Implementation of a fair value accounting model would represent a substantial change in financial reporting for property and casualty insurers, entailing substantial effort and cost for preparers, and education of users. To be worthwhile, a change of this magnitude must be shown to be a demonstrable improvement. Both the FASB and IASB have developed a carefully articulated set of precepts to guide them in choosing among alternative presentations of financial information. While the two sets of precepts differ in their language, there is little substantive difference between them. The precepts focus on the purposes, uses, and principles underlying the presentation of financial information.

²⁵ FASB, “The IASC-U.S. Comparison Project: A Report on the Similarities and Differences between IASC Standards and U.S. GAAP” (Second Edition, 1999), Page 6.

The IASB's precept document states that the objective of financial information is

“to provide information about the financial position, performance, and changes in financial position of an enterprise that is useful to a wide range of users in making economic decisions.”

Elements of financial statements are monetary representations of underlying economic resources, obligations or transactions (i.e., assets, liabilities, revenues, expenses, etc.). Accounting principles and standards define when a financial statement element should be recognized, and how that element should be measured. The choice of measurement attributes should be determined by five considerations: (1) reliability of the measure, (2) relevance of the measure, (3) comparability and consistency with other similar financial statement elements, (4) neutrality of the measure, and (5) the cost of the measurement.

Reliability of the Measure

Reliability connotes representational faithfulness: the degree to which an element of a financial statement corresponds to the underlying set of economic resources, obligations, or transactions. It also connotes verifiability, such that an independent third party could confirm the measurement. Since most assets and liabilities are estimates, reliability does not connote certainty. However, one measurement attribute may be preferred over another because it is subject to less estimation error. The degree to which a measurement attribute is subject to estimation error is important because (a) estimates that involve a high degree of judgment are susceptible to manipulation by management, and (b) estimation methods can introduce spurious volatility into reported income. While income statement and balance sheet presentations necessitate the use of point estimates, reporting the degree of uncertainty in an element of the financial statements may be necessary to achieve representational faithfulness.

Relevance to Users

To be relevant, information must be capable of affecting users' decisions. Information that is untimely generally has little relevance to users because it is not reflective of the current situation of the enterprise. Similarly, information that is not understandable by competent users is not likely to be very relevant to them, because they will be unable to make informed decisions based on it. Transparency is implicit in the relevance criteria; elements of financial statements should be clearly communicated so as to maximize the utility of the information to users.

A test of relevance is whether or not the measurement attribute is consistent with internal management information practices within well managed companies. If internal performance is managed using measurement approaches that are inconsistent with a measurement attribute, then it is likely that external users will not find the information relevant.

Comparability and Consistency of the Measure

Financial statement presentations should be comparable over time and consistent between different enterprises, so that users can discern trends and relative performance. This precept requires that “financial statements provide sufficient standardization across enterprises to allow existing and potential shareholders, creditors and other users to make meaningful comparisons of key information.”

In the absence of any agreed international accounting standard there is little comparability today in the way financial condition and performance are reported among insurance companies operating in different countries. With the globalization of insurance and reinsurance markets and the emergence of multi-national insurers, the lack of comparability is a significant impediment to the usefulness of insurer financial statements.

Additionally, even within countries, the absence of a uniform standard that encompasses the accounting for financial assets has often made it difficult to compare companies across different sectors within the financial services industry (e.g., banks and insurance companies). Finally, there is concern within the insurance industry that if a fair value framework is implemented for insurance companies, but is not adopted consistently across other industries, the insurance industry would be disadvantaged versus its competitors for capital.

4. Scope of Inquiry

4.1 Limitations on Scope of Analysis

The purpose of this paper and the related analysis is to explore how a typical U.S. property and casualty insurance company's financial statements might be affected by a change from current U.S. GAAP accounting to a new accounting approach based on fair value. An additional objective is to highlight some of the practical issues that might arise with the implementation of fair value. Such an analysis should be useful to those who are developing the fair value proposal, as well as preparers and users of financial statements who may be evaluating the proposal.

In designing the research project, we have intentionally limited the scope of inquiry. Our approach was to focus on a limited set of key issues, rather than attempting to be comprehensive. Readers should appreciate these limitations, so as not to infer too much from our analysis or conclusions.

First, this paper does not attempt to develop a definitive methodology for measuring the fair value of property and casualty insurance liabilities, especially with regards to market risk margins. While we have developed some measurement techniques that we think are reasonable, they are meant to be illustrative only and not the “definitive word”. Further refinements to our methodology can be made, and other methodologies can be employed. Our methodology illustrates the types of calculations that can be practically performed with available data, and some of the limitations of the techniques and data.

In addition, we are only considering the fair value of policy benefit liabilities associated with “loss and loss adjustment expense liabilities” under current U.S. GAAP. We understand that the current fair value proposal would establish a unified policy benefit liability, covering both existing claims associated with coverage already provided and future claims associated with coverage to be provided on existing contracts (that is, the liabilities for loss and loss adjustment expenses and unearned premiums would be combined). Our decision to focus only on the fair value of the liabilities represented by the loss and loss expense provision is appropriate for two reasons:

- i. Loss and loss adjustment expense liabilities are highly material to a property and casualty insurer's balance sheet and income statement, and
- ii. The measurement issues pertaining to loss and loss adjustment expense liabilities would also apply to the unearned premium liabilities.

A property and casualty insurer typically considers its policy benefit liabilities in three categories:

1. *Claim liabilities*, reflecting the estimated cost of payments directly to claimants under the coverage provided by the policy (net of anticipated subrogation and salvage recoveries);
2. *Defense cost liabilities*, reflecting the estimated cost of providing contractual services related to the claims, such as legal, investigation, and court costs; and

3. *Claim adjusting cost liabilities*, reflecting the estimated administrative costs associated with processing the claims.

Mostly as a concession to the available data, we have only considered the fair value of the first two categories. The third category is small relative to the first two. In addition, while transactions relating to the first two categories can be directly attributed to specific insurance policies, transactions associated with the third category are not. Transactions in this latter category are typically associated with internal staff costs, which must be allocated to product lines and policies, based on time studies. Under the circumstances, different approaches to fair value measurement of claim adjusting cost liabilities may be appropriate.

Most property and casualty insurers purchase reinsurance as a hedge to extreme fluctuations in their claim and defense cost liabilities. We have focused only on the fair value of the direct policy liabilities, and not on the fair value of any offsetting reinsurance recoverable asset. In essence we have treated each company as if they purchased no reinsurance, and therefore published their financial results on a direct, rather than net of reinsurance, basis. Issues and approaches applicable to the direct liabilities can be extended to the treatment of reinsurance recoverables.

Under current U.S. GAAP, property and casualty insurers typically report their claim and defense cost liabilities on a nominal value basis; they do not discount these liabilities for the time value of money, nor do they incorporate margins for conservatism. We have assumed that the claim and defense cost liabilities reported by each company group (after adjusting for situations where reserves were known to be discounted) are the group's best estimate of the associated liabilities. While this assumption is probably valid for the overall claim and defense cost liabilities of any given company, it is somewhat less valid in respect of the liabilities allocated by the company to a particular product line or year of coverage.

In developing *pro forma* income statements for each company, we focused mostly on the income associated with underwriting operations. We have included in income the investment income that would have been generated by hypothetical assets backing the claim and defense cost liabilities, but have not attempted to restate the actual investment income (nor the balance sheet assets) to a fair value basis. These adjustments are obviously necessary to obtain a complete picture of financial results in a fair value environment.

Finally, we have not considered the issue of whether it is appropriate to adjust the fair value of claim and defense cost liabilities for the credit standing of the obligor company. This issue has already received considerable attention; in our analysis we have assumed that no such adjustment is required.

4.2 Data Limitations

In addition to limitations on the scope of our inquiry, there are a number of limitations associated with the data that we have used in our analysis. While we do not believe that these limitations are a serious impediment to our analysis, they should be noted.

The data that we used are drawn from published financial reports to state regulatory authorities, prepared on a regulatory accounting basis. The main source of the data used is a Tillinghast-constructed database of financial data drawn from insurance company annual regulatory financial reports. This database was populated from data purchased each year from the A.M. Best Company. The database allowed us to analyze financial results for each

line of business of the representative set of companies over an 11-year period from 1992 to 2002, roughly covering a complete underwriting cycle. (Technically our analysis covered 11 years of income and 12 years of balance sheets, including year-end 1991.)

While we restricted our analysis to public data, it should be noted that companies would have additional information available internally. Companies would typically have internal underwriting experience segmented more finely, and would have additional data (for example, policy counts and claim counts) that would be useful in estimating the fair value of policy liabilities. Companies would also have a greater knowledge of their business, and would therefore be in a better position to interpret the data.

Given the time and related constraints, we could not perform extensive cleansing of the data. For example, we did not make inquiries at the selected companies as to the explanation for apparent data anomalies. Several candidate companies with clearly “problematic data” were excluded from our analysis; in several other instances anomalous or missing data were adjusted or estimated from other sources. Most importantly, we did not substitute our estimates of the claim and defense cost liabilities, relying on the reported figures.

U.S. insurance regulatory accounting policies and reporting requirements have changed over the time period that we analyzed. Regulatory authorities have invested considerable effort in a project aimed at codifying their accounting policies. The most notable change in the reporting of property and casualty insurance policy liabilities are formalized definitions of defense and adjusting costs that classify the types of expenses that belong in each category. Prior to the introduction of these formalized definitions in 1998, company practices varied. We have not adjusted the historical data for the effect of this change, essentially assuming that its impact was immaterial.

5. Research Approach

5.1 Overview

For each of the three insurance products, we selected 20 representative property and casualty insurance company groups. (It is common within the insurance industry for an insurer to operate its business through multiple legal entities under common ownership and management, described informally as a “group”.) Because some company groups offer multiple products, the same company group was sometimes included in our analysis for more than one insurance product. However, each product within a company group was treated separately for analysis purposes (in other words, as if each company group’s insurance product was sold by a stand-alone company), without consideration of cross-product correlation or risk diversification benefits. Late in the project we concluded that data problems with two of the Medical Professional Liability company groups were too great to use them in the study; the results for this product are therefore based on only eighteen company groups.

Using the regulatory reports for each sample company group as a starting point, we performed two major steps to restate the financial data.

1. *First, we adjusted the regulatory financial data to a pro forma U.S. GAAP basis.* Since regulatory accounting does not permit deferral of policy acquisition expenses, this entailed estimating a deferred policy acquisition cost asset (DPAC) for each company, product, and statement date. In addition, we adjusted the claim and defense cost liabilities in the regulatory financial data to a consistent undiscounted basis for those few companies that reported their regulatory claim and defense cost liabilities on a discounted basis. While discounting of these liabilities is permitted under U.S. GAAP, the prevailing practice is to report claim and defense cost liabilities on an undiscounted basis. Since we intended to introduce a discount for the time value of money in the estimates of fair value, it was necessary to have undiscounted liabilities as our starting point.
2. *Second, we adjusted the pro forma U.S. GAAP financial statements to reflect claim and defense cost liabilities presented on a fair value basis.* This entailed calculating a discount for the time value of money and a market risk margin for each company group, product, and statement date. We calculated the market risk margins using two alternative methodologies, such that we ended up with two alternative fair value presentations.

While fair value does not require that elemental components (i.e., expected cash flows, time value of money, market risk margin) be calculated separately, it does appear that all three elements must be at least theoretically present. We chose to build our estimates of fair value by component so that we could analyze the progression of the three elements separately.

Finally, we compared the results of step one to the results of step two to gauge the likely impact of fair value on the company groups’ reported financial results. Each of these steps is described more fully below, with additional details covered in the Appendix.

5.2 Published Regulatory Financial Data

For each of the three insurance products (Personal Auto Liability, Workers Compensation, and Medical Professional Liability), we selected a final sample of 20 company groups (eighteen for Medical Professional Liability) and constructed a history of their regulatory financial statements for the 11-year study period, reflecting only the results for the specific product. The final list of companies selected for each product, as well as some of the considerations and data issues involved, can be found in Appendix 8.1.

To ensure we portrayed a fair sample of the property and casualty insurance industry for each product, we included company groups that ranged in size (based on their direct written premiums). The mix of company groups includes large national companies as well as mid-sized regional or single-state insurers. Over the time period evaluated, the cumulative market share for the company groups we selected is approximately 60% for Personal Auto Liability, 25% for Workers Compensation, and 50% for Medical Professional Liability.

Since part of our analysis focuses on the progression of financial statements over the 11-year period, it was important to ensure that those statements contain minimal discontinuities. In order to maintain reasonable consistency over the time period, each company group was reconstituted to include the same set of insurance company legal entities as it did at the end of 2002.

The financial data used to construct each company group's historical regulatory financial statements were drawn from a database of annual regulatory reports for each individual insurer legal entity. The principal schedule within the regulatory report from which the financial data were drawn is the Insurance Expense Exhibit ("the IEE"). The Insurance Expense Exhibit requires property and casualty insurers to allocate each element of their (pre-tax) income statement, as well as selected balance sheet items, to thirty-three (33) prescribed product lines, including the three that were the focus of our study.

For this project, we used data from Part 3 of the IEE to create historical regulatory income statements by line of business for each of the company groups in our final sample. Since Part 3 reflects direct business only, the revenue and expenses associated with assumed and ceded reinsurance transactions are excluded.

In a few cases we developed "work-arounds" that substituted more reasonable values for data in the IEE that we considered anomalous. Specific adjustments made to the data of individual company groups are described in Appendix 8.1.

Part 3 does not include an allocation of the company's investment income to product line. Even if it did, such an allocation would be of questionable value, given the assumptions that would be required. Rather than develop an allocation ourselves, we have included investment income by calculating the total return (with assets "marked to market", as they would be under fair value) on a hypothetical portfolio of risk-free assets equal to the nominal loss and defense cost liabilities. This is a reasonable proxy for the total (pre-tax) income from the insurance operations of the company, and is sufficient to analyze the effects of a change to fair value. It implicitly ignores the investment income on capital; essentially our income statement reflects only the results from "insurance operations".

Composite regulatory financial data for the 20 companies for each product are displayed in Exhibit 8.1.4 at the end of Section 8.

5.3 Adjustments to Convert Data to Current U.S. GAAP

The differing aims of regulatory financial reporting (referred to in the U.S. as statutory accounting principles, or “SAP”) and generally accepted accounting principles (GAAP) necessitate differing treatment of certain items. The most significant difference is the treatment of policy acquisition costs. Under SAP these costs are charged to income when they are paid (i.e., at the time the policy is written), reflecting the goal of conservatism inherent in regulatory reporting. However, under current U.S. GAAP, the recognition of these expenses is matched to the related revenue, in this case the earned premiums on the associated policies. That is, under GAAP when a policy is written, a deferred policy acquisition cost (DPAC) asset is established in the amount of the related expenses. Then, as the premium is earned over the life of the policy, the DPAC asset is amortized into expenses.

To adjust the published regulatory financial statements to a *pro forma* GAAP basis, we created an estimated DPAC asset for each company group at each statement date based on the underwriting expense figures from the Insurance Expense Exhibit. Appendix 8.1 provides the details of this adjustment.

In addition to estimating DPAC assets for each company, we also adjusted the published regulatory data for identified instances in which the claim and defense cost liabilities were discounted for the time value of money. (As has been indicated, our goal was to achieve a consistent set of undiscounted liabilities as a starting point for our estimates of fair value.)

Two distinct types of discounting are present in the reported regulatory loss reserves. First, SAP allows all insurers to use a tabular discounting approach (that is, annuity claim reserves that combine life expectancy and the time value of money into a single tabular value for each attained age). Tabular discounting may be used on all individual claims involving life pension benefits. Claims involving life pension benefits are common in Workers Compensation; they are relatively rare in other lines, such as Auto No-Fault, as few states have adopted systems that provide such benefits. A second type of discounting is referred to as non-tabular (to distinguish it from tabular discounting). This type of discounting is sometimes permitted for a particular company and line of business by regulators on a discretionary basis. Typically a non-tabular discount is calculated on the entire inventory of claims; an aggregate expected settlement cash flow is generated and then discounted. In our sample of company groups, non-tabular discounts were reported at some point in their history by six Workers Compensation insurers, six Medical Professional Liability insurers, and one Personal Auto Liability insurer. For those insurers who reported non-tabular discounts, their impacts ranged from 1% to 32% of the reported claim and defense cost liabilities.

GAAP practices relating to discounting also vary from insurer to insurer. Many insurers employ parallel discounting practices for GAAP and SAP. Others may discount their claim and defense cost liabilities in one context, but not the other; or they may employ different assumptions. Since tabular discounting is a long-standing practice within the industry (dating back to at least the 1950s), it is very common for tabular discounting practices to be parallel between GAAP and SAP; however it is less common for non-tabular discounting practices to be parallel between GAAP and SAP. As described more fully in Appendix 8.1,

our approach was to adjust the reported claim and defense cost liabilities only for the reported non-tabular discounts. This was largely a practical concession to the available data. However, we do not believe that the inclusion of tabular discounts materially affects our results or conclusions.

There are other differences between SAP and GAAP that are excluded from our analysis because they were not considered to be material. These items include:

- Claim and defense cost liabilities are recorded net of anticipated subrogation and salvage recoveries under GAAP, but not under SAP;
- Policyholder dividends that are planned but not formally declared are usually accrued as a liability under GAAP, but not SAP. SAP records policyholder dividends as a liability at the time that the dividends are declared;
- GAAP accruals for additional premiums under retrospectively rated policies and policies subject to audit are typically less conservative than they are under SAP.

Composite financial data for the 20 companies, adjusted to an estimated *pro forma* U.S. GAAP basis, for each product are displayed in Exhibit 8.1.5 at the end of Section 8.

5.4 Discounting for the Time Value of Money

Principles dictate that estimates of the fair value of policy claim and defense cost liabilities incorporate (a) the best estimate of the expected cash flows associated with these liabilities, (b) the time value of money, and (c) a margin reflecting the amount that marketplace participants would demand as compensation for *systematic* risk. While these elements need to be incorporated in any estimate of fair value, they need not be separately determined. For example, one can directly observe the market price of a particular publicly-traded stock and use that price as its fair value without separating the price into its component elements. (Having directly observed the prices, one could use an accepted pricing model drawn from financial economics to estimate the elements within the price; typically one would estimate two of the three elements and then infer the third as a residual. While this would not be needed to measure the fair value of the stock itself, it might yield important information about underlying market pricing assumptions that one could use in estimating the fair value of other assets or liabilities.)

For this research project, we have elected to estimate the fair value of policy claim and defense cost liabilities by building up the three component elements. Our choice of this approach does not imply that this is the only approach, nor is it necessarily the best approach. Its principal advantages are practicality and the ability to directly observe the interaction of the three component elements. This section discusses the development of the first two elements, the expected cash flows and the time value of money. The next section discusses the development of the market risk margin.

Our starting point was the *pro forma* GAAP claim and defense cost liabilities for each company group, product, and statement date. We assumed that those amounts represent the best estimate of the nominal ultimate liabilities as of each statement date. Calculation of the adjustment for the time value of money requires two major assumptions: the timing of the expected future cash flows and selection of appropriate interest rates. A discussion of the

considerations and issues associated with these assumptions, as well as our results, follows below. The technical details of the calculations are presented in Appendix 8.2.

The actuarial data necessary to calculate appropriate discounts for the time value of money (and to calculate the market risk margin, discussed subsequently) were drawn from Schedule P of each of the selected company group's annual regulatory reports. Unfortunately, the data are not available on a direct basis (that is, on a basis directly comparable to the IEE financial statement data that we developed). The bulk of the data in Schedule P are net, after application of all reinsurance. For the purposes of this project, we have elected to use the net data to develop the fair value adjustments, and then apply those adjustments to the direct claim and defense cost liabilities.

In essence, the use of the net data is tantamount to assuming that the patterns of the cash flows developed from the net data for each company group are (proportionately) the same as those that we would have developed on a direct basis, given the data. This assumption is not likely to be borne out in practice. Recoveries under non-proportional reinsurance are only made after the insurer has paid losses beyond its retained layer; to the extent that this type of insurance (which is very common) is present, the direct cash flows for a company are likely to be longer than the net cash flows. In addition, significant changes in reinsurance programs over time can create "noise" in the pattern of net claim payments that would not be present in the direct data. Notwithstanding these comments, we believe that the adjustments for time value of money that are derived from the net data are reasonable, and perhaps slightly conservative.

Development of Payment Pattern Assumptions to Project the Future

Cash Flows

A generally accepted actuarial method for projecting the future cash flows associated with policy benefit liabilities is to derive an expected payment pattern applicable to a typical coverage year cohort of claims, by examination of historical claim emergence data. Typically the historical claim data are arrayed as a triangle with transactional data summarized by coverage year (in other words, all transactions associated with a claim are assigned to the year in which the coverage was provided and the insured events occurred) and by maturity, showing the actual payments made at successive maturities for each cohort. The historical patterns of payments are analyzed and adjustments are made for changes in conditions to produce a pattern that is believed to be appropriate for the future. Once derived, the expected payment pattern is then applied to the estimated unpaid policy liabilities by coverage year to obtain the projection of expected future cash flows.

The articulated fair value principles express a strong preference for market-based methods and assumptions over entity-specific methods and assumptions. Clearly, the basic actuarial method outlined above for projecting future policy liability cash flows could be considered to be a market method as FASB has defined it, as it is used routinely by property and casualty insurers in developing asking prices for the insurance policies that they wish to sell. However, within the broad method there are a variety of specific techniques for developing the payment pattern; different techniques will produce somewhat different patterns. It is unclear from the available guidance whether these different techniques represent nuances within a market-based method, or whether they represent entity-specific methods in need of

greater market resolution. We have assumed that the former is the case, and used a single selected technique to develop the payment patterns.

A related (and more critical) issue is whether the payment pattern assumption should be developed for the market as a whole using industry data, or whether each insurer should use its own data (supplemented by industry statistics where the insurer's data are not sufficiently credible) to calculate an entity-specific payment pattern assumption. As a review of the results will show, there are material variations in coverage year payment patterns between insurers. The causes for these variations fall into three categories: (1) differences in the nature of the company's customers; (2) differences in the coverage provided; and (3) difference in company operational procedures.

Different approaches to marketing, product distribution, and underwriting criteria contribute to differences in the makeup of each insurer's customer base. Since customers have differing claim propensities, their expected pattern of claim payments will vary. For example, larger claims typically take longer to settle, because they are often more problematic than smaller claims. Customers with a greater propensity for serious claims are, all other things being equal, therefore likely to have a slower pattern of expected claim payments. Similarly, since most insurance claims are adjudicated through state judicial and administrative systems with varying procedures, variation in the mix of customers by state can create significant variations in claim payment patterns.

In personal insurance such as Auto Liability, customer demographics can vary substantially from one insurer to the next. An example of this phenomenon might be the program sponsored by the AARP and underwritten by The Hartford, which targets retirees. Other companies target the wealthy, youthful operators, alumni of a particular university, owners of specific models of cars or members of a profession; other companies sell products through agents located in geographic areas that they perceive to be attractive.

In commercial insurance such as Workers Compensation and Medical Professional Liability, the variations in expected claim payment patterns between categories of customers can be even more pronounced, because of the variation in the businesses of the customers. A good example might be the variation between private practice physicians and hospitals, both of which purchase Medical Professional Liability insurance. Although they are combined under one product in the regulatory financial reports, their underlying exposure is quite different. Even within the physicians category, significant differences in exposure exist — for example, between dermatologists and orthopedic surgeons. In Workers Compensation, each industry has its own distinct hazard profile, generating different expectations as to the mix of injuries that will be generated.

In addition to differences in the underlying exposure of customers, the coverage provided can also vary. Even within relatively standardized contracts like Personal Auto, customers purchase different limits for their liability coverage. Very generally, the least affluent customers tend to purchase the minimum limits (e.g., \$25,000) while the most affluent customers tend to purchase optional higher limits (e.g., \$1,000,000). Since claim payments are truncated at the policy limit, payout patterns for the former tend to be much faster than the latter.

In commercial insurance there is even greater flexibility in coverage terms. Some customers purchase "first dollar" coverage; others purchase coverage over per-claim deductibles that are often as high as \$25,000 and can be as high as \$1,000,000. These deductibles tend to

eliminate coverage for smaller claims that would otherwise usually be paid relatively quickly. On larger claims the insurer's payments do not commence until the insured's deductible has been reached. Both of these factors tend to cause claim payment patterns to be longer on policies with deductibles. Differences in coverage limits and exclusions on certain types of claims will also have an influence on commercial insurance claim payment patterns.

Finally, the form of the coverage itself can vary. In Medical Professional Liability (as well as some other liability insurance products) coverage can be provided either on an "occurrence" basis or a "claims-made" basis. Simply stated, the former covers claims that occurred within the policy period, without regard to when they are reported; the latter covers claims that are reported during the policy period, without regard to when they occurred.

Given identical exposures and coverage, expected claim payout patterns will still vary between insurers, owing to different operating structures and claim handling procedures. Some insurers prefer to have their own staff of field claim adjusters and house counsel, while others make greater use of independent contractors. Companies will also differ in their approach to defending liability claims, protecting themselves against fraudulent claims, use of structured settlement approaches, use of medical case managers and return-to-work programs, and pursuit of subrogation recoveries. The companies believe that their approach will have a positive influence on the ultimate cost of the claims, as well as the timing of payment. Re-engineering of claim operations has been an ongoing activity within the property and casualty insurance industry, as companies seek to achieve a competitive advantage through lower claim, defense and adjusting costs.

Differences in company payment patterns that are caused by differences in customers or coverage terms could be addressed by being more careful in defining what constitutes a product and a market. The available industry data are not sufficiently refined in this regard; greater segmentation of the data by type of customer and coverage purchased would be required if market assumptions as to payment patterns are required. Differences in company payment patterns that are caused by operational differences are, of course, entity specific.

Unfortunately while it is possible to observe differences in claim payment patterns between insurers, it is much more difficult to separate the observed differences into their root causes (customer and coverage differences versus operating differences). A more pragmatic solution to this issue may therefore be to permit the use of entity-specific assumptions as to payment patterns. In our experience, this is the approach that market participants use when pricing (limited) loss portfolio reinsurance transfers, and when performing appraisals of companies or blocks of business for sale or purchase.

For this project, we calculated an (entity-specific) payment pattern assumption for each company group at each statement date, based on information that would have been available to the company at the time. Our approach is generally consistent with practices commonly found in the industry — in both the internal practices of companies, and the practices of reinsurers who price loss reserve portfolio reinsurance products. We first developed "benchmark" payment patterns at each statement date, using the composite data of the 20 selected companies. As a proxy for judgment, the payment pattern for each company group was determined by credibility-weighting the pattern indicated by its own data with the composite pattern. (Generally, the credibility of the company group data was high.) Finally, we applied each company group's payment pattern assumption to its estimate of unpaid

claim and defense cost liabilities to obtain a projection of their expected future claim and defense cost cash flows.

To construct the payment patterns we used data from Part 3 of each company group's Schedule P. Since Schedule P provides data extending only to the tenth maturity, we assumed that all remaining payments occur in the eleventh year.

Exhibit 5.4.1 displays the average-time-of-payment (measured in years from contract inception) implicit in the coverage year payment pattern derived for each company at year-end 2002. The dispersion among companies is evident. Variations within each of the product lines reflect the factors alluded to earlier. Even the Personal Auto Liability product, the fastest paying of the three, exhibits variation. (The auto outlier is a single-state writer, operating in a state that is considered problematic from a claim standpoint.) Variations in Medical Professional Liability are most pronounced, particularly because of differences in the form of coverage sold by the various insurers.

Exhibit 5.4.1

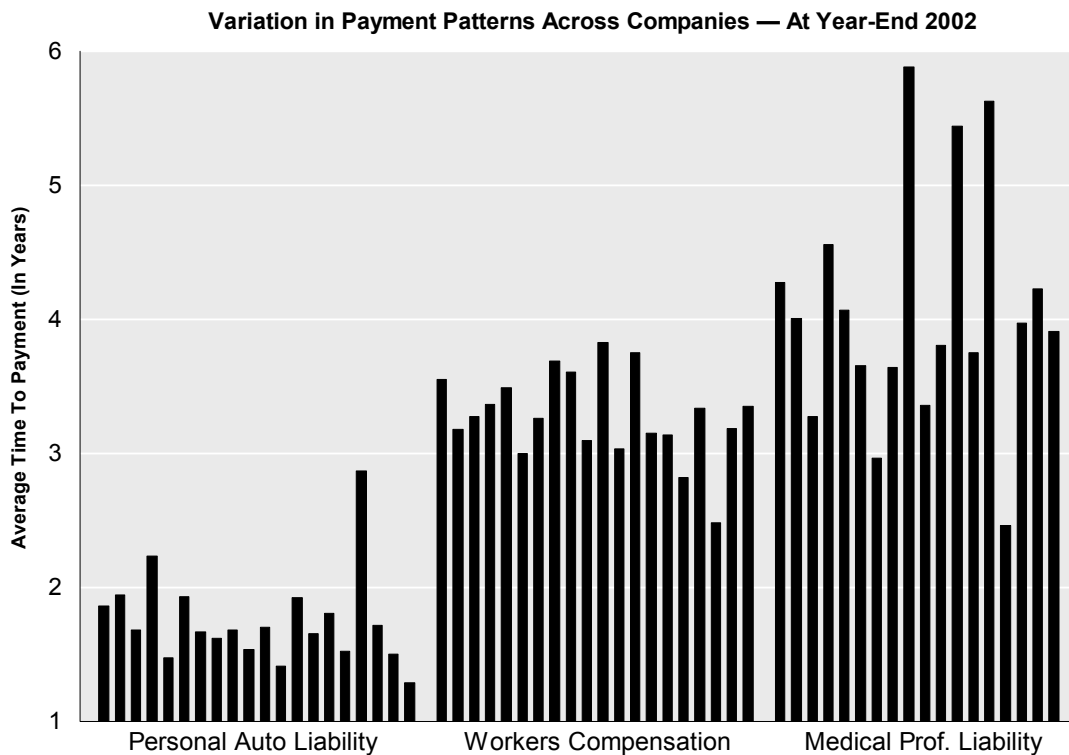


Exhibit 5.4.2 displays the same average-time-of-payment data by company group, and also over time. The composite result is also displayed, so that any overall trends over time can be discerned. Since the mix of customers, coverage sold and operations of a particular company can be expected to change only gradually over time, we would not expect an abrupt shift in this statistic. Evidence to the contrary would suggest that the derived payment pattern assumptions are not reliable.

