



Workers Compensation Claim Frequency— 2013 Update

INTRODUCTION

The Great Recession of 2007–2009 was the most serious and long lasting economic contraction since the Great Depression. The recession and its modest recovery had a considerable influence on workers compensation claim frequency. This paper will provide NCCI's latest frequency change estimate for Accident Year 2012 and will examine the effect of the recession on frequency changes by various claim and employer characteristics.

KEY FINDINGS

- According to preliminary estimates, lost-time claim frequency declined by 5% in Accident Year 2012.
- Claim frequency for workers compensation injuries increased 3.8% in Accident Year 2010, marking the first increase since 1997. Prior to the 2010 uptick, claim frequency had been declining at an average rate of more than 4% per year since 1990. Following the 2010 uptick, claim frequency declined in 2011, albeit by a modest 0.9% (and, as just noted, declined in 2012).
- In 2012, while frequency decreased by 5%, the average cost per lost-time claim increased 1% for indemnity and 3% for medical.
- Over the five complete policy years ending with Policy Year Expiring (PYE) 2011:
 - Frequency per payroll declined by 16% (4.3% per year) but has leveled off over the latest two years.
 - Frequency per payroll declined for all industry groups, most notably in Contracting and Manufacturing.
 - Frequency per payroll declined for all employer sizes, with the largest declines for employers having more than \$100 million in payroll.
 - Frequency declines were relatively consistent by NCCI type of injury.
 - Payroll volume increased by double digits in the Oil & Gas and Health Care sectors, while declining nearly 2% for all industries combined. In the Oil & Gas sector, claim frequency is notably high in the emerging Hydraulic Fracturing industry.
- NCCI measures claim frequency relative to a variety of bases such as payroll (frequency per payroll) and premium (frequency per premium). While both measures provide valuable insight on long term frequency trends, frequency per premium is less distorted by changes in industry mix. This is because frequency per premium varies far less by class than frequency per payroll. For the construction industry, claim frequency is high relative to payroll and low relative to premium. The decline in the construction industry during the recent recession put considerable downward pressure on frequency per payroll and slight upward pressure on frequency per premium.

STUDY DESIGN

This research brief is subdivided into the following three sections:

- I. Overall Trends
- II. Impact of Changes in Industry Mix on Frequency and Severity
- III. Frequency Changes by Claim and Employer Characteristics

The first section contains accident year statistics and is based primarily on NCCI's aggregate **Financial Call** data, which provides the latest available frequency information (through Accident Year 2012). In addition, NCCI's **Statistical Plan** data was used to analyze Accident Years 2011 and prior in greater detail. Though not as recent as financial data, **Statistical Plan** data contains detailed policy information that allows us to analyze frequency in more detail.

The last two sections contain policy year statistics and are based only on NCCI's **Statistical Plan** data which, as noted above, allows for a more detailed breakdown. **Statistical Plan** data also allows us to analyze a variety of frequency measures (e.g., frequency per payroll vs. per premium) and how shifts in industry mix during the recession impacted these measures. We also examine the decline in frequency over the latest five years by various claim and employer characteristics.

I. OVERALL TRENDS

As communicated at NCCI's **Annual Issues Symposium 2013**, Exhibit 1 indicates that after increasing in 2010 for the first time in 13 years, lost-time claim frequency declined in 2011, by 0.9% and again in 2012 by 5%.

Prior to the 2010 uptick, injury rates had fallen nearly 57% from 1990 through 2009, an average decrease of more than 4% per year. The only increases during this period occurred in 1994 and 1997. It remains to be seen whether the 5% decrease in 2012 is a sign that frequency will resume its historical long-term rate of decline.

Exhibit 1 is based on NCCI's aggregate **Financial Call** data, representing experience for NCCI-affiliated carriers.

- As measured here, accident year frequency for a given year is the number of lost-time claims per \$1 million of earned pure premium.
- Earned premium is adjusted by state to current average weekly wages and current approved NCCI voluntary loss cost levels.
- The Accident Year 2012 frequency change represents a preliminary estimate that may be revised as additional information becomes available. It is based on a comparison of preliminary undeveloped lost-time claim counts for Accident Year 2012 as of 12/31/2012 vs. Accident Year 2011 as of 12/31/2011.
- The frequency changes for Accident Years 2011 and prior are based upon lost-time claim counts that have been developed to ultimate level.

Workers Compensation Lost-Time Claim Frequency Resumes Historical Downtrend

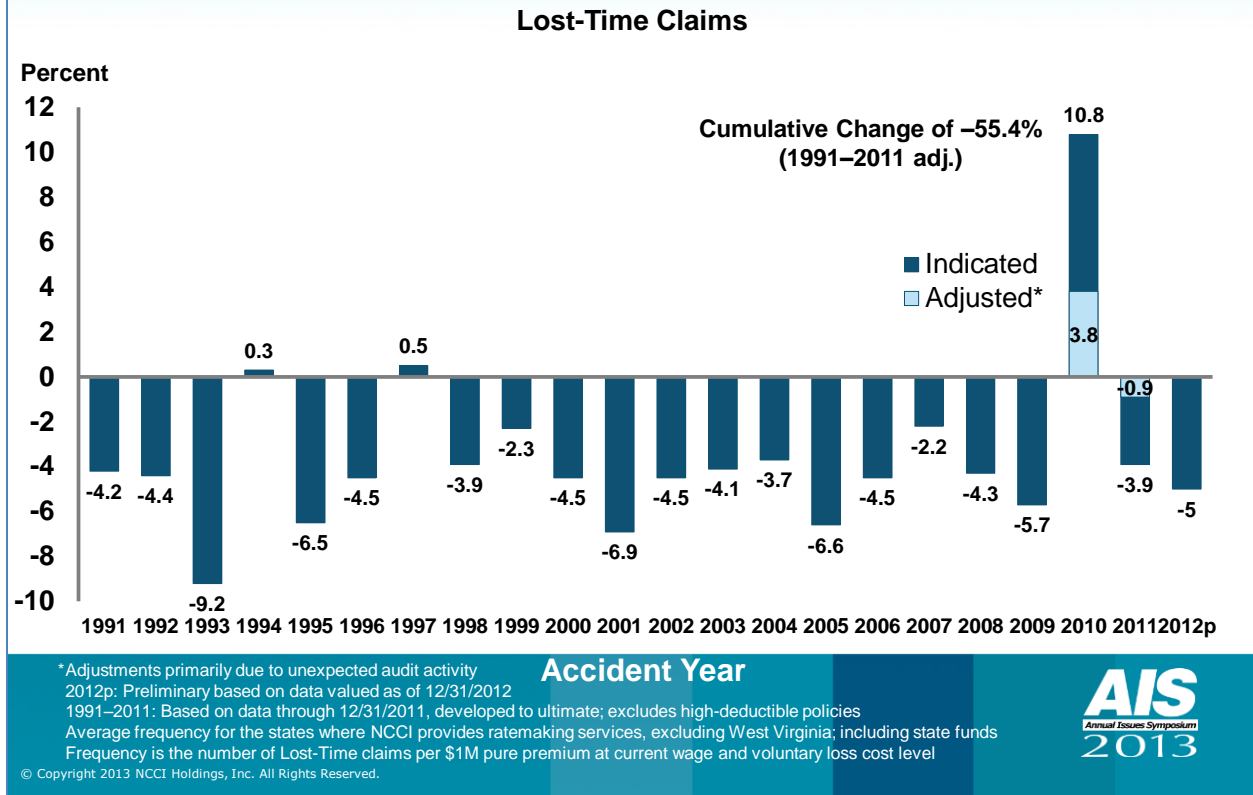


Exhibit 1: Lost-Time Claim Frequency Declined in 2012

NCCI rate filings typically use policy year data, which represents an exact match of premiums and losses from the same group of policies. The majority of NCCI rate filings made in 2013 will be based upon state data for Policy Years 2010 and 2011. For this reason, in addition to looking at accident year data, we also analyzed *Financial Call* data for Policy Year 2011 as of 12/31/2012. We estimate a preliminary change in frequency from Policy Year 2010 to Policy Year 2011 of approximately -3%.

The recent recession is viewed by many economists as the most severe economic downturn since the Great Depression. Previously, NCCI identified three recessionary factors that had a significantly greater effect on reported workers compensation frequency than would be expected in a normal economy: change in industry mix, change in hours worked per week, and change in premium audits.¹ Once adjustments were made for these factors, frequency was still up 3.8% in 2010 and declined by 0.9% in 2011.

Since the conclusion of the recession, changes in industry mix have stabilized, premium audit adjustments have risen toward historical levels and the average length of the workweek has increased to pre-recession level. For these reasons, the recessionary adjustments applied to the 2010 and 2011 changes in frequency are no longer necessary.

Several factors may have contributed to the abrupt halt in 2010 in the long-term decline in frequency. There is evidence of an influx of small lost-time claims in 2010. Also, some have suggested that workers, fearful of losing their jobs, may have postponed filing workers compensation claims, but became less hesitant to file claims as the economy began to show signs of modest improvement. While the extent to which this phenomenon has occurred is unclear and cannot be confirmed by NCCI, it may have contributed to the observed increase in claim frequency in 2010.

¹ See 2012 NCCI report, *Workers Compensation Claim Frequency—2012 Update* by Jim Davis, available on ncci.com.

Using **Statistical Plan** data for policies effective through June 30, 2011 we were able to examine accident year changes through 2011 in greater detail.²

Exhibit 2 displays Exposure Accident Year³ frequency changes by size of claim. Individual claim amounts were adjusted to the 2011 inflation level prior to assigning to the appropriate size category. Specifically, indemnity losses were adjusted for changes in state average weekly wages and medical losses for changes in the Medical Consumer Price Index (CPI)⁴ through 2011.

For this analysis we define lost-time claims less than \$2,000 as small, between \$2,000 and \$50,000 as midsize, and above \$50,000 as large.

The exhibit shows that from 2007 to 2011, frequency declined for all loss sizes. While frequency increased in 2010, this may be a return to the long-term frequency trend following the sharper than usual drop in 2009.

