



BALANCING RISK AND GROWTH
IN A CHANGING MARKET
ANNUAL STATISTICAL REVIEW

INSURANCE RISK
BENCHMARKS RESEARCH
OCTOBER 2016
GUY CARPENTER STRATEGIC ADVISORY

ON THE COVER

This image of the continental United States at night is a composite assembled from data acquired by the Suomi NPP satellite in April and October 2012. Image Source: NASA Earth Observatory, in partnership with NOAA & The Department of Defense.

For more information and detail on this research, please contact us at riskbenchmarks@guycarp.com

TABLE OF CONTENTS

Introduction	2	IV Uncertain Liability Duration	51
Executive Summary	4	4.1 Introduction	51
I Overview	8	4.2 Mean Payment Pattern and Volatility	52
1.1 Introduction to the Annual Statistical Review (ASR)	8	V Correlation Concerns	54
1.2 Calculation Notes and Limitations	10	5.1 Introduction	54
1.3 Lines of Business Mapping for Expenses	11	5.2 Correlation in Ultimate Loss Ratio	55
1.4 Market Segmentation	13	5.3 Importance of Premium Volume	56
1.5 Tables and Exhibits Inventory	16	VI Expense Benchmarking	59
II Underwriting Performance & Volatility	17	6.1 Introduction	59
2.1 Introduction	17	6.2 Expense Ratios by Line of Business	60
2.2 Current and Long Term Loss Ratios	18	6.3 Expense Trends	61
2.3 Charting the Underwriting Cycle	19	VII Financial Management & Strategy	64
2.4 Competitive Differentiation	23	7.1 Introduction	64
2.5 Market Competitive Dynamics	30	7.2 Industry Operating Performance	65
2.6 Premium Trends	32	7.3 Industry Balance Sheet	66
2.7 Volatility Impact of Ceded Reinsurance	35	7.4 Charting Policyholder Surplus	68
2.8 Frequency and Severity Trends	40	7.5 Industry Asset Profile	73
III Reserve Development Risk	42	Appendix	75
3.1 Introduction	42	A.1. Risk Benchmarks Supplement	76
3.2 Industry Risk in Total	43	A.2 This Year's Contributors	77
3.3 Risk by Line of Business	47	A.3 Guy Carpenter Solutions	78
3.4 Risk by Market Segment	49		



INTRODUCTION

As the insurance market faces unprecedented change and evolution, insurers require access to accurate, unbiased data for strategic decision-making. Current challenging conditions have made it increasingly difficult for companies to grow profitably. Guy Carpenter provides unparalleled expertise and counsel to clients in this rapidly changing global environment to manage challenges and seize opportunities. *The Risk Benchmarks Research Annual Statistical Review* highlights critical findings of our six year research initiative.



Guy Carpenter's Risk Benchmarks Research is the most comprehensive research project in the industry, representing over thirty years of property/casualty (P&C) insurance statutory financial data from more than a thousand companies. The study's purpose is to provide an unmatched source of unbiased financial data to help industry leaders and practitioners better understand the changes and evolution within the sector. In turn, this helps clients better understand reserve volatility, efficiently manage expenses, monitor pricing cycles more accurately and better segment the marketplace to grow profitably.

Through our research we found some noteworthy results: Less than 40 percent of insurers reported an underwriting profit over the last five accident years. In 2015, industry net surplus growth was flat, while booked loss reserves grew by three percent, reversing a six year trend of robust surplus growth and reserve growth below one percent per year. We also discovered that in 2014-2015 the gap in loss ratio performance between the best and worst underwriters widened. This is significant because historically in periods of declining loss ratios, the gap between the best and worst market performers narrowed as rates rose across the board; whereas in periods preceding an increase in industry loss ratios, there was a widening gap in the performance of top and bottom performers as we see today.

The results of the Risk Benchmarks Research are presented in threefold:

1. **Annual Statistical Review:** An industry-wide overview of the Risk Benchmarks Research is presented in this report. It is a summary of the most popular industry statistics.
2. **The Risk Benchmarks Statistical Supplement:** A more detailed collection of industry trend data. It provides state and market segment level data, and is geared for actuaries and capital modelers. (Available to clients upon request)
3. **BenchmaRQ® Advisory Services:** Through our Strategic Advisory® practice we provide custom analysis utilizing data and information from the Risk Benchmarks Research.

We hope you find the attached Annual Statistical Review insightful and encourage you to further explore our analysis through the Risk Benchmarks Statistical Supplement and BenchmaRQ Advisory service. We encourage feedback and value our collaborative client partnerships.

Best regards,

A handwritten signature in black ink that reads "Timothy R Gardner". The signature is written in a cursive, flowing style.

Timothy Gardner

CEO of US Operations of Guy Carpenter & Company, LLP

EXECUTIVE SUMMARY

The fundamental economics of the P&C insurance business are easy to understand but extremely difficult to execute. Similarly, the basic formula for insurance profitability has not changed in over 150 years, but the factors driving industry performance continually evolve. It is important for insurance leaders and practitioners to stay abreast of these changes in order to continue to grow profitably.

Guy Carpenter has dedicated the past six years to the Risk Benchmarks Research Study initiative, which provides the industry with the financial data and information necessary for important strategic growth decision making. This study is the most inclusive collection of unbiased U.S. insurance statutory financial data in the sector.

Profitability in P&C companies is demonstrated in three key metrics – underwriting margin, investment yield and operating leverage. In today's changing market environment all three of these areas face challenges, and companies have responded by refining their strategies. Based on more than 30 years' data, Guy Carpenter's research findings identified three key elements of profitability:

Underwriting Margin

- Fewer than 40 of the top 100 underwriters industry wide reported a positive underwriting profit over the last five accident years, while favorable development on prior period reserves have all but disappeared.
- The general liability occurrence and special property lines of business provide carriers the highest underwriting margin compared to other lines due to benign loss cost trends and subdued catastrophe activity.
- Personal auto recorded the lowest volatility of all lines, while homeowners, medical and products liability have exhibited among the highest.
- Medical malpractice and other commercial casualty lines provide carriers the greatest ability to differentiate on underwriting excellence, while workers compensation and personal lines have the most homogeneous results among carriers.
- In a low yield environment underwriting discipline is more important than ever and the industry was able to achieve a third straight year of net underwriting gain. Prior to 2013 the industry had only recorded an underwriting gain in four of the preceding 17 years.

Investments

- Companies have responded to the persistently low interest rate environment by shedding U.S. Treasury Bonds and municipal bonds in favor of riskier corporate bonds, equities and alternative investments.
- Companies have shortened their fixed income portfolio durations by two years in the past decade to reduce interest rate risk although the persistent steepness in the yield curve has benefited companies who have stayed with longer duration bonds.
- Larger carriers have achieved the best asset returns throughout the cycle due to their ability to leverage their larger balance sheets and higher allocation of equity and alternative investments.
- The industry's realized investment yield has fallen from over five percent in 2007 to below four percent in 2015, and continues to fall as new money yield remains far below that of maturing assets.

Operating Leverage

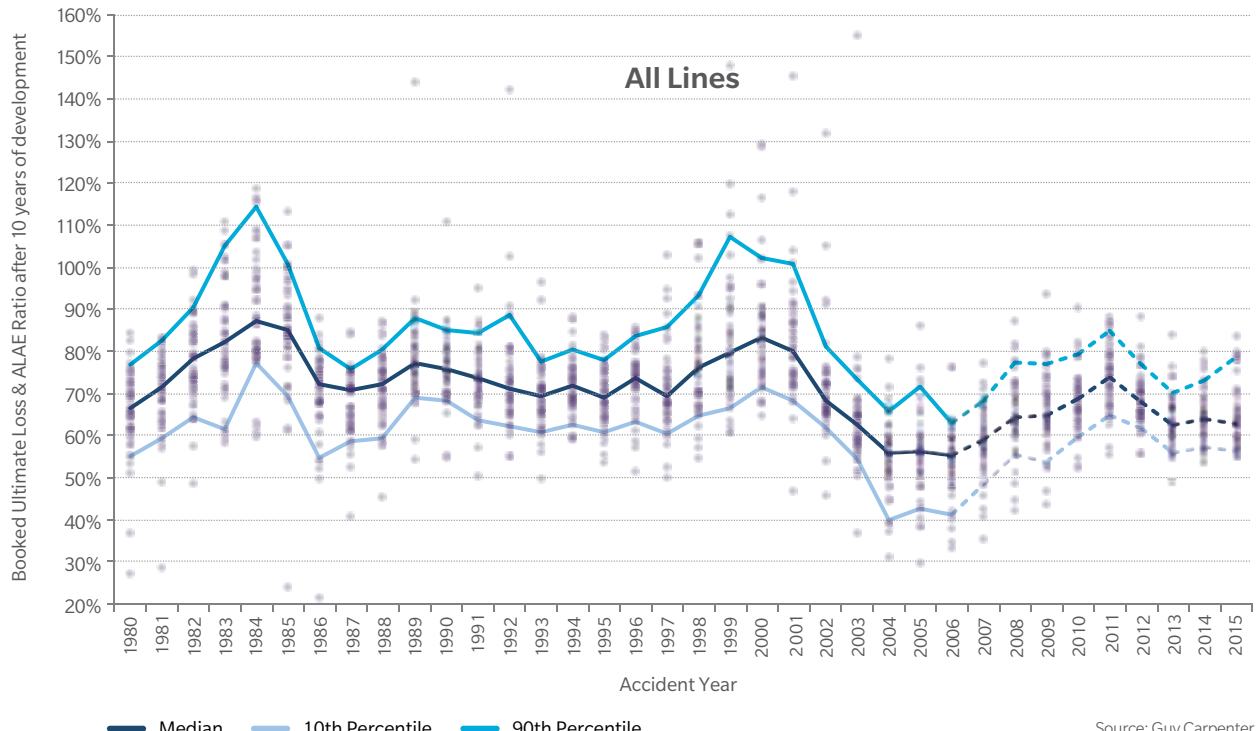
- The average operating leverage (cash & investible assets/policyholders surplus (PHS)) for the U.S. P&C industry declined from 2.8 in 2002 to 2.2 in 2013, where it has remained. The drop was due to industry surplus growing at a rate faster than premium.
- Publicly traded companies have returned the majority of their earnings to shareholders over the past several years; total surplus for these companies has actually declined slightly from USD 335 billion in 2013 to USD 333 billion in 2015.
- Mutual companies have earned a lower return on surplus but have grown their balance sheets more quickly due to retained earnings.
- In 2015 the industry reversed a six-year trend of industry surplus growth outpacing reserve growth – from 2009 to 2014 industry surplus grew at a compound annual rate of seven percent while reserves grew at a one percent annual rate. In 2015, industry surplus was flat, while reserves grew three percent. Historically, reserve growth has been strongest during hardening markets while drops in market surplus have coincided with either catastrophe events or troughs in past underwriting cycles.

Loss Ratio Trends

In addition to managing the return dynamics highlighted above, insurance companies must be cognizant of risk. Insurers face intense competition, regulatory uncertainty, volatile financial markets and a constant threat of unexpected adverse claim activity. To succeed, insurers need to understand and frequently quantify the risks inherent in their business. The graphic below explores loss ratio performance, a measure of risk, for the median, top ten percent and bottom ten percent performers in the industry.

- At the median range of the industry, Exhibit E1 shows recent accident year loss ratios at near generational lows, only matched by the 2004 to 2006 casualty hard market. Additionally, we see that in markets with falling loss ratios (1984-1986, 2000-2004 and 2011-2013) the gap between the best and worst performers narrows as rates rise. For years preceding a cyclical increase in industry loss ratios (1980-1984 and 1996-1998) there is a widening of the gap in performance between the best and worst performers in the industry. In a difficult underwriting environment companies with faster growth or looser underwriting guidelines tend to be disproportionately impacted. Even as industry median loss ratios stayed flat from 2014 to 2015 we see the divergence between the best and worst carriers widen. This is a trend that merits close watching, and may be an early indication of a cyclical shift in market condition.

E1 | ULTIMATE LOSS RATIO FOR ALL LINES COMBINED, WITH PERCENTILES
 Net of reinsurance, accident years 1980 to 2015, all ten-year Schedule P lines combined



Source: Guy Carpenter

Premium and Expense Trends

The composition of industry premium has changed fairly dramatically in recent decades. Homeowners has been the fastest growing line because of rapid exposure growth in catastrophe-prone areas. Recent winter storm and convective storm activity has caused some states – Maine, Rhode Island, Illinois, Michigan and Wisconsin – to be among the fastest growing states in direct written premium per capita in 2015. A 2015 slowdown in the energy sector reduced exposures and premium in energy dependent states – Arkansas, North Dakota, South Dakota, Oklahoma, Louisiana and Texas. Workers compensation has been the slowest growing line as the profile of the U.S. workforce has shifted away from higher risk hazard classes.

Over the past 20 years exponential growth in advertising spending has occurred in the industry, particularly among top 25 personal lines carriers. Large personal lines writers' advertising spending has grown from one percent of overall expense to almost five percent in less than 20 years as companies compete for brand recognition in the competitive direct-to-consumer channel.

These insights and many others await readers of the 2016 Annual Statistical Review. For readers seeking additional detail we have produced an accompanying Risk Benchmarks Supplement that contains expanded segment level tables and graphs.

This report is available upon request from Guy Carpenter by e-mailing RiskBenchmarks@guycarp.com.

WHAT'S NEW FOR OUR READERSHIP

The Risk Benchmarks Research has three intended audiences:

- 1. Capital Modeling Practitioners** who turn to the ASR or Risk Benchmarks Compendium for context in parameterizing risk. These readers will be interested in the addition of statistics for nine new market segments (Reciprocal/RRG, Northeast Personal Lines, Large Commercial, Small Commercial, Large Personal, Small Personal, Florida Property, California Workers Compensation, Non-standard Auto). They will also benefit from the value of additional company level volatility statistics for both reserving and underwriting risk.
- 2. Industry Analysts** who study the insurance market and identify drivers of future performance and differentiation in company risk/return profile. These readers will find value in the expanded competitive dynamics section that presents a market concentration analysis by line of business and by state over time.
- 3. Company Stakeholders** who make decisions about their company's strategy and future operating plan. These readers may find the newly introduced market analysis by state and the volatility impact of ceded reinsurance strategy to be of most interest.

To our entire readership - we encourage you to enjoy the analysis presented herein, and to please provide your own thoughts and ideas by emailing RiskBenchmarks@guycarp.com.

I. OVERVIEW

1.1 INTRODUCTION TO THE ANNUAL STATISTICAL REVIEW (ASR)

The Annual Statistical Review or ASR is a result of Guy Carpenter's broader ongoing Insurance Risk Benchmarks research project. Over the past six years, Guy Carpenter has constructed and refined a comprehensive database of statutory financial data for the entire P&C insurance industry. The database informs this report and the firm's BenchmaRQ[®] capital modeling advisory service (see Section A.2 of the Appendix for a description).

Certain irregularities can be found in the statutory loss history for individual companies. These irregularities may stem from mergers and acquisitions or simple data error. Each year, Guy Carpenter thoroughly detects and corrects these irregularities to ensure that our empirical view of industry risk is accurate.

Guiding Principle to the Risk Benchmarks

The risk benchmarks are based on more than thirty years of financial results for 1,095 companies. The data is presented in its original form without manipulations or estimates from applied models. The ASR is intended to provide a pure snapshot of the observed risk.

Our Extensive Database

Our database contains Schedule P filings from 1989 to 2015 with experience back to Accident Year 1980. The statistics represent approximately 96 percent of the industry. 291 companies are excluded because they are not allocated to any of the market segments in the ASR due to lack of credible loss history or a risk profile not consistent with one of the defined market segments (as discussed in Section 1.4).

General Line of Business Definitions

Lines of business are associated with the following Annual Statement Schedule P definitions and presented with the following acronyms:

T1 | LINE OF BUSINESS ACRONYMS AND INDUSTRYWIDE PREMIUMS (THOUSANDS)

Sched P Letter	ASR Acronym	Analyzed	Data Since	Full Description	2015 DWP	Percent of Industry
A	HO	Yes	1981	Homeowners/Farmowners	91,590,800	16.3%
B	PPA	Yes	1981	Private Passenger Auto Liability	118,915,728	21.2%
C	CAL	Yes	1980	Commercial Auto Liability	22,642,632	4.0%
D	WC	Yes	1980	Workers Compensation	52,921,666	9.4%
E	CMP	Yes	1980	Commercial Multiple Peril	37,751,591	6.7%
F1	MPLO	Yes	1980	Medical Professional Liability (Occurrence)	2,357,188	0.4%
F2	MPLC	Yes	1984	Medical Professional Liability (Claims Made)	6,726,749	1.2%
G	SL	Yes	1987	Special Liability	6,413,473	1.1%
H1	GLO	Yes	1980	General Liability (Occurrence)	36,782,511	6.6%
H2	GLC	Yes	1987	General Liability (Claims Made)	17,646,474	3.1%
I	SP	Yes	1997	Special Property	53,672,092	9.6%
J	APD	Yes	1997	Auto Physical Damage	86,611,345	15.5%
K	FS	Yes	1997	Fidelity and Surety	6,435,334	1.1%
L				Other Including Credit Accident Health	8,093,834	1.4%
M				International	69,853	0.0%
N				Reinsurance Nonproportional Assumed Property	-	0.0%
O				Reinsurance Nonproportional Assumed Liability	-	0.0%
P				Reinsurance Nonproportional Assumed Financial	-	0.0%
R1	PLO	Yes	1982	Products Liability (Occurrence)	2,999,763	0.5%
R2	PLC	Yes	1987	Products Liability (Claims Made)	492,815	0.1%
S				Financial Mortgage Guaranty	5,413,536	1.0%
T				Warranty	2,783,764	0.5%
Analyzed Lines					543,960,161	97.1%
All Lines					560,321,148	100.0%

Source: Guy Carpenter

1.2 CALCULATION NOTES AND LIMITATIONS

The following notes provide information about the calculations in this report.

Net/Gross of Reinsurance: The risk benchmarks are calculated using data net of reinsurance. Certain statistics presented in the report are available gross of reinsurance upon request.

Reserve Adequacy: The risk benchmarks are based on the carried reserves as found in the financial statements. We have made no attempt to assess the potential redundancy or deficiency in carried amounts.

Ultimate Reserve Risk: Our view of ultimate reserve risk is limited to ten years of development for an accident year (AY). The duration and reserve risk for very long-tailed lines of business such as workers compensation must be reviewed with this caveat. The metrics on ultimate reserve risk are based on Accident Years 1980 to 2006 because these years are considered to be “fully developed.”

Definition of Loss: In this report we use the term “loss” to mean loss and allocated loss adjustment expense, also known as defense and cost containment expense.

Pearson’s Correlation Coefficient: Pearson’s correlation coefficients (the linear correlation) are applied in this report. Other measures of correlation are available upon request.

Correlation Matrices: The correlation matrices for the industry and for the market segments include coefficients that are stronger than those of an individual company’s expected experience – necessary because an individual company experiences more noise, or “process risk.” The observed historic correlation between two lines of business for an individual company can be modeled as a function of that company’s premium volume in each line of business. This year’s Correlations Concerns section provides practical guidance on the range of correlation an individual company can expect to experience as a function of its premium size by line of business. Additionally, in the Risk Benchmarks Supplement individual company level correlation matrices can be found by market segment.

Payment Patterns Beyond Ten Years: To measure duration, we assume that carried reserves are exactly adequate and that the incremental payment as a percentage of ultimate in the tenth payment period will repeat until either the ultimate loss burden is satisfied or the fifteenth year, whichever is earlier. In the event that the total losses are not fully disbursed by the fifteenth year under this projection, we assume that the entire remaining amount is then paid in the fifteenth year. Note that this methodology is consistent with the U.S. Internal Revenue Service method for discounting loss reserves, found in the Internal Revenue Code §§ 846(d)(3)(C) and (D), “Special rule for certain long-tail lines.”

Autocorrelation: The series of single-year reserve development percentages exhibits a strong autocorrelation. By applying autoregressive integrated moving average (ARIMA) modeling to these time series, we estimate that 25 percent to 90 percent (depending on segment) of the volatility shown in industry underwriting results is explained by the cycle.

Length of Loss History: Special Cases: For most lines of business, the data set begins in accident year 1980. For products liability, reporting as a line separate from general liability began in 1982. Reporting for products liability separately between occurrence and claims made business began in 1984. For certain of the lines of business within particular market segments we did not include data for the earliest accident years due to credibility and data quality concerns.

Portfolio Size and Differences: We measure variability of the industry in aggregate, by segment and for individual companies. All things being equal, each individual insurer will likely experience more variability than the segment it is a part of or the industry as a whole due to its smaller relative portfolio size. An individual insurer’s true risk will also differ from the industry or segment benchmarks to the extent that the insurer’s portfolio is dissimilar to the industry or market segment.

1.3 LINE OF BUSINESS MAPPING FOR EXPENSES

The statutory annual statement contains two sets of line of business definitions, those within Schedule P and those included in the other exhibits. Schedule P has its own unique set of business definitions in order to track the development of claims payments and reserves over ten periods of accident year maturity. All other schedules and exhibits with line of business detail display some version of what we designate the Underwriting and Investment Exhibit lines (U&I lines). In the ASR we make use of the U&I lines through the Schedule P Statutory Page 14, which contains individual state detail and assists in our regional segment definitions, as well as through the Insurance Expense Exhibit (IEE), which is the foundation for Section 6 (Expense Benchmarking).

All ASR lines of business are based on Schedule P definition, requiring a mapping between the two definition sets. Across the industry, we have developed a map based on net earned premium found in Schedule P and the Underwriting and Investment Exhibit. The map is not perfect, as some companies may have slightly different procedures as to how policies are allocated across the two definition sets. In general, the premiums we used to create this map agree within a few tenths of a percent for each relationship.

T2 | MAPPING THE STATUTORY LINES OF BUSINESS

Schedule P	ASR Acro'	ASR Name	Line of Business	U&I Exhibits	State Pages	IEE	Comm Casulty	Comm Property	Pers Lines	Comm Lines
A - Homeowners/ Farmowners	HO	Homeowners	3. Farmowners multiple peril 4. Homeowners multiple peril	X X	X X	X X			X X	
B - Passenger Auto Liab./Medical	PPA	Private Passenger Auto	19.1. Private passenger auto no-fault (personal injury protection) 19.2. Other private passenger auto liability 19.1, 19.2. Private passenger auto liability		X X				X X X	
C - Commercial Auto/ Truck Liab./Medical	CAL	Commercial Auto	19.3. Commercial auto no-fault (personal injury protection) 19.4. Other commercial auto liability 19.3, 19.4. Commercial auto liability		X X		X X X			X X X
D - Workers Compensation	WC	Workers Compensation	16. Workers compensation	X	X	X				X
E - Commercial Multiple Peril	CMP	Commercial Multiple Peril	5. Commercial multiple peril 5.1. Commercial multiple peril (non-liability portion) 5.2. Commercial multiple peril (liability portion)	X				X		X X X
F1 - Medical Professional Liability-Occurrence	MPLO	Medical Professional Liability Occurrence	11.1. Medical professional liability - occurrence	X			X			X
F2 - Medical Professional Liability-Claims Made	MPLC	Medical Professional Liability Claims Made	11.2. Medical professional liability - claims-made	X			X			X
F - Medical Professional Liability	MPL	Medical Professional Liability	11. Medical Professional Liability		X	X	X			X
G - Special Liability	SL	Special Liability	8. Ocean marine 22. Aircraft (all perils) 27. Boiler and machinery	X X X	X X X	X X X				X X X
H1 - Other Liability- Occurrence	GLO	General Liability Occurrence	17.1. Other liability - occurrence 17.3. Excess Workers Compensation	X X	X X	X X	X X			X X
H2 - Other Liability- Claims Made	GLC	General Liability Claims Made	17.2. Other liability - claims-made	X	X	X	X			X
I - Special Property	SP	Special Property	1. Fire 2.1. Allied lines 2.2. Multiple peril crop 2.3. Federal Flood 2.4. Private Crop 9. Inland marine 12. Earthquake 26. Burglary and theft	X X X X X X X X	X X X X X X X X	X X X X X X X X		X X X X X X		X X X X X X X X

Continued Overleaf

T2 | MAPPING THE STATUTORY LINES OF BUSINESS (CONTINUED)

Schedule P	ASR Acro'	ASR Name	Line of Business	U&I Exhibits	State Pages	IEE	Comm Casualty	Comm Property	Pers Lines	Comm Lines	
J - Auto Physical Damage	APD	Auto Physical Damage	21. Auto physical damage	X							
			21.1. Private passenger auto physical damage		X	X				X	
			21.2. Commercial auto physical damage		X	X		X			X
K - Fidelity / Surety	FS	Fidelity and Surety	23. Fidelity	X	X	X				X	
			24. Surety	X	X	X				X	
L - Other (Incl. Credit, A&H)			13. Group accident and health	X	X	X					
			14. Credit accident and health (group and individual)	X	X	X					
			15. Other accident and health	X		X					
			15.1. Collectively renewable A&H		X						
			15.2. Non-cancelable A&H		X						
			15.3. Guaranteed renewable A&H		X						
			15.4. Non-renewable for stated reasons only		X						
			15.5. Other accident only		X						
			15.6. Medicare Title XVIII exempt from state taxes or fees		X						
			15.7. All other A&H		X						
			15.8. Federal employees health benefits program premium		X						
28. Credit	X	X	X					X			
M - International			29. International	X		X					
N - Reinsurance - Nonproportional Assumed Property			31. Reinsurance - Nonproportional Assumed Property	X							
O - Reinsurance - Nonproportional Assumed Liability			32. Reinsurance - Nonproportional Assumed Liability	X							
P - Reinsurance - Nonproportional Assumed Financial Lines			33. Reinsurance - Nonproportional Assumed Financial Lines	X							
N,O,P - Reinsurance - Nonproportional Assumed			31, 32, 33. Reinsurance - Nonproportional Assumed			X					
R1 - Products Liability - Occurrence	PLO	Products Liability Occurrence	18.1. Products liability - occurrence	X			X			X	
R2 - Products Liability - Claims Made	PLC	Products Liability Claims Made	18.2. Products liability - claims-made	X			X			X	
R - Products Liability	PL	Products Liability	18. Products liability		X	X				X	
S - Financial Guaranty/ Mortgage Guaranty			6. Mortgage guaranty	X	X	X				X	
			10. Financial guaranty	X	X	X				X	
T - Warranty			30. Warranty	X	X	X				X	

Source: Guy Carpenter

1. The Underwriting and Investment Exhibit provides a breakdown for MPL between Occurrence and Claims Made, but the IEE does not
2. Reinsurance lines are aggregated in the IEE
3. The Underwriting and Investment Exhibit provides a breakdown for PL between Occurrence and Claims Made, but the IEE does not

1.4 MARKET SEGMENTATION

The market segments illustrated in this report were defined to provide insurers with a diverse collection of risk benchmarks that are comparable to their own profile. We present two types of segments: “Divisional” segments and “Functional” segments. Divisional segments represent a breakdown of the industry into mutually exclusive groups. Functional segments are defined on a stand-alone basis reflecting unique characteristics of the companies.

Four Divisional sub-segments have regional descriptions, providing insight into the dynamics companies will consider when exploring geographical expansion. In contrast, the Functional market segments assist in understanding differentiation in ownership structure and product strategy.

The market segments include:

T3 | DIVISIONAL AND FUNCTIONAL MARKET SEGMENTS, WITH PREMIUM AND MARKET SHARE

Divisional Segment	Number of Companies	Total DWP (Millions)			Average DWP (Millions)			% of Industry		
		2013	2014	2015	2013	2014	2015	2013	2014	2015
Top 15 Writers	15	295,470	307,627	321,032	19,698	20,508	21,402	54.8%	54.5%	54.8%
National	44	81,872	88,682	93,252	1,861	2,016	2,119	15.2%	15.7%	15.9%
Multi Regional	16	19,290	19,667	20,461	1,206	1,229	1,279	3.6%	3.5%	3.5%
Northeast/Atlantic	284	30,499	31,893	32,998	107	112	116	5.7%	5.7%	5.6%
West	162	22,963	24,851	26,838	142	153	166	4.3%	4.4%	4.6%
Midwest	202	20,422	22,073	23,380	101	109	116	3.8%	3.9%	4.0%
Southeast/Gulf	339	36,936	39,311	42,264	109	116	125	6.9%	7.0%	7.2%
Other*	33	1,168	144	97	35	4	3	0.2%	0.0%	0.0%
ASR Industry**	1095	508,620	534,248	560,321	464	488	512	94.4%	94.7%	95.6%

Functional Segment	Number of Companies	Total DWP (Millions)			Average DWP (Millions)			% of Industry		
		2013	2014	2015	2013	2014	2015	2013	2014	2015
E&S	70	18,656	20,040	20,858	267	286	298	3.5%	3.6%	3.6%
WC Specialty	100	16,841	19,050	20,738	168	191	207	3.1%	3.4%	3.5%
Mutual	314	46,012	47,916	50,021	147	153	159	8.5%	8.5%	8.5%
Public	101	245,503	260,279	277,070	2,431	2,577	2,743	45.5%	46.1%	47.3%
Reciprocals/Risk Retention Groups	175	50,988	53,449	55,882	291	305	319	9.5%	9.5%	9.5%
NE Personal	30	6,685	6,961	7,348	223	232	245	1.2%	1.2%	1.3%
Large Commercial	19	128,998	134,769	139,595	6,789	7,093	7,347	23.9%	23.9%	23.8%
Small Commercial	675	80,906	84,380	89,319	120	125	132	15.0%	15.0%	15.2%
Large Personal	14	183,760	195,751	206,606	13,126	13,982	14,758	34.1%	34.7%	35.3%
Small personal	300	48,571	51,341	54,951	162	171	183	9.0%	9.1%	9.4%
FL Property	50	5,502	6,280	7,650	110	126	153	1.0%	1.1%	1.3%
CA WC	6	3,918	4,186	4,469	653	698	745	0.7%	0.7%	0.8%
Non Standard Auto	121	11,607	12,007	12,661	96	99	105	2.2%	2.1%	2.2%

Source: Guy Carpenter

* Other segment is comprised of companies that do not fit any of the strict definitions set for the other segments.

**291 companies for which Annual Statements exist are not included in the ‘ASR Industry’ due to premium being less than USD1million in each state or belonging to reinsurer segment.

As noted in Section 1.2, 291 companies (approximately four percent of the industry) are not allocated to any of the market segments in the ASR due to lack of credible loss history or a risk profile that is not consistent with a defined segment.

A.M. Best's listing of insurance groups and unaffiliated single entities, excluding excess and surplus lines (E&S) was used as the initial universe of companies to construct the market segments. From that universe, companies with less than USD 1 million in 2015 direct written premium were removed due to lack of sufficiently credible loss experience. The insurance groups and unaffiliated single entities were then segmented as follows:

- **Top 15 Writers** include the 15 largest insurance groups in the industry based on total direct written premium. These companies manage their insurance risks on a national scale.
- **National** includes companies with at least USD 500 million in 2015 direct written premium and that write business in at least 40 states.
- **Multi Regional** includes companies with at least USD 500 million in 2015 direct written premium and that write business in at least 25 states.
- **The four regional segments (Northeast/Atlantic, Southeast/Gulf, Midwest and West)** represent the rest of the companies that write business in fewer than 25 states or have less than USD 500 million in 2015 direct written premium. The dominant region for these companies' premium is determined on an all lines combined basis. The following table lists the states allocated to each region and summarizes the P&C insurance penetration in each state:

T4 | REGIONAL MAPPING AND SUMMARY OF STATE PREMIUMS

Northeast/ Atlantic	All Lines 2015 DWP (Millions)	Premium Per Capita 2015	Premium Per Capita Growth from 2014
CT	7,863	2,190	2.0%
DC	1,649	2,453	-7.8%
DE	2,264	2,393	1.1%
MA	13,304	1,958	0.2%
MD	10,417	1,734	-0.8%
ME	2,092	1,573	5.1%
NH	2,234	1,679	1.5%
NJ	19,424	2,168	0.1%
NY	41,528	2,098	1.0%
PA	22,225	1,736	2.0%
RI	2,157	2,042	5.0%
VT	1,371	2,191	-0.4%
WV	2,846	1,543	1.7%
Total	129,374	1,968	1.0%

Southeast/ Gulf	All Lines 2015 DWP (Millions)	Premium Per Capita 2015	Premium Per Capita Growth from 2014
AL	7,477	1,539	1.8%
AR	4,559	1,531	0.6%
FL	43,538	2,148	-2.9%
GA	16,526	1,618	1.3%
LA	10,401	2,227	-2.3%
MS	4,707	1,573	2.1%
NC	13,699	1,364	-1.2%
OK	7,503	1,918	-2.8%
SC	8,076	1,650	0.0%
TN	10,171	1,541	-0.2%
TX	46,878	1,707	-5.3%
VA	12,230	1,459	-1.8%
Total	185,766	1,731	-2.1%

Midwest	All Lines 2015 DWP (Millions)	Premium Per Capita 2015	Premium Per Capita Growth from 2014
IA	5,679	1,818	0.7%
IL	23,327	1,814	5.0%
IN	10,162	1,535	1.8%
KS	5,804	1,993	0.4%
KY	6,671	1,508	1.7%
MI	17,568	1,770	2.9%
MN	10,445	1,903	1.1%
MO	10,265	1,687	2.1%
ND	2,119	2,799	-11.8%
NE	4,107	2,166	0.7%
OH	15,006	1,292	2.1%
SD	2,170	2,528	-2.7%
WI	9,479	1,642	3.3%
Total	122,802	1,698	2.3%

West	All Lines 2015 DWP (Millions)	Premium Per Capita 2015	Premium Per Capita Growth from 2014
AK	1,618	2,191	-7.7%
AZ	9,331	1,367	-1.4%
CA	66,262	1,693	0.6%
CO	10,300	1,888	-1.1%
HI	2,256	1,576	-3.3%
ID	2,377	1,436	1.6%
MT	2,084	2,017	-0.4%
NM	2,992	1,435	2.4%
NV	4,329	1,498	-1.9%
OR	6,044	1,500	0.0%
UT	4,034	1,347	-1.2%
WA	10,192	1,421	-1.8%
WY	1,048	1,788	-1.2%
Total	122,867	1,616	-0.2%

Source: Guy Carpenter

- The **E&S** market segment includes entities defined as “Surplus Lines” writers according to A.M. Best. E&S writers with less than USD 5 million in 2015 direct written premium, companies with zero net written premium and companies whose assumed written premium from affiliates was greater than 25 percent of direct written premiums plus reinsurance assumed from affiliates were all removed. This filtering was necessary in order to remove companies that may be identified as E&S writers but because of the effects of intercompany reinsurance or pooling the net results do not reflect the E&S business.
- The **Workers Compensation Specialty** market segment includes all companies that satisfy two conditions. First, workers compensation direct written premium in 2015 was larger than USD 10 million. Second, 40 percent or more of total written premium for the company is collected from workers compensation policies. This composite is designed to reflect the experience of workers compensation state funds and private companies that specialize in this line, while removing the impact of the top 15 writers and large national companies with broader, multiline portfolios.
- The **Mutual** market segment includes all U.S. companies with 2015 direct written premium less than USD 2 billion and defined by A.M. Best as having a “mutual” ownership structure. This segment is designed to capture the experience of the majority of small- and medium-sized mutual insurers. Larger mutual insurers such as State Farm and Liberty Mutual were excluded to prevent their experience from having a disproportionate effect on the statistics.
- The **Public** market segment includes all companies with 2015 net earned premium larger than USD 100 million that have equity shares listed for trade on a public exchange. Companies in this segment may be listed on a non-U.S. exchange and may be operating subsidiaries of non-insurance conglomerates. This segment was designed to capture the experience of insurers who are owned and operated for the benefit of corporate shareholders and potentially are subject to unique profitability pressures.
- The **Northeast Personal Lines Specialty** segment includes all companies with 75 percent or more of their total 2015 direct written premium in personal lines in Northeast/Atlantic States.
- The **Large Commercial** segment includes all companies with \geq \$2B of 2015 direct written premium and \geq 60% of their total direct written premium in commercial lines.
- The **Small Commercial** segment includes all companies with USD 2 billion or more of 2015 direct written premium and 60 percent or more of their total direct written premium in commercial lines.
- The **Large Personal** segment includes all companies with USD 2 billion or more of 2015 direct written premium and 60 percent or more of their total direct written premium in personal lines.
- The **Small Personal** segment includes all companies with USD 2 billion or more of 2015 direct written premium and 60 percent or more of their total direct written premium in personal lines.
- The **Florida Property Specialists** segment includes all companies with 40 percent or more of 2015 direct written premium in property lines in Florida.
- The **California Workers Compensation Specialists** segment includes all companies with 25 percent or more of 2015 direct written premium in the workers compensation line in California.
- The **Non-Standard Auto Writers** segment is based on the A.M. Best Non-Standard Auto Writers Composite.
- The **Reciprocals/Risk Retention Groups** segment includes all companies with National Association of Insurance Commissioners (NAIC) ownership structure listed as Reciprocal Exchange or Risk Retention Group.