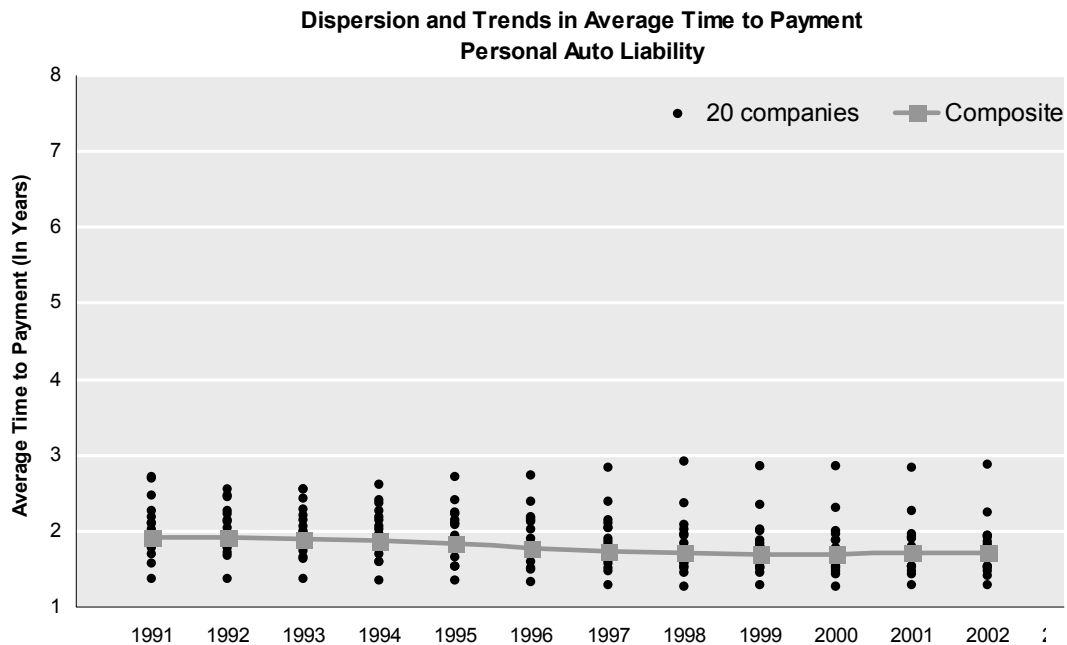
- For Personal Auto Liability, there is a slight overall trend towards a shorter average-time-to-payment, reflecting industry-wide efforts to settle claims more quickly. While company variations are evident, there are very few unusual values over the 12-year period.

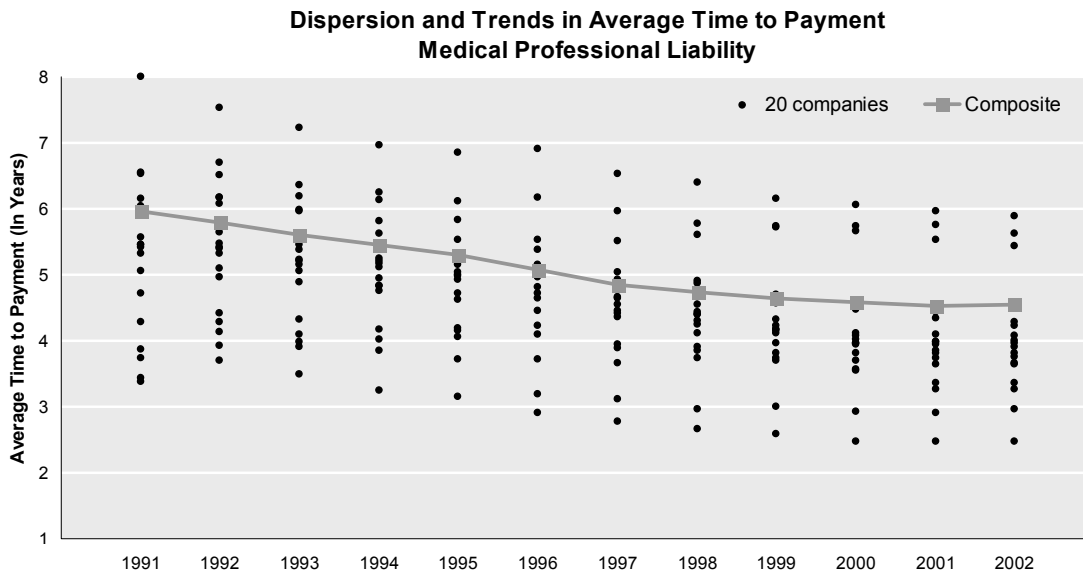
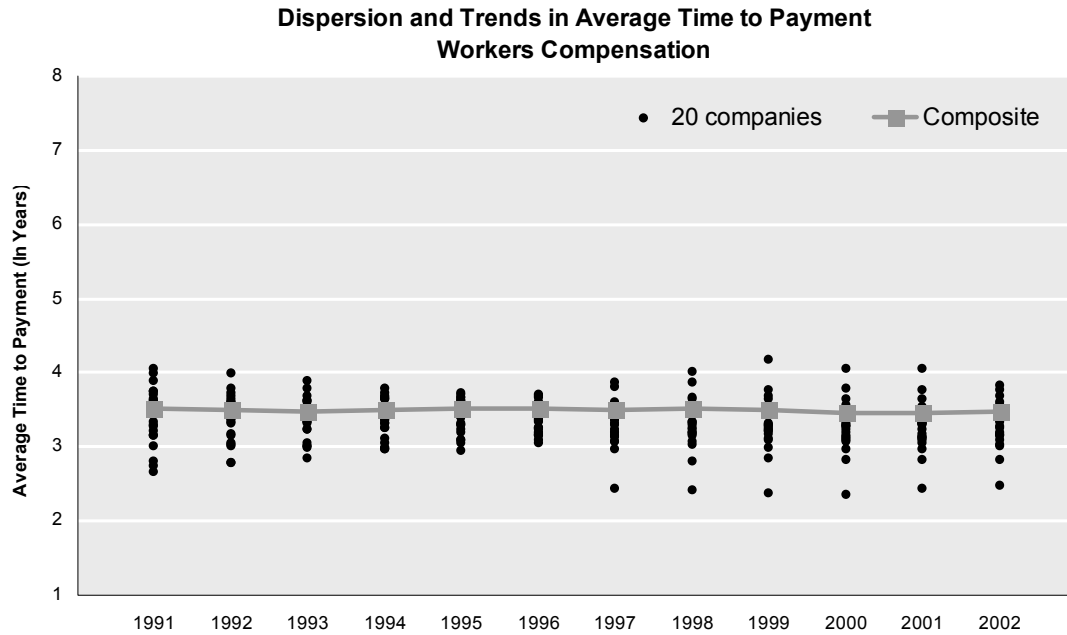
- For Workers Compensation, the overall average-time-to-payment is stable across the period. One company exhibited an abrupt shift to an unusually short average-time-to-payment in 1997 (possibly due to a change in its reinsurance program).
- For Medical Professional Liability, there is a significant trend towards a shorter average-time-to-payment. This result is largely driven by the indicated amount of payments beyond 10 years. In the experience reports for the older years there are significant reported liabilities remaining at the end of the tenth maturity; in the more recent reports the relative amounts of unpaid claim and defense cost liabilities remaining at the end of the tenth maturity are lower. When we control for this effect (by substituting a fixed assumption as to the amount of payments beyond 10 years) the trend is substantially reduced — to a level commensurate with that observed in Personal Auto Liability.

One possible explanation for the trend would be a shift in the mix of business from occurrence coverage (which has a relatively longer average-time-to-payment) to claim-made coverage. However, a check of the split of premiums between the two forms of coverage does not suggest that such a change in mix occurred during the period. A second, more plausible explanation is that in the early years overly conservative assumptions were used to estimate the costs of the remaining claims. Companies gradually recognized that this was the case, and adjusted their estimates to reflect less conservative assumptions.

In addition to the trend, the variation across companies is quite significant. This is partially explained by differing mixes of business: claims-made versus occurrence coverage, doctors versus hospitals, etc. However, in addition, the payment patterns for an individual company are relatively unstable, changing more from one year to the next than we observed in the other two product lines.

Exhibit 5.4.2-A





Selecting an Interest Rate for Discounting

For this research project, our approach was to discount the claim and defense cost liabilities at a risk-free rate, and then to develop an explicit market risk margin. As noted earlier, an equally acceptable approach would be to combine these two steps by developing a risk-adjusted rate and discounting the liabilities at that rate.

Rather than selecting a single risk-free rate and applying it to the cash flows at all maturities, we developed a risk-free rate applicable to the cash flow at each maturity, reflecting the slope in the yield curve. Conceptually, we developed a notional portfolio of risk-free assets with maturities that matched the expected liability cash flows; the current market value of these assets is the discounted value of the liabilities.

Several points regarding risk-free rates are worth noting in passing:

- Some have suggested that — even if an explicit risk margin is calculated — estimates of the fair value of claim and defense cost liabilities should be determined by discounting at other than the risk-free rate. They point out that insurers invest in a variety of assets, including investment grade corporate bonds, equities, mortgage-backed securities, and real estate. It is therefore possible that the market pricing of these liabilities by insurers might make use of a higher rate, reflective of the higher expected returns on these other asset classes.
- The fact that we developed the discount by constructing a notional matched portfolio of risk-free assets does not imply that the insurance industry actually invests in this manner, or that it necessarily should invest in this manner. The industry has historically held fixed investments with a duration longer than its liabilities in order to capture the higher yields associated with longer maturities.
- While rates on government instruments are often described as risk-free, this is true only in a narrow sense of the term. It would be more correct to describe government instruments as ‘default-risk-free.’ All fixed income instruments are subject to purchase-power risk: the risk that inflation will erode the real value of the principal during the time that the bond is held. (The presence of purchase-power risk is a major reason that the yield curve slopes upward with maturity.) In addition, government bonds are subject to liquidity risk.
- There is actually a wide choice of instruments to consider when setting the risk-free rate. These include government debt, swap rates, repurchase agreement rates, and even the highest-grade non-governmental debt. In the absence of market imperfections we should expect the results from each source to be similar. However empirical evidence has shown that this is not always the case. Development of the “best” measure of the risk-free rate is beyond the scope of this paper. While we have chosen to use rates based on U.S. Treasury securities for this project, we would note in passing that a wide range of recent academic research is coming to the view that rates based on government debt are not the best proxy for risk-free rates²⁶.
- Finally, it is worth noting that backing these liabilities with risk-free assets may not minimize risk from an overall asset-liability perspective. To the extent that the liabilities are inflation sensitive (which some almost certainly are), research has shown that the overall risk of the company is minimized by including some inflation sensitive assets in the portfolio.

²⁶ For example, see Houweling and Vorst, “An Empirical Comparison of Default Swap Pricing Models” (Working paper, Erasmus Rotterdam University, 2002).

To obtain risk-free rates for this project, our starting point was yield-to-maturity data on zero-coupon bonds, obtained from Bloomberg. These bonds are synthetic; they are backed by U.S. Treasury securities, however the coupons on the underlying bonds have been stripped and sold separately. Because the Treasury securities backing them are held in trust, the synthetic securities have essentially the same credit characteristics as the Treasuries themselves. The principal advantage of the zero-coupon bonds is that they are traded in the open market.

Discount rates were developed based on the Bloomberg yield curves at each year-end from 1991 to 2002. Discount factors for prior time periods were developed from comparable yield curve data relating to constant maturity Treasury bonds, published by the Federal Reserve. The data used and additional technical details can be found in Appendix 8.2.

Applying the Discount Rates to the Projected Cash Flows

At each statement date, we applied the current discount rate for each maturity to the projected net claim and defense cost cash flows for each company group. Cash flows were assumed to occur at mid-year. We then compared the discounted and undiscounted values of the net liabilities, and computed an average discount factor. As a final step we applied the average discount factor to the reported direct claim and defense cost liabilities, as a first step toward adjusting them to a fair value basis.

The magnitude of the time-value-of-money adjustment varies with the level of interest rates. Exhibit 5.4.3 analyzes the impact of varying interest rates on the overall average discount factor for each of the three products. It displays the average discount factor (across all coverage years and the 20-company composite) that would have been developed if the current (i.e., year-end 2002) policy claim and defense cost liabilities were discounted at the historical market risk-free interest rates in effect at each year-end over the last 22 years. The three-year zero-coupon treasury rate is also shown as a benchmark. As can be seen, the amount of discount is much more significant historically than it is in the current interest rate environment. As interest rates have fallen from the high levels of the 1980s, the average discount factor has risen correspondingly. In the recent interest rate environment, the impact of discounting has ranged between 5% and 10% for Personal Auto Liability and 10% to 20% for Workers Compensation and Medical Professional Liability. If we take the interest rate levels of 1996 as being relatively “normative” then the impact of discounting would typically be about 8% for Personal Auto Liability, 17% for Workers Compensation, and 16% for Medical Professional Liability.

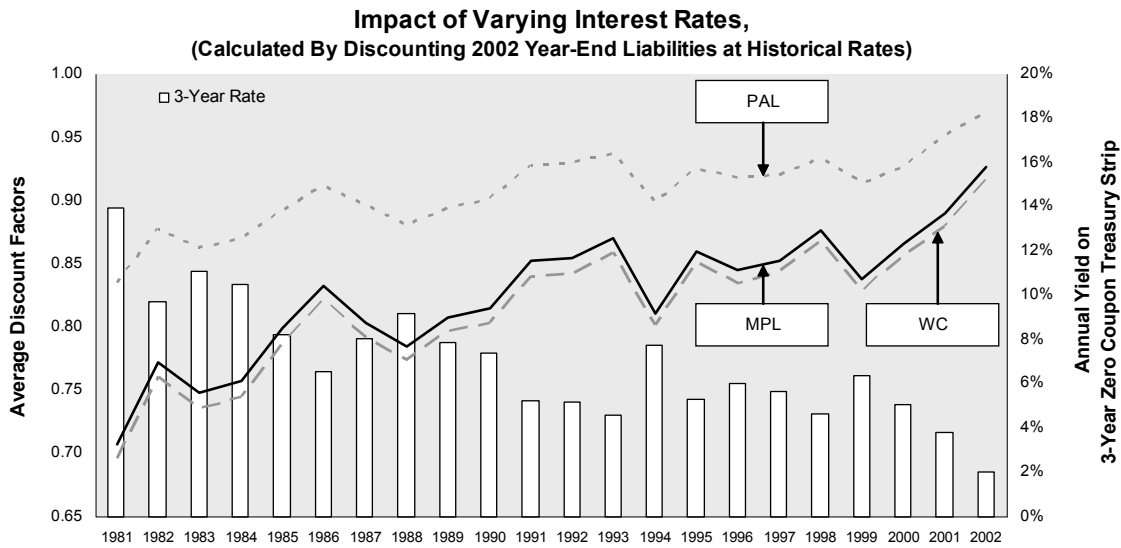
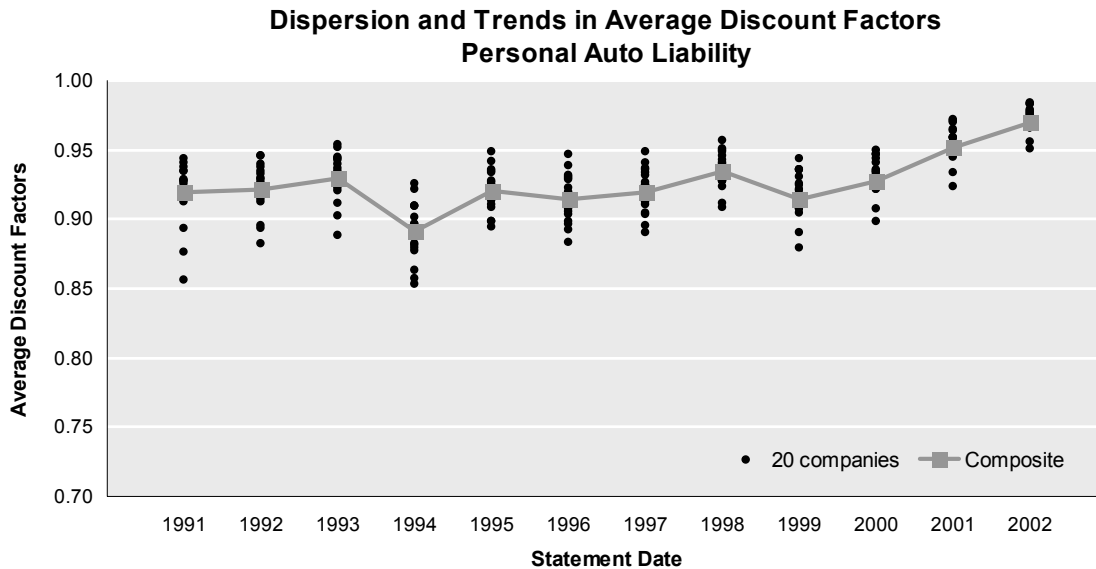
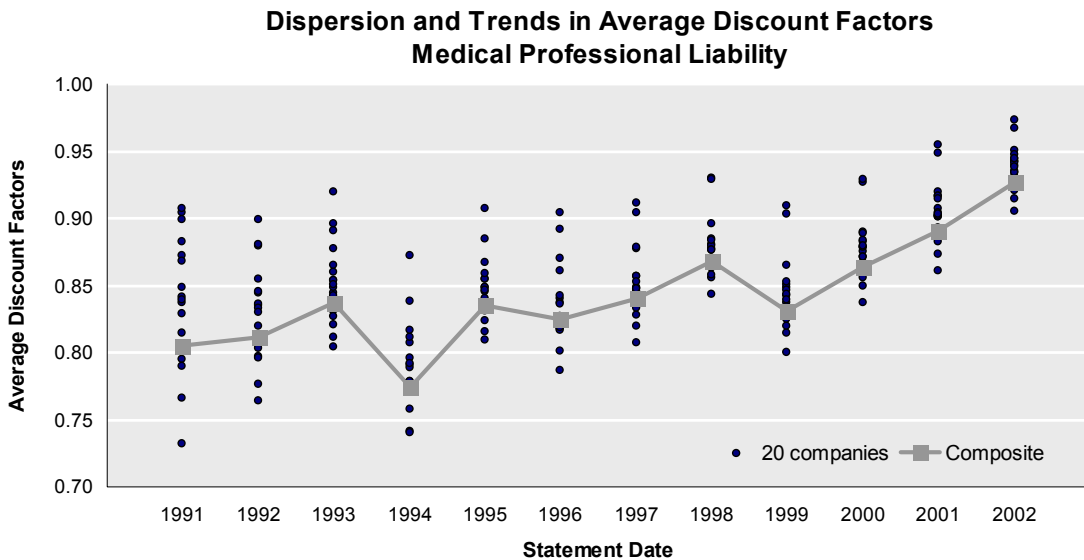
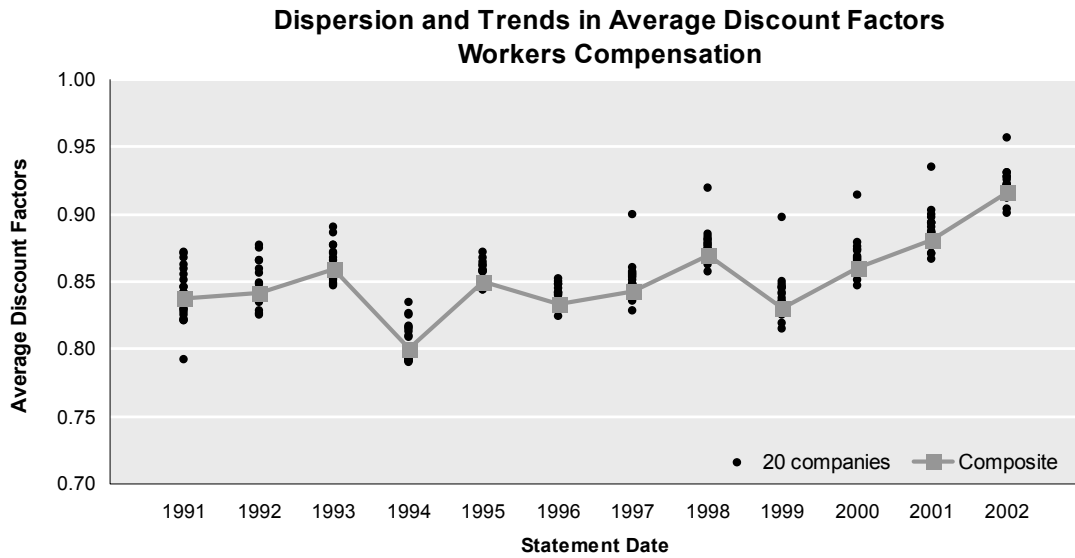


Exhibit 5.4.4 displays the dispersion of average discount factors across company groups and over time, including the 20-company composite. At any given statement date, average discount factors will vary by company group due to differing assumed payment patterns, and differing inventories of liabilities by coverage year. Over time, the discount factors will vary due to changes in interest rates, as well.

Exhibit 5.4.4-A





5.5 Market Risk Margins

Both the FASB and the IASB have indicated that estimates of the fair value of a financial asset or liability should include a margin reflecting the amount that marketplace participants would demand as compensation for systematic risk. (In this paper we refer to this margin as a market risk margin; others refer to it as a market value margin.) The economic rationale for a market risk margin is that an open market exchange would not occur at a price equal to the present value of the expected cash flows at the risk-free rate, unless the cash flows were also risk-free. To the extent that risk is present in the cash flows, rational buyers would demand a higher price to compensate them for that risk.

Issues Relating to the Definition and Measurement of Risk

While financial and actuarial literature are both consistently supportive of this conceptual proposition, there is a wide divergence of opinion as to what risks should be included and how market risk margins should be determined. The main areas of disagreement are (a) the degree to which market imperfections exist, and therefore the degree to which they need to be reflected in fair value estimates; and (b) the definition of systematic, or non-diversifiable risk, and how it should be measured and incorporated into fair value measures.

Statistically, diversifiable risk is defined as risk that can be reduced by volume through the operation of the law of large numbers. Property and casualty insurers are fundamentally in the business of diversifying risk. They write large volumes of similar policies (for example Personal Auto Liability insurance policies), with the risk of a claim on any given policy being largely independent of claims on the other policies. While the volatility of claims on an individual insurance policy is very high due to the random occurrence or non-occurrence of claims, the volatility of the claim experience for the overall portfolio of policies is relatively small. For most large auto insurers the remaining volatility of their claim experience is driven not by the randomness of the claims, but rather by factors that influence all of their insurance policies: changes in speed limits, improvements in highways, enforcement of drunk driving laws, introduction of safety features such as airbags, medical cost inflation, and so forth.

Separation of risk into diversifiable and non-diversifiable elements is important because economic theory makes a compelling case that market prices do not include a risk margin for diversifiable risk. In competitive, efficient markets, those that are diversified will simply bid prices down to eliminate any such margins. Market equilibrium will occur at prices that include only margins for risk that are not (practically) diversifiable.

The two standards bodies have indicated that market risk margins should be based on empirical market observation, and reflective of risks, market imperfections, and similar factors that are present in actual markets — not solely the risks that would be present in perfectly efficient markets. Efficient financial markets are characterized by (a) many buyers and sellers with free access to the market, similar risk appetites, and equal access to perfect information; (b) finely divisible transactions such that a single large transaction cannot distort the price; and (c) insignificant transaction costs, such that trading activity is unimpeded. Efficient markets are highly liquid with financial instruments that are actively traded; they are also devoid of information asymmetry that would advantage one trader over another. While many property and casualty insurance markets are highly competitive, the lack of a secondary market makes the financial liabilities created by them highly illiquid. Property and casualty insurance companies are not traders of these liabilities as envisioned by efficient market theory; in essence they are constricted to a “buy-and-hold” portfolio strategy.

Some would argue that the presence of these imperfections in the insurance market should lead to risk margins that are above those required by efficient markets; others would argue that these imperfections are largely irrelevant because the insurer’s cost of capital (which must be financed by the risk margins in its insurance prices) is determined by the efficiency of the stock market. In essence, those espousing the latter view are arguing that property and casualty insurance market risk margins are driven (solely) by investor cost of capital

considerations, which can be determined (solely) from equity market efficiency considerations.

One must also exercise care in defining and measuring what constitutes systematic risk in the context of fair value. Financial economists tend to define systematic risk restrictively, to include only the risk associated with stock market returns. All other risk is considered to be non-systematic, or diversifiable. This approach is embodied in the Capital Asset Pricing Model (CAPM), which provides a theoretical framework for explaining how the risk associated with an individual stock is priced by the market. Under CAPM, risk is defined in terms of the degree to which an asset's return is linked to the overall stock market return. Assets with returns that are largely independent of the stock market will be priced by the market to produce expected returns close to the risk-free rate — because their risk can be diversified away through stock selection. By investing in a broad array of stocks, the independent volatility can be diversified away.

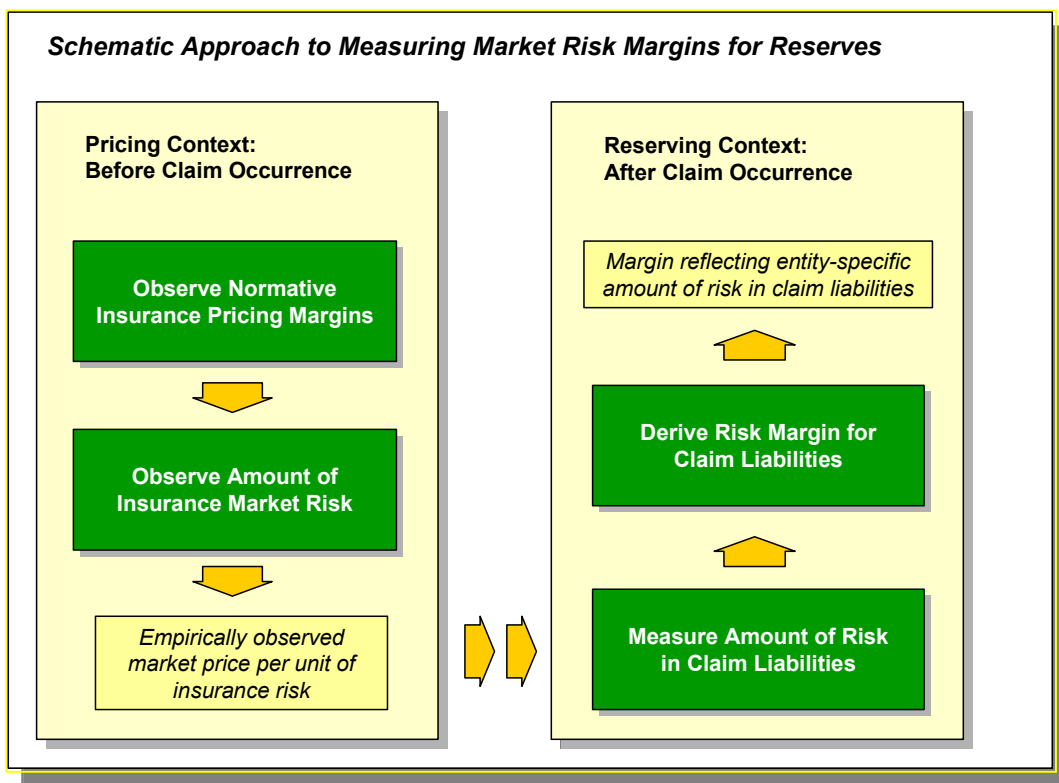
Of course, CAPM was developed in the context of individual stock selection and equity portfolio management. In CAPM, there is only one risk (stock returns), and only one class of assets (stocks). Others view stock market risk as one case of systematic risk and seek to generalize CAPM to incorporate more types of risk and more classes of assets. This approach is embodied in Arbitrage Pricing Theory (APT), in which individual asset prices are driven by a number of underlying systematic risk elements such as interest rates, energy prices, the level of economic activity, unemployment rates, wage inflation, and so forth. Under APT, risk is defined as the degree to which an individual asset's return is linked to each of these underlying risk elements. As with CAPM, assets with returns that are independent of one or more of these risk elements will have lower returns — because investors can construct portfolios that diversify independent risk. In addition, to the extent that assets exist with returns that are counter to one or more of these risk elements, investors can construct portfolios with natural hedges that will also act to bid down the price for those risks.

The importance of these definitional issues to property and casualty insurers is not whether diversifiable risk should have a risk margin associated with it under fair value. The answer to this question is clearly 'no' and methods for determining risk margins will need to be developed that differentiate between diversifiable and non-diversifiable risk. Rather, the key issue is whether the non-diversifiable element of insurance risk will be considered systematic, allowing a risk margin to be associated with it. The definitional choice of systematic risk can have a dramatic influence on the conclusions and results. For example, under a pure CAPM approach the risks associated with hurricanes and earthquakes (which are not fully diversifiable by the insurer, since they tend to affect multiple policyholders simultaneously) would not be considered systematic — because they are largely independent of stock market returns. This would imply that the market risk margin required for these risks can be determined merely as a provision that assures that the insurer obtains an after-tax return on its capital equal to the risk-free rate (i.e., a margin that covers any tax and agency costs). In contrast, a broader definition of systematic risk that includes non-diversifiable hurricane and earthquake risks would allow for a margin that incorporates these risks.

Overview of Our Approach to Measuring Market Risk Margins

For the purposes of this research project, our starting point was historical empirical evidence as to the actual market risk margin achieved in the insurance markets for each product. To

calculate market risk margins for claim and defense cost liabilities we took a four-step approach, as depicted in the graphic and described below:



- First, we calculated empirical market risk margins for the liabilities based on the prices that insurers actually charged at the time that the policies were sold. This was done for each product over a 27-year historical period by comparing the actual premiums charged in that year to the net present value of the actual expenses and policy benefit costs that were subsequently incurred. From the 27-year history we selected a normative market pricing risk margin.
- Second, we measured the amount of empirical non-diversifiable risk that is associated with the historical margin for each product, using the same time period and data. This allowed us to express the empirical market risk margins in terms of a market price per unit of non-diversifiable insurance risk.
- Third, we measured the amount of risk associated with each company's claim and defense cost liabilities at each statement date. (As a sensitivity test, we employed two different methods to measure the amount of risk.)
- Fourth, we applied the market price per unit of risk to the amount of risk present in the loss and defense cost liabilities to obtain a derived market reserve risk margin for each company at each statement date.

All of the above analysis was performed using data drawn from the Schedule P for each company group. Schedule P of the regulatory report provides a 10-year history of premiums and claim experience by year of coverage. For each product, Schedule P displays the

amounts of claim and defense payments, and the adjusters' estimates of the settlement cost of unpaid claims, for each year of coverage. Information is displayed at successive annual maturities, such that one can observe the emergence and settlement of claims over time. For mature years, one is able to observe the actual claim and defense costs associated with a particular year of coverage, rather than the initial estimates of those costs at the time the coverage was provided. Because Schedule P contains 10 years of history (that is, the current year plus nine prior years), our 12 years of financial reports yielded 21 years of coverage experience.

Each of the steps outlined above is discussed more fully below, with additional technical details provided in Appendix 8.3.

Empirical Market Pricing Risk Margins

Our starting point was empirical evidence as to the margins that were actually present historically in the prices charged in the insurance market for each product. For each historical year of coverage, we deducted the present value (discounted at the then-prevailing risk-free rate) of actual acquisition, underwriting and claim adjusting expenses from the actual premium revenue. The net amount remaining (i.e., the *pure premium*) represents the provision for claim and defense costs, including any margin that the market allows insurers to charge for taking the risk. We then deducted the net present value of the actual claim and defense costs. Any net remainder would presumably represent the margin for risk that was allowed by the market. Several points should be noted:

- The resulting empirical market risk margins are ex-post measures, in the sense that we are looking at the actual realizations of claims, rather than the market expectations. This approach is analogous to measuring the equity risk premium by looking at actual equity returns over an extended period. Generally, ex-post measures reflecting actual realizations are easier to obtain than ex-ante measures reflecting their expectation.
- Since the prices for the insurance products were set before the coverage was provided and the claims occurred, the resulting empirical market risk margins are indicative of the level of risk at that point. Actuaries would refer to this level of risk as *pricing risk*, rather than *reserve risk*. The latter is presumably a subset of the former, as the claim reserves relate to liabilities for events that have already happened. In theory, the level of risk is greatest at the time the policy is issued; the risk then gradually dissipates as the coverage is provided, the insured events occur, the claims are initially reported, and the information necessary to settle them is developed. At each stage of maturity, the level of risk should reduce as uncertainties are eliminated and information about the claims and their ultimate settlement costs become known.