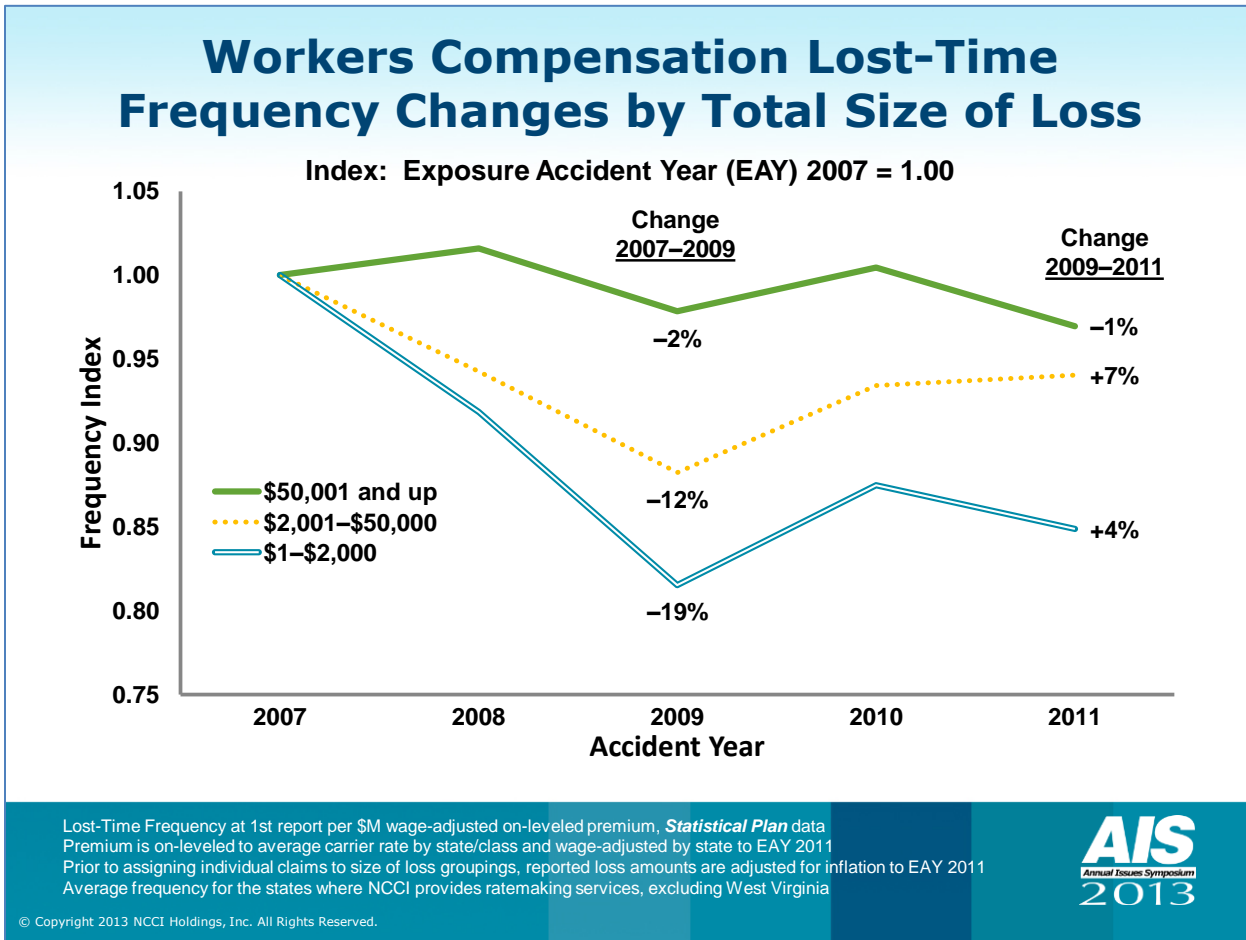


Exhibit 2: Claim Frequency Changes by Type of Claim

We also determined that a shift from medical only to lost-time claims occurred from Accident Year 2007 to 2010 before leveling off in 2011. However, given that this shift occurred over several years, we do not believe it was a major contributor to the observed uptick in frequency in 2010.

² Using policies effective through 6/30/11, NCCI estimates that over 85% of Accident Year 2011 accidents are included for the states used in this analysis.

³ For each policy, final audited premium was allocated to the appropriate calendar year based on the period of exposure. Thus the measures are unaffected by changes in premium audit levels. To illustrate, consider a July 1st, 2010 policy written for \$8,000 with an audit in August 2011 for \$2,000. The actual earned premiums for this policy in 2010 and 2011 would be \$4,000 and \$6,000 respectively. However this approach derives earned premium of \$5,000 for both years.

⁴ The Medical CPI is a measure of price inflation for all forms of healthcare, and does not capture changes in utilization.

Exhibit 3 displays lost-time frequency by NCCI Industry Group over the latest five accident years. All industries experienced a decline in frequency over the five-year period. Frequency in the Manufacturing and Contracting sectors decreased sharply during the recession before rebounding through 2011. Frequency changes in the Office & Clerical and Goods & Services industries followed a similar year-to-year pattern, but were less volatile.

Workers Compensation Lost-Time Frequency Changes by Industry Group

Industry Group	Exposure Accident Year				
	2007–2008	2008–2009	2009–2010	2010–2011	2007–2011
Manufacturing	-5.9%	-15.4%	9.8%	0.9%	-11.8%
Contracting	-5.9%	-8.5%	6.0%	-0.6%	-9.3%
Office & Clerical	-4.2%	-4.9%	2.0%	-3.7%	-10.5%
Goods & Services	-3.9%	-5.4%	3.7%	-0.7%	-6.3%
Miscellaneous	-4.3%	-7.2%	3.5%	0.4%	-7.8%

Lost-Time Frequency at 1st report per \$M wage-adjusted on-leveled premium, *Statistical Plan* data
 Premium is on-leveled to average carrier rate by state/class and wage-adjusted by state to Exposure Accident Year 2011
 For all states where NCCI provides ratemaking services, excluding West Virginia

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Exhibit 3: Claim Frequency Changes by Industry Group

Exhibit 4 displays average indemnity claim costs since 1991, along with the corresponding year-to-year changes. A shift in the mix of claims by size will affect average claim severity. The decrease of 3.0% in the average indemnity cost per claim in 2010 was influenced by the influx of small lost-time claims. The average indemnity cost per claim increased 2.2% in 2011 and NCCI estimates a modest increase of 1% in 2012.

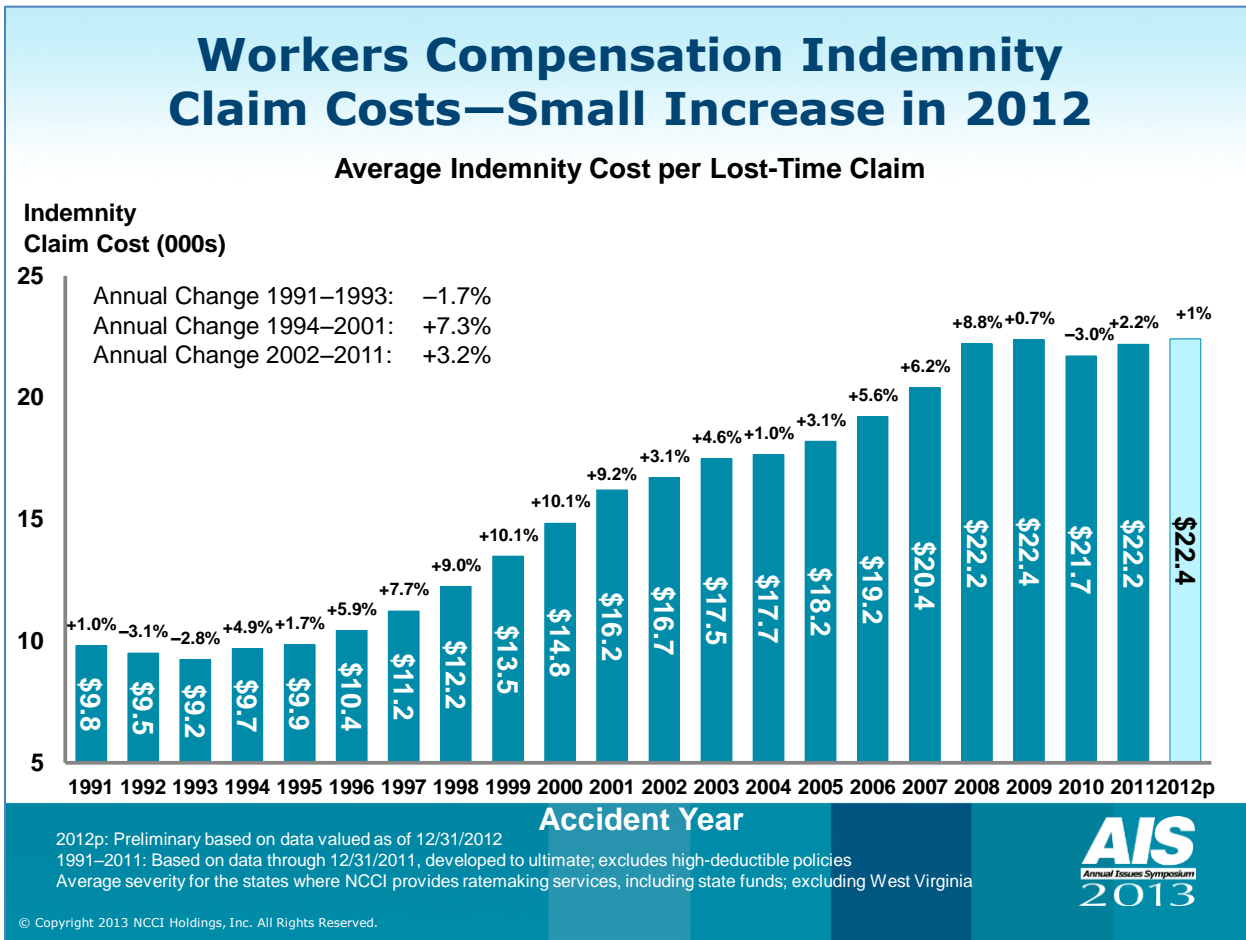


Exhibit 4: Change in Average Indemnity Cost per Claim

Exhibit 5 displays average medical claim costs per lost-time claim since 1991, along with the associated year-to-year changes. Following increases of 1.4% and 3.6% in 2010 and 2011 respectively, NCCI estimates an increase of 3% in the average medical cost per lost-time claim in 2012. These changes are modest in comparison to historical changes. However, in spite of this improvement, the underlying drivers of medical costs are still present and remain a concern.

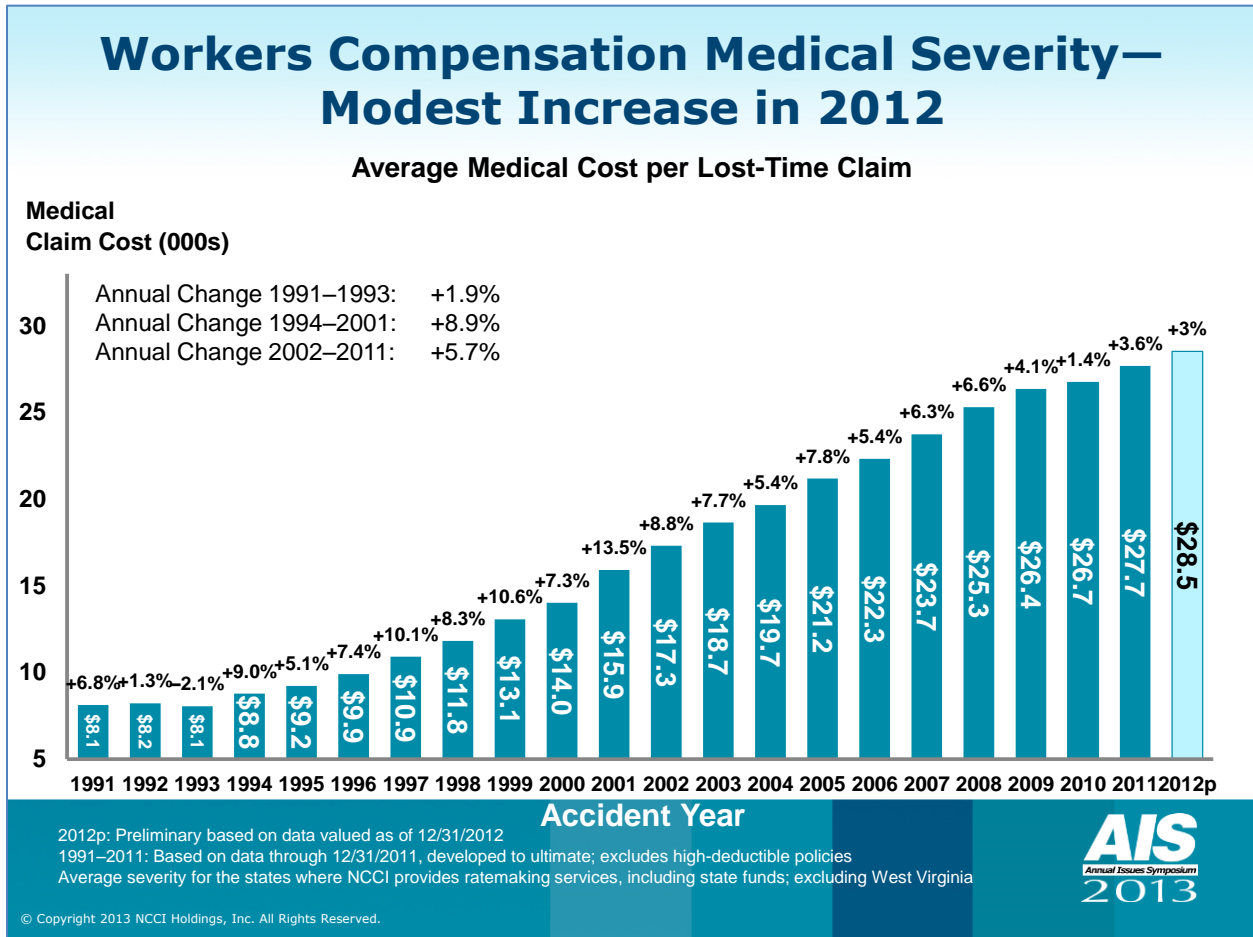


Exhibit 5: Change in Average Medical Cost per Lost-Time Claim

II. IMPACT OF CHANGES IN INDUSTRY MIX ON FREQUENCY AND SEVERITY

The analyses discussed in the remainder of this paper are based on **Statistical Plan** data in states for which NCCI provides ratemaking services (excluding West Virginia).⁵ Though not as recent as Financial data, **Statistical Plan** data contains detailed information by policy that allows us to perform a variety of analyses. The term “frequency” can be defined in many different ways. In this section, we examine two frequency measures for Policy Years Expiring (PYE) 2007 through 2011:

