

# **LOB-3: Wheels Down**

**CLRS Seminar, September 11-12, 2017**

**Philadelphia, PA**

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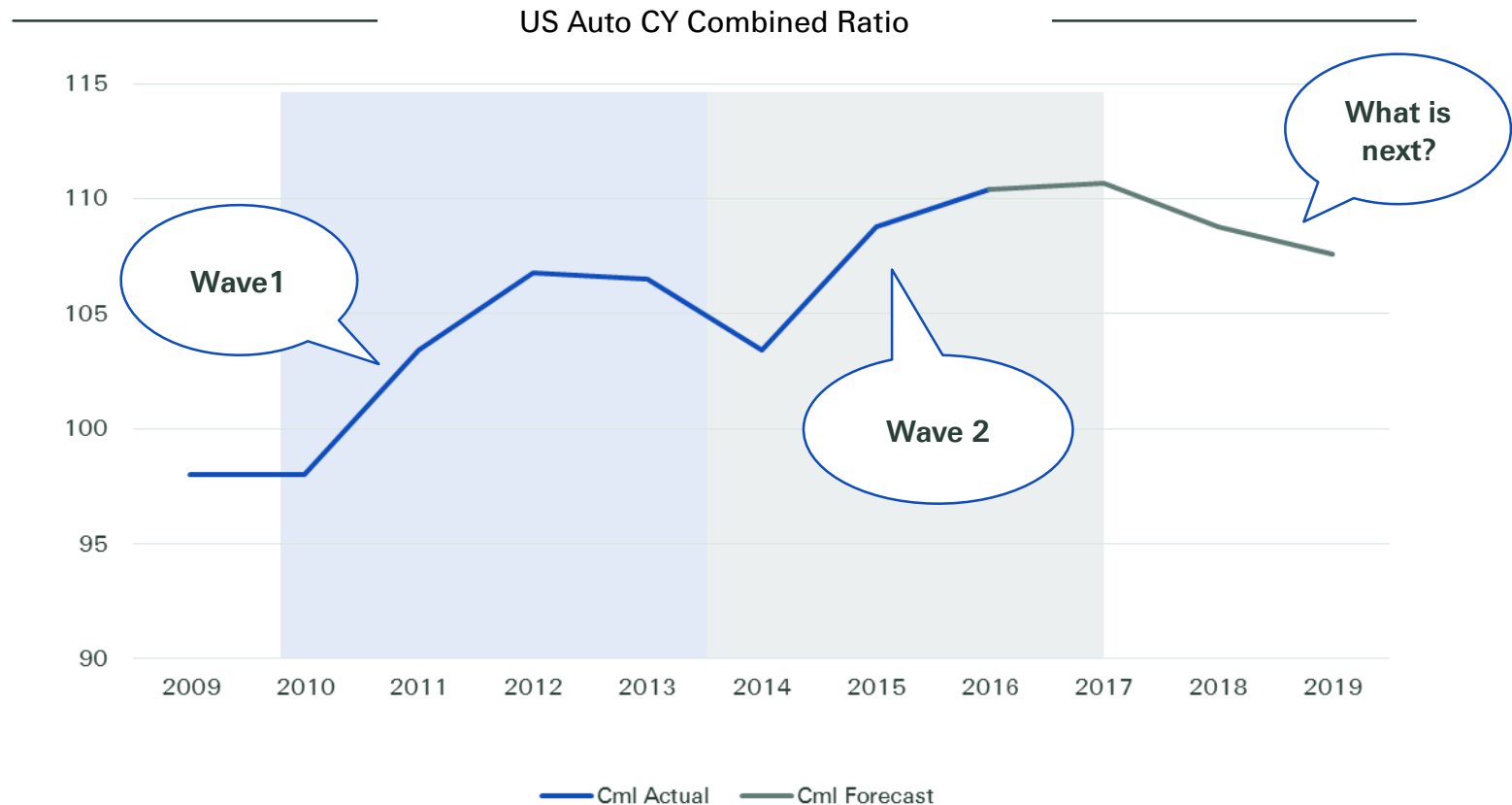


# LOB-3: Wheels Down

- This session will address the continuing commercial auto issues from a pricing and reserving perspective. We will approach the issues by looking walking through the last decade to understand the trends and drivers behind these trends
- We will break down the overall results into the latest frequency and severity trends, rate changes, pressures on increased limits factors, lengthening development factors and resulting profitability issues.
- Cross-line comparisons including a review of the commercial auto component of umbrella will be addressed.
- We will also discuss tests devised to spot outlier companies early on, including market differentiating features such as average case-reserving practices, last-reserve-to-settlement amounts, and duration matching.
- Lastly presenters will cover the qualitative and quantitative features to address the drivers and results through the cycle, including a look at trend drivers into the future.



# US Commercial auto insurance industry results have been deteriorating since 2010 driven by several waves of activity



Source: 2015 and prior: Conning Insurance Segment Report: Commercial Auto, Mid-Year 2017. 2016 estimate and 2017-2019 forecasts: Conning Total Industry Forecasts 2017Q2

# CLRS: Wheels Down

- View at 2010
  - Will frequencies (and rates) ever stop dropping?
- Wave 1: 2010 – 2013
  - Red ink is flowing. Why is this happening?
- Wave 2: 2014 – Today
  - Another Wave? Déjà vu?
- Forensic Analysis
  - Diving a little deeper
- A Look to the Future
  - What's next?
- Q&A



# Commercial Auto View at 2010





# Commercial Auto – View at 2010 Overall Frequency and Severity

Illustrative

## Frequency

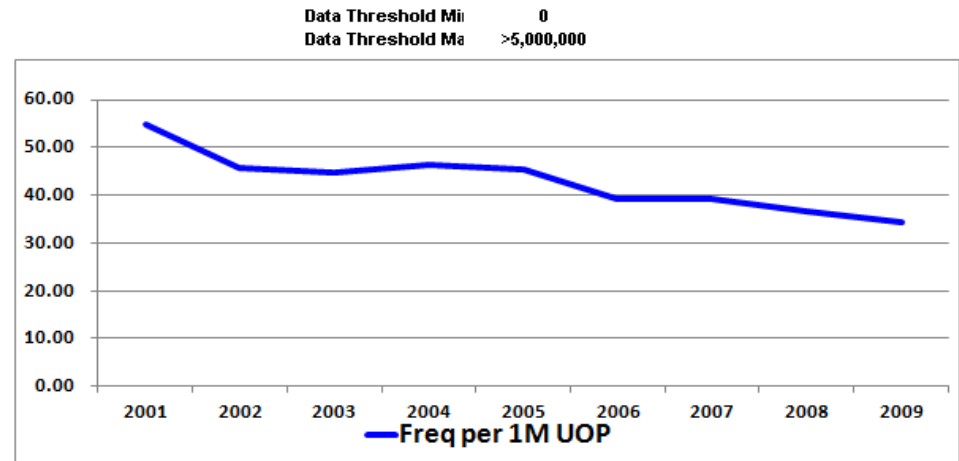
Analysis Method: Premium (MW rate change)

Apriori Trend = 0.03

INCURRED

AY	Ultimate OCCURRENCE	Freq per 1M UOP	YTY Change	Ultimate Prem
2001	287,739	54.8940		5,241,730,845
2002	233,162	45.8150	-16.54%	5,089,250,680
2003	212,072	44.7750	-2.27%	4,736,394,774
2004	205,497	46.4050	3.64%	4,428,370,494
2005	207,560	45.4080	-2.15%	4,571,045,142
2006	197,104	39.1880	-13.70%	5,029,644,311
2007	200,826	39.3190	0.33%	5,107,664,575
2008	177,153	36.6460	-6.80%	4,834,202,298
2009	159,060	34.2520	-6.53%	4,643,800,894
<b>Total/Average</b>	<b>3,139,584</b>	<b>71.8735</b>	<b>-2.84%</b>	<b>43,682,104,012</b>
Trend 7 year			-5.07%	
Trend - all year			-4.98%	

-37.6%



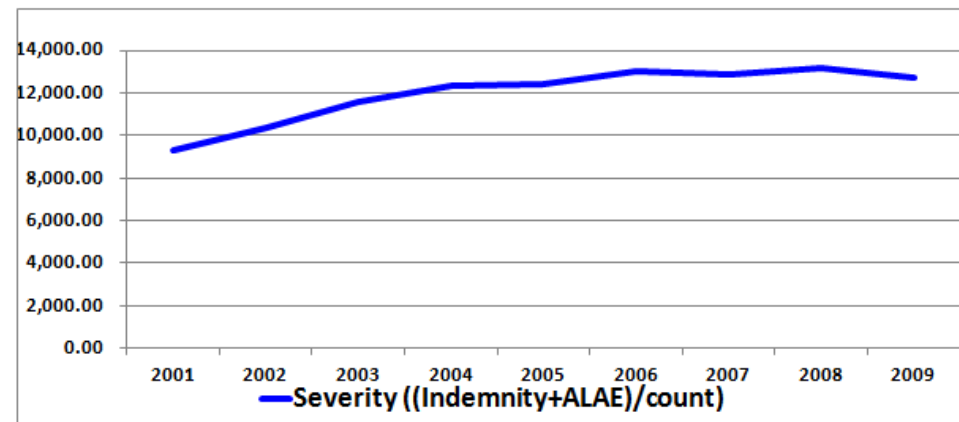
## Severity

Analysis Method: Premium (MW rate change)

Apriori Trend = 0.03

INCURRED

AY	Ultimate Severity ((Indemnity+ALAE)/count)	Severity ((Indemnity+ALAE)/count)	YTY Change	Ultimate Prem
2001	9,334	9,334	9.11%	5,241,730,845
2002	10,383	10,383	11.24%	5,089,250,680
2003	11,585	11,585	11.58%	4,736,394,774
2004	12,336	12,336	6.48%	4,428,370,494
2005	12,406	12,406	0.57%	4,571,045,142
2006	12,988	12,988	4.69%	5,029,644,311
2007	12,832	12,832	-1.20%	5,107,664,575
2008	13,190	13,190	2.79%	4,834,202,298
2009	12,725	12,725	-3.53%	4,643,800,894
<b>Total/Average</b>	<b>140,980</b>	<b>140,980</b>	<b>3.62%</b>	<b>43,682,104,012</b>
Trend 7 year			1.60%	
Trend - all year			3.69%	





# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
All Causes of Loss  
Unlimited xs 0