Empirical pricing risk margins are calculated for coverage years from 1976 to 2002 (i.e., over a 27 year period). As a proxy for the market we used the historical experience for the composite of the 20 companies going back to 1982, and supplemented that data with published industry results from 1976 to 1981.

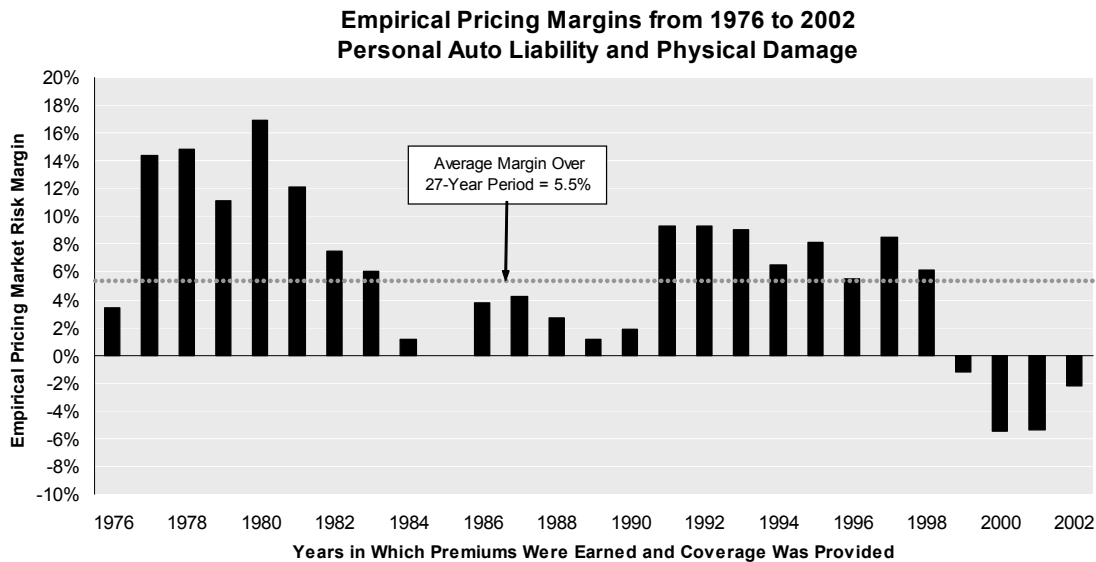
A special issue emerged with Personal Auto Liability. For most customers, this coverage is purchased in conjunction with Personal Auto Physical Damage coverage. Insurers are concerned primarily with the margin on the overall contract, including both coverages. At certain times, competitive and regulatory considerations may cause insurers to accept a sub-

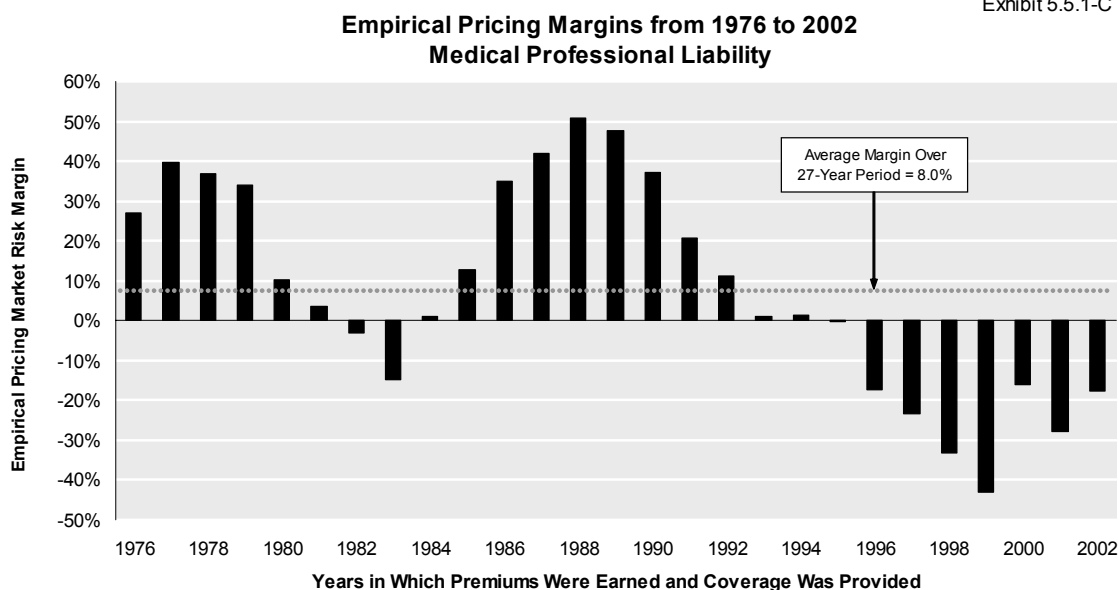
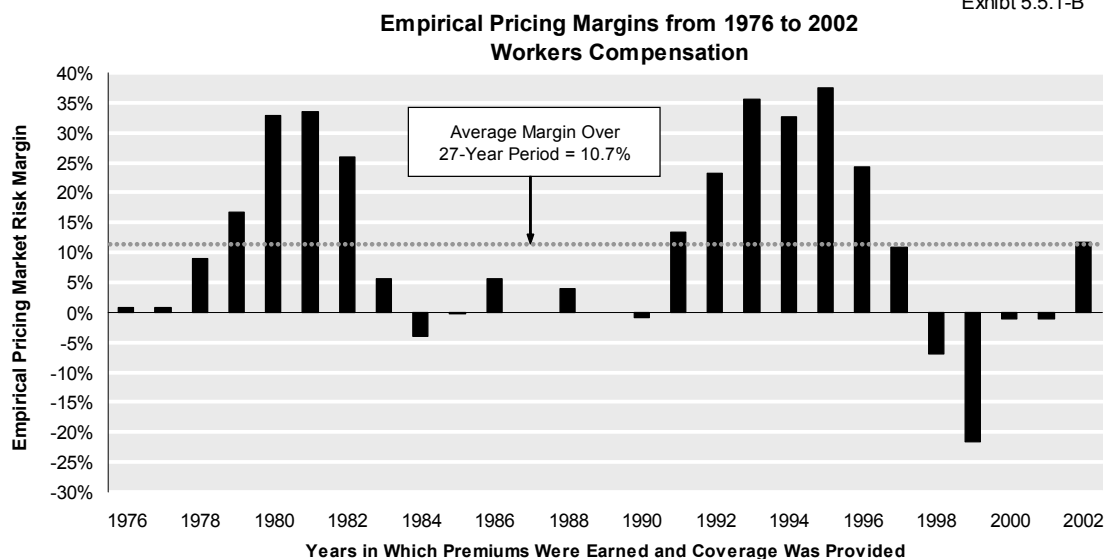
par return on one of the coverages in exchange for an attractive return on the other. We therefore analyzed the empirical pricing risk margins on the two coverages combined.

The empirical market pricing risk margins, expressed as a ratio to the pure premium, for each product are displayed in Exhibit 5.5.1. One can see immediately that they are volatile and cyclical, reflecting the dynamics of the markets for each of the products. Variations in the pricing risk margins over time can be caused by (a) market mis-estimation of the expected claim and defense costs at the time the product was priced, especially when there is a change in the underlying trends affecting the claim costs; (b) periods of alternating over-supply and under-supply in the market, with the former leading to the bidding down of prices to a point below expected costs as participants attempted to protect their market share; (c) rate suppression by regulatory authorities in various jurisdictions, particularly in times of high inflation causing the need for large increases; (d) high levels of investment returns, which add to capital and bolster performance, in turn causing companies to bid for business more aggressively.

Margins for Personal Auto are the most stable, with only a few periods indicating negative margins. Workers Compensation is more volatile (note the changes in the scale of the left axis from one product to another), with periods of substantial margins and periods of small or negative margins. Medical Professional Liability is more volatile still, showing an extended period of substantially negative margins over the latest seven years.

Exhibit 5.5.1-A





Our goal was not to measure the market pricing risk margin at any given point, but rather to develop an estimate on the long-term normative market pricing risk margin. We calculated the average market pricing risk margin over various historical periods. Due to their volatility, the average historical market pricing risk margins are somewhat dependent on the specific time period chosen. (An analogous issue occurs when analyzing historical equity returns.) Ultimately, we selected a normative market pricing risk margin for each line judgmentally, based on risk-return considerations (discussed below). The values we selected are meant to be reasonable, but illustrative. Further research could help to refine estimates of the market pricing risk margins.

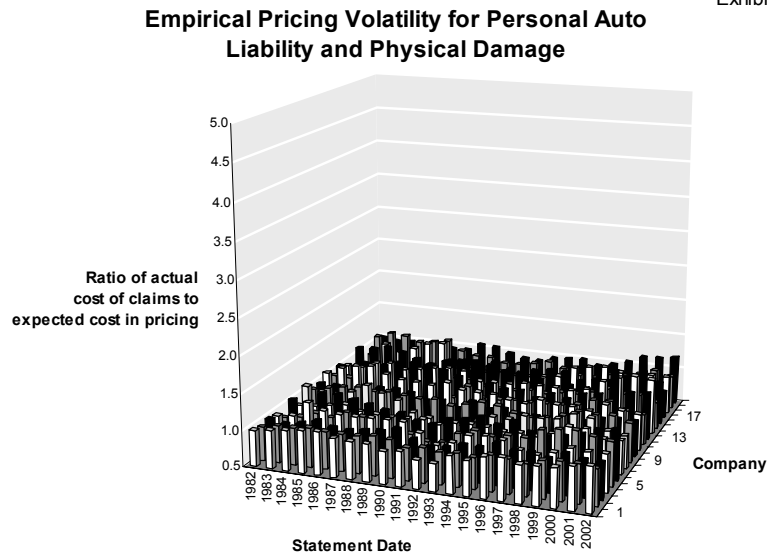
In passing, we would note that we could have allocated capital to each product, and converted the empirical margins into a return on capital. While this would have allowed us to make comparisons to returns on other financial instruments such as stocks and bonds, it

would have depended on our assumptions as to the required level of capital. We therefore chose to simply look at the margins as a percent of revenue.

Using the same data for the period 1982 to 2002, we measured the empirical market volatility associated with the empirical pricing risk margin of each product. We measured the volatility over time and across the 20 companies. Exhibit 5.5.2 displays the results graphically. As can be seen, the volatility of the market pricing risk margins is relatively small for Personal Auto, somewhat larger for Workers Compensation, and very significant for Medical Professional Liability (the left hand scale has been kept constant to permit visual comparisons between the lines). In Personal Auto the variation is relatively uniform across all company groups, with no outliers. However, in Workers Compensation, two company groups appear to be outliers, exhibiting greater volatility. In Medical Professional Liability a number of company groups also exhibit significant volatility.

The empirical volatility observed in Exhibit 5.5.2 includes systematic risk due to the behavior of the markets and the underlying economic environment. It also includes some residual non-systematic risk due to the random nature of claims (particularly large claims). Since we excluded companies with very small volumes of business from our sample, most of the non-systematic risk will have been diversified away. In addition, since the data are net of reinsurance they reflect the extent of risk hedging that companies typically purchase. We are not aware of a method to empirically separate the systematic risk from the residual non-systematic risk.

Exhibit 5.5.2-A



Empirical Pricing Volatility for Workers Compensation

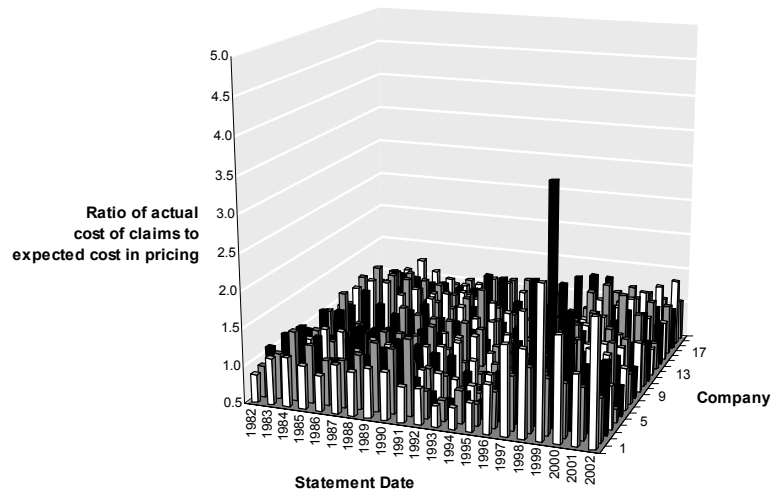
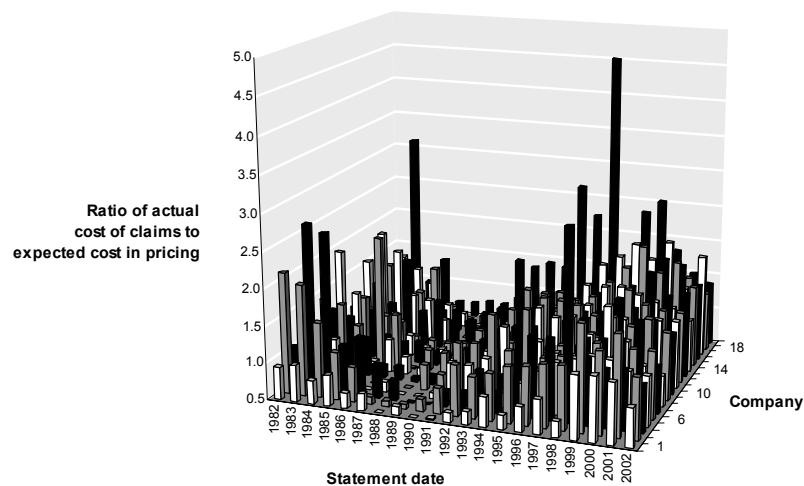


Exhibit 5.5.2-C

Empirical Pricing Volatility for Medical Professional Liability



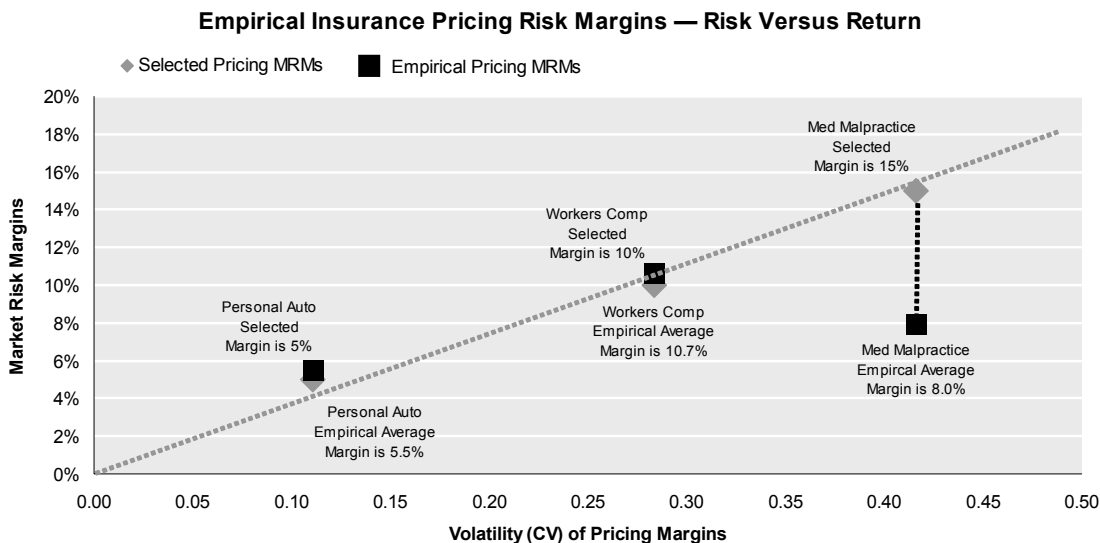
Our chosen measure of volatility was the standard deviation of the margins expressed as a percentage on the net present value of the expected claim and defense cash flows (statistically, the coefficient of variation). Using this measure, the market pricing risk margin volatilities are 11.1% for Personal Auto, 28.3% for Workers Compensation, and 41.6% for Medical Professional Liability.

Exhibit 5.5.3 combines the overall results for each line in a risk-return framework, showing both the empirical historical average market pricing risk margins and our selections of their normative values.

One would expect that the market would allow greater margins for greater risk; however, this is not the case for Medical Professional Liability. The latter product has been particularly problematic over the last several decades, as it suffered from very high inflation

in claim costs. Many insurers have withdrawn from the market for this product because they do not believe that they can achieve acceptable returns. We would therefore conclude that the historical experience is not representative of the required returns for this product. As can be seen on the exhibit, we chose normative market pricing risk margins of 5%, 10%, and 15% for Auto Liability, Workers Compensation, and Medical Professional Liability, respectively. The choice of round numbers with an approximate linear relationship between risk and return is indicative of the accuracy of the estimates. Here again, further research should help to improve the measurement of these relationships.

Exhibit 5.5.3



Finally, by dividing the selected normative market pricing risk margin by the coefficient of variation, we obtained a measure of the normative market price per unit of risk for each line. These are approximately 450 basis points for Personal Auto, 350 basis points for Workers Compensation, and 360 basis points for Medical Professional Liability. (Recall that the margins are a return on sales, rather than return on capital, such that they are not directly comparable to risk premia on different classes of investment.)

Measuring Reserving Risk and Deriving Market Reserve Risk Margins

Having developed normative empirical market pricing risk margins, we turned our attention to the measurement of the amount of risk present in the claim and defense cost liabilities. Our goal was to develop a measure of the amount of risk for the total inventory of unpaid claims for each entity, rather than the amount of risk associated with the unpaid claims by coverage year. We would expect that the amount of risk present in the liabilities for each coverage year would decline with older, more mature coverage years — due to the decreasing uncertainty discussed earlier. Our methodology could easily be refined to reflect varying amounts of risk by coverage year. We measured the total amount of reserving risk for each company group at each statement date, using two different generally accepted stochastic reserving methods. Two methods are used to illustrate the differences in results that might be obtained.

- The first method is an analytic approach, as published by Mack²⁷. Using the historical claim development data, the standard error of the estimated claim and defense cost liabilities is computed based on certain underlying statistical assumptions as to the underlying claim process.
- The second method is a stochastic simulation approach, as published by Hodes, Feldblum, and Blumsohn²⁸ (referred to subsequently in this paper as the HFB method). Parameters are derived from the company group's historical claim development data; future claim and defense cost payments are then simulated via random draws from a set of assumed statistical distributions having the derived parameters. The result is a sample distribution of projected future cash flows, which can be adjusted to a present value basis by discounting at the risk-free rate.

As has been indicated, both of the above methods utilize the same historical data. Both methods incorporate risks as to the timing and the amounts of future cash flows. However, our results indicate that the two methods produce different indications as to the amount of reserving risk present at each company group.

Each of the two methods, and their application in the context of this project, are described more fully in Appendix 8.3.

As a final step, we applied the selected market price per unit of risk to the indicated amount of reserving risk to produce a derived market reserving risk margin. Consistent, with fair value principles, while the reserving risk margin reflects the entity-specific amount of risk for a given product, the margin reflects only a market cost of risk rather than a company (entity-specific) cost of risk.

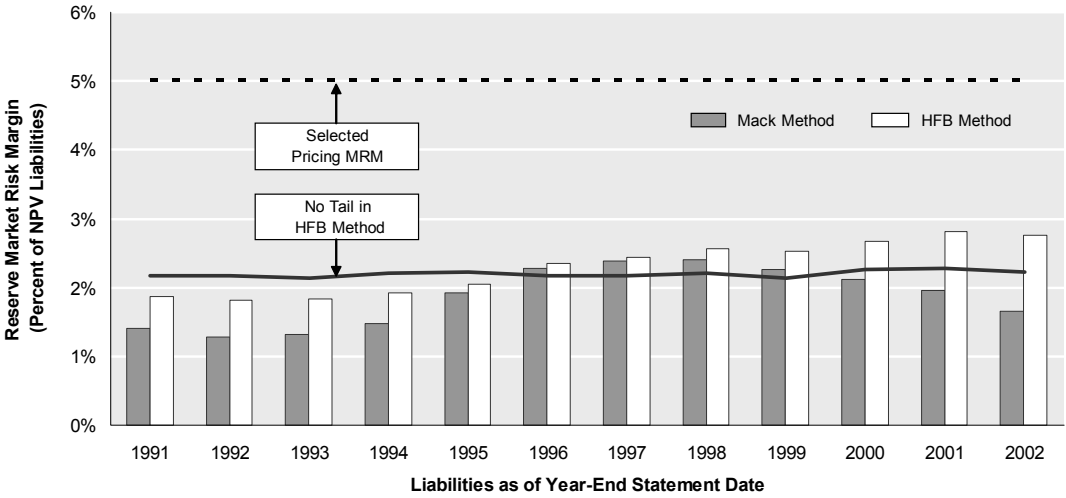
Exhibit 5.5.4 displays in bar chart format the derived reserving risk margins for the 20-company composite at each statement date for each of the three product lines. Results are shown for both the Mack and the HFB methods. As can be seen, the derived reserving risk margins are different between the two methods. They also vary over time, due to changing parameters derived from the emerging claim development experience. The charts also show (as a horizontal dashed line) the selected market pricing risk margin. As would be expected, the reserving risk margins are a fraction of the pricing risk margins. The pricing risk margins reflect the level of risk that is present at the time the product was sold, before any of the insured events have happened. The reserve risk is therefore a residual; as events unfold and more information becomes available, the risk should decline.

In reviewing Exhibit 5.5.4, note that the composite results shown are the weighted average of the individual company group margins, and not the margin derived from the composite data.

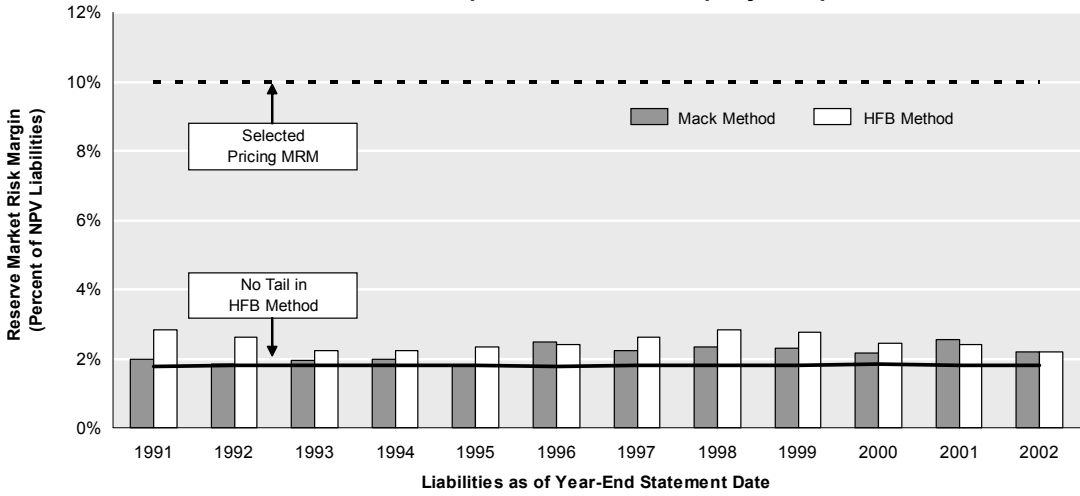
²⁷ Thomas Mack, "Measuring the Variability of Chain Ladder Reserve Estimates", *CAS Prize Paper Competition on Variability of Loss Reserves* (1993, p. 102-182).

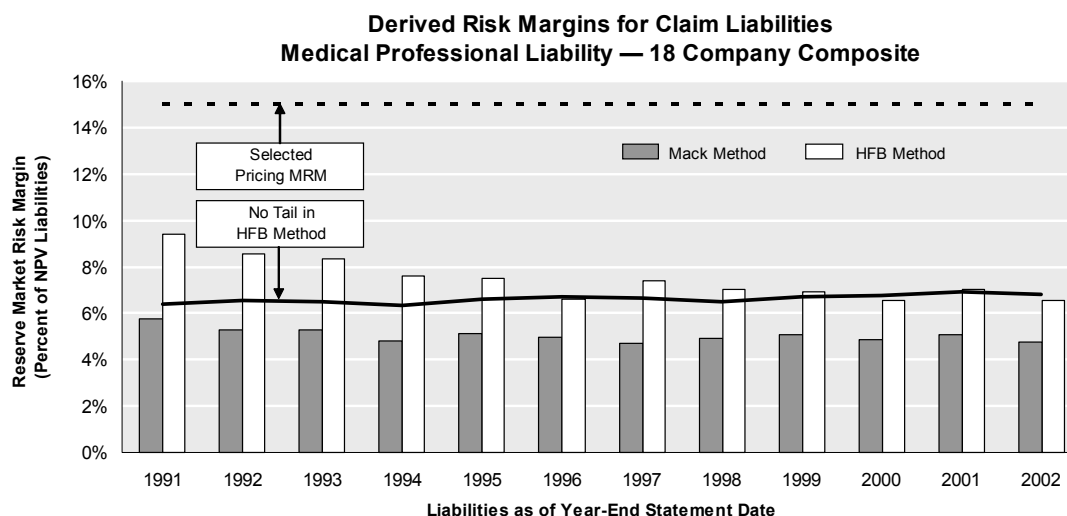
²⁸ Douglas Hodes, Sholom Feldblum, and Gary Blumsohn, "Workers Compensation Reserve Uncertainty", *Proceedings of the Casualty Actuarial Society, Volume LXXXVI* (p. 263-392).

**Derived Risk Margins for Claim Liabilities
Personal Auto Liability — 20 Company Composite**



**Derived Risk Margins for Claim Liabilities
Workers Compensation — 20 Company Composite**

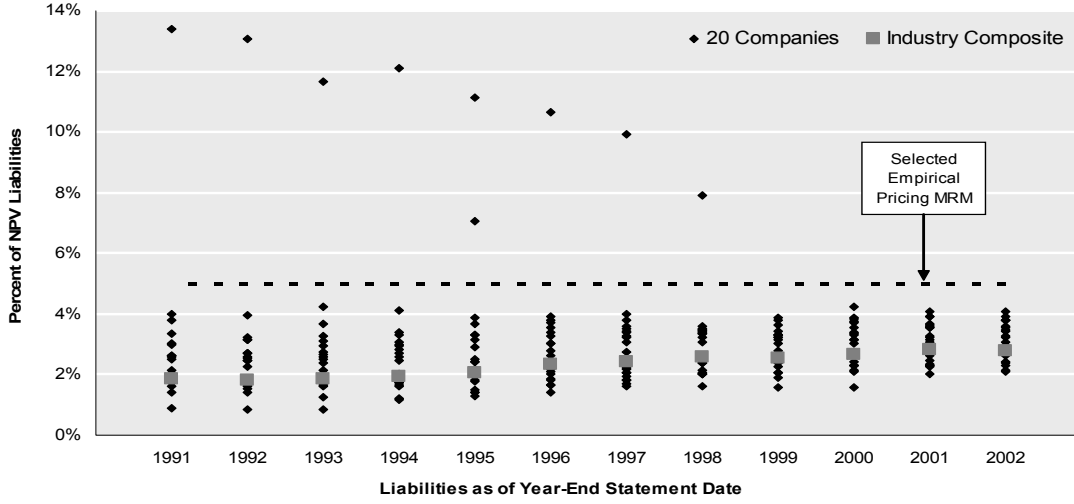




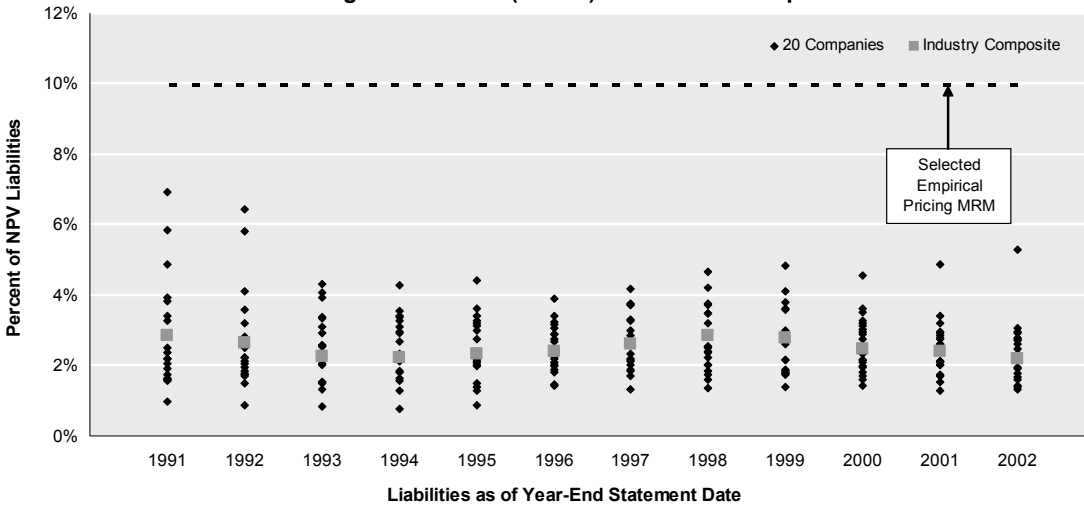
For all three lines, the market reserve risk margins produced by the HFB method are higher than those produced by the Mack method. To the extent that there are outlier values, the HFB method is more responsive to them — creating higher measures of reserve variability. Moreover, the HFB method assumes development beyond the tenth maturity (i.e., where our data stops), whereas our implementation of the Mack method does not. The uncertainty of the development beyond the tenth maturity has a leveraged effect on the measured uncertainty. For comparison purposes, we performed alternative calculations using the HFB method in which we assumed that there was no development beyond the tenth maturity. These are shown as a solid line on Exhibit 5.5.4. As can be seen, eliminating the “tail” uncertainty from the HFB method lowers and stabilizes the measured uncertainty. In fact, removing the tail uncertainty in Workers Compensation moves the market reserve risk margin indicated by the HFB method below that indicated by the Mack method.

Exhibit 5.5.5 displays the dispersion of individual companies around the composite at each statement date, as well as the trends over time, of the measured market reserve risk margins using the HFB method. Note that a few companies (two for Personal Auto Liability and four for Medical Professional Liability) have a derived market reserve market risk margin that is in excess of the selected normative market pricing risk margin — indicating that their amount of reserving risk is greater than the assumed amount of market pricing risk. This is an unusual result, given our hypothesis that the amount of risk declines as information about the claims becomes known. In theory, these companies would record a loss on the sale of new business, as they would be required to record claim and defense cost liabilities with a market reserve risk margin in excess of the allowance in market prices for the particular product.