Frequency per Payroll—Lost-time claims at 1st report⁶ per \$1 million payroll, adjusted for changes in QCEW⁷ average weekly wages by state through PYE 2011

Frequency per Premium—Lost-time claims at 1st report per \$1 million manual premium (rate times payroll), adjusted (on-leveled) to PYE 2011 average carrier rates by class and state, and adjusted for changes in QCEW average weekly wages

For this analysis, PYE 2011 was the latest policy year available from the **Statistical Plan** data. Beginning with the frequency paper published in 2011,⁸ we have explored how shifts in industry mix can have much different effects on these measures. Given that the recent recession falls entirely within our period under study (PYEs 2007 through 2011), we have elected to perform this analysis again for this paper.

Note that the change in frequency per payroll is identical to the change in frequency per premium at the “state/class” level. This is due to the fact that we have adjusted (on-leveled) premiums to a current average carrier rate. Hence, when calculating a change in frequency per premium for a given class and state, the average rate cancels yielding the change in frequency per payroll.

Exhibit 6 plots the above frequency measures for the largest 50 classes in terms of premium volume in PYE 2011, with frequency per premium on the horizontal axis and frequency per payroll on the vertical axis. The chart is divided into four quadrants. The frequencies have been indexed to the average frequency for all classes in all NCCI states.

Most of these 50 classes have higher than average frequency per payroll and, therefore, appear in the upper quadrants. The reason for this is that the average of all classes is greatly influenced by the clerical office class code (8810), which has extremely low frequency per payroll, coupled with very high payroll volume.

The Roofing class appears in the upper-left quadrant. While this class has a very high frequency per payroll relative to all other classes, it has a relatively low frequency per premium. This is true for many construction classes. This is due to the fact that the premiums reflect claim frequency (per payroll) and claim severity, both of which are relatively high for the construction industry. Average severity for the construction industry is approximately 50% higher than that of all industries.

The Fast Food Restaurant class has slightly higher-than-average frequency per payroll, but significantly higher than average frequency per premium. This is due to a relatively low severity, in contrast with the Roofing class. The low severity might be attributable to lower average wages, relatively younger employees (who tend to heal faster), and a higher proportion of relatively minor injuries. The relatively high frequency may be the result of less experienced workers who tend to have higher injury rates.

⁵ West Virginia became an NCCI state effective July 1, 2006.

⁶ 1st report is valued 18 months after policy effective month.

⁷ US Bureau of Labor Statistics: Quarterly Census of Employment and Wages.

⁸ See NCCI reports, Jim Davis and Yair Bar-Chaim, *Workers Compensation Claim Frequency—2011 Update*, and Jim Davis, *Workers Compensation Claim Frequency—2012 Update*, 2012, available on ncci.com.

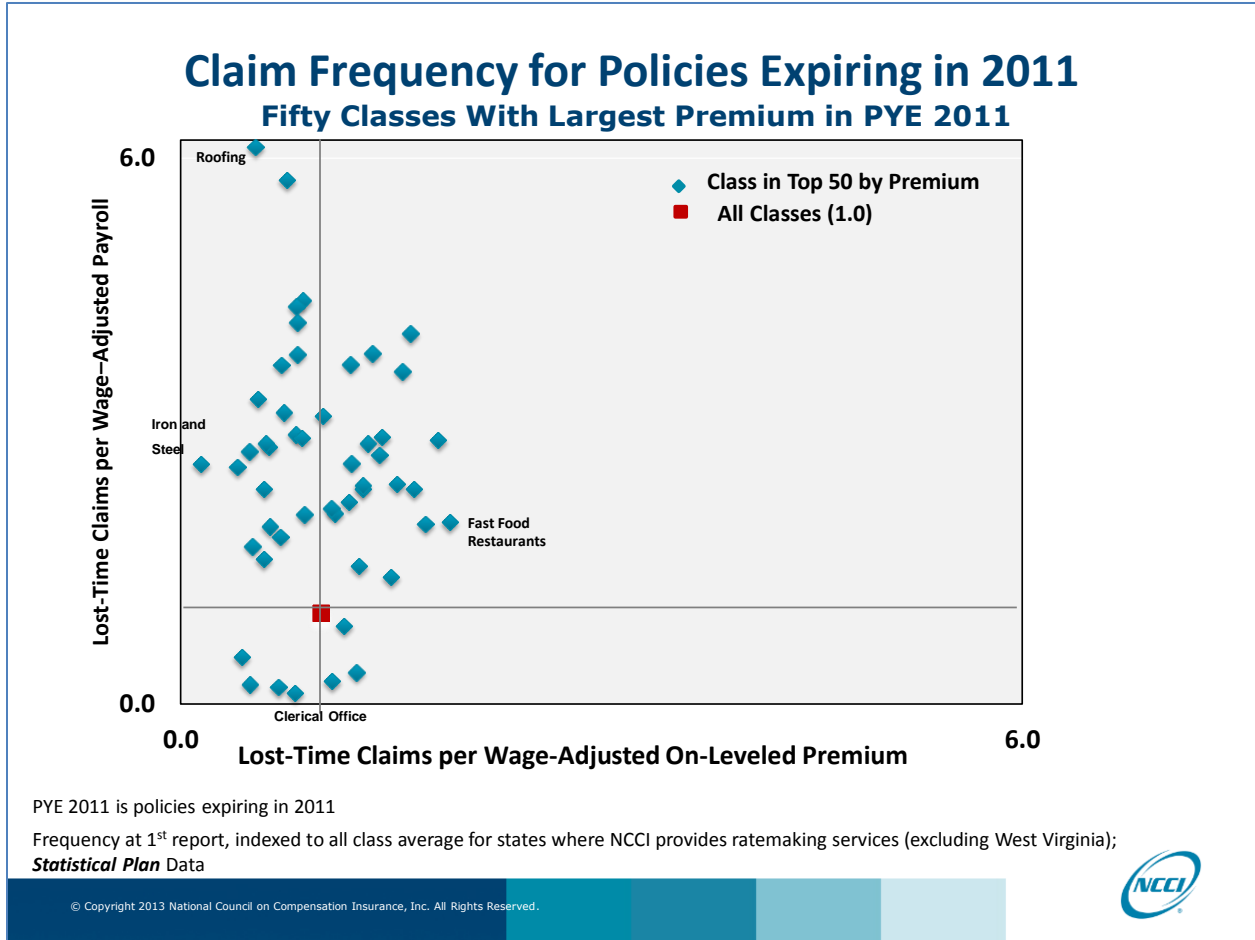


Exhibit 6: Top 50 Classes by Premium

Frequency per payroll varies considerably, from 0.12 to 6.12 for the 50 classes displayed. For example, Contracting classes (e.g., Roofing, Carpentry) have very high frequency per payroll, whereas Office & Clerical classes have very low frequency per payroll. Hence, a change in industry (or class) mix will impact the overall frequency per payroll for all classes combined. The measure is very useful in comparing industries or classes but caution should be exercised when examining frequency per payroll for all classes combined.

Frequency per premium varies considerably less by class, from 0.14 to 1.92 for the 50 classes shown, because frequency is reflected in premiums charged. Therefore, this measure is less distorted by changes in industry (or class) mix. Frequency per premium is useful for examining long term trends in frequency for all classes combined.

Exhibit 7 contains the frequency indices for the 50 largest classes by premium volume underlying Exhibit 6. The frequency for each class is indexed to the average frequency for all classes.

Frequencies for Largest 50 Classes Based on Premium Volume for Policies Expiring in 2011

Class	Frequency per	
	Payroll	Premium
8810 Clerical office employees, NOC	0.12	0.81
8017 Store, retail NOC	1.51	1.27
8380 Automobile service or repair center	2.22	1.20
8742 Salespersons, collectors or messengers	0.19	0.70
7229 Trucking, long distance hauling only	4.43	0.87
9082 Restaurant, NOC	1.98	1.75
7228 Trucking, local hauling only	3.84	0.83
7219 Trucking, NOC	4.19	0.83
7380 Drivers, chauffeurs & their helpers, NOC	3.73	1.21
5183 Plumbing NOC & drivers	1.95	0.64
5190 Electrical wiring, within buildings & drivers	1.59	0.59
8833 Hospital, professional employees	0.86	1.17
3724 Machinery or equipment erection or repair NOC	1.73	0.51
8829 Convalescent or nursing home, all employees	2.73	1.42
8018 Store, wholesale NOC	2.93	1.44
8868 College, professional employees	0.35	1.26
9014 Buildings, operation by contractor	2.86	1.34
8832 Physician & clerical	0.25	1.08
5645 Carpentry, detached one or two family dwellings	5.76	0.76
9015 Buildings, operation by owner or lessee of mgt. firm	2.64	1.22
7720 Police officers & drivers	2.09	1.10
5403 Carpentry NOC	3.35	0.55
8835 Nursing, home health, public and traveling	2.36	1.30
5537 Heating, ventilation, AC, and refrigeration systems	2.96	0.82
5551 Roofing, all kinds & drivers	6.12	0.53

Class	Frequency per	
	Payroll	Premium
9083 Restaurant, fast food	2.00	1.92
9052 Hotel, all other employees	2.90	1.84
3632 Machine shop NOC	2.08	0.88
8033 Store, meat, grocery & provision stores	2.36	1.66
6217 Excavation & drivers	2.36	0.60
7403 Aircraft or helicopter operation	4.07	1.64
5606 Contractor, executive supervisor	0.51	0.44
9101 College, all other employees	3.65	1.58
5474 Painting or paperhanging, NOC and drivers	2.82	0.63
9403 Garbage, ashes or refuse collection & drivers	4.37	0.82
5213 Concrete construction NOC	2.78	0.49
5506 Street or road construction, paving or repaving	2.86	0.61
5221 Concrete or cement work	2.92	0.87
8232 Lumberyard new materials only	3.16	1.01
6202 Oil or gas well & drivers	2.60	0.41
8107 Machinery dealer NOC	1.83	0.71
4484 Plastics mfg, molded products, NOC	2.15	1.08
5022 Masonry NOC	3.72	0.72
5040 Iron or steel, erection, frame structures	2.64	0.14
8008 Store, clothing, wearing apparel or dry goods, retail	1.39	1.50
8292 Storage Warehouse NOC	3.85	1.37
8006 Gas station, self-service and convenience	2.42	1.54
7600 Telephone or telegraph co, all other employees	2.40	1.30
8601 Architect or engineer	0.21	0.49
5437 Carpentry, installation of cabinet work	3.20	0.74

Frequency at 1st report, indexed to all class average for states where NCCI provides ratemaking services (excluding West Virginia);

Statistical Plan Data

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Exhibit 7: Frequency Measures for Top 50 Classes by Premium

Impact of Industry Mix Changes on Frequency

Exhibit 8 displays countrywide payroll by Industry Group from PYE 2007 to 2011 for NCCI states. During this period, which spans the recent recession, payroll volume decreased sharply in the Construction and Manufacturing industries, but decreased by only 1.8% for all industries combined.