Detailed lists of the names of companies included in each segment can be found in Appendix A.1.

1.5 TABLES AND EXHIBIT INVENTORY

The following is an inventory of all tables and exhibits in this report. Please refer to appendix A1 for a full list of exhibits available in the Risk Benchmarks Supplement.

TABLES AND EXHIBITS

Exhibit	Section	Page	Description
One	2.3	20	Ultimate Loss Ratio for All Lines Combined, with Percentiles
Two	2.3	21	Initial and Ultimate Loss Ratios by Line of Business
Three	2.4	23	Loss Ratio Spread by Line of Business
Four	2.4	25	Combined Ratio Spread by Line of Business
Five	2.4	28	Market Performance by State
Six	2.5	31	Lorenz Curves and Gini Coefficients by Line of Business
Seven	2.6	32	Premium Trends by Market Segment
Eight	2.7	36	Trends in Reinsurance Utilization
Nine	2.7	38	Volatility Reduction of Reinsurance
Ten	2.8	40	Frequency and Severity Trends
Eleven	3.2	46	All Lines Reserve Development Cycle
Twelve	3.3	47	Reserve Development Cycle by Line of Business
Thirteen	3.4	49	Reserve Development Cycle by Line of Business
Fourteen	6.3	61	Expense Trends by Market Segment
Fifteen	7.2	65	Recent Operating Performance in the Industry
Sixteen	7.3	67	Historical Balance Sheet in the P&C Industry
Seventeen	7.4	68	Charting the Change in Policyholder Surplus by Market Segment
Eighteen	7.5	74	Asset Profile in the P&C Industry

Table	Section	Page	Description
One	1.1	9	Line of Business Acronyms and Industrywide Premiums
Two	1.3	11	Mapping the Statutory Lines of Business
Three	1.4	13	Divisional and Functional Market Segments, with Premium and Market Share
Four	1.4	14	Regional Mapping and Summary of State Premiums
Five	2.2	18	Ultimate Loss Ratio Performance, with Individual Company Volatility
Six	3.2	43	One Calendar Year Reserve Development by Line of Business
Seven	3.2	45	Ultimate Development by Line of Business
Eight	4.2	52	Mean Payment Pattern and Duration
Nine	4.2	53	Coefficient of Variation of Payment Pattern Increments
Ten	5.2	55	Correlation in the Ultimate Loss Ratio Between Lines of Business
Eleven	5.3	57	Correlation in the Ultimate Loss Ratio
Twelve	6.2	60	Direct and Net Expenses by Line of Business



II. UNDERWRITING PERFORMANCE AND VOLATILITY

2.1 INTRODUCTION

The fundamental competency of the P&C insurance industry is prudent risk assessment and underwriting. Underwriters seeking higher levels of return must tolerate higher levels of operating risk. Capitalization and owner preference impact the determination of an acceptable level of risk. The underwriting performance and risk metrics explored in this section illustrate the range of operating strategies pursued within the P&C industry.

In addition to company risk preference, market conditions can significantly impact insurance carriers' risk and return tradeoffs. Market conditions have changed significantly over time, driven by economic conditions, exogenous shocks and competitive forces. Examining past market conditions helps to put the current underwriting environment into context as companies seek to plot the most efficient risk and reward tradeoffs available.

This section explores many aspects of underwriting risk. For example, we follow the accumulation of risk across both competition-based and cost-based underwriting cycles; investigate the present competitive underwriting landscape and analyze the inequalities in performance driven by scale and geographic footprint; and analyze the impact of reinsurance strategy on companies' retained operating volatility. Prudent underwriting has been particularly critical in the current low interest rate environment – this section strives to illustrate where underwriters are earning appropriate risk-adjusted returns today and where there is room for improvement.

2.2 CURRENT AND LONG TERM LOSS RATIOS

T5 | ULTIMATE LOSS RATIO PERFORMANCE, WITH INDIVIDUAL COMPANY VOLATILITY Net of Reinsurance, Accident Years 1980 to 2015 Where Available

Table 5: Explanation

Table 5 provides performance statistics for the ultimate loss ratio in each line of business:

$$\text{Ultimate Loss Ratio} = \frac{\text{Paid and Reserved Losses and ALAE at 120 Months of Development}}{\text{Earned Premium}}$$

These accident year ratios do not reflect any development subsequent to 120 months of maturity. The long term mean (column 1) loss ratios are calculated across the entire period for which data is available. Five year mean (column 2) loss ratios are calculated across accident years 2011 to 2015.

Standard Deviation is a measure of volatility (column 4) in the loss experience and is expressed in loss ratio points for each line of business. Individual companies may experience more or less volatility than the industry and the Individual Company Volatility (CV) section of Table 5 (columns 7, 8 and 9) illustrates the range of actual volatility experienced for individual companies. For example, ten percent of the providers of commercial auto liability (CAL) experienced volatility less than nine percent CV and another ten percent of providers experienced volatility greater than 28 percent CV.

Table 5: Discussion

Comparing long-term mean (column 1) to five-year mean (column 2) to AY 2015 booked (column 3) loss ratios, by line of business, the industry in total and in nearly every line of business exhibits a positive trend. Current booked loss ratios are less than both recent and long-term averages. Medical professional liability and auto physical damage are notable exceptions. The pure liability lines: general liability, products liability and medical professional liability have exhibited the greatest volatility, attributable to significant adverse reserve development in the early 1980s and again in the early part of this millennium. Comparing the ranges for individual experience in columns 7 to 9, homeowners (HO), products liability claims made (PLC) and medical professional liability occurrence (MPLO) have exhibited the greatest differentiation in volatility among companies.

Line of Business	Averages			Volatility			Individual Company Volatility		
	Long-Term Mean	Five Year Mean	AY 2015 Booked	Volatility	Minimum	Maximum	10th Percentile	Median	90th Percentile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
APD	62%	65%	67%	4%	54%	70%	8%	14%	30%
CAL	79%	70%	66%	14%	56%	113%	9%	14%	28%
CMP	69%	62%	55%	13%	46%	93%	10%	22%	50%
FS	42%	32%	31%	13%	30%	74%	8%	19%	40%
GLC	67%	66%	62%	22%	45%	113%	9%	15%	30%
GLO	81%	63%	62%	23%	52%	139%	13%	25%	53%
HO	71%	62%	55%	11%	52%	112%	14%	33%	113%
MPLC	85%	76%	80%	28%	45%	128%	5%	10%	22%
MPLO	111%	82%	83%	36%	61%	183%	17%	26%	100%
PLC	78%	64%	62%	57%	24%	279%	11%	27%	68%
PLO	89%	68%	81%	32%	49%	163%	9%	16%	31%
PPA	75%	70%	73%	7%	63%	88%	5%	9%	20%
SL	61%	59%	57%	11%	43%	76%	6%	16%	46%
SP	58%	60%	52%	11%	44%	75%	7%	14%	34%
WC	78%	71%	68%	14%	54%	99%	7%	16%	41%
All Lines	75%	67%	65%	9%	56%	91%	6%	13%	33%

Source: Guy Carpenter



2.3 CHARTING THE UNDERWRITING CYCLE

E1 | ULTIMATE LOSS RATIO FOR ALL LINES COMBINED, WITH PERCENTILES Net of reinsurance, accident years 1980 to 2015, all ten-year Schedule P lines combined

Exhibit 1: Explanation

In Exhibit 1 we identify the largest 50 P&C insurers for all lines combined and selected lines of business. We plot the total ultimate loss ratio based on total premium in each year reporting ten development periods in Schedule P. The solid lines illustrate the 10th, 50th and 90th percentiles of individual company performance in each year. The median loss ratio line is dashed following 2006, emphasizing that losses are not developed to ten-year maturity for these years.

Exhibit 1 Discussion

Exhibit 1 for Industry All Lines Combined is an illustration of more than two full underwriting cycles, with loss ratios peaking between the years 1983 to 1985 and again between 1999 and 2001. The rationale for the two peaks differed because the poor performance in the 1980s affected individual carriers in a relatively consistent way, while there was less consistency in performance among carriers between 1999 and 2001. Some carriers competed aggressively on price during the time period and grew during a period of rising medical costs. The ultimate impact of inadequate pricing did not become apparent for several years.

Further observations capture a recent loss ratio high of 75 percent in 2011 due in large part to elevated natural catastrophe losses on residential and commercial property. This is most clearly seen in the CMP and HO graphs. Loss ratios improved in 2012 and 2013 as a result of rate increases, particularly in commercial lines, until they stabilized from 2014 to 2015.

The recent-period data reveals a divergence in loss ratios since 2013 of performance between the 10th and 90th percentile underwriters. As overall industry loss ratios have remained flat, companies with loss ratios in the highest decile of the industry have seen their results deteriorate from 69 percent to 79 percent over the past two years.

Breaking out a sampling of individual lines, it is clear that there is a strong correlation between commercial casualty lines such as CAL and WC, but less correlation between personal lines such as HO and PPA mainly due to the different dynamics between property losses and casualty losses.

The volatility illustrated in the HO graph is largely non-cyclical and driven by the presence or absence of catastrophe activity, visible most clearly via spikes in the 90th percentile line in 1992, 1996, 2001, 2005, 2008 and 2011. Losses from Hurricane Andrew caused the largest spike in 1992. In the past three years mean market performance has been favorable as many regions were able to achieve more adequate rate increases and avoid large scale catastrophe activity, but the worst performers experienced elevated loss ratios in 2015 due to Northeast winter storm activity and Texas hailstorms. In general, the industry has become smarter in pricing risk in more recent years and has avoided cash flow underwriting, a practice that was popular during prior periods of high investment returns.

The CMP graph exhibits a blend of casualty driven cyclical and property driven catastrophe exposure. In recent years, as catastrophe activity was benign, commercial casualty also experienced low to moderate loss cost trends. The range of results among CMP carriers has narrowed, and loss ratios, though undeveloped, have improved.

WC has exhibited extreme cyclical over the past 37 years with divergence between carriers widest in the hard market years and lowest during soft markets. Though not fully developed, loss ratios in the current market environment appear to be improving for most carriers from a cyclical peak in 2010.

PPA results have been very steady throughout the various market cycles experienced over the last several decades, exhibiting only a slight increase in the early 2000s. Loss ratios began to deteriorate in 2015 due to unexpected increase in loss frequency and severity. Though the range of performance between carriers has been tight, the carriers with the highest loss ratios have seen a disproportionate increase in their loss ratios since 2013 versus the industry as a whole.

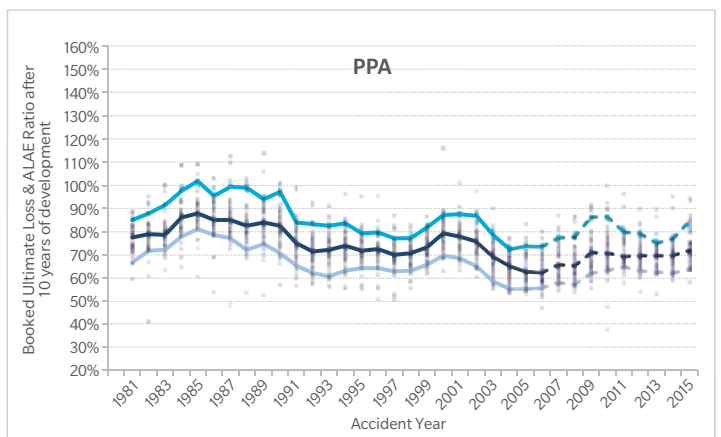
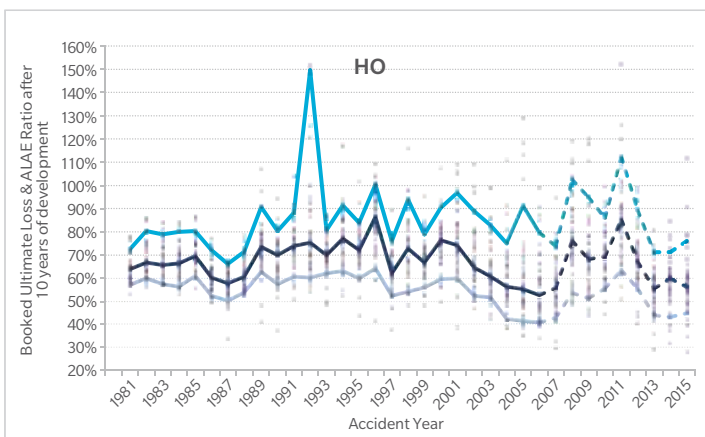
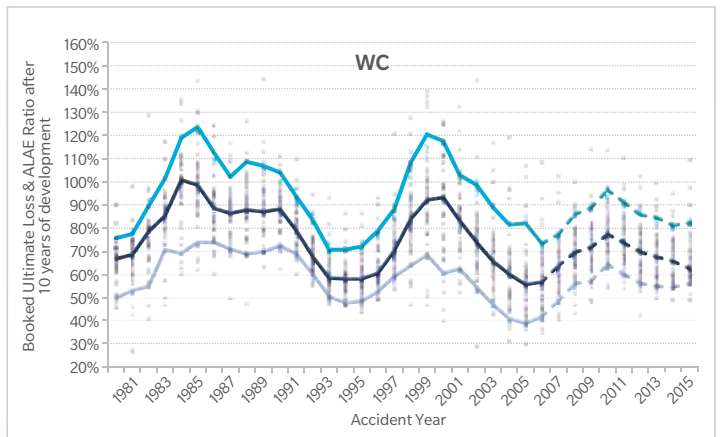
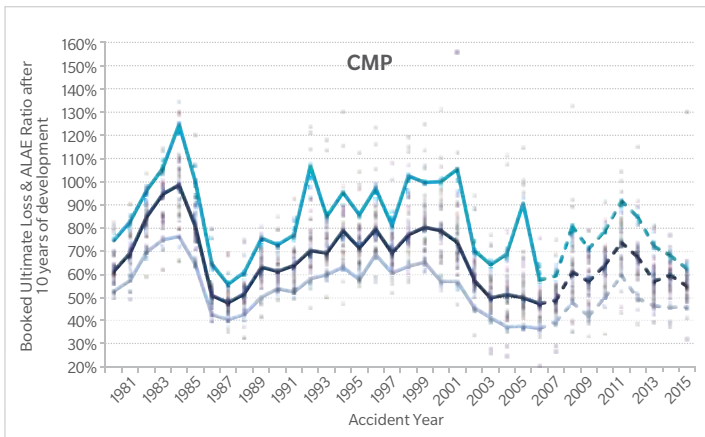
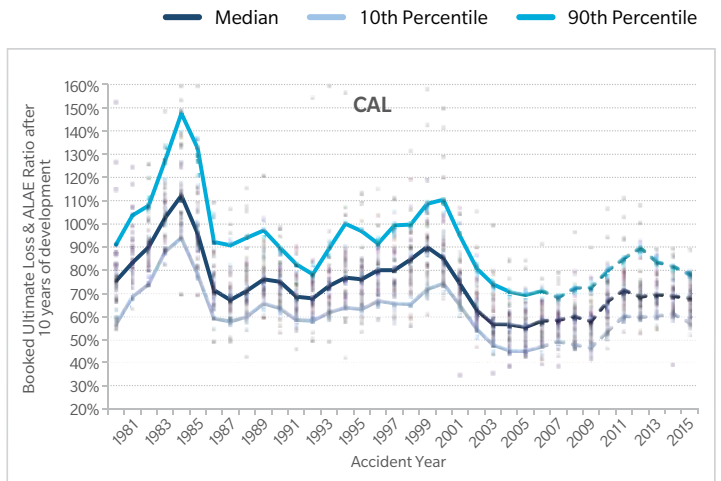
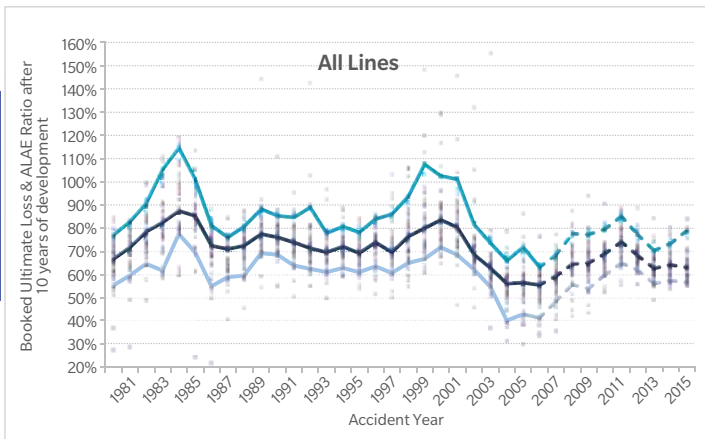


CAL performance, like other commercial casualty lines, has seen significant cyclicity over the last several decades. Though immature, recent accident year performance appears to be flattening at the mean and improving for the highest loss ratio carriers due to recent rate increases. Loss ratios are still approximately 11 percent higher than 2003 to 2009 levels.

Please refer to the Risk Benchmarks Supplement for Graphs for other lines of business.

E1 | ULTIMATE LOSS RATIO WITH PERCENTILES

Underwriting



Source: Guy Carpenter

E2 | INITIAL AND ULTIMATE LOSS RATIOS BY LINE OF BUSINESS

Net of reinsurance, accident years 1980 to 2015 where available

Exhibit 2: Explanation

Each chart in Exhibit 2 plots loss and ALAE (Allocated Loss Adjustment Expense) ratios in industry aggregate for selected lines of business. The initial ratio as reported at 12 months of development is illustrated with a dashed blue line, whereas the developed ultimate loss ratio (as currently reported) is shown with a solid red line. Periods of adverse reserve development in successive accident years are shaded in red, while periods of reserve release are shown in blue. A third, gray line illustrates the calendar year loss ratio, the cyclicity of which trails the accident year patterns.

Exhibit 2: Discussion

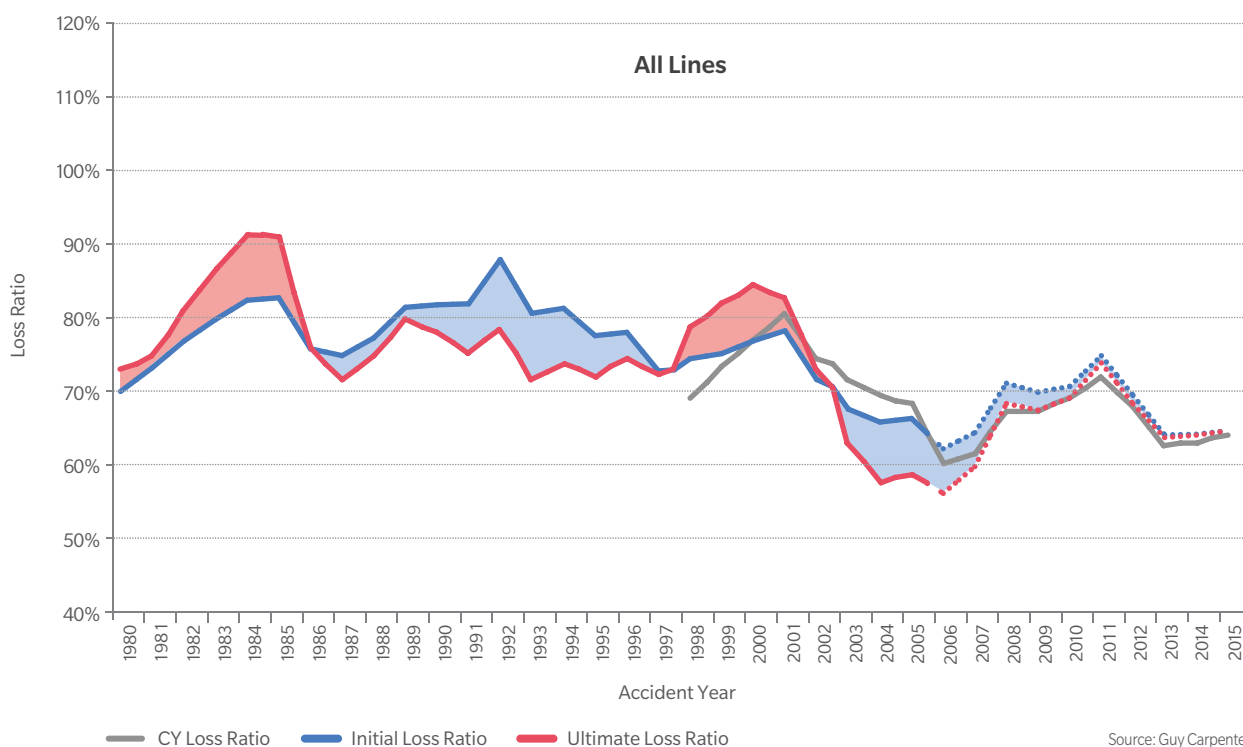
This composite exhibit illustrates the diversity of issues carriers need to consider when managing different lines of business, including duration, cyclicity, reserving norms and distinct loss processes.

For example, we observe that the risk in HO is strongly correlated with the occurrence or non-occurrence of natural catastrophes. Reserve risk is minimal, as demonstrated by the lack of shaded areas and the close alignment of the gray calendar year line with the red ultimate line.

For PPA, while the industry experienced an increase in loss ratios between 1999 and 2001, the acceleration in losses was detected much sooner than in other casualty lines. The industry has not experienced much adverse reserve development in auto insurance at all since 1980, and generally PPA reserves have been booked relatively conservatively in each accident year and taken down as losses developed favorably – a notable exception is forming in Accident Years 2013 to 2015, where calendar year and accident year loss ratios have been increasing. To date, industry reserve releases have not occurred as consistently as they did in the period from 2002 to 2012.

Casualty lines have exhibited the same pattern of alternating periods of adverse and benign reserve development, but to different degrees. The amplitude of these reserve adjustments signifies sensitivity to the cycle, which is related to duration, competition and the degree to which medical inflation drives ultimate loss costs. MPL and WC are among the most sensitive lines. In recent years, MPL writers have continued to enjoy reserve redundancies, while CAL writers have experienced significant reserve deficiencies for Accident Years 2011 to 2014. Generally, GL writers booked reserves adequately for the last five accident years with no material favorable or adverse development to date on these immature years. WC carriers experienced a brief period of peaking loss ratios and adverse development from 2009 to 2011 but recently, accident year loss ratios again fell and reserve redundancies resumed.

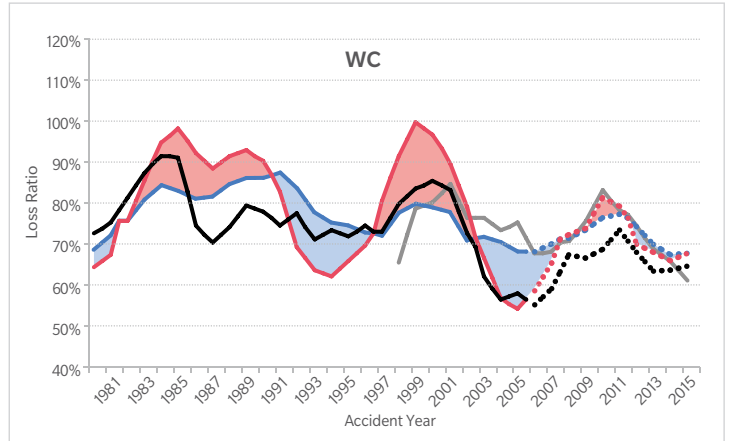
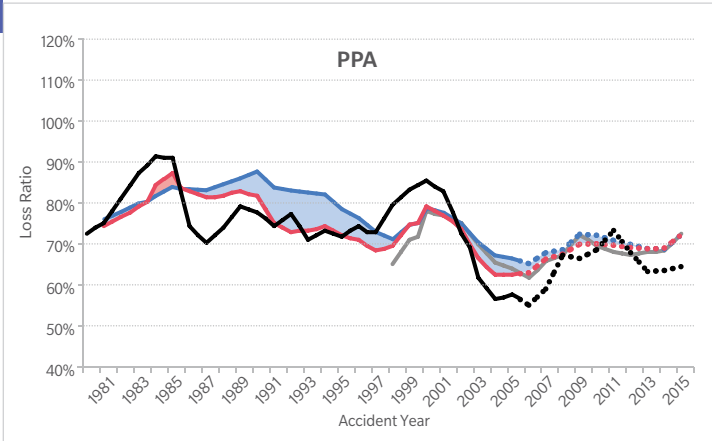
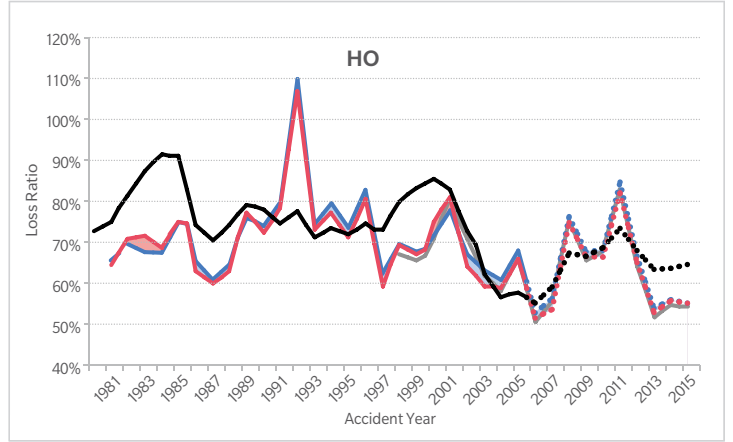
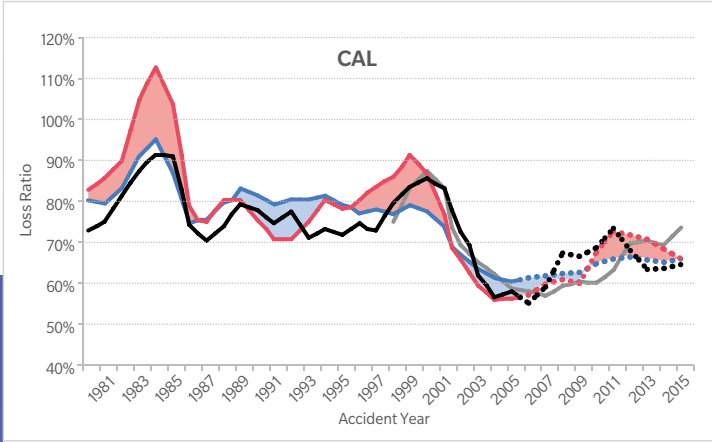
Please refer to the Risk Benchmarks Supplement for Graphs for other lines of business.



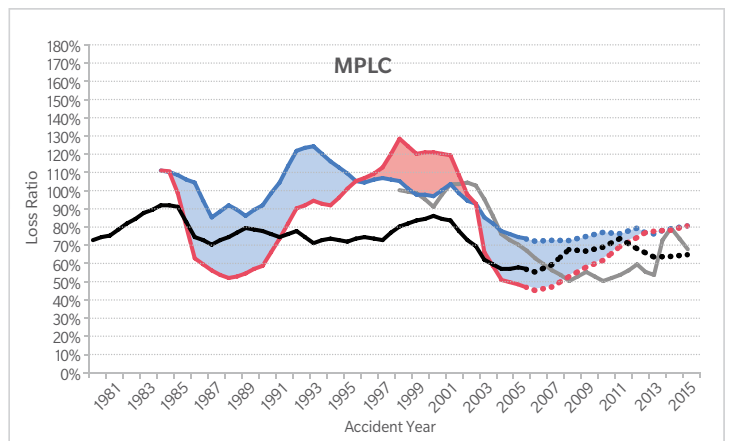
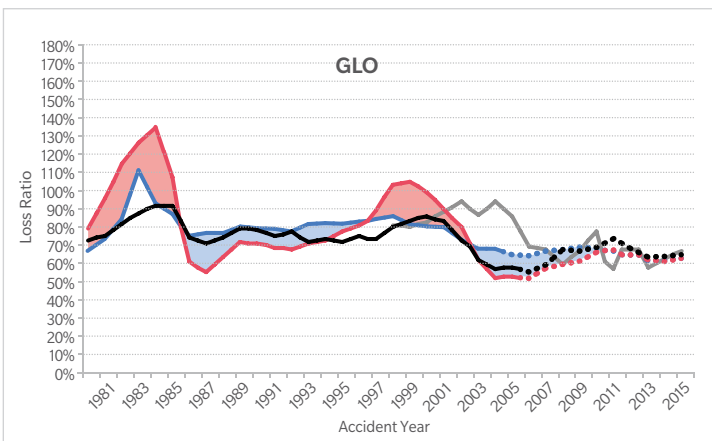


E2 | LINES WITH LOW HISTORICAL RANGE

Underwriting



E2 | LINES WITH WIDE HISTORICAL RANGE



Source: Guy Carpenter

— Initial Loss Ratio
 — Ultimate Loss Ratio
 — CY Loss Ratio
 — All Lines Ultimate Loss Ratio

2.4 COMPETITIVE DIFFERENTIATION

E3 | LOSS RATIO SPREAD BY LINE OF BUSINESS

Sorted in ascending order of average performance from 2011 to 2015

Volatility estimated from accident years 2006 to 2015

Exhibit 3: Explanation

Exhibit 3 depicts recent performance and volatility for the largest writers in selected lines of business. Where available, as many as one hundred companies are included in each chart. We sort companies by mean loss ratio, from lowest to highest, and illustrate volatility with a colored bar spanning one standard deviation on either side of the loss ratio. The color of each bar is chosen according to the market segment to which each company belongs.

The *market slope* statistic measures the disparity in results across the companies – a higher market slope means some companies are performing much better than others. The market slope is calculated based on the average absolute deviation from median loss ratio across all companies, excluding the five percent best-performing and five percent worst-performing companies for statistical stability.

The mark in the center of each bar plots the mean loss ratio and the shape of the mark indicates the size quartile to which the company belongs for that line of business.

Exhibit 3: Discussion

Lines with a greater market slope provide more opportunities for competitive differentiation between carriers. Lines with the highest market slopes include commercial casualty coverages such as GLC, GLO, MPLO, PLO and SL. Within these lines there is significant differentiation among coverages offered and rating and deductible scheme. Since these lines are transacted business to business, there is relatively little regulation compared with personal lines, allowing companies to develop innovative coverages and ratings approaches. Lines with the lowest market slopes are either highly regulated – PPA or APD – or lines where many companies employ a similar rating scheme – WC or HO. Generally, companies that do the best job controlling marginal costs will outperform the market in lines with lower slopes; companies that employ prudent individual risk underwriting and incur higher up-front costs to select the best risks will find opportunities in lines with higher slopes.

For the CAL line, a relatively high degree of volatility is consistent among all carriers due to the high severity inherent in the exposure. Conversely, there is very low volatility among nearly all carriers writing the APD line due to the low severity nature of the risk. For CMP and GLO, there is significant differentiation in volatility among carriers. For GLO, this volatility can be attributed to different operating strategies by company – some companies write excess coverage while others write lower severity primary coverage. For CMP, the difference in volatility by company is largely a function of whether a given company has incurred catastrophe losses in the experience period: 2006 to 2015.

Please refer to the Risk Benchmarks Supplement for Graphs for other lines of business.

Line of Business	Number of Companies		Market Slope
	Shown	In Total*	
CAL	100	268	12%
CMP	100	291	10%
GLC	55	150	14%
GLO	100	326	14%
HO	100	384	9%
MPLC	77	174	13%
MPLO	28	80	19%
PLO	49	84	18%
PPA	100	288	7%
WC	100	256	9%
APD	100	360	7%
FS	82	116	14%
SL	42	68	16%
SP	100	438	12%

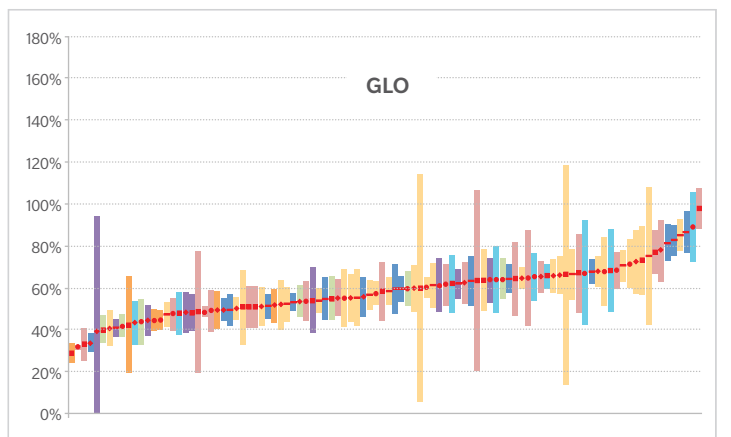
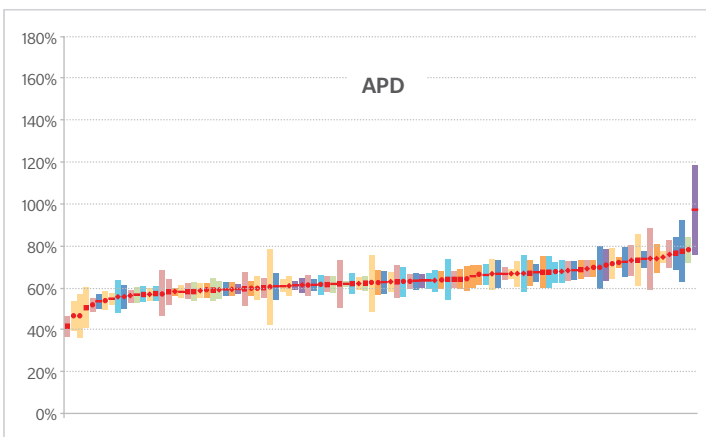
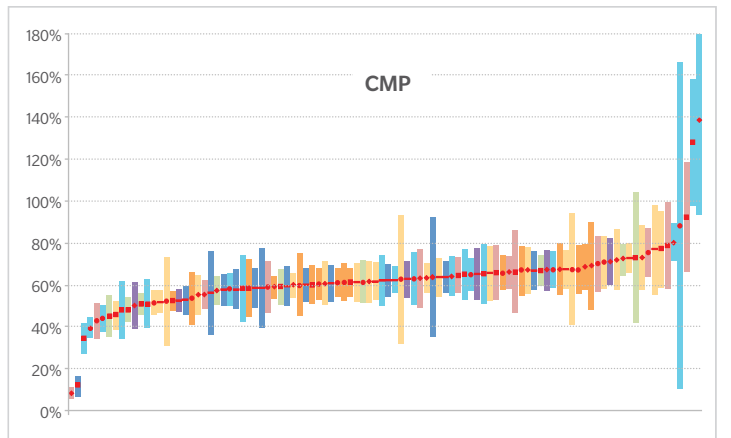
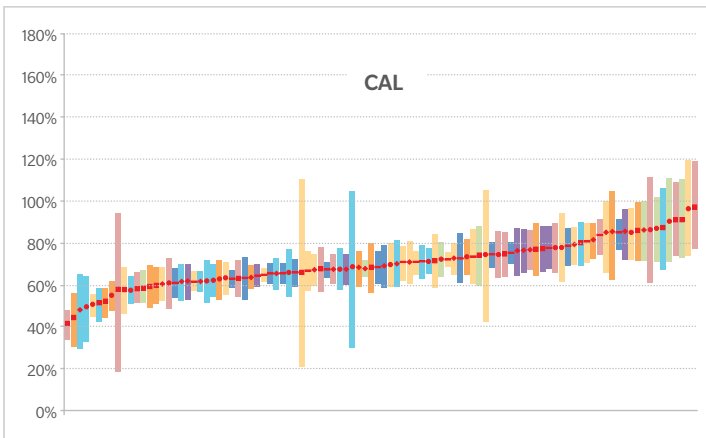
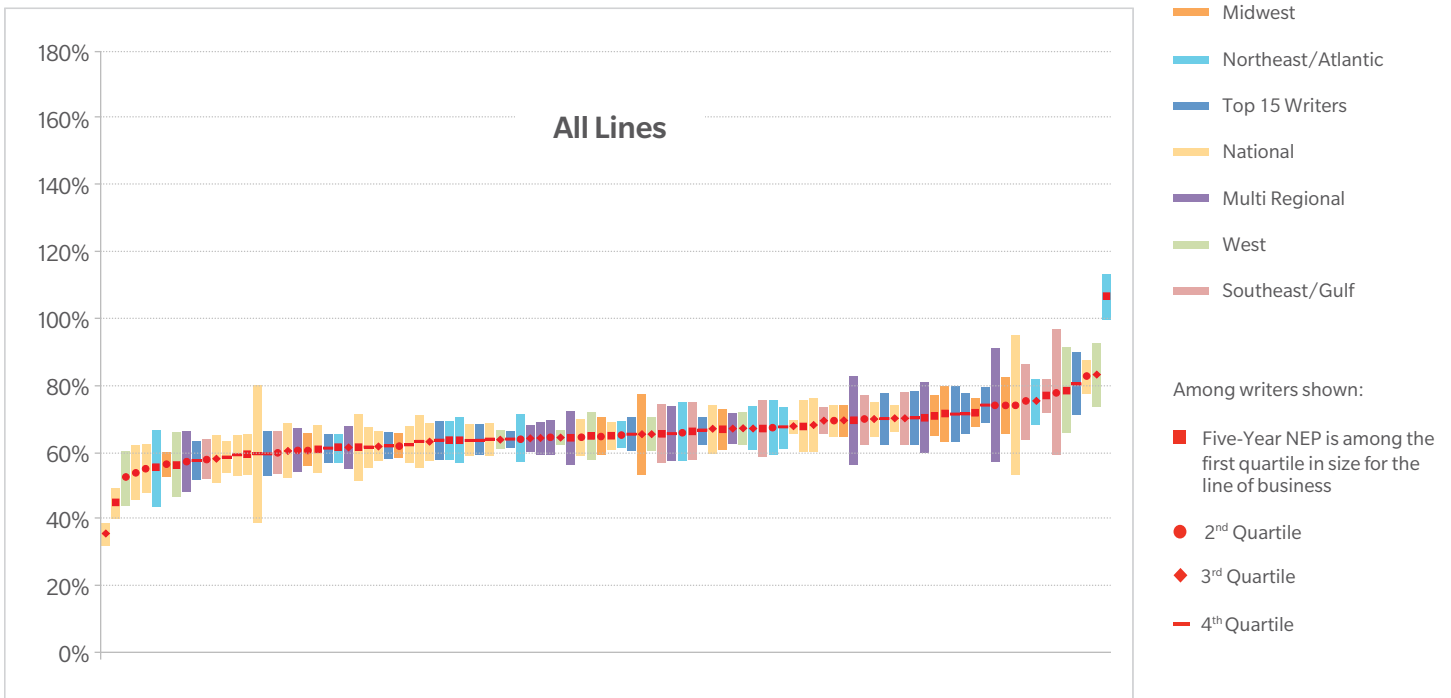
*Recent five year average net earned premium at least \$1M

Source: Guy Carpenter



E3 | LOSS RATIO SPREAD BY LINE OF BUSINESS

Underwriting



Source: Guy Carpenter

E4 | COMBINED RATIO SPREAD BY LINE OF BUSINESS

Mean combined ratios computed over period from 2011 to 2015

Exhibit 4: Explanation

Exhibit 4 charts the combined ratio for the largest one hundred providers for selected lines of business. Each combined ratio is illustrated with a stacked bar and the bars are sorted in ascending order of profitability. Categories of loss and expense are styled differently according to cost category and the color of each bar represents the market segment to which each company belongs. The *market slope* measures the degree to which good performance differs from poor performance and is an indicator of upside potential due to excellence in underwriting, pricing and claims handling. Higher market slope relates to more differentiation.