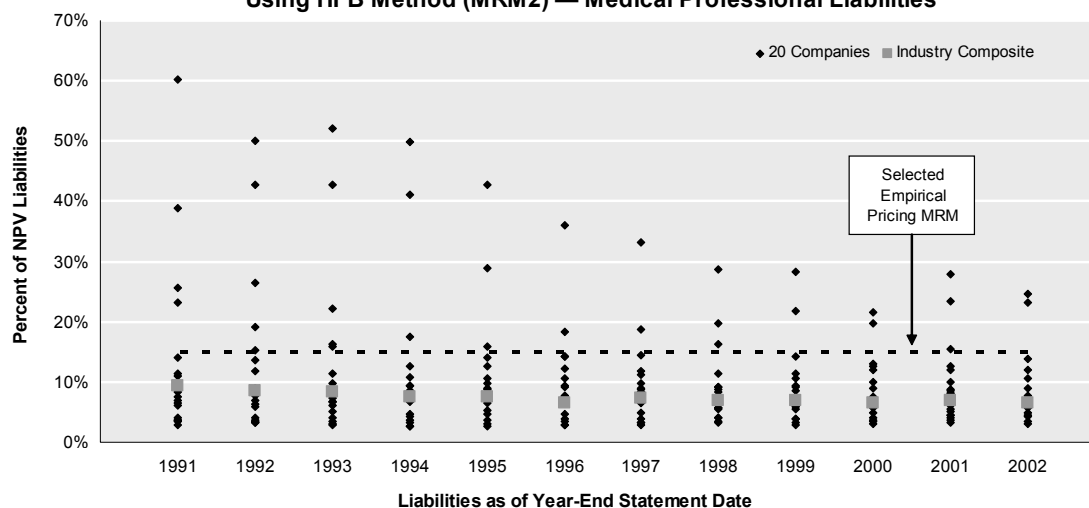
**Derived Risk Margins for Claim Liabilities
Using HFB Method — Personal Auto Liability**



**Derived Risk Margins for Claim Reserve Liabilities
Using HFB Method (MRM2) — Workers Compensation**



**Derived Risk Margins for Claim Reserve Liabilities
Using HFB Method (MRM2) — Medical Professional Liabilities**



We wanted to test whether the size of the company (as measured by its premium volume for the particular product) had an influence on the measured reserve risk. Our hypothesis was that larger companies enjoy a greater level of diversification of risk, and that smaller companies still have some undiversified non-systematic risk present in their business. To test this hypothesis, we segmented the company groups into three tiers based on their premium volume for each product. For each tier, we calculated an average of the measured reserve risk across all companies in the tier and all statement years, using premium volume as our weights. The resulting average market reserve risk margins by tier are shown in Exhibit 5.5.6. As can be seen, the level of measured reserve risk does increase as the company size diminishes, suggesting that we are still capturing some process risk in the smaller companies. Since process risk is diversifiable, economic theory argues that the market will not pay a risk premium for it. However, the data reflects the level of diversification that actually exists in the market — further diversification (for example, via mergers that create larger, more diversified portfolios) may not be practical for structural reasons.

Average Reserve Market Risk Margins -- By Size of Company

Exhibit 5.5.6

Product	Size Tier	Composite of Measured Reserve Risk Across Companies and Years			
		Mack Method	Ratio to Largest	HFB Method	Ratio to Largest
Personal Auto Liability	Smallest	0.028	1.56	0.036	1.64
	Middle	0.023	1.28	0.027	1.23
	Largest	0.018	1.00	0.022	1.00
Workers Compensation	Smallest	0.022	1.05	0.029	1.16
	Middle	0.023	1.10	0.024	0.96
	Largest	0.021	1.00	0.025	1.00
Medical Prof. Liability	Smallest	0.076	1.73	0.111	1.68
	Middle	0.058	1.32	0.076	1.15
	Largest	0.044	1.00	0.066	1.00

Finally, Exhibit 5.5.7 summarizes the volatility of individual company group reserve risk margins. In each column, the company groups have been sorted in descending order in terms of the stability of their measured reserve volatility (the results for the 20-company composite are shown in bold). The statistic shown is the square root of the sum of the squares in the annual change in the market reserve risk margin from one year to the next. As can be seen, the companies vary dramatically as to the stability of their measured reserve risk, using either of the two methods. Generally the HFB method is less stable. As we have noted, the HFB method is somewhat more responsive to outlier values in the claim experience data. It also incorporates an element for the volatility of the tail of unpaid claims beyond 10 years maturity. (These are not meant as criticisms of the HFB method; they are simply observations as to the drivers of the differences between the methods.)

Stability of Reserve Market Risk Margins Over Time

Exhibit 5.5.7

Company Rank	Personal Auto Liability		Workers Compensation		Medical Prof. Liability	
	Mack	HFB	Mack	HFB	Mack	HFB
1	0.0441	0.0580	0.0756	0.0536	0.1784	0.3026
2	0.0352	0.0542	0.0643	0.0298	0.0893	0.2353
3	0.0301	0.0141	0.0545	0.0296	0.0777	0.1165
4	0.0222	0.0117	0.0525	0.0217	0.0753	0.1153
5	0.0189	0.0114	0.0223	0.0212	0.0691	0.0856
6	0.0153	0.0102	0.0218	0.0207	0.0585	0.0746
7	0.0149	0.0101	0.0188	0.0199	0.0554	0.0741
8	0.0130	0.0097	0.0179	0.0165	0.0455	0.0737
9	0.0124	0.0091	0.0148	0.0157	0.0441	0.0592
10	0.0122	0.0087	0.0136	0.0140	0.0438	0.0402
11	0.0118	0.0084	0.0135	0.0100	0.0354	0.0351
12	0.0112	0.0080	0.0128	0.0097	0.0334	0.0273
13	0.0110	0.0073	0.0123	0.0096	0.0325	0.0248
14	0.0087	0.0070	0.0106	0.0093	0.0243	0.0238
15	0.0077	0.0069	0.0105	0.0079	0.0196	0.0237
16	0.0077	0.0068	0.0095	0.0070	0.0175	0.0224
17	0.0073	0.0067	0.0095	0.0067	0.0127	0.0188
18	0.0071	0.0066	0.0079	0.0066	0.0094	0.0158
19	0.0069	0.0056	0.0069	0.0064	0.0066	0.0108
20	0.0061	0.0056	0.0056	0.0064		
21	0.0037	0.0044	0.0043	0.0032		

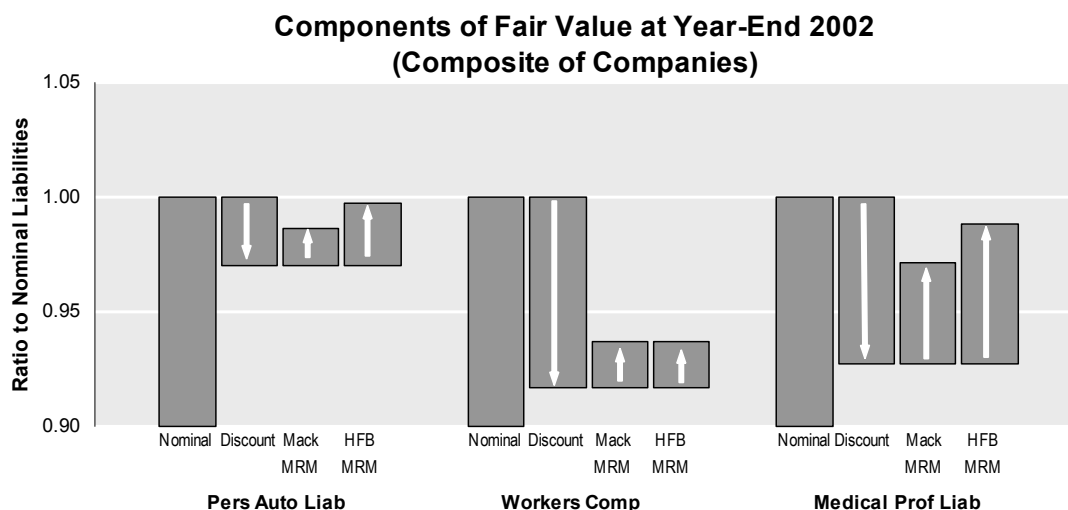
6. Impact of Fair Value on Financial Results

Having calculated discounts for the time value of money and market risk margins that are applicable to claim and defense cost liabilities, we can now restate the historical financial results for each company and for each of the three products from a *pro forma* U.S. GAAP basis to a hypothetical fair value basis.

6.1 Balance Sheet Impact

Exhibit 6.1.1 displays the magnitude of the changes from nominal to fair value claim and defense cost liabilities for the 20-company composite for each of the three products, as of December 31, 2002. The results by product are quite disparate; however the disparities are consistent with generally accepted perceptions of the three products.

Exhibit 6.1.1



For Personal Auto Liability the combination of relatively low reserve risk and historically low interest rates at the end of 2002 causes the composite fair value liabilities to be close to their nominal value (especially when we used the HFB method to measure the amount of the reserve risk). Depending on the method used to measure the amount of reserving risk, the composite fair value at the end of 2002 is 1% to 2% below the nominal value. Under more normative interest rate levels, the fair value of Personal Auto Liability claim and defense cost liabilities would, on average, be 4% to 5% below their nominal value.

In Workers Compensation, while the amount of reserve risk is relatively low, the longer payout pattern creates a much deeper discount, causing the composite fair value of the liabilities at the end of 2002 to be substantially lower than the nominal value — on average about 6% lower. Under more normative interest rate levels, the fair value of Workers Compensation Liability claim and defense cost liabilities would, on average, be 11% to 12% below their nominal value.

Finally, for Medical Professional Liability, the measured reserve risk is sufficiently high that it almost offsets the substantial discount. The composite fair value of the liabilities at the end of 2002 is 2% to 3% below the nominal value; under more normative interest rate levels, the fair value of Medical Professional Liability claim and defense cost liabilities would, on average, be 7% to 8% below their nominal value.

Exhibit 6.1.2 displays the ratio of the estimated fair value of claim and defense cost

Exhibit 6.1.2-A

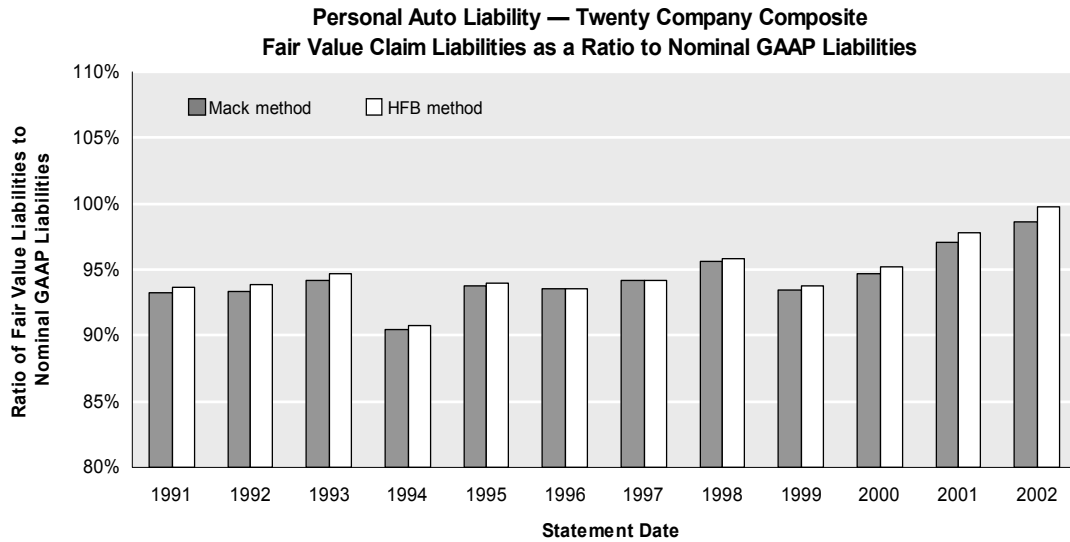
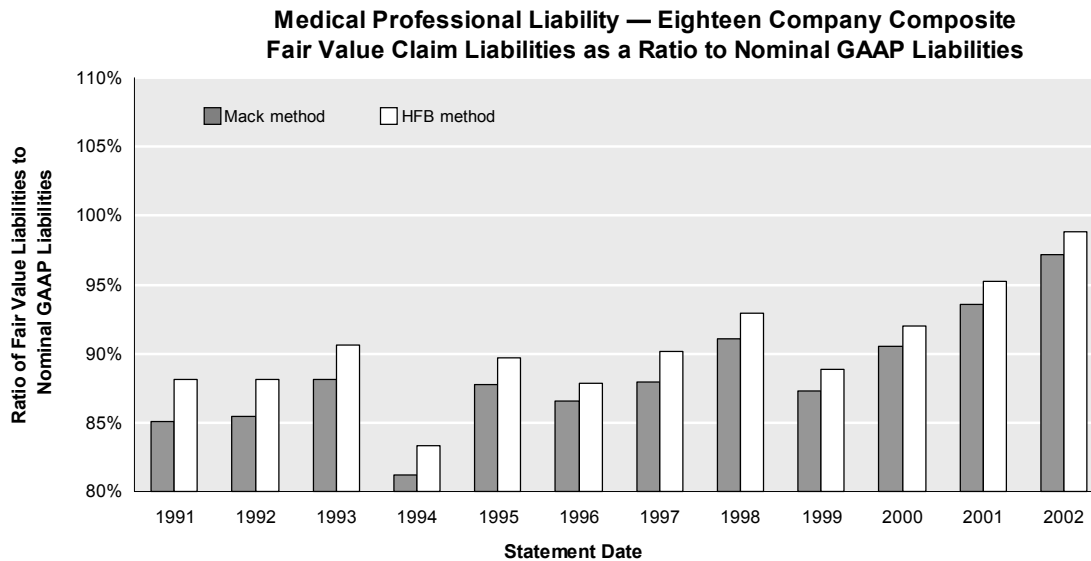


Exhibit 6.1.2-B



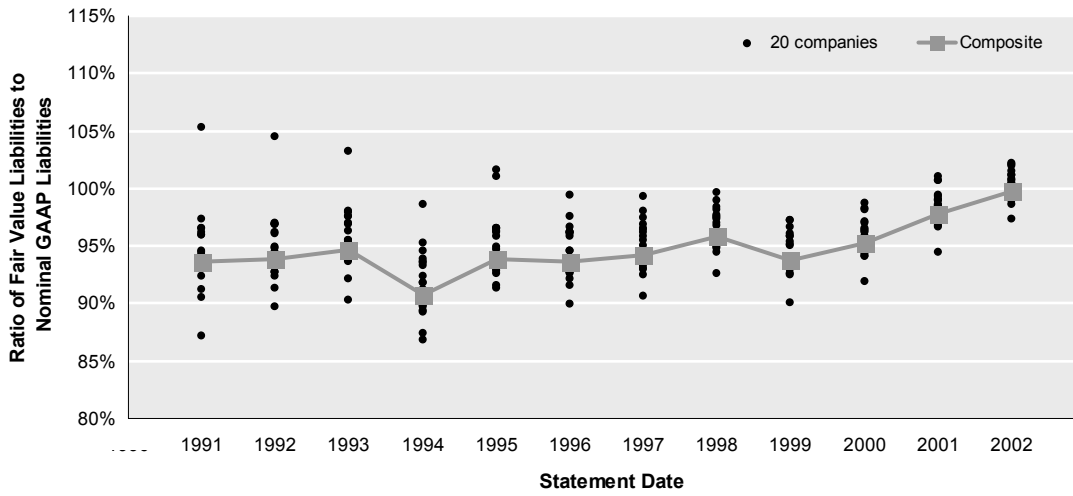


liabilities to the corresponding nominal value for the 20-company composite for each product line across the 12-year period. The movements over time reflect the combined effects of changing interest rates and amounts of measured reserve risk.

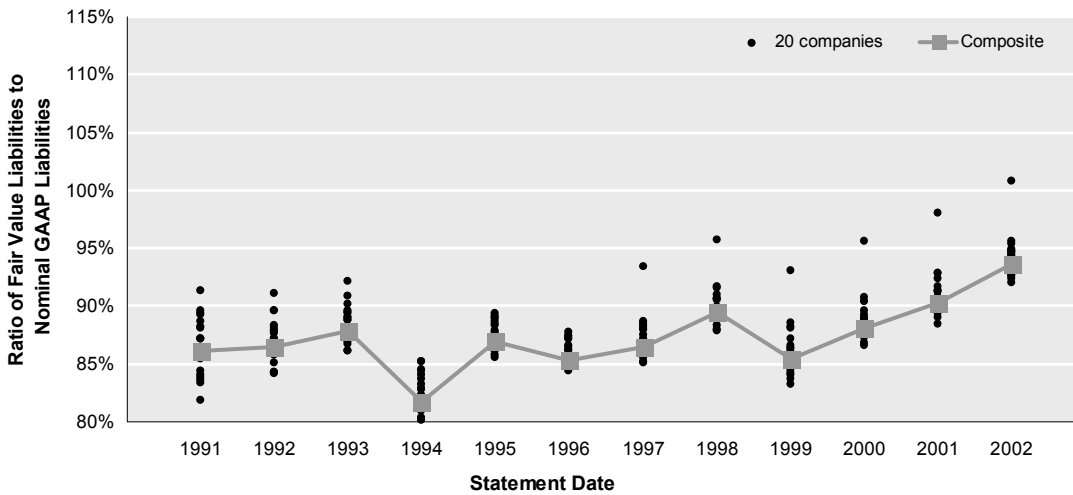
Finally, Exhibit 6.1.3 displays the dispersion of the ratio of fair values to nominal values across companies and over time. For each of the products, the dispersion tends to narrow over time, with fewer outlying companies. In Personal Auto Liability, the dispersion is lower in the latest five years than in the earlier years. This is also true for Workers Compensation, if one ignores an outlier company group. The dispersion is substantially higher in Medical Professional Liability, but also appears to narrow slightly in the most recent years.

As can be seen, at various points in time the measured reserve risk of individual companies is sufficiently high to cause the fair value of their liabilities to be above the nominal values. While this occurs only sporadically in Personal Auto Liability and Workers Compensation (depending on the year and the reserve risk measurement method), it occurs relatively frequently in Medical Professional Liability. In Personal Auto Liability, roughly half of company groups have fair values above their nominal values at the end of 2002, due to the low interest rates. Under more normative levels of interest rates this situation occurs with only one or two company groups.

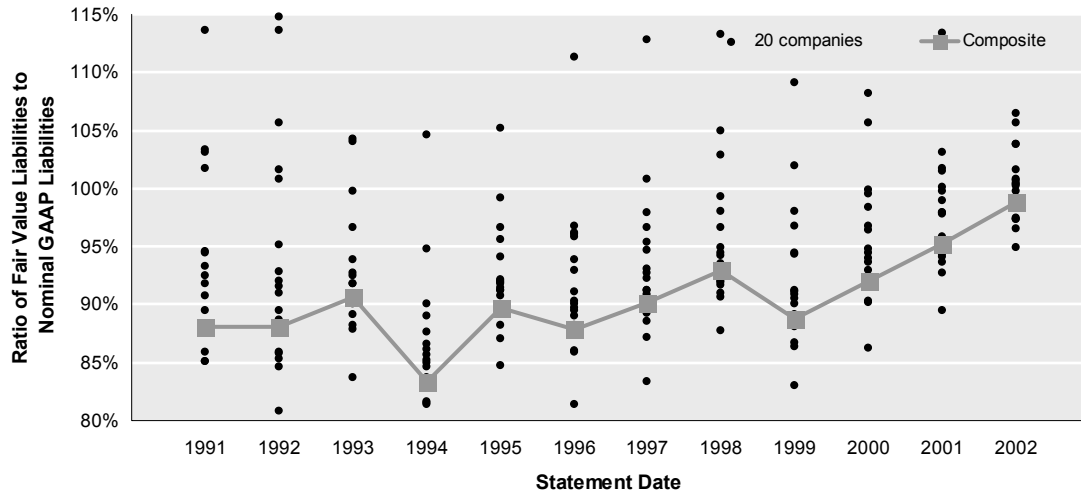
**Ratio of Fair Value Claim Liabilities to Nominal GAAP Liabilities
Using HFB Method — Personal Auto Liability**



**Ratio of Fair Value Claim Liabilities to Nominal GAAP Liabilities
Using HFB Method — Workers Compensation**



Ratio of Fair Value Claim Liabilities to Nominal GAAP Liabilities Using HFB Method — Medical Professional Liability



6.2 Income Statement Impact

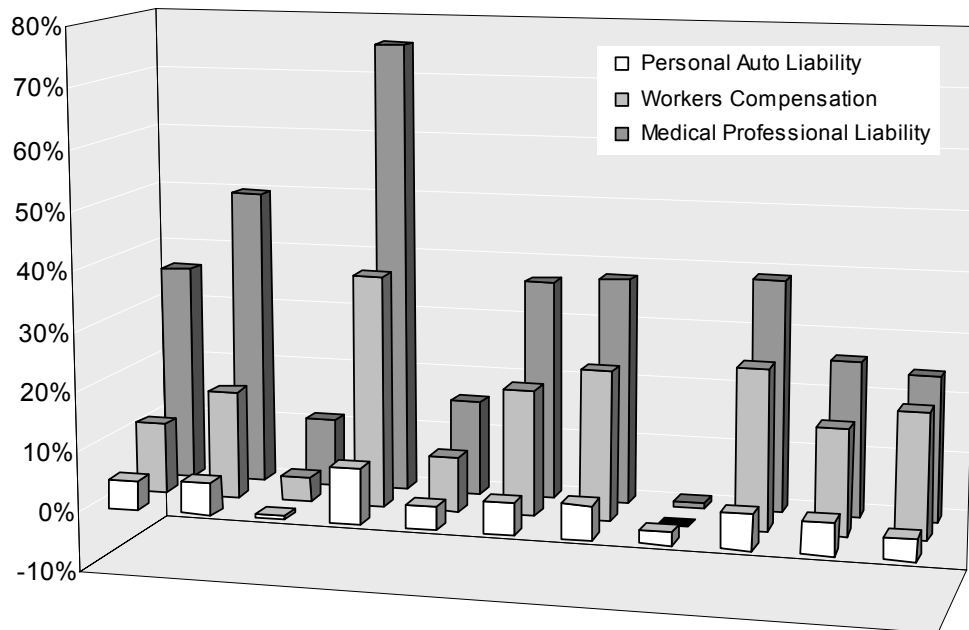
Moving from the balance sheet to the income statement, Exhibit 6.2.1 (at the end of this section) displays the composite financial data for the 20 companies on a *pro forma* U.S. GAAP basis. This data are the same as that presented in Exhibit 8.1.5, except that the elements of the income statement have been rearranged in anticipation of a fair value presentation. The most significant change is a separation of underwriting results between the income associated with current business and gains or losses from changes in the estimated value of liabilities on prior business. While the precise form of a fair value income statement presentation has not been defined by either the FASB or IASB, we believe that it is reasonable to expect that this separation between current and prior business will be required. (In addition, we believe that the separation, even on a U.S. GAAP basis, provides greater transparency to the income statement.)

The investment income displayed in Exhibit 6.2.1 is calculated based on an assumption that assets equal to the nominal value of the claim and defense cost liabilities is invested in risk-free treasury zeroes with maturities that are matched to the expected liability payout.²⁹ (In essence, the assets are invested in the same instruments that were used to discount the associated liabilities.) All assets are marked to market at each year end, as they would be under fair value, such that the investment income during each period reflects the total return, including market appreciation/depreciation due to changing interest rates. This treatment is not current U.S. GAAP; rather, it is consistent with fair value concepts. The results in Exhibit 6.2.1 might therefore be interpreted as an example of a hybrid implementation, in which the assets are presented at fair value, while the liabilities continue to be presented at their nominal value.

Two commonly used metrics for measuring the performance of a property and casualty insurer under U.S. GAAP are the *combined ratio* and the *operating ratio*. The combined ratio is calculated by taking the ratio of the total incurred expenses and policy benefit costs to the earned premium for the period; the operating ratio is calculated by taking the ratio of the reported investment income attributable to insurance operations to the earned premium for the period, and deducting that ratio from the combined ratio. Exhibit 6.2.2 displays the investment income ratios for the composite of each product line. As can be seen, the investment ratios are highly volatile — much more so than they would be under traditional bond amortization approaches.

²⁹ The investment income calculations exclude consideration of assets backing the unearned premium reserve, which causes a modest understatement of income from insurance operations.

Investment Income Ratio to Earned Premium Matched Risk-Free Investments



The volatility in reported investment income causes the operating income to be more volatile as well. As has been noted, this presentation of income is consistent with some proposals to implement fair value on the asset side of the balance sheet only, while leaving the liability side unchanged. Such proposals would inject substantially more volatility into reported income than is present today. Those arguing against the hybrid implementation approach would point out that, since a matched investment strategy has been employed, the volatility in our example is spurious; the matched investment strategy has immunized the company against fluctuations in the market value of its assets. Assuming that the claim and defense cost liabilities are settled as expected, the companies would simply hold the assets until their maturity and sell them at their (fixed) face value.

Exhibit 6.2.3 (at the end of this section) displays the composite financial data for the 20 companies after adjustment of the claim and defense cost liabilities to a fair value basis. Results are displayed using the HFB reserve risk measurement method. Premiums, underwriting expenses, and investment income here are identical to Exhibit 6.2.1; only the incurred claim and defense costs have changed, to reflect the change in the basis of the presentation of the claim and defense cost liabilities to fair value.

Several changes have been made to the income statement presentation. First, the investment gains have been divided into two component elements: (1) the investment gains relating to assets supporting the fair value liabilities, and (2) the investment gains relating to assets in excess of the fair value liabilities. (To maintain consistency between the GAAP and fair value financial statements, the invested assets are set equal to the *nominal* liabilities in both.) Second, the investment income associated with the fair value liabilities has been moved up to

the prior years, where new elements have been added to report the ‘unwinding’ of the discount and the release of the fair value margin. Finally, the traditional combined ratios and operating ratios have been replaced with new performance measures — most notably an estimate of the margin on sales relating to the current year’s business.

In theory, the investment income on assets backing the claim and defense cost liabilities should offset the unwinding of the discount in the claim and defense cost liabilities — such that the Prior Years should reflect only the release of the market risk margin over time, plus or minus any changes in the estimated liabilities. And, while marked-to-market investment returns are volatile, the investment gains and losses due to changes in interest rates are offset by contra-movements in the incurred claim and defense costs, such that the overall volatility of income is dampened.

The Prior Years results show a practical implementation of the intended theoretical benefit of the fair value approach. Each year there is a relatively close correspondence between the investment gains on the assets supporting the liabilities and the unwinding of the fair value discount. For example, in 1994 interest rates rose, causing bond values and investment returns to fall substantially. However, at the same time, the discount in the liabilities rose, causing their fair value to fall. Overall, the net of the two elements had little impact on income. The two figures do not offset precisely because of other influences such as the variance between actual and expected claim and defense cost payments and changes in the nominal estimates of the liabilities.

The result described above is largely a consequence of the cash-flow-matched investment strategy. Under such a strategy the operating results should be immunized from movements in interest rates. Subsequently, we examine an alternative set of results in which an unmatched investment strategy is employed.

A second intended advantage of the fair value approach is that the Current Year results reflect the estimated economic gains or losses on the current business. (In our presentation, the Current Year results relate to the coverage provided in the current year; as we have noted earlier, in the actual fair value proposal the Current Year results would relate to the policies issued during the current year.) This intended advantage will only be realized if the claim and defense cost liabilities are accurately estimated by coverage year. A close inspection of the Current Year results in Exhibit 6.2.2 indicates that, at least historically, company groups did not report estimates accurately by coverage year. For example, in Personal Auto Liability, one can see each year that the reported results for the Current Year imply substantial economic losses. At the same time, the Prior Year results reflect substantial favorable changes in the estimated liabilities. Apparently, company practices during the historical period were to report very conservative estimates of the ultimate liabilities on the current business, which subsequently developed favorably. Historically, companies have been primarily concerned with the overall adequacy of their liability estimates, with less attention paid to the accuracy of estimates for specific products and coverage years. Successful implementation of fair value will require companies to develop accurate estimates by coverage period.

Exhibit 6.2.4 compares the reported operating ratios under the hybrid U.S. GAAP approach to those that would have been reported under fair value. One can see the stabilizing influence of the fair value liabilities; the year-to-year results exhibit less fluctuation. For the typical company, presenting the claim and defense cost liabilities on a fair value basis reduces

the volatility of the operating ratio by 4% for Personal Auto Liability, 11% for Workers Compensation, and 12% for Medical Professional Liability.