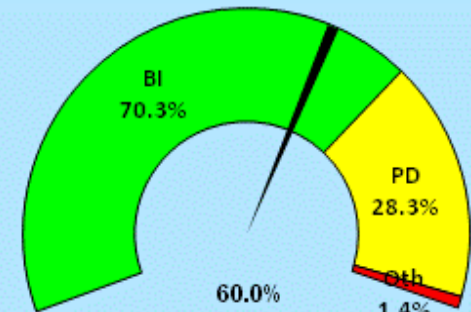
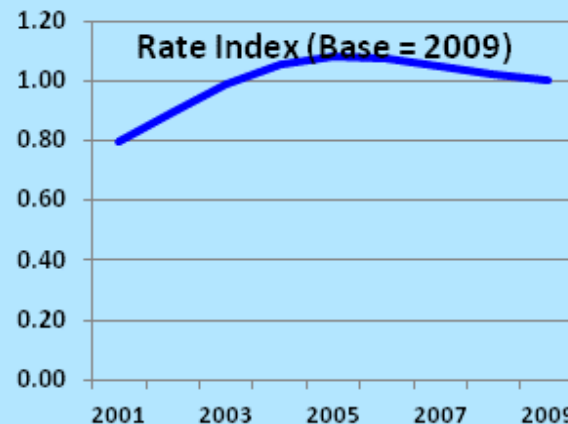
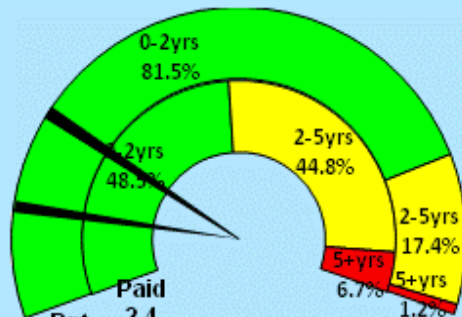
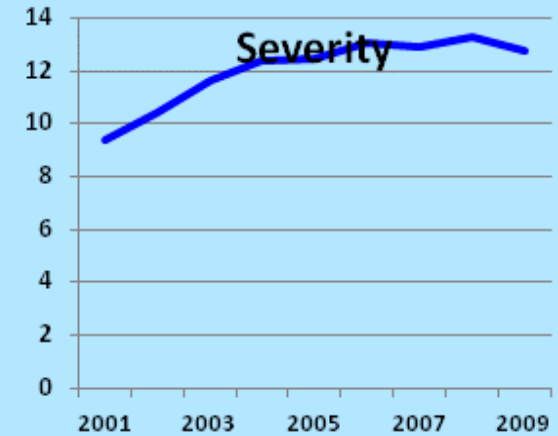
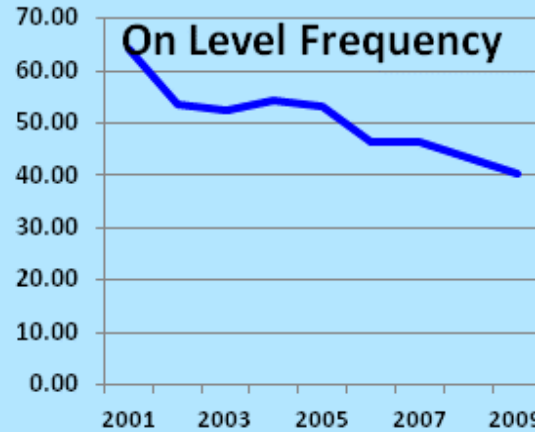
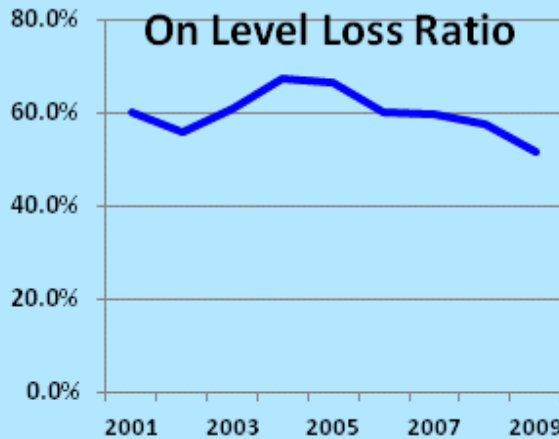
## Loss Ratio Analytics: View At 2010 - TTT

SOLM 2017 v0.4.2

*Illustrative*

Est All Yr/Curr Yr LR: 60.0% / 51.9%  
7 Year Severity Trend: 1.60%  
All Year Trend: 3.69%  
Avg Rep / Pay Duration: 1.2 / 2.4 Years

Total Premium 12/2009: 36,899,761,019  
Total Incurred Loss & Alae: 31,174,002,891  
Total Occurrences: 3,129,183  
Total Exposure (Power Units): 260,470,867



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016





# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
Bodily Injury  
Unlimited xs 0

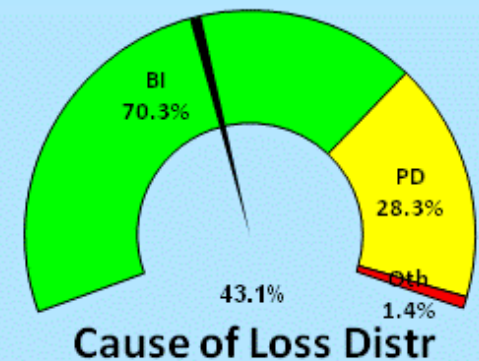
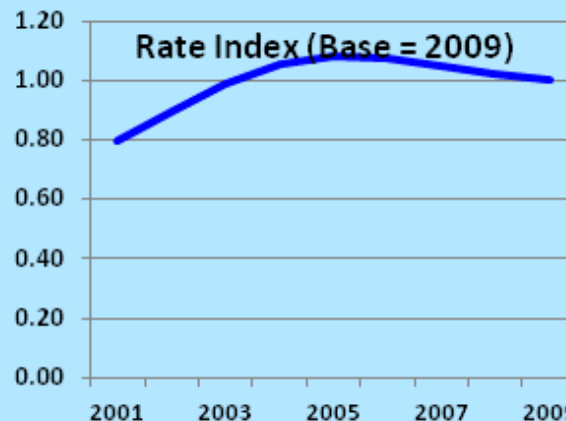
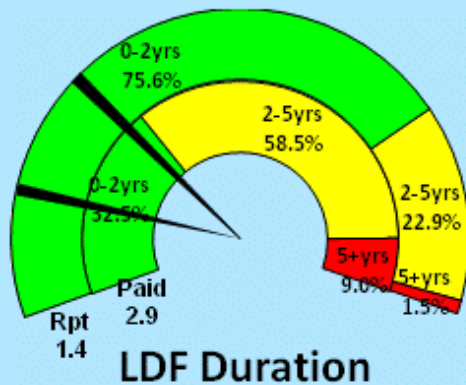
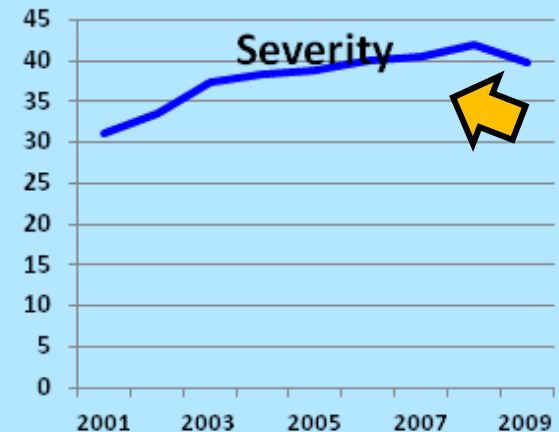
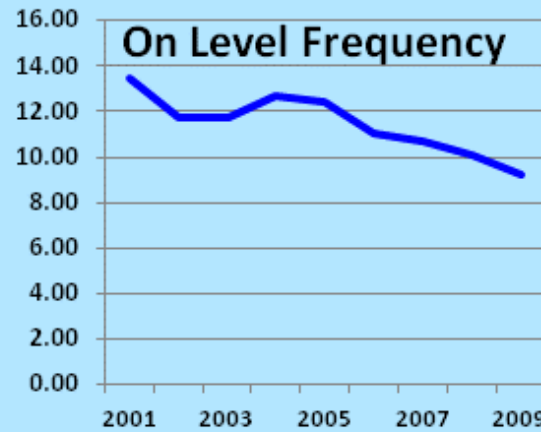
## Loss Ratio Analytics: View At 2010 - TTT BI

SOA 2017 v0.4.2

### Illustrative

Est All Yr/Curr Yr LR: 43.1% / 36.9%  
7 Year Severity Trend: 1.49%  
All Year Trend: 3.10%  
Avg Rep / Pay Duration: 1.4 / 2.9 Years

Total Premium 12/2009: 36,899,761,019  
Total Incurred Loss & Alae: 21,919,029,206  
Total Occurrences: 699,655



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016



# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Private Passenger Types - All Companies  
All Causes of Loss  
Unlimited xs 0

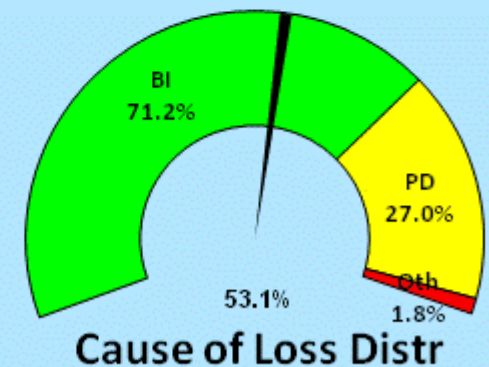
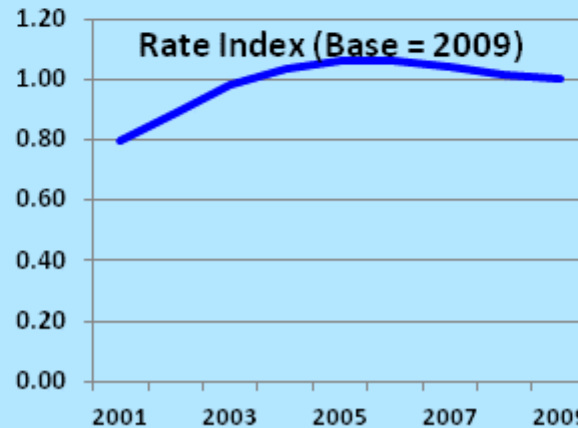
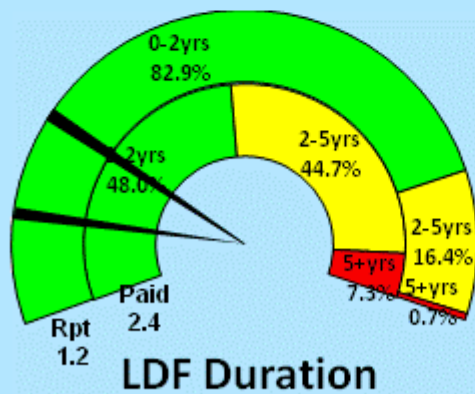
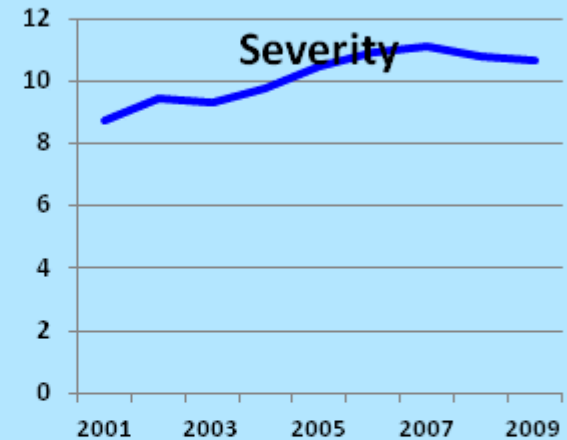
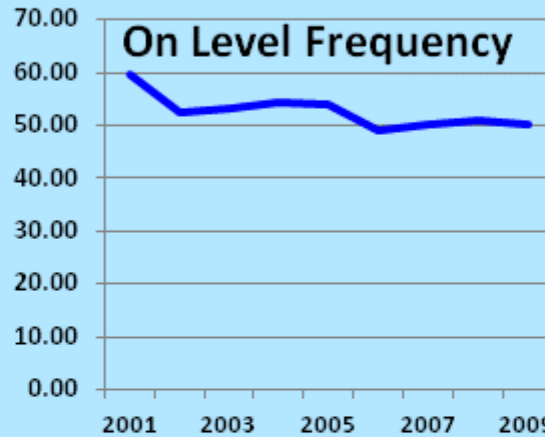
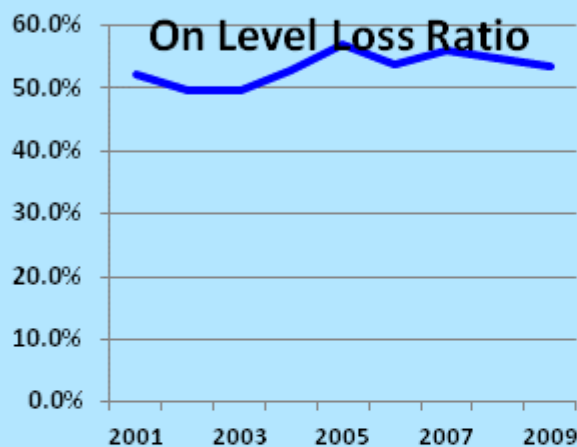
## Loss Ratio Analytics: View At 2010 - PPT

SOLM 2017 v0.4.2

*Illustrative*

Est All Yr/Curr Yr LR: 53.1% / 53.6%  
7 Year Severity Trend: 2.35%  
All Year Trend: 2.78%  
Avg Rep / Pay Duration: 1.2 / 2.4 Years

Total Premium 12/2009: 7,359,419,928  
Total Incurred Loss & Alae: 5,961,259,411  
Total Occurrences: 665,883