Exhibit 4: Discussion

Exhibit 4 tells the remainder of the story in performance differentiation: expenses. Eight of the 11 best all lines performers belong to the National segment, defined as companies that write at least USD 500 million in all-lines premiums and also operate in at least 40 states, but are not among the group of the 15 largest carriers.

In the HO line, nine of the top 13 carriers are from the Southeast/Gulf segment, specializing in the Florida market. These companies outperformed the market due to a lull in hurricane activity in the experience period. Excluding these Florida specialists, the top performers in the industry are mostly the Top 15 and National carriers. The bottom performing companies are Northeast specialists, Southeast carriers operating outside of Florida and Midwest carriers. Each of these regions has been impacted by catastrophe losses during the experience period. The regional diversification attained by the carriers with national scope allows for a more favorable long-term risk and return tradeoff in the HO line.

The chart for PPA illustrates the intense competition in this highly commoditized line of business. Only approximately 15 percent of the carriers have been able to write this line at 100 percent combined ratio or below. In recent years it has been commonplace to attempt offsetting these underwriting losses with profitable results in APD, where approximately 45 percent of the providers have produced combined ratios below 100 percent.

In the GLO line, there is significant opportunity for differentiation among carriers. Approximately 75 percent of GLO carriers have been operating profitably in the experience period (at current booked ultimate loss ratio). Carriers in the Midwest segment tend to outperform the industry as a whole, as they operate in the least litigious states in the country.

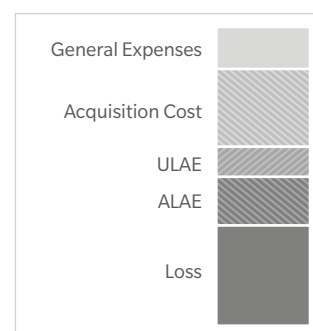
The CAL line has reported challenged performance in the experience period, as only approximately 20 percent of carriers operated at a combined ratio below 100 percent. Carriers in the Northeast and Midwest segment generally outperformed the industry as a whole, while carriers in the more litigious West and Southeast segments underperformed the industry.

Please refer to the Risk Benchmarks Supplement for Graphs for other lines of business.

Line of Business	Number of Companies		
	Shown	In Total*	Market Slope
CAL	100	244	12%
CMP	100	263	11%
GLC	97	125	13%
GLO	100	275	15%
HO	100	353	9%
MPLC	100	164	13%
MPLO	68	69	34%
PLO	71	71	18%
PPA	100	271	8%
WC	100	237	9%
APD	100	331	10%
FS	92	103	13%
SL	55	55	16%
SP	100	376	12%

*Recent five year average net earned premium at least \$1M

Source: Guy Carpenter

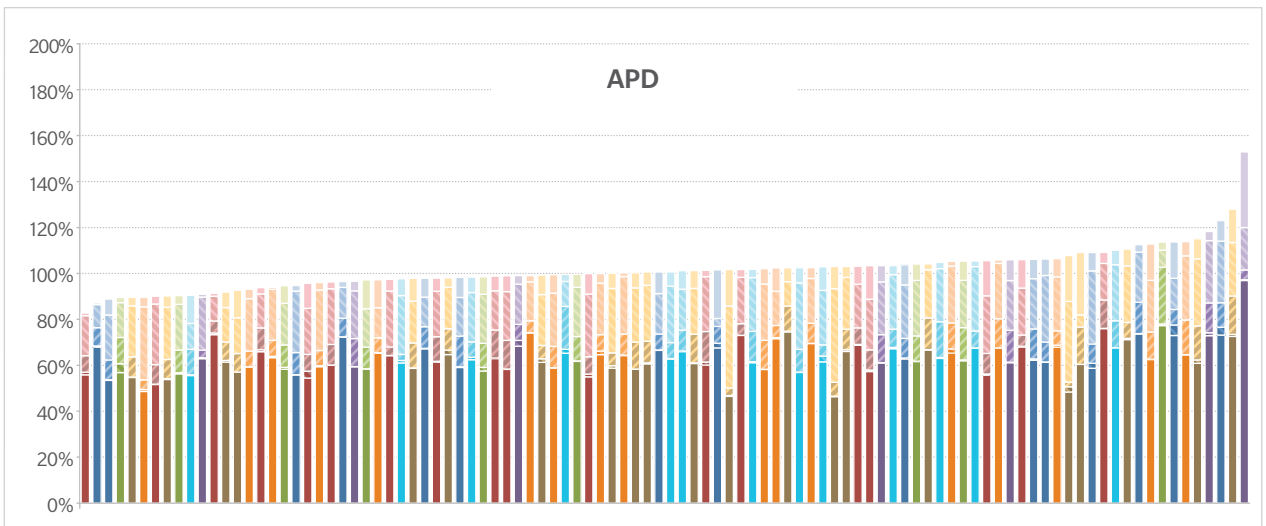
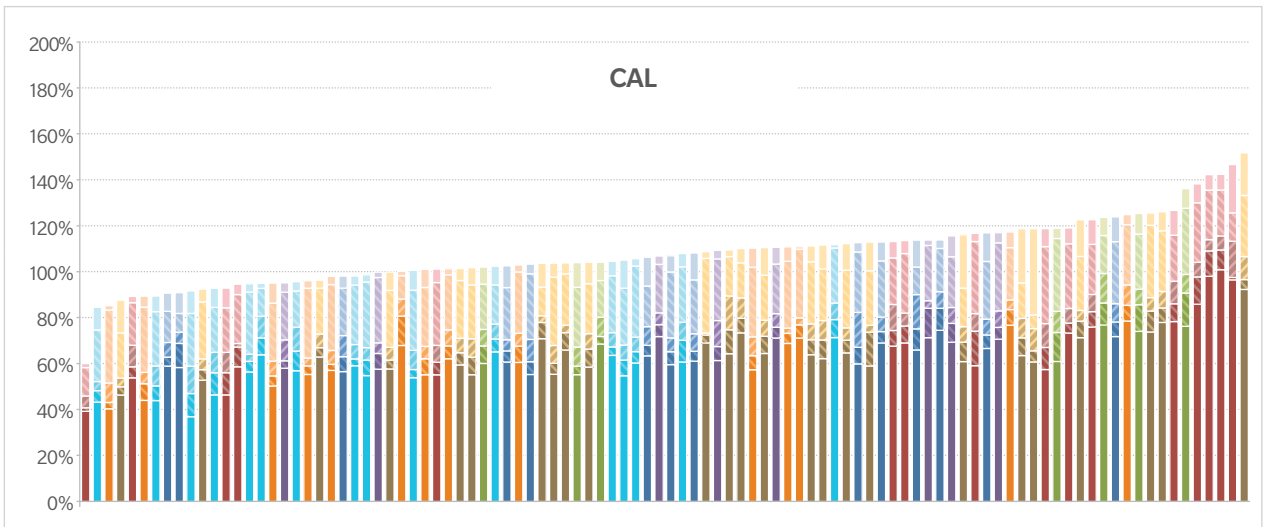
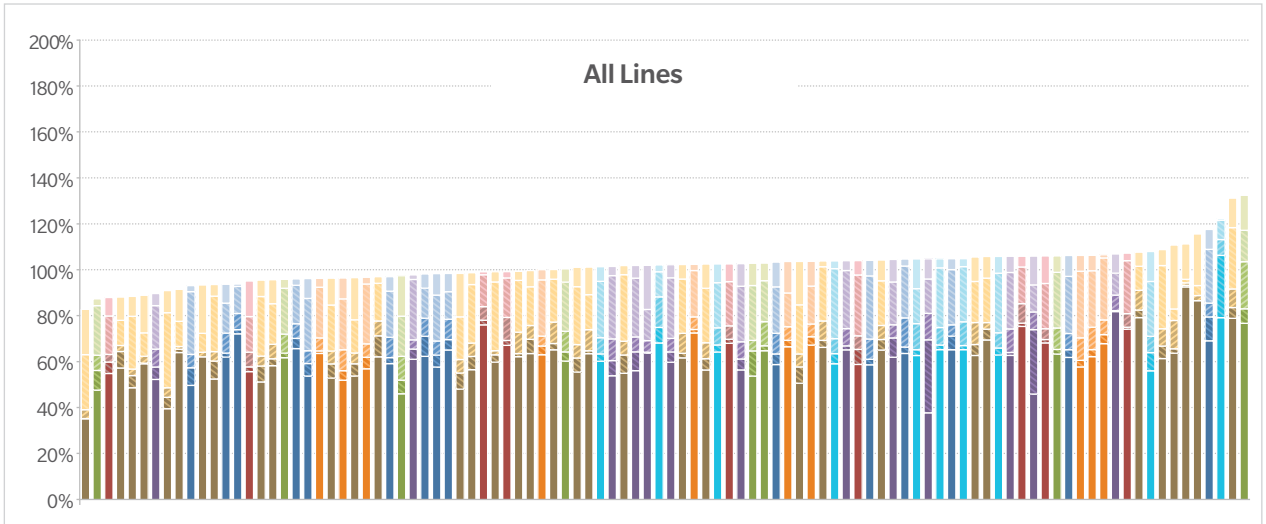




E4 | COMBINED RATIO SPREAD BY LINE OF BUSINESS

Midwest Northeast/Atlantic Top 15 Writers National Multi Regional West Southeast/Gulf

Underwriting

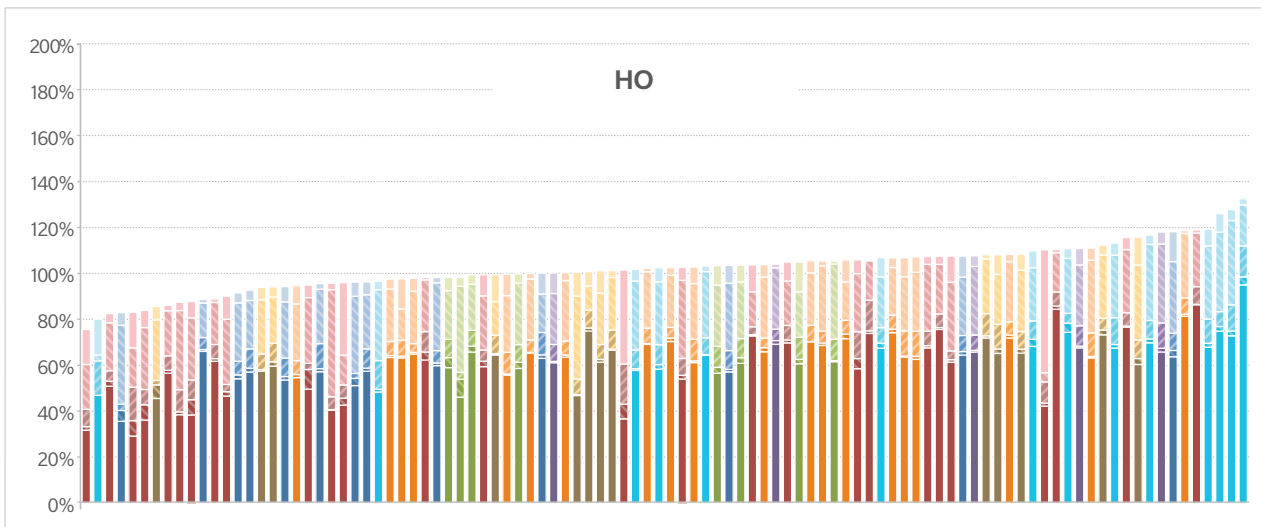
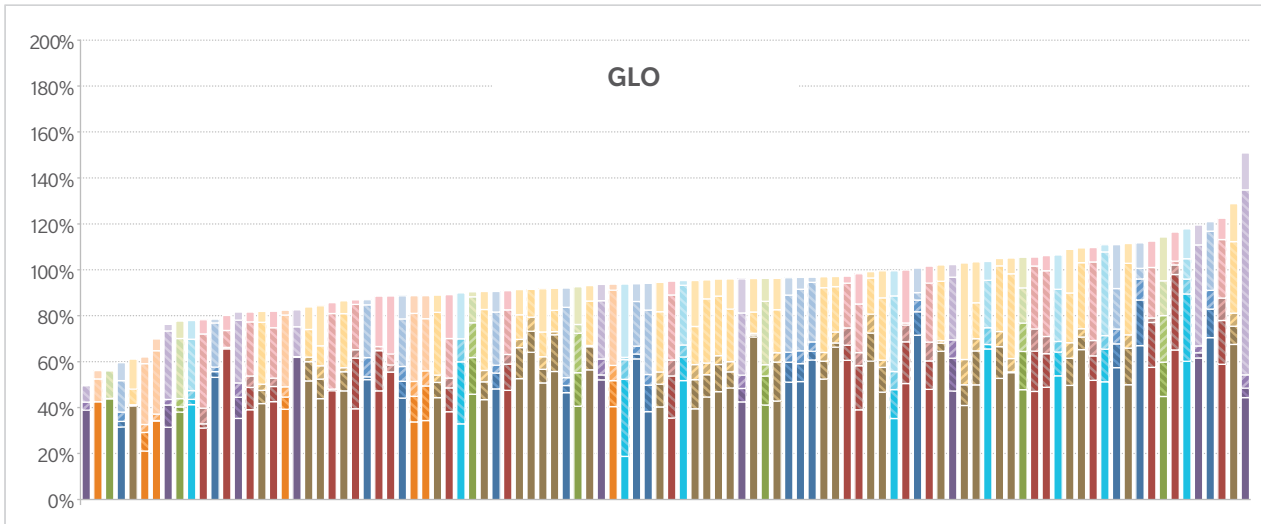


Source: Guy Carpenter



E4 | COMBINED RATIO SPREAD BY LINE OF BUSINESS

Midwest Northeast/Atlantic Top 15 Writers National Multi Regional West Southeast/Gulf



Source: Guy Carpenter

Underwriting

E5 | MARKET PERFORMANCE BY STATE

Exhibit 5: Discussion

Exhibit 5 charts direct calendar year experience by state for the industry and for a selected line — commercial property. By analyzing data at the state level we are able to assess which regions of the country are growing, which have been operating profitably and which have experienced the most volatility in underwriting performance. Finding profitable growth opportunities is top of mind for many insurers today, and many companies have found that growth into new states assists with top and bottom line expansion while diversifying their risk profile. Companies seeking growth in new states need to look beyond examining state insurance data – they need to model catastrophes, perform legal and macro-economic analysis and study distribution channels. For additional insight on how Guy Carpenter can help your company grow into new regions, please contact your Guy Carpenter account executive or RiskBenchmarks@guycarp.com.

Exhibit 5: Explanation

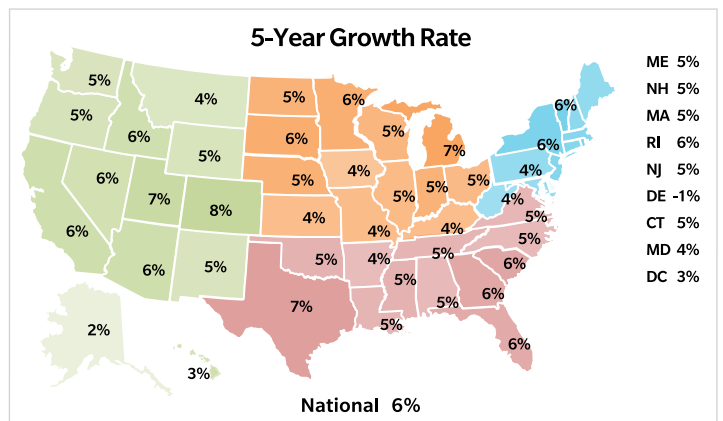
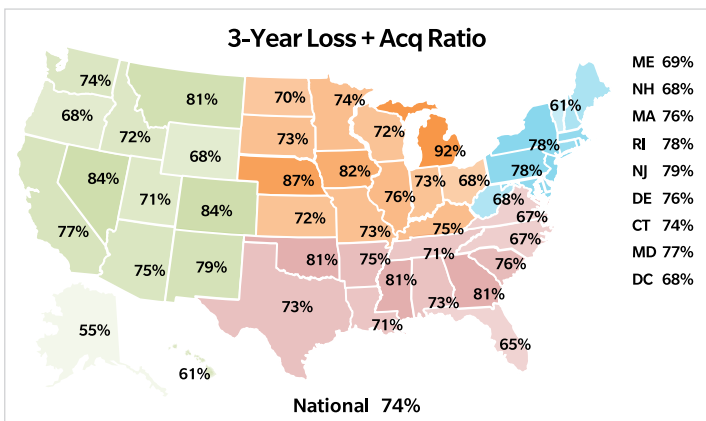
Across the country all lines combined direct written premium has grown at six percent annually over the past five years, with Delaware, Washington, D.C., Arkansas, Maryland and Hawaii among the slowest growing states. Texas, Utah, Colorado and Michigan have been the fastest growing states. Texas, New York, New Jersey, states in the Midwest and some Gulf Coast states have had the highest volatility in the last decade due to severe convective storms and Hurricane Sandy. Peak zone catastrophe states Florida and California as well as the Pacific Northwest states of Washington, Oregon and Idaho have not had significant catastrophe activity and have among the lowest loss ratio volatility in the experience period.

Overall U.S. commercial property business grew in line with the industry at six percent, but it has been significantly more concentrated in the Midwest, Texas and Colorado, which have been impacted by losses. California and Florida have grown at a significantly slower rate than the industry due to competition-driven rate cuts and lack of significant catastrophe activity. In the past ten years, while the Midwest states have exhibited the highest loss volatility in the United States, the relatively low volatility of the recent loss experience in Florida belies the significant risk inherent in that market.

Please refer to the Risk Benchmarks Supplement for Graphs for other lines of business.

E5 | MARKET PERFORMANCE BY STATE

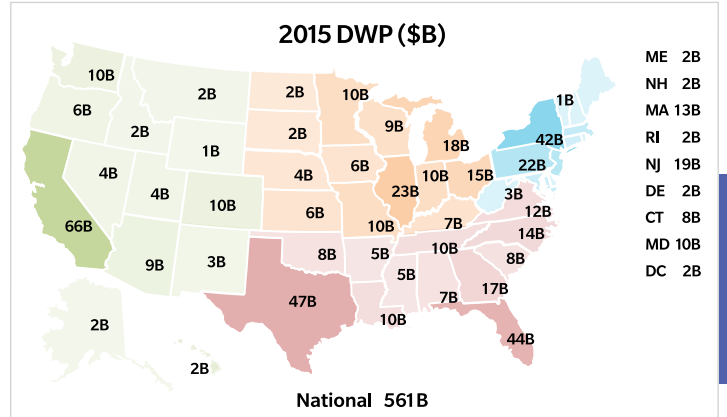
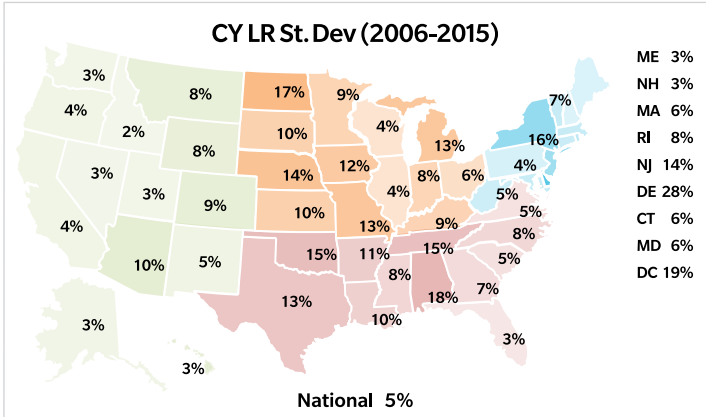
Total All Lines



Source: Guy Carpenter

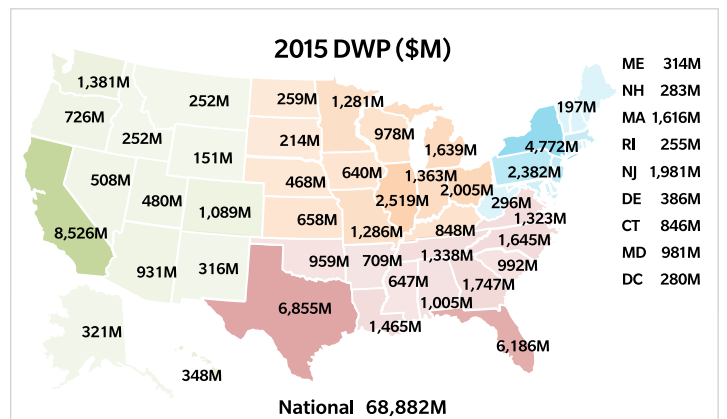
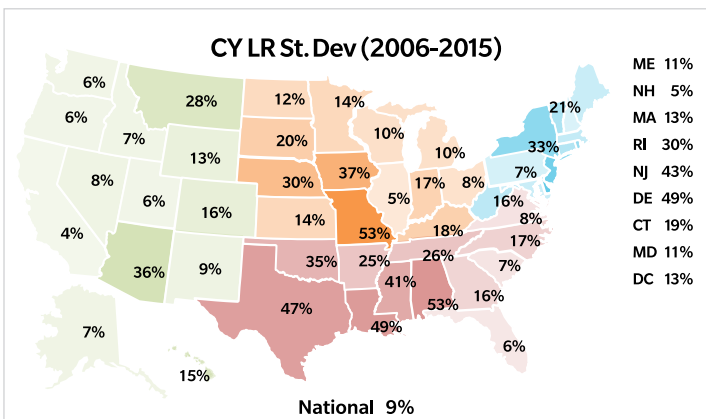
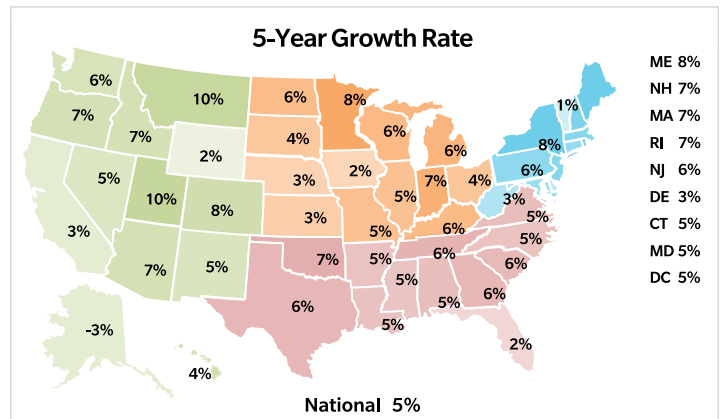
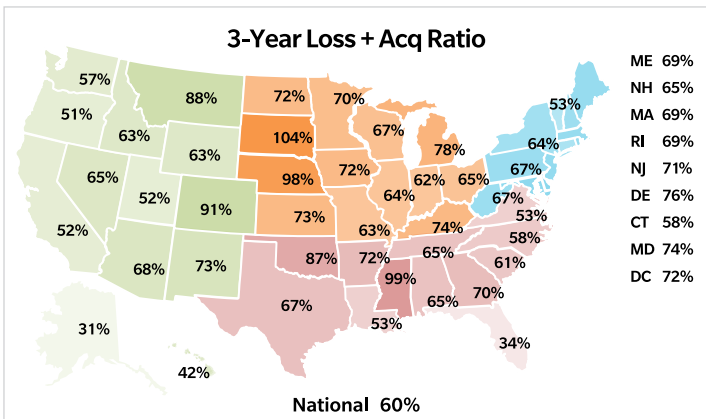


Total All Lines (Continued)



Underwriting

Commercial Property



Source: Guy Carpenter

2.5 MARKET COMPETITIVE DYNAMICS

E6 | LORENZ CURVES AND GINI COEFFICIENTS BY LINE OF BUSINESS

Exhibit 6: Explanation

Exhibit 6 includes three graphical depictions of the concentration of premiums in the insurance industry among carriers. The graphic labeled *Lorenz Curve* shows the breakout of 2015 net written premium by carrier for the industry by line of business. To construct these curves, we sort the companies in ascending order of total direct written premium. We then count the number of companies and the running total of cumulative premium they write. For example, the light green line is the Lorenz curve for general liability and it shows that approximately 90 percent of the companies write only ten percent of the total premium. The remaining ten percent of the companies, the largest companies in the industry, write the remaining 90 percent.

A diagonal reference line illustrates how a Lorenz curve would appear if each company in the industry wrote an equal amount of premium. The *Gini Coefficient* is a metric that calculates the proportion of total area under the reference line that is outlined by each Lorenz curve. Comparatively unequal marketplaces have Gini coefficients closer to one, which mean that they are dominated by fewer and larger companies. The graphic labeled *Gini Coefficient* plots how this statistic has changed in the industry over time in total and by line of business.

The calculation of the state and line of business Gini Coefficient is the same as the Lorenz Curve. The key difference is that the data is on state level and on a direct, calendar year basis.

The bubble chart depicts the Gini coefficient based on direct written premium for all lines combined for the ten largest states by P&C direct written premium. The vertical axis shows the 2015 Gini coefficient, while the horizontal axis shows that statistic in 2006. Bubbles that are above and to the left of the diagonal dotted line represent states whose insurance markets have become more concentrated in the last ten years, while states to the bottom right of the line have become less concentrated over the last decade. Bubble size is scaled according to total statewide 2015 direct written premium.

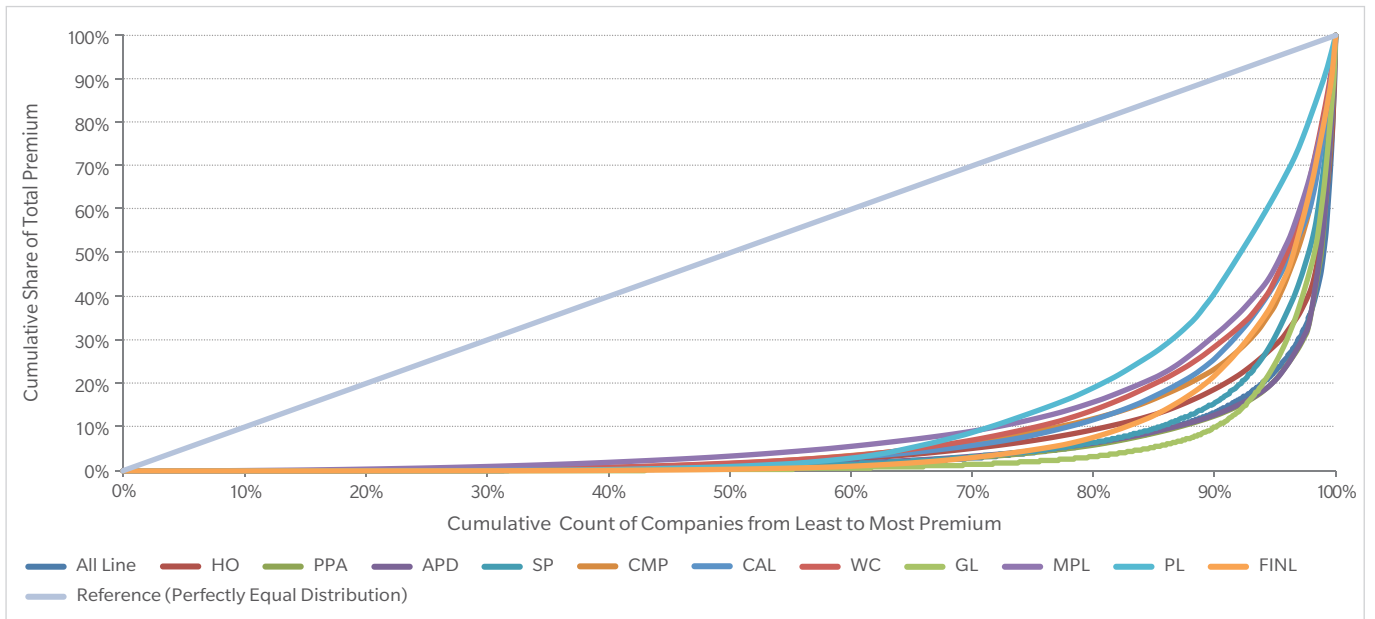
Exhibit 6: Discussion

In general, the P&C industry is very unequal and exhibits very high Gini coefficients. Certain specialty commercial liability lines such as products liability and medical professional liability are comparatively equal and present competitive opportunities for smaller carriers. We saw in Exhibit 3 that these lines have among the highest market slope, indicating opportunity for differentiation in profitability for the best underwriters. General liability and personal auto lines have among the highest concentration among major large carriers.

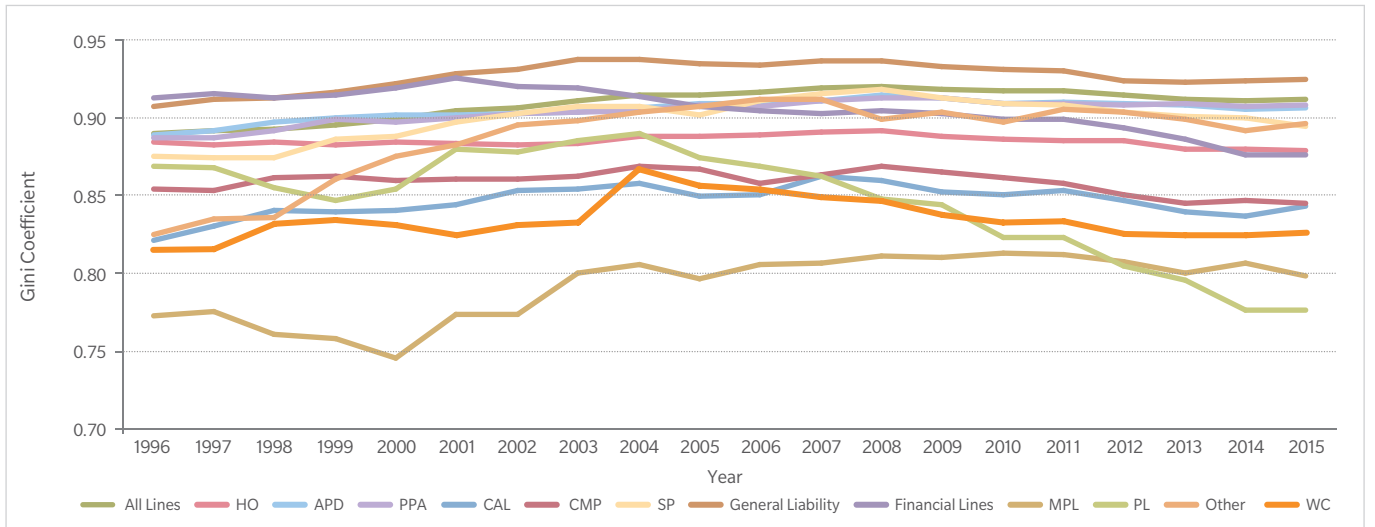
The Gini coefficient for the entire industry has trended downward slightly from a high in 2008 at 92.0 percent, demonstrating that the current environment is conducive to market growth for smaller carriers as some large carriers have reduced exposure in commercial auto, workers compensation and commercial property. We have confirmed the existence of this trend after making corrections for mergers and acquisitions.

Looking at individual state insurance markets, we see that among the largest states Florida is by far the least concentrated, due to the preponderance of small homeowners specialists who control a significant portion of the state property market. This trend has continued as the market has become less concentrated over the past decade, due in part to private market takeouts of policies previously insured by Florida Citizens. Texas, Illinois and Pennsylvania have also become less concentrated over the last decade, while Georgia, New York, Michigan and New Jersey have become more concentrated.

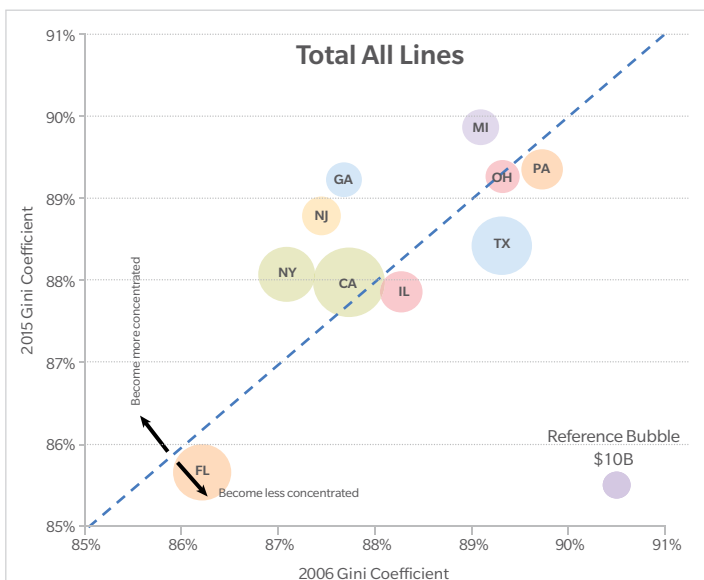
Insurance companies must balance a desire for growth with the risk associated with underpricing and adverse selection. Understanding how competitive dynamics have changed over time and what has driven those changes is an important piece of an effective growth strategy.