<p align="center">Countrywide Payroll (\$M) by Industry Group For Policy Years Expiring 2007 through 2011</p>						
Industry Group	2007	2008	2009	2010	2011	2007–2011
Manufacturing	201,518	202,282	189,092	174,680	179,152	
<i>Change</i>	—	+0.4%	-6.5%	-7.6%	+2.6%	-11.1%
Contracting	167,628	169,320	156,094	131,353	129,260	
<i>Change</i>	—	+1.0%	-7.8%	-15.9%	-1.6%	-22.9%
Office & Clerical	1,254,340	1,296,690	1,286,575	1,257,474	1,279,220	
<i>Change</i>	—	+3.4%	-0.8%	-2.3%	+1.7%	+2.0%
Goods & Services	397,290	414,290	398,646	392,106	394,357	
<i>Change</i>	—	+4.3%	-3.8%	-1.6%	+0.6%	-0.7%
Miscellaneous	113,810	117,250	115,823	113,263	114,813	
<i>Change</i>	—	+3.0%	-1.2%	-2.2%	+1.4%	+0.9%
Total	2,134,586	2,199,832	2,146,230	2,068,875	2,096,803	
<i>Change</i>	—	+3.1%	-2.4%	-3.6%	+1.3%	-1.8%

Statistical Plan data utilized for all states where NCCI provides ratemaking services, excluding West Virginia
Payrolls are wage-adjusted to 2011



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Exhibit 8: Shifts in Payroll Distribution by Industry Group

Exhibit 9 displays the changes in lost-time frequency by NCCI Industry Group from PYE 2007 to 2011.

As shown in Columns 2 and 3, the overall changes in frequency per payroll and frequency per premium over the period differ considerably, -16.0% and -8.9% , respectively. As explained below, this disparity is primarily due to changes in the mix of payroll by class and state over this period.

Note, however, that the changes in the two measures are somewhat closer within any given Industry Group (e.g., -13.5% and -13.9% for the Office & Clerical group). This is not unexpected since classes within each Industry Group are, by definition, more homogeneous than classes across all Industry Groups.

Column 4 displays frequency changes adjusted for changes in industry mix. We recalculated the PYE 2011 frequency (per payroll) using 2007 payroll weights (by class and state) instead of 2011 payroll. In other words, Column 4 indicates what the changes by Industry Group and in total would have been if the payroll volume by class and state stayed the same from PYE 2007 to 2011. After this adjustment for industry mix, the overall change in frequency per payroll of -16.0% becomes -9.5% (i.e. a smaller decrease). This is due to the fact that payroll declined in the high frequency per payroll Contracting and Manufacturing sectors, while increasing in all other sectors. Together, these changes in industry mix combined to put downward pressure on overall frequency in PYE 2011.

Column 4 also represents the “mix-adjusted” change in frequency per premium. The mix-adjusted change in frequency per payroll is equal to the mix-adjusted change in frequency per premium.⁹ We recalculated the PYE 2011 frequency (per premium) using 2007 premium weights (by class and state) instead of 2011 premium. Thus, Column 4 indicates what the changes by Industry Group and total would have been if the premium volume by class and state stayed the same from PYE 2007 to 2011. After adjustment for industry mix, the overall change in frequency per premium decreased from -8.9% to -9.5% , which is approximately -0.1% per year. As expected, the effect of changing industry mix was minimal (on a frequency per premium measure).

⁹ For mix-adjustment proof refer to the Appendix

Impact of Change in Industry Mix on Frequency

For Policies Expiring in 2007 versus 2011

(1) Industry Group	(2) Change in Frequency Per Wage-Adjusted Payroll	(3) Change in Frequency Per Wage-Adjusted On-Levelled Premium	(4) Change in Frequency Adjusted for Changes in Industry Mix*	(2)-(4) <i>Impact of Mix Adjustment on Frequency Per Payroll</i>	(3)-(4) <i>Impact of Mix Adjustment on Frequency Per Premium</i>
Manufacturing	-19.1%	-17.1%	-14.8%	-4.3%	-2.3%
Contracting	-17.4%	-16.3%	-8.4%	-9.0%	-7.9%
Office & Clerical	-13.5%	-13.9%	-14.5%	+1.0%	+0.6%
Goods & Services	-8.6%	-7.7%	-8.6%	-0.1%	+0.9%
Miscellaneous	-6.7%	-4.2%	-2.8%	-3.9%	-1.5%
ALL	-16.0%	-8.9%	-9.5%	-6.5%	+0.6%

* Mix-adjusted frequency is based on the assumption that payroll, by class and state, remains constant over the time period displayed
 Note: **Statistical Plan** data utilized for all states where NCCI provides ratemaking services, excluding West Virginia



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Exhibit 9: Changes in Frequency From PYE 2007 to 2011

We performed an identical analysis for PYE 2010 to 2011 and found that changes in industry mix had a negligible effect on the two frequency measures. We expect similar results in the near future as our economy continues to stabilize and distance itself from the recent recession.

Exhibits 10a and 10b contain the frequency measures underlying the Industry Group changes displayed above.

Frequency Measures by Industry Group

For Policies Expiring in 2007 Versus 2011

(1) Industry Group	(2) 2007 Frequency Per Wage- Adjusted Payroll (\$M)	(3) 2011 Frequency Per Wage- Adjusted Payroll (\$M)	(4) 2007-2011 Frequency Change	(5) 2011 Mix-Adjusted* Frequency (Using 2007 Payroll)	(6) 2007-2011 Mix-Adjusted Frequency Change
Manufacturing	0.451	0.365	-19.1%	0.384	-14.8%
Contracting	0.543	0.449	-17.4%	0.497	-8.4%
Office & Clerical	0.044	0.038	-13.5%	0.038	-14.5%
Goods & Services	0.464	0.424	-8.6%	0.424	-8.6%
Miscellaneous	0.622	0.580	-6.7%	0.604	-2.8%
ALL	0.231	0.194	-16.0%	0.209	-9.5%

* Mix-adjusted frequency is based on the assumption that payroll, by class and state, remains constant over the time period displayed
 Note: **Statistical Plan** data utilized for all states where NCCI provides ratemaking services, excluding West Virginia



Exhibit 10a: Frequency per Payroll Measures by Industry Group

Frequency Measures by Industry Group

For Policies Expiring in 2007 Versus 2011

(1) Industry Group	(2) 2007 Frequency Per On–Leveled and Wage Adjusted Premium (\$M)	(3) 2011 Frequency Per On–Leveled and Wage Adjusted Premium (\$M)	(4) 2007–2011 Frequency Change	(5) 2011 Mix-Adjusted* Frequency (Using 2007 On–Leveled Premium)	(6) 2007–2011 Mix-Adjusted Frequency Change
Manufacturing	12.44	10.32	–17.1%	10.61	–14.8%
Contracting	7.51	6.28	–16.3%	6.87	–8.4%
Office & Clerical	11.22	9.66	–13.9%	9.59	–14.5%
Goods & Services	15.69	14.49	–7.7%	14.35	–8.6%
Miscellaneous	10.75	10.30	–4.2%	10.46	–2.8%
ALL	11.53	10.51	–8.9%	10.44	–9.5%

* Mix-adjusted frequency is based on the assumption that premium, by class and state, remains constant over the time period displayed
 Note: **Statistical Plan** data utilized for all states where NCCI provides ratemaking services, excluding West Virginia

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Exhibit 10b: Frequency per Premium Measures by Industry Group


As shown in Exhibit 11, the effect of changing class mix from PYE 2007 to 2011 was most evident in the Contracting Industry Group, where the mix adjusted change in frequency per payroll (-8.4%) was approximately 9 points higher than the observed change (-17.4%). This result is driven by classes that fall into one of the following categories:

- a) Classes with high frequency per payroll that had a decrease in share of contracting payroll (e.g. 5645)
- b) Classes with low frequency per payroll that had an increase in share of contracting payroll (e.g. 3719)

Class Code 5645 (Carpentry Residential—Dwellings less than 3 stories) was the largest contributor, accounting for nearly 25% of the 9-point mix effect. Specifically, by omitting this class entirely, the countrywide change in frequency becomes -15.9% and the mix adjusted change becomes -9.1%. The difference (or mix effect) becomes 6.8 points, nearly 25% less than the actual mix effect of 9 points.

Contracting Industry Impact of Changes in Class Mix on Frequency For Policies Expiring in 2007 Versus 2011									
(1) Class	(2) Description	(3) 2007 Wage- Adjusted Payroll (\$M)	(4) 2011 Wage- Adjusted Payroll (\$M)	(5) 2007 Freq Per Wage- Adj. Payroll (\$M)	(6) 2011 Freq Per Wage- Adj. Payroll (\$M)	(7) 2007-11 Freq Change	(8) 2007-11 Mix Adj. Freq Change*	(9) = (7) - (8) Difference	(10) Class Contribution (to -9.0%)
	Contracting	\$167,628	\$129,260	0.543	0.449	-17.4%	-8.4%	-9.0%	
						<i>Contracting Group Frequency Change excluding Class Code below:</i>			
5645	Carpentry- Residential Dwellings < 3 Stories	\$7,048	\$2,863	1.180	1.115	-15.9%	-9.1%	-6.8%	24.5%
3719	Oil Still Erection or Repair	\$3,241	\$3,452	0.138	0.114	-16.9%	-8.4%	-8.5%	4.7%

* Mix-adjusted frequency is based on the assumption that payroll, by class and state, remains constant over the time period displayed
 Note: **Statistical Plan** data utilized for all states where NCCI provides ratemaking services, excluding West Virginia



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Exhibit 11: Impact of Mix Changes on the Contracting Industry

Exhibit 12 displays the individual class contributions to the “mix effect” for all 119 NCCI Contracting classification codes. Classes on the right-hand side fall into category a) or b) as defined above, and include Class Code 5645 which was, by far, the largest contributor.