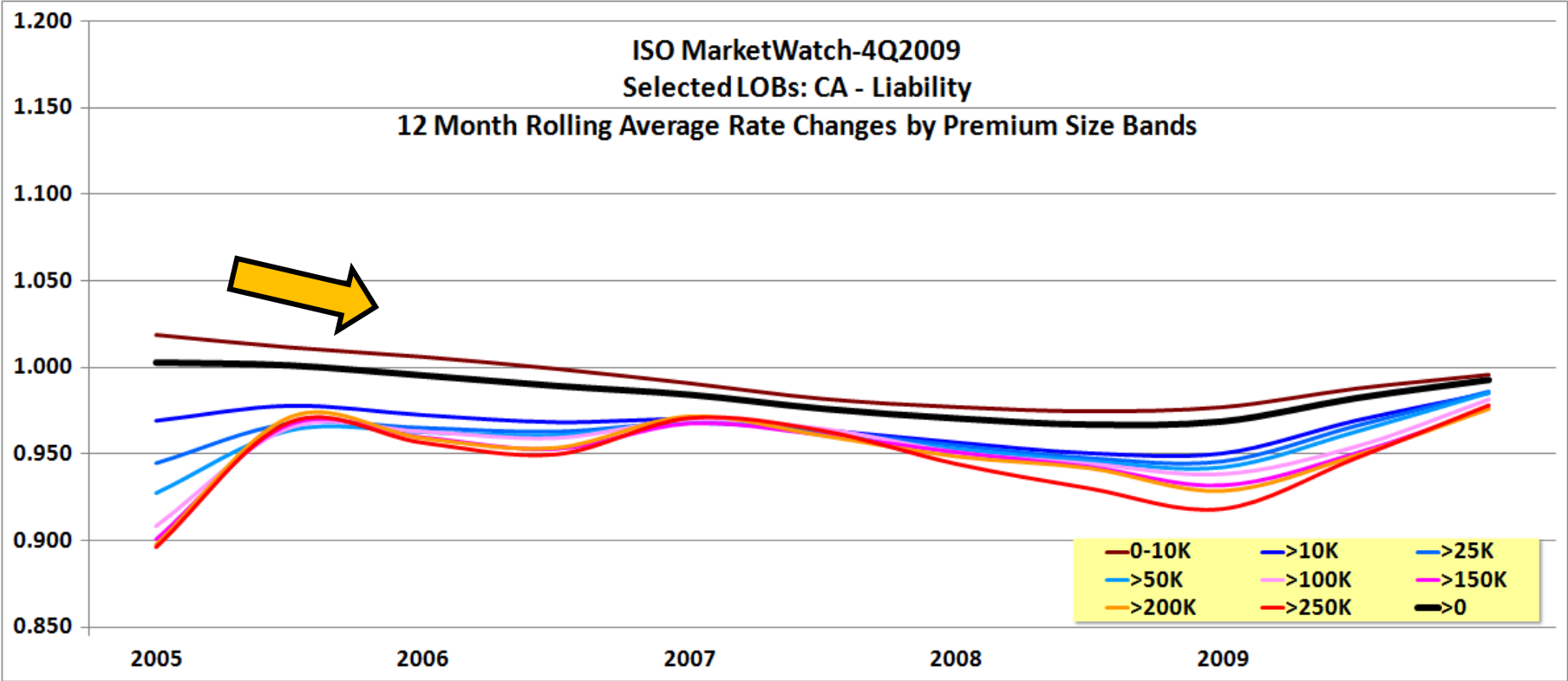


Note: Loss development factors and durations use all year VWA and 3% detrending.  
Rate changes from MarketWatch - Private Passenger Types - Liability - 12/31/2016



# Commercial Auto Liability - Rate Changes

*Illustrative*

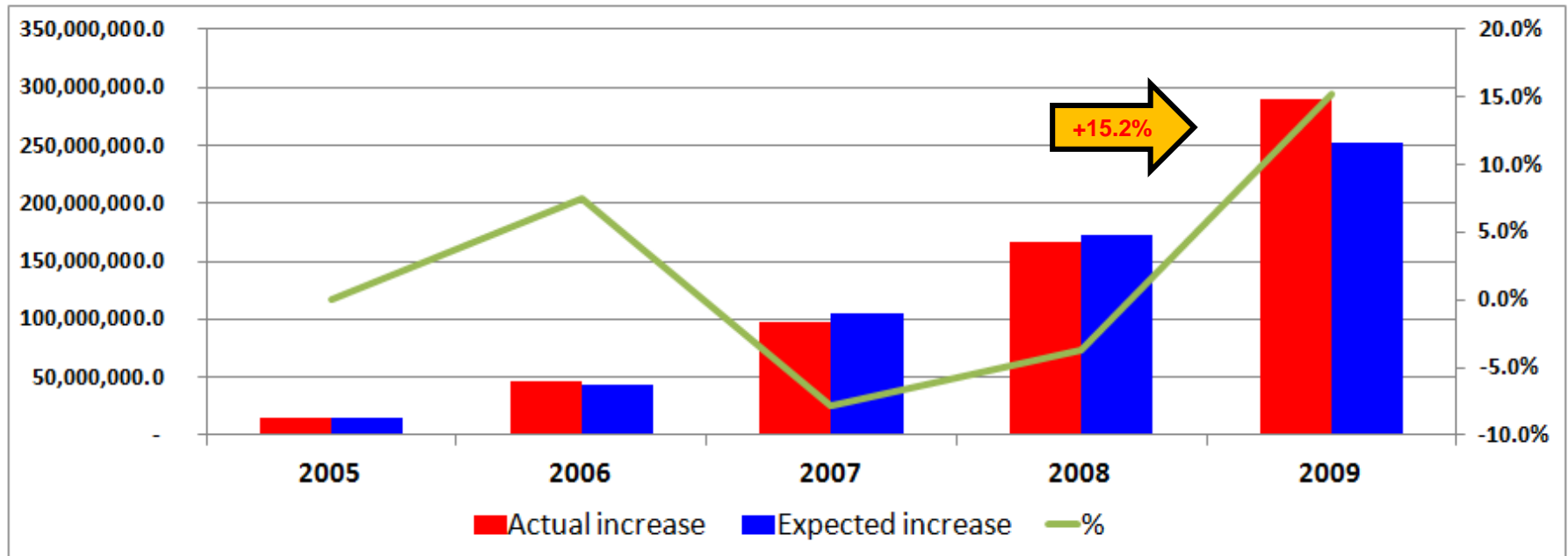


Total # of policies	Total Premium (previous)			
	All	>10K	>100k	>200k
23,362,613	15,557,426,367	4,615,685,616	1,177,375,379	675,199,945



# Commercial Auto – TTT - ERLI Warning

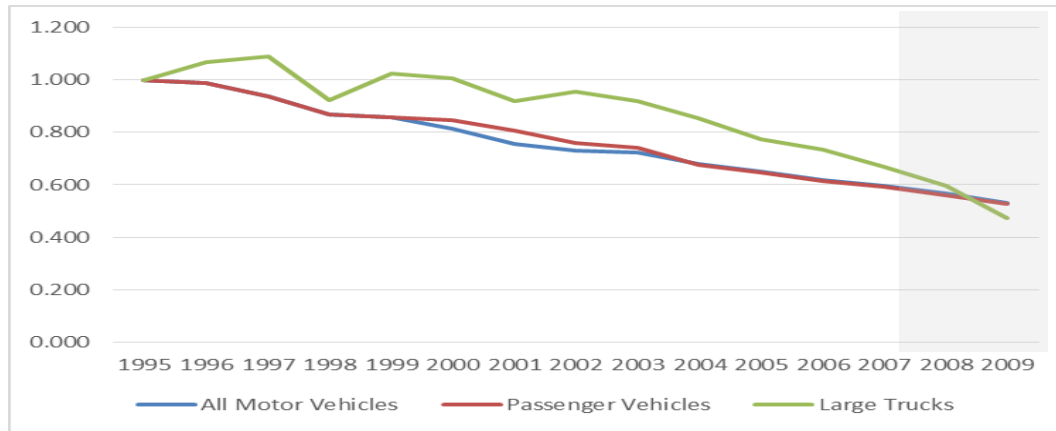
View at 2010: Ex-ante 5 years – excess layer 900x100k *Illustrative*



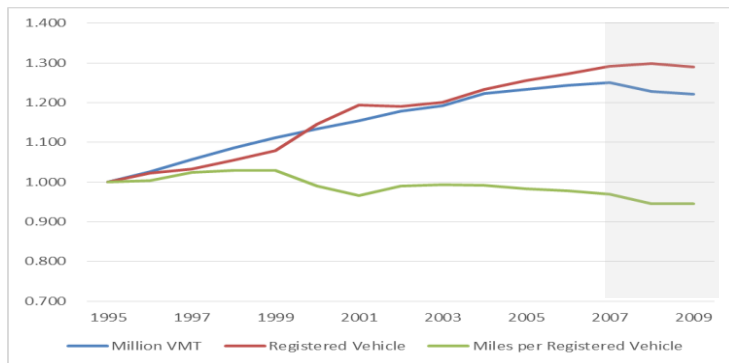
AY	Actual n-6	Actual n-5	5-Yr ATA	Expected n-5	AY	Actual increase	Expected increase	Actual - Expected	%
2005	1,097,265,890	1,112,068,639	1.0135	1,112,059,126	2005	14,802,749.0	14,793,235.6	9,513.4	0.1%
2006	1,066,637,325	1,112,815,458	1.0403	1,109,570,434	2006	46,178,133.0	42,933,109.1	3,245,023.9	7.6%
2007	991,509,745	1,088,630,104	1.1063	1,096,882,077	2007	97,120,359.0	105,372,332.4	(8,251,973.4)	-7.8%
2008	722,271,219	888,533,303	1.2391	894,986,382	2008	166,262,084.0	172,715,163.5	(6,453,079.5)	-3.7%
2009	334,768,535	624,898,496	1.7525	586,678,587	2009	290,129,961.0	251,910,051.5	38,219,909.5	15.2%
2010		372,698,496			2010				
Sum x2010	12,419,753,463	13,029,933,029		13,010,201,530	Sum x2015	610,179,566	590,448,067	19,731,499	3.3%
1996-1999	3,028,045,461	3,027,332,760		3,027,933,529	2001-2004	(712,701)	(111,932)	(600,769)	-536.7%
2000-2004	5,179,255,288	5,175,654,269		5,182,091,395	2005-2009	(3,601,019)	2,836,107	(6,437,126)	-227.0%
2005-2009	4,212,452,714	4,826,946,000		4,800,176,606	2010-2014	614,493,286	587,723,892	26,769,394	4.6%

# Prior to 2010 the industry benefited from and began to expect continued decline in accident rates

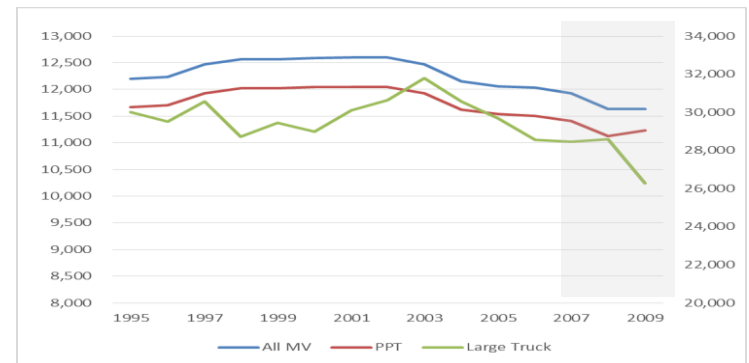
Crashes Per Registered Vehicle  
Indexed to 1995



VMT and Reg Vehicles  
All Motor Vehicles Indexed to 1995



Miles per Registered Vehicle



Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics*.