Gini Coefficient



Gini Coefficient



Line of Business	2015 Gini Coefficient
All Lines	0.91
APD	0.91
CAL	0.84
CMP	0.84
Financial Lines	0.88
GL	0.92
HO	0.88
MPL	0.80
Others	0.90
PPA	0.91
PL	0.78
SP	0.89
WC	0.83

2.6 PREMIUM TRENDS

E7 | PREMIUM TRENDS BY MARKET SEGMENT

Exhibit 7: Explanation

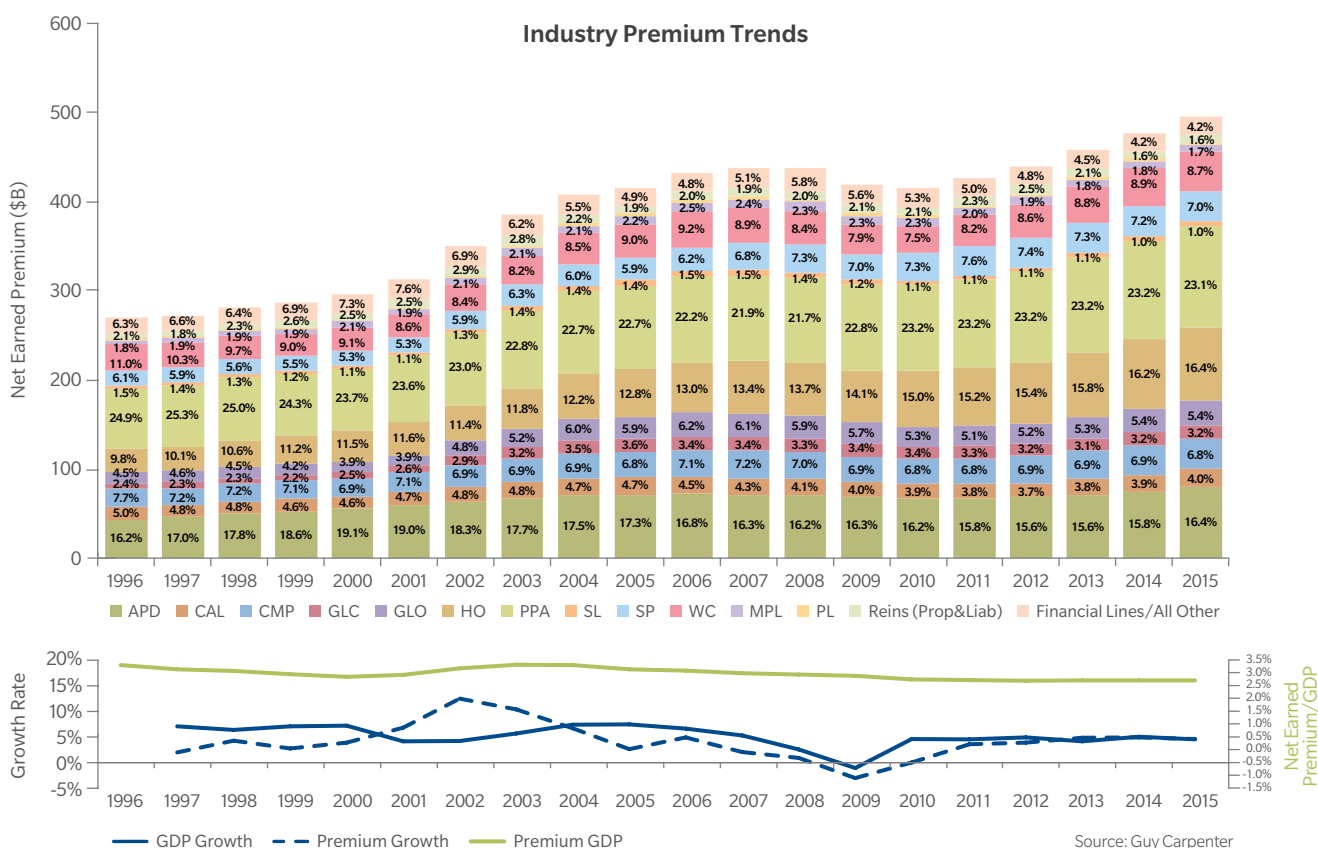
Exhibit 7 portrays growth trends in total premium for the industry, in total and separately for top 15 and non-top 15 carriers. The bar charts break out net earned premium by line of business in each year, showing shifts in the composition of the industry premium base. The line graphs compare annual premium growth to gross domestic product (GDP) growth and how premium growth differs between the top 15 and all other carriers. The GDP figures are the nominal GDP from U.S. Bureau of Economic Analysis. The list of Top 15 carriers is based on all lines net earned premium and is recalculated in each historic year to avoid growth bias in the data. The company list is the industry list, excluding reinsurers and companies with irregular premium or expense values.

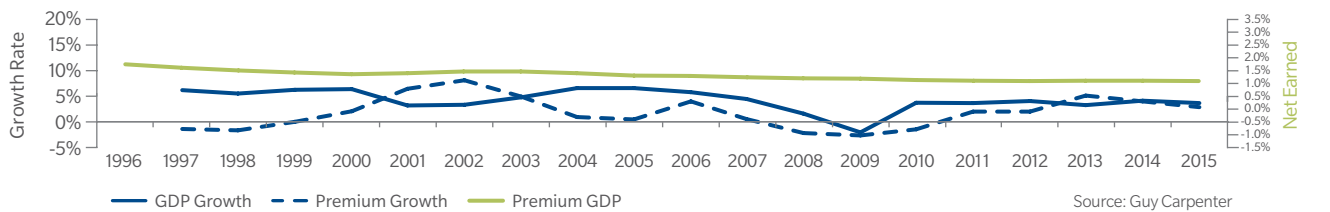
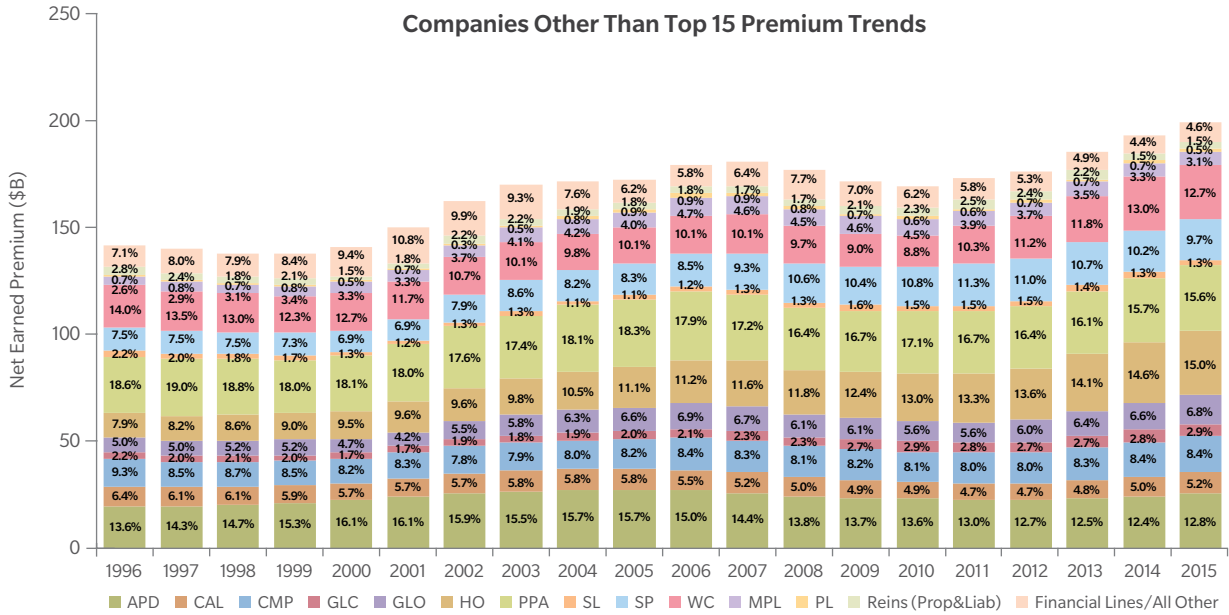
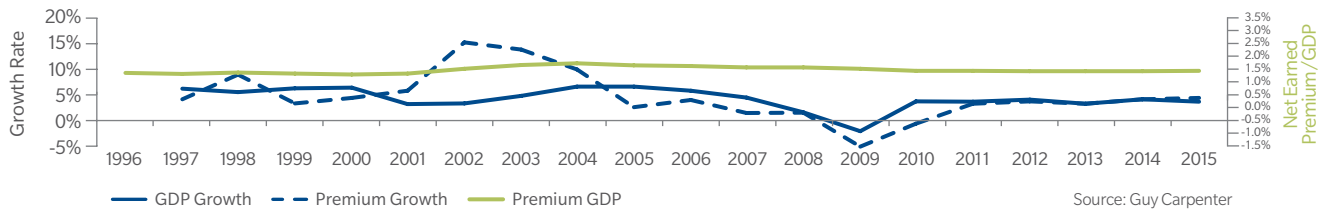
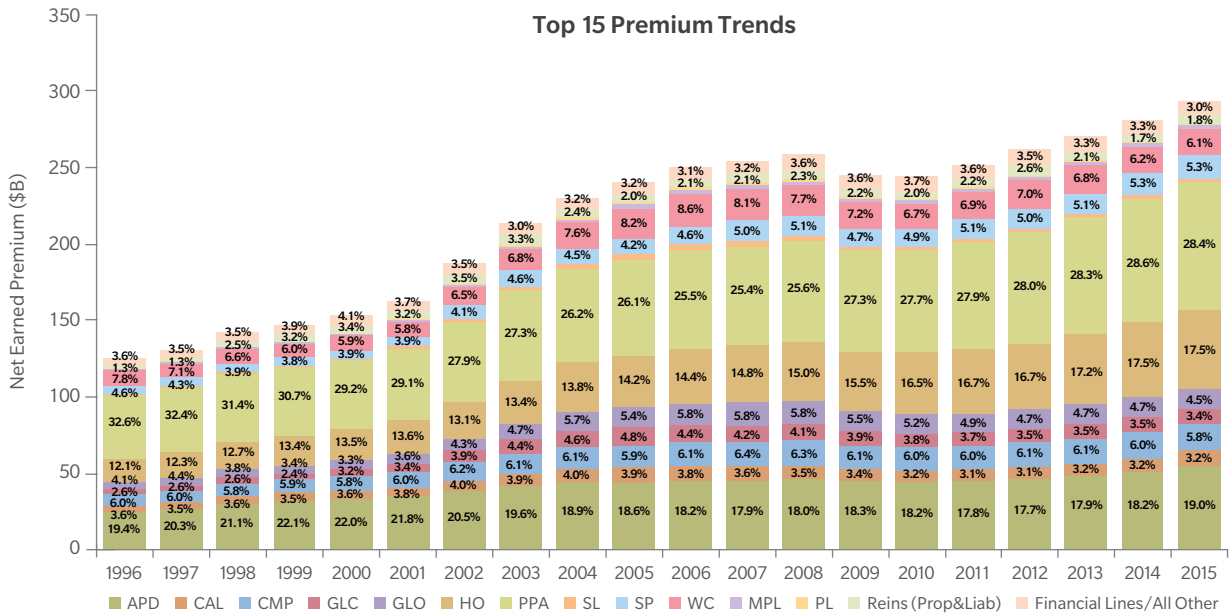
Exhibit 7: Discussion

The net earned premiums-to-GDP ratio has generally increased during hard markets and decreased during soft markets. The last peak in the premium-to-GDP ratio was in 2003 at approximately 3.4 percent. It has since fallen to 2.7 percent in 2012, and remained there for the past four years as both premium and GDP growth have held steady at slightly below the long term average. Premium growth has tended to correlate more to, but be more volatile than, GDP, due to the cyclicity of premium adequacy in the insurance industry.

An industry premium profile demonstrates the most striking trend being the increase of homeowners premium from 9.8 percent in 1996 to 16.4 percent in 2015. The advent and development of sophisticated modeling and challenging loss experience caused by various natural perils has increased understanding of property catastrophe exposure in this line. Industry wide the general liability and special property lines have grown faster than the overall market, while growth in workers compensation, commercial and personal auto liability have trailed the market average.

Comparing the top 15 carriers with the remainder of the market demonstrates that larger companies are disproportionately concentrated in personal lines, while smaller companies have a greater presence in commercial lines. Please refer to the Risk Benchmarks for additional premium breakouts by segment.



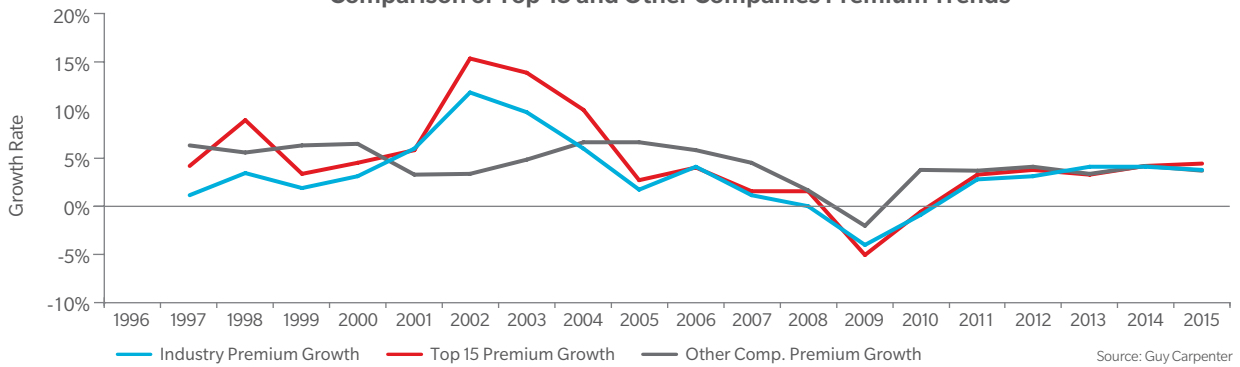




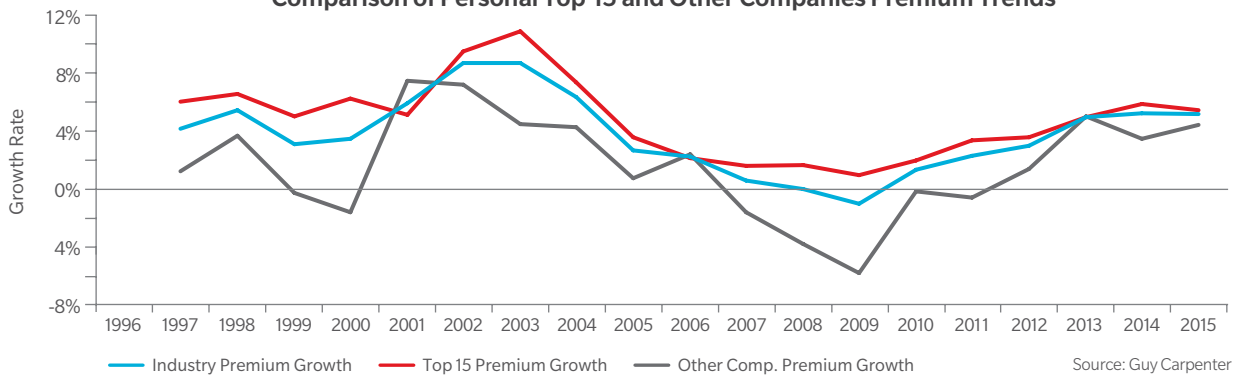
E7 | PREMIUM TRENDS BY MARKET SEGMENT

Underwriting

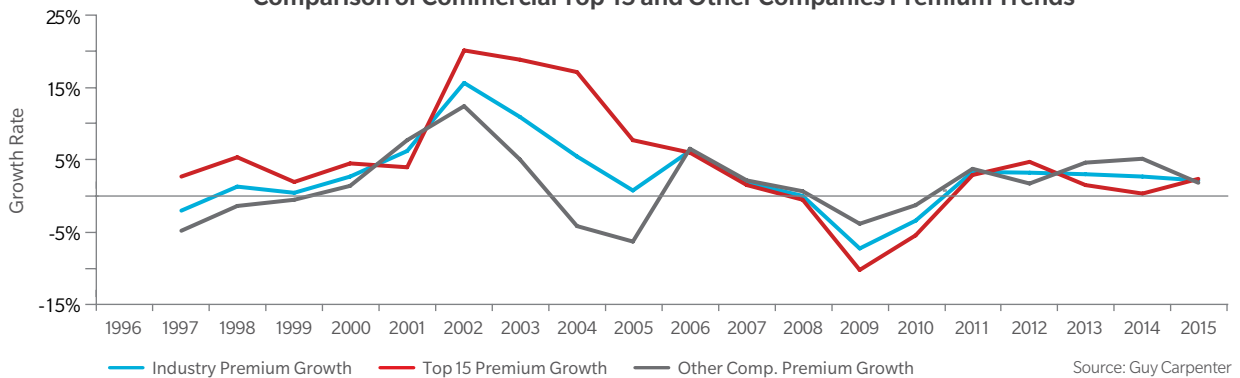
Comparison of Top 15 and Other Companies Premium Trends



Comparison of Personal Top 15 and Other Companies Premium Trends



Comparison of Commercial Top 15 and Other Companies Premium Trends





2.7 VOLATILITY IMPACT OF CEDED REINSURANCE

E8 | TRENDS IN REINSURANCE UTILIZATION

Exhibit 8: Explanation

Exhibit 8 provides company ceding patterns by line of business over time. To isolate the effects of external reinsurance compared with company pooling, we analyze only premium ceded to non-affiliates. The graphs separate the industry between the top 25 writers in each given year and all other carriers. The list of top 25 writers is recalculated each year and is based on direct written premium in the analyzed line of business.

Exhibit 8: Discussion

Exhibit 8 demonstrates a clear trend in HO, commercial property and personal auto lines where smaller carriers appear to purchase significantly more third-party reinsurance than larger carriers. Larger carriers generally have greater geographic diversification and a larger capital base to leverage, allowing them to absorb greater net volatility in their operating results. Larger premium bases also allow companies to better weather individual large claims, reducing the demand for per risk and working layer covers to protect against individual large claims. Finally, large carriers in a given line may feel more comfortable with the risks inherent with that particular line of business – a large commercial property specialist may be less likely to use facultative reinsurance to reinsure a factory or other unique risk because the company management believes they have the expertise to price and retain that risk in-house. Conversely, a carrier that offers commercial property as a supporting line may be more likely to seek third-party protection for a difficult or unique risk as it does not have the experience or the scale to comfortably price and retain that risk net.

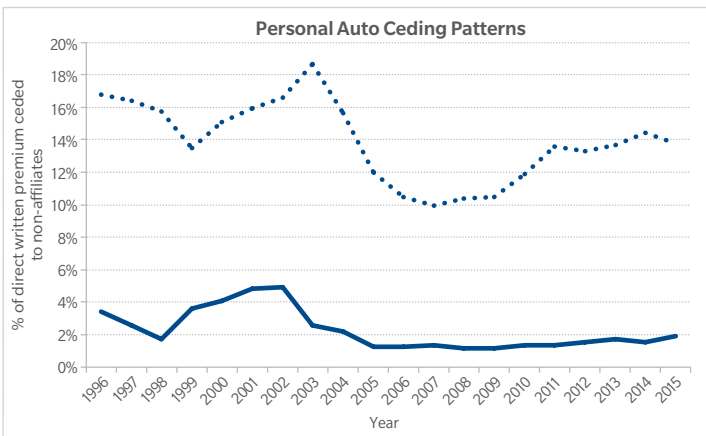
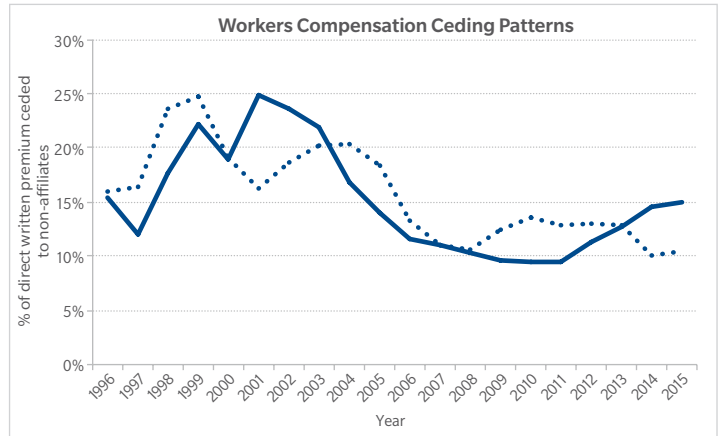
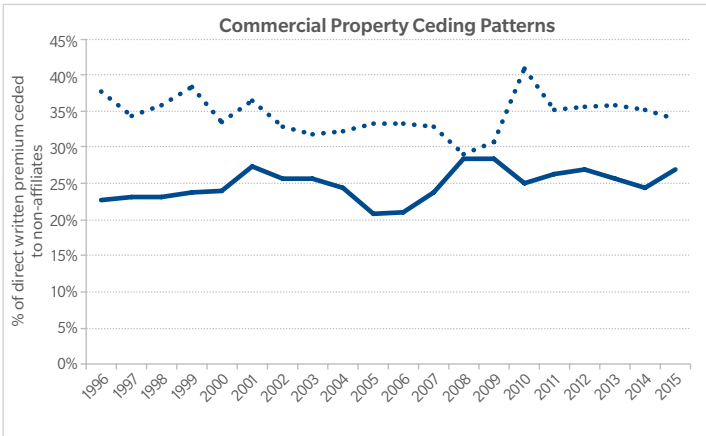
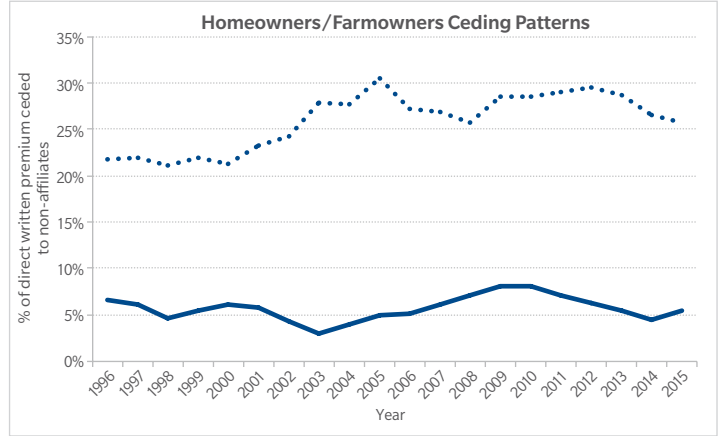
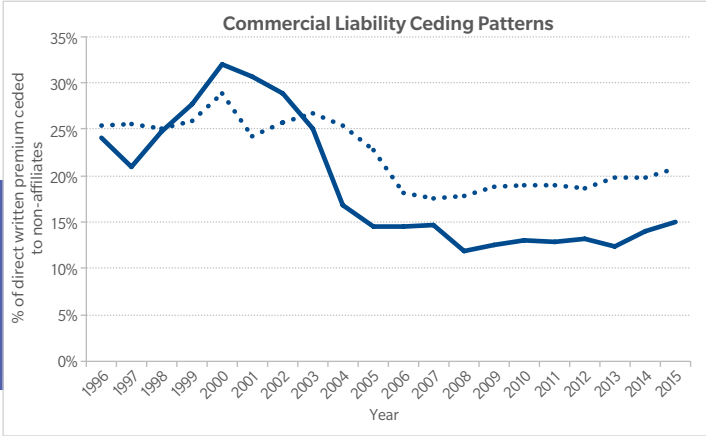
For WC and commercial liability, the pattern in reinsurance utilization between large and small carriers is less clear. Workers compensation carriers tend to use a roughly equal amount of reinsurance whether they are large or small. Typically, primary workers compensation covers have no limit per claimant, so nearly all insurers will seek per risk covers to cap their potential liability for any individual claim. A characteristic of casualty lines that differs from property lines is the cyclical nature of their loss reserve development. Companies purchasing casualty reinsurance often seek protection from the systemic impact of claims inflation across many claims, which may take several years to emerge. Claims inflation tends to have a leveraged impact on excess coverage layers, so reinsurance, particularly excess of loss coverage, is a good way for many companies to mitigate their reserve risk emanating from long-tail casualty exposures.

Within WC and commercial liability lines, reinsurance utilization peaked from 1999 to 2002 during the peak of the last casualty hard market cycle. From 2002 to 2009 ceded premium declined as a percent of direct as the casualty market recovered and companies became increasingly better capitalized. Since 2009, the ceded premium percentage for casualty lines has stayed largely steady, even increasing slightly since 2013. This degree of cyclical nature in reinsurance utilization is largely a casualty phenomenon – property reinsurance utilization percentages have stayed mostly stable over the last two decades.



E8 | TRENDS IN REINSURANCE UTILIZATION

Underwriting



— Top 25 Writers Reins% ···· Non-Top 25 Writers Reins%

Source: Guy Carpenter

E9 | VOLATILITY REDUCTION OF REINSURANCE

Exhibit 9: Explanation

Exhibit 9 captures the benefit companies have received over the past 29 years in volatility reduction from their reinsurance cessions. For each line of business we have divided companies into three groups – low, medium and high reinsurance utilization based on the percentage of direct written premium that they cede to non-affiliates. The thresholds for low, medium and high reinsurance utilization are assigned by line of business to evenly divide the companies so there are roughly an equal number of companies in each of the three groups. These thresholds are reported in the table accompanying the exhibit. We carefully filter out companies by line of business based on premium volume and number of years of activity in the line to ensure we are capturing only companies with a consistent and significant underwriting footprint in the given line. We then examine each company's gross and net loss ratio volatility from 1987 to 2015.

The line chart compares the gross and net loss ratio volatility for the average company in each of the three reinsurance utilization categories.

The box and whiskers plot charts the benefit of reinsurance in volatility reduction along the spectrum of companies in each line of business and reinsurance utilization category. Companies that receive little or no benefit in terms of volatility reduction will be at the bottom of the distribution (25 percent), while those that have received the most benefit will be near the top (75 percent and 90 percent). The median point is marked to denote the volatility reduction that the median company has received from each cohort.

Exhibit 9: Discussion

Looking first at the line chart, it is clear that for all lines of business analyzed, companies with higher reinsurance utilization have higher historic net and gross loss ratio volatilities than companies with lower reinsurance utilization. This is an interesting finding and is likely a function of several factors. First, as discussed in Exhibit 8, larger companies tend to purchase less reinsurance for some lines of business and their results may be more stable due to premium volume and geographic diversification. Second, companies that operate in riskier sub-segments within a given line may be more likely to utilize reinsurance to achieve underwriting guidance and smooth out volatile results. Finally, companies that grow rapidly tend to experience more volatile results than companies in steady state, and they will also typically be more heavily reinsured. Whatever the cause, it is clear that companies that use reinsurance most heavily are expecting, and generally experience, significantly higher loss volatility than companies who utilize reinsurance less.

The box and whisker chart and the accompanying table demonstrate the impact of reinsurance on loss ratio volatility. For some lines of business, there is a direct relationship for the average company between higher reinsurance utilization and greater volatility reduction. In other words, on average, companies ceding more premiums have reported a greater relative stability in their net results compared with gross results than companies taking more of their risk net. For the median company this relationship holds for GLO, GLC, HO and PL. This relationship does not hold for CAL, CMP, MM and WC, where the highest volatility reduction is achieved by companies in the medium cession group.

When we compare the 75th percentile company rather than the median company, we find a consistent relationship across all analyzed lines of business between reinsurance utilization and volatility reduction.

In a comparison of the 90th percentile company across lines of business, we find that reinsurance has the greatest impact on underwriting volatility in the property exposed CMP and HO lines. The companies captured in this cohort have experienced catastrophe activity and have benefited from reinsurance cessions in catastrophe-impacted accident years.

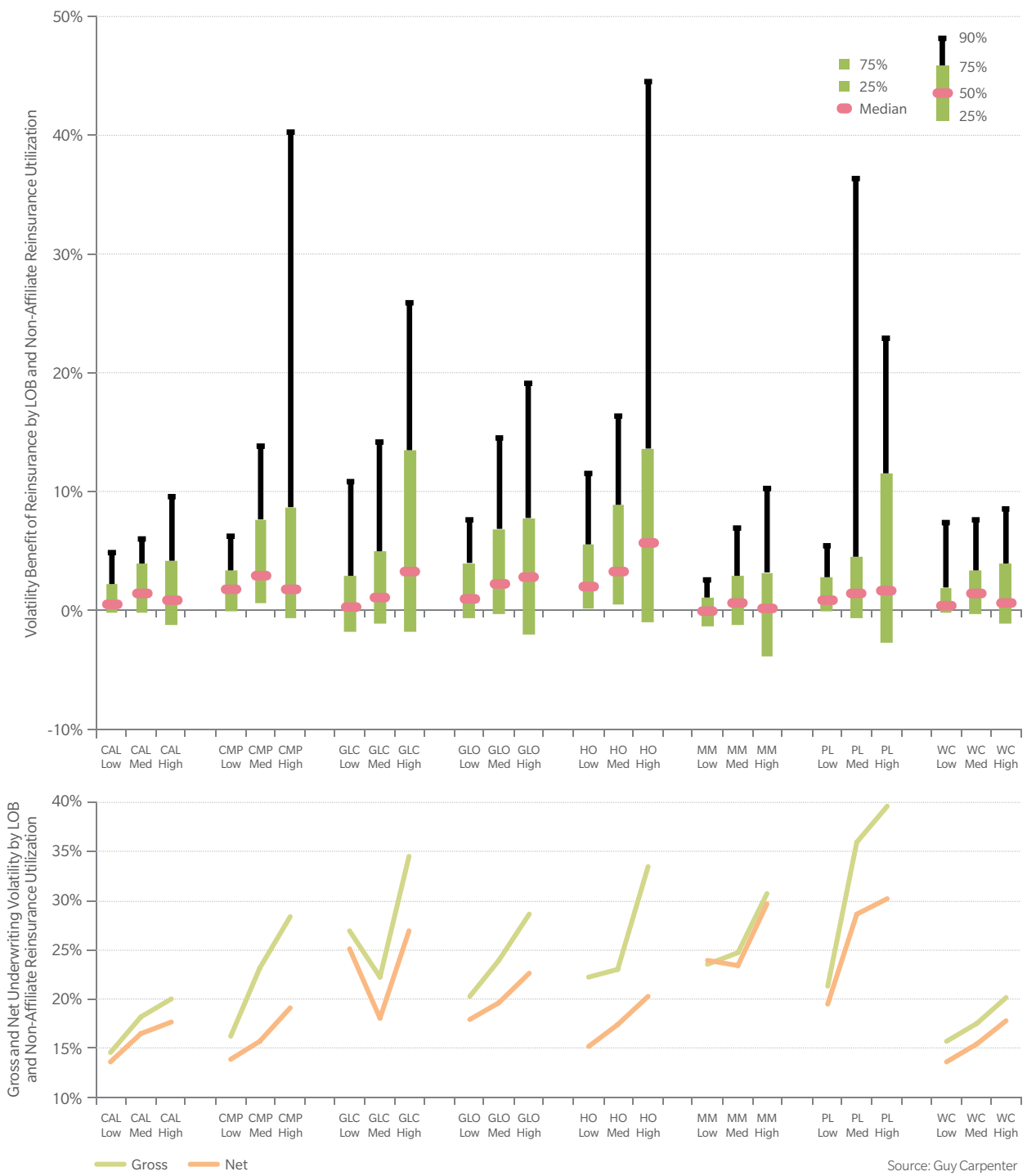
The 25th percentile company generally demonstrates little reduction in volatility and often a slightly higher volatility net of reinsurance compared with gross.

The impact of reinsurance in volatility reduction is negligible for companies with very little volatility in their gross underwriting results, but reinsurance materially reduces that volatility.



E9 | VOLATILITY REDUCTION OF REINSURANCE

Underwriting



Source: Guy Carpenter

E9 | VOLATILITY REDUCTION OF REINSURANCE

Line of Business	Low Reinsurance Utilization Companies								
	Ceded to Non Affiliates Threshold Minimum	Ceded to Non Affiliates Threshold Maximum	Gross LR CV	Net LR CV	Mean Volatility Reduction (Gross Net)	25th Percentile Volatility Reduction	50th Percentile Volatility Reduction	75th Percentile Volatility Reduction	90th Percentile Volatility Reduction
CAL		6.1%	14.6%	13.6%	1.0%	-0.2%	0.5%	2.2%	4.8%
CMP		12.5%	16.2%	13.9%	2.3%	0.0%	1.7%	3.3%	6.3%
GLC		14.6%	27.0%	25.1%	1.9%	-1.9%	0.3%	2.9%	10.8%
GLO		17.7%	20.3%	18.0%	2.3%	-0.7%	1.0%	4.0%	7.5%
HO		11.2%	22.2%	15.2%	7.0%	0.1%	2.0%	5.5%	11.5%
WC		8.3%	15.8%	13.7%	2.1%	-0.3%	0.4%	1.9%	7.4%
MM		10.4%	23.5%	24.0%	-0.5%	-1.3%	-0.1%	1.1%	2.5%
PL		3.6%	21.4%	19.6%	1.8%	0.0%	0.8%	2.7%	5.4%

Source: Guy Carpenter

Line of Business	Med Reinsurance Utilization Companies								
	Ceded to Non Affiliates Threshold Minimum	Ceded to Non Affiliates Threshold Maximum	Gross LR CV	Net LR CV	Mean Volatility Reduction (Gross Net)	25th Percentile Volatility Reduction	50th Percentile Volatility Reduction	75th Percentile Volatility Reduction	90th Percentile Volatility Reduction
CAL	6.1%	18.2%	18.3%	16.6%	1.7%	-0.2%	1.4%	3.9%	6.0%
CMP	12.8%	24.8%	23.1%	15.7%	7.4%	0.6%	2.9%	7.0%	13.2%
GLC	15.1%	34.3%	22.3%	18.0%	4.2%	-1.2%	1.1%	4.9%	14.1%
GLO	17.9%	35.0%	24.0%	19.7%	4.3%	-0.4%	2.2%	6.8%	14.5%
HO	11.2%	25.7%	23.1%	17.4%	5.6%	0.4%	3.3%	8.4%	16.0%
WC	8.3%	20.2%	17.6%	15.5%	2.1%	-0.4%	1.3%	3.3%	7.5%
MM	10.6%	20.3%	24.7%	23.4%	1.4%	-1.2%	0.6%	2.8%	6.9%
PL	3.6%	20.2%	36.0%	28.6%	7.4%	-0.7%	1.4%	4.4%	36.3%

Source: Guy Carpenter

Line of Business	High Reinsurance Utilization Companies								
	Ceded to Non Affiliates Threshold Minimum	Ceded to Non Affiliates Threshold Maximum	Gross LR CV	Net LR CV	Mean Volatility Reduction (Gross Net)	25th Percentile Volatility Reduction	50th Percentile Volatility Reduction	75th Percentile Volatility Reduction	90th Percentile Volatility Reduction
CAL	18.2%		20.0%	17.7%	2.3%	-1.3%	0.8%	4.2%	9.6%
CMP	24.9%		28.4%	19.1%	9.3%	-0.7%	1.7%	8.7%	40.2%
GLC	35.9%		34.6%	27.0%	7.6%	-1.8%	3.2%	13.5%	25.8%
GLO	35.1%		28.6%	22.6%	6.0%	-2.0%	2.7%	7.8%	19.1%
HO	25.9%		33.5%	20.3%	13.2%	-1.1%	5.7%	13.6%	44.5%
WC	20.5%		20.1%	17.8%	2.3%	-1.1%	0.5%	3.9%	8.5%
MM	20.8%		30.7%	29.6%	1.1%	-3.9%	0.2%	3.2%	10.2%
PL	20.2%		39.7%	30.3%	9.4%	-2.7%	1.6%	11.5%	22.9%

Source: Guy Carpenter

2.8 FREQUENCY AND SEVERITY TRENDS

E10 | FREQUENCY AND SEVERITY TRENDS

Claim frequency and severity since 1995

Supplemented by macroeconomic data for estimates of exposure

Exhibit 10: Explanation

Exhibit 10 combines loss experience and claim counts from the industry statutory database with macroeconomic proxies for insured exposure base. With this combined data we present standard actuarial measures by line of business: frequency (claims per exposure unit) and severity (loss dollars per claim). Trends over time reflect changes to the pure premium (expected loss dollars per exposure unit) for which insurance policies are purchased.