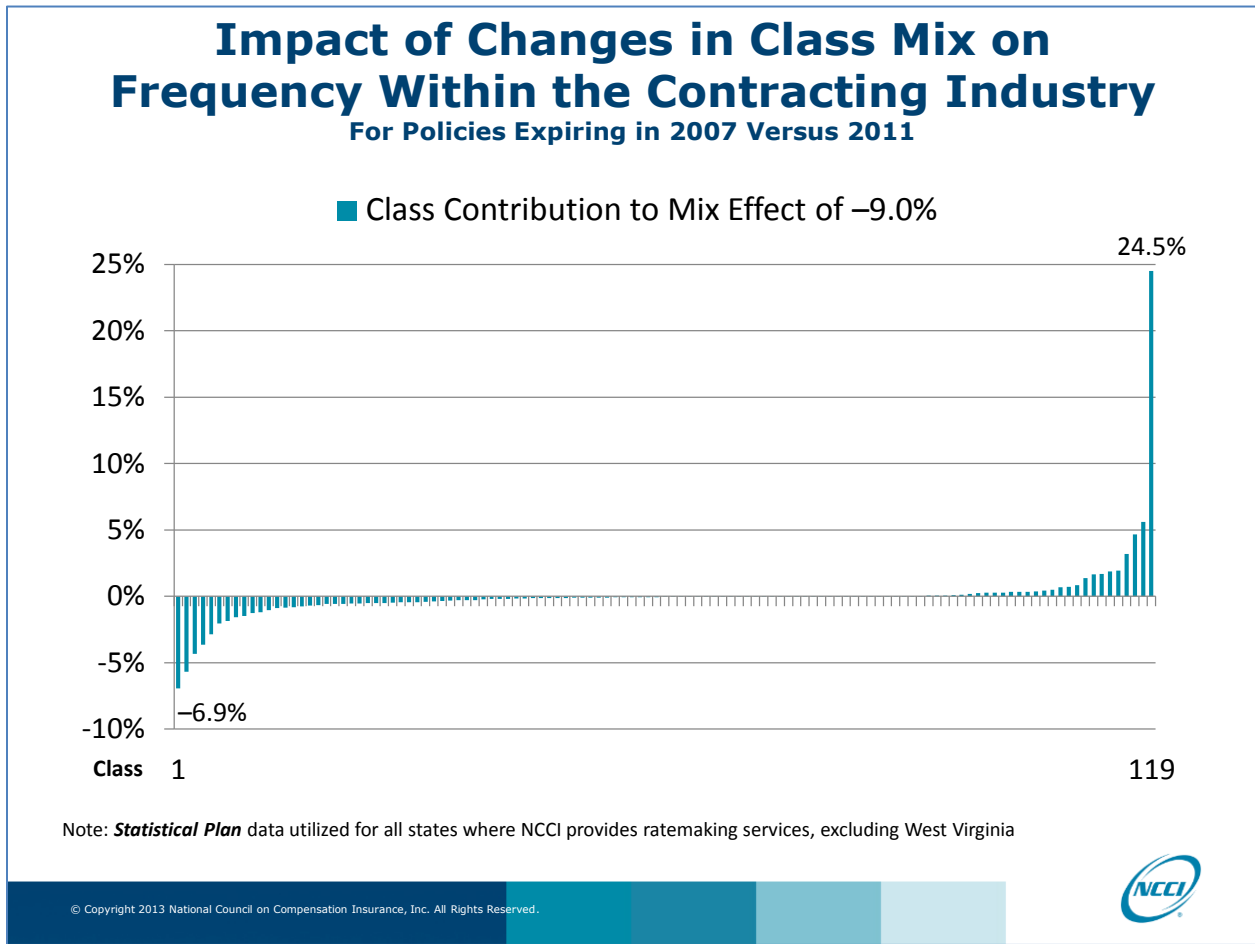


Exhibit 12: Impact of Mix Changes on the Contracting Industry

Impact of Industry Mix Changes on Severity

To fully understand the impact of industry mix changes, we examine the effect on claim severity as well as frequency.

Exhibit 13 displays the changes in claim severity by NCCI Industry Group from PYE 2007 to 2011. For this analysis, severity is defined as the reported average cost per lost-time claim (paid losses plus case reserves) as of 1st report for medical and indemnity combined. We performed a “mix adjustment” to determine what the countrywide change in severity from PYE 2007 to 2011 would have been if payroll by class and state did not change from PYE 2007 levels.

Specifically, we apply the 2011 frequencies per payroll to the 2007 payrolls by state/class to determine what the 2011 claim counts would have been had payroll remained constant over the period. We then recalculate the 2011 severity using these restated 2011 claim counts as weights.

The mix adjusted countrywide change in total severity from PYE 2007 to 2011 of +18.5% is approximately three points higher than the actual observed change in severity of +15.4%. The Contracting Industry Group was the primary contributor to this difference. As noted earlier, the Contracting sector experienced the largest decline in payroll from PYE 2007 to 2011 of all Industry Groups. As can be seen in Column 3, average severity for the Contracting Industry Group is approximately 50% higher than all Industry Groups combined. Hence, the decline in Contracting volume placed downward pressure on the countrywide change in severity.

We also analyzed the effect of “industry mix” changes within each Industry Group. With the exception of the Contracting group, which was hardest hit by the recession, the effect of mix changes within Industry Group was minimal.

Impact of Change in Industry Mix on Severity For Policies Expiring in 2007 Versus 2011

(1) Industry Group	(2) 2007 Severity*	(3) 2011 Severity	(4) 2007–2011 Severity Change	(5) 2011 Mix-Adjusted Severity**	(6) 2007–2011 Mix-Adjusted Severity Change
Manufacturing	\$26,342	\$32,625	+23.9%	\$32,527	+23.5%
Contracting	\$41,625	\$48,446	+16.4%	\$47,721	+14.6%
Office & Clerical	\$26,240	\$30,435	+16.0%	\$30,533	+16.4%
Goods & Services	\$21,933	\$26,025	+18.7%	\$26,193	+19.4%
Miscellaneous	\$30,456	\$35,788	+17.5%	\$35,992	+18.2%
ALL	\$28,098	\$32,422	+15.4%	\$33,297	+18.5%

* Severity is the reported average cost per Lost-Time claim as of 1st report for medical and indemnity combined

** Mix-adjusted severity is based on the assumption that payroll, by class and state, remains constant over the time period displayed

Note: **Statistical Plan** data utilized for all states where NCCI provides ratemaking services, excluding West Virginia



Exhibit 13: Severity Measures by Industry Group

We performed a similar analysis for PYE 2010 to 2011 and found that changes in industry mix had virtually no effect. This result was not surprising, given that we have emerged from the recent recession and our economy has begun to stabilize.

III. FREQUENCY CHANGES BY CLAIM AND EMPLOYER CHARACTERISTICS

In this section we focus on the Frequency per Payroll measure. Recall that this measure is defined as reported lost-time claims as of 1st report¹⁰ per \$1 million of wage-adjusted payroll. While it is not uncommon for claims to be reported subsequent to 1st report, this paper focuses on changes in frequency observed at 1st report.¹¹ This allows us to include the latest year available and ensures a valid year-to-year comparison.

As shown in Exhibit 14, overall frequency declined by –16.0% from PYE 2007 to 2011 but has leveled off in recent years.

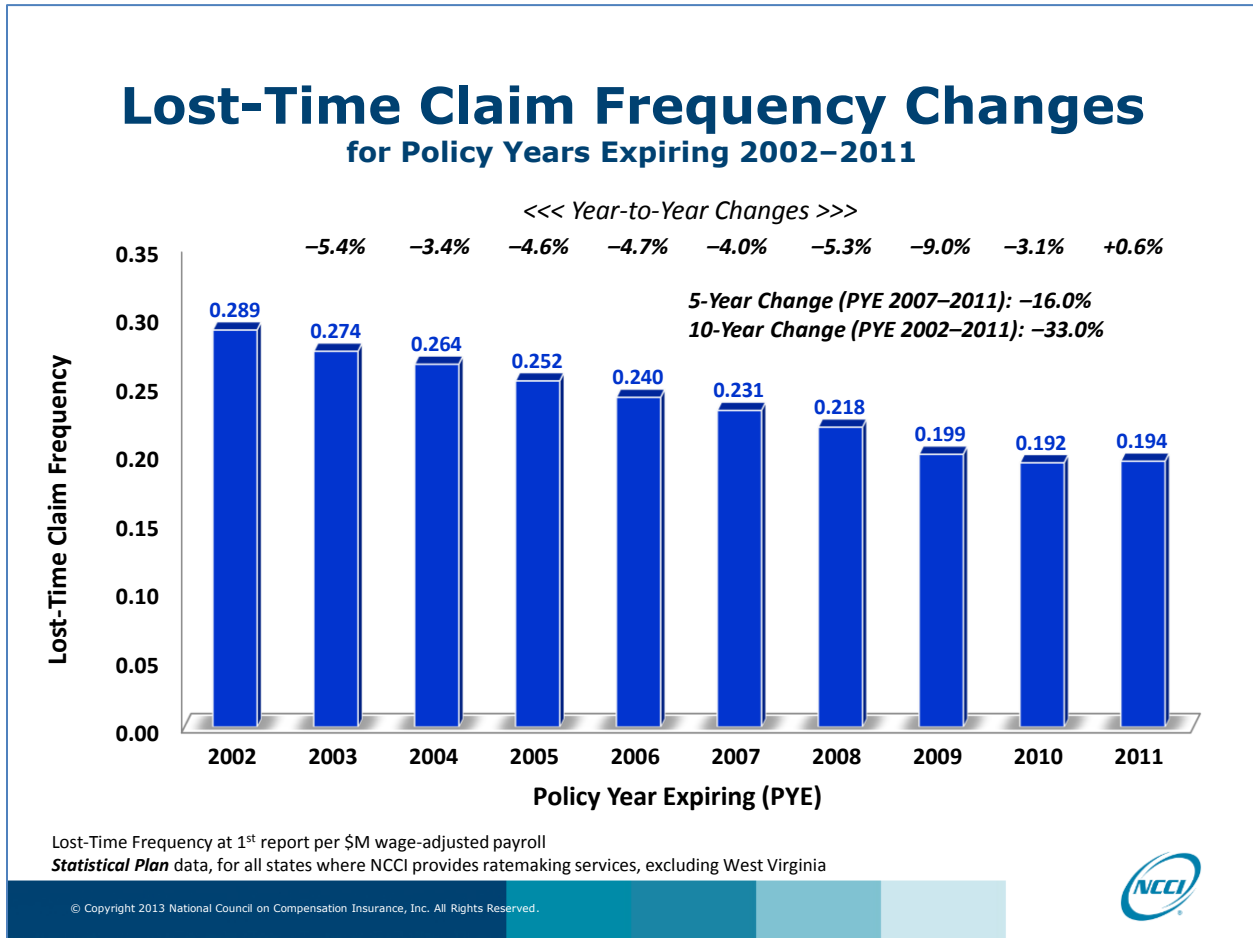


Exhibit 14: Lost-time Claim Frequency Per Payroll

¹⁰ 1st report is 18 months after policy effective date for *Statistical Plan* data.

¹¹ Approximately 95% to 98% of claims are reported as of 1st report.

Changes in Claim Frequency by Injury Type

As shown in Exhibit 15, changes in frequency by NCCI Injury Type over the latest five years were very consistent with the overall decline of 16% for all injury types over the period. Fatal and permanent total claims tend to exhibit more year-to-year volatility than other injury types, likely due to the much smaller volume of these claims.