[http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/) and Swiss Re Analysis. Note: 2008 and prior restated to adjust for methodology changes in VMT and Registered vehicles

# Commercial Auto

## Wave 1: 2010-2013





# ISO Size-of-Loss Matrix

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Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
All Causes of Loss  
Unlimited xs 0

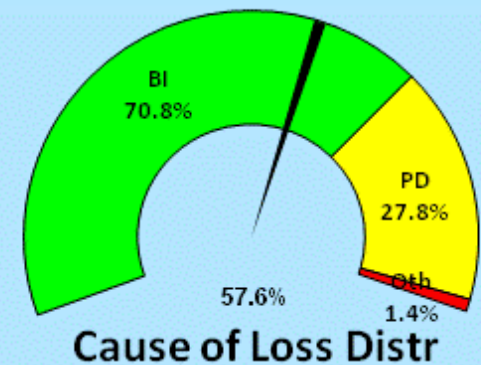
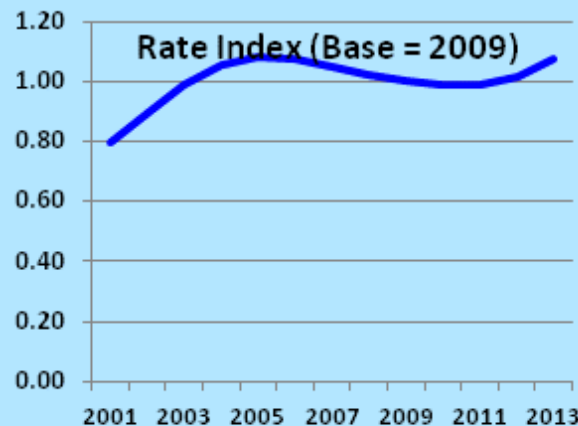
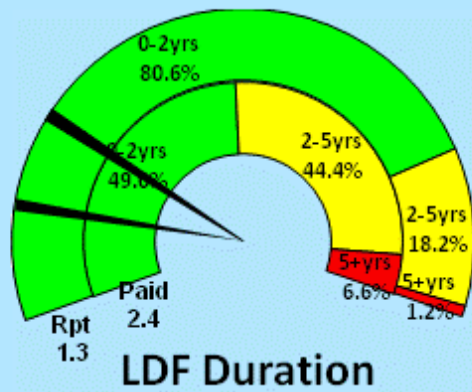
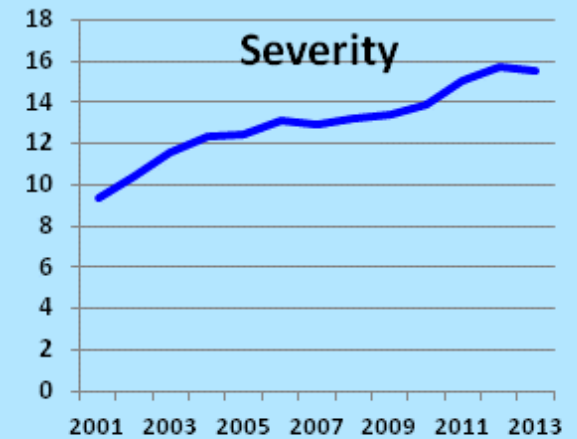
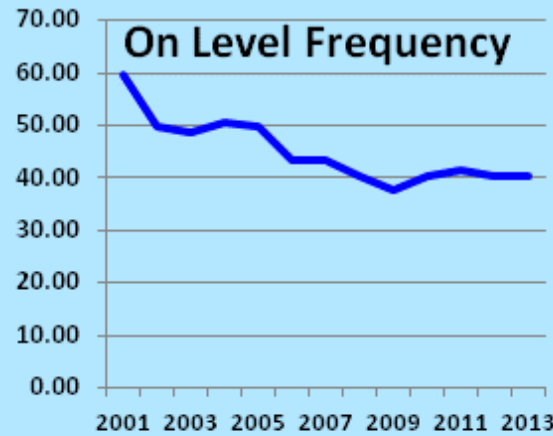
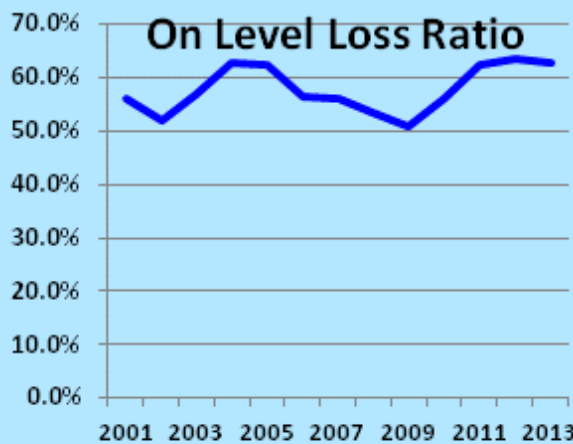
## Loss Ratio Analytics: View At 2014 - TTT

SOLEM 2017 v0.4.2

### Illustrative

Est All Yr/Curr Yr LR: 57.6% / 62.8%  
7 Year Severity Trend: 3.67%  
All Year Trend: 3.66%  
Avg Rep / Pay Duration: 1.3 / 2.4 Years

Total Premium 12/2013: 52,517,171,135  
Total Incurred Loss & Alae: 41,012,115,025  
Total Occurrences: 3,797,565  
Total Exposure (Power Units): 389,863,143



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016



# ISO Size-of-Loss Matrix

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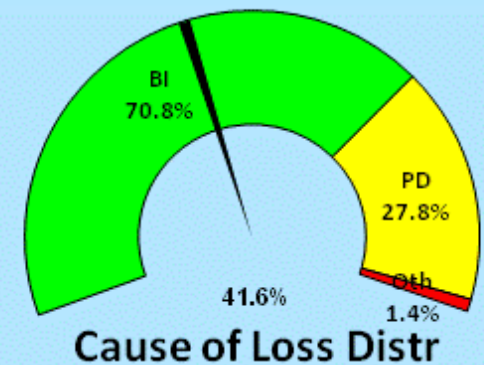
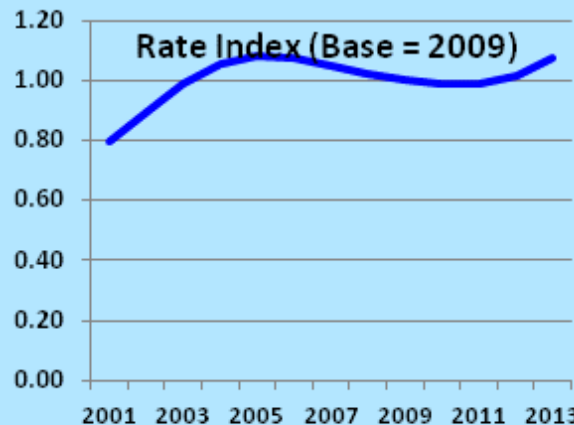
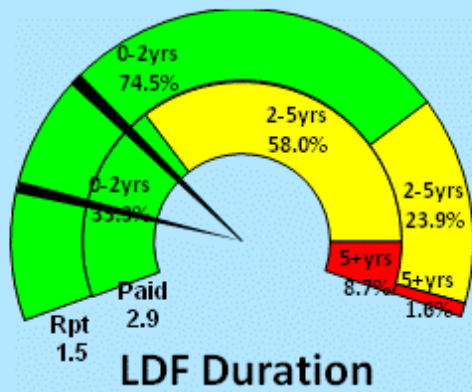
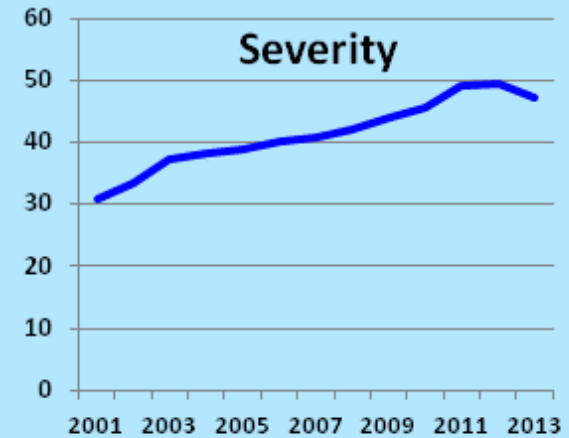
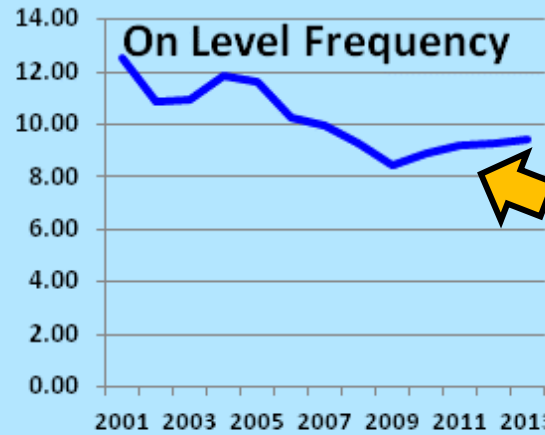
Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
Bodily Injury  
Unlimited xs 0

## Loss Ratio Analytics: View At 2014 - TTT BI

SOLEM 2017 v0.4.2

Est All Yr/Curr Yr LR: 41.6% / 44.8%  
7 Year Severity Trend: 3.17%  
All Year Trend: 3.54%  
Avg Rep / Pay Duration: 1.5 / 2.9 Years

Total Premium 12/2013: 52,517,171,135  
Total Incurred Loss & Alae: 29,029,435,616  
Total Occurrences: 850,958



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016





# ISO Size-of-Loss Matrix

## Loss Ratio Analytics: View At 2014 - TTT PD

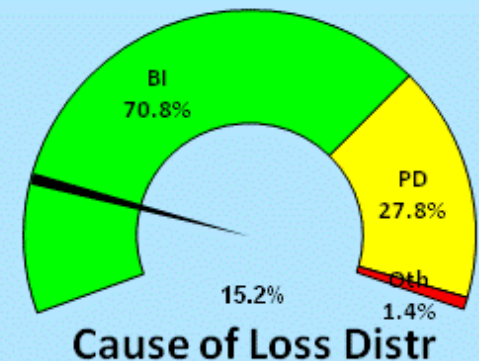
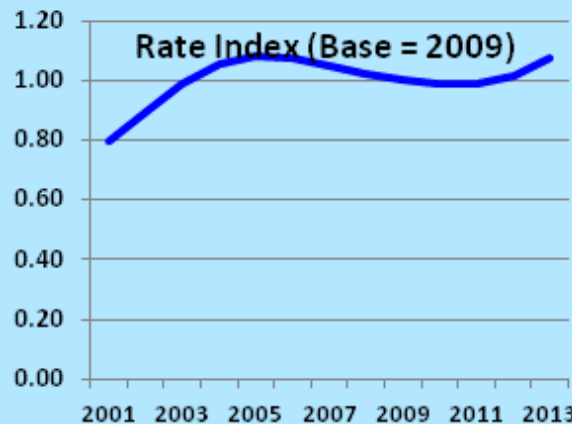
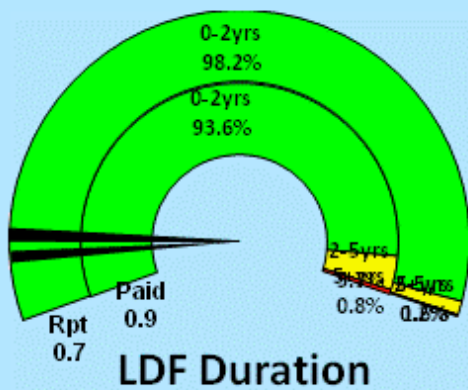
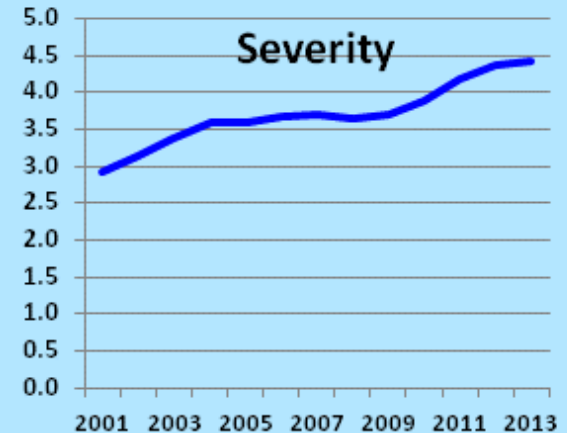
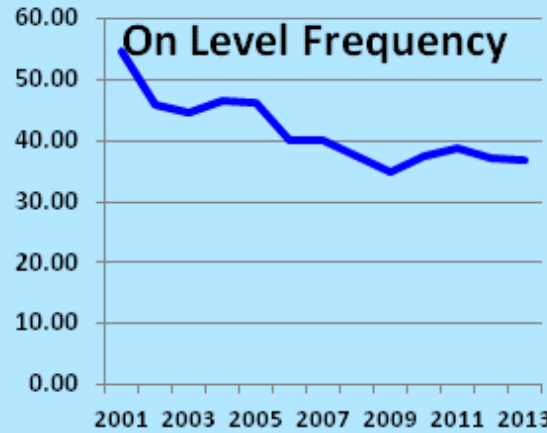
SOLM 2017 v0.4.2