As noted in the table, we cite various sources for the exposure base proxies:

- **BEA:** U.S. Bureau of Economic Analysis, Department of Commerce;
- **CPS:** U.S. Census Bureau, Current Population Survey/Housing Vacancy Survey, Series H-111;
- **BLS:** U.S. Bureau of Labor Statistics, Labor Force Statistics, Department of Labor;
- **DOT:** U.S. Department of Transportation RITA (Research and Innovative Technology Administration), Bureau of Transportation Statistics; and
- **EIA:** U.S. Energy Information Administration, Independent Statistics and Analysis.

These proxies are not perfect measures of insured exposure base, but nevertheless provide insightful views on long term trends in the loss experience.

Exhibit 10: Discussion

In general, industry pure premium for the last two decades has shifted towards fewer, more expensive claims in two ways. First, claims have become more expensive. Significant growth in claim severity arose at the turn of the millennium, due to accelerated medical inflation and utilization and has continued at a slower but positive rate since. Second, frequency trends have generally been negative. Improvements in technology and infrastructure – workplace safety programs affecting workers compensation and improved roads affecting private passenger auto – have led to fewer claims per exposure unit.

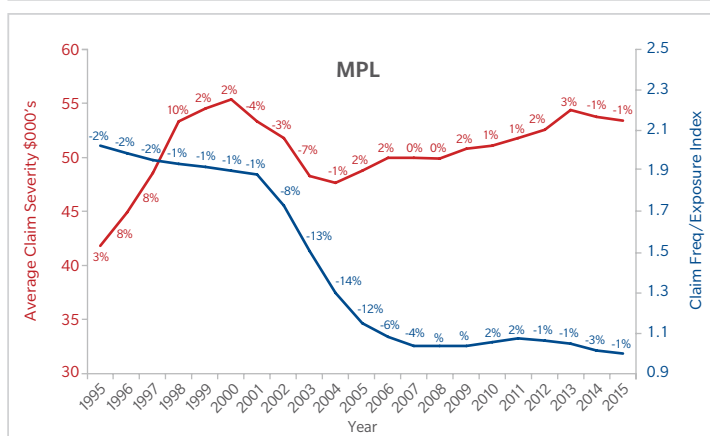
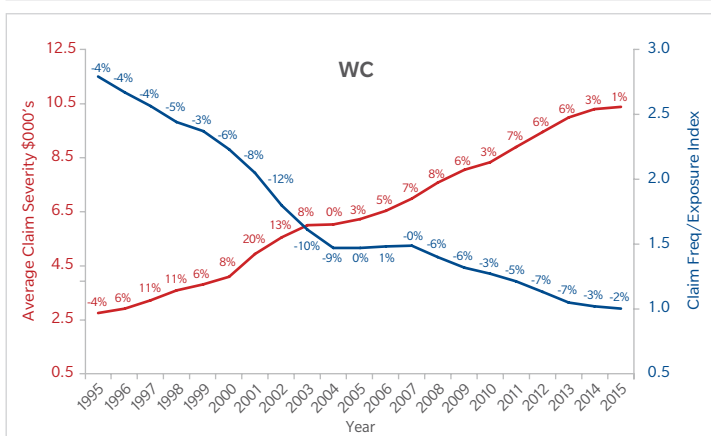
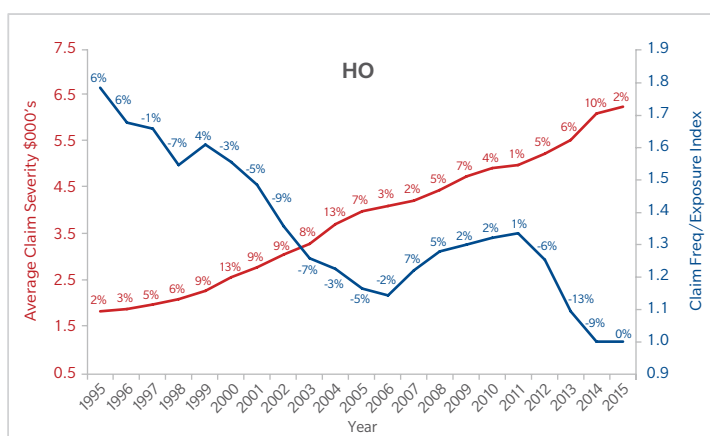
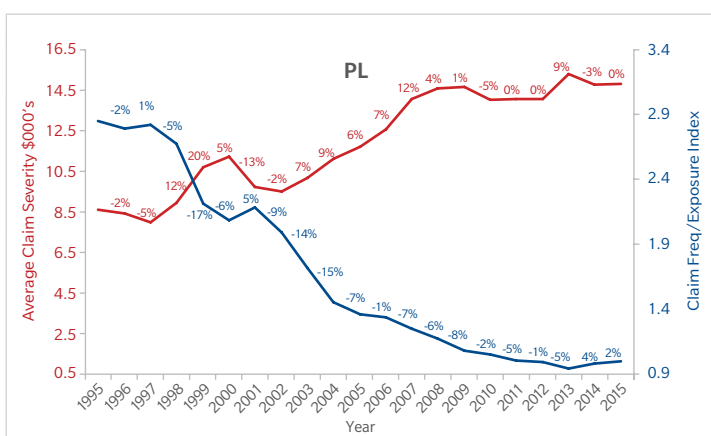
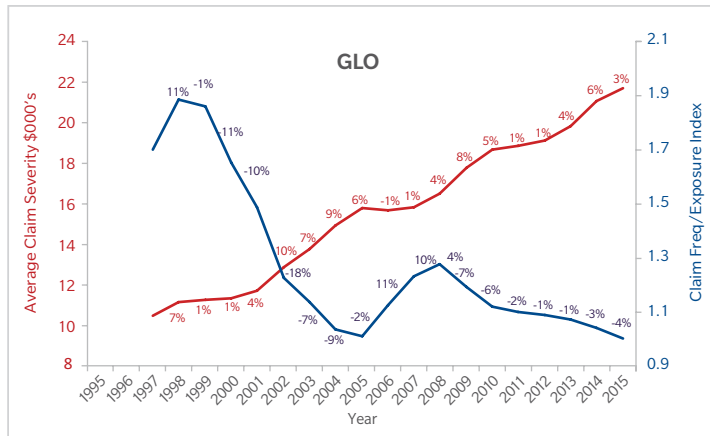
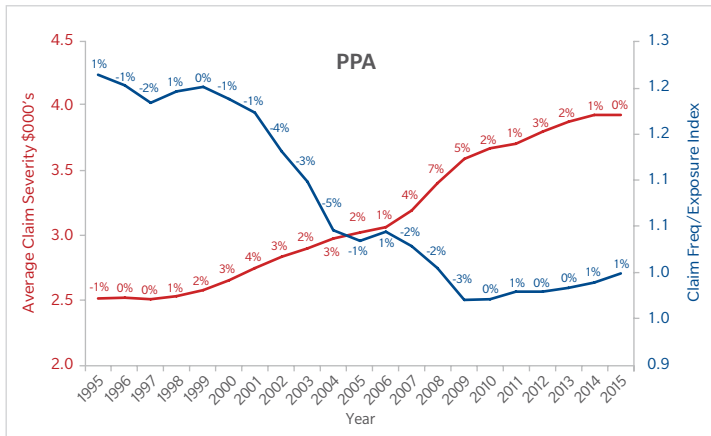
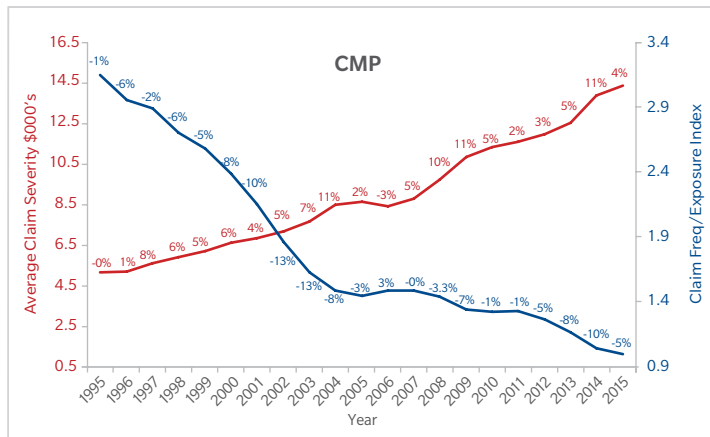
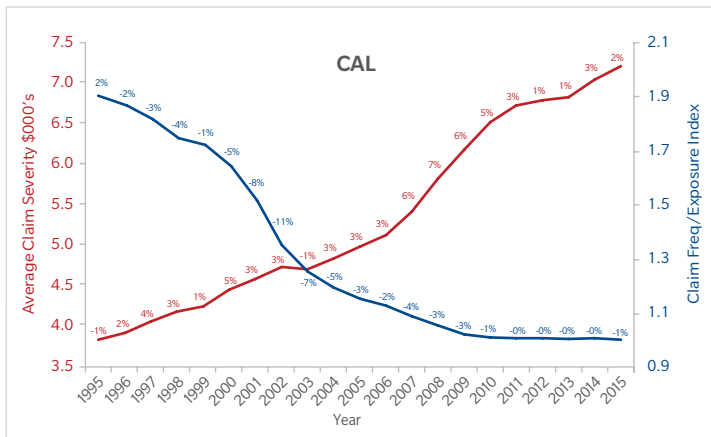
While the trend toward lower claim frequency seems to have stabilized in recent years for auto insurance policies, it continues at a significant pace for the long-tailed casualty lines. These lines (general liability, medical professional liability and products liability) have the highest severities as they do not include property or indemnity coverages.

Line of Business	Avg Claim Severity	Severity Trend	Frequency Trend	Exposure Base
	2013-2015	2010-2015	2010-2015	
CAL	7.0	2.1%	-0.2%	EIA: Gallons of diesel fuels for highway use
CMP	13.6	4.9%	-5.5%	BEA: Personal Consumption Quantity Index - Goods & Services
GLO	20.8	3.1%	-2.2%	BEA: Personal Consumption Quantity Index - Goods & Services
HO	6.0	4.8%	-5.4%	CPS: Number of Owner Occupied Housing Units
MPL	53.9	0.9%	-1.1%	BEA: Personal Consumption Quantity Index - Goods & Services
PPA	3.9	1.4%	0.6%	DOT: Number of Road Miles Traveled
PL	15.0	1.1%	-1.0%	BEA: Personal Consumption Quantity Index - Goods & Services
WC	10.2	4.5%	-4.7%	BLS: Number of Employed Workers

Source: Guy Carpenter

E10 | FREQUENCY AND SEVERITY TRENDS

Severity/Claim(\$000's) Freq Index



Source: Guy Carpenter

III. RESERVE DEVELOPMENT RISK

3.1 INTRODUCTION

Reserve risk is the single biggest source of volatility on most P&C insurer's balance sheets. As noted in prior years' reports, reserve risk demonstrates clear cyclical tendencies and the industry has recently enjoyed a 13 year run of flat or favorable reserve development. Factors external to the industry, such as improvements in vehicle and building safety; lack of casualty catastrophe events; and a generally low inflation environment brought on by the 2008 Great Recession have contributed to this development. This section demonstrates that like any financial asset or liability, valuation of long-tail P&C reserve liabilities carries with it a level of uncertainty. This section discusses the relationship between empirical volatility in claims reserves and claims duration. We do not opine on the adequacy of the industry's current reserves, but we do note that current conditions and trends broadcast a need for careful attention. These statistics serve as empirical reminders of the potential magnitude of the risk.

3.2 INDUSTRY RISK IN TOTAL

T6 | ONE CALENDAR YEAR DEVELOPMENT BY LINE OF BUSINESS For groups of ten accident years, net of reinsurance

Table 6: Explanation

Table 6 compares the potential for one-year adverse development in claims reserves between lines of business based on industry experience since 1980. We compute the *One Calendar Year Development* across that time period using groups of ten consecutive accident years at a time. This metric measures the change in the booked reserve beyond what was expected between 12/XX to 12/XX+1. For example, we calculate:

$$\text{One Calendar Year Development} = \frac{\text{Reserve at 12/2015} + \text{Paid During 2015} - \text{Reserve at 12/2014}}{\text{Reserve at 12/2014}}$$

The reserve at 12/2015 is the total reserve for prior Accident Years 2005 to 2014 and the paid during 2015 is also for prior Accident Years 2005 to 2014.

We repeat this calculation for all periods 12/2014, 12/2013... to 12/1989 to produce 26 measures of One Calendar Year Development for each line of business. Table 6 presents basic statistics from that array of measures.

Line of Business	Mean (1)	StDev (2)	Minimum (3)	Maximum (4)
CAL	1.00	3%	0.97	1.08
CMP	0.99	3%	0.94	1.04
GLC	0.99	7%	0.90	1.19
GLO	0.99	3%	0.95	1.06
HO	0.96	5%	0.89	1.11
MPLC	0.96	6%	0.89	1.12
MPLO	0.96	5%	0.89	1.07
PPA	0.96	3%	0.92	1.00
PLC	0.99	10%	0.81	1.25
PLO	1.00	5%	0.90	1.10
WC	0.99	3%	0.95	1.06

Source: Guy Carpenter

T7 | ULTIMATE RESERVE DEVELOPMENT BY LINE OF BUSINESS

For groups of ten accident years, net of reinsurance

Table 7: Explanation

Table 7 compares the potential for ultimate adverse development in claims reserves between lines of business based on industry experience since 1980. We compute the *Ultimate Reserve Development* across that time period using groups of ten consecutive accident years at a time. This metric measures the change in the booked reserve over nine development years, from 12/XX to 12/XX+9. For example, for 2006 we calculate:

$$\text{Ultimate Reserve Development} = \frac{\text{Sum (Booked Ultimate Loss at 120 Months – Total Paid Loss at 12/2006)}}{\text{Reserve at 12/2006}}$$

Where the summation is for all values this represents accident years 1997 to 2006.¹

When we repeat this calculation as of 12/2005, the values are for accident years 1996 to 2005. We perform this calculation for all periods 12/2006, 12/2005... to 12/1989 to produce 18 measures of Ultimate Reserve Development for each line of business. Table 7 presents basic statistics from that array.

It is important to emphasize that because the statistic requires ten development years to compute, the Ultimate Reserve Development that will emerge for accident years 2007 to present is not included in the metric.

Table 7: Discussion

Table 6 demonstrated that One Calendar Year Development has averaged to a reserve release rather than a reserve increase since 1980. By contrast, in this table certain lines of business (commercial multiple peril, general liability (claims made), products liability (occurrence) and workers compensation) have averaged to an ultimate increase. As expected, personal lines, commercial multiple peril and commercial auto liability experienced the least volatility in Ultimate Reserve Development. Across this experience period, private passenger auto liability ultimate reserve development was not adverse for any cohort of ten accident years.

The volatility in Ultimate Reserve Development is directly related to claims duration (shown in Table 7). The supplemental scatterplot illustrates the strong relationship and can serve as a benchmarking reference when validating volatility assumptions for more bespoke portfolios in economic capital models.

In general, history suggests that low-duration lines of business possess an intrinsic ultimate reserve volatility of between five percent and ten percent, and each additional year of duration beyond one contributes about three percent volatility. General liability (claims made) and products liability (claims made) are outliers, with experienced volatility higher than the trend established by other lines.

Claims-made reserve experience for all three relevant lines of business (general liability, medical professional liability and products liability) has been as volatile as or more so than the experience for occurrence-based reserves. This suggests that the driving factor for severe adverse development potential is the exposure of existing claims to unanticipated medical cost inflation rather than the reporting of incurred-but-unknown claims. Column 3 demonstrates that significant reserve decreases have been larger for claims made business, contributing volatility to the metrics via benign development.

In the Risk Benchmarks Supplement we include tables that explore these one year and ultimate reserve risk parameters by segment, and also for individual companies within each segment. Similar to underwriting risk, reserve risk can be more acute for individual companies than for the industry as a whole due to process risk.

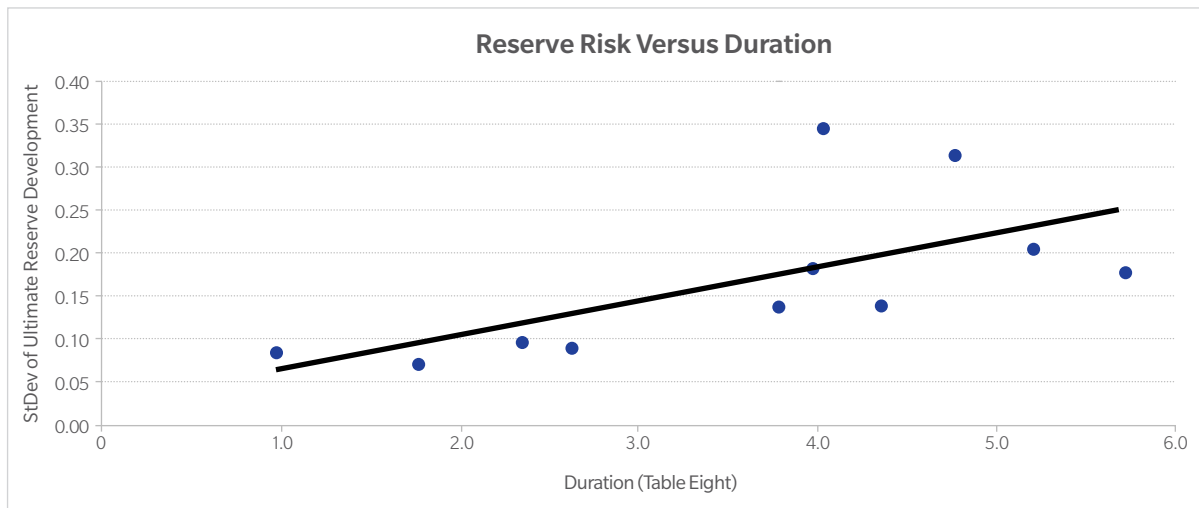
1. It is assumed the booked ultimate loss does not change for the oldest accident year.

T7 | ULTIMATE DEVELOPMENT BY LINE OF BUSINESS

For groups of ten accident years, net of reinsurance

Line of Business	Mean	StDev	Minimum	Maximum	Duration (in years)
	(1)	(2)	(3)	(4)	
CAL	0.99	9%	0.89	1.17	2.6
CMP	1.02	10%	0.85	1.21	2.4
GLC	1.13	35%	0.67	1.64	4.0
GLO	0.98	14%	0.85	1.25	4.3
HO	0.91	9%	0.77	1.11	1.0
MPLC	0.90	18%	0.66	1.20	4.0
MPLO	0.87	18%	0.63	1.11	5.7
PPA	0.90	7%	0.79	0.99	1.8
PLC	1.03	31%	0.66	1.63	4.8
PLO	1.21	21%	0.99	1.60	5.2
WC	1.01	14%	0.82	1.22	3.8

Source: Guy Carpenter



Source: Guy Carpenter

E11 | ALL LINES RESERVE DEVELOPMENT CYCLE

By accident year, all ten year Schedule P lines combined, net of reinsurance

Exhibit 11: Explanation

The reserve for a particular accident year is re-estimated periodically. Exhibit 11 illustrates these re-estimates, where each line is the booked ultimate loss at subsequently older evaluations, indexed on the initial booked ultimate loss at 12 months of development. For example, after ten years of re-estimates, the booked ultimate loss for Accident Year 2000 was 15 percent higher than the initial estimate of the ultimate loss booked at 12/31/2000. In this exhibit all ten-year Schedule P lines are combined beginning with Accident Year 1980.

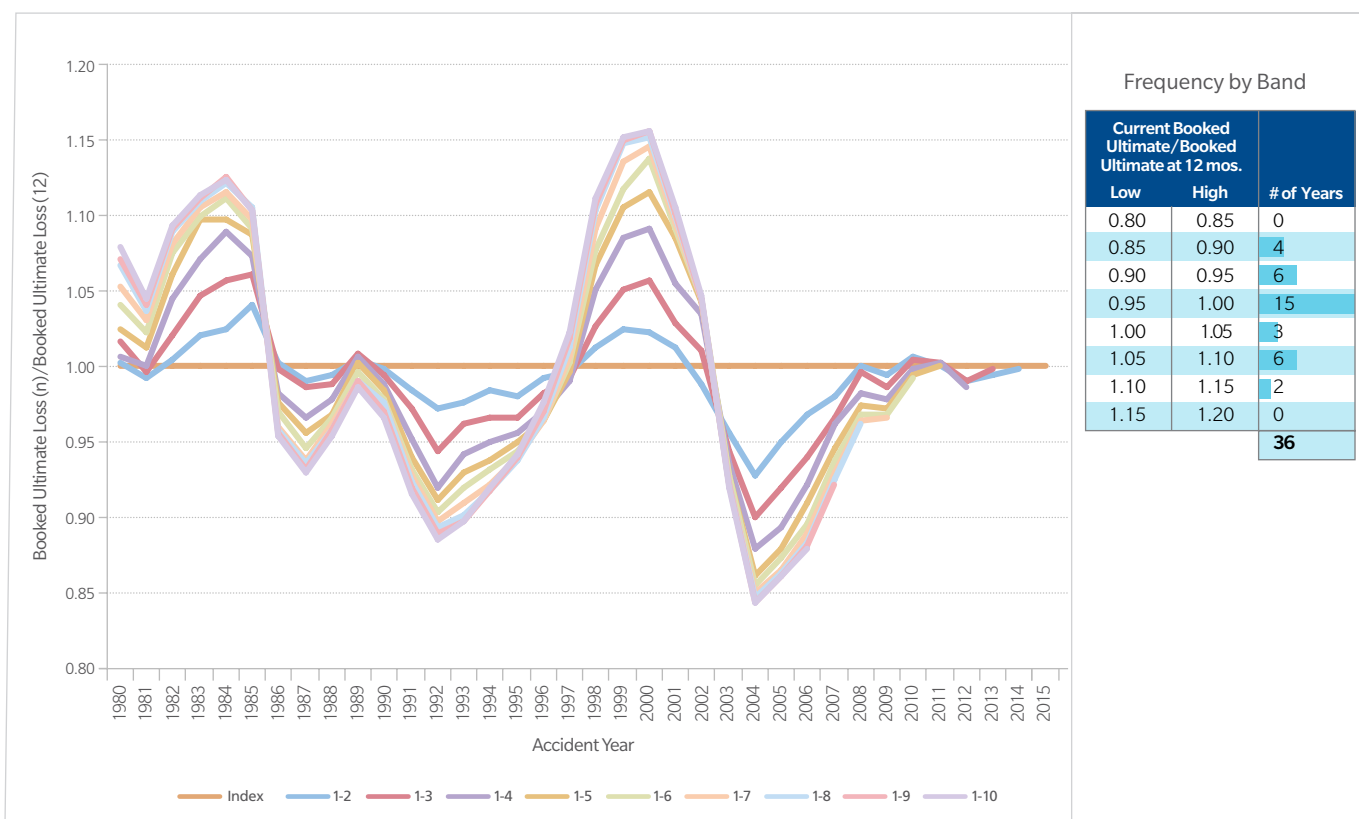
Exhibit 11: Discussion

In 2014 and 2015 the reserve releases to which the industry had been accustomed in recent years clearly slowed. Accident Year 2014 reserves were released by approximately 0.2 percent, the smallest release of the previous accident year since 2010. Accident Years 2011 to 2013 experienced no net change at all and older accident years all experienced benign development, but less than 0.4 percent.

Analysis of this chart points to three possible conclusions

1. The reserve cycle we observed over the last three decades and longer has dissipated, demonstrated by the flattening of the cycle over the last five accident years without the appearance of significant systemic adverse development as the previous pattern would indicate.
2. Major cycles like those that occurred in the years 1981 to 1985 and 1997 to 2001 appear to be subsiding. We are in a period of experience similar to that of the years 1987 to 1990 and will return to the market's regular cycle when economic and market conditions normalize.
3. We are already starting to experience the early stages of the next hard market cycle, and Accident Years 2015 to 2016 could be the beginning of a new reserve hardening phase. It is unclear at this point which of these narratives will prove correct. Certainly, all carriers need to stay vigilant to possible changes in market conditions.

Reserve Development Risk



Source: Guy Carpenter

3.3 RISK BY LINE OF BUSINESS

E12 | RESERVE DEVELOPMENT CYCLE BY LINE OF BUSINESS By accident year, net of reinsurance

Exhibit 12: Explanation

Exhibit 12 illustrates the successive evaluation of ultimate losses at yearly intervals for each accident year since 1980, similar to that shown in Exhibit 11 but expanded by line of business detail.

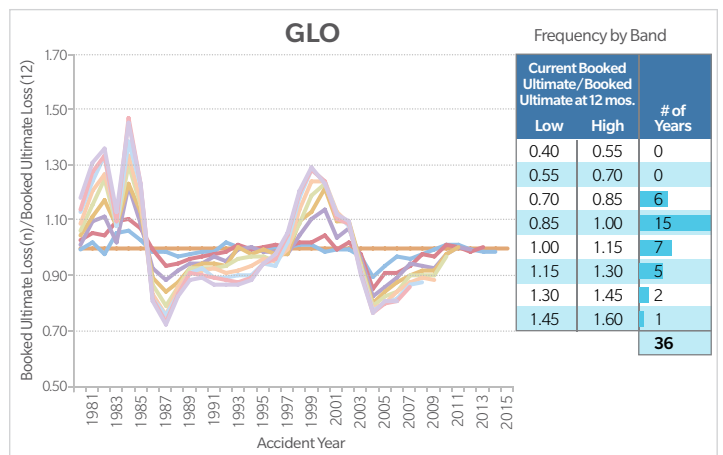
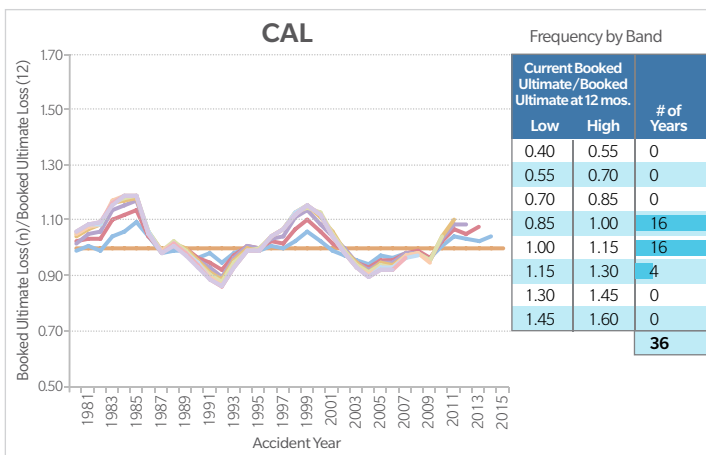
Exhibit 12: Discussion

These exhibits provide a time-dependent illustration consistent with the volatility measures shown in column 2 of Tables 6 and 7. Whereas most lines of business exhibited very modest reserve releases in 2015, recent accident years for commercial auto liability experienced between two percent and five percent adverse development in 2015. Also, general liability notably experienced a small amount of adverse development in Accident Years 2012 and 2013.

Personal auto also experienced minor adverse development after years of consistent reserve releases due to an unexpected pick up in claims cost trends. Workers compensation writers enjoyed favorable reserve development of one to three percent from Accident Years 2012 to 2014 as claim cost trends remained benign. Medical malpractice writers enjoyed favorable development, particularly in occurrence business.

Homeowners and other property-centric lines exhibit no reserve cycle to speak of – the reserve cycle is inherently a casualty phenomenon.

Index 1-2 1-3 1-4 1-5 1-6 1-7 1-8 1-9 1-10

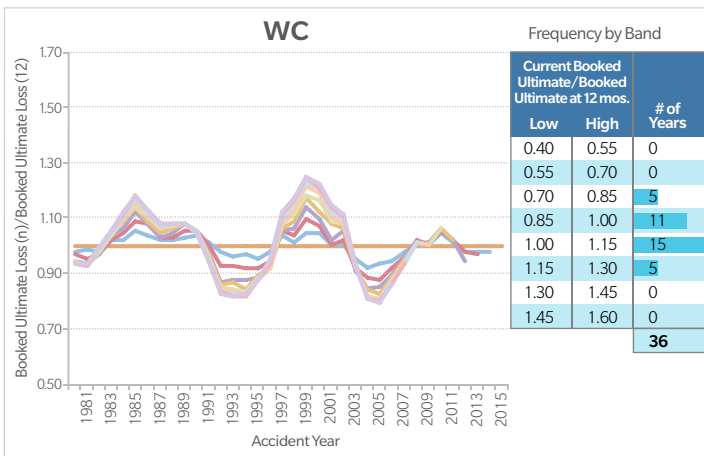
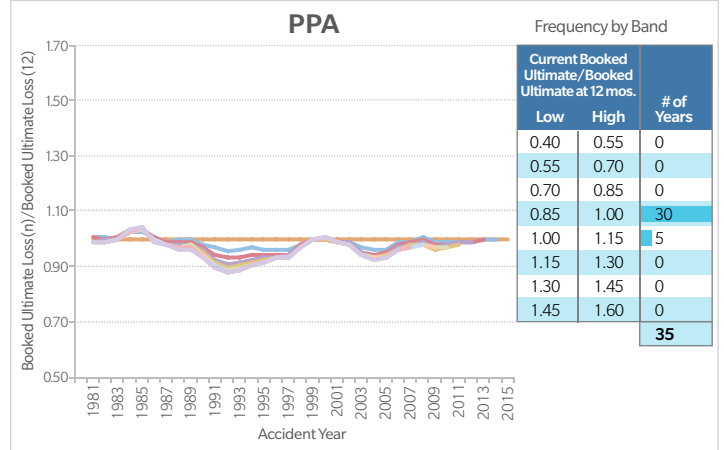
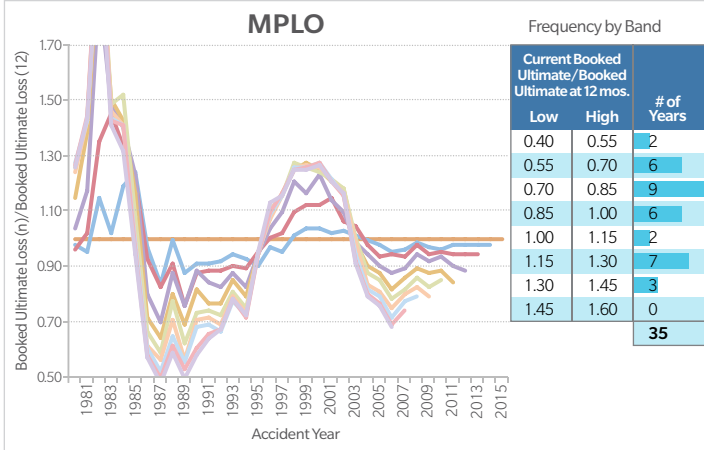
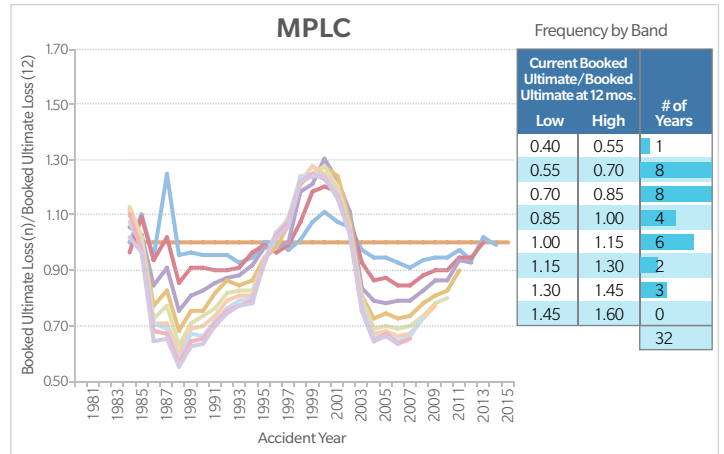
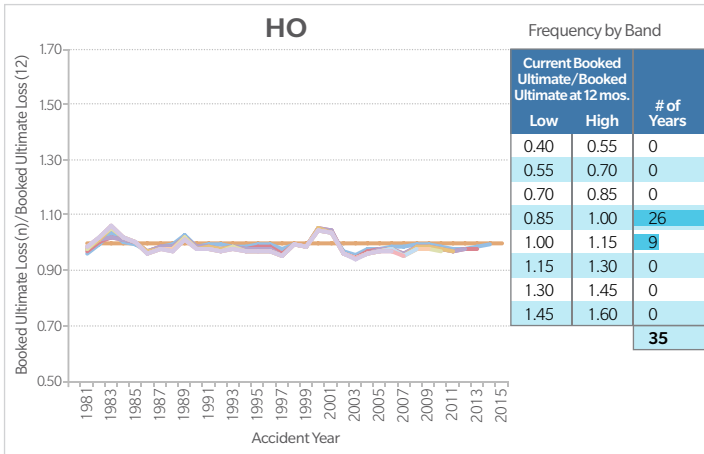


Source: Guy Carpenter



E12 | RESERVE DEVELOPMENT CYCLE BY LINE OF BUSINESS

Index 1-2 1-3 1-4 1-5 1-6 1-7 1-8 1-9 1-10



Source: Guy Carpenter

Reserve Development Risk

3.4 RISK BY MARKET SEGMENT

E13 | RESERVE DEVELOPMENT CYCLE BY MARKET SEGMENT

By accident year, net of reinsurance

Exhibit 13: Explanation

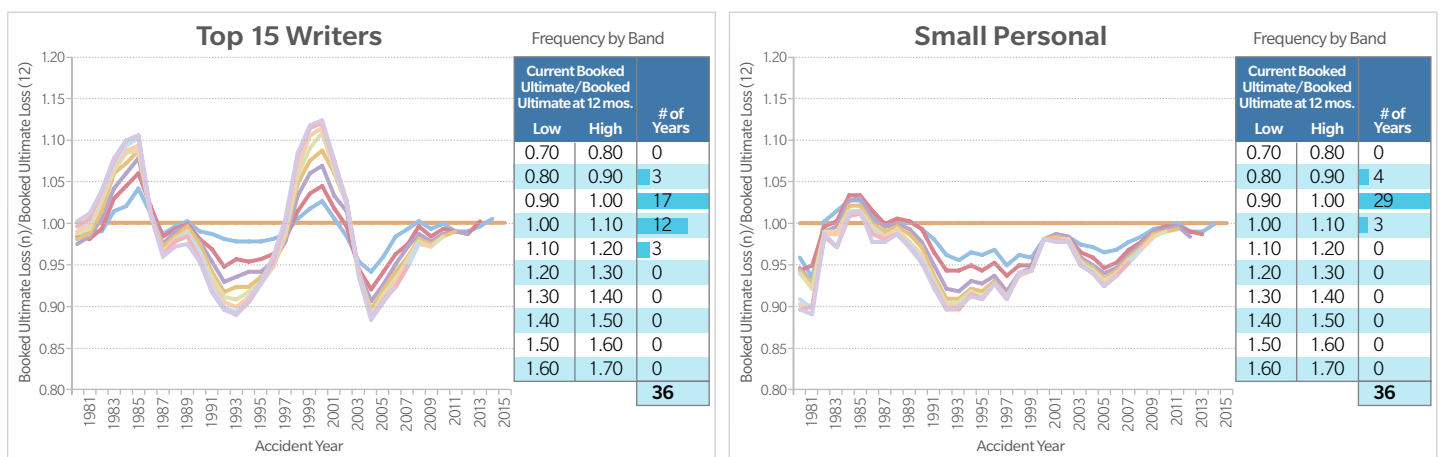
Exhibit 13 illustrates the successive evaluation of ultimate losses at yearly intervals for each accident year since 1980, similar to that shown in Exhibit 11 but expanded by market segment detail.

Exhibit 13: Discussion

This exhibit presents contrast for reserve development experience between large and small carriers and between personal and commercial carriers. Comparison of the charts for the Top 15 and Large Commercial segments to those of the Small Personal and Mutual segments reveals the benign reserve releases were larger for smaller and personal lines-focused underwriters and adverse development was more severe for larger, commercial oriented companies between Accident Years 1999 and 2001. The intense competition and growth appetite that led to increasing market inequality until 2008 (see Exhibit 6) was coupled with reluctance to recognize emerging claims trends during the first few years of the millennium for the large carriers.