This exhibit is based on the Injury Type reported as of 1st report. The development of claim counts from 1st report to ultimate level can differ considerably by injury type. For example, fatal claim frequency at 1st report is more than three times higher than permanent total disability claim frequency. However, this difference will decline as claims age since permanent total claim count development is significantly greater than fatal claim count development beyond 1st report.¹²

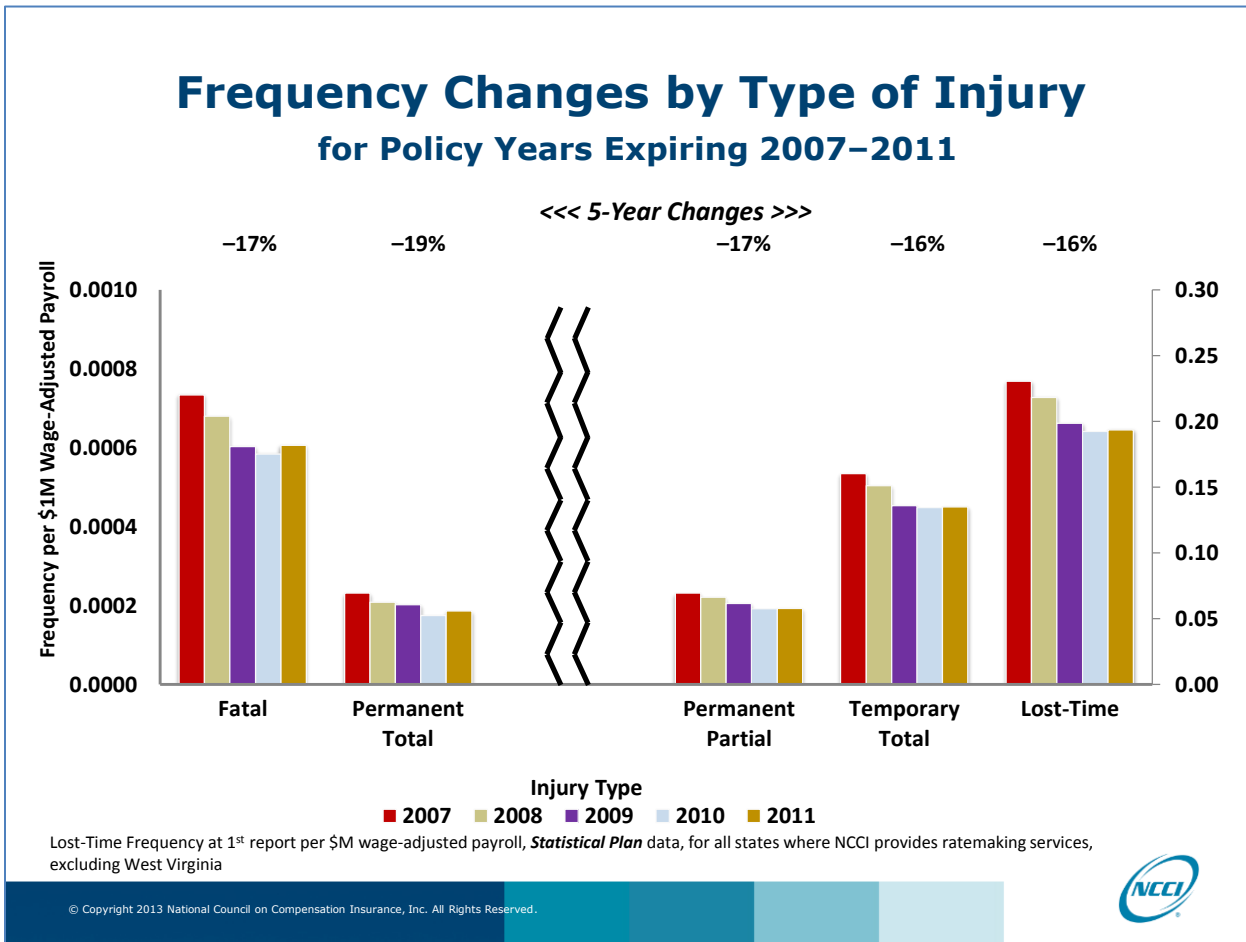


Exhibit 15: Claim Frequency by Injury Type

¹² For more information on claims by type of injury, refer to the NCCI *Annual Statistical Bulletin*.

Changes in Claim Frequency by Market Type

Exhibit 16 shows that from PYE 2007 to 2011 the voluntary market experienced a double digit decline in frequency (–16%), while the assigned risk market experienced a slight increase (+1%).

For this exhibit, employers are assigned to the appropriate market type by year. During the period displayed, the assigned risk markets were generally depopulating. With all else being equal, a shift of employers with relatively lower frequency from the assigned risk market into the voluntary market would slow the decline in frequency in both markets. This explains why the overall change in lost-time frequency of –16% for both markets combined does not fall in between the changes displayed for the two markets.

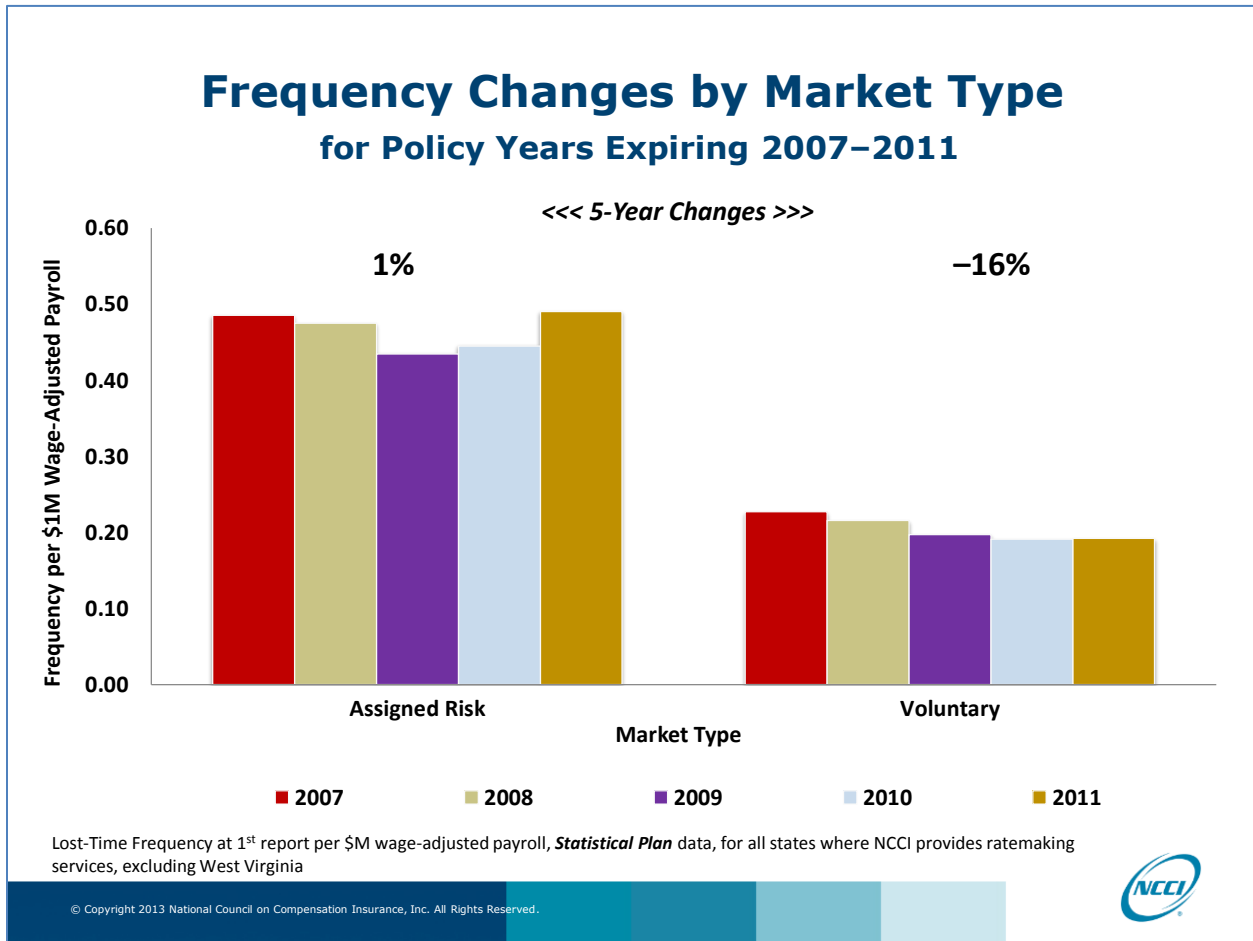


Exhibit 16: Claim Frequency by Market Type

Changes in Claim Frequency by Employer Characteristics

In the next two exhibits, we have grouped employers by size of payroll and size of premium respectively. Note that the assignments to each size range are performed separately for each year. Thus, it is possible for individual employers to change size range from one year to the next.

Changes in Claim Frequency by Size of Employer Payroll

Exhibit 17 shows that employers of all payroll sizes experienced double-digit frequency declines over the latest five years. Employers with over \$100 million in payroll exhibited the largest decline in frequency. Larger employers might be better equipped than smaller employers to implement loss control and safety programs.

Each employer’s payroll by state is adjusted to the PYE 2011 wage level. Employers are then assigned to the appropriate size range based on their wage-adjusted payroll.

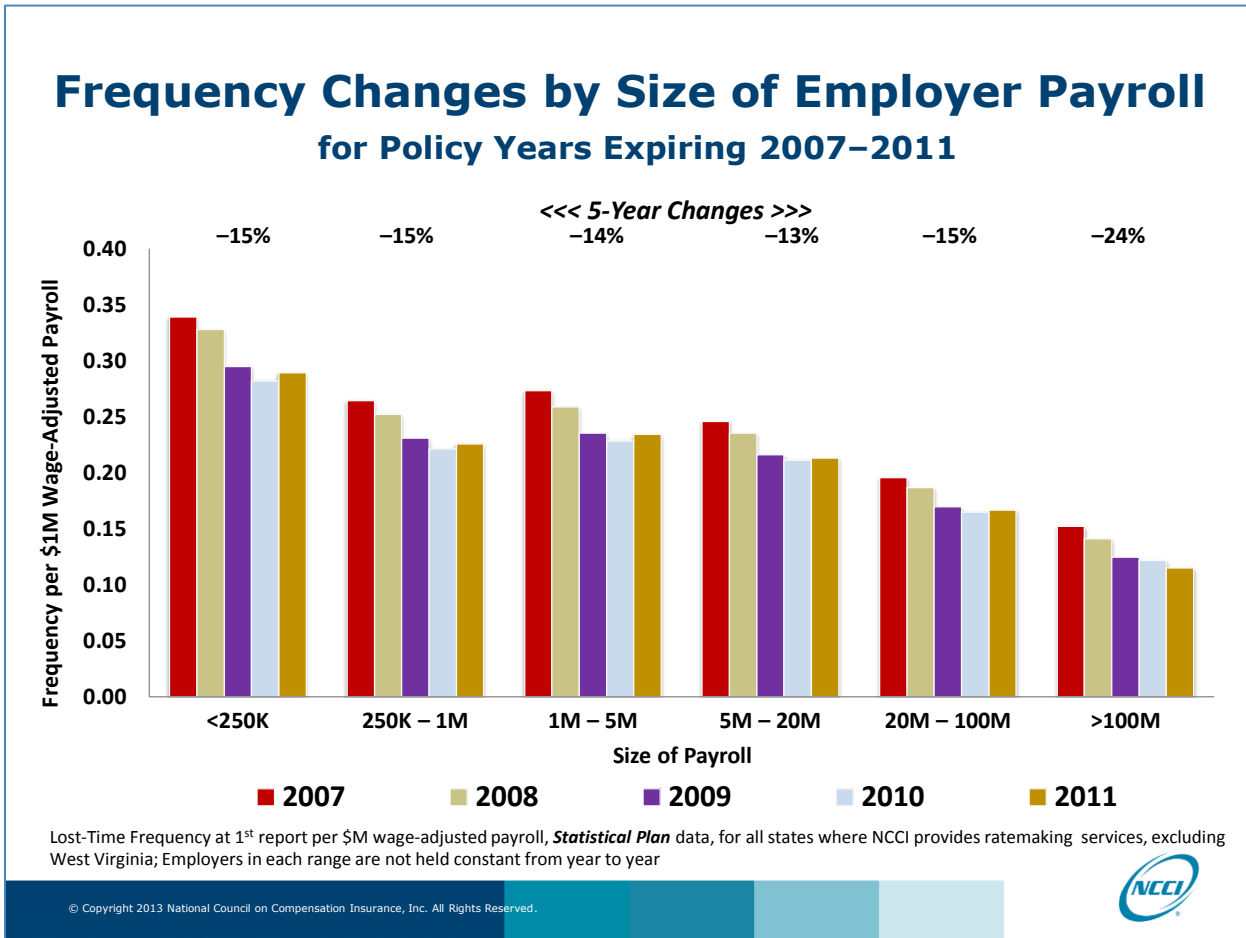


Exhibit 17: Claim Frequency by Size of Employer Payroll

Changes in Claim Frequency by Size of Employer Premium

Exhibit 18 indicates that declines in frequency over the latest five years were relatively consistent by size of employer premium, with the largest declines occurring for policies above \$250,000.