Exhibit 6.2.4-A

**Operating Ratios — 20 Company Composite
Personal Auto Liability**

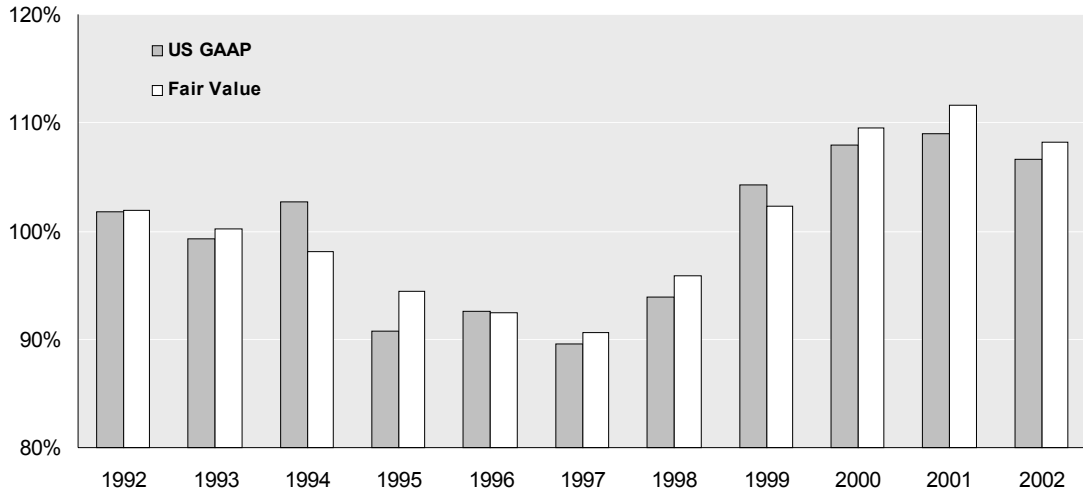
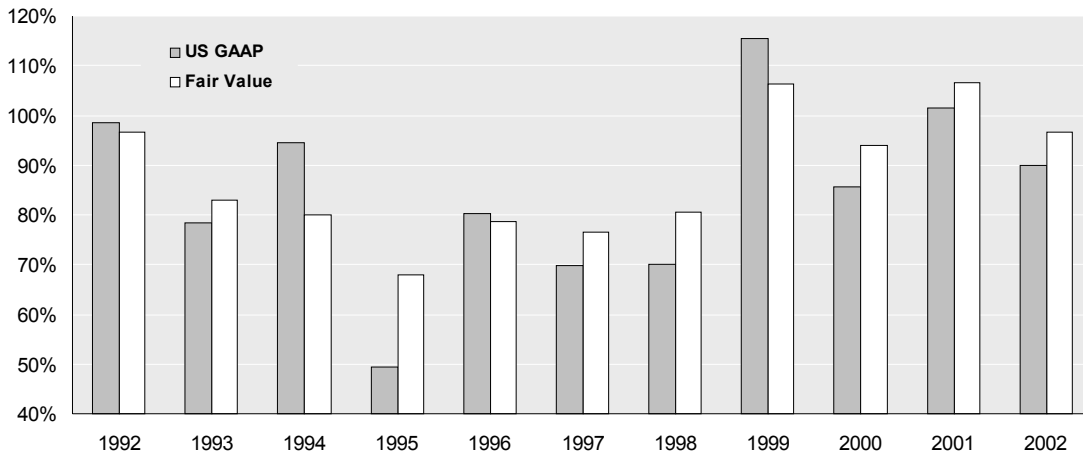
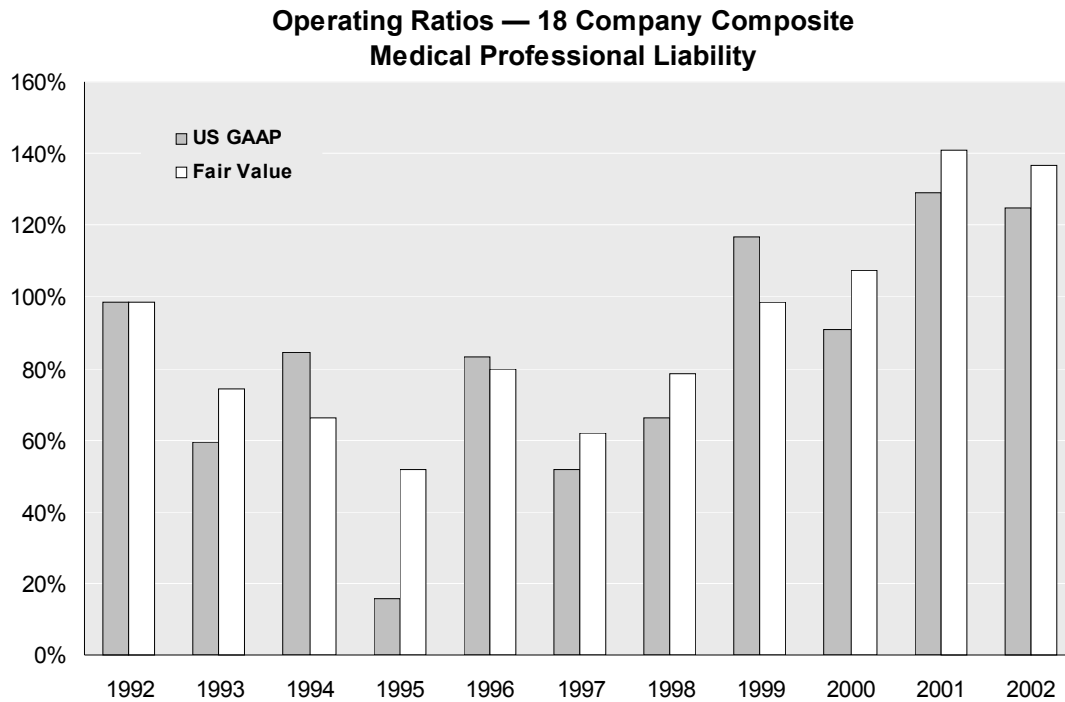


Exhibit 6.2.4-B

**Operating Ratios — 20 Company Composite
Workers Compensation**

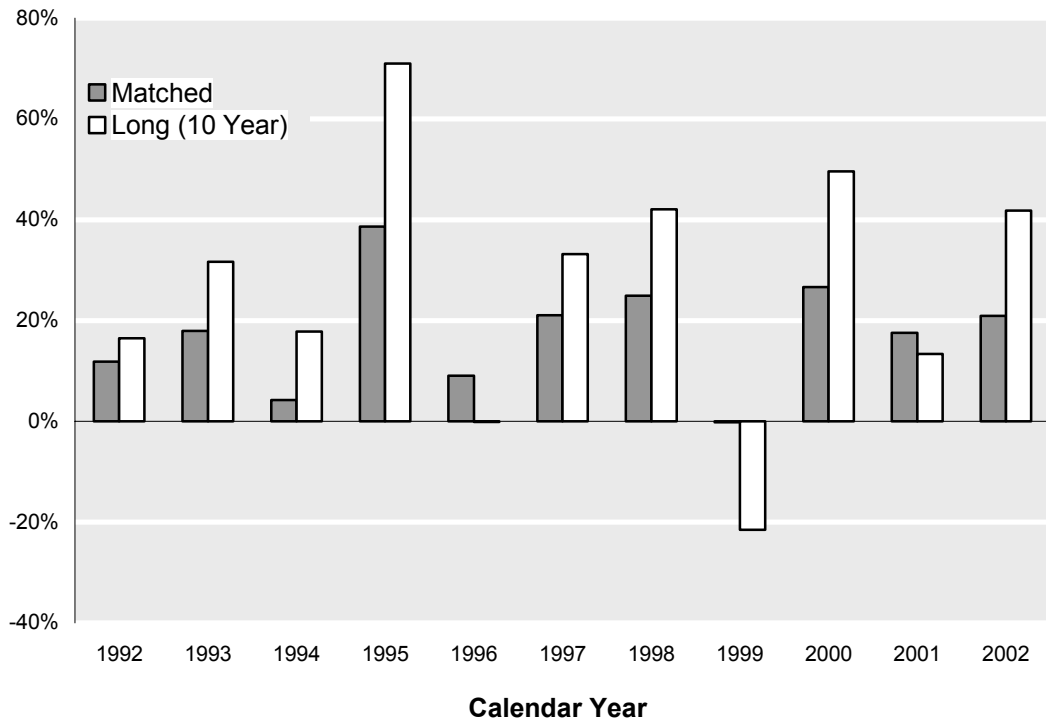




Exhibits 6.2.5 and 6.2.6 (at the end of this section) are similar to Exhibit 6.2.1 and 6.2.3, except that the companies are assumed to be invested in a long Treasury bond portfolio (10-year maturity) rather than a cash flow matched portfolio. As would be expected, the longer investment term adds volatility to the annual investment returns. Exhibit 6.2.7 compares the investment income ratios under the matched investment strategy to those under the long investment strategy for Workers Compensation.

Finally, as would be expected, the long investment strategy is not immunized under fair value reporting. Changes in the amount of the discount in the liabilities no longer completely offset investment gains and losses due to changes in interest rates.

Investment Income Ratio to Earned Premium Workers Compensation



Personal Auto Liability -- Composite of 20 Companies
Direct Income Statement with Underwriting Income on GAAP and Investment Income on Fair Value Basis
Matched Investment Strategy
(\$000,000 omitted)

Exhibit 6.2.1-A

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Underwriting from Prior Years</i>											
Less Adverse (Favorable) Change in Est. Liabilities	(3,277)	(3,694)	(3,924)	(4,392)	(5,473)	(5,145)	(3,607)	(3,037)	(2,635)	(1,675)	(1,986)
Subtotal -- Und. Gains (Losses) on Prior Business	3,277	3,694	3,924	4,392	5,473	5,145	3,607	3,037	2,635	1,675	1,986
<i>Underwriting from Current Year</i>											
Premiums Earned	32,954	35,448	38,017	40,263	42,291	44,048	43,881	43,200	43,533	46,012	51,631
Less Expenses Incurred	9,607	10,223	10,603	11,622	12,581	13,783	14,434	14,642	14,852	15,354	16,874
Less Estimated Paid and Unpaid Liabilities	28,826	30,536	32,602	33,091	33,654	33,128	32,856	34,344	37,380	39,005	42,066
Subtotal -- Und. Gains (Losses) on Current Business	(5,480)	(5,311)	(5,188)	(4,450)	(3,945)	(2,863)	(3,409)	(5,786)	(8,700)	(8,348)	(7,309)
<i>Financing</i>											
Investment Gain (Loss) on Reserve Assets	1,626	1,865	244	3,769	1,595	2,295	2,469	912	2,598	2,511	1,929
Subtotal -- Gains (Losses) from Financing	1,626	1,865	244	3,769	1,595	2,295	2,469	912	2,598	2,511	1,929
Total Net Income from Insurance Operations	(577)	247	(1,020)	3,710	3,123	4,577	2,667	(1,837)	(3,467)	(4,162)	(3,394)
Prior Loss Ratio	-9.9%	-10.4%	-10.3%	-10.9%	-12.9%	-11.7%	-8.2%	-7.0%	-6.1%	-3.6%	-3.8%
Current Loss Ratio	87.5%	86.1%	86.8%	82.2%	79.6%	75.2%	74.9%	79.5%	85.9%	84.8%	81.5%
Total Loss Ratio	77.5%	75.7%	75.4%	71.3%	66.6%	63.5%	66.7%	72.5%	79.8%	81.1%	77.6%
Expense Ratio	29.2%	28.8%	27.9%	28.9%	29.8%	31.3%	32.9%	33.9%	34.1%	33.4%	32.7%
Combined Ratio	106.7%	104.6%	103.3%	100.1%	96.4%	94.8%	99.5%	106.4%	113.9%	114.5%	110.3%
Investment Ratio	-4.9%	-5.3%	-0.6%	-9.4%	-3.8%	-5.2%	-5.6%	-2.1%	-6.0%	-5.5%	-3.7%
Operating Ratio	101.8%	99.3%	102.7%	90.8%	92.6%	89.6%	93.9%	104.3%	108.0%	109.0%	106.6%

Workers Compensation -- Composite of 20 Companies
Direct Income Statement with Underwriting Income on GAAP and Investment Income on Fair Value Basis
Matched Investment Strategy
(\$000,000 omitted)

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Underwriting from Prior Years</i>											
Less Adverse (Favorable) Change in Est. Liabilities	731	(300)	(316)	(488)	(515)	(516)	(682)	347	296	814	956
Subtotal -- Und. Gains (Losses) on Prior Business	(731)	300	316	488	515	516	682	(347)	(296)	(814)	(956)
<i>Underwriting from Current Year</i>											
Premiums Earned	8,171	7,918	7,319	6,896	6,502	6,139	6,092	5,997	6,460	7,238	7,752
Less Expenses Incurred	1,933	1,887	1,828	1,927	1,917	1,851	2,066	2,131	2,250	2,337	2,331
Less Estimated Paid and Unpaid Liabilities	6,365	6,044	5,085	4,637	4,411	4,237	4,401	4,443	4,707	5,475	5,311
Subtotal -- Und. Gains (Losses) on Current Business	(127)	(13)	406	332	174	52	(375)	(577)	(497)	(573)	110
<i>Financing</i>											
Investment Gain (Loss) on Reserve Assets	969	1,420	(310)	2,663	586	1,291	1,518	(9)	1,722	1,272	1,624
Subtotal -- Gains (Losses) from Financing	969	1,420	(310)	2,663	586	1,291	1,518	(9)	1,722	1,272	1,624
Total Net Income from Insurance Operations	111	1,707	412	3,483	1,275	1,859	1,825	(934)	929	(114)	777
Prior Loss Ratio	8.9%	-3.8%	-4.3%	-7.1%	-7.9%	-8.4%	-11.2%	5.8%	4.6%	11.2%	12.3%
Current Loss Ratio	77.9%	76.3%	69.5%	67.2%	67.8%	69.0%	72.2%	74.1%	72.9%	75.6%	68.5%
Total Loss Ratio	86.8%	72.5%	65.2%	60.2%	59.9%	60.6%	61.0%	79.9%	77.5%	86.9%	80.9%
Expense Ratio	23.7%	23.8%	25.0%	27.9%	29.5%	30.2%	33.9%	35.5%	34.8%	32.3%	30.1%
Combined Ratio	110.5%	96.4%	90.1%	88.1%	89.4%	90.7%	95.0%	115.4%	112.3%	119.2%	110.9%
Investment Ratio	-11.9%	-17.9%	-4.2%	-38.6%	-9.0%	-21.0%	-24.9%	0.1%	-26.6%	-17.6%	-20.9%
Operating Ratio	98.6%	78.4%	94.4%	49.5%	80.4%	69.7%	70.1%	115.6%	85.6%	101.6%	90.0%

Medical Professional Liability -- Composite of 18 Companies
Direct Income Statement with Underwriting Income on GAAP and Investment Income on Fair Value Basis
Matched Investment Strategy
(\$000,000 omitted)

Exhibit 6.2.1-C

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Underwriting from Prior Years</i>											
Less Adverse (Favorable) Change in Est. Liabilities	(639)	(1,161)	(1,567)	(1,584)	(932)	(1,679)	(1,331)	(773)	(209)	390	645
Subtotal -- Und. Gains (Losses) on Prior Business	639	1,161	1,567	1,584	932	1,679	1,331	773	209	(390)	(645)
<i>Underwriting from Current Year</i>											
Premiums Earned	2,291	2,353	2,635	2,764	2,736	2,697	3,072	3,153	3,275	3,717	4,389
Less Expenses Incurred	432	450	431	526	499	542	727	744	767	913	917
Less Estimated Paid and Unpaid Liabilities	3,292	3,277	3,653	3,577	3,142	3,518	3,796	3,738	3,683	4,449	4,977
Subtotal -- Und. Gains (Losses) on Current Business	(1,434)	(1,374)	(1,449)	(1,340)	(905)	(1,363)	(1,451)	(1,329)	(1,175)	(1,645)	(1,506)
<i>Financing</i>											
Investment Gain (Loss) on Reserve Assets	832	1,169	(297)	2,090	433	989	1,161	29	1,270	961	1,058
Subtotal -- Gains (Losses) from Financing	832	1,169	(297)	2,090	433	989	1,161	29	1,270	961	1,058
<i>Total Net Income from Insurance Operations</i>	37	956	(179)	2,334	460	1,306	1,040	(527)	305	(1,074)	(1,092)
Prior Loss Ratio	-27.9%	-49.3%	-59.5%	-57.3%	-34.1%	-62.3%	-43.3%	-24.5%	-6.4%	10.5%	14.7%
Current Loss Ratio	143.7%	139.2%	138.6%	129.4%	114.8%	130.4%	123.6%	118.6%	112.5%	119.7%	113.4%
Total Loss Ratio	115.8%	89.9%	79.2%	72.1%	80.8%	68.2%	80.3%	94.0%	106.1%	130.2%	128.1%
Expense Ratio	18.9%	19.1%	16.4%	19.0%	18.2%	20.1%	23.7%	23.6%	23.4%	24.6%	20.9%
Combined Ratio	134.7%	109.0%	95.5%	91.2%	99.0%	88.3%	103.9%	117.6%	129.5%	154.7%	149.0%
Investment Ratio	-36.3%	-49.7%	-11.3%	-75.6%	-15.8%	-36.7%	-37.8%	-0.9%	-38.8%	-25.9%	-24.1%
Operating Ratio	98.4%	59.4%	84.3%	15.5%	83.2%	51.6%	66.1%	116.7%	90.7%	128.9%	124.9%

Personal Auto Liability -- Composite of 20 Companies
Direct Income Statement with Underwriting Income and Investment Income on Fair Value Basis -- Using HFB Method (MRM 2)
Matched Investment Strategy
(\$000,000 omitted)

Component of P/C Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Prior Years</i>											
Investment Gain (Loss) on Reserve Assets	1,519	1,761	221	3,530	1,488	2,158	2,364	855	2,476	2,461	1,925
Less Unwinding of Discount	1,365	1,548	450	2,756	1,467	1,902	1,955	887	2,063	2,116	1,517
Release of Market Risk Margin	314	305	333	310	341	450	435	521	456	485	600
Less Adverse (Favorable) Change in Est. Liabilities	(3,277)	(3,694)	(3,924)	(4,392)	(5,473)	(5,145)	(3,607)	(3,037)	(2,635)	(1,675)	(1,986)
Subtotal -- Gains (Losses) on Prior Business	3,745	4,212	4,027	5,476	5,835	5,851	4,451	3,526	3,505	2,504	2,995
<i>Current Year</i>											
Premiums Earned	32,954	35,448	38,017	40,263	42,291	44,048	43,881	43,200	43,533	46,012	51,631
Less Expenses Incurred	9,607	10,223	10,603	11,622	12,581	13,783	14,434	14,642	14,852	15,354	16,874
Less Est. Paid and Unpaid Liabilities at Fair Value	27,705	29,525	30,728	31,969	32,357	31,983	32,059	33,091	36,331	38,515	42,008
Subtotal -- Gains (Losses) on Current Business	(4,359)	(4,300)	(3,314)	(3,228)	(2,648)	(1,718)	(2,613)	(4,532)	(7,650)	(7,857)	(7,252)
<i>Financing</i>											
Investment Gain on Surplus Assets	106	104	23	239	106	136	105	57	122	50	3
Subtotal -- Gains (Losses) from Financing	106	104	23	239	106	136	105	57	122	50	3
Total Net Income from Insurance Operations	(507)	16	736	2,487	3,293	4,270	1,944	(950)	(4,024)	(5,303)	(4,254)
<i>Fair Value of Current Business</i>											
Expense Ratio	29.2%	28.8%	27.9%	28.9%	29.8%	31.3%	32.9%	33.9%	34.1%	33.4%	32.7%
Fair Value Loss Ratio	84.1%	83.3%	80.8%	79.2%	76.5%	72.6%	73.1%	76.6%	83.5%	83.7%	81.4%
Est. Margin on Sales -- Current Business	-13.2%	-12.1%	-8.7%	-8.0%	-6.3%	-3.9%	-6.0%	-10.5%	-17.6%	-17.1%	-14.0%
<i>Gains (Losses) on Prior Business</i>											
Operating Margin on Sales	11.4%	11.9%	10.6%	13.6%	13.8%	13.3%	10.1%	8.2%	8.1%	5.4%	5.8%
Investment Gain on Surplus Assets	-1.9%	-0.2%	1.9%	5.6%	7.5%	9.4%	4.2%	-2.3%	-9.5%	-11.6%	-8.2%
Total Net Income from Insurance Operations	0.3%	0.3%	0.1%	0.6%	0.3%	0.3%	0.2%	0.1%	0.3%	0.1%	0.0%

Workers Compensation -- Composite of 20 Companies
Direct Income Statement with Underwriting Income and Investment Income on Fair Value Basis -- Using HFB Method (MRM 2)
Matched Investment Strategy
(\$000,000 omitted)

Component of P/C Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Prior Years</i>											
Investment Gain (Loss) on Reserve Assets	855	1,272	(262)	2,379	517	1,157	1,403	(6)	1,583	1,196	1,564
Less Unwinding of Discount	527	956	(169)	1,515	389	763	934	32	952	778	842
Release of Market Risk Margin	90	144	98	49	67	43	39	95	114	63	90
Less Adverse (Favorable) Change in Est. Liabilities	731	(300)	(316)	(488)	(515)	(516)	(682)	347	296	814	956
Subtotal -- Gains (Losses) on Prior Business	(312)	760	320	1,402	710	953	1,191	(292)	449	(333)	(144)
<i>Current Year</i>											
Premiums Earned	8,171	7,918	7,319	6,896	6,502	6,139	6,092	5,997	6,460	7,238	7,752
Less Expenses Incurred	1,933	1,887	1,828	1,927	1,917	1,851	2,066	2,131	2,250	2,337	2,331
Less Est. Paid and Unpaid Liabilities at Fair Value	5,653	5,450	4,357	4,152	3,906	3,798	4,031	3,947	4,267	5,042	5,025
Subtotal -- Gains (Losses) on Current Business	585	581	1,134	817	680	490	(5)	(81)	(56)	(141)	396
<i>Financing</i>											
Investment Gain on Surplus Assets	114	148	(48)	284	69	134	115	(1)	138	76	59
Subtotal -- Gains (Losses) from Financing	114	148	(48)	284	69	134	115	(1)	138	76	59
Total Net Income from Insurance Operations	387	1,489	1,406	2,502	1,459	1,576	1,300	(374)	531	(398)	311
<i>Fair Value of Current Business</i>											
Expense Ratio	23.7%	23.8%	25.0%	27.9%	29.5%	30.2%	33.9%	35.5%	34.8%	32.3%	30.1%
Fair Value Loss Ratio	69.2%	68.8%	59.5%	60.2%	60.1%	61.9%	66.2%	65.8%	66.0%	69.7%	64.8%
Est. Margin on Sales -- Current Business	7.2%	7.3%	15.5%	11.8%	10.5%	8.0%	-0.1%	-1.4%	-0.9%	-1.9%	5.1%
<i>Gains (Losses) on Prior Business</i>											
Operating Margin on Sales	-3.8%	9.6%	4.4%	20.3%	10.9%	15.5%	19.5%	-4.9%	6.9%	-4.6%	-1.9%
Investment Gain on Surplus Assets	3.3%	16.9%	19.9%	32.2%	21.4%	23.5%	19.5%	-6.2%	6.1%	-6.5%	3.2%
Total Net Income from Insurance Operations	1.4%	1.9%	-0.7%	4.1%	1.1%	2.2%	1.9%	0.0%	2.1%	1.0%	0.8%

Medical Professional Liability -- Composite of 18 Companies
Direct Income Statement with Underwriting Income and Investment Income on Fair Value Basis -- Using HFB Method (MRIM 2)
Matched Investment Strategy
(\$000,000 omitted)

Component of P/C Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Prior Years</i>											
Investment Gain (Loss) on Reserve Assets	764	1,094	(258)	1,922	395	910	1,095	26	1,188	930	1,058
Less Unwinding of Discount	740	930	87	1,482	628	769	866	189	1,053	855	909
Release of Market Risk Margin	240	192	342	161	264	131	199	250	213	122	235
Less Adverse (Favorable) Change in Est. Liabilities	(639)	(1,161)	(1,567)	(1,584)	(932)	(1,679)	(1,331)	(773)	(209)	390	645
Subtotal -- Gains (Losses) on Prior Business	903	1,518	1,563	2,185	963	1,951	1,760	861	557	(194)	(261)
<i>Current Year</i>											
Premiums Earned	2,291	2,353	2,635	2,764	2,736	2,697	3,072	3,153	3,275	3,717	4,389
Less Expenses Incurred	432	450	431	526	499	542	727	744	767	913	917
Less Est. Paid and Unpaid Liabilities at Fair Value	2,725	2,820	2,876	3,089	2,648	3,076	3,438	3,221	3,303	4,126	4,817
Subtotal -- Gains (Losses) on Current Business	(867)	(917)	(672)	(852)	(410)	(921)	(1,093)	(812)	(795)	(1,322)	(1,345)
<i>Financing</i>											
Investment Gain on Surplus Assets	68	75	(39)	168	38	80	66	3	83	31	0
Subtotal -- Gains (Losses) from Financing	68	75	(39)	168	38	80	66	3	83	31	0
Total Net Income from Insurance Operations	105	676	853	1,501	591	1,109	732	52	(155)	(1,485)	(1,605)
<i>Fair Value of Current Business</i>											
Expense Ratio	18.9%	19.1%	16.4%	19.0%	18.2%	20.1%	23.7%	23.6%	23.4%	24.6%	20.9%
Fair Value Loss Ratio	119.0%	119.8%	109.1%	111.8%	96.8%	114.1%	111.9%	102.1%	100.9%	111.0%	109.7%
Est. Margin on Sales -- Current Business	-37.8%	-39.0%	-25.5%	-30.8%	-15.0%	-34.2%	-35.6%	-25.8%	-24.3%	-35.6%	-30.6%
<i>Gains (Losses) on Prior Business</i>											
Operating Margin on Sales	39.4%	64.5%	59.3%	79.1%	35.2%	72.3%	57.3%	27.3%	17.0%	-5.2%	-5.9%
Investment Gain on Surplus Assets	1.6%	25.5%	33.8%	48.2%	20.2%	38.2%	21.7%	1.5%	-7.3%	-40.8%	-36.6%
Investment Gain on Surplus Assets	3.0%	3.2%	-1.5%	6.1%	1.4%	2.9%	2.1%	0.1%	2.5%	0.8%	0.0%

Personal Auto Liability -- Composite of 20 Companies
Direct Income Statement with Underwriting Income on GAAP and Investment Income on Fair Value Basis
Mismatched (Long) Investment Strategy

Exhibit 6.2.5-A

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Underwriting from Prior Years</i>											
Less Adverse (Favorable) Change in Est. Liabilities	(3,277)	(3,694)	(3,924)	(4,392)	(5,473)	(5,145)	(3,607)	(3,037)	(2,635)	(1,675)	(1,986)
Subtotal -- Und. Gains (Losses) on Prior Business	3,277	3,694	3,924	4,392	5,473	5,145	3,607	3,037	2,635	1,675	1,986
<i>Underwriting from Current Year</i>											
Premiums Earned	32,954	35,448	38,017	40,263	42,291	44,048	43,881	43,200	43,533	46,012	51,631
Less Expenses Incurred	9,607	10,223	10,603	11,622	12,581	13,783	14,434	14,642	14,852	15,354	16,874
Less Estimated Paid and Unpaid Liabilities	28,826	30,536	32,602	33,091	33,654	33,128	32,856	34,344	37,380	39,005	42,066
Subtotal -- Und. Gains (Losses) on Current Business	(5,480)	(5,311)	(5,188)	(4,450)	(3,945)	(2,863)	(3,409)	(5,786)	(8,700)	(8,348)	(7,309)
<i>Financing</i>											
Investment Gain (Loss) on Reserve Assets	2,435	4,092	(1,922)	8,579	233	3,903	4,716	(1,975)	5,790	2,013	5,681
Subtotal -- Gains (Losses) from Financing	2,435	4,092	(1,922)	8,579	233	3,903	4,716	(1,975)	5,790	2,013	5,681
Total Net Income from Insurance Operations	232	2,474	(3,186)	8,521	1,761	6,185	4,914	(4,723)	(275)	(4,660)	358
Prior Loss Ratio	-9.9%	-10.4%	-10.3%	-10.9%	-12.9%	-11.7%	-8.2%	-7.0%	-6.1%	-3.6%	-3.8%
Current Loss Ratio	87.5%	86.1%	85.8%	82.2%	79.6%	75.2%	74.9%	79.5%	85.9%	84.8%	81.5%
Total Loss Ratio	77.5%	75.7%	75.4%	71.3%	66.6%	63.5%	66.7%	72.5%	79.8%	81.1%	77.6%
Expense Ratio	29.2%	28.8%	27.9%	28.9%	29.8%	31.3%	32.9%	33.9%	34.1%	33.4%	32.7%
Combined Ratio	106.7%	104.6%	103.3%	100.1%	96.4%	94.8%	99.5%	106.4%	113.9%	114.5%	110.3%
Investment Ratio	-7.4%	-11.5%	5.1%	-21.3%	-0.6%	-8.9%	-10.7%	4.6%	-13.3%	-4.4%	-11.0%
Operating Ratio	99.3%	93.0%	108.4%	78.8%	95.8%	86.0%	88.8%	110.9%	100.6%	110.1%	99.3%

Workers Compensation -- Composite of 20 Companies
Direct Income Statement with Underwriting Income on GAAP and Investment Income on Fair Value Basis
Mismatched (Long) Investment Strategy
(\$000,000 omitted)

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Underwriting from Prior Years</i>											
Less Adverse (Favorable) Change in Est. Liabilities	731	(300)	(316)	(488)	(515)	(516)	(682)	347	296	814	956
Subtotal -- Und. Gains (Losses) on Prior Business	(731)	300	316	488	515	516	682	(347)	(296)	(814)	(956)
<i>Underwriting from Current Year</i>											
Premiums Earned	8,171	7,918	7,319	6,896	6,502	6,139	6,092	5,997	6,460	7,238	7,752
Less Expenses Incurred	1,933	1,887	1,828	1,927	1,917	1,851	2,066	2,131	2,250	2,337	2,331
Less Estimated Paid and Unpaid Liabilities	6,365	6,044	5,085	4,637	4,411	4,237	4,401	4,443	4,707	5,475	5,311
Subtotal -- Und. Gains (Losses) on Current Business	(127)	(13)	406	332	174	52	(375)	(577)	(497)	(573)	110
<i>Financing</i>											
Investment Gain (Loss) on Reserve Assets	1,348	2,509	(1,305)	4,897	(8)	2,036	2,563	(1,291)	3,203	968	3,242
Subtotal -- Gains (Losses) from Financing	1,348	2,509	(1,305)	4,897	(8)	2,036	2,563	(1,291)	3,203	968	3,242
Total Net Income from Insurance Operations	490	2,796	(583)	5,717	682	2,604	2,870	(2,215)	2,410	(419)	2,396
Prior Loss Ratio	8.9%	-3.8%	-4.3%	-7.1%	-7.9%	-8.4%	-11.2%	5.8%	4.6%	11.2%	12.3%
Current Loss Ratio	77.9%	76.3%	69.5%	67.2%	67.8%	69.0%	72.2%	74.1%	72.9%	75.6%	68.5%
Total Loss Ratio	86.8%	72.5%	65.2%	60.2%	59.9%	60.6%	61.0%	79.9%	77.5%	86.9%	80.9%
Expense Ratio	23.7%	23.8%	25.0%	27.9%	29.5%	30.2%	33.9%	35.5%	34.8%	32.3%	30.1%
Combined Ratio	110.5%	96.4%	90.1%	88.1%	89.4%	90.7%	95.0%	115.4%	112.3%	119.2%	110.9%
Investment Ratio	-16.5%	-31.7%	17.8%	-71.0%	0.1%	-33.2%	-42.1%	21.5%	-49.6%	-13.4%	-41.8%
Operating Ratio	94.0%	64.7%	108.0%	17.1%	89.5%	57.6%	52.9%	136.9%	62.7%	105.8%	69.1%

Exhibit 6.2.5-C

Medical Professional Liability -- Composite of 18 Companies
Direct Income Statement with Underwriting Income on GAAP and Investment Income on Fair Value Basis
Mismatched (Long) Investment Strategy
(\$000,000 omitted)

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Underwriting from Prior Years</i>											
Less Adverse (Favorable) Change in Est. Liabilities	(639)	(1,161)	(1,567)	(1,584)	(932)	(1,679)	(1,331)	(773)	(209)	390	645
Subtotal -- Und. Gains (Losses) on Prior Business	639	1,161	1,567	1,584	932	1,679	1,331	773	209	(390)	(645)
<i>Underwriting from Current Year</i>											
Premiums Earned	2,291	2,353	2,635	2,764	2,736	2,697	3,072	3,153	3,275	3,717	4,389
Less Expenses Incurred	432	450	431	526	499	542	727	744	767	913	917
Less Estimated Paid and Unpaid Liabilities	3,292	3,277	3,653	3,577	3,142	3,518	3,796	3,738	3,683	4,449	4,977
Subtotal -- Und. Gains (Losses) on Current Business	(1,434)	(1,374)	(1,449)	(1,340)	(905)	(1,363)	(1,451)	(1,329)	(1,175)	(1,645)	(1,506)
<i>Financing</i>											
Investment Gain (Loss) on Reserve Assets	1,145	2,007	(1,037)	3,793	(16)	1,569	2,000	(1,013)	2,437	726	2,297
Subtotal -- Gains (Losses) from Financing	1,145	2,007	(1,037)	3,793	(16)	1,569	2,000	(1,013)	2,437	726	2,297
Total Net Income from Insurance Operations	350	1,795	(920)	4,037	11	1,886	1,879	(1,569)	1,471	(1,309)	147
Prior Loss Ratio	-27.9%	-49.3%	-59.5%	-57.3%	-34.1%	-62.3%	-43.3%	-24.5%	-6.4%	10.5%	14.7%
Current Loss Ratio	143.7%	139.2%	138.6%	129.4%	114.8%	130.4%	123.6%	118.6%	112.5%	119.7%	113.4%
Total Loss Ratio	115.8%	89.9%	79.2%	72.1%	80.8%	68.2%	80.3%	94.0%	106.1%	130.2%	128.1%
Expense Ratio	18.9%	19.1%	16.4%	19.0%	18.2%	20.1%	23.7%	23.6%	23.4%	24.6%	20.9%
Combined Ratio	134.7%	109.0%	95.5%	91.2%	99.0%	88.3%	103.9%	117.6%	129.5%	154.7%	149.0%
Investment Ratio	-50.0%	-85.3%	39.4%	-137.2%	0.6%	-58.2%	-65.1%	32.1%	-74.4%	-19.5%	-52.3%
Operating Ratio	84.7%	23.7%	134.9%	-46.1%	99.6%	30.1%	38.8%	149.8%	55.1%	135.2%	96.7%