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Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
Property Damage  
Unlimited xs 0

**Illustrative**  
Est All Yr/Curr Yr LR: 15.2% / 16.3%  
7 Year Severity Trend: 3.64%  
All Year Trend: 2.89%  
Avg Rep / Pay Duration: 0.7 / 0.9 Years

Total Premium 12/2013: 52,517,171,135  
Total Incurred Loss & Alae: 11,405,659,652  
Total Occurrences: 3,484,234



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016



# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Private Passenger Types - All Companies  
All Causes of Loss  
Unlimited xs 0

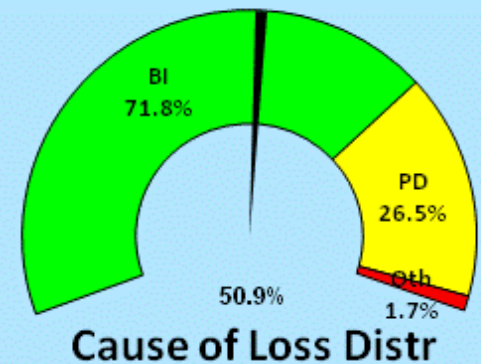
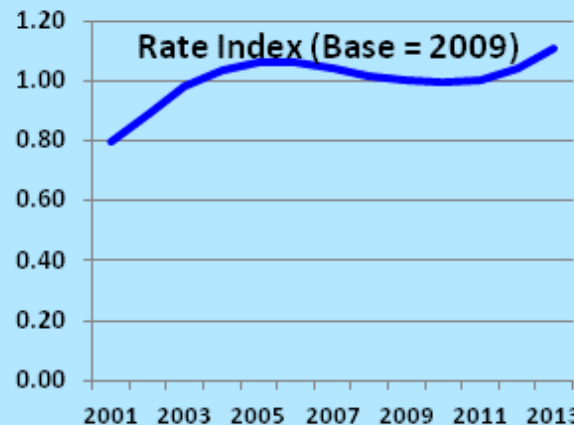
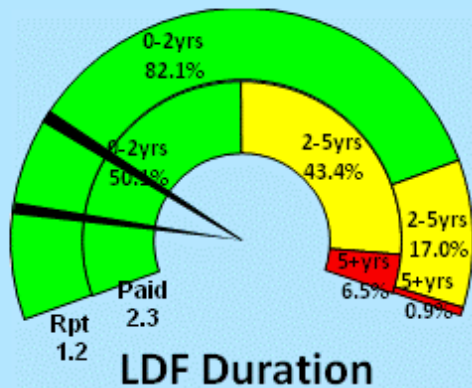
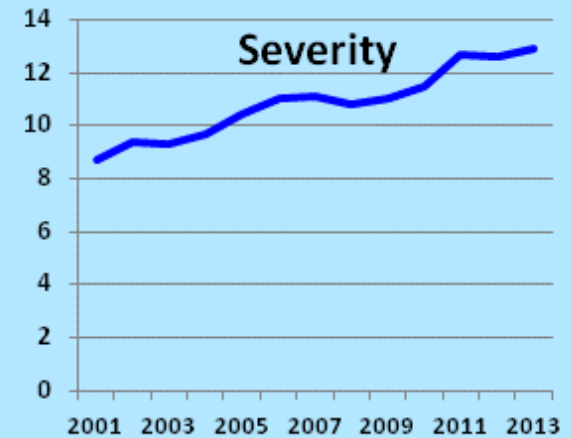
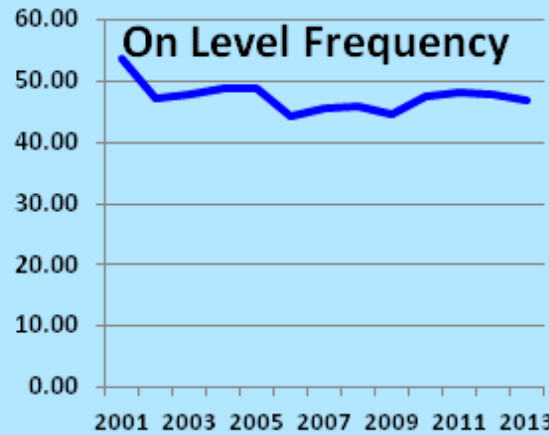
## Loss Ratio Analytics: View At 2014 **PPT**

SOLM 2017 v0.4.2

### Illustrative

Est All Yr/Curr Yr LR: 50.9% / 60.4%  
7 Year Severity Trend: 3.27%  
All Year Trend: 3.12%  
Avg Rep / Pay Duration: 1.2 / 2.3 Years

Total Premium 12/2013: 10,216,046,752  
Total Incurred Loss & Alae: 7,728,799,540  
Total Occurrences: 811,737



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Private Passenger Types - Liability - 12/31/2016



# Commercial Auto – Lengthening Loss Development

## Compare to 2010: Ex-ante 5 years – excess layer 900x100k

Illustrative

State	Countrywide		Line of Business	Market	State			
Major Class	CA		CA	Combined	Countrywide			
Data Threshold Min	100,001							
Data Threshold Max	1,000,000							
Paid/Incurred	INCURRED							
Loss Type	INDEMNITY							
Trend	3.0%							
	12	24	36	48	60	72	84	96
AY 1997	352,883,222	617,774,125	756,950,801	842,517,130	912,791,715	938,273,843	949,819,880	950,724,785
AY 1998	361,574,320	610,836,081	783,181,509	917,409,907	969,817,214	984,022,031	988,320,401	989,207,712
AY 1999	375,819,924	643,345,945	871,990,360	999,072,041	1,047,350,457	1,071,732,446	1,080,432,924	1,083,276,328
AY 2000	364,230,364	668,607,352	888,136,006	1,019,035,751	1,069,796,753	1,078,665,399	1,078,134,771	1,080,449,826
AY 2001	<b>362,874,309</b>	646,234,901	855,175,814	998,697,134	1,028,546,796	1,032,712,610	1,035,065,638	1,036,330,034
AY 2002	359,155,078	647,590,063	836,254,069	927,380,059	958,498,124	975,097,181	980,217,784	981,263,268
AY 2003	373,693,137	673,313,688	850,101,251	951,649,708	989,067,394	1,005,607,530	1,007,869,678	1,006,014,437
AY 2004	428,699,656	744,516,910	924,343,635	1,011,867,427	1,058,416,374	1,075,494,990	1,074,042,654	1,076,878,061
AY 2005	444,161,637	771,183,404	949,105,547	1,056,701,234	1,097,265,890	1,112,068,639	1,118,372,434	1,120,755,518
AY 2006	437,386,107	766,785,312	963,240,899	1,066,637,325	1,112,815,458	1,128,449,852	1,129,332,037	1,131,489,486
AY 2007	462,185,649	801,737,481	991,509,745	1,088,630,104	1,118,547,727	1,139,793,153	1,146,546,479	1,146,898,069
AY 2008	425,290,636	722,271,219	888,533,303	978,115,334	1,013,557,136	1,027,136,175	1,034,021,517	1,035,845,596
AY 2009	334,768,535	624,898,496	776,064,454	883,104,169	927,787,928	948,485,344	949,819,735	
AY 2010	372,698,496	672,626,988	865,740,409	969,387,048	1,035,435,988	1,051,546,587		
AY 2011	421,407,667	783,041,966	990,396,802	1,125,676,152	1,194,878,815			
AY 2012	423,223,216	796,628,773	1,042,048,655	1,168,866,896				
AY 2013	448,843,946	849,643,294	1,079,354,243					
AY 2014	475,727,327	837,690,338						
AY 2015	500,463,960							
Y tots-2014,2015:	18,120,331,965	19,430,015,200						
			15,321,892,201	20.0%				
	24/12	36/24	48/36	60/48	72/60	84/72	96/84	108/96
AY 1997	1.751	1.225	1.113	1.083	1.028	1.012	1.001	1.002
AY 1998	1.689	1.282	1.171	1.057	1.015	1.004	1.001	1.001
AY 1999	1.712	1.355	1.146	1.048	1.023	1.008	1.003	1.000
AY 2000	1.836	1.328	1.147	1.050	1.008	1.000	1.002	0.999
AY 2001	1.781	1.323	1.168	1.030	1.004	1.002	1.001	0.998
AY 2002	1.803	1.291	1.109	1.034	1.017	1.005	1.001	0.999
AY 2003	1.802	1.263	1.119	1.039	1.017	1.002	0.998	1.001
AY 2004	1.737	1.242	1.095	1.046	1.016	0.999	1.003	1.000
AY 2005	1.736	1.231	1.113	1.038	1.013	1.006	1.002	1.001
AY 2006	1.753	1.256	1.107	1.043	1.014	1.001	1.002	1.002
AY 2007	1.735	1.237	1.098	1.027	1.019	1.006	1.000	1.003
AY 2008	1.698	1.230	1.101	1.036	1.013	1.007	1.002	
AY 2009	1.867	1.242	1.138	1.051	1.022	1.001		
AY 2010	1.805	1.287	1.120	1.068	1.016			
AY 2011	1.858	1.265	1.137	1.061				
AY 2012	1.882	1.308	1.122					
AY 2013	1.893	1.270						
AY2014	1.761							

**Ex-Ante Analysis**



5 year ATA/ATU Factor

5 Ex Ante

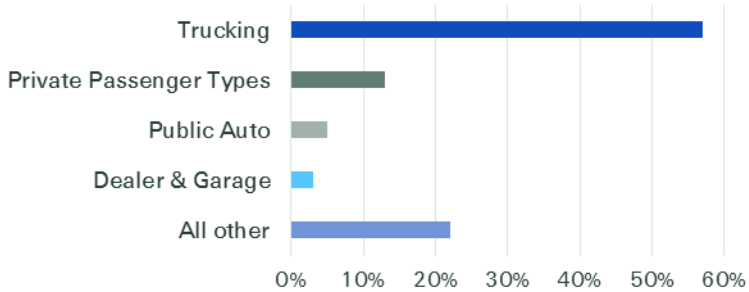
# Wave 1 rise in commercial auto was driven by worsening experience in trucking, the largest segment

CAGR\*1  
2009-2013

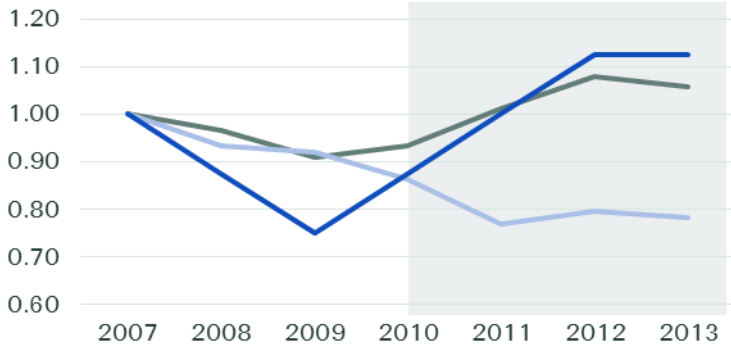
	Severity	# Claims	Ine L&ALAE
--	----------	----------	------------

<b>Extra Heavy</b>	3.5%	5.2%	8.9%
<b>Medium</b>	3.6%	3.1%	6.8%
Private Pass	0.4%	0.8%	1.3%
US Cml Auto	1.4%	1.1%	2.5%