Each employer's premium by state is adjusted to reflect wage changes through 2011. Employers are then assigned to the appropriate size range based on their wage-adjusted premium.

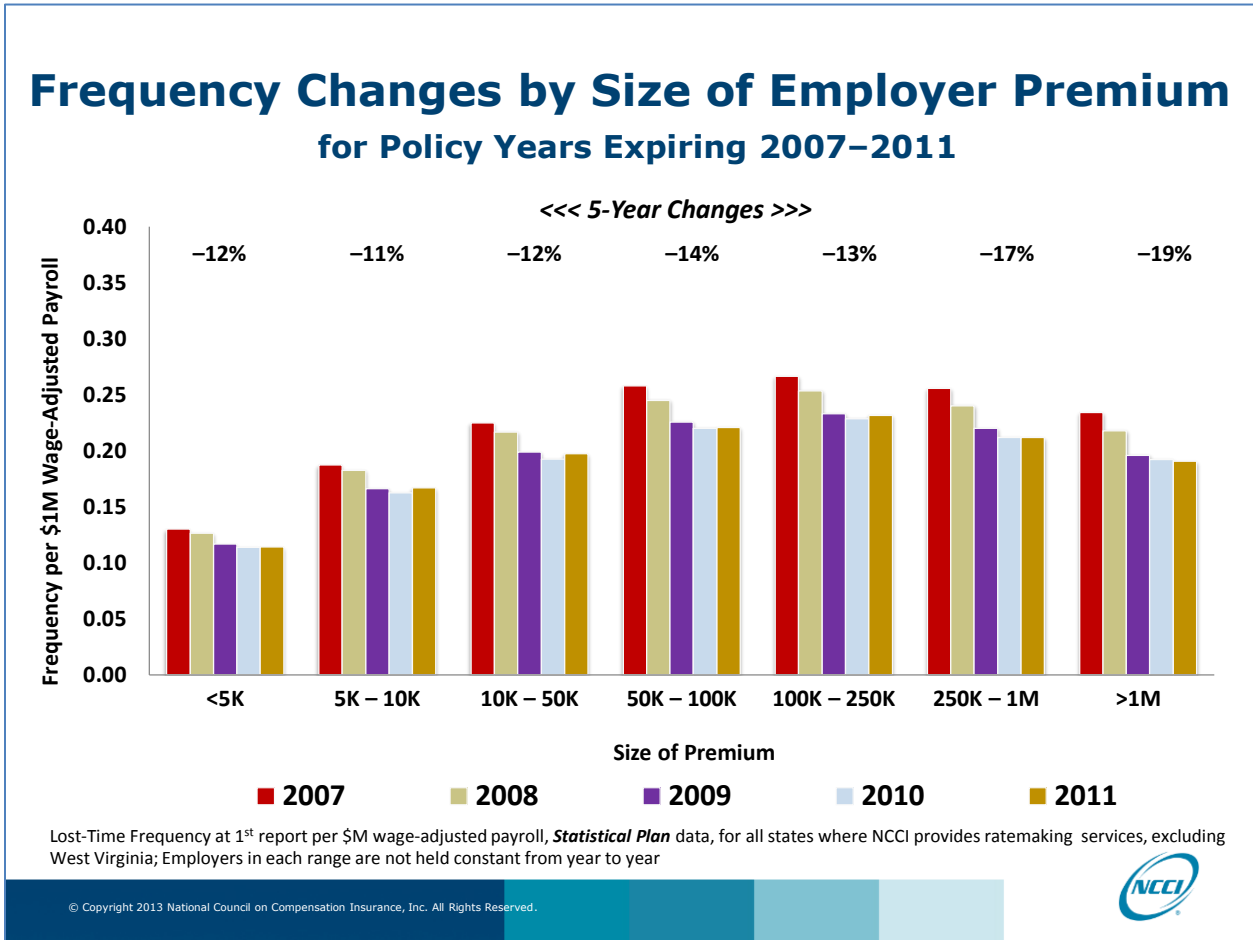


Exhibit 18: Claim Frequency by Size of Employer Premium

Changes in Claim Frequency by Size of Loss

Exhibit 19 displays claim distributions by size of loss for the 10 years ending with PYE 2011. To construct the exhibit, we obtained the total (medical plus indemnity) reported average cost per case (ACC) as of 1st report for each year. We then determined the number of lost-time claims in selected intervals (up to 10% of the ACC, up to 25% of the ACC, etc.). The chart indicates that the distribution of claims by size, relative to the average, has remained remarkably stable over the period displayed.

Distribution of Claims by Size Relative to the Average Cost per Case by Year

Claim Size Interval as % of ACC*	Cumulative Distribution of Lost-Time Claims in PYE:									
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Up to 10%	22.1%	21.5%	21.1%	21.2%	21.4%	21.3%	21.4%	21.1%	21.1%	20.6%
Up to 25%	38.6%	37.1%	37.8%	37.4%	38.6%	37.7%	37.9%	37.3%	38.1%	37.8%
Up to 50%	54.3%	53.8%	53.8%	54.2%	54.9%	54.7%	54.9%	54.3%	54.3%	54.0%
Up to 75%	64.0%	64.0%	64.4%	64.5%	64.9%	64.5%	65.4%	64.2%	64.5%	64.4%
Up to 100%	71.1%	70.9%	71.1%	71.6%	72.2%	72.0%	72.2%	71.6%	71.8%	71.5%
Up to 150%	80.8%	81.0%	81.5%	81.6%	81.7%	81.9%	82.1%	81.8%	82.0%	81.7%
Up to 300%	93.4%	93.5%	93.5%	93.5%	93.6%	93.6%	93.7%	93.7%	93.8%	93.8%
Up to 1000%	99.4%	99.4%	99.4%	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%
All Claims	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Avg. Cost per Case	22,464	23,757	24,798	25,572	26,536	27,886	29,597	31,913	32,116	32,388

*Average Cost per Case (Average Reported Paid Losses Plus Case Reserves per Claim at 1st Report)
Statistical Plan data utilized for all states where NCCI provides ratemaking services, excluding West Virginia

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Exhibit 19: Claim Frequency by Size of Loss

Analysis of Growing Industries

As noted above, total countrywide payroll (for the private insurance market) declined by nearly 2% over the latest five year period from PYE 2007 to 2011. However, NCCI identified two industry sectors that, despite the recent recession, experienced double digit growth. In the Health Care and Oil & Gas industries, payroll volume increased by 14% and 16% respectively over this period.

Health Care

Exhibit 20 displays selected statistics for the Health Care industry as defined by NCCI, as well as for the 10 largest Health Care classes. The physician and hospital class codes, 8832 and 8833 respectively, comprise nearly 70% of Health Care payroll. The decline in frequency per payroll for the Health Care industry of -8% is considerably less than the decline for all industries of -16% (as shown on Exhibits 9, 10a, and 14) from PYE 2007 to 2011.

Health Care Industry Payroll, Frequency, and Severity Measures

Industry / Class Description	Class Code	Industry Group	PYE 2011			Change from 2007 to 2011 in:		
			Payroll	Frequency	Severity	Payroll	Frequency	Severity
PHYSICIAN & CLERICAL	8832	Office & Clerical	95,567,329,935	0.049	28,303	12.4%	-10.0%	13.7%
HOSPITAL: PROFESSIONAL EMPLOYEES	8833	Office & Clerical	40,893,091,672	0.166	25,068	9.8%	-12.8%	18.3%
CONVALESCENT OR NURSING HOME—ALL EMPLOYEES	8829	Goods & Services	14,162,925,267	0.529	20,989	12.5%	-15.7%	19.0%
HOME, PUBLIC, AND TRAVELING HEALTHCARE—ALL EMPLOYEES	8835	Goods & Services	11,015,233,388	0.457	26,321	47.6%	-10.5%	22.2%
ANALYTICAL LABORATORIES OR ASSAYING	4511	Goods & Services	6,620,419,611	0.082	29,990	16.6%	-10.4%	16.0%
HOSPITAL—VETERINARY & DRIVERS	8831	Goods & Services	5,132,977,431	0.268	20,614	18.7%	-15.7%	-9.8%
DRUG, MEDICINE OR PHARMACEUTICAL PREPARATION	4611	Manufacturing	4,505,193,136	0.144	29,607	0.9%	-24.9%	29.4%
RETIREMENT LIVING CENTERS: HEALTH CARE EMPLOYEES	8824	Goods & Services	3,914,449,771	0.792	19,372	19.7%	-0.2%	12.2%
HOSPITAL: ALL OTHER EMPLOYEES	9040	Goods & Services	3,453,559,966	0.733	22,476	2.0%	-9.3%	7.6%
STORE: DRUG — RETAIL	8045	Goods & Services	3,353,623,654	0.078	27,647	14.2%	-21.2%	22.3%
All Other Health Care Class Codes			12,874,301,417	0.325	25,714	19.8%	8.7%	27.8%
Health Care Industry	ALL		201,493,105,248	0.182	24,231	13.7%	-8.0%	17.1%

Payroll is adjusted for wage changes through 2011

Frequency is Lost-time claims at 1st report per \$M of wage-adjusted payroll

Severity is the average reported cost per Lost-time claim as of 1st report, medical and indemnity combined

Statistical Plan data for all states where NCCI provides ratemaking services, excluding West Virginia

Exhibit 20: Health Care Industry

Exhibit 21 displays the frequencies for the four largest Health Care class codes for PYE 2007 and 2011 along with the corresponding changes. The exhibit also shows that the frequencies for these codes are higher than the average frequencies for the corresponding NCCI Industry Groups. Most notably, the frequency for hospital professionals (Class Code 8833) of 0.166 is more than four times the frequency for its Office & Clerical Industry Group of 0.038.