Personal Auto Liability -- Composite of 20 Companies
Direct Income Statement with Underwriting Income and Investment Income on Fair Value Basis -- Using HFB Method
Mismatched (Long) Investment Strategy
(\$00,000 omitted)

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Prior Years</i>											
Investment Gain (Loss) on Reserve Assets	2,276	3,864	(1,738)	8,035	217	3,671	4,515	(1,852)	5,518	1,973	5,672
Less Unwinding of Discount	1,365	1,548	450	2,756	1,467	1,902	1,955	887	2,063	2,116	1,517
Release of Market Risk Margin	314	305	333	310	341	450	435	521	456	485	600
Less Adverse (Favorable) Change in Est. Liabilities	(3,277)	(3,694)	(3,924)	(4,392)	(5,473)	(5,145)	(3,607)	(3,037)	(2,635)	(1,675)	(1,986)
Subtotal -- Gains (Losses) on Prior Business	4,502	6,315	2,068	9,982	4,564	7,364	6,603	819	6,547	2,016	6,741
<i>Current Year</i>											
Premiums Earned	32,954	35,448	38,017	40,263	42,291	44,048	43,881	43,200	43,533	46,012	51,631
Less Expenses Incurred	9,607	10,223	10,603	11,622	12,581	13,783	14,434	14,642	14,852	15,354	16,874
Less Est. Paid and Unpaid Liabilities at Fair Value	27,705	29,525	30,728	31,969	32,357	31,983	32,059	33,091	36,331	38,515	42,008
Subtotal -- Gains (Losses) on Current Business	(4,359)	(4,300)	(3,314)	(3,228)	(2,648)	(1,718)	(2,613)	(4,532)	(7,650)	(7,857)	(7,252)
<i>Financing</i>											
Investment Gain on Surplus Assets	159	228	(183)	544	16	232	201	(123)	272	40	9
Subtotal -- Gains (Losses) from Financing	159	228	(183)	544	16	232	201	(123)	272	40	9
Total Net Income from Insurance Operations	303	2,243	(1,430)	7,297	1,932	5,878	4,191	(3,836)	(832)	(5,801)	(501)
<i>Fair Value of Current Business</i>											
Expense Ratio	29.2%	28.8%	27.9%	28.9%	29.8%	31.3%	32.9%	33.9%	34.1%	33.4%	32.7%
Fair Value Loss Ratio	84.1%	83.3%	80.8%	79.2%	76.5%	72.6%	73.1%	76.6%	83.5%	83.7%	81.4%
Est. Margin on Sales -- Current Business	-13.2%	-12.1%	-8.7%	-8.0%	-6.3%	-3.9%	-6.0%	-10.5%	-17.6%	-17.1%	-14.0%
<i>Gains (Losses) on Prior Business</i>											
Operating Margin on Sales	13.7%	17.8%	5.4%	24.8%	10.8%	16.7%	15.0%	1.9%	15.0%	4.4%	13.1%
Investment Gain on Surplus Assets	0.4%	5.7%	-3.3%	16.8%	4.5%	12.8%	9.1%	-8.6%	-2.5%	-12.7%	-1.0%
Investment Gain on Surplus Assets	0.5%	0.6%	-0.5%	1.4%	0.0%	0.5%	0.5%	-0.3%	0.6%	0.1%	0.0%

Workers Compensation -- Composite of 20 Companies
Direct Income Statement with Underwriting Income and Investment Income on Fair Value Basis -- Using HFB Method
Mismatched (Long) Investment Strategy
(\$000,000 omitted)

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Prior Years</i>											
Investment Gain (Loss) on Reserve Assets	1,189	2,247	(1,103)	4,375	(7)	1,824	2,369	(1,159)	2,946	910	3,124
Less Unwinding of Discount	527	956	(169)	1,515	389	763	934	32	952	778	842
Release of Market Risk Margin	90	144	98	49	67	43	39	95	114	63	90
Less Adverse (Favorable) Change in Est. Liabilities	731	(300)	(316)	(488)	(515)	(516)	(682)	347	296	814	956
Subtotal -- Gains (Losses) on Prior Business	22	1,735	(521)	3,398	186	1,620	2,157	(1,443)	1,811	(619)	1,416
<i>Current Year</i>											
Premiums Earned	8,171	7,918	7,319	6,896	6,502	6,139	6,092	5,997	6,460	7,238	7,752
Less Expenses Incurred	1,933	1,887	1,828	1,927	1,917	1,851	2,066	2,131	2,250	2,337	2,331
Less Est. Paid and Unpaid Liabilities at Fair Value	5,653	5,450	4,357	4,152	3,906	3,798	4,031	3,947	4,267	5,042	5,025
Subtotal -- Gains (Losses) on Current Business	585	581	1,134	817	680	490	(5)	(81)	(56)	(141)	396
<i>Financing</i>											
Investment Gain on Surplus Assets	159	261	(202)	522	(1)	211	193	(132)	258	58	118
Subtotal -- Gains (Losses) from Financing	159	261	(202)	522	(1)	211	193	(132)	258	58	118
Total Net Income from Insurance Operations	766	2,577	411	4,736	865	2,321	2,345	(1,656)	2,013	(702)	1,929
<i>Fair Value of Current Business</i>											
Expense Ratio	23.7%	23.8%	25.0%	27.9%	29.5%	30.2%	33.9%	35.5%	34.8%	32.3%	30.1%
Fair Value Loss Ratio	69.2%	68.8%	59.5%	60.2%	60.1%	61.9%	66.2%	65.8%	66.0%	69.7%	64.8%
Est. Margin on Sales -- Current Business	7.2%	7.3%	15.5%	11.8%	10.5%	8.0%	-0.1%	-1.4%	-0.9%	-1.9%	5.1%
<i>Gains (Losses) on Prior Business</i>											
Operating Margin on Sales	7.4%	29.3%	8.4%	61.1%	13.3%	34.4%	35.3%	-25.4%	27.2%	-10.5%	23.4%
Investment Gain on Surplus Assets	1.9%	3.3%	-2.8%	7.6%	0.0%	3.4%	3.2%	-2.2%	4.0%	0.8%	1.5%

Medical Professional Liability -- Composite of 18 Companies
Direct Income Statement with Underwriting Income and Investment Income on Fair Value Basis -- Using HFB Method
Mismatched (Long) Investment Strategy
(\$000,000 omitted)

Component of Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>Prior Years</i>											
Investment Gain (Loss) on Reserve Assets	1,051	1,879	(900)	3,488	(14)	1,443	1,886	(917)	2,278	703	2,296
Less Unwinding of Discount	740	930	87	1,482	628	769	866	189	1,053	855	909
Release of Market Risk Margin	240	192	342	161	264	131	199	250	213	122	235
Less Adverse (Favorable) Change in Est. Liabilities	(639)	(1,161)	(1,567)	(1,584)	(932)	(1,679)	(1,331)	(773)	(209)	390	645
Subtotal -- Gains (Losses) on Prior Business	1,191	2,303	921	3,751	553	2,484	2,551	(83)	1,647	(421)	978
<i>Current Year</i>											
Premiums Earned	2,291	2,353	2,635	2,764	2,736	2,697	3,072	3,153	3,275	3,717	4,389
Less Expenses Incurred	432	450	431	526	499	542	727	744	767	913	917
Less Est. Paid and Unpaid Liabilities at Fair Value	2,725	2,820	2,876	3,089	2,648	3,076	3,438	3,221	3,303	4,126	4,817
Subtotal -- Gains (Losses) on Current Business	(867)	(917)	(672)	(852)	(410)	(921)	(1,093)	(812)	(795)	(1,322)	(1,345)
<i>Financing</i>											
Investment Gain on Surplus Assets	94	129	(138)	305	(1)	126	113	(96)	159	23	1
Subtotal -- Gains (Losses) from Financing	94	129	(138)	305	(1)	126	113	(96)	159	23	1
Total Net Income from Insurance Operations	418	1,514	112	3,204	142	1,689	1,570	(991)	1,011	(1,720)	(366)
Fair Value of Current Business											
Expense Ratio	18.9%	19.1%	16.4%	19.0%	18.2%	20.1%	23.7%	23.6%	23.4%	24.6%	20.9%
Fair Value Loss Ratio	119.0%	119.8%	109.1%	111.8%	96.8%	114.1%	111.9%	102.1%	100.9%	111.0%	109.7%
Est. Margin on Sales -- Current Business	-37.8%	-39.0%	-25.5%	-30.8%	-15.0%	-34.2%	-35.6%	-25.8%	-24.3%	-35.6%	-30.6%
Gains (Losses) on Prior Business	52.0%	97.9%	35.0%	135.7%	20.2%	92.1%	83.0%	-2.6%	50.3%	-11.3%	22.3%
Operating Margin on Sales	14.1%	58.9%	9.5%	104.9%	5.2%	57.9%	47.4%	-28.4%	26.0%	-46.9%	-8.4%
Investment Gain on Surplus Assets	4.1%	5.5%	-5.2%	11.0%	-0.1%	4.7%	3.7%	-3.0%	4.8%	0.6%	0.0%

7. Conclusions and Implications

As we indicated in Section 3.5, the choice of measurement attributes for financial statement elements should be determined by five considerations: reliability of the measure, relevance of the measure, comparability and consistency with similar financial statement elements, neutrality of the measure, and cost of implementation. In this section, we discuss several of these considerations in light of our research into the measurement of the fair value of property and casualty claim and defense cost liabilities.

Reliability

It is an open question whether the estimation of discounts and market risk margins for property and casualty claim and defense cost liabilities can be sufficiently reliable to support their inclusion in fair value estimates.

- In discounting claim and defense cost liabilities, the key assumption is the pattern of future payments for the claims associated with a single year of coverage. Our analysis supports the need for these assumptions to be entity-specific, so that they reflect the specific characteristics of the business underwritten. Although we used an actuarial technique that was designed to produce stable payment pattern assumptions over time, in several instances we noted an abrupt change in the pattern for a particular company from one year-end to the next. This change is greater than one would expect from the gradual shifts in the make-up of the underlying business. It is likely that, at least in some cases, these abrupt changes are caused by events that require information internal to the company to interpret correctly.
- In measuring the market pricing risk margins, the historical industry data are very volatile — such that the historical average depends heavily on the time period selected. Ultimately judgment will be necessary, as the empirical data are not sufficiently stable to provide definitive indications.
- Our approach assumes that industry-level research would determine the pricing market risk margins, and the market price per unit of risk, to be used by all companies. Each company would then measure the entity-specific amount of reserve risk, and the reserve market risk margin. This approach limits the variation across companies to differences in the method used to measure the amount of reserve risk. In measuring the amount of risk remaining in the claim and defense cost liabilities, the two methods we tested produced different results, implying different risk margins. Presumably other methods could be employed by the companies, adding further to the variation across companies.
- Each method for measuring the amount of reserve risk produced different results over time — differences that we do not believe represent true changes in the underlying level of risk. Unless an approach is developed that is more stable over time, the changes in measured risk from one year to the next will contribute to “noise” in the financial statements. The changes in the level of measured risk over time were present to some degree for all companies and all three products; while these might not be material in many cases, several company groups exhibited abrupt changes in the measured amount of risk, creating potentially significant noise in their income statements for that year.

Again, some of the abrupt changes that we observed may be caused by issues with the data that we employed.

- Ultimately, the amount of variation on company practices is a function of the way fair value is implemented. While we used a single measure of the market price per unit of risk for each product across all companies, this determination could be left to individual companies. This would increase the variation in market risk margins across companies. Moving in the opposite direction, both the market price of risk and the method for measuring the amount of reserve risk could be prescribed for all companies, narrowing the variation.

Clearly, further research and refinement in the approaches to measuring these elements of fair value will be needed. Our work is only a start. To achieve consistency, consideration should be given to some level of standardization in the implementation of fair value.

A clear goal of fair value is to move the financial reporting associated with all financial instruments closer to market values, in the belief that this will result in financial statement elements that are more representationally faithful. The net effect will be financial statements that are closer to underlying economic reality, increasing their transparency. However, as our analysis indicates, claim and defense cost liabilities are subject to considerable uncertainty, with significant potential for errors in their estimation. These errors have historically created significant distortions in the reported financial results of property and casualty insurers — causing significant disparities between reported income and economic income. This point is particularly relevant when one considers that claim and defense cost liabilities are typically a multiple of annual revenue, such that any errors in the estimation of the liabilities are leveraged.

To measure the degree to which a change to fair value will move the reported results closer to the underlying economic reality, we measured the correlation between reported operating income (as measured by the operating ratio — the ratio of total income from insurance operations to premium) and the economic margins we developed in our assessment of pricing risk. The latter is a measure of the actual economic profit achieved on the coverage provided during each period. The former is an accounting representation of that profit, reflecting estimates of the policy liabilities. We first measured the correlation between reported income under U.S. GAAP (under the matched investment strategy) and the economic margins; then we measured the correlation between reported income under fair value and the economic margins. In each case we measured the correlations across all 11 years of income and all 20 companies.

The results are summarized in Exhibit 7.1.1 below. The first point to be noted is the low correlations between the U.S. GAAP operating ratios and the economic margins. Correlations are just 55% for Personal Auto Liability; they are below 50% for the other two products, especially Medical Professional Liability. These low correlations are largely a consequence of the substantial distorting effect of the errors in estimation of the claim and defense cost liabilities on reported income for each of the three products.

Correlations Between Reported Operating Ratios and Economic Margins
Using Matched Investment Strategy

Exhibit 7.1.1

	<u>Pers. Auto Liability</u>		<u>Workers' Comp.</u>		<u>Medical Prof. Liability</u>	
	Correlation	Gain	Correlation	Gain	Correlation	Gain
Economic vs US GAAP	55%		42%		14%	
Economic vs Fair Value (Mack)	59%	4%	45%	3%	32%	18%
Economic vs Fair Value (HFB)	59%	4%	47%	5%	31%	17%

The second point to be noted is that the correlations between the fair value operating ratios and the economic margins are not materially better than those relating to U.S. GAAP. While discounting the liabilities in a manner that is consistent with the investment strategy should improve the correlations, this improvement is marginal. Putting the estimated liabilities on an economic basis does not address the more fundamental issue of errors in the estimates themselves. In addition, the theoretical gains from fair value are partially offset by additional noise created by changing payment patterns and measured amounts of reserve risk from one year to the next.

This analysis suggests that, from an income statement perspective, the implementation of fair value may not move reported results materially closer to economic reality.

Stating the issue somewhat differently, some might argue that there is little value in refining the estimates of claim and defense cost liabilities to incorporate discounts and risk margins when the basic estimates of the nominal liabilities are subject to so much uncertainty.

Notwithstanding these measurement issues, our analysis demonstrates that practical methods can be developed and employed to estimate these liabilities on a fair value basis.

Relevance

Our analysis also demonstrates that the preparation of fair value estimates is complex, and it will take considerable education of actuaries and others — both to develop the estimates and to use them. The current use of nominal estimates has a substantial advantage over fair value, in that nominal estimates are easy to understand.

Fair value is not currently adopted anywhere in the world. Property and casualty insurance companies do not produce financial statements oriented to fair value, nor do external audiences (e.g., regulators, investors) think in “fair value” terms. How quickly and easily this measure would become relevant to both internal and external users is a point of current debate.

Cost

The additional analysis and assumptions required to support fair value estimates will require a substantial investment by preparers of financial statements. While our work demonstrates that the data and methods necessary to perform the calculations can be developed, there will need to be significant further research and development prior to implementation. In addition, the data that we used were not perfectly suited to the task. For example we used some data that were net of reinsurance, where direct data would be more appropriate. In some areas, additional history for the time-series data would also be desirable. Further investment, to develop the data and refine the methodologies, will need to occur prior to implementation.

The fair value calculations are complex, and will require that informed judgments be made at several critical juncture points. Preparation of fair value estimates for property and casualty insurance liabilities will therefore require the ongoing use of trained experts.

From our analysis, it is not clear that sufficient benefits will be derived from fair value to support these costs.

8. Technical Appendix

8.1 Developing the Financial Data

For each of the three insurance products (Personal Auto Liability, Workers Compensation, and Medical Professional Liability), we initially selected approximately 30 company groups for investigation. Generally we selected the larger company groups, which would be expected to have credible claim data. From that list, we selected a final sample of 20 company groups and constructed a history of their statutory financial statements for the 12-year period, reflecting only the results for the specific product. The final list of companies selected for each product is presented in Exhibit 8.1.1.

<i>Selected Company Groups for Personal Auto Liability</i>			Exhibit 8.1.1-A	
<i>Group Name</i>	<i>Direct Written Premium</i>		<i>Market Share</i>	
	<i>1991</i>	<i>2002</i>	<i>1991</i>	<i>2002</i>
Allmerica Group	447,582	619,449	0.8%	0.7%
Allstate Group	6,524,663	8,763,123	12.3%	10.4%
American Family Group	831,613	1,645,290	1.6%	2.0%
Auto Club Group	510,895	519,226	1.0%	0.6%
Auto Club of Southern California	562,231	845,254	1.1%	1.0%
California State Auto Group	848,675	871,208	1.6%	1.0%
Commerce Group	279,508	743,929	0.5%	0.9%
Erie Insurance Group	535,449	935,818	1.0%	1.1%
Farmers Group (Part of Zurich Group)	2,848,617	3,832,708	5.4%	4.6%
GEICO Group (Part of Berkshire Hathaway Group)	1,157,160	4,152,882	2.2%	4.9%
GMAC Group	307,243	586,885	0.6%	0.7%
Hartford Insurance Group	759,194	1,534,949	1.4%	1.8%
Mercury General Group	324,693	977,769	0.6%	1.2%
Met Life Property and Casualty Group	581,003	1,228,269	1.1%	1.5%
NJM Insurance Group	163,324	452,260	0.3%	0.5%
Progressive Insurance Group	725,117	5,082,978	1.4%	6.1%
Prudential of America Group	823,137	841,877	1.6%	1.0%
Southern Farm Bureau Group	361,554	576,690	0.7%	0.7%
State Farm Group	10,949,034	16,446,204	20.7%	19.6%
USAA Group	1,553,962	2,820,509	2.9%	3.4%
Total 20 Selected Company Groups	31,094,654	53,477,277	58.7%	63.7%
Industry Total	52,990,267	83,947,493	100.0%	100.0%

Selected Company Groups for Workers Compensation

Exhibit 8.1.1-B

<u>Group Name</u>	<u>Direct Written Premium</u>		<u>Market Share</u>	
	<u>1991</u>	<u>2002</u>	<u>1991</u>	<u>2002</u>
Allmerica Group	293,709	143,355	0.8%	0.4%
Amerisure Group	172,243	288,536	0.5%	0.8%
Argonaut Group	350,071	226,838	1.0%	0.7%
Atlantic Mutual Companies	133,150	195,407	0.4%	0.6%
Chubb Group	238,715	587,523	0.7%	1.7%
Cincinnati Insurance Companies	121,098	300,605	0.3%	0.9%
EMC Group	92,846	136,649	0.3%	0.4%
Erie Insurance Group	80,427	271,405	0.2%	0.8%
Farmers Group (Part of Zurich Group)	160,960	372,070	0.4%	1.1%
Federated Mutual Group	99,074	199,917	0.3%	0.6%
Firemans Fund Group (Part of Allianz Group)	752,087	194,838	2.1%	0.6%
Hartford Insurance Group	1,739,981	1,288,069	4.8%	3.7%
Kemper Group	1,716,624	1,334,125	4.8%	3.9%
NJM Insurance Group	209,984	280,991	0.6%	0.8%
Old Republic General Group	369,263	337,251	1.0%	1.0%
Selective Ins Group	96,609	155,820	0.3%	0.5%
Sentry Insurance Group	189,677	334,970	0.5%	1.0%
Sierra Group	110,582	175,003	0.3%	0.5%
St Paul Companies	1,236,707	956,768	3.4%	2.8%
State Farm Group	239,209	240,995	0.7%	0.7%
Total 20 Selected Company Groups	8,403,016	8,021,135	23.4%	23.2%
Industry Total (excluding state funds)	35,880,611	34,585,365	100.0%	100.0%

Selected Company Groups for Medical Professional Liability

Exhibit 8.1.1-C

<u>Group Name</u>	<u>Direct Written Premium</u>		<u>Market Share</u>	
	<u>1991</u>	<u>2002</u>	<u>1991</u>	<u>2002</u>
AP Capital Group	69,346	176,627	1.4%	2.0%
Farmers Group (Part of Zurich Group)	92,934	231,074	1.8%	2.6%
Firemans Fund Group (Part of Allianz Group)	28,315	207,740	0.6%	2.4%
FPIC Group	21,935	62,388	0.4%	0.7%
HANYS Group	31,822	74,530	0.6%	0.8%
Health Care Indemnity Inc. Group	81,655	342,022	1.6%	3.9%
ISMIE Group	173,471	260,757	3.4%	3.0%
MAG Mutual Ins Company	69,157	212,654	1.4%	2.4%
Markel North America Group	18,379	187,208	0.4%	2.1%
Medical Mutual Group (MD)	68,416	100,156	1.4%	1.1%
MLMIC Group	454,204	958,843	9.0%	10.9%
Mutual Insurance Co. of Arizona	46,419	107,230	0.9%	1.2%
NORCAL Group	120,924	246,744	2.4%	2.8%
Physicians Recip Insurers	101,223	185,332	2.0%	2.1%
ProAssurance Group	109,771	443,275	2.2%	5.0%
ProMutual Group	117,526	179,791	2.3%	2.0%
SCPIE Companies	111,007	159,768	2.2%	1.8%
St Paul Companies	534,626	219,397	10.6%	2.5%
State Volunteer Mutual Ins Company	57,589	163,859	1.1%	1.9%
Zurich-American Group (Part of Zurich Group)	-	203,552	0.0%	2.3%
Total 20 Selected Company Groups	2,308,719	4,722,947	45.6%	53.8%
Industry Total	5,064,203	8,783,647	100.0%	100.0%

In selecting the final sample of company groups to include in the study, we strove to meet several criteria:

- Create a representative sample of company groups for each product (with a bias towards companies with material volumes of business, as noted above).
- For each company group, be able to adjust for mergers and acquisitions — such that we maintained a consistent company group definition.
- Avoid companies with serious unexplained data anomalies.

To ensure we portrayed a fair sample of the property and casualty insurance industry for each product, we included company groups that ranged in size (based on their direct written premiums). The mix of company groups includes large national companies as well as mid-sized regional or single-state insurers. Over the time period evaluated, the cumulative market share for the company groups we selected was approximately 60% for Personal Auto Liability, 25% for Workers Compensation, and 50% for Medical Professional Liability.

Since part of our analysis focuses on the progression of financial statements over the 11-year period, it was important to ensure that those statements contain minimal discontinuities. In order to maintain reasonable consistency over the time period, each company group was reconstituted to include the same set of insurance company legal entities as it did at the end of 2002. We identified mergers, acquisitions, and divestitures affecting each company group during the time period, and included/excluded legal entities accordingly. For example, as of 2002, the Travelers Property/Casualty Group includes the former Aetna Group of property and casualty companies. Our goal for the Travelers Group, therefore, was to use this 2002 definition and apply it consistently throughout the time period covered by the study. Since Travelers acquired Aetna's property and casualty companies in 1996, we adjusted the definition of the 1996 and prior Travelers Group to also include the acquired Aetna companies. The Aetna Group, per se, is itself not included in the study, as it did not exist in 2002. Its business however, is included as part of the Travelers Group for the entire 1992 – 2002 time period.

In some cases this reconstitution exercise became overly problematic, and the company group was dropped from consideration.

Next we reviewed the list of individual companies within each company group to identify those companies that might be “different” from the bulk of the business typically written by the company group. By “different” we mean companies that write business that is of a different nature (within the same product line) or is separately managed. In several instances we redefined the company group to include only those companies that we considered to be “similar.”

Finally, we encountered data anomalies with several company groups that caused us to drop them from consideration. In some cases these anomalies were caused by unusual transactions or special company circumstances that require additional research to identify. In other cases they may have represented errors in the particular financial schedules from which our data are drawn. Addressing these data problems is possible, but was not necessary to meet the objectives of this project.

Published Regulatory Financial Data

The financial data used to construct each company group's historical regulatory financial statements were drawn from a database of annual regulatory reports for each individual insurer legal entity. The principal schedule within the regulatory report from which the financial data were drawn is the Insurance Expense Exhibit.

The Insurance Expense Exhibit requires property and casualty insurers to allocate each element of their (pre-tax) income statement, as well as selected balance sheet items, to 33 prescribed product lines, including the three that were the focus of our study. Part 2 of the IEE requires a presentation that is net of all reinsurance, both "outward" reinsurance protection purchased by the company and "inward" reinsurance protection sold to other companies. Since 1992, a newly added Part 3 of the IEE requires a presentation of direct business only, excluding both inward and outward reinsurance.

While many of the financial statement elements (for example, premiums, commissions, policy benefits) are directly attributable to a product line, others (for example, general underwriting expenses, claim adjusting expenses) must be allocated to product line by the insurer to complete the IEE.

For this project, we used data from Part 3 of the IEE to create historical regulatory income statements by line of business for each of the company groups in our final sample. As was mentioned above, since Part 3 reflects direct business only, the revenue and expenses associated with assumed and ceded reinsurance transactions are excluded.

The available financial statement elements from Part 3 of the IEE are:

<i>Income Statement</i>	<i>Balance Sheet</i>
Written Premiums	Premium Receivable Asset
Earned Premiums	Unearned Premium Reserve
Commission and Brokerage Expenses Incurred	
Other Acquisition Expenses Incurred	
General Expenses Incurred	
Premium Taxes and Other Fees Incurred	
Dividends to Policyholders Declared	
Losses Incurred (i.e., Policy Benefit Expenses)	Loss Reserve (i.e., Policy Benefit Liability)
Defense Expenses Incurred	Defense Expense Reserve
Adjusting Expenses Incurred	Adjusting Expense Reserve
Pre-Tax Underwriting Profit or Loss	

For each of these elements, we combined (i.e., added) the individual legal entity data to create the company group financial statements.

In some cases we developed "work-arounds" that substituted more reasonable values for data that we considered anomalous. Specific adjustments made to individual company groups are described below, so that the reader can gain a sense of them.

- Company group 17 for Personal Auto Liability reported incurred taxes, licenses and fees of 24% of written premium in 1992 and 1993 and -15% in 1994. We replaced the TLF ratios for these three years with the average TLF ratio from 1995-2002.

- Two company groups for Workers Compensation reported negative direct unearned premium liabilities in their respective IEEs. It is possible that accrued return premiums on retrospectively rated contracts, which are recorded as an offset to unearned premiums in the IEE, are the cause of the negative figures. However, we substituted an estimate of the unearned premium (by taking a percentage of the written premium) for company group 3 for the calendar periods 1993-1998 and for company group 12 for the calendar periods 1992-2000.
- Company group 5 for Medical Professional Liability reported no unearned premiums for most calendar years (even though there was written premium). We estimated the unearned premiums based on the written premium data.
- Company group 6 for Medical Professional Liability reported negative commissions in 1992 and negative TLF in 1993. We estimated commission and TLF ratios for these years based on the average ratios reported for 1994-1996.

Part 3 does not include an allocation of the company's investment income to product line. Even if it did, such an allocation would be of questionable value, given the assumptions that would be required. Rather than develop an allocation ourselves, we have included investment income by calculating the total return on a hypothetical portfolio of assets equal to the loss and defense expense liabilities. This is a reasonable proxy for the total (pre-tax) income from the insurance operations of the company, and is sufficient to analyze the effects of a change to fair value. It implicitly ignores the investment income on capital; essentially our income statement reflects only the results from "insurance operations".

Adjustments to Convert Data to U.S. GAAP

The differing aims of regulatory reporting (referred to in the U.S. as statutory accounting principles, or “SAP”) and generally accepted accounting principles (GAAP) necessitate differing treatment of certain items. The most significant difference is the treatment of deferred policy acquisition costs (DPAC). Under SAP, these expenses are charged to income when they are paid (i.e., at the time the policy is written), reflecting the goal of conservatism inherent in regulatory reporting. However, under current U.S. GAAP, the recognition of these expenses is matched to the related revenue, in this case the earned premiums on the associated policies. That is, under GAAP when a policy is written, a DPAC asset is established in the amount of the related expenses. Then, as the premium is earned over the life of the policy, the DPAC asset is amortized into expenses.

To adjust the published regulatory financial statements to a *pro forma* GAAP basis, we created an estimated DPAC asset for each company group at each statement date. Our starting point was the underwriting expense figures from the Insurance Expense Exhibit. First, for each company group and calendar year we calculated the ratio of Incurred Commissions, Other Acquisition Expenses and Premium Taxes and Other Fees to Written Premiums. Next we multiplied this ratio by the year-end Unearned Premium Reserve to estimate the DPAC asset at each statement date.

Actual company practices vary as to which expenses they defer. Generally all companies defer commissions and premium taxes, as these expenses are incurred at policy inception (i.e., when premiums are written). However, portions of expenses classified as Other Acquisition Expenses and Taxes, Licenses & Fees under regulatory accounting may not be considered to be deferrable under GAAP. We do not consider these issues to be material to our analysis.

Over the 12-year period and the 20-company composite, the calculated total policy acquisition expense ratio averaged 10% for Medical Professional Liability, 15% for Workers Compensation, and 17% for Personal Auto Liability. There was some variation among companies due primarily to the different distribution systems they employ. Most companies’ policy acquisition expense ratios were relatively stable over the 12-year period.

Exhibit 8.1.2 shows the calculated DPAC ratios for each company at each statement date.