Examining recent accident years, we see that smaller mutual companies continue to report significant reserve releases, while top 15 and large commercial carriers have begun reporting minor reserve deficiencies. Large personal carriers have also reported a minor deficiency for Accident Year 2014, while smaller personal carriers were able to take down reserves for the same year. Larger companies are usually subject to more pressures from investors and management to grow and report profitable performance, while smaller mutual companies have more freedom to reserve more prudently up front and take down reserves in later calendar years. Any capital modeling exercise requires a thorough understanding of a company's reserve history and philosophy, as well as the current state of the market and the size and operational scope of the company.

Reserve Development Risk



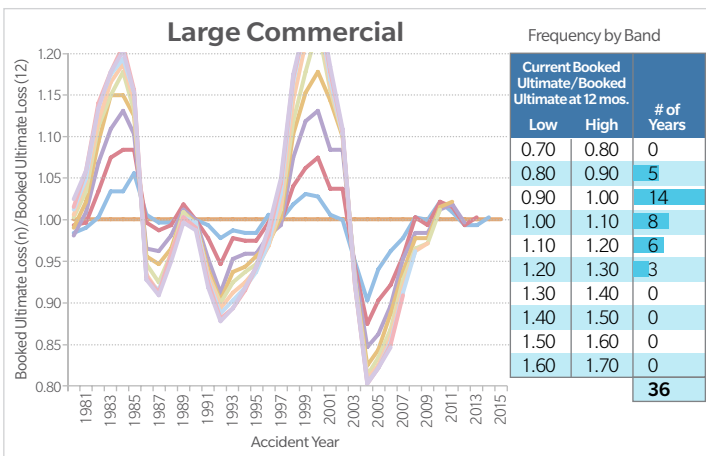
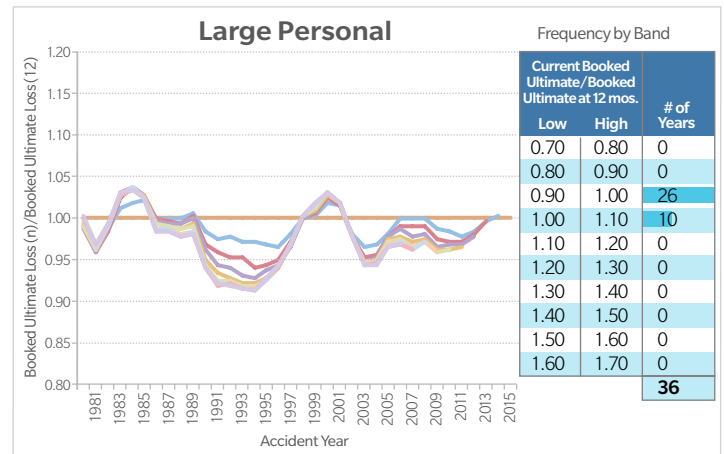
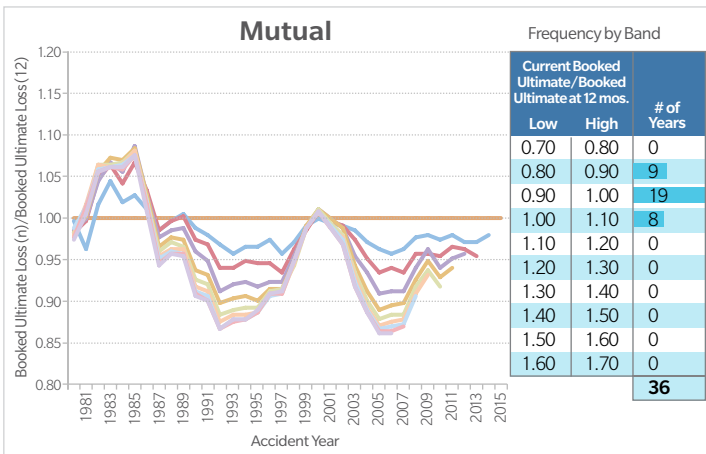
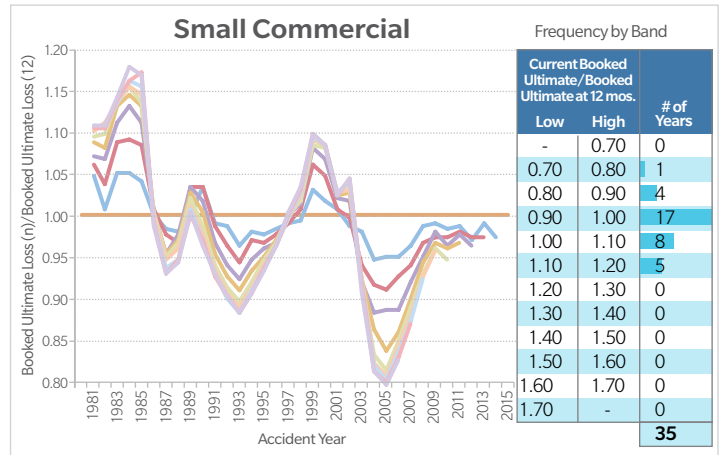
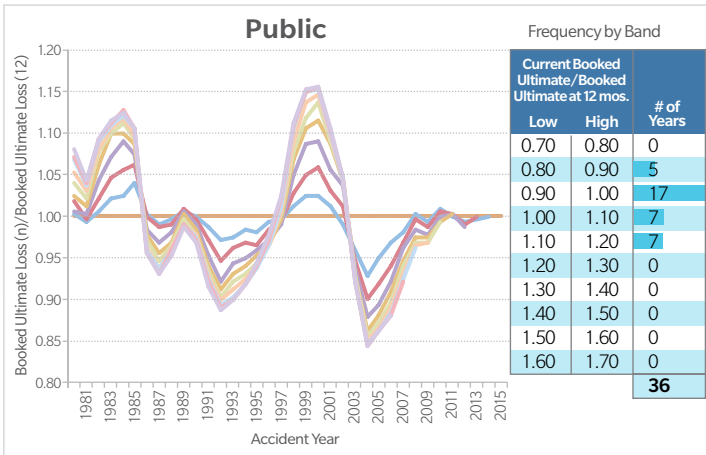
Source: Guy Carpenter



E13 | RESERVE DEVELOPMENT CYCLE BY MARKET SEGMENT

Index 1-2 1-3 1-4 1-5 1-6 1-7 1-8 1-9 1-10

Reserve Development Risk



Source: Guy Carpenter



IV. UNCERTAIN LIABILITY DURATION

4.1 INTRODUCTION

Liability duration is a topic worthy of careful consideration for professionals within the financial planning departments of insurance companies. P&C liabilities are inherently uncertain in both timing and ultimate value. Insurers must carefully monitor potential cash needs to guarantee that enough cash and liquid assets are on hand to pay claims as they come due. In today's uncertain financial markets, value of long term debt or equity instruments can fluctuate rapidly, and returns on more liquid and stable investments are at historic lows, creating a difficult operational environment for insurers. To efficiently manage cash flows, insurers are required to carefully manage payment pattern risk. The benchmarks presented in this section, along with the detailed parameters included in the Risk Benchmarks Supplement, provide companies with a solid starting point for understanding the payment pattern dynamics of various P&C lines of business.

4.2 MEAN PAYMENT PATTERN AND VOLATILITY

T8 | MEAN PAYMENT PATTERN AND DURATION Industry in aggregate, net of reinsurance

Table 8: Explanation

Table 8 calculates the percentage of the ultimate loss that is paid in each development period, for a single accident year. Table 8 also estimates the undiscounted Macaulay Duration for each line of business. Duration is calculated using projections of payment pattern consistent with the assumptions described in Section 1.2 (Payment Patterns Beyond Ten Years).

$$\text{Increment} = \frac{\text{Paid Loss in Twelve Month Period for an Accident Year}}{\text{Carried Ultimate Loss at 120 months for an Accident Year}}$$

$$\text{Duration} = \frac{\text{Sum Across Increments [Product of (Increment Maturity in Months - 6) and Increment]}}{12}$$

Table 8: Discussion

The duration and payment patterns shown here are consistent with last year's statistics. Overall duration is similar and duration for individual lines did not change significantly.

While the industry fixed income asset duration has trended downward for more than a decade (see Exhibit 18), it is still currently longer than even medical professional liability (occurrence) at approximately 5.7 years. The longer duration of fixed income assets implies that an increase in interest rates could reduce asset values more than it would reduce the present value of claim liabilities.

The present data suggest that there is a clear gap between claims made and occurrence claims triggers for general liability (0.3 years), products liability (0.4 years) and medical professional liability (1.7 years).

Line of Business	Duration (in years)	Development Period (in months)										
		0-12	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120+
CAL	2.6	23%	25%	20%	14%	8%	5%	2%	1%	1%	0%	2%
CMP	2.4	37%	22%	11%	9%	6%	5%	3%	2%	1%	1%	3%
GLC	4.0	12%	16%	19%	16%	12%	7%	5%	4%	2%	2%	6%
GLO	4.3	11%	13%	15%	15%	11%	9%	6%	4%	3%	2%	11%
HO	1.0	70%	21%	4%	2%	1%	1%	0%	0%	0%	0%	0%
MPLC	4.0	4%	17%	23%	17%	12%	8%	5%	3%	2%	1%	6%
MPLO	5.7	1%	5%	11%	16%	15%	13%	10%	7%	4%	3%	15%
PPA	1.8	38%	31%	14%	8%	4%	2%	1%	0%	0%	0%	1%
PLC	4.8	5%	17%	20%	15%	11%	7%	5%	4%	3%	3%	12%
PLO	5.2	4%	7%	12%	14%	13%	11%	8%	7%	5%	4%	16%
WC	3.8	21%	25%	14%	10%	6%	4%	3%	2%	2%	1%	13%
Overall	2.4	35%	25%	13%	9%	5%	4%	2%	1%	1%	1%	4%

Source: Guy Carpenter

T9 | COEFFICIENT OF VARIATION OF PAYMENT PATTERN INCREMENTS

Industry in aggregate, net of reinsurance

Table 9: Explanation

Table 9 presents the coefficient of variation of incremental loss that is paid in each development period, for a single accident year:

$$\text{Incremental CV} = \frac{\text{Standard Deviation of Incremental Percentage for a Development Period}}{\text{Mean Incremental Percentage from Table 8}}$$

When interpreting Table 9, note that because each CV is a ratio to the mean for that increment, the value in dollars of the volatility changes across the payment pattern for an individual line of business.

Line of Business	Development Month										
	12	24	36	48	60	72	84	96	108	120	120+
CAL	14%	10%	6%	6%	14%	24%	23%	30%	36%	63%	66%
CMP	6%	11%	11%	9%	14%	17%	20%	59%	27%	22%	18%
GLC	78%	18%	26%	24%	27%	22%	28%	34%	47%	49%	39%
GLO	31%	23%	14%	10%	12%	33%	21%	28%	27%	39%	27%
HO	4%	10%	14%	17%	27%	32%	45%	41%	282%	108%	26%
MPLC	26%	22%	15%	14%	16%	17%	30%	42%	51%	47%	66%
MPLO	31%	24%	17%	12%	16%	17%	15%	20%	26%	29%	48%
PPA	7%	5%	6%	5%	7%	13%	18%	25%	25%	28%	35%
PLC	62%	48%	60%	35%	49%	54%	65%	88%	108%	85%	111%
PLO	40%	21%	16%	13%	9%	12%	18%	18%	26%	31%	20%
WC	8%	7%	8%	47%	13%	18%	22%	18%	21%	23%	27%
Overall	10%	7%	6%	20%	22%	22%	29%	29%	32%	34%	21%

Source: Guy Carpenter

V. CORRELATION CONCERNS

5.1 INTRODUCTION

This section explores correlation between products and across time in the P&C industry. It is driven by many common risk drivers for insurance policies, including (but not limited to) geographic concentration; exposure to medical inflation; existence of frequency contagion; and vulnerability to competitive pricing pressure. Most collective risk models are extremely sensitive to assumptions regarding future correlation; therefore, it is helpful for pricing actuaries and capital modelers to model a range of correlation assumptions – allowing a better understanding of the sensitivity of their analysis to the select correlation. We have also noted over the past several years that correlation on an industry level is not applicable to individual companies, as it will generally be too high. Accordingly, we have introduced a new calculation to measure empirical historical correlation for every company in the industry. We report individual company correlation by market segment and premium size-band and believe this approach provides a useful benchmark for companies when choosing correlation assumptions to use within their own financial and actuarial models.

5.2 CORRELATION IN ULTIMATE LOSS RATIO

T10 | CORRELATION IN THE ULTIMATE LOSS RATIO BETWEEN LINES OF BUSINESS U.S. industry in aggregate, net of reinsurance, Accident Years 1987 to 2006 Correlations that are statistically significantly different from zero are shown in bold

Table 10: Explanation

Table 10 details the correlation in the Ultimate Loss Ratio between lines of business. Data considered for these calculations includes Accident Years 1987 to 2006. We closed the time series at 2006 to avoid underestimating potential adverse development in recent, immature accident years. Also, we present two additional correlations: the correlation of each line of business with the industry in total and the auto-correlation for each line with itself over time. For example, for commercial auto liability and commercial multiple peril we calculate:

$$[\text{Correlation (CAL, CMP)}] = \frac{E[(LR^{CAL} - \text{Mean}(LR^{CAL})) * (LR^{CMP} - \text{Mean}(LR^{CMP}))]}{(\text{Standard Deviation of } LR^{CAL}) * (\text{Standard Deviation of } LR^{CMP})}$$

Where:

E is the expectation operator

LR^{CMP} is the Actual Ultimate Loss Ratio for CMP

The autocorrelation is a similar calculation except that we measure the loss ratio history for a single line with itself and a lag of one year:

$$[\text{Autocorrelation (CAL)}] = \frac{E[(LR^{CAL,t} - \text{Mean}(LR^{CAL})) * (LR^{CAL,t-1} - \text{Mean}(LR^{CAL}))]}{(\text{Standard Deviation of } LR^{CAL})^2}$$

If an accident year with a high loss ratio is followed by another accident year with a high loss ratio, then a high auto-correlation will be seen in Table 10. We apply a statistical significance test to the line-by-line correlations to indicate the credibility of each correlation coefficient and show in bold black all correlations that are significant based on a “p” value of .25. This industry matrix is positive definite, meaning it can be used in modeling applications using copulas without adjustment. In addition to an industry matrix, we include three matrices by premium size band. Each of these matrices illustrates the typical correlation for a company whose total premium for each given pair of lines of business falls with the noted size band. These matrices are meant to serve as practical correlation values appropriate for individual companies. See the Risk Benchmarks Supplement for additional company-level correlation detail by segments.

Table 10: Discussion

The correlation tables confirm much of our intuition regarding the insurance industry and the risk profiles that trend in the same direction. Auto physical damage has exhibited very weak correlations with other lines, the sole exception being personal auto liability. The strongest correlation with the homeowners line of business is with CMP among all modeled lines. Loss experience for both of these lines was affected by similar outbreaks of natural peril activity, most recently in 2011. The longer-tail lines exhibit the greatest correlation because of common exposure to medical cost inflation. All lines possess strong momentum in results, as measured by the autocorrelation, with the exception of homeowners.

Line of Business	APD	CAL	CMP	GLC	GLO	HO	MPL	PL	PPA	Re	SP	WC	Finl	Other	All Lines	Auto-Correlation
APD	100%															99%
CAL	0%	100%														88%
CMP	-36%	79%	100%													75%
GLC	-37%	58%	60%	100%												83%
GLO	-41%	81%	81%	89%	100%											88%
HO	5%	26%	64%	20%	26%	100%										23%
MPL	-47%	77%	84%	76%	94%	31%	100%									89%
PL	-44%	71%	81%	77%	86%	32%	92%	100%								76%
PPA	76%	50%	16%	21%	20%	26%	5%	13%	100%							88%
Re	58%	13%	-5%	-16%	-12%	12%	-27%	-38%	35%	100%						67%
SP	83%	13%	-3%	-39%	-30%	38%	-25%	-22%	65%	49%	100%					97%
WC	-10%	88%	64%	65%	83%	7%	80%	68%	35%	-11%	-14%	100%				88%
Finl	75%	-16%	-57%	-54%	-51%	-27%	-52%	-63%	36%	53%	51%	-14%	100%			79%
Other	49%	56%	50%	30%	36%	64%	29%	31%	78%	43%	71%	27%	2%	100%		86%
All Lines	68%	66%	39%	22%	33%	44%	28%	27%	90%	37%	72%	52%	34%	84%	100%	92%

Small NEP defined as <\$50M of combined NEP in the analyzed pair of lines, Medium NEP is defined as \$50-\$250M combined NEP in analyzed pair of lines, Large NEP includes any companies with >\$250M in each pair of analyzed lines.

Source: Guy Carpenter

5.3 IMPORTANCE OF PREMIUM VOLUME

T11 | CORRELATION IN THE ULTIMATE LOSS RATIO Between Lines of Business by Company Size Band

Table 11: Explanation

For individual companies, the correlation experienced between two lines is affected by both market signal and process noise. As we discussed in Section 5.2, market signal can stem from common exposure to medical cost inflation or natural perils, among other sources of contagion. When premiums grow and a portfolio of insurance risks become a larger subset of the industry the correlation it can expect to experience will increase and grow closer to that of the industry. The process noise surrounding the correlation will diminish.

Table 11: Discussion

In Table 11 we present correlation on an industry level as well as on a company level. We base company correlation on empirical loss ratio histories for each company in the industry. For each line of business pair – for example GLO and WC – we consider a company valid if it has earned at least USD 1 million of net premium in each of those two lines for five concurrent years and reported loss ratios in each line greater than zero percent in those years. We then sorted all valid companies by premium size group and ranked each group from lowest to highest correlation. The median statistic reported in the company level matrix is the correlation of the company whose correlation falls in the middle of all companies in the sample.

We note that this exhibit is only useful to the extent that historical correlation is a good indicator for future correlation. There are other ways to model prospective correlation, such as modeling a common inflation shock to severity distributions in a collective risk model using structural economic scenarios. But historical statistics are quite popular in settling the question of how much correlation belongs in economic capital models, and this chart makes those statistics actionable for companies of all sizes.

In deciding whether the 50th, 75th or even 90th percentile (data available in the *Risk Benchmarks Supplement*) makes sense for modeling your portfolio, consider the following factors when determining if risks are more or less correlated than a typical portfolio:

- **Policy limits profile:** Higher limits in casualty mean higher exposure to severity surprises;
- **Incurred But Not Reported Losses (IBNR):** The threat of true IBNR, due to coverage triggers or policy coverages, means exposure to correlation from frequency contagion;
- **Geographic concentration:** If high-frequency natural perils, such as tornado, hail and winter storm are not modeled explicitly in a capital model, geographic concentrations may contribute significant expected correlation;
- **Class strategy:** For example, pursuing high severity classes of business in workers compensation can mean more exposure to correlation; and
- **Market pressures:** Competitive markets place pressure on loss ratios regardless of insured coverage. Aggregate loss ratio modeling is sensitive to premium trends as well as loss trends.

Definitions of Premium Size Bands for LOB pairings
Small NEP <\$50M total for individual LOB pairings <\$500M total for All Lines statistics
Medium NEP \$50M-\$250M total for individual LOB pairings \$500M-\$2B total for All Lines statistics
Large NEP >\$250M total for individual LOB pairings >\$2B total for All Lines statistics

Source: Guy Carpenter

Median Small NEP

Line of Business	APD	CAL	CMP	GLC	GLO	HO	MPL	PL	PPA	Re	SP	WC	Finl	Other	All Lines	Auto-Correlation
APD	100%															48%
CAL	-5%	100%														34%
CMP	-7%	16%	100%													22%
GLC	8%	6%	-21%	100%												36%
GLO	-2%	16%	13%	19%	100%											29%
HO	-7%	7%	28%	24%	17%	100%										31%
MPL	-2%	45%	7%	0%	27%	-32%	100%									57%
PL	-11%	12%	10%	12%	1%	11%	-5%	100%								27%
PPA	7%	10%	10%	17%	-4%	10%	9%	22%	100%							55%
Re	8%	2%	9%	-15%	-6%	-18%	-13%	10%	12%	100%						9%
SP	29%	7%	2%	-14%	-4%	2%	-14%	-11%	4%	5%	100%					16%
WC	14%	21%	-1%	-9%	11%	11%	59%	17%	29%	-2%	18%	100%				53%
Finl	14%	-3%	17%	-6%	-13%	-4%	9%	9%	0%	14%	20%	18%	100%			27%
Other	-31%	7%	30%	-8%	-1%	0%	-17%	-7%	25%	-21%	5%	18%	22%	100%		29%
All Lines	43%	30%	44%	79%	29%	60%	100%	9%	44%	24%	47%	54%	51%	26%	100%	100%

Source: Guy Carpenter

Median Medium NEP

Line of Business	APD	CAL	CMP	GLC	GLO	HO	MPL	PL	PPA	Re	SP	WC	Finl	Other	All Lines	Auto-Correlation
APD	100%															70%
CAL	-15%	100%														57%
CMP	-29%	23%	100%													47%
GLC	13%	6%	28%	100%												33%
GLO	-14%	22%	16%	12%	100%											45%
HO	-10%	23%	53%	13%	13%	100%										32%
MPL	-31%	30%	-2%	18%	8%	-1%	100%									74%
PL	-2%	5%	15%	24%	14%	12%	33%	100%								71%
PPA	7%	34%	8%	10%	22%	20%	-6%	-27%	100%							70%
Re	-8%	21%	9%	24%	-2%	7%	21%	33%	-2%	100%						1%
SP	28%	-17%	-10%	2%	4%	-1%	0%	-12%	8%	-6%	100%					20%
WC	13%	1%	-2%	12%	12%	0%	0%	19%	21%	5%	15%	100%				69%
Finl	-8%	3%	11%	-6%	11%	0%	-10%	0%	-3%	-13%	2%	-9%	100%			31%
Other	-17%	-4%	11%	0%	-2%	1%	3%	10%	-9%	33%	-7%	27%	-11%	100%		43%
All Lines	46%	50%	43%	25%	32%	57%	100%	52%	54%	39%	36%	72%	53%	44%	100%	100%

Source: Guy Carpenter

Median Large NEP

Line of Business	APD	CAL	CMP	GLC	GLO	HO	MPL	PL	PPA	Re	SP	WC	Finl	Other	All Lines	Auto-Correlation
APD	100%															74%
CAL	-22%	100%														70%
CMP	-34%	54%	100%													69%
GLC	-15%	18%	24%	100%												59%
GLO	-17%	46%	53%	34%	100%											64%
HO	-18%	22%	55%	15%	20%	100%										19%
MPL	-18%	50%	46%	40%	42%	23%	100%									82%
PL	-13%	34%	53%	44%	50%	9%	48%	100%								68%
PPA	12%	36%	6%	17%	11%	8%	16%	10%	100%							78%
Re	-12%	20%	30%	12%	26%	4%	24%	18%	3%	100%						36%
SP	34%	-14%	-16%	-11%	-14%	-9%	-7%	1%	1%	-1%	100%					27%
WC	0%	41%	9%	34%	21%	-6%	24%	19%	40%	18%	10%	100%				76%
Finl	9%	1%	8%	-4%	-9%	6%	0%	6%	6%	-9%	4%	-6%	100%			64%
Other	-15%	43%	25%	18%	30%	16%	23%	53%	10%	32%	-8%	27%	-1%	100%		48%
All Lines	46%	61%	59%	55%	59%	46%	100%	72%	67%	74%	24%	78%	50%	44%	100%	100%

Source: Guy Carpenter

Correlation Concerns



75th Percentile Small NEP

Line of Business	APD	CAL	CMP	GLC	GLO	HO	MPL	PL	PPA	Re	SP	WC	Finl	Other	All Lines	Auto-Correlation
APD	100%															69%
CAL	17%	100%														60%
CMP	14%	39%	100%													45%
GLC	36%	41%	-8%	100%												64%
GLO	27%	44%	41%	46%	100%											52%
HO	17%	49%	54%	35%	35%	100%										53%
MPL	22%	59%	32%	60%	66%	37%	100%									76%
PL	4%	43%	73%	39%	32%	33%	36%	100%								59%
PPA	34%	49%	33%	35%	26%	32%	19%	36%	100%							75%
Re	25%	25%	47%	2%	28%	46%	-12%	53%	22%	100%						24%
SP	55%	33%	23%	20%	30%	24%	13%	26%	21%	39%	100%					42%
WC	38%	54%	36%	25%	39%	41%	74%	45%	50%	6%	26%	100%				74%
Finl	44%	28%	45%	25%	19%	15%	31%	41%	28%	23%	38%	41%	100%			54%
Other	17%	53%	47%	19%	34%	47%	37%	10%	47%	5%	36%	62%	53%	100%		54%
All Lines	72%	65%	65%	100%	54%	84%	100%	49%	72%	55%	74%	100%	100%	54%	100%	100%

Source: Guy Carpenter

75th Percentile Medium NEP

Line of Business	APD	CAL	CMP	GLC	GLO	HO	MPL	PL	PPA	Re	SP	WC	Finl	Other	All Lines	Auto-Correlation
APD	100%															78%
CAL	15%	100%														75%
CMP	-4%	42%	100%													67%
GLC	34%	48%	38%	100%												61%
GLO	9%	42%	44%	27%	100%											62%
HO	15%	49%	64%	52%	40%	100%										52%
MPL	5%	32%	17%	61%	36%	35%	100%									78%
PL	14%	28%	31%	41%	44%	50%	61%	100%								72%
PPA	25%	63%	34%	45%	40%	42%	6%	3%	100%							78%
Re	8%	28%	37%	73%	28%	31%	60%	50%	42%	100%						51%
SP	59%	8%	15%	23%	23%	21%	11%	2%	27%	3%	100%					42%
WC	41%	36%	19%	33%	44%	32%	31%	34%	52%	40%	35%	100%				80%
Finl	14%	26%	29%	38%	26%	30%	15%	38%	14%	12%	35%	23%	100%			57%
Other	18%	21%	31%	36%	14%	43%	41%	26%	24%	65%	19%	50%	7%	100%		64%
All Lines	76%	69%	69%	48%	59%	82%	100%	66%	71%	81%	68%	100%	97%	61%	100%	100%

Source: Guy Carpenter

75th Percentile Large NEP

Line of Business	APD	CAL	CMP	GLC	GLO	HO	MPL	PL	PPA	Re	SP	WC	Finl	Other	All Lines	Auto-Correlation
APD	100%															80%
CAL	4%	100%														74%
CMP	-7%	67%	100%													78%
GLC	6%	39%	43%	100%												71%
GLO	10%	61%	69%	60%	100%											76%
HO	3%	46%	71%	35%	41%	100%										35%
MPL	-3%	63%	62%	69%	67%	42%	100%									84%
PL	8%	58%	65%	46%	77%	40%	56%	100%								68%
PPA	36%	57%	22%	49%	34%	33%	27%	42%	100%							81%
Re	0%	53%	43%	29%	57%	18%	46%	40%	20%	100%						44%
SP	53%	7%	-1%	17%	0%	15%	23%	23%	30%	15%	100%					40%
WC	39%	64%	32%	45%	40%	17%	54%	42%	68%	37%	28%	100%				83%
Finl	29%	21%	25%	26%	30%	34%	10%	32%	24%	19%	22%	17%	100%			79%
Other	12%	60%	52%	43%	43%	42%	27%	69%	34%	54%	10%	48%	12%	100%		59%
All Lines	63%	72%	71%	66%	78%	62%	100%	72%	85%	83%	60%	97%	100%	63%	100%	100%

Source: Guy Carpenter

Correlation Concerns



VI. EXPENSE BENCHMARKING

6.1 INTRODUCTION

The traditional maxim in the insurance industry is “no one has gone bankrupt because of their expense ratio.” In other words: invest in effective underwriting, and combined ratio will take care of itself over the long term. In the current prolonged soft market, this wisdom is being challenged as companies seek to reduce costs and invest in efficient distribution to gain an advantage over competitors. Distribution and claims management have always been critical functions of the insurance business but have becoming even more critical in the current environment. Companies are therefore finding ways to use technological innovation and scale to improve on both of these competencies. Carriers that harness the most efficient distribution platform and are able to service clients most effectively and economically will be successful in the future. As the industry continues to evolve, companies need to monitor key expense trends in order to fully understand how the business is changing.

6.2 EXPENSE RATIOS BY LINE OF BUSINESS

T12 | DIRECT AND NET EXPENSES BY LINE OF BUSINESS

Table 12: Explanation

Table 12 presents expense ratios for the entire industry based on the Insurance Expense Exhibit (IEE) in the statutory statement. As discussed in Section 1.3, line of business definitions found in the IEE need to be mapped to Schedule P – based on definitions found in the ASR. This table presents expense categories as a ratio to earned premium on both a direct and a net basis.

Table 12: Discussion

The contents of this table warrant grouping lines of business into categories based on expense profile. The long-tail liability lines, products liability and medical professional liability, might be considered the “high maintenance lines,” in that they are both low in total acquisition expense (the sum of columns 5, 6 and 7) and very high in loss adjustment expense (the total of columns 3 and 4). Homeowners and commercial multiple peril might be considered the “expensive commodities,” in that they rank among the highest in acquisition expense but are also among the lowest in loss adjustment expense. Interestingly, and although it is not often grouped with these same two lines, fidelity and surety could be considered an “expensive commodity” based on its expense profile.

Among the large premium lines of business, private passenger auto (the total of private passenger auto liability and auto physical damage) stands out as extremely efficient, both on a direct and net basis. Expense ratios can spell the difference between underwriting profit and loss in these lines (see Exhibit 5). They are also the lines of business where the effect of reinsurance is the lowest, measured by the difference between direct and net total expense ratio. Special property, special liability and general liability (occurrence) expense ratios, in contrast, are affected the most by reinsurance.

Direct Expenses

Line of Business	Total Expense Ratio (including LAE)	Expense Ratio (excluding LAE)	Defense & Containment Costs	Claims Adjusting & Other	Commission & Brokerage	Taxes, Licenses & Fees	Other Acquisition Expense	General & Administrative
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
APD	35%	25%	0%	9%	9%	2%	8%	6%
CAL	43%	29%	8%	6%	14%	2%	5%	7%
CMP	45%	33%	7%	5%	17%	2%	7%	7%
FS	52%	47%	2%	3%	23%	3%	11%	10%
GLC	44%	28%	11%	5%	14%	2%	6%	6%
GLO	43%	27%	11%	5%	13%	2%	6%	6%
HO	36%	28%	1%	7%	13%	2%	8%	5%
MPL	53%	26%	22%	5%	8%	5%	5%	8%
PL	65%	32%	25%	8%	14%	2%	7%	8%
PPA	38%	24%	4%	9%	8%	2%	8%	6%
SL	35%	29%	2%	3%	13%	2%	7%	8%
SP	29%	25%	1%	3%	13%	2%	4%	6%
WC	37%	24%	8%	6%	9%	3%	5%	6%

Source: Guy Carpenter

Net Expenses

Line of Business	Total Expense Ratio (including LAE)	Expense Ratio (excluding LAE)	Defense & Containment Costs	Claims Adjusting & Other	Commission & Brokerage	Taxes, Licenses & Fees	Other Acquisition Expense	General & Administrative
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
APD	35%	25%	0%	9%	9%	2%	8%	6%
CAL	45%	30%	8%	7%	13%	3%	6%	8%
CMP	48%	36%	7%	6%	16%	3%	8%	9%
FS	54%	49%	1%	3%	23%	3%	12%	11%
GLC	45%	30%	10%	6%	11%	2%	8%	8%
GLO	49%	30%	11%	7%	11%	2%	8%	9%
HO	39%	30%	2%	7%	12%	3%	9%	6%
MPL	56%	28%	22%	6%	7%	6%	6%	10%
PL	66%	32%	26%	8%	12%	2%	8%	9%
PPA	39%	25%	4%	10%	9%	2%	8%	6%
SL	40%	33%	3%	4%	10%	2%	9%	12%
SP	36%	30%	1%	4%	10%	3%	7%	10%
WC	39%	25%	7%	7%	7%	3%	7%	7%

Source: Guy Carpenter

6.3 EXPENSE TRENDS

E14 | EXPENSE TRENDS BY MARKET SEGMENT

Exhibit 14: Explanation

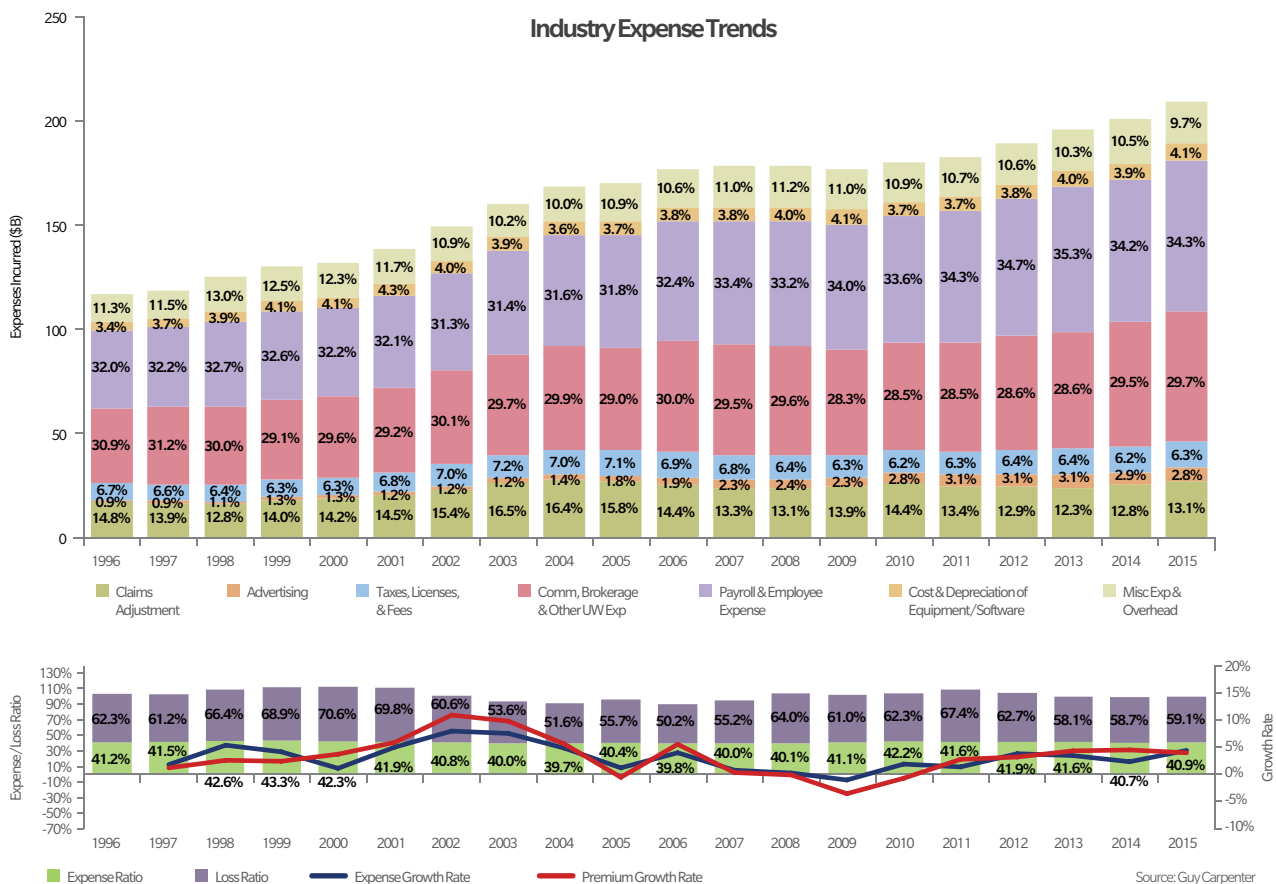
Exhibit 14 portrays growth trends in total premium and expense for the entire industry and for the top 15 carriers by premium volume compared with all other carriers. The top 15 carriers are recalculated in each year based on net earned premium in that calendar year. The company list is the industry list, excluding reinsurers and companies with irregular premium or expense values.

