

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>			<i>Exhibit 8.1.1-A</i>	
<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.

Non-Tabular Reserve Discounting												Exhibit 8.1.3	
Amount of Reported Discount as Percentage of Held Reserves													
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:

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

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.

8.4 Bibliography

Research Papers

American Council of Life Insurers & International Actuarial Association, *Second Report on the ACLI/LAA Joint Research Project Concerning the Potential Interaction of Methods of Asset Measurement under LAS 32/39 with Various Liability Measurement Methods and the Effect of this Interaction on the Financial Statements of Life Insurers* (ACLI / IAA, June 2003).

American Academy of Actuaries, *Public Policy Monograph: Fair Valuation of Insurance Liabilities: Principles and Methods* (AAA, September 2002).

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

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

Dickenson, Jerry, "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).

Lowe, Stephen, "GAAP and the Casualty Actuary", *CAS Forum* (1989).

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

Accounting Standards

Financial Accounting Standards Board of the Financial Accounting Foundation, Statement of Financial Accounting Concepts No. 7, "Using Cash Flow Information and Present Value in Accounting Measurements" (February 2000).

Financial Accounting Standards Board of the Financial Accounting Foundation, Statement No. 115 "Accounting for Certain Investments in Debt and Equity Securities" (May 1993).

Financial Accounting Standards Board of the Financial Accounting Foundation, Project Update: Fair Value Measurement (October 2003).

International Accounting Standards Committee Foundation, IAS 32: Financial Instruments: Disclosure and Presentation.

International Accounting Standards Committee Foundation, IAS 39: Financial Instruments: Recognition and Measurement.

International Accounting Standards Committee Foundation, IAS 40: Investment Property.

International Accounting Standards Committee Foundation, "Insurance Contracts (Phase I)" (August 13, 2003).

International Accounting Standards Committee Foundation, "Insurance Contracts (Phase II)" (July 11, 2003).

International Accounting Standards Committee Foundation, "Draft Statement of Principles", EDO 5.

Public Data Referenced

A.M. Best Company, *Best Insurance Reports*, 1992-2002.

Personal Auto 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	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
Subtotal Loss and LAE Incurred	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
Subtotal Other Underwriting Expenses	6,903	7,151	7,441	8,111	8,549	9,471	9,650	9,894	9,958	10,435	11,777
Total Underwriting Gains (Losses)	(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**

Exhibit 8.1.4-C

(\$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
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