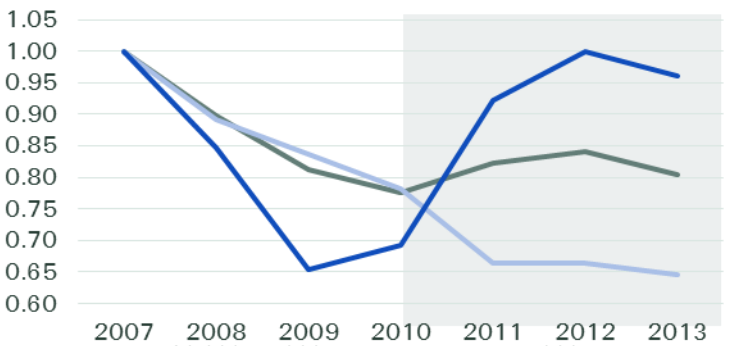
Earned Premium<sup>1</sup>  
2009-2013



Injury Rate<sup>2</sup>  
per 100 million vehicle miles travelled



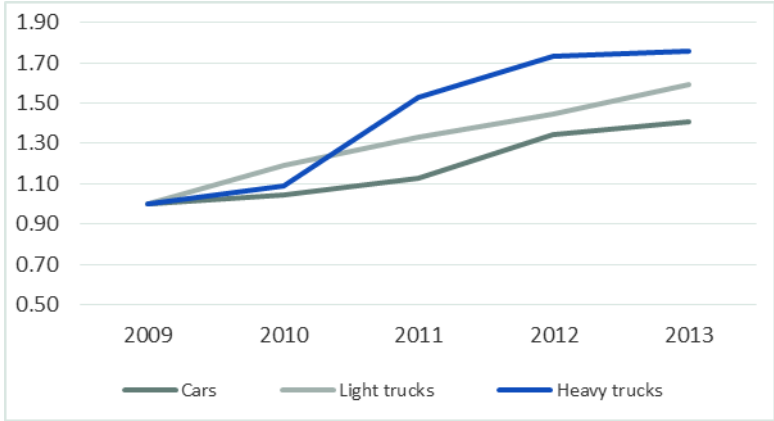
Fatality Rate<sup>2</sup>  
per 100 million vehicle miles travelled



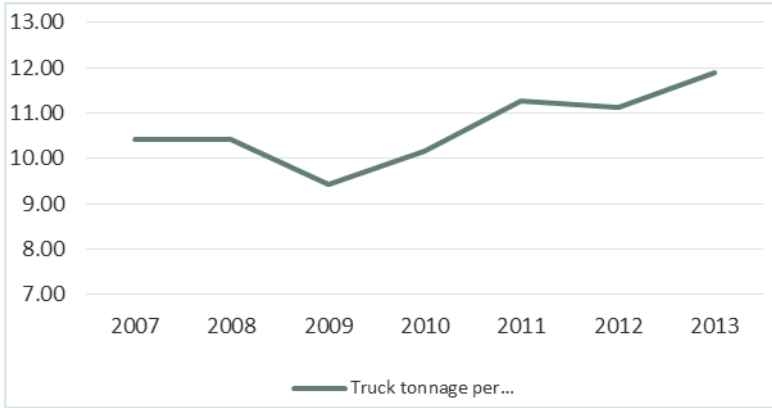
1. Source: ISONet, Swiss Re analysis. st and 3rd party covers, CAGR: Compound Annual Growth Rate; Heavy; 20,000-45,000 lbs; Extra Heavy: >45,000 lbs  
 2. Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics*, [http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/)

# Trucking loss rise partly explained by economic conditions where growth outpaced other sectors early in the decade

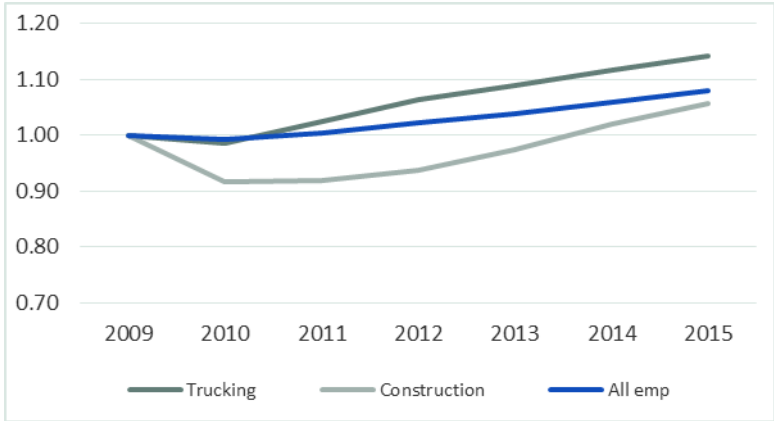
New Retail Vehicle Sales



Total Tonnage Transported per 1 million registered trucks



Employment Over Time



Driver Age & Experience



Source: Ward's communication, Bureau of Labor Statistics, U.S. Department of Transportation, Bureau of Transportation Statistics, and Swiss Re Analysis

# Recap – Wave 1 highlights

Commercial Auto Reserve Analysis: “It’s Déjà Vu Again...”  
Another Year Of Adverse Development Driven By More  
Recent AY & Lower Initial Loss Picks. Reserves Continue To  
Appear Modestly Deficient

- Adverse prior year reserve development for third consecutive year
- Turn in frequency trend with continued positive severity trends
- Increased Trucking activity and exposure post-recession
- Rate increases in the low to mid-single-digit rate
- Direct written premium up 9% in 2014



Source: Compiled by ISO from Dowling & Partners Securities, LLC IBNR Reports (1H2015) – Used with Permission

# Commercial Auto

## Wave 2: 2014 - 2016





# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
All Causes of Loss  
Unlimited xs 0

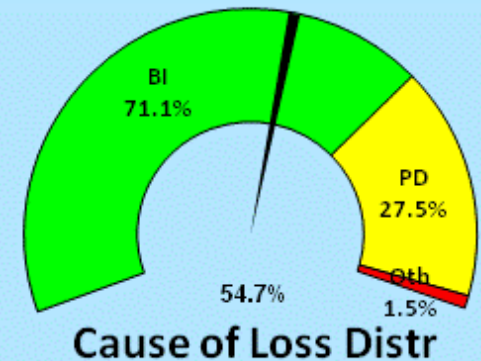
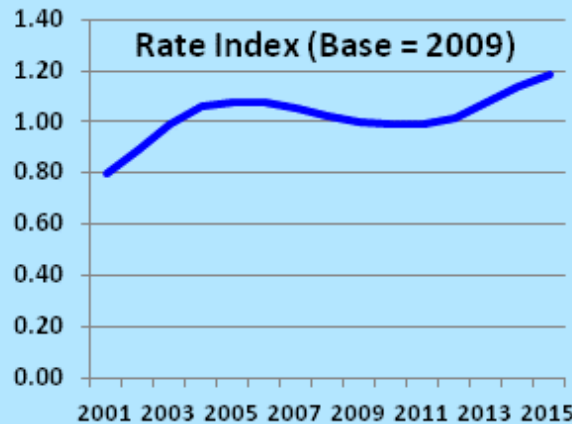
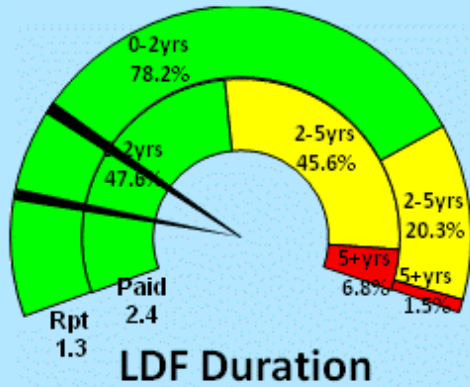
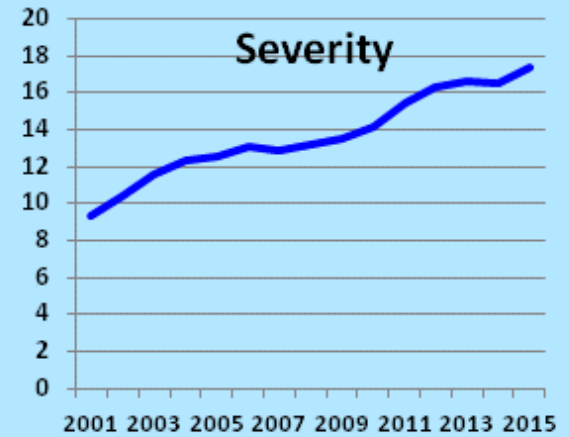
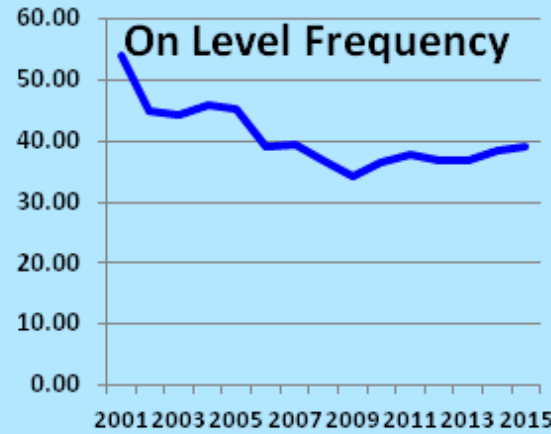
## Loss Ratio Analytics: View At 2016 - TTT

Illustrative

Est All Yr/Curr Yr LR: 54.7% / 67.8%  
7 Year Severity Trend: 4.09%  
All Year Trend: 3.86%  
Avg Rep / Pay Duration: 1.3 / 2.4 Years

Total Premium 12/2015: 61,791,988,908  
Total Incurred Loss & Alae: 47,116,526,436  
Total Occurrences: 4,166,504  
Total Exposure (Power Units): 457,996,921

SOEM 2017 v0.4.2



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016





# ISO Size-of-Loss Matrix

## Loss Ratio Analytics: View At 2016 **TTT BI**

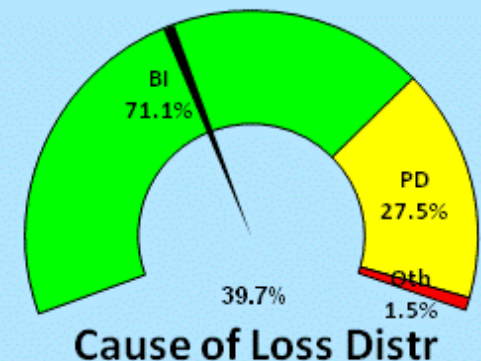
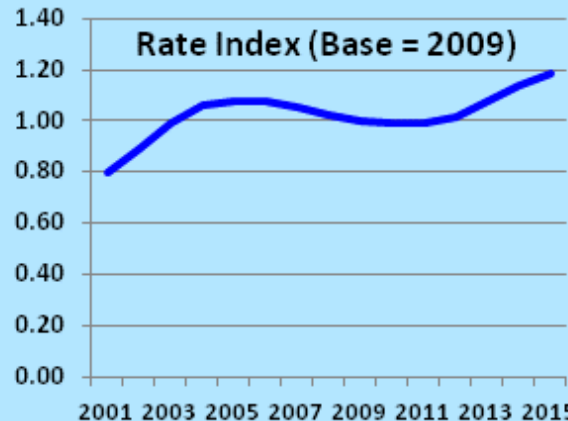
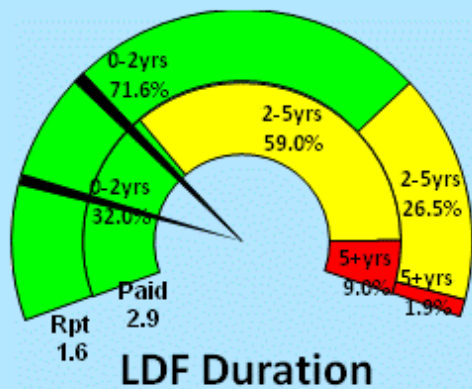
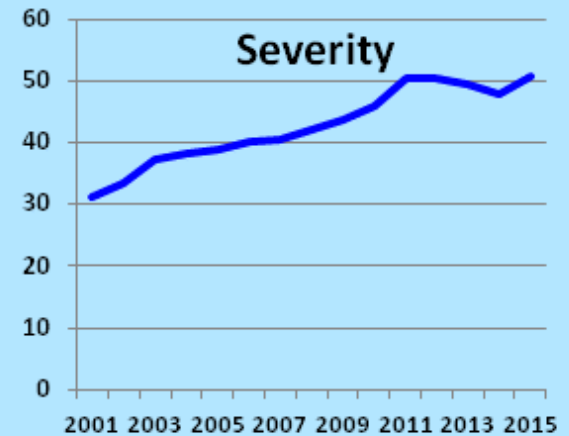
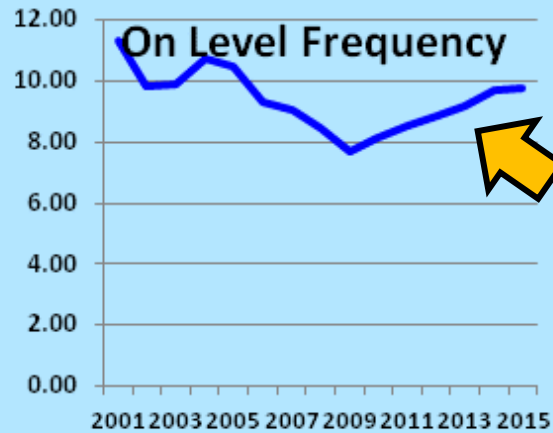
SOLM 2017 v0.4.2