Deferred Policy Acquisition Ratios -- Based on Regulatory IEE Data
Ratio of Commissions, Other Acquisition Expenses, Taxes, Licenses, and Fees to Written Premium

Exhibit 8.1.2

Company	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Personal Auto Liability												
1	19.4%	18.6%	18.7%	19.3%	19.6%	20.4%	20.1%	24.5%	17.8%	17.8%	16.7%	16.3%
2	19.2%	20.6%	19.3%	18.5%	18.8%	19.1%	19.8%	18.9%	20.0%	19.8%	17.8%	17.7%
3	14.1%	13.2%	13.2%	14.3%	14.7%	15.0%	15.5%	15.7%	16.4%	16.7%	16.0%	15.4%
4	11.4%	10.4%	10.5%	11.7%	11.7%	12.9%	13.9%	14.7%	14.0%	14.7%	13.9%	14.4%
5	12.3%	11.2%	12.4%	12.6%	11.9%	13.5%	14.4%	15.3%	10.8%	19.8%	17.6%	17.5%
6	13.1%	14.0%	13.8%	12.6%	12.8%	12.4%	12.8%	14.5%	13.6%	13.8%	14.1%	15.1%
7	9.0%	9.0%	9.8%	8.8%	8.7%	8.9%	9.9%	12.3%	13.5%	12.8%	10.5%	10.4%
8	18.8%	17.6%	18.7%	18.7%	18.9%	20.3%	21.6%	21.7%	24.0%	17.2%	16.3%	18.2%
9	13.0%	15.1%	15.5%	11.2%	13.1%	10.3%	11.3%	14.8%	12.2%	12.3%	12.7%	14.9%
10	21.9%	22.2%	21.4%	22.3%	21.7%	21.9%	22.8%	24.5%	24.7%	24.1%	23.9%	23.0%
11	21.7%	25.0%	23.3%	20.9%	19.9%	19.4%	19.8%	21.6%	21.8%	25.6%	23.2%	21.5%
12	20.8%	23.8%	22.4%	20.3%	19.6%	17.7%	17.3%	15.1%	13.2%	12.3%	14.8%	13.3%
13	18.8%	24.1%	20.6%	14.2%	16.4%	18.6%	19.5%	21.2%	23.6%	26.4%	22.1%	20.4%
14	15.0%	14.8%	13.9%	14.4%	16.0%	15.8%	17.7%	18.4%	19.1%	20.0%	18.8%	20.6%
15	8.4%	8.9%	7.5%	8.3%	8.3%	9.2%	9.1%	9.9%	10.9%	10.3%	10.7%	10.7%
16	20.5%	24.0%	18.7%	19.8%	20.0%	20.0%	18.6%	18.5%	19.8%	20.6%	21.6%	22.1%
17	7.5%	7.5%	7.5%	7.5%	6.3%	8.2%	7.2%	6.2%	7.0%	8.3%	8.5%	8.0%
18	23.9%	23.8%	22.9%	23.2%	25.4%	24.1%	23.2%	23.3%	23.0%	22.4%	21.3%	21.2%
19	15.5%	14.0%	14.4%	15.3%	16.4%	17.2%	18.1%	18.6%	19.2%	19.8%	19.0%	18.7%
20	13.8%	14.1%	14.4%	13.5%	14.1%	13.0%	12.9%	13.5%	14.2%	14.7%	12.5%	14.0%
Composite	16.2%	17.1%	16.0%	15.5%	16.3%	16.3%	17.1%	17.4%	17.7%	17.9%	17.1%	17.5%
Workers Compensation												
1	13.4%	12.8%	13.0%	13.4%	15.1%	13.0%	15.4%	17.2%	18.5%	14.1%	19.3%	17.2%
2	17.7%	13.9%	16.9%	13.6%	21.9%	22.4%	22.4%	22.4%	19.9%	17.8%	17.9%	16.3%
3	14.8%	13.3%	13.7%	17.3%	21.3%	18.6%	25.3%	24.2%	23.2%	20.8%	19.7%	17.3%
4	23.6%	24.0%	24.1%	23.2%	24.5%	22.0%	25.9%	27.4%	25.8%	22.0%	25.0%	26.0%
5	15.3%	16.6%	14.7%	14.9%	14.5%	15.7%	18.4%	18.4%	17.8%	20.6%	20.2%	20.6%
6	13.0%	11.2%	11.1%	14.7%	14.7%	13.2%	12.9%	12.2%	12.5%	12.3%	10.2%	12.4%
7	12.8%	14.8%	12.6%	12.9%	12.3%	11.3%	13.0%	16.4%	14.0%	12.0%	18.5%	13.9%
8	12.2%	11.9%	11.5%	13.0%	13.2%	11.6%	13.8%	15.5%	18.0%	17.8%	17.5%	18.7%
9	11.2%	9.4%	9.5%	10.7%	12.5%	13.7%	14.4%	15.1%	15.8%	12.5%	15.4%	14.5%
10	2.4%	2.4%	2.2%	2.2%	2.7%	2.4%	2.3%	3.4%	4.5%	4.4%	3.3%	3.7%
11	9.6%	9.7%	6.5%	8.8%	10.0%	13.1%	15.0%	17.7%	17.8%	17.3%	16.2%	14.6%
12	13.9%	13.1%	12.4%	13.5%	14.8%	15.9%	16.3%	17.1%	17.8%	19.0%	8.8%	12.1%
13	18.4%	18.6%	17.4%	17.8%	18.2%	20.0%	20.5%	19.0%	18.1%	17.8%	16.1%	18.6%
14	16.6%	20.4%	14.8%	12.1%	18.7%	16.9%	20.9%	21.4%	18.5%	21.6%	22.1%	23.6%
15	13.9%	11.6%	14.1%	14.9%	13.6%	15.4%	15.6%	17.5%	17.7%	15.9%	15.5%	17.6%
16	12.7%	11.1%	11.5%	12.1%	13.4%	15.3%	15.3%	20.5%	17.8%	18.4%	14.4%	17.5%
17	10.2%	9.9%	9.5%	9.7%	10.5%	11.3%	14.3%	15.3%	16.8%	16.4%	13.4%	13.3%
18	24.8%	21.5%	22.7%	30.1%	30.8%	19.0%	19.7%	21.1%	21.1%	21.2%	20.1%	19.7%
19	18.1%	17.8%	18.3%	18.4%	18.5%	17.6%	19.9%	18.6%	26.1%	32.9%	27.2%	27.2%
20	18.9%	20.1%	19.9%	18.6%	17.3%	18.6%	22.0%	21.6%	21.0%	20.4%	19.4%	17.3%
Composite	13.6%	13.0%	12.5%	13.4%	14.6%	14.4%	16.1%	17.1%	17.8%	16.8%	16.8%	17.1%
Medical Professional Liability												
1	24.5%	24.8%	24.7%	24.0%	25.3%	23.8%	26.4%	26.0%	28.9%	31.8%	25.2%	27.4%
2	6.7%	7.1%	7.2%	5.8%	8.3%	9.7%	15.9%	15.2%	16.2%	16.1%	14.7%	13.3%
3	7.2%	5.9%	6.7%	9.1%	7.4%	13.8%	11.8%	16.2%	12.0%	9.1%	12.8%	9.8%
4												
5	0.0%	6.7%	8.6%	4.3%	3.5%	1.5%	2.2%	2.4%	2.5%	2.1%	2.3%	2.0%
6	0.8%	-0.2%	-0.1%	0.5%	0.6%	1.1%	1.8%	2.1%	4.2%	5.1%	5.8%	6.9%
7	6.6%	6.0%	6.4%	7.4%	7.7%	8.7%	9.2%	7.5%	11.1%	10.8%	10.6%	9.5%
8	19.3%	30.3%	13.3%	16.7%	17.1%	19.0%	19.9%	20.9%	22.9%	25.3%	19.3%	17.3%
9	13.5%	12.3%	13.9%	13.7%	13.4%	14.1%	14.2%	15.2%	14.1%	14.4%	14.6%	14.1%
10	8.4%	8.4%	8.4%	8.4%	8.3%	8.6%	8.1%	9.2%	7.9%	9.1%	7.4%	8.7%
11	7.3%	8.2%	7.4%	6.9%	8.1%	5.7%	6.5%	7.3%	8.0%	9.9%	9.5%	9.3%
12	4.7%	3.6%	3.5%	4.2%	5.2%	7.1%	6.8%	6.4%	7.0%	6.6%	7.4%	8.2%
13	1.7%	2.2%	1.6%	1.3%	1.0%	2.1%	3.8%	2.7%	3.6%	5.8%	5.7%	6.1%
14	5.7%	3.9%	4.1%	4.3%	7.0%	8.3%	11.6%	11.1%	10.6%	10.8%	10.5%	9.0%
15	6.1%	6.3%	5.9%	6.0%	8.4%	11.2%	12.3%	14.5%	17.1%	14.9%	13.9%	13.5%
16	4.7%	3.7%	4.6%	4.9%	4.8%	5.6%	8.4%	13.2%	13.4%	18.0%	14.3%	15.0%
17	14.4%	14.9%	14.5%	13.1%	13.3%	16.0%	18.4%	18.5%	18.0%	16.2%	14.5%	12.3%
18	2.5%	2.6%	2.6%	2.5%	2.5%	2.5%	2.5%	2.6%	2.7%	2.8%	2.3%	2.1%
19												
20	14.3%	16.2%	13.3%	12.8%	16.6%	12.7%	13.9%	13.3%	15.0%	17.2%	18.5%	18.6%
Composite	8.6%	8.8%	8.7%	8.1%	8.4%	9.1%	9.8%	10.9%	11.2%	11.7%	11.0%	10.4%

In addition to estimating DPAC for each company, we also adjusted the published regulatory data for identified instances of loss reserve discounting. (As has been indicated, our goal was to achieve a consistent set of undiscounted liabilities as a starting point for our

estimates of fair value.) Two distinct types of reserve discounting are present in the reported regulatory liabilities. Under current regulatory reporting requirements, insurers are required to disclose the amount of discount for each type by product line (in Schedule P, discussed subsequently).

First, SAP allows all insurers to use a tabular discounting approach (i.e., annuity reserves that combine life expectancy and the time value of money into a single tabular value for each attained age). Tabular reserves may be used on all individual claims involving life pension benefits. Claims involving life pension benefits are common in Workers Compensation; they are relatively rare in other lines, such as Auto No-Fault, as few states have adopted systems that provide such benefits. We therefore focused our analysis of tabular discounting only on the Workers Compensation product line. However, not all insurance companies appear to have chosen to utilize tabular discounts; in our sample of 20 Workers Compensation insurers, only 9 reported that they currently use tabular discounts. For those insurers who reported tabular discounts, their impact (i.e., the amount by which the liabilities were reduced) ranged from 1% to 7% of the held loss liabilities.

It is not clear whether differences in the reported tabular discounts reflect actual differences in practice, or an inability of some insurers to comply with the regulatory reporting requirements of Schedule P. While we have not researched the issue, we believe that the latter situation is more likely. For those insurers that did report tabular discounts, the range of impacts is plausible, reflecting differences in the classes of business that they may have targeted. High hazard classes would be more likely to generate serious injuries, resulting in a higher prevalence of life pension benefit claims.

A second type of discounting is referred to as non-tabular (to distinguish it from tabular discounting). This type of discounting is permitted for a particular company and line of business by regulators on a discretionary basis. Typically a non-tabular discount is calculated on the entire inventory of claims; an aggregate cash flow is generated and then discounted. In our sample, non-tabular discounts were reported by four Workers Compensation insurers, three Medical Professional Liability insurers, and one Personal Auto Liability insurer. For those insurers who reported non-tabular discounts, their impacts ranged from 2% to 16% of the current held loss liabilities.

Reported discounts at 31 December 2002 are summarized in the table below:

Product Line	Tabular Discount	Non-Tabular Discount	
	Number of Companies	Number of Companies	Range of Impact
Workers Compensation	9	4	2% to 11%
Personal Auto Liability		1	15%
Medical Professional Liability		3	3% to 16%

GAAP practices relating to reserve discounting also vary from insurer to insurer. Many insurers employ parallel discounting practices for GAAP and SAP. Others may discount their liabilities in one context, but not the other, or they may employ different assumptions. Since tabular discounting is a long-standing practice within the industry (dating back to at least the 1950s), it is more common for tabular discounting practices to be parallel between

GAAP and SAP than it is for non-tabular. The latter type of discounting emerged as an issue primarily in the 1980s, during the period of record high interest rates.

Our approach was to adjust the reported claim and defense cost liabilities only for the reported non-tabular discounts. For each company group, product line, and statement date, we added the amounts of the reported non-tabular discounts to the reported claim and defense cost liabilities. We chose not to adjust the data for tabular discounts for several reasons:

1. As noted earlier, we suspect that the lack of reported tabular discounts by some companies reflects an inability to comply with the reporting requirement, rather than an actual absence of tabular discounts. We believe that the majority of Workers Compensation insurers do employ them, for both SAP and GAAP reporting.
2. Most of the tabular discount relates to cash flows that stretch far into the future, over the lifetime of the beneficiary. As will be discussed subsequently, our time-value-of-money adjustment focuses on the projected cash flows over the next 10 years (the vast majority of the dollars are paid out within this period), and not with cash flows beyond that point. Thus, there is only a partial overlap between our derived fair value discount and any tabular discount.
3. The available data do not easily facilitate adjusting for tabular discounts.

Exhibit 8.1.3 displays the adjustments we made (expressed as a ratio to the reported reserves) for non-tabular discounts by company and statement date.

<i>Non-Tabular Reserve Discounting</i>												Exhibit 8.1.3	
<i>Amount of Reported Discount as Percentage of Held Reserves</i>													
Company	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
Personal Auto Liability													
4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	13.6%	15.1%	
Composite	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	
Workers Compensation													
2	18.5%	31.9%	29.4%	22.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
3	1.2%	1.6%	1.5%	1.9%	1.7%	1.7%	1.6%	1.7%	1.5%	1.1%	1.3%	1.6%	
7	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.2%	10.0%	9.8%	12.7%	11.4%	
9	0.0%	0.0%	0.0%	1.4%	2.7%	3.6%	4.2%	4.8%	5.0%	6.5%	13.4%	10.7%	
11	0.0%	0.0%	0.0%	5.5%	5.8%	8.1%	7.8%	8.6%	7.5%	8.3%	8.1%	7.6%	
13	0.0%	0.0%	2.0%	9.7%	10.0%	8.7%	8.3%	0.0%	0.0%	0.0%	0.0%	0.0%	
Composite	0.4%	0.7%	0.9%	2.5%	2.2%	2.2%	2.2%	1.3%	1.3%	1.5%	2.3%	2.1%	
Medical Professional Liability													
2	10.2%	9.7%	9.7%	11.5%	10.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
3	0.0%	11.7%	8.5%	8.6%	6.6%	5.1%	2.6%	1.5%	0.0%	0.0%	0.0%	0.0%	
10	26.9%	29.7%	27.2%	25.4%	20.4%	18.6%	16.8%	13.8%	13.6%	13.1%	12.8%	12.4%	
12	12.2%	14.0%	12.0%	4.2%	3.9%	3.6%	3.6%	3.5%	3.8%	3.8%	3.8%	2.6%	
13	32.1%	31.4%	30.6%	29.5%	28.0%	27.9%	22.6%	23.8%	22.8%	22.1%	19.7%	16.2%	
14	6.8%	4.1%	3.0%	0.8%	0.1%	0.0%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	
Composite	12.2%	12.8%	12.1%	11.1%	9.0%	8.1%	6.8%	5.5%	5.3%	5.3%	4.9%	4.8%	

There are other differences between SAP and GAAP that are excluded from our analysis. These items include:

- Claim and defense cost liabilities are recorded net of anticipated subrogation and salvage recoveries under GAAP, but not under SAP;

- Policyholder dividends that are planned but not formally declared are usually accrued as a liability under GAAP, but not SAP. SAP records policyholder dividends as a liability at the time that the dividends are declared;
- GAAP accruals for additional premiums under retrospectively rated policies and policies subject to audit are typically less conservative than they are under SAP.

These differences are not considered to be material to our analysis.

Reported regulatory financial data for each product for the composite of the 20 selected companies are displayed in Exhibit 8.1.4 (located at the end of this section). Composite financial data for the 20 companies, adjusted to an estimated *pro forma* U.S. GAAP basis, are displayed in Exhibit 8.1.5 (also located at the end of this section).

8.2 Time Value of Money Adjustment

Principles dictate that the time value of money be incorporated in estimates of the fair value of liabilities. This can be accomplished in three steps: (1) projecting the expected future cash flows, (2) selecting appropriate interest rates, and (3) applying the resulting discount factors to the expected cash flows by maturity. The dollar difference between the sum of the undiscounted expected cash flows and the discounted cash flows is the adjustment for the time value of money.

As discussed below, the data necessary to perform these steps (and to calculate the market risk margin, discussed subsequently) were drawn from Schedule P of each company group's annual regulatory report.

Schedule P

In Part 1 of Schedule P, insurers present a comprehensive picture of the structure of their loss and loss expense reserves for the current year-end. For each of 21 product line groupings, companies are required to display a breakdown of their paid and estimated unpaid losses, defense expenses, and adjusting expenses by coverage year. These figures are presented gross (i.e., direct plus inwards reinsurance) and net after all reinsurance.

In Parts 2, 3, and 4 of Schedule P, insurers present a 10-year 'development' of historical net loss and defense expenses (combined) that facilitates testing of the reserves. For each product line grouping, paid and estimated unpaid losses and defense expenses are displayed by coverage year at each of the latest 10 year-end maturities, so that the progression of estimated losses and defense costs by coverage year cohort can be tracked over time. (The data forms a 'triangle', with the oldest coverage year showing the development of losses and defense costs at 10 successive maturities and the most recent coverage year showing only the initial value of losses and defense costs at the first maturity.)

Since each statement year of Schedule P data contains information for the 10 most recent coverage years, our database (which draws from 12 statements) contains coverage year data for each of the coverage years 1982 through 2002. However, because of the format of Schedule P, the amount of historical development information varies by coverage year. The table below illustrates the evaluation points contained in the database for each of the coverage years 1982 to 2002.

Coverage Year	Evaluation Points Available (maturity measured in months)
1982	120
1983	108, 120
1984	96, 108, 120
1985	84, 96, 108, 120
1986	72, 84, 96, 108, 120
1987	60, 72, 84, 96, 108, 120
1988	48, 60, 72, 84, 96, 108, 120
1989	36, 48, 60, 72, 84, 96, 108, 120
1990	24, 36, 48, 60, 72, 84, 96, 108, 120
1991	12, 24, 36, 48, 60, 72, 84, 96, 108, 120
1992	12, 24, 36, 48, 60, 72, 84, 96, 108, 120
1993	12, 24, 36, 48, 60, 72, 84, 96, 108, 120
1994	12, 24, 36, 48, 60, 72, 84, 96, 108
1995	12, 24, 36, 48, 60, 72, 84, 96
1996	12, 24, 36, 48, 60, 72, 84
1997	12, 24, 36, 48, 60, 72
1998	12, 24, 36, 48, 60
1999	12, 24, 36, 48
2000	12, 24, 36
2001	12, 24
2002	12

Unfortunately, Schedule P data are not available on a direct basis (i.e., on a basis directly comparable to the IEE financial statement data). While Part 1 is available on a gross basis, much of the data at the individual legal entity level are contaminated by reinsurance with affiliates that would need to be eliminated to obtain a consolidated company group result. (Many company groups operate with an inter-company reinsurance pooling arrangement, through which the business written by each company is shared pro-rata among the members of the pool.) While we believe it is feasible to use the gross Schedule P data for selected companies that would be a very close proxy for direct data, this would entail a detailed (and time consuming) analysis of each of the individual legal entities within each company group at every point in the historical period. For the purposes of this project, we have elected to use the net data to develop the fair value adjustments. This approach allows us to simply add together the Schedule P data for all of the legal entities within a company group.

As noted earlier, the use of the net data is tantamount to assuming that the payment patterns developed from the net data for each company group are (proportionately) the same as those

that we would have developed on a direct basis, given the data. While this is far from a perfect assumption, it is a concession to the available data, and perhaps slightly conservative. Finally, because the development triangles in Schedule P contain only (combined) loss and defense costs, we projected only those policy liabilities — excluding claim-adjusting expenses.

The data from Schedule P included some anomalies; in some cases we developed “work-arounds” that substituted more reasonable values. Specific adjustments made to individual company groups are described below, so that the reader can gain a sense of them.

- Three companies reported Workers Compensation net paid loss and defense cost triangles in which a diagonal showed a decrease in cumulative paid losses from one reporting period to the next. Since the triangles are on a net basis, it is possible that the company group received a significant amount of reinsurance recoveries on all coverage years in a calendar year, but this does not seem plausible. The data from these diagonals were excluded in the calculation of the payment patterns. The affected companies are

Company 11 for calendar year 1999

Company 13 for calendar year 1996

Company 16 for calendar year 1993

- Two company groups reported Medical Professional Liability experience in which there were negative cumulative paid losses and defense costs for some coverage years at some maturities. Since this did not occur at all maturities for a coverage year, we replaced the negative amounts with an estimate based on the amounts shown for that coverage year at other maturities. Company groups 6 and 10 exhibited this problem.
- Company group 20 for Medical Professional Liability reported incurred losses and defense costs at some maturities that were less than the amounts paid at that same point in time. We adjusted the data to make the incurred amounts at least as great as the paid amounts.

Step 1 – Projecting the Future Cash Flows

Projected cash flows were derived for each company and each statement date based on the cumulative net paid loss and defense cost development triangles in Part 3 of Schedule P as of that statement date. For each company, product and year-end, we constructed an expected payment pattern applicable to a typical coverage year using generally accepted actuarial techniques. We then cross-multiplied the payment pattern and the estimated unpaid losses by coverage year to produce an array of projected cash flows by coverage year and future calendar period. The array was summed across coverage years to obtain the expected cash flows by future calendar period.

Given the need to develop 720 entity-specific payment patterns, we were forced to employ a relatively mechanical actuarial algorithm. In actual practice, the patterns would be developed by each company using informed judgment to interpret their internal data. In designing the algorithm, we sought to incorporate a proxy for judgment by credibility weighting the indicated pattern from the company data with a benchmark pattern derived from composite data. This approach tends to discard the company data when it is unstable.

To construct the company payment patterns, we first constructed a composite development triangle of the 20 insurers for each product at each year-end. Composite age-to-age development factors were calculated and judgmentally selected in the traditional manner. These composite development factors are used as the “benchmark”. Next, age-to-age factors for each company were mechanically calculated as the average of the last available five factors at each maturity. (The sample size of five was selected to strike a balance between stability and responsiveness.) Next, at each maturity, the calculated individual company group average factors were credibility weighted with the benchmark factors. Bühlmann (i.e., least squares) credibility was used with K equal to the variance within the five factors for a particular company group, divided by the variance of the average factor between all 20 company groups. The credibility (i.e., weight) assigned to the individual company group average factors is given by:

$$Z = \frac{n}{n+K}$$

This approach is designed so that (a) when the individual company group age-to-age factors are highly volatile, the benchmark is used, and (b) when the individual company group age-to-age factors are highly stable, their average is used.

Finally, the credibility weighted age-to-age factors were accumulated across maturities to create the payment pattern for a typical coverage year for each company group at the specific statement date.

We also calculated an average time to payment, as the weighted average of future payments multiplied by the length of time to payment. This metric allows us to compare payment patterns across companies, and to identify any lengthening or shortening of expected payment patterns over time.

In developing our coverage year payment patterns, we made the simplifying assumption that all payments after 120 months maturity occur in the next subsequent (i.e., the eleventh) year. Since Schedule P only includes historical data for 10 coverage years, it does not provide information from which a payment pattern can be extended beyond that point.

Step 2 – Selecting an Interest Rate

To obtain risk-free rates for this project, our starting point was year-end yield-to-maturity rates constructed and published by Bloomberg, as displayed in Exhibit 8.2.1.

Interest Rates from Bloomberg

Exhibit 8.2.1

Annual Yields to Maturity -- Fitted Yield Curve to Zero Coupon US Treasury Strips

Year End	Term to Maturity										
	1 year	2 years	3 years	4 years	5 years	7 years	8 years	9 years	10 years	15 years	20 years
12/31/1991	4.40%	4.88%	5.25%	5.71%	6.13%	6.66%			7.14%		7.86%
12/31/1992	3.76%	4.72%	5.17%	5.82%	6.15%	6.57%			6.96%		7.47%
12/31/1993	3.75%	4.22%	4.60%	5.00%	5.25%	5.64%			6.09%		6.58%
12/30/1994	7.28%	7.69%	7.78%	7.85%	7.84%	7.88%			7.89%		8.04%
12/29/1995	5.21%	5.25%	5.30%	5.36%	5.38%	5.49%			5.71%		6.09%
12/31/1996	5.63%	5.89%	6.04%	6.14%	6.18%	6.29%	6.40%	6.43%	6.49%	6.67%	6.74%
12/31/1997	5.65%	5.67%	5.69%	5.72%	5.71%	5.79%	5.81%	5.84%	5.88%	5.98%	6.01%
12/31/1998	4.56%	4.50%	4.67%	4.64%	4.65%	4.70%	4.75%	4.80%	4.97%	5.32%	5.47%
12/31/1999	6.13%	6.21%	6.37%	6.41%	6.48%	6.58%	6.64%	6.68%	6.73%	6.85%	6.84%
12/29/2000	5.22%	5.02%	5.05%	5.06%	5.07%	5.15%	5.18%	5.24%	5.31%	5.56%	5.62%
12/31/2001	2.13%	3.16%	3.80%	4.13%	4.44%	4.92%	5.18%	5.25%	5.41%	5.76%	5.82%
12/31/2002	1.09%	1.62%	2.04%	2.49%	2.79%	3.55%	3.75%	3.87%	4.14%	4.75%	4.96%

Rates for most annual terms from 1 to 10 are available from Bloomberg. The underlying data are traded prices on zero-coupon bonds. These bonds are synthetic; they are backed by U.S. Treasury securities, however the coupons on the underlying bonds have been stripped and sold separately. Because the Treasury securities backing them are held in trust, the synthetic securities have essentially the same credit characteristics as the Treasuries themselves. The principal advantage of the zero-coupon bonds is that they are traded in the open market. However, the market data are relatively thin; for example, the most recent Bloomberg rates were based on trading values for 184 distinct bonds.

The Bloomberg rates are available back to 1991 only. For prior years, we supplemented the Bloomberg data with year-end constant maturity yield rates published by the Federal Reserve, as displayed in Exhibit 8.2.2. These rates are constructed by the Treasury Department using data for the most actively traded marketable treasury securities, based on quotes reported by dealers to the New York Fed. To obtain constant maturity yields, Treasury constructs a continuous yield curve daily; yields for specific fixed maturity points are then read from yield curve.

Annual Yields to Maturity -- Fitted Yield Curve to Actively Traded US Treasuries

Year End	Term to Maturity							
	6 months	1 year	2 years	3 years	5 years	7 years	10 years	20 years
12/31/1980	13.76%	13.86%	13.06%	12.85%	12.59%	12.49%	12.43%	12.09%
12/31/1981	11.98%	13.35%	13.63%	13.99%	13.97%	13.97%	13.98%	14.04%
12/31/1982	8.00%	8.68%	9.48%	9.74%	10.09%	10.32%	10.36%	10.62%
12/31/1983	9.14%	10.08%	10.85%	11.13%	11.57%	11.77%	11.82%	11.98%
12/31/1984	8.19%	9.22%	10.02%	10.52%	11.08%	11.52%	11.55%	11.70%
12/31/1985	7.08%	7.60%	7.98%	8.22%	8.49%	8.87%	9.00%	9.50%
12/31/1986	5.63%	5.95%	6.35%	6.56%	6.81%	7.09%	7.23%	7.39%
12/31/1987	6.17%	7.10%	7.77%	8.04%	8.33%	8.67%	8.83%	
12/31/1988	8.20%	9.02%	9.14%	9.18%	9.14%	9.18%	9.14%	
12/31/1989	7.48%	7.76%	7.87%	7.87%	7.86%	7.97%	7.93%	
12/31/1990	6.43%	6.82%	7.15%	7.40%	7.68%	8.00%	8.08%	
12/31/1991	3.86%	4.12%	4.77%	5.11%	5.93%	6.38%	6.71%	
12/31/1992	3.28%	3.61%	4.56%	5.12%	6.04%	6.43%	6.70%	
12/31/1993	3.20%	3.63%	4.25%	4.58%	5.21%	5.53%	5.83%	6.48%
12/31/1994	6.22%	7.20%	7.69%	7.80%	7.83%	7.84%	7.84%	8.02%
12/31/1995	4.96%	5.18%	5.18%	5.25%	5.38%	5.49%	5.58%	6.01%
12/31/1996	5.12%	5.51%	5.88%	6.04%	6.21%	6.34%	6.43%	6.73%
12/31/1997	5.23%	5.51%	5.66%	5.68%	5.71%	5.77%	5.75%	6.02%
12/31/1998	4.39%	4.53%	4.54%	4.55%	4.56%	4.73%	4.65%	5.39%
12/31/1999	5.49%	5.98%	6.24%	6.29%	6.36%	6.55%	6.45%	6.83%
12/31/2000	5.47%	5.32%	5.11%	5.06%	4.99%	5.16%	5.12%	5.59%
12/31/2001	1.79%	2.17%	3.07%	3.59%	4.38%	4.84%	5.07%	5.74%
12/31/2002	1.21%	1.32%	1.61%	1.99%	2.78%	3.36%	3.83%	4.83%

Since our analysis assumes that payments are made at mid-year, we needed yields at half-year rather than annual maturities. For simplicity we used linear interpolation between the available data points to obtain the rates we needed. The final rates are shown in Exhibit 8.2.3.

Year End	Term to Maturity (In Years)										
	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5
12/31/1977	6.44%	7.10%	7.29%	7.41%	7.50%	7.57%	7.63%	7.68%	7.72%	7.76%	7.78%
12/31/1978	9.48%	10.28%	9.79%	9.52%	9.39%	9.30%	9.25%	9.22%	9.19%	9.16%	9.15%
12/31/1979	11.82%	11.47%	10.93%	10.56%	10.44%	10.38%	10.37%	10.36%	10.35%	10.34%	10.33%
12/31/1980	13.76%	13.46%	12.96%	12.79%	12.66%	12.57%	12.52%	12.48%	12.46%	12.44%	12.43%
12/31/1981	11.98%	13.49%	13.81%	13.99%	13.98%	13.97%	13.97%	13.97%	13.98%	13.98%	13.98%
12/31/1982	8.00%	9.08%	9.61%	9.83%	10.00%	10.15%	10.26%	10.33%	10.34%	10.35%	10.36%
12/31/1983	9.14%	10.47%	10.99%	11.24%	11.46%	11.62%	11.72%	11.78%	11.80%	11.81%	11.82%
12/31/1984	8.19%	9.62%	10.27%	10.66%	10.94%	11.19%	11.41%	11.53%	11.54%	11.55%	11.55%
12/31/1985	7.08%	7.79%	8.10%	8.29%	8.42%	8.59%	8.78%	8.89%	8.94%	8.98%	9.00%
12/31/1986	5.63%	6.15%	6.46%	6.62%	6.75%	6.88%	7.02%	7.11%	7.16%	7.21%	7.23%
12/31/1987	6.17%	7.44%	7.91%	8.11%	8.26%	8.42%	8.59%	8.70%	8.75%	8.80%	8.83%
12/31/1988	8.20%	9.08%	9.16%	9.17%	9.15%	9.15%	9.17%	9.17%	9.16%	9.15%	9.14%
12/31/1989	7.48%	7.82%	7.87%	7.87%	7.86%	7.89%	7.94%	7.96%	7.95%	7.94%	7.93%
12/31/1990	6.43%	6.99%	7.28%	7.47%	7.61%	7.76%	7.92%	8.01%	8.04%	8.07%	8.08%
12/31/1991	3.86%	4.64%	5.07%	5.48%	5.92%	6.26%	6.53%	6.74%	6.90%	7.06%	7.14%
12/31/1992	3.28%	4.24%	4.95%	5.50%	5.99%	6.26%	6.47%	6.64%	6.77%	6.90%	6.96%
12/31/1993	3.20%	3.99%	4.41%	4.80%	5.13%	5.35%	5.54%	5.72%	5.87%	6.02%	6.09%
12/31/1994	6.22%	7.49%	7.74%	7.82%	7.85%	7.85%	7.87%	7.88%	7.89%	7.89%	7.89%
12/31/1995	4.96%	5.23%	5.28%	5.33%	5.37%	5.41%	5.46%	5.53%	5.60%	5.67%	5.71%
12/31/1996	5.12%	5.76%	5.97%	6.09%	6.16%	6.21%	6.26%	6.35%	6.42%	6.46%	6.49%
12/31/1997	5.23%	5.66%	5.68%	5.71%	5.72%	5.73%	5.77%	5.80%	5.83%	5.86%	5.88%
12/31/1998	4.39%	4.53%	4.59%	4.66%	4.65%	4.66%	4.69%	4.73%	4.78%	4.89%	4.97%
12/31/1999	5.49%	6.17%	6.29%	6.39%	6.45%	6.51%	6.56%	6.61%	6.66%	6.71%	6.73%
12/31/2000	5.47%	5.12%	5.04%	5.06%	5.07%	5.09%	5.13%	5.17%	5.21%	5.28%	5.31%
12/31/2001	1.79%	2.65%	3.48%	3.97%	4.29%	4.56%	4.80%	5.05%	5.22%	5.33%	5.41%
12/31/2002	1.21%	1.36%	1.83%	2.26%	2.64%	2.98%	3.36%	3.65%	3.81%	4.00%	4.14%

Step 3 – Applying the Discount Rates

For each year-end, the annual yield rates for each maturity were converted to discount factors (i.e. compounded for the appropriate number of years). For each company and product, the discount factors applicable to that year-end were then applied to the projected future loss and defense cost payments by maturity. In each instance, we compared the sums of the discounted and undiscounted future payments to create an average discount factor. As a final step, the average discount factor derived from the net Schedule P data was applied to the direct reserves from the IEE data to obtain discounted reserves for each company group.