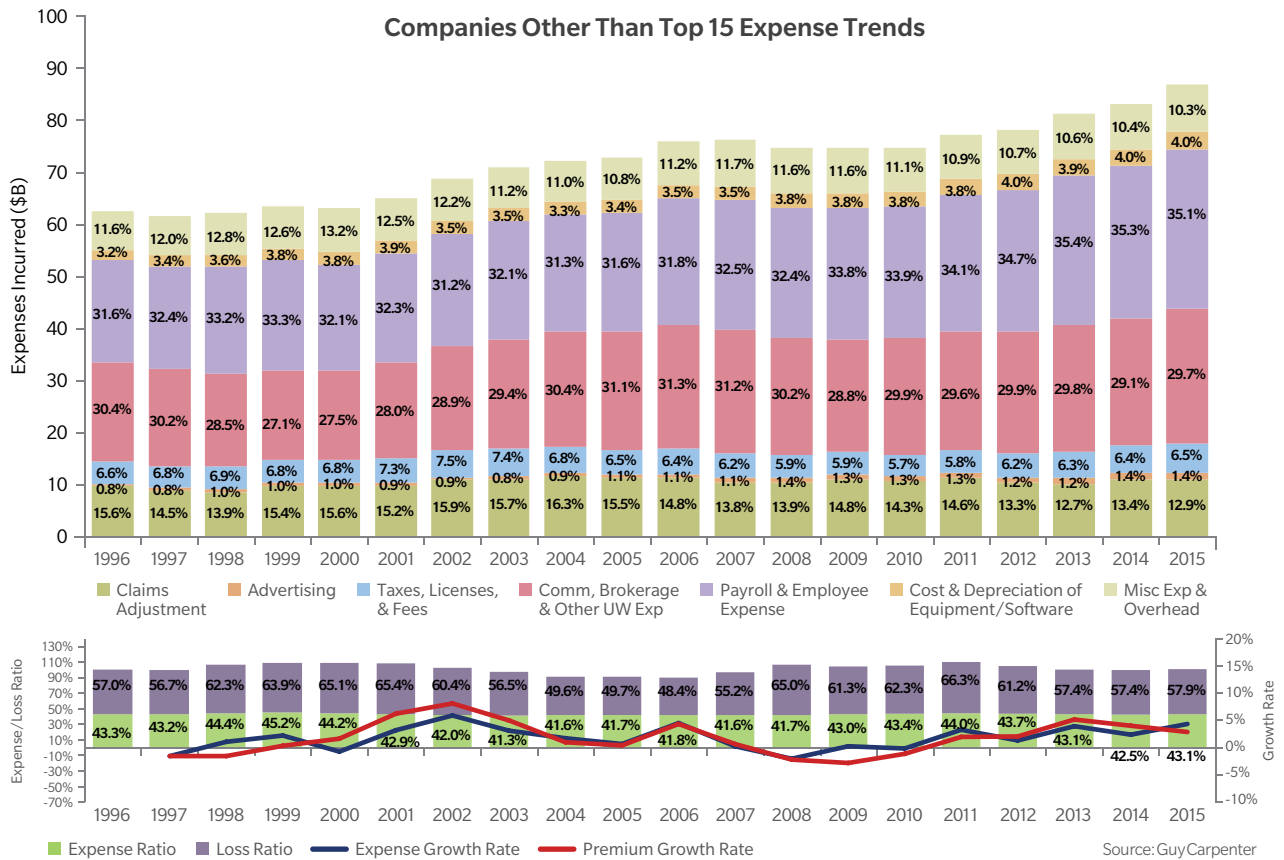
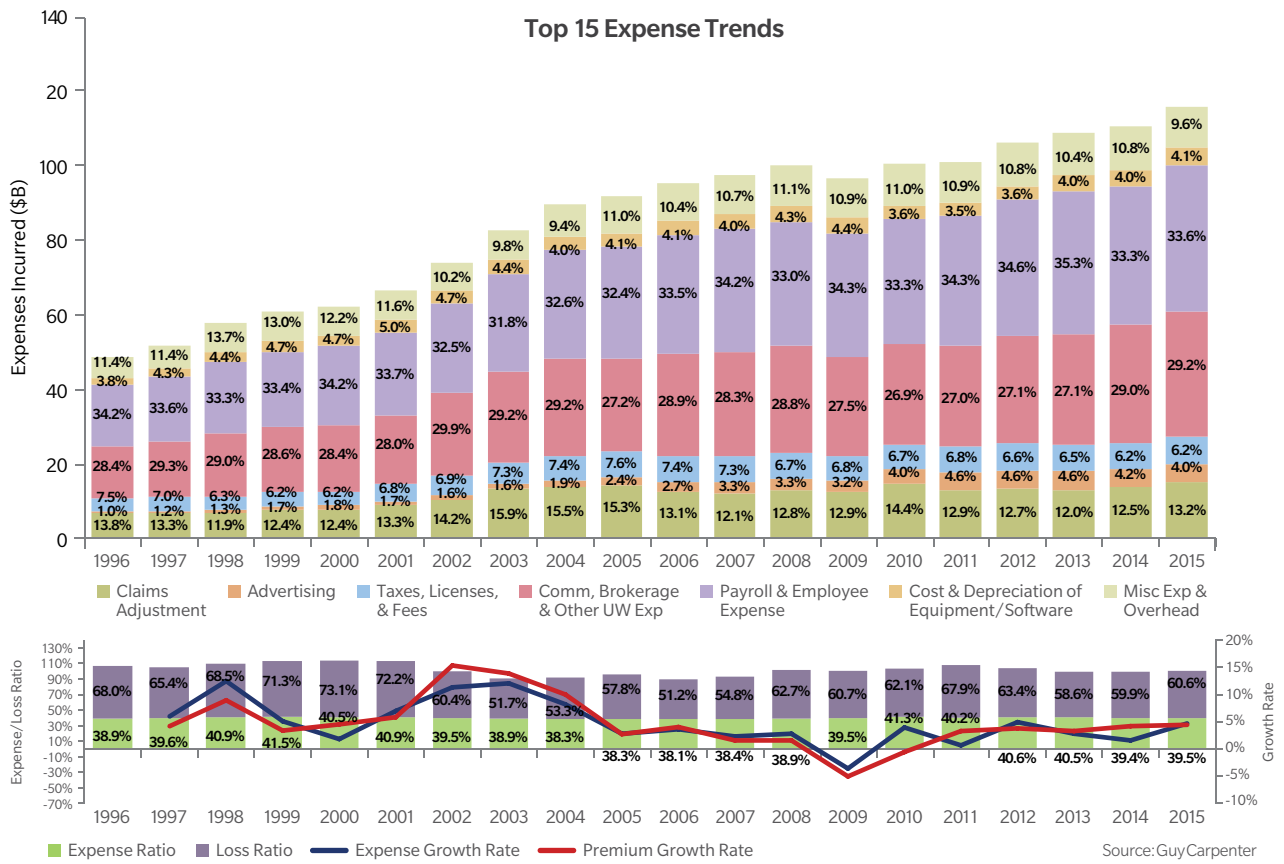
Exhibit 14: Discussion

The industry's expense profile has been quite stable but demonstrates an evolution over a 20 year time period. Advertising costs have tripled from 0.9 to 2.8 percent of total while claims adjustment expenses have fallen from a high of 16.5 percent in 2003 to 13.1 percent in 2015.

When the top 15 carriers are compared with all others, the largest difference that appears is in advertising expense. For the top 15 carriers, advertising makes up 4 percent of total expenses, while it is 1.4 percent for all other carriers. Smaller carriers also tend to have slightly higher expenses related to payroll and employees, 35.1 percent compared with 33.6 percent for the top 15 insurers.

Please refer to the Risk Benchmarks Supplement for additional expense breakouts by industry segment.

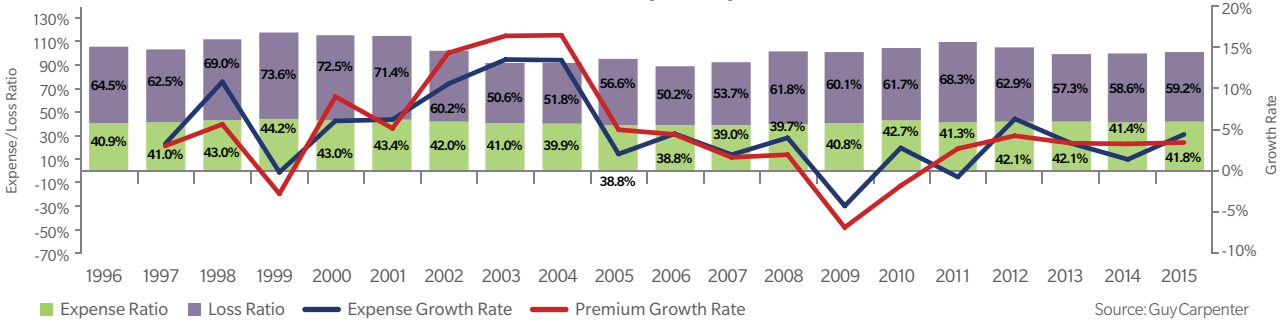




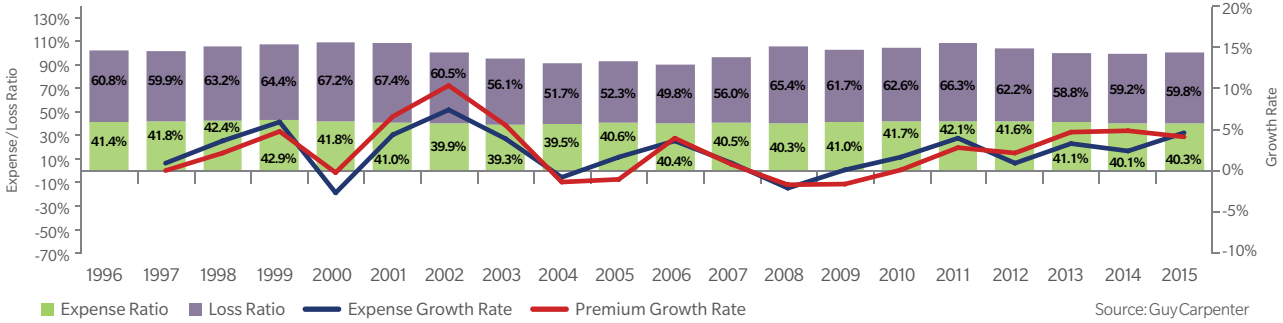
Expense Benchmarking

E14 | EXPENSE TRENDS BY MARKET SEGMENT

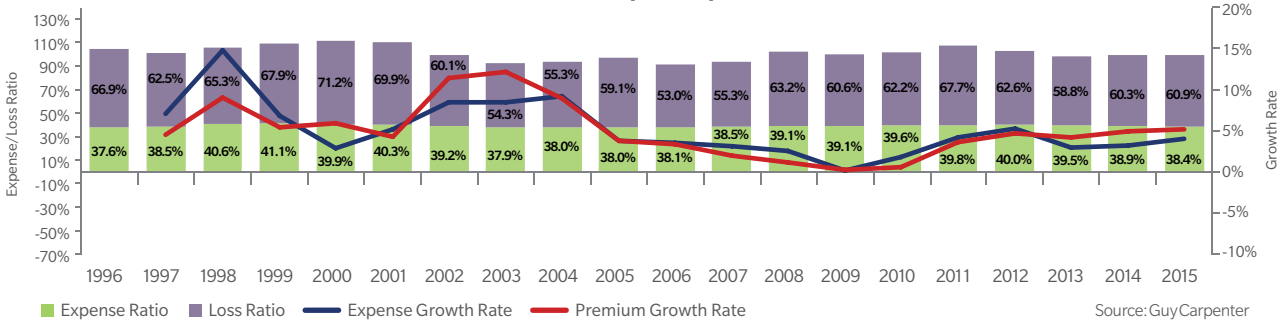
Commercial Lines Top 15 Expense Trends



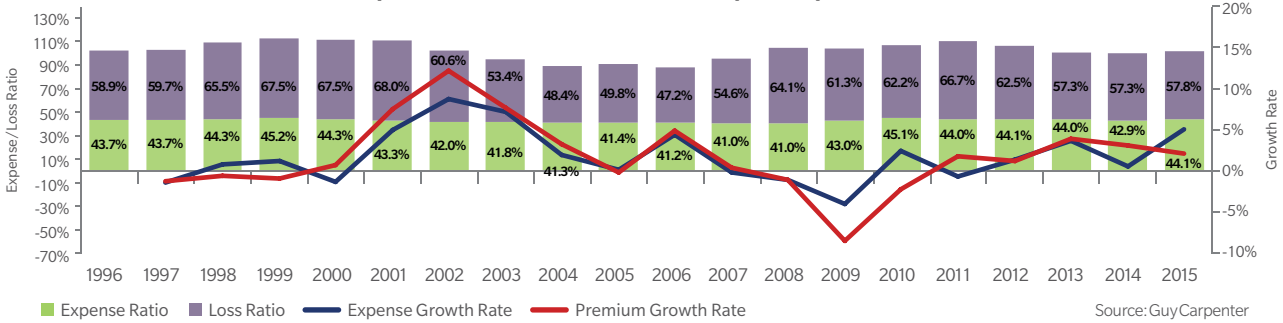
Companies Other Than Commercial Top 15 Expense Trends



Personal Lines Top 15 Expense Trends



Companies Other Than Personal Top 15 Expense Trends





VII. FINANCIAL MANAGEMENT AND STRATEGY

7.1 INTRODUCTION

As demonstrated throughout this report, understanding insurance risk requires careful review of many cyclical drivers, some of which affect costs while others affect revenue. An understanding of the investment environment is also critical. Insurers today are enduring one of the longest protracted low interest rate environments in history. Low interest rates reduce an insurer's ability to fund underwriting losses with investment income. In this section we explore the industry's historical balance sheet and capitalization since 1996.

7.2 INDUSTRY OPERATING PERFORMANCE

E15 | RECENT OPERATING PERFORMANCE IN THE P&C INDUSTRY

Exhibit 15: Explanation

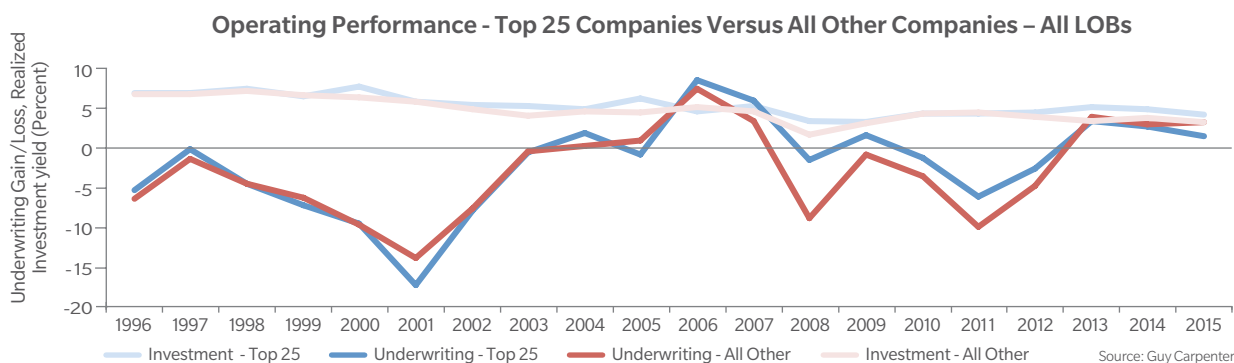
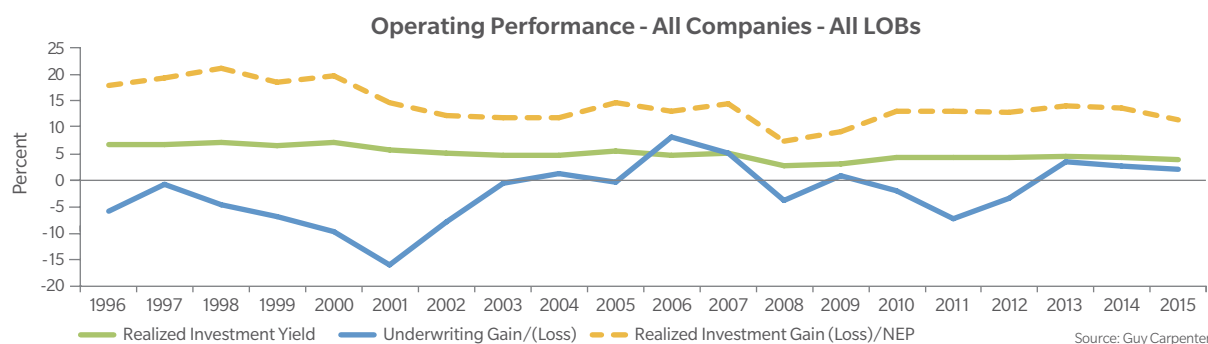
Exhibit 15 depicts the industry's historical operating performance, highlighting underwriting performance and realized investment returns. Underwriting performance is measured as the calendar year underwriting gain/(loss) divided by net earned premium. Realized investment yield represents the net investment gain/(loss) divided by total invested assets, where net investment gain/(loss) is defined as net investment income earned plus realized capital gains/(losses) net of a capital gains tax. The realized gain/(loss) over NEP (the dotted yellow line) represents the "value of insurance float" and is depicted to allow visual comparison between the investment and underwriting performance.

Exhibit 15: Discussion

The industry's operating performance over this period contains two periods of consecutive underwriting gains: from 2006 to 2007 and from 2013 to 2015. The year 2005 witnessed record-setting hurricane events (notably Katrina, Rita and Wilma) but still generated a breakeven underwriting performance due to a strong cyclical hard market in casualty lines (before considering policyholder dividends).

In the early part of the millennium, the P&C industry's underwriting results were trending downward. Adverse reserve development between 1999 and 2002 resulted from underpriced policies in a highly competitive market coupled with unexpected inflation in bodily injury costs. Ultimately, approximately 15 percent of statutory policyholder surplus was destroyed during this period. The events of September 11, 2001, further deepened a negative underwriting position, creating a rare occasion when investment income could not offset underwriting losses. The ensuing hard market improved underwriting results for several years, reaching peak performance in 2006.

In more recent years, underwriting results have improved from a recent low in 2011, when high-frequency natural peril activity including tornadoes, hail and winter storms headlined the industry's concerns. Rate increases have since boosted premium adequacy, particularly in commercial lines. Although these trends slowed in 2014 and 2015, it was still a positive performing year compared to historical results in which only six of the past 20 years did not involve either an underwriting loss or a breakeven on the premiums collected.





7.3 INDUSTRY BALANCE SHEET

E16 | HISTORICAL BALANCE SHEET IN THE P&C INDUSTRY

Exhibit 16: Explanation

Exhibit 16 presents the industry's historical balance sheet beginning with 1996 with the yearly percentage changes identified for each major component. Our definition of the industry on each valuation date includes all active P&C companies with USD 1 million of direct written premiums and with positive policyholder surplus. Total asset values (illustrated with positive amounts in the chart) are the mirror image of the total liabilities plus policyholder surplus (illustrated with negative amounts in the chart).

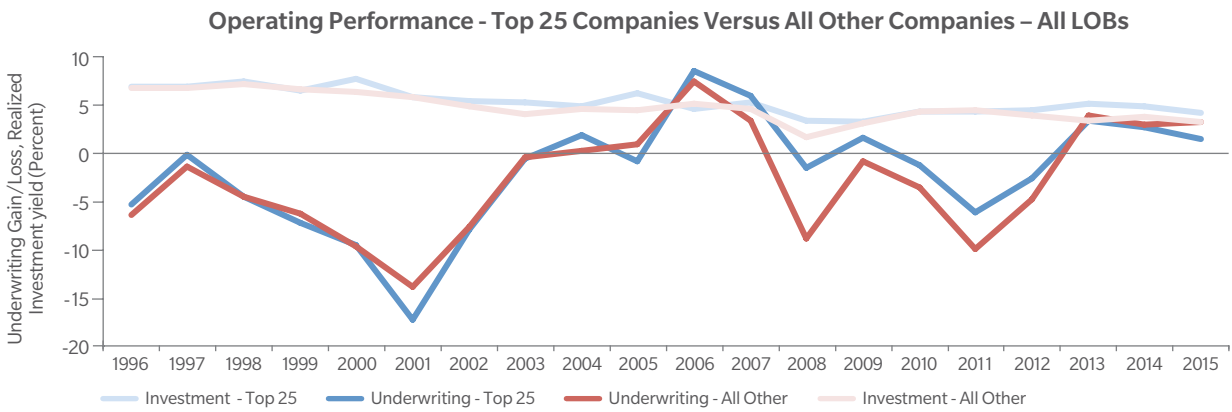
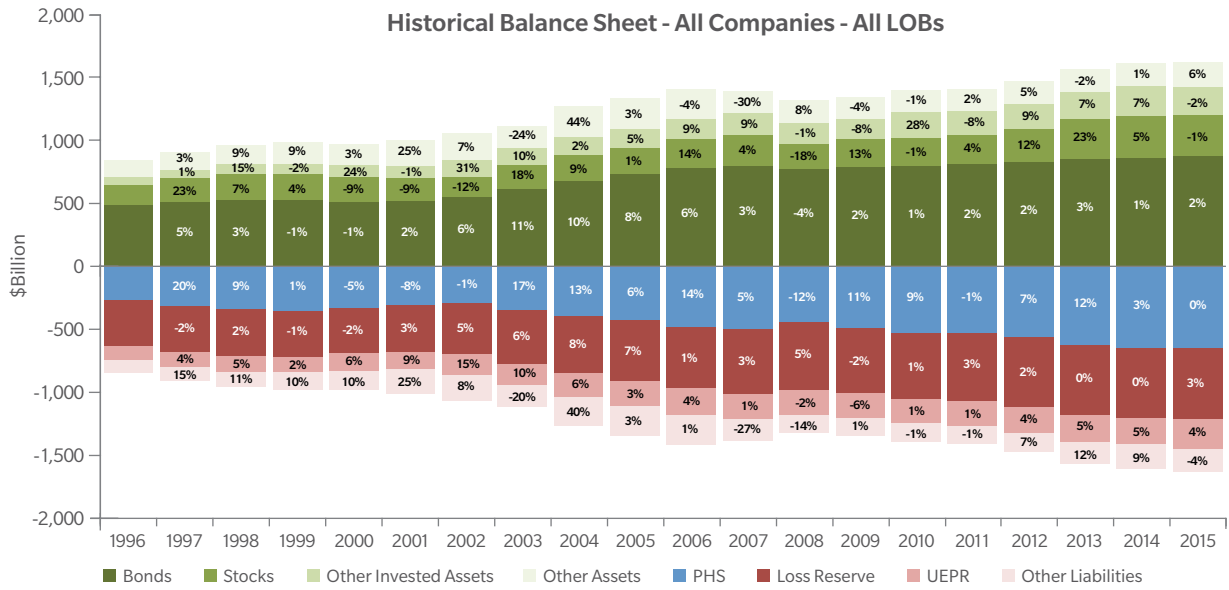
Exhibit 16: Discussion

Clearly, operating performance (see Section 7.2) is an important driver of the industry's surplus position, but unrealized capital gains/(losses) can also have a large impact. From 1996 to 2015 the industry's surplus grew by over 150 percent. However, operating losses have been far more common than operating gains over this time period. Surplus decreased in only five of the 19 years. Reductions in surplus typically result from a combination of catastrophe events and stock market losses. Highlights of past losses are as follows:

- **2000:** While operating income was positive, the stock market saw its first annual decline in a decade. Unrealized capital losses and dividends more than offset a modest operating profit in 2000.
- **2001:** Losses from the terror events on September 11, adverse reserve development from previously mispriced business and a sagging stock market all contributed to the evaporation of nine percent of industry surplus – the largest decline in the last two decades.
- **2002:** The effect of three consecutive years of negative annual stock returns was mitigated by rate increases and re-underwriting. The industry experienced only a slight one percent loss to surplus.
- **2008:** Devastating stock market losses due to the credit crisis generated the worst annual returns since 1931. Approximately 20 percent of the industry's invested asset portfolio was allocated to equities before the crisis (see Exhibit 20). These asset losses and above average property catastrophe losses depleted surplus by 12 percent, the largest amount across this history. In 2008, six named hurricanes made landfall and high tornado activity occurred in the United States.
- **2011:** Catastrophes wreaked havoc in 2011 across multiple geographic regions. Tornadoes across the United States, wildfires in the Southwest, winter storms in the Midwest and Hurricane Irene landfalls in North Carolina and New Jersey contributed to losses. In 2013, the industry enjoyed both strong underwriting and investment results, producing a return on surplus that was among the best in two decades. The strong underwriting results carried into 2014 but growth in surplus slowed due to lower stock returns. In 2015, the industry surplus position stayed flat, as capital returned to shareholders offset modest underwriting profits and investment income.

From 2008 to 2015 the loss and LAE reserve balance for the industry increased by only seven percent, even as net earned premium increased by over 25 percent – coinciding with a period of prior period consistent reserve releases. The increase of three percent in 2015 was the largest increase since 2008.

On the asset side of the balance sheet, the industry's fixed income holdings have steadily increased at a rate of one to three percent from 2009 to 2015, while stocks and other invested assets (including Schedule BA assets) have experienced significantly more volatility.



7.4 CHARTING POLICYHOLDER SURPLUS

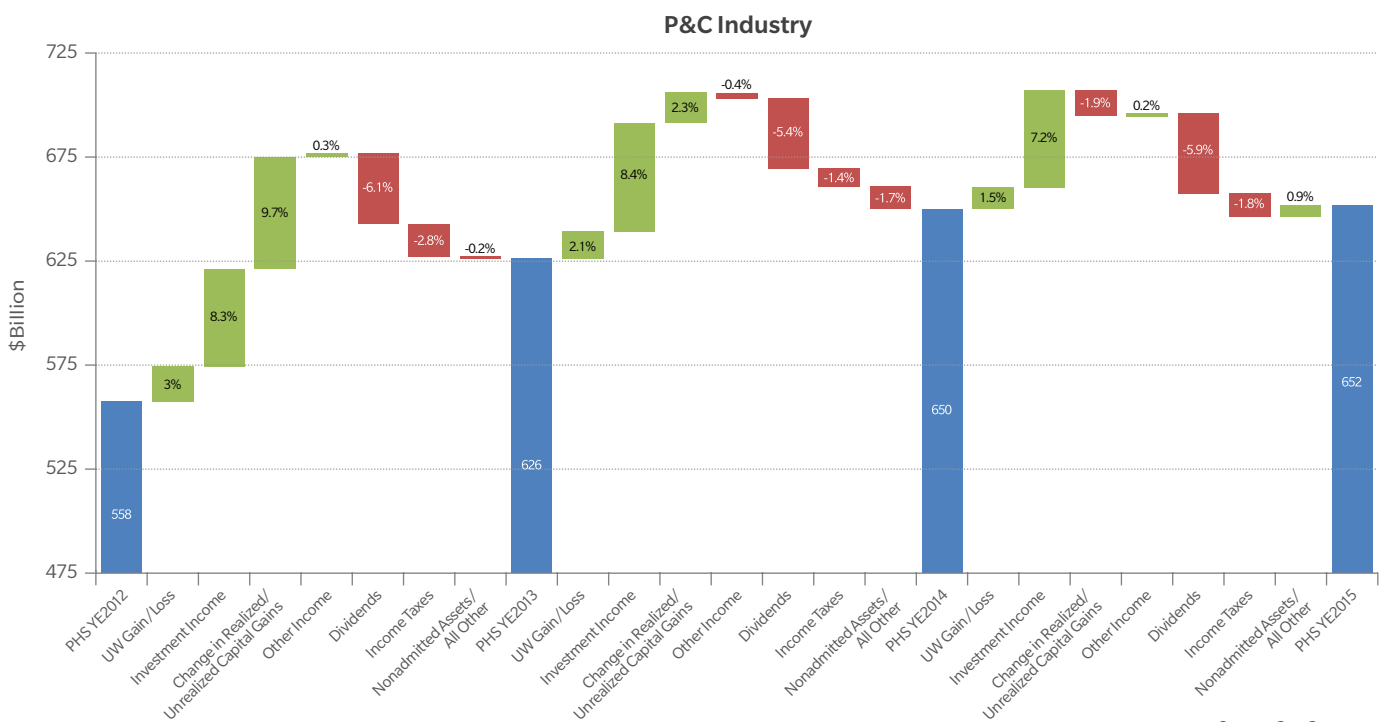
E17 | CHARTING THE CHANGE IN POLICYHOLDER SURPLUS BY MARKET SEGMENT

Exhibit 17: Explanation

This waterfall chart shows how capital has flowed in and out of the P&C industry over the last three calendar years. Capital accretions are colored in green while depletions of capital are in red. The primary contributors to changes in policyholder surplus are identified as underwriting gain/(loss), investment income, realized and unrealized capital gains (net of income taxes), other income, dividends, income taxes (excluding taxes on capital gains/(losses)) and non-admitted assets and all other changes. We also present similar waterfalls for the public market and mutual market segments (see Section 1.4).

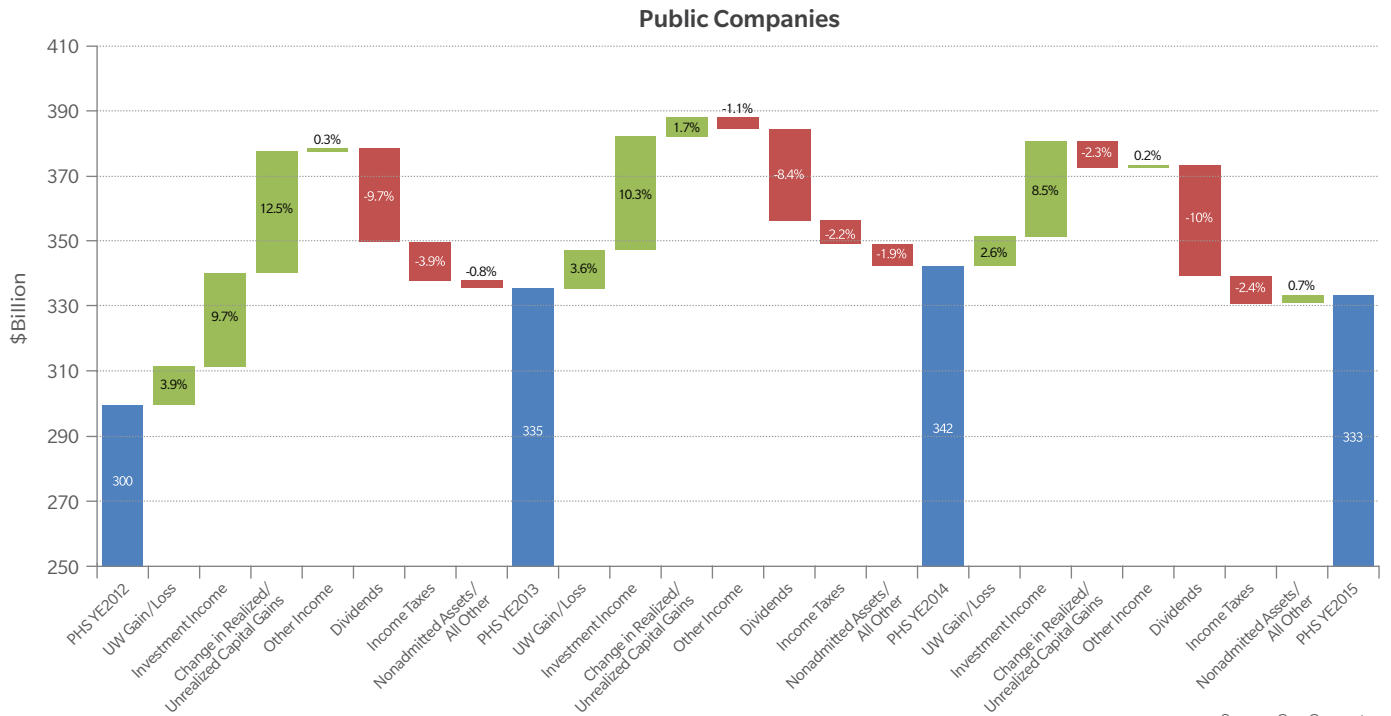
Exhibit 17: Discussion

2015 marked a third consecutive year of underwriting gains for the P&C industry. Public and mutual companies reported profitable underwriting results. In the 19 years prior to 2015 there was only one other string of consecutive underwriting gains, from 2006 to 2007 (see Sections 7.2 and 7.3). While both public and mutual companies have grown their surplus over the past three years, the mutual companies have lagged the public companies in underwriting and investment returns. However, because they have returned lower dividends to policyholders than the public companies have returned to shareholders, surplus for the mutual market segment grew by more (7.5 percent per year) than that for the public segment (3.5 percent per year).