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Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
Bodily Injury  
Unlimited xs 0

*Illustrative*  
Est All Yr/Curr Yr LR: 39.7% / 49.7%  
7 Year Severity Trend: 1.80%  
All Year Trend: 3.30%  
Avg Rep / Pay Duration: 1.6 / 2.9 Years

Total Premium 12/2015: 61,791,988,908  
Total Incurred Loss & Alae: 33,493,169,950  
Total Occurrences: 945,626



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016



# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Private Passenger Types - All Companies  
All Causes of Loss  
Unlimited xs 0

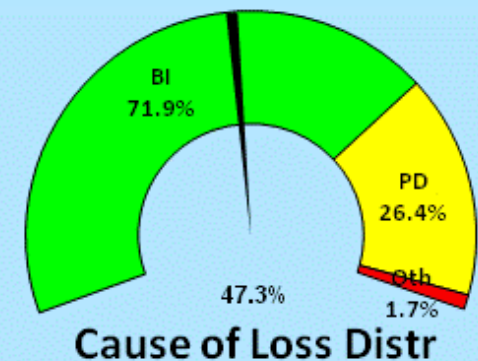
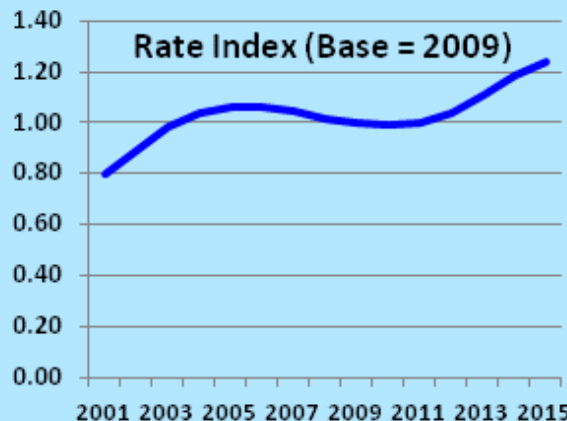
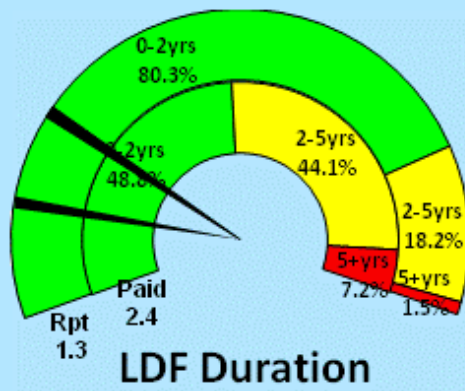
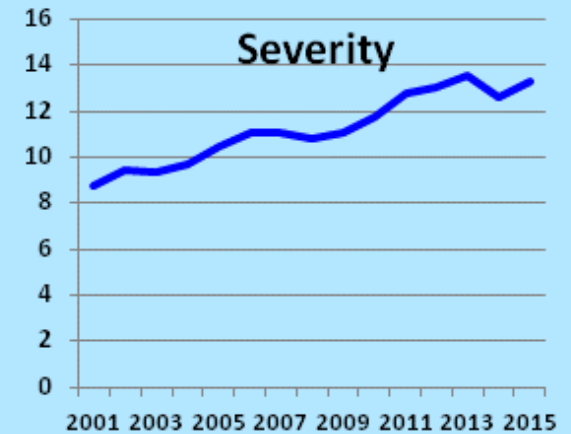
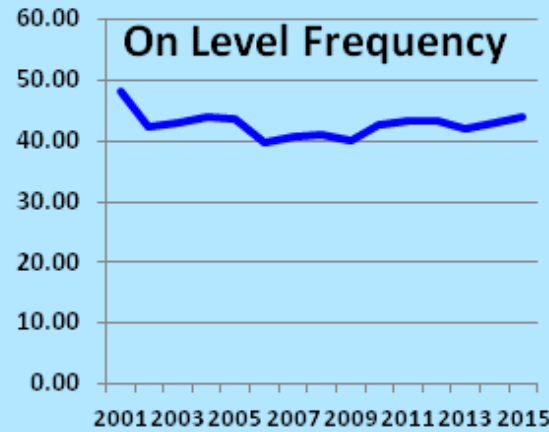
## Loss Ratio Analytics: View At 2016 - PPT

SOLM 2017 v0.4.2

### Illustrative

Est All Yr/Curr Yr LR: 47.3% / 58.3%  
7 Year Severity Trend: 2.68%  
All Year Trend: 3.03%  
Avg Rep / Pay Duration: 1.3 / 2.4 Years

Total Premium 12/2015: 11,839,941,214  
Total Incurred Loss & Alae: 8,680,277,249  
Total Occurrences: 884,091



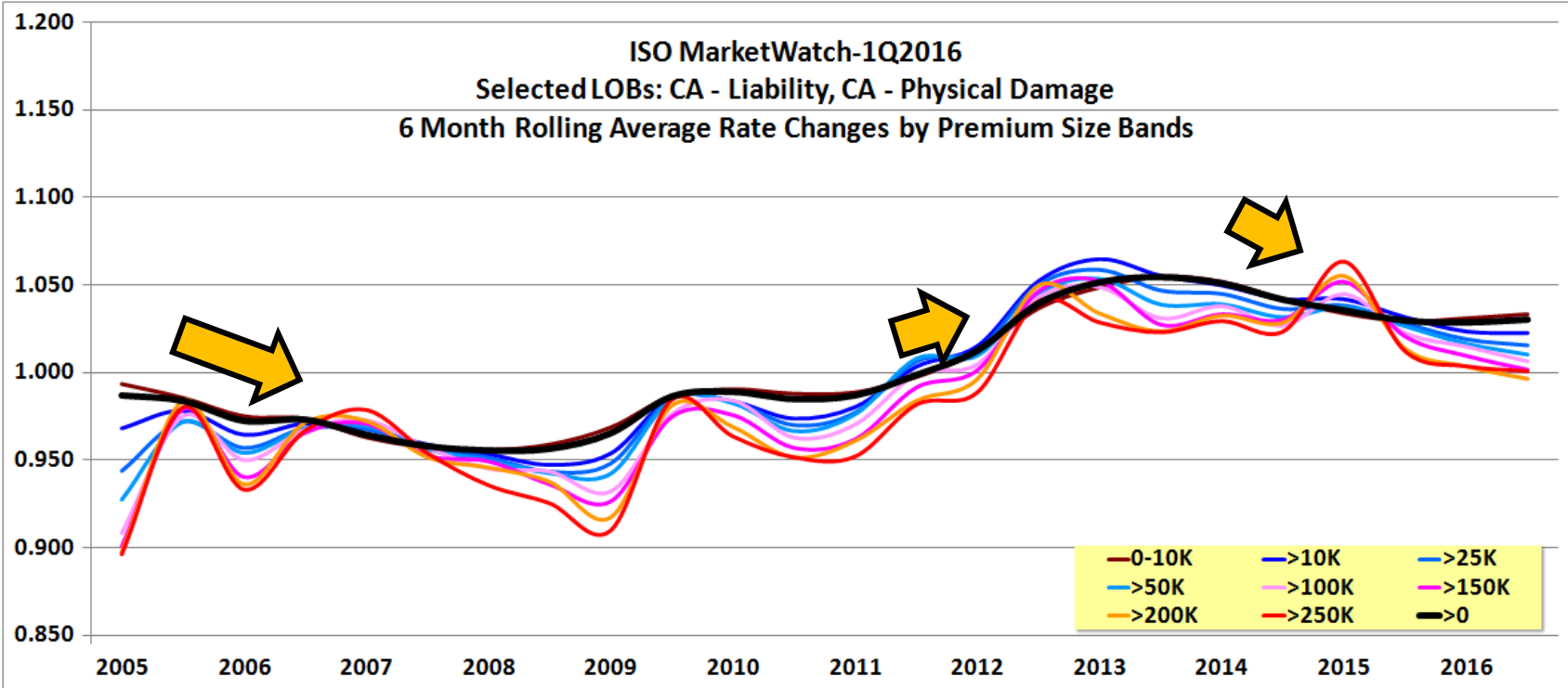
Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Private Passenger Types - Liability - 12/31/2016



# Incremental Rate Changes Through 3/31/2016

Liability & Physical Damage

*Illustrative*



Total # of policies	Total Premium (previous)			
	All	>10K	>100k	>200k
111,663,846	4,224,713,668	10,845,455,414	2,879,824,622	1,635,625,849

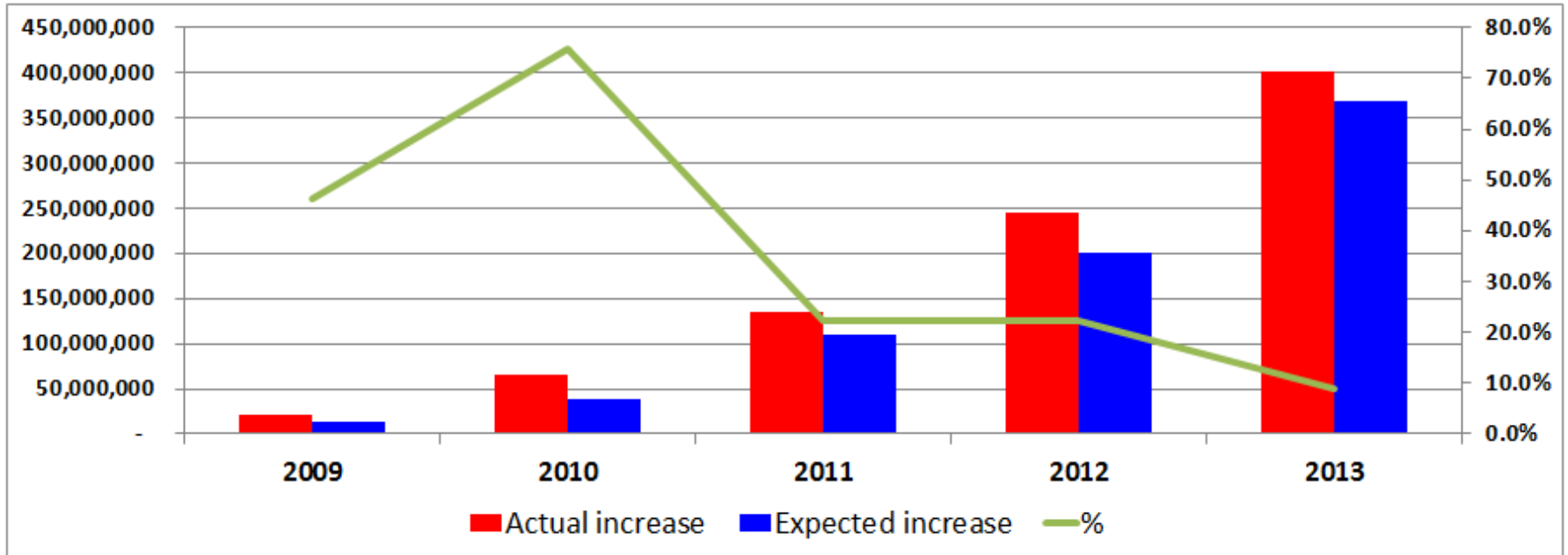
Source: ISO MarketWatch – released 6/15/2016; further details in Commercial Actuarial Panel – December 2016