8.3 Market Risk Margin Adjustment

In Section 5.5, we provided a brief summary of the four steps employed in the calculation of the market risk margins applicable to the loss and defense cost liabilities. The four steps in order of calculation are the following:

1. Develop an empirical measure of the normative pricing market risk margin for each product.
2. Measure the pricing volatility and translate the empirical pricing risk margin into a market risk margin per unit of risk.
3. Measure the amount of reserve volatility of each company group at each year end, in a manner consistent with the measured pricing volatility.
4. Set the reserve market risk margin based on the empirical margin per unit of risk and the measured amount of reserve volatility.

In this section of the Appendix, we will describe in greater detail the calculations associated with each of the four steps mentioned above.

Step 1 — Pricing Risk Margin

The pricing risk margins are calculated over a 27-year period, starting with coverage year 1976 and ending with coverage year 2002. The method employed compares the actual claim and defense cost expenses from Schedule P to the corresponding provision in the premium for each coverage year, with any excess of the latter over the former representing the risk margin allowed by the market. The claim and defense expense cost provision in the premium was calculated as a residual — by subtracting the actual underwriting and claim adjusting expenses from the reported premium (based on expense ratios reported in Part II of the Insurance Expenses Exhibit).

The main advantages of this approach are its simplicity and the fact that it produces an objective empirical measure based on published financial data. A disadvantage is that it is an ex-post realization of pricing risk margins; in other words, it considers the actual realization of claims after a policy is written rather than the market expectations at the time the policies were written. An underlying assumption is, therefore, that the market expectation is unbiased, such that the average ex-post realizations are a true measure of the expectation. The results suggest that this assumption may be imperfect, particularly for Medical Professional Liability. Market participants may be overly optimistic about the future costs of the coverage that they are providing, leading to an understatement of the market pricing risk margin.

A detailed list of all the inputs required for the calculation of pricing risk margins are described in the following paragraphs.

1. **Net Earned Premium:** Earned premium net of reinsurance was taken from Schedule P, Part 1. For each coverage year, the earned premium is from the latest available statement date. The assumption was made that policies are written at 1/1/xx and premium is paid at 3 months. Premium was discounted to time zero.

2. **Net Commission, Acquisition, and Tax Expenses Incurred:** We first calculated the ratios of the calendar year net commission, acquisition and tax expenses to net written premium (all from Insurance Expense Exhibit, Part II) . We then applied this ratio to the net earned premium from Schedule P. For statement dates 1990 and prior, we applied a selected ratio. The same selected ratio was applied in any year in which the company group's reported incurred expenses in the IEE were either zero or negative. Commission and acquisition expenses were assumed to be paid at time $t=3$ months and were discounted to time zero.
3. **Net General Expenses Incurred:** We first calculated ratios of the calendar year net general expenses to net earned premium (all from the Insurance Expense Exhibit (IEE) Part II). We then applied this ratio to the net earned premium from Schedule P. For statement dates 1990 and prior, we applied a selected ratio. The same selected ratio was applied in any year in which the company group's reported incurred expenses in the IEE were either zero or negative. General expenses were assumed to be paid at time $t=6$ months and were discounted to time zero.
4. **Net Claim Adjusting Expenses:** We started with ultimate incurred claim adjusting expenses by coverage year as reported in Schedule P Part 1. We projected claim adjusting expense payments based on the assumption that 50% of the expenses are paid in proportion to the loss payout pattern, 45% of the expenses are paid in the first calendar year of the coverage year and 5% of the expenses are paid in the second calendar year of the coverage year. Expenses are assumed to be paid midway through a calendar year and discounted to time zero.
5. **Claim and Defense Provision in the Premium:** This item is equal to (1) – (2) – (3) – (4). It represents the provision for claim and defense cost expenses together with any margin to compensate the insurer for risk.
6. **Net Present Value of Actual Claim and Defense Cost Expenses:** The latest available data on actual claim and defense cost expenses by coverage year were taken from Schedule P, Parts 2 and 3. The estimates of ultimate are the sum of the paid-to-date and any remaining estimated unpaid as of the latest statement date. Paid and unpaid data for coverage years 1993 to 2002 are based on the 2002 statement date. For coverage years 1992 and prior, the paid and unpaid data are taken from the 2001 and prior statement dates, respectively. By employing data from the 2001 statement date for the 1992 coverage year, we have 10 years of actual payments for the 1992 year. By maximizing the years of actual payments for a particular coverage year, we minimize any possible distortions in the initial estimates of claim and defense cost expenses for an immature year. The payments are discounted to time zero. The underlying assumption is that loss payments are made midway through a calendar year.
7. **Empirical Market Pricing Margins:** Item (7) is calculated for each coverage year as: $[(5)-(6)] / (5)$. It represents the difference between actual and expected claim and defense cost expenses as a ratio to expected costs. In other words, it is the implied percentage of market pricing margin as a percentage of expected claim and defense costs.

Throughout the above calculations the present values are computed using the same risk-free interest rates as were described earlier.

Exhibit 5.5.1 shows the pricing risk margins calculated by coverage year from 1976 to 2002 coverage year period. Note that the Personal Auto data include combined auto liability and auto physical damage figures. We combined these two coverages so that we were focusing on the overall margin for the combined product offering.

Step 2 — Pricing Volatility

In the second step of our analysis, we measured the pricing volatility, using the coefficient of variation of the ratio of actual claim and defense expense cost to expected cost. For actual and expected claim cost, we used items (6) and (5) from the pricing risk margin data, respectively. Both actual and expected costs are adjusted for the time value of money. The pricing volatility is calculated across all companies and statement dates.

Step 3 — Reserve Volatility

The third step in our analysis was to calculate the amount of reserve volatility at the entity-specific level. The reserve volatility for each company group at each statement date is measured by employing two well-established techniques, as published in two papers:

- “Workers Compensation Reserve Uncertainty” by Hodes, Feldblum and Blumsohn
- “Measuring the Variability of Chain Ladder Reserve Estimates” by Thomas Mack.

We briefly summarize here the methodologies employed in each of the two papers. For more details regarding the methodologies, the interested reader should refer to the individual papers.

The HFB paper is a stochastic simulation approach that quantifies the contribution to reserve volatility from the two main components of reserve uncertainty: process risk and parameter risk. Process risk is the risk that the actual results will differ from the true expected results due to random variation in the claim development process. Parameter risk is the risk that the model expected results will differ from the true expected results due to mis-estimation of the parameters employed in the model.

The input to the HFB method is the paid claim and defense cost triangles (from Schedule P, Part 3). (Reported claim and defense costs are not used because they are distorted by different levels of reserve adequacy at various points in time.) In a traditional reserving exercise we would select paid age-to-age (ATA) development factors for each maturity and, based on the selected factors, calculate point estimates of the claim and defense cost liabilities. The HFB method seeks to identify and incorporate all components that contribute to the uncertainty in our liability estimates through the selection of the ATA factors — both process and parameter uncertainty.

The HFB method assumes that the ATA factors at each maturity follow a log-normal distribution with known mean and variance. The mean and variance figures are taken from the available sample of historical ATA factors. Even though the mean and variance of the future ATA factors is assumed to be known, future inflation and economic conditions will force the actual ATA factors to vary around their expected value. These ATA factors are simulated by employing a Monte Carlo simulation approach. Based on the selected mean and variance of the log-normal distribution, the Monte Carlo approach provides random ATA factors that belong to the same distribution. This approach is followed for all available maturities.

For claim and defense costs beyond the available Schedule P maturities the method simulates development to ultimate. It fits an inverse power curve to the simulated ATA factors from the first 10 maturities to estimate the tail development to ultimate. The formula employed here is the following:

$$ATA = 1 + a * t^{-b},$$

where a and b are the fitted parameters and t represents the development year. The development factors in the tail of the triangle vary at each simulation since the ATA factors from the first 10 calendar years vary with each simulation. The ultimate year of development is assumed to be 50 years for Workers Compensation, 20 years for Medical Professional Liability and 12 years for Personal Auto Liability. A final source of process uncertainty is the last payment period for a coverage year. The assumption is that the last payment follows a uniform distribution between development periods m and n, i.e., there is an equal probability that all claims associated with a particular coverage year will close between development periods m and n. The (m,n) period is (40,50) years for Workers Compensation, (15,20) years for Medical Professional Liability and (10,12) for Personal Auto Liability.

An important component of reserve uncertainty is the inflation that will be applied to future loss payments. For simplicity, we are not simulating future inflation in our analysis. Instead, we know that each ATA factor captures development from two different dimensions. The coverage-year dimension that represents true loss development, and the calendar-year dimension that captures any inflationary effects. For the purpose of this work, we assume a future inflation rate that is equal to the implicit inflation rate included in the historical ATA factors. Note that the previous assumption of inflation introduces a parameter risk in the model.

The final step is the quantification of parameter risk. In reality, we are neither sure if the true distribution of the ATA factors is log-normal nor if the selected means and variances of this distribution, based on historical figures, are representative of the future ATA factors. The HFB method simplifies the calculations by assuming that the distribution of the ATA factors at each maturity is log-normal. It recognizes, though, that the selected mean and variance could be wrong. Reasons why the true parameters of the log-normal distribution could be different from the selected ones include:

- The selected parameters are based on a limited number of historical points and not the whole population of the ATA factors. The limited sample of observations increases the uncertainty of the estimates.
- The selected parameters of the log-normal distribution might well be representative of the past but not of the future. For example, a change in the mix of claims, like a shift from temporary total to permanent total claims over time, could result in different future parameters of the log-normal distribution compared to the current ones.

The HFB method calculates the parameter uncertainty based on a procedure developed by Kreps. The Kreps procedure uses Bayesian analysis to produce a tractable formula for calculating the parameter risk associated with the unknown mean and variance of a log-normal distribution. The resulting formula for the parameter uncertainty is:

$$z_{eff} = v + z \times \{n \times (1 + v^2) / w\}^{0.5}$$

where:

- i. n is the number of ATA factors in a column,
 - ii. z follows a standard normal distribution (simulated),
 - iii. w follows a Chi-Squared distribution with parameter $(n+\theta-1)$ (simulated),
 - iv. $v = t / (n+\theta-2)^{0.5}$ where t follows a student t distribution with parameter $(n+\theta-2)$ (simulated), and
- $$\theta = 2.$$

Combining process and parameter risk, the HFB method produces final simulated ATA factors based on the following formula:

$$z_{eff} = 1 + \exp(\mu_o + \sigma_o \times z_{eff}),$$

where μ_o and σ_o are the mean and standard deviation of the logs of (ATA-1) factors, respectively. To avoid the existence of outliers results we limited the simulated ATA factors within one standard deviation of the average ATA factor at each maturity.

A second method for calculating reserve uncertainty is based on the Thomas Mack paper. The Mack method offers an analytic solution, which does not require extensive simulation. It establishes a formula for the standard error of the reserves, based on certain simplifying assumptions regarding the chain ladder development method. The Mack method uses the same paid claim and defense cost triangles as the HFB method.

As presented in the Mack paper, the method uses the following notation:

Let C_{ik} denote the cumulative loss and defense cost payments for coverage year i , $1 \leq i \leq I$ and maturity year k , $1 \leq k \leq I$. The values of C_{ik} are known for $i+k \leq I+1$. We want to estimate the values of C_{ik} for $i+k > I+1$. The nominal value of the unpaid claim and defense cost liabilities for coverage year i is:

$$R_i = C_{iI} - C_{i,I+1-i},$$

where C_{iI} represents the true ultimate claim and defense costs for coverage year i . The expected ultimate claim and defense costs for coverage year i is calculated by the formula:

$$\mathbf{C}_{iI} = C_{i,I+1-i} \times \mathbf{f}_{I+1-i} \times \mathbf{f}_{I-1},$$

where $2 \leq i \leq I$ and \mathbf{f}_k are the observed volume weighted ATA factors from maturity k to $k+1$ for $1 \leq k \leq I-1$. Notice the bolded figure \mathbf{C}_{iI} that represents an estimate of the ultimate claim and defense costs for coverage year i employing historical ATA factors \mathbf{f}_k for $1 \leq k \leq I-1$. The true value of the ultimate claim and defense costs for coverage year I is denoted by C_{iI} and depends on the actual ATA factors f_k whose values are currently unknown.

There are three major assumptions that form the base of this paper:

1. $E\left(\frac{C_{i,k+1}}{C_{i,k}} / C_{iI}, \dots, C_{iI}\right) = f_k$ for $1 \leq i \leq I$ and $1 \leq k \leq I-1$, i.e. the expected value of the ATA development factor $\frac{C_{i,k+1}}{C_{i,k}}$ equals f_k , where f_k is the unknown “true” development

factor which is the same for all coverage years. Moreover the ATA development factor $\frac{C_{i,k+1}}{C_{i,k}}$ equals f_k irrespective of the prior development C_{i1}, \dots, C_{ik} .

2. The variables $\{C_{i1}, \dots, C_{iI}\}$ and $\{C_{j1}, \dots, C_{jI}\}$ for different coverage years $i \neq j$ are independent, i.e. the loss payments in a coverage year are independent from the claim and defense costs payments in another coverage year. Under this assumption the ATA estimators f_k are unbiased i.e. $E(f_k) = f_k$.
3. The third major assumption of the paper satisfies the principle of the theory of point estimation that among all the unbiased estimators of the ATA development factors, preference should be given to the one with the smallest variance. In the notation of the paper this principle can be restated as:

$$\text{Var}(C_{j,k+1} / C_{j1}, \dots, C_{jk}) = C_{jk} \times \alpha_k^2, \text{ where } 1 \leq j \leq I, 1 \leq k \leq I-1$$

with unknown proportionality constants α_k^2 for $1 \leq k \leq I-1$.

It is obvious that assumptions (2) and (3) are not met for every development triangle. For example, calendar effects such as inflation could affect the claim and defense costs payments in all coverage years such that assumption (2) will not be satisfied.

With the help of the previous stated assumptions, the Mack method calculates the mean squared error (mse) of the ultimate claim and defense costs for coverage year i . This mse of the ultimate claim and defense costs is defined as:

$$\text{mse}(C_{iI}) = E[(C_{iI} - \mathbf{C}_{iI})^2 / C_{ik} \text{ for } i+k \leq I+1].$$

It can easily be shown that the mse of the ultimate claim and defense costs and the liabilities for a particular coverage year i are equal, i.e. $\text{mse}(C_{iI}) = \text{mse}(\mathbf{R}_i)$. The square root of the mean squared error of the liabilities is called the standard error (s.e.) of the liabilities. Based on the previously stated assumptions the standard error of the liabilities is calculated for every coverage year i , $\text{s.e.}(\mathbf{R}_i)$, and for all coverage years combined, $\text{s.e.}(\mathbf{R})$. The formulas are as follows:

$$(\text{s.e.}(C_{iI}))^2 = C_{iI}^2 \sum_{k=I+1-i}^{I-1} \frac{a_k^2}{f_k^2} \left(\frac{1}{C_{ik}} + \frac{1}{\sum_{j=1}^{I-k} C_{jk}} \right)$$

and

$$(\text{s.e.}(\mathbf{R}))^2 = \sum_{i=2}^I \left\{ (\text{s.e.}(\mathbf{R}_i))^2 + C_{iI} \left(\sum_{j=i+1}^I C_{jI} \right) \sum_{k=I+1-i}^{I-1} \frac{2a_k^2 / f_k^2}{\sum_{n=1}^{I-k} C_{nk}} \right\},$$

where:

$$a_k^2 = \frac{1}{I-k-1} \sum_{J=1}^{I-k} C_{Jk} \left(\frac{C_{J,k+1}}{C_{Jk}} - f_k \right)^2, 1 \leq k \leq I-2.$$

The data employed by both of the reserve volatility methods are paid claim and defense cost triangles, taken from each company group's Schedule P, Part 3.

In our initial analysis, we observed that the resulting risk margins from both of the above methods were greatly affected by the existence of any paid loss age-to-age development factor outliers. We tried to avoid these outliers by limiting the paid loss development factors, at each maturity, to one standard deviation around the all year average development factor.

Step 4 — Reserve Market Risk Margins

Both of the methods described above produce an estimated probability distribution for the claim and defense cost liabilities for each company group at each year end. These distributions reflect both the uncertainty as to the amount and timing of the future settlement payments. Both are adjusted to a present value basis, using the risk-free rates described earlier.

From these distributions, it is a simple step to calculate the amount of reserve risk and the reserve market risk margin. To be consistent with the measurement of pricing risk, the coefficient of variation of the claim and defense cost liability distribution is used. The coefficient of variation is multiplied by the margin per unit of risk to produce the appropriate reserve market risk margin.

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Personal Auto Liability Composite
Direct Income Statement and Selected Balance Sheet Items on a Statutory Basis
(\$000,000 omitted)

<i>Component of P/C Income</i>	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Premiums Written	33,760	36,336	38,815	40,926	42,962	44,426	43,866	43,364	42,960	46,997	53,477
Premiums Earned	32,954	35,448	38,017	40,263	42,291	44,048	43,881	43,200	43,533	46,012	51,631
Losses Incurred	23,971	25,192	27,112	27,296	26,789	26,321	26,924	29,009	32,422	35,139	37,745
Defense Expense Incurred	1,579	1,651	1,566	1,404	1,392	1,662	2,324	2,298	2,323	2,191	2,335
Adjusting Expense Incurred	2,868	3,128	3,263	3,705	4,141	4,477	4,821	4,777	4,840	4,998	5,468
<i>Subtotal Loss and LAE Incurred</i>	28,417	29,970	31,940	32,405	32,322	32,460	34,069	36,084	39,585	42,329	45,547
Other Underwriting Expense Incurred											
Commission and Brokerage	2,134	1,947	2,040	2,135	3,153	3,463	3,398	3,355	3,304	3,573	4,059
Other Acquisition	2,597	2,976	3,115	3,582	2,849	3,068	3,285	3,365	3,478	3,376	4,040
Taxes, Licenses and Fees	1,050	877	844	945	1,008	1,064	946	936	920	1,078	1,253
General Expenses	1,122	1,351	1,443	1,449	1,540	1,877	2,021	2,238	2,256	2,407	2,425
<i>Subtotal Other Underwriting Expenses</i>	6,903	7,151	7,441	8,111	8,549	9,471	9,650	9,894	9,958	10,435	11,777
<i>Total Underwriting Gains (Losses)</i>	(2,367)	(1,673)	(1,365)	(253)	1,420	2,118	162	(2,777)	(6,011)	(6,752)	(5,693)
Balance Sheet Items											
Agents' Balances	3,586	4,312	4,919	5,525	6,042	6,371	6,370	8,010	7,183	7,869	8,821
Unearned Premium Reserve	9,974	10,854	11,653	12,323	12,995	13,377	13,363	13,525	12,952	13,938	15,784
Loss Reserves	33,552	35,211	37,264	38,706	39,458	38,915	38,223	38,150	39,356	41,523	44,807
Defense Expense Reserves	4,609	4,912	5,114	5,133	4,997	4,955	5,162	5,486	5,762	5,870	6,042
Adjusting Expense Reserves	2,001	2,306	2,414	2,602	2,936	3,177	3,242	3,565	3,681	3,550	3,760

Workers Compensation Composite
Direct Income Statement and Selected Balance Sheet Items on a Statutory Basis
(\$000,000 omitted)

Component of P/C Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Premiums Written	7,820	7,879	7,239	6,802	6,491	6,051	6,098	6,015	6,731	7,562	8,021
Premiums Earned	8,171	7,918	7,319	6,896	6,502	6,139	6,092	5,997	6,460	7,238	7,752
Losses Incurred	6,589	5,243	4,330	3,804	3,555	3,394	3,382	4,255	4,470	6,098	5,716
Defense Expense Incurred	506	501	439	345	341	326	337	536	534	191	552
Adjusting Expense Incurred	419	394	372	432	460	402	503	505	541	495	447
Subtotal Loss and LAE Incurred	7,514	6,138	5,141	4,582	4,356	4,122	4,222	5,296	5,545	6,784	6,715
Other Underwriting Expense Incurred											
Commission and Brokerage	413	407	410	424	416	426	472	463	500	574	602
Other Acquisition	295	292	279	311	305	314	323	360	378	412	423
Taxes, Licenses and Fees	306	288	282	257	214	237	249	247	250	287	345
General Expenses	461	500	492	511	512	495	534	564	594	612	565
Subtotal Other Underwriting Expenses	1,475	1,487	1,463	1,503	1,447	1,472	1,578	1,634	1,723	1,884	1,935
Total Underwriting Gains (Losses)	(819)	293	716	811	700	546	293	(933)	(808)	(1,429)	(897)
Balance Sheet Items											
Agents' Balances	1,960	2,127	2,194	1,762	1,766	1,720	1,838	1,770	1,954	2,133	2,013
Unearned Premium Reserve	2,015	1,980	1,900	1,805	1,832	1,777	1,781	1,799	2,073	2,378	2,646
Loss Reserves	17,514	17,781	17,477	17,176	16,916	16,595	16,492	16,638	16,624	18,029	18,960
Defense Expense Reserves	1,368	1,453	1,469	1,452	1,440	1,429	1,445	1,628	1,790	1,561	1,737
Adjusting Expense Reserves	627	701	706	748	805	769	820	852	890	891	818

Medical Malpractice Professional Liability Composite
Direct Income Statement and Selected Balance Sheet Items on a Statutory Basis

(\$000,000 omitted)

Component of P/C Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Premiums Written	2,293	2,401	2,734	2,812	2,744	2,637	2,997	3,143	3,270	3,961	4,445
Premiums Earned	2,291	2,353	2,635	2,764	2,736	2,697	3,072	3,153	3,275	3,717	4,389
Losses Incurred	1,967	1,514	1,533	1,326	1,567	1,095	1,800	2,090	2,641	3,748	4,313
Defense Expense Incurred	686	602	554	667	644	744	665	876	833	1,091	1,309
Adjusting Expense Incurred	109	111	58	126	112	122	210	168	180	240	210
Subtotal Loss and LAE Incurred	2,762	2,227	2,144	2,120	2,322	1,960	2,675	3,133	3,654	5,079	5,832
Other Underwriting Expense Incurred											
Commission and Brokerage	102	95	104	119	117	113	146	158	177	236	253
Other Acquisition	49	58	55	53	77	87	108	122	127	110	114
Taxes, Licenses and Fees	51	56	62	64	55	59	73	73	80	90	97
General Expenses	116	134	157	180	158	170	199	218	209	250	239
Subtotal Other Underwriting Expenses	318	344	378	415	406	429	526	571	592	686	703
Total Underwriting Gains (Losses)	(790)	(217)	113	229	7	308	(129)	(551)	(972)	(2,048)	(2,147)
Balance Sheet Items											
Agents' Balances	552	527	541	650	666	663	619	687	716	992	1,019
Unearned Premium Reserve	1,278	1,369	1,468	1,519	1,525	1,468	1,512	1,498	1,517	1,758	1,917
Loss Reserves	9,861	10,105	10,359	10,416	10,566	10,154	10,851	10,799	10,851	11,619	12,674
Defense Expense Reserves	2,405	2,484	2,509	2,711	2,768	2,908	3,015	3,071	2,953	3,098	3,270
Adjusting Expense Reserves	450	467	406	397	400	405	457	414	470	448	416

Exhibit 8.1.5-A

Personal Auto Liability Composite
Direct Income Statement and Selected Balance Sheet Items on a GAAP Basis
(\$000,000 omitted)

Component of P/C Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Premiums Written	33,760	36,336	38,815	40,926	42,962	44,426	43,866	43,364	42,960	46,997	53,477
Premiums Earned	32,954	35,448	38,017	40,263	42,291	44,048	43,881	43,200	43,533	46,012	51,631
Loss Incurred	23,971	25,192	27,112	27,296	26,789	26,321	26,924	29,009	32,422	35,139	37,745
Defense Expense Incurred	1,579	1,651	1,566	1,404	1,392	1,662	2,324	2,298	2,323	2,191	2,335
Adjusting Expense Incurred	2,868	3,128	3,263	3,705	4,141	4,477	4,821	4,777	4,840	4,998	5,468
Subtotal Loss and LAE	28,417	29,970	31,940	32,405	32,322	32,460	34,069	36,084	39,585	42,329	45,547
Other Underwriting Expense Incurred											
Commission and Brokerage	2,134	1,947	2,040	2,135	3,153	3,463	3,398	3,355	3,304	3,573	4,059
Other Acquisition	2,597	2,976	3,115	3,582	2,849	3,068	3,285	3,365	3,478	3,376	4,040
Taxes, Licenses and Fees	1,050	877	844	945	1,008	1,064	946	936	920	1,078	1,253
General Expenses	1,122	1,351	1,443	1,449	1,540	1,877	2,021	2,238	2,256	2,407	2,425
Change in DPAC	163	55	101	195	108	165	37	29	(54)	78	370
Subtotal Other Underwriting Expenses	6,740	7,095	7,340	7,917	8,441	9,306	9,614	9,865	10,012	10,356	11,406
Total Underwriting Gains (Losses)	(2,203)	(1,617)	(1,264)	(59)	1,528	2,283	198	(2,748)	(6,065)	(6,673)	(5,323)
Balance Sheet Items											
Agents' Balances	3,586	4,312	4,919	5,525	6,042	6,371	6,370	8,010	7,183	7,869	8,821
Unearned Premium Reserve	9,974	10,854	11,653	12,323	12,995	13,377	13,363	13,525	12,952	13,938	15,784
Loss Reserves	33,552	35,211	37,264	38,706	39,458	38,915	38,223	38,150	39,356	41,523	44,807
Defense Expense Reserves	4,609	4,912	5,114	5,133	4,997	4,955	5,162	5,486	5,762	5,870	6,042
Adjusting Expense Reserves	2,001	2,306	2,414	2,602	2,936	3,177	3,242	3,565	3,681	3,550	3,760

**Workers Compensation Composite
Direct Income Statement and Selected Balance Sheet Items on a GAAP Basis**

(\$000,000 omitted)

Component of P/C Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Premiums Written	7,820	7,879	7,239	6,802	6,491	6,051	6,098	6,015	6,731	7,562	8,021
Premiums Earned	8,171	7,918	7,319	6,896	6,502	6,139	6,092	5,997	6,460	7,238	7,752
Loss Incurred	6,589	5,243	4,330	3,804	3,555	3,394	3,382	4,255	4,470	6,098	5,716
Defense Expense Incurred	506	501	439	345	341	326	337	536	534	191	552
Adjusting Expense Incurred	419	394	372	432	460	402	503	505	541	495	447
Subtotal Loss and LAE	7,514	6,138	5,141	4,582	4,356	4,122	4,222	5,296	5,545	6,784	6,715
Other Underwriting Expense Incurred											
Commission and Brokerage	413	407	410	424	416	426	472	463	500	574	602
Other Acquisition	295	292	279	311	305	314	323	360	378	412	423
Taxes, Licenses and Fees	306	288	282	257	214	237	249	247	250	287	345
General Expenses	461	500	492	511	512	495	534	564	594	612	565
Change in DPAC	(39)	(6)	6	9	(10)	22	14	8	15	43	51
Subtotal Other Underwriting Expenses	1,514	1,493	1,456	1,494	1,457	1,450	1,564	1,626	1,708	1,841	1,884
Total Underwriting Gains (Losses)	(858)	287	722	820	689	568	307	(925)	(793)	(1,387)	(846)
Balance Sheet Items											
Agents' Balances	1,960	2,127	2,194	1,762	1,766	1,720	1,838	1,770	1,954	2,133	2,013
Unearned Premium Reserve	2,015	1,980	1,900	1,805	1,832	1,777	1,781	1,799	2,073	2,378	2,646
Loss Reserves	17,514	17,781	17,477	17,176	16,916	16,595	16,492	16,638	16,624	18,029	18,960
Defense Expense Reserves	1,368	1,453	1,469	1,452	1,440	1,429	1,445	1,628	1,790	1,561	1,737
Adjusting Expense Reserves	627	701	706	748	805	769	820	852	890	891	818

Medical Malpractice Professional Liability Composite
Direct Income Statement and Selected Balance Sheet Items on a GAAP Basis
(\$000,000 omitted)

Exhibit 8.1.4-C

Component of P/C Income	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Premiums Written	2,293	2,401	2,734	2,812	2,744	2,637	2,997	3,143	3,270	3,961	4,445
Premiums Earned	2,291	2,353	2,635	2,764	2,736	2,697	3,072	3,153	3,275	3,717	4,389
Loss Incurred	1,967	1,514	1,533	1,326	1,567	1,095	1,800	2,090	2,641	3,748	4,313
Defense Expense Incurred	686	602	554	667	644	744	665	876	833	1,091	1,309
Adjusting Expense Incurred	109	111	58	126	112	122	210	168	180	240	210
Subtotal Loss and LAE Incurred	2,762	2,227	2,144	2,120	2,322	1,960	2,675	3,133	3,654	5,079	5,832
Other Underwriting Expense Incurred											
Commission and Brokerage	102	95	104	119	117	113	146	158	177	236	253
Other Acquisition	49	58	55	53	77	87	108	122	127	110	114
Taxes, Licenses and Fees	51	56	62	64	55	59	73	73	80	90	97
General Expenses	116	134	157	180	158	170	199	218	209	250	239
Change in DPAC	(5)	4	5	15	20	9	9	(6)	6	13	(4)
Subtotal Other Underwriting Expenses	323	339	373	400	386	420	517	576	586	673	707
Total Underwriting Gains (Losses)	(795)	380	661	881	631	1,043	527	331	(145)	(970)	(834)
Balance Sheet Items											
Agents' Balances	552	527	541	650	666	663	619	687	716	992	1,019
Unearned Premium Reserve	1,278	1,369	1,468	1,519	1,525	1,468	1,512	1,498	1,517	1,758	1,917
Loss Reserves	9,861	10,105	10,359	10,416	10,566	10,154	10,851	10,799	10,851	11,619	12,674
Defense Expense Reserves	2,405	2,484	2,509	2,711	2,768	2,908	3,015	3,071	2,953	3,098	3,270
Adjusting Expense Reserves	450	467	406	397	400	405	457	414	470	448	416