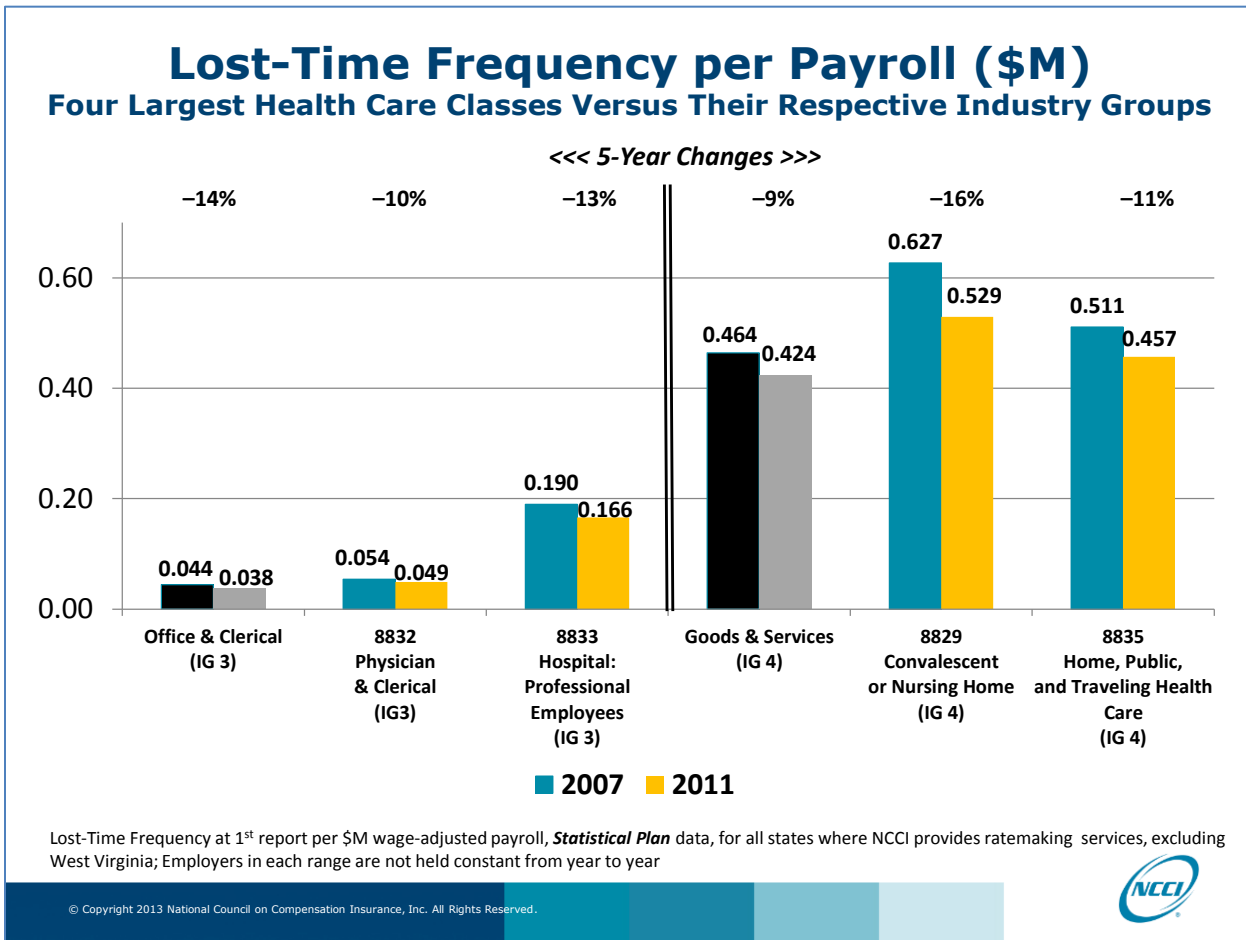


Exhibit 21: Frequency for the Four Largest Health Care Classes

Oil & Gas

Exhibit 22 displays selected statistics for the Oil & Gas industry as defined by NCCI, as well as for the 10 largest Oil & Gas classes. The Oil & Gas industry is predominantly composed of classes within NCCI's Contracting Industry Group. Given that the contracting industry was hit hardest by the recession, the double digit growth in Oil & Gas payroll is even more striking. The increase in severity for the Oil & Gas industry of +22.0% is greater than the increase for all industries of +15.4% (as shown on Exhibit 13) from PYE 2007 to 2011.

**Oil & Gas Industry
Payroll, Frequency, and Severity Measures**

Industry / Class Description	Class Code	Industry Group	PYE 2011			Change from 2007 to 2011 in:		
			Payroll	Frequency	Severity	Payroll	Frequency	Severity
OIL REFINING—PETROLEUM—& DRIVERS	4740	Manufacturing	3,767,877,645	0.072	53,880	10.8%	-12.9%	-13.6%
OIL STILL ERECTION OR REPAIR	3719	Contracting	3,452,498,208	0.114	65,697	6.5%	-17.4%	28.8%
OIL OR GAS LEASE OPERATOR—ALL OPERATIONS & DRIVERS	1320	Miscellaneous	2,209,503,513	0.166	53,989	33.7%	-39.7%	8.4%
OIL OR GAS — LEASE WORK NOC — BY SPECIALIST CONTRACTOR & DRIVERS	6216	Contracting	2,021,751,745	0.485	46,087	42.0%	-20.5%	-0.4%
OIL OR GAS PIPELINE OPERATION & DRIVERS	7515	Miscellaneous	1,938,487,666	0.095	77,759	21.1%	-31.2%	83.8%
TOOL MFG—AGRICULTURAL, CONSTRUCTION, LOGGING, MINING, WELLS	3126	Manufacturing	1,515,261,584	0.269	37,402	12.0%	-24.3%	57.8%
OIL OR GAS WELL: INSTRUMENT LOGGING OR SURVEY WORK & DRIVERS	6237	Contracting	1,474,701,436	0.133	66,904	9.3%	-32.9%	71.2%
OIL OR GAS PIPELINE CONSTRUCTION & DRIVERS	6233	Contracting	1,420,659,701	0.195	70,546	96.9%	-25.6%	66.0%
OIL OR GAS WELL: DRILLING OR REDRILLING & DRIVERS	6235	Contracting	1,246,586,372	0.545	53,717	-12.9%	-22.8%	17.8%
OIL OR GAS — WELL — SPECIALTY TOOL & EQUIPMENT LEASING NOC	6213	Contracting	1,169,285,386	0.281	47,422	12.7%	3.2%	33.1%
All Other Oil & Gas Class Codes			1,190,066,679	0.567	68,043	-3.7%	7.9%	18.7%
Oil & Gas Industry	ALL		21,406,679,935	0.222	55,820	16.0%	-20.4%	22.0%

Payroll is adjusted for wage changes through 2011
 Frequency is Lost-time claims at 1st report per \$M of wage-adjusted payroll
 Severity is the average reported cost per Lost-time claim as of 1st report, medical and indemnity combined
Statistical Plan data for all states where NCCI provides ratemaking services, excluding West Virginia

Exhibit 22: Oil & Gas Industry

Hydraulic Fracturing is a segment of the Oil & Gas Industry that has received considerable national attention. Hydraulic Fracturing is a process by which rock fractures below the earth's surface are opened or widened by injecting a highly pressurized mixture of water, sand and chemicals. Petroleum or natural gas, trapped deep in the rock formations, is then released into the well for extraction. While the process was introduced in the 1940s, the use of multiple technologies (e.g., horizontal drilling) in recent years has made the process more economical and more efficient. As a result, there has been a boom in natural gas production in the United States.

Hydraulic Fracturing falls primarily under NCCI Contracting Codes 6235 (Oil or Gas Well Drilling) and 6216 (Oil or Gas Lease Work by Specialist Contractor). Frequency for these codes is substantially higher than for the Oil and Gas Industry as a whole.

Conclusion

As previously reported, NCCI believes that several factors have contributed to the long term decline in frequency since the early 1990s, including advances in automation fostered by global competition and continued emphasis on workplace safety.

The Great Recession of 2007–2009 and its modest recovery had a considerable influence on workers compensation claim frequency. The 2010 increase in frequency, the first increase in 13 years, may have been the result of recession-related factors. Despite the 2010 uptick, claim frequency declined in 2011 and 2012. However it remains to be seen whether frequency will resume its historical long-term rate of decline.

Acknowledgments

Barry Lipton, John Robertson, Delano Brown, Yair Bar-Chaim and Tom Sheppard contributed to this study.

APPENDIX

Distribution of Lost-Time Claim Counts and Reported Loss Amounts

The following charts provide the underlying loss distributions for selected categories of data provided in this report. Each chart provides a distribution of lost-time claim counts and reported loss amounts (medical and indemnity combined). For each distribution, we used **Statistical Plan** data for the latest five years combined to add stability. The data is undeveloped as of 1st report. Thus, the distributions are likely to change as claim counts and loss dollars develop to an ultimate level.

The following claim counts and loss distributions can be used to estimate the impact that the change in frequency for a given claim type had on the entire workers compensation market.

Distribution of Lost-Time Claims by NCCI Industry Group

Industry Group	Claim Counts	Loss Amounts
Manufacturing	17.1%	16.7%
Contracting	16.4%	24.5%
Office & Clerical	11.7%	10.9%
Goods & Services	39.3%	31.1%
Miscellaneous	15.4%	16.8%
Total	100.0%	100.0%

Distribution reflects latest 5-year period for Policy Years Expiring (PYE) 2007 to 2011
 Loss amounts represent reported undeveloped paid losses plus case reserves for medical and indemnity at 1st report
Statistical Plan data, for all states where NCCI provides ratemaking services, excluding West Virginia



Distribution of Lost-Time Claims by Size of Employer Payroll

Size of Payroll	Claim Counts	Loss Amounts
0 to 250K	9.8%	12.7%
250K to 1M	13.3%	15.2%
1M to 5M	23.9%	24.7%
5M to 20M	22.1%	20.7%
20M to 100M	18.0%	15.9%
100M and up	12.8%	10.8%
Total	100.0%	100.0%

Distribution reflects latest 5-year period for Policy Years Expiring (PYE) 2007 to 2011
Loss amounts represent reported undeveloped paid losses plus case reserves for medical and indemnity at 1st report
Statistical Plan data, for all states where NCCI provides ratemaking services, excluding West Virginia

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Distribution of Lost-Time Claims by Size of Employer Premium

Size of Premium	Claim Counts	Loss Amounts
0 to 5K	6.4%	7.5%
5K to 10K	4.7%	5.3%
10K to 50K	17.9%	19.3%
50K to 100K	10.9%	11.0%
100K to 250K	16.0%	15.6%
250K to 1M	21.3%	20.2%
1M and up	22.8%	21.0%
Total	100.0%	100.0%

Distribution reflects latest 5-year period for Policy Years Expiring (PYE) 2007 to 2011
Loss amounts represent reported undeveloped paid losses plus case reserves for medical and indemnity at 1st report
Statistical Plan data, for all states where NCCI provides ratemaking services, excluding West Virginia

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Distribution of Lost-Time Claims by Injury Type

Injury Type	Claim Counts
Fatal	0.07%
Permanent Total	0.02%
Permanent Partial	7.1%
<u>Temporary Total</u>	<u>16.4%</u>
Lost-Time Total	23.6%
<u>Medical Only</u>	<u>76.4%</u>
Total	100.0%

Distribution reflects latest 5-year period for Policy Years Expiring (PYE) 2007 to 2011
Loss amounts represent reported undeveloped paid losses plus case reserves for medical and indemnity at 1st report
Statistical Plan data, for all states where NCCI provides ratemaking services, excluding West Virginia

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Mix-Adjustment Proof

The mix-adjusted change in frequency per premium equals the mix-adjusted change in frequency per payroll:

Mix Adjustment Proof

Mix-Adjusted Frequency Per Payroll Change

$$\left(\frac{\sum \text{Claims 2011} * \text{Payroll 2010}}{\text{Payroll 2011}} \right) / \sum \text{Payroll 2010} / \{ \sum \text{Claims 2010} / \sum \text{Payroll 2010} \}$$

Mix-Adjusted Frequency Per On-Levelled Premium Change

$$\left(\frac{\sum \text{Claims 2011} * \text{Premium 2010}}{\text{Premium 2011}} \right) / \sum \text{Premium 2010} / \{ \sum \text{Claims 2010} / \sum \text{Premium 2010} \}$$

Change in On-Levelled Premium = Change in Payroll

$$\frac{\text{Premium 2010}}{\text{Premium 2011}} = \frac{\text{Payroll 2010} * \text{Rate 2011}}{\text{Payroll 2011} * \text{Rate 2011}} = \frac{\text{Payroll 2010}}{\text{Payroll 2011}}$$



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