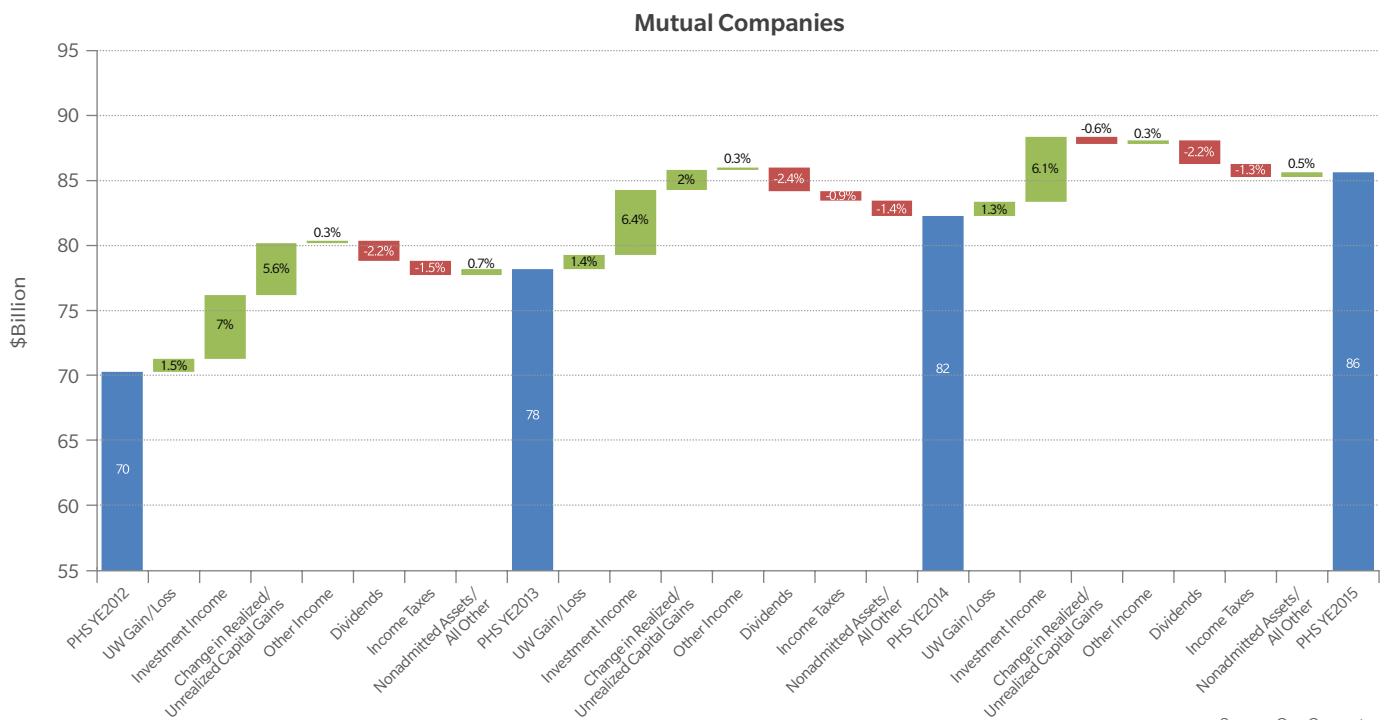


Source: Guy Carpenter

E17 | CHARTING THE CHANGE IN POLICYHOLDER SURPLUS BY MARKET SEGMENT



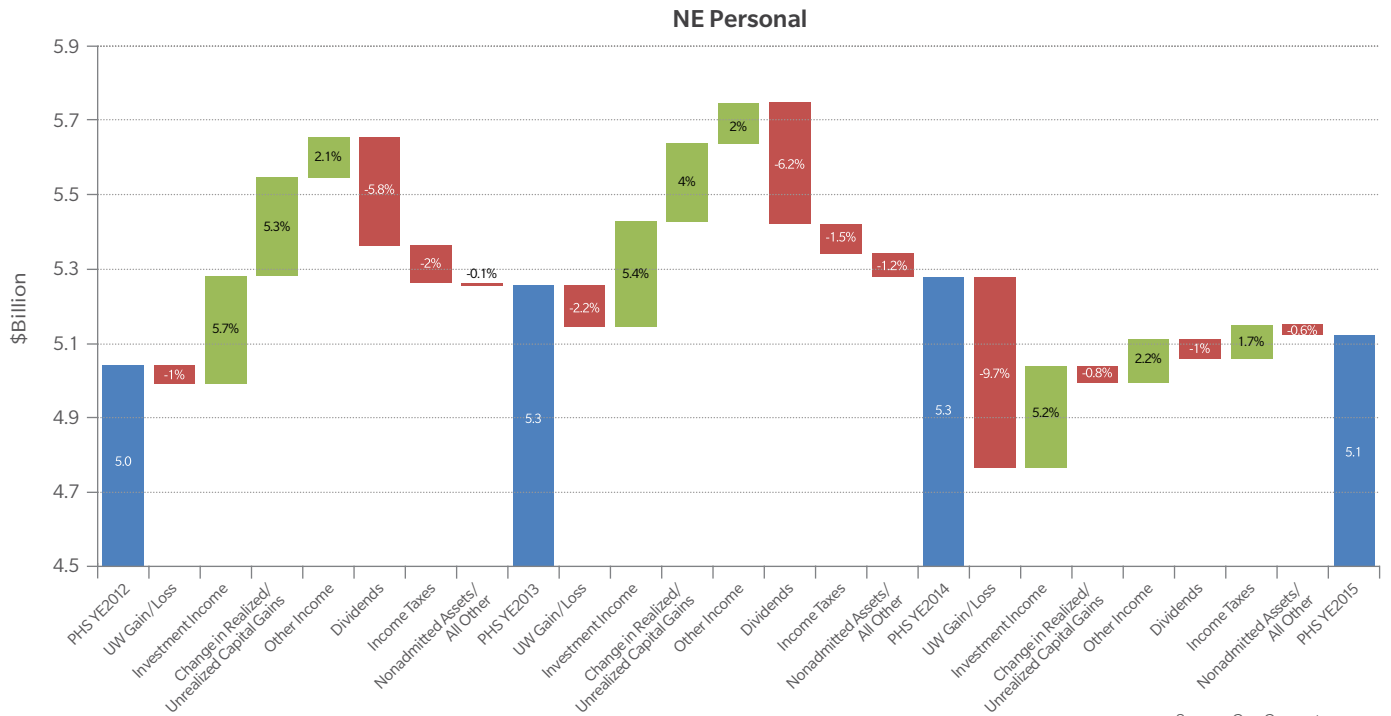
Source: Guy Carpenter



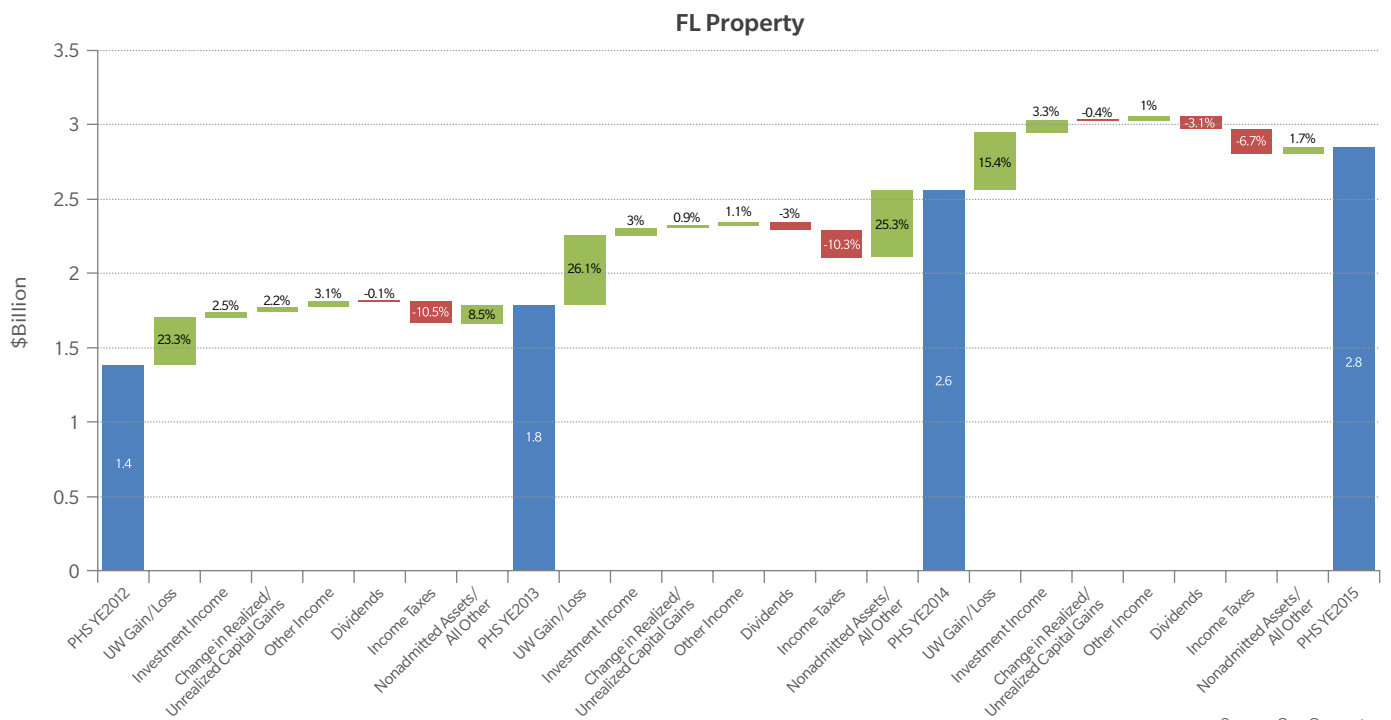
Source: Guy Carpenter

Note: The company list for this composite was left unchanged from last year in this exhibit for continuity purposes.

E17 | CHARTING THE CHANGE IN POLICYHOLDER SURPLUS BY MARKET SEGMENT

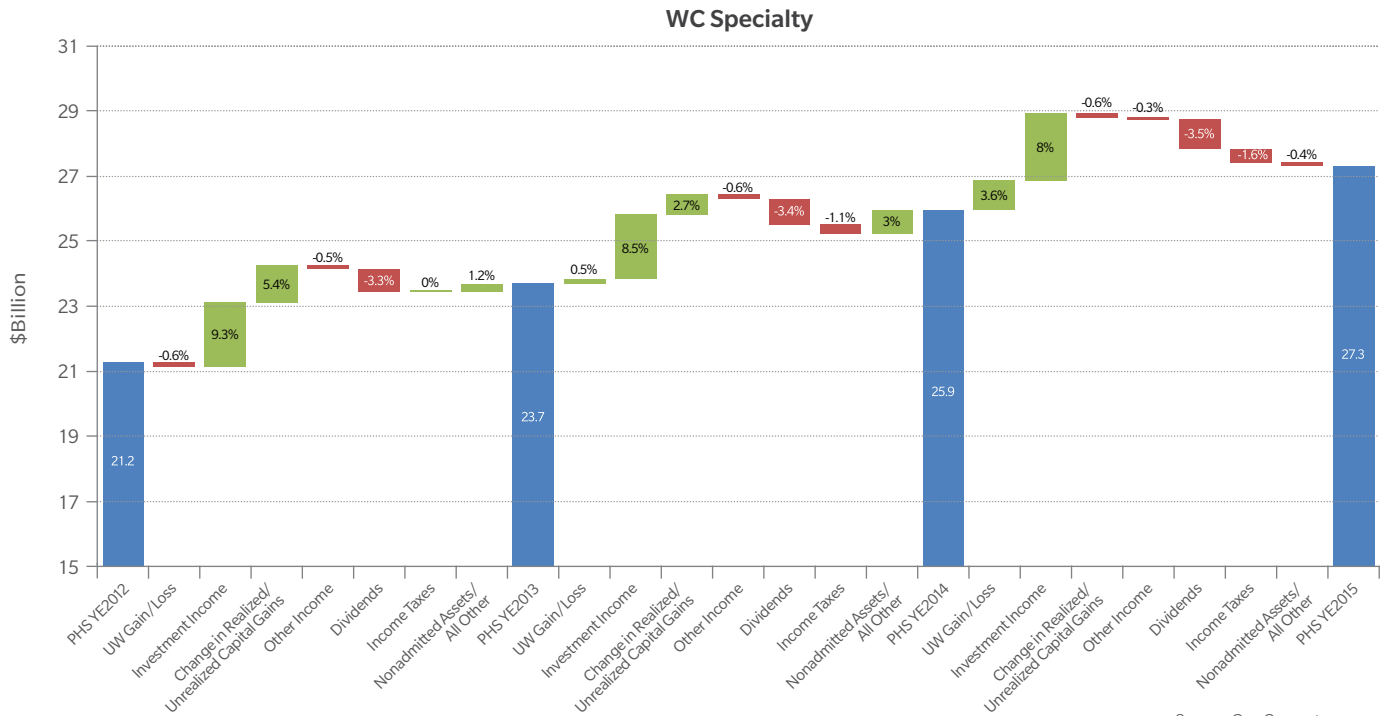


Source: Guy Carpenter



Source: Guy Carpenter

E17 | CHARTING THE CHANGE IN POLICYHOLDER SURPLUS BY MARKET SEGMENT

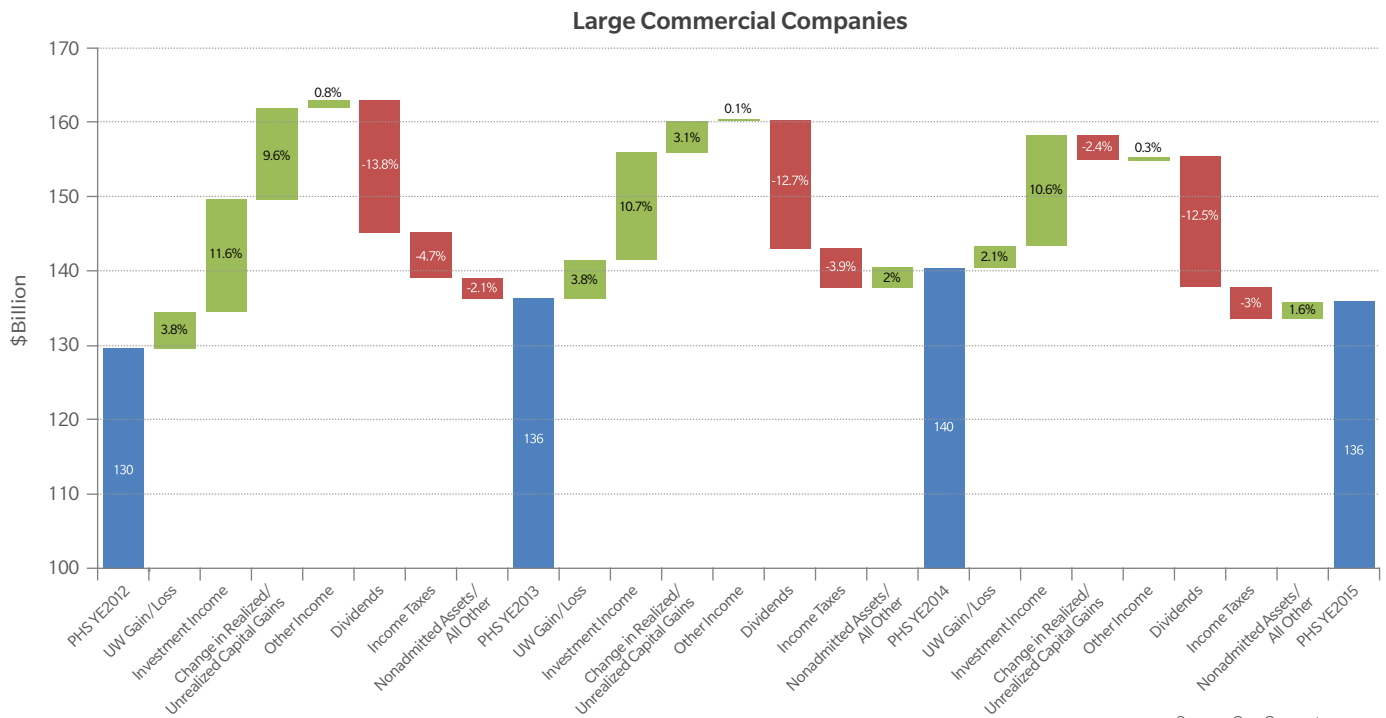


Source: Guy Carpenter



Source: Guy Carpenter

E17 | CHARTING THE CHANGE IN POLICYHOLDER SURPLUS BY MARKET SEGMENT



Source: Guy Carpenter

7.5 INDUSTRY ASSET PROFILE

E18 | ASSET PROFILE IN THE P&C INDUSTRY

Exhibit 18: Explanation

Exhibit 18 portrays the historical asset profile of the P&C industry, highlighting how the growing capital base and the impact of the investment markets have altered asset allocation strategies. Our definition of the industry on each valuation date includes all active P&C companies with USD 1 million of direct written premium with positive policyholder surplus. The corresponding annual percentages represent the asset component's ratio to total invested assets. A line on the chart represents total invested assets divided by policyholder surplus.

Exhibit 18: Discussion

Invested asset holdings in the industry have remained fairly consistent over time. Since 2010 the industry's allocation to equities has increased 18 percent to 24 percent. This trend began with the downgrade of the U.S. government's credit rating in August 2011. The prolonged low interest rate environment gave insurers a reason to devote more of their invested asset portfolios to equities. This trend continued as returns on the market remained positive from 2012 to 2015.

In recent years, a second asset allocation trend involved corporate bond growth – from 19 percent as late as 2007 to 25 percent in 2015. Insurers have turned to corporate bonds in pursuit of more yield over this period.

For the industry's asset profile, municipal and special revenue bonds, mainstays in the P&C insurer portfolio, have become a smaller piece of the pie of total assets.

Schedule BA assets have grown in dollar value over time, but the number of companies holding such assets has not changed drastically since 2001. Based on 2015 figures, the ten companies with largest Schedule BA asset holdings account for 75 percent of the total investments. All but two of these companies are all part of the Top 15 market segment in the ASR.

Schedule BA Assets	2001	2005	2010	2015
Total Amount \$B	34	39	98	118
# of Companies with BA Assets	352	319	324	354

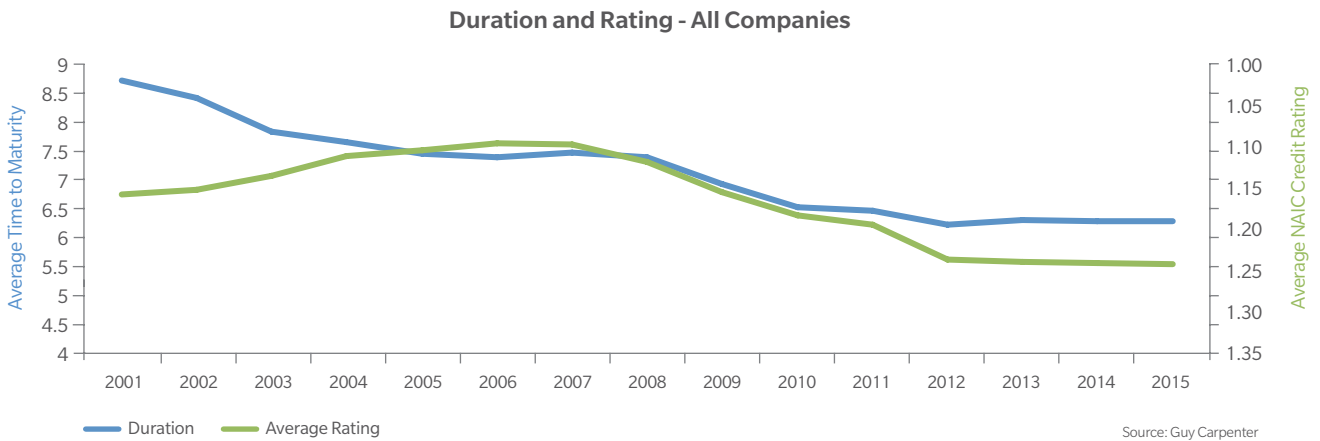
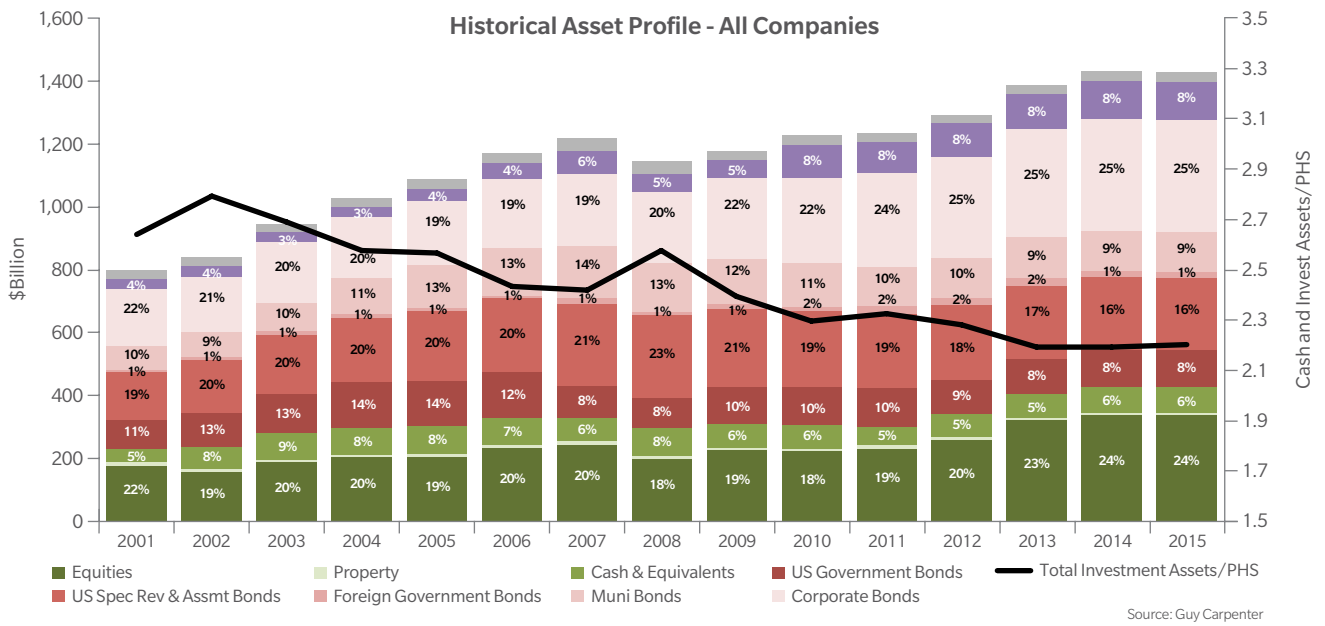
Source: Guy Carpenter

In general, asset leverage has declined consistently since 2001. A noteworthy reversal to this trend occurred in 2008; one of only two years since 2001 when invested asset holdings declined overall. Losses in the stock market coupled with underwriting losses from natural catastrophes (see Section 7.2) depleted both assets and surplus, and the asset leverage spiked in the aftermath. In 2015, asset leverage increased slightly as company reserve and asset balances increased, while retained industry capital stayed flat (see Section 7.3).

The industry fixed income portfolio has changed markedly over the last decade. As risk-free rates have fallen in the wake of the financial crisis and global central bank action, insurers have been compelled to invest in riskier bonds to achieve greater yield, with average NAIC credit rating deteriorating from 1.10 in 2006 to 1.25 in 2015. Companies have also sought to reduce their duration risk by reducing the duration of their bond portfolio, which was as high as 8.7 in 2001 and has fallen to 6.3 in 2015. As the low interest rate environment has lingered longer than many economists had initially predicted, the strategy of reducing portfolio duration has in hindsight reduced industry yield while increasing reinvestment risk as older securities mature and cash is reinvested at the lower prevailing interest rates. The benefit of the lower duration strategy is the flexibility that companies have afforded themselves to turnover their portfolio more quickly if interest rates do rise.



E18 | ASSET PROFILE IN THE P&C INDUSTRY





APPENDIX

A.1 RISK BENCHMARKS SUPPLEMENT

The exhibits presented in the Risk Benchmarks Annual Statistical Review are a small sampling of the research conducted in Guy Carpenter's Study of Industry Risk Benchmarks. We encourage readers to refer to the Risk Benchmarks Supplement, an accompanying document to the Annual Statistical Review that presents additional detail by market segment and line of business. The table below details the exhibits included in the Risk Benchmarks Supplement. For any questions on the Risk Benchmarks ASR or Supplement, we encourage readers to reach out to their Guy Carpenter Account Executive, or RiskBenchmarks@guycarp.com.

TABLES AND EXHIBITS

Exhibit	Section	Description
One	2	Ultimate Loss Ratio for All Lines Combined and by Line of Business, with Percentiles
Two	2	Initial and Ultimate Loss Ratios by Line of Business
Three	2	Loss Ratio Spread by Line of Business
Four	2	Combined Ratio Spread by Line of Business
Five	2	Market Performance by State
Six	2	Lorenz Curves and Gini Coefficients by Line of Business, by Region
Seven	2	Underwriting Return, Volatility and Premium Size Scatterplot
Eight	2	Premium Trends by Market Segment
Nine	2	Trends in Reinsurance Utilization
Ten	2	Volatility Reduction of Reinsurance
Eleven	2	Frequency and Severity Trends
Twelve	3	All Lines Reserve Development Cycle
Thirteen	3	Reserve Development Cycle by Line of Business
Fourteen	3	Reserve Development Cycle by Segments
Fifteen	3	Underwriting Return, Volatility, and Premium Size Scatterplot by Line of Business for Individual Companies
Sixteen	4	Payment Pattern Mean and Volatility Illustrations
Seventeen	5	Correlation in the Ultimate Loss Ratio between Lines of Business, by Market Segment, with Percentiles
Eighteen	6	Industry Expense Trends
Nineteen	6	Expense Trends by Market Segment
Twenty	7	Historical Balance Sheet in the P&C Industry
Twenty One	7	Charting the Change in Policyholder Surplus by Market Segment
Twenty Two	7	Asset Profile in the P&C Industry

Table	Section	Description
Zero	1	List of Companies by Market Segment
One	1	Line of Business Acronyms and Industrywide Premiums
Two	1	Mapping the Statutory Lines of Business
Three	1	Divisional and Functional Market Segments, with Premium and Market Share
Four	1	Summary of State Premiums by Region
Five	2	Ultimate Loss Ratio Performance, with Individual Company Volatility
Six	2	Ultimate Loss Ratio Performance and Volatility by Market Segment
Seven	2	Volatility Reduction of Reinsurance
Eight	3	One-Year Reserve Development by Line of Business
Nine	3	One-Year Reserve Development by Market Segment
Ten	3	Ultimate Development by Line of Business
Eleven	3	Ultimate Development by Market Segment
Twelve	3	Relationship between Duration and Risk in Loss Reserves
Thirteen	4	Mean Payment Pattern and Duration
Fourteen	4	Mean Payment Pattern and Duration by Market Segment
Fifteen	4	Coefficient of Variation of Payment Pattern Increments
Sixteen	4	Coefficient of Variation of Payment Pattern Increments by Market Segment
Seventeen	5	Correlation in the Ultimate Loss Ratio between Lines of Business
Eighteen	6	Direct and Net Expenses by Line of Business
Nineteen	6	Direct and Net Expenses by Market Segment and Line of Business

A.2 THIS YEAR'S CONTRIBUTORS



Blake Berman is a Vice President in Guy Carpenter's Strategic Advisory® practice specializing in enterprise risk management (ERM) and capital modeling. Blake has six years of experience as a P&C actuary in insurance and reinsurance. He manages the development of BenchmaRQ® Capital Advisory and works with clients to help them optimize their growth and reinsurance strategy. Blake is a Fellow of the Casualty Actuarial Society and frequent speaker at industry forums on topics of financial modeling and capital allocation.



Hanbing He is an Assistant Vice President in Guy Carpenter's Strategic Advisory® practice. With actuarial and computer science backgrounds, Hanbing's role includes building databases, validating methodologies and optimizing models to help Guy Carpenter stay on the forefront of data and analytics. Hanbing holds a M.S. from Columbia University and a B.A. from CUFE in China. He continues to study towards the FCAS designation.



Zan Zhao is an actuarial analyst in GC Analytics®. He joined Guy Carpenter in 2015 as a summer intern of the ERM service team. He initiated the ASR Generator tool to significantly improve the database management and manipulation for the 2015 Risk Benchmarks report. Zan graduated from Columbia University and is now working with the Guy Carpenter MetaRisk® team on financial model validation and actuarial tool development.



Gina Carlson is a Senior Vice President in Guy Carpenter's Strategic Advisory® practice focusing on ERM. She is an active leader in the BenchmaRQ® Capital Advisory project that provides standardized economic capital modeling results to Guy Carpenter clients. She has 19 years of P&C industry experience, with a focus on financial analysis, capital adequacy and reinsurance accounting.



Phil Lee is a Vice President in Guy Carpenter's Strategic Advisory® practice working with the ERM Services Team. He has played a critical role in maintaining the process flows and data integrity for the Risk Benchmarks research for the last three years. He serves Guy Carpenter clients as an advisor in using BenchmaRQ® capital modeling. He is an associate actuary of Casualty Actuarial Society and has ten years of experience in reinsurance, actuarial science and risk management.

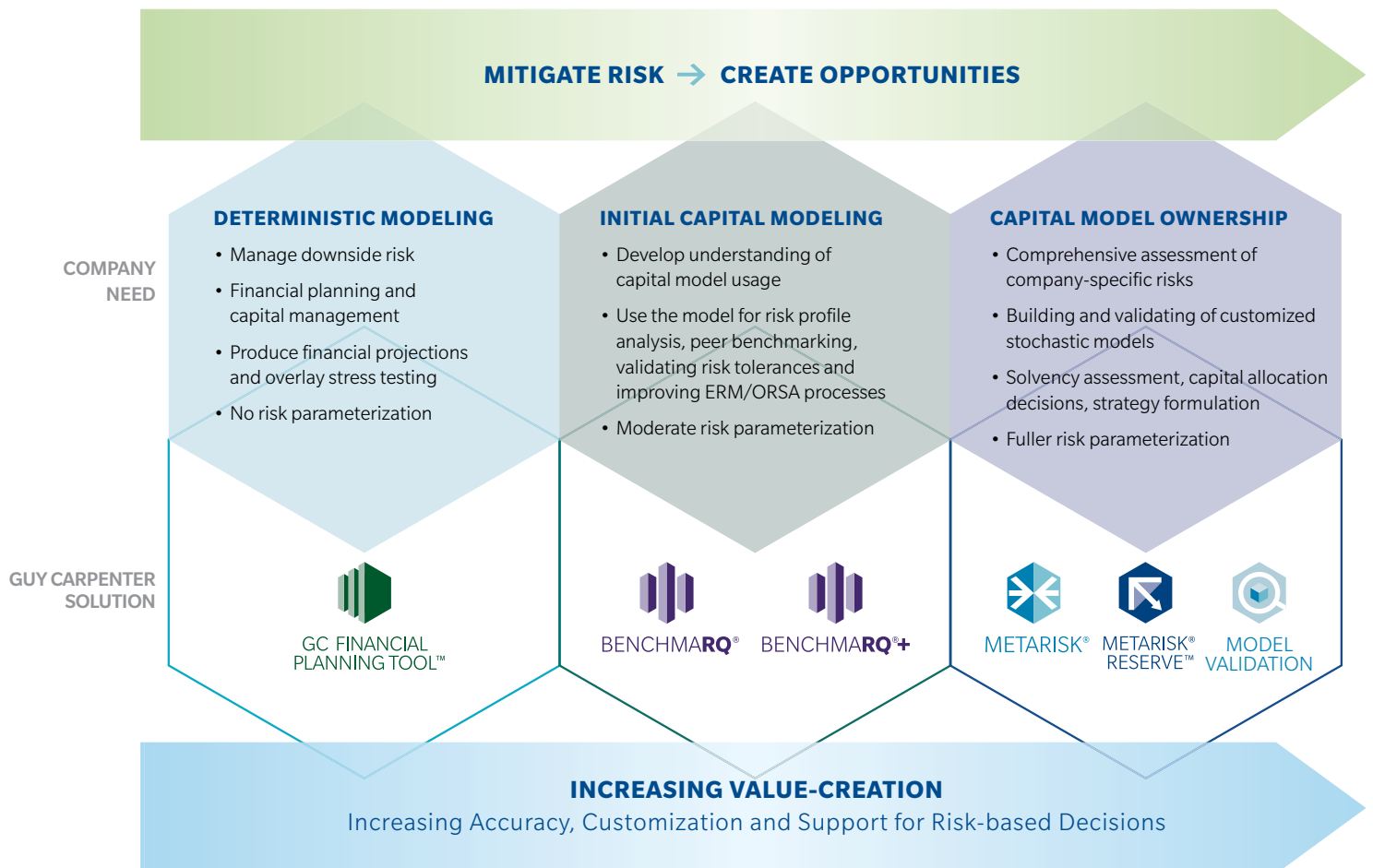


Weilan Xue, Shibo Chen, and Thitiwat Kaewwattanaborworn designed tools and algorithms to update our extensive databases and create the complex exhibits in this report. They are students in the Masters of Actuarial Science Program at Columbia University and interned with Guy Carpenter during the summer of 2016. These students exemplify the demanding technical and analytical aptitudes offered to our industry by the next generation of actuaries.







A.3 GUY CARPENTER SOLUTIONS

Effective capital modeling is critical for today's insurers as they address the ever-increasing expectations of all stakeholders, from regulators and rating agencies to board members and policyholders. Guy Carpenter's full suite of solutions, in-depth industry knowledge and experience and unparalleled support as a trusted advisor can help your company further develop and customize your capital model to assist with important risk-based decisions.

Guy Carpenter's suite of capital modeling solutions is designed to meet the needs of a wide spectrum of insurers. Whether your firm's needs are less complex and you are new to the process or you represent a large company with a fully developed in-house model, Guy Carpenter can work with you to customize and implement the solution that best serves your needs.



A Complete Range of Solutions to Fit Your Needs

Solution	Key Benefit	User Profile
 <p>GC FINANCIAL PLANNING TOOL™</p> <p>Deterministic multi-year model that projects financials and provides insights into key metrics to assist with business planning, stress testing and rating agency evaluations.</p>	<p>Traditional financial planning tool with stress testing overlay and direct links to BCAR results to enhance capital management and interactions with rating agencies.</p>	<p>Smaller regional insurers with less complex modeling needs seeking to manage their risk downside using deterministic assumptions and with limited resources to run the model.</p>
 <p>BENCHMARQ®</p> <p>Standardized pre-built stochastic model using industry data and proprietary risk models. Simulates one year of company performance and provides financial statements associated with various outcomes.</p>	<p>Benchmarks risk profile relative to peers, features user-friendly reports and graphics and informs risk tolerance setting.</p>	<p>Mid-sized companies that desire substantial risk-based information and a better understanding of using stochastic capital models but do not have resources to build one at this time. Also, companies with internal models that want to compare modeling outcomes.</p>
 <p>BENCHMARQ+™</p> <p>Customized version of BenchmaRQ® that includes company-specific enhancements.</p>	<p>Provides single or multi-year stochastic projections. Helps with underwriting planning, managing reserve risk and non-cat reinsurance purchasing.</p>	<p>Companies that need specific, customized enhancements in their modeling, yet are not prepared to own and maintain an in-house model.</p>
 <p>METARISK®</p> <p>Customized single or multi-year stochastic model that assists clients in building a fully parameterized model that provides a comprehensive assessment of risks. Powerful software application for capital modeling, in addition to reinsurance evaluation, catastrophe management, assumed reinsurance pricing, capital allocation and curve-fitting.</p>	<p>The industry's leading timeline-based capital modeling software, fully customized with fuller risk parameterization. Full-time access to support from capital modeling experts.</p>	<p>Primarily large companies, but also smaller and medium-sized ones, that typically have internal modeling capabilities and seek comprehensive assessment of company-specific risks.</p>
 <p>METARISK® RESERVE™</p> <p>Stochastic reserving software that enables companies to quantify reserves and measure reserve risk through generalized linear modeling. Integrates seamlessly with MetaRisk or can be used on a standalone basis.</p>	<p>Incorporates inflationary effects into reserve risk assessments. Outputs can be used with any capital model.</p>	<p>Companies seeking a clearer picture of their reserve risk and variability.</p>
 <p>MODEL VALIDATION</p> <p>Independent evaluation of a company's existing capital model by comparing it to a parallel model developed by Guy Carpenter.</p>	<p>Parallel models developed by industry-leading developers and actuaries. Capital modeling experts provide evaluation and consultation.</p>	<p>Companies with fully developed internal models that require validation and consulting services.</p>



ABOUT GUY CARPENTER

Guy Carpenter & Company, LLC is a leading global risk and reinsurance specialist. Since 1922, the company has delivered integrated reinsurance and capital market solutions to clients across the globe. As a most trusted and valuable reinsurance broker and strategic advisor, Guy Carpenter leverages its intellectual capital to anticipate and solve for a range of business challenges and opportunities on behalf of its clients. With over 2,300 professionals in more than 60 offices around the world, Guy Carpenter delivers a powerful combination of broking expertise, strategic advisory services and industry-leading analytics to help clients achieve profitable growth. For more information on Guy Carpenter's complete line-of-business expertise and range of business units, including GC Specialties, GC Analytics®, GC Fac®, Global Strategic Advisory, GC Securities*, Client Services and GC Micro Risk Solutions®, please visit www.guycarp.com and follow Guy Carpenter on LinkedIn and Twitter @GuyCarpenter.

Guy Carpenter is a wholly owned subsidiary of Marsh & McLennan Companies (NYSE: MMC), a global professional services firm offering clients advice and solutions in the areas of risk, strategy, and people. With annual revenue of \$13 billion and 60,000 colleagues worldwide, Marsh & McLennan Companies provides analysis, advice, and transactional capabilities to clients in more than 130 countries through: Marsh, a leader in insurance broking and risk management; Mercer, a leader in talent, health, retirement, and investment consulting; and Oliver Wyman, a leader in management consulting. Marsh & McLennan is committed to being a responsible corporate citizen and making a positive impact in the communities in which it operates. Visit www.mmc.com for more information and follow us on LinkedIn and Twitter @MMC_Global.

*Securities or investments, as applicable, are offered in the United States through GC Securities, a division of MMC Securities LLC, a US registered broker-dealer and member FINRA/NFA/SIPC. Main Office: 1166 Avenue of the Americas, New York, NY 10036. Phone: (212) 345-5000. Securities or investments, as applicable, are offered in the European Union by GC Securities, a division of MMC Securities (Europe) Ltd. (MMCSEL), which is authorized and regulated by the Financial Conduct Authority, main office 25 The North Colonnade, Canary Wharf, London E14 5HS. Reinsurance products are placed through qualified affiliates of Guy Carpenter & Company, LLC. MMC Securities LLC, MMC Securities (Europe) Ltd. and Guy Carpenter & Company, LLC are affiliates owned by Marsh & McLennan Companies. This communication is not intended as an offer to sell or a solicitation of any offer to buy any security, financial instrument, reinsurance or insurance product.

Disclaimer

Guy Carpenter & Company, LLC provides this report for general information only. The information contained herein is based on sources we believe reliable, but we do not guarantee its accuracy, and it should be understood to be general insurance/reinsurance information only. Guy Carpenter & Company, LLC makes no representations or warranties, express or implied. The information is not intended to be taken as advice with respect to any individual situation and cannot be relied upon as such. Please consult your insurance/reinsurance advisors with respect to individual coverage issues.

Statements concerning tax, accounting, legal or regulatory matters should be understood to be general observations based solely on our experience as reinsurance brokers and risk consultants, and may not be relied upon as tax, accounting, legal or regulatory advice, which we are not authorized to provide. All such matters should be reviewed with your own qualified advisors in these areas.

Readers are cautioned not to place undue reliance on any historical, current or forward-looking statements. Guy Carpenter & Company, LLC undertakes no obligation to update or revise publicly any historical, current or forward-looking statements, whether as a result of new information, research, future events or otherwise.

This document or any portion of the information it contains may not be copied or reproduced in any form without the permission of Guy Carpenter & Company, LLC, except that clients of Guy Carpenter & Company, LLC need not obtain such permission when using this report for their internal purposes.

The trademarks and service marks contained herein are the property of their respective owners.

Guy Carpenter Report

© 2016 Guy Carpenter & Company, LLC