# Commercial Auto – CAu (3 markets) - ERLI Warning

View of 2014: Ex-ante 2 years – excess layer 900x100k

*Illustrative*



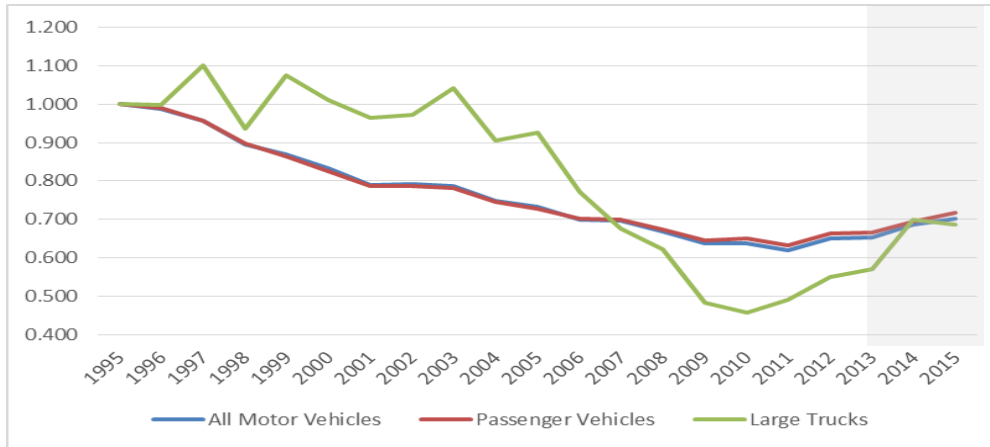
## SOLM Release 2016 (v4.2) - Development Triangle and Analysis

### ERLI Warning

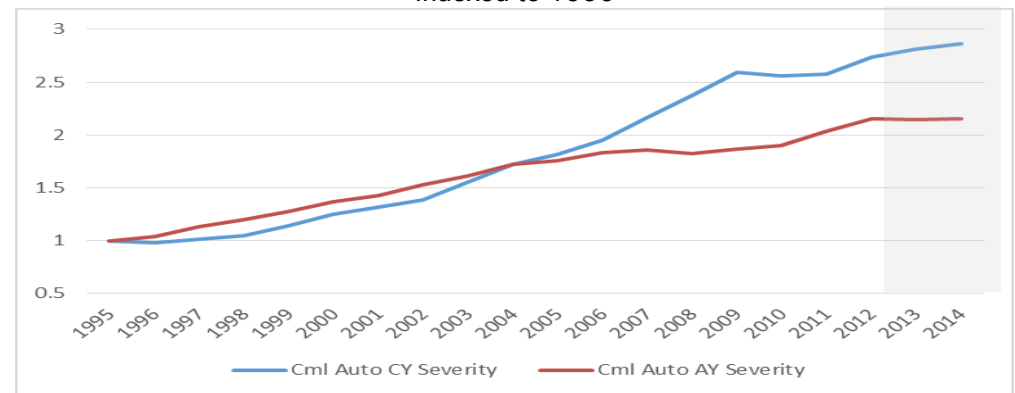
CY=2014					2 Ex Ante				
AY	Actual n-3	Actual n-2	5-Yr ATA	Expected n-2	AY	Actual increase	Expected	Actual - Expected	%
2009	927,792,337	948,489,796	1.015	941,937,861	2009	20,697,459	14,145,524	6,551,935	46.3%
2010	969,391,676	1,035,440,722	1.039	1,006,993,685	2010	66,049,046	37,602,009	28,447,037	75.7%
2011	990,401,529	1,125,681,334	1.112	1,100,985,153	2011	135,279,805	110,583,624	24,696,181	22.3%
2012	796,632,607	1,042,053,515	1.252	997,232,576	2012	245,420,908	200,599,969	44,820,939	22.3%
2013	448,845,946	849,647,219	1.820	817,040,649	2013	400,801,273	368,194,703	32,606,570	8.9%
Sum x2014	14,820,297,316	15,698,714,934		15,555,987,734	Sum x2014	878,417,618	735,690,418	142,727,200	19.4%
1999-2002	4,175,976,527	4,176,860,812		4,176,055,046	1999-2002	884,285	78,519	805,766	1026.2%
2003-2007	5,484,115,606	5,486,515,086		5,485,827,797	2003-2007	2,399,480	1,712,191	687,289	40.1%
2008-2012	4,711,359,237	5,185,691,817		5,077,064,243	2008-2012	474,332,580	365,705,006	108,627,574	29.7%

# Wave 2: increases driven by an upward shift in frequency while severity continues to show a consistent trend

Crashes Per Registered Vehicle  
Indexed to 1995



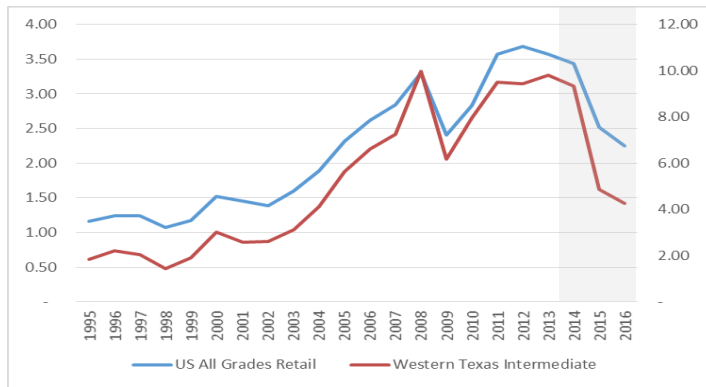
Commercial Auto Severity  
Indexed to 1995



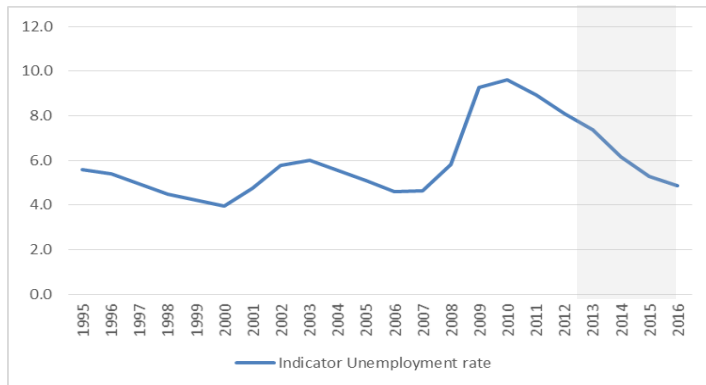
Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics*, [http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/), ISO Verisk Commercial Auto Trends CA-2017\_002 and Swiss Re Analysis

# Recent frequency trends driven by economic factors that have lead to increased miles and vehicles on the road

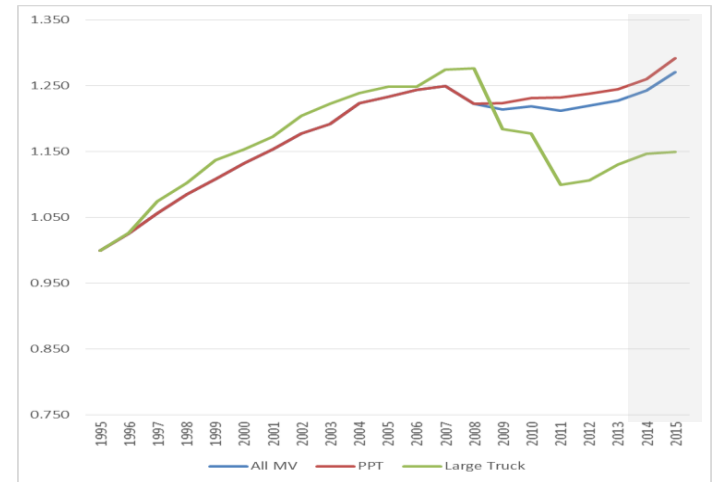
### Fuel Prices



### Unemployment



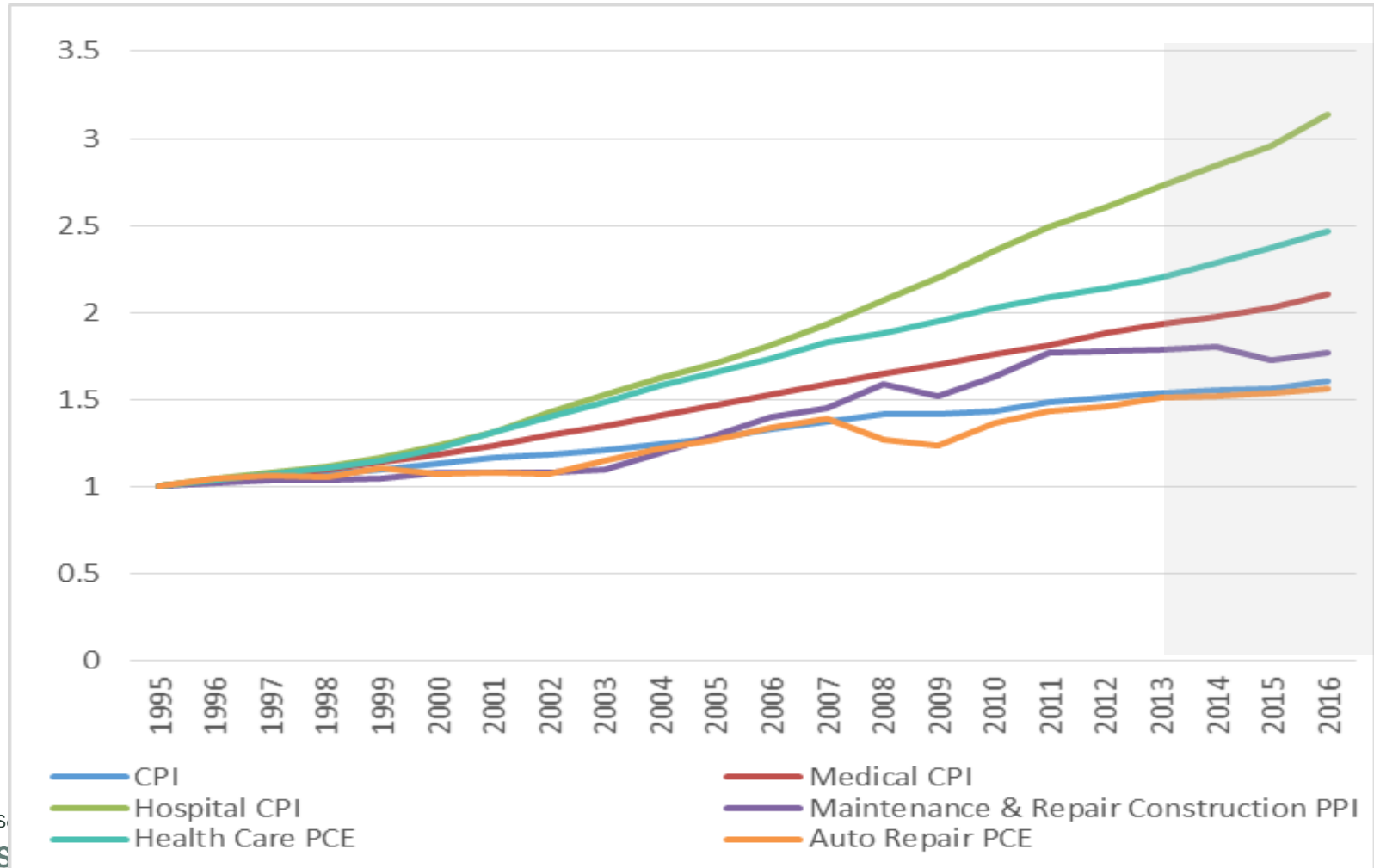
### Vehicles Miles Traveled Indexed to 1995



Source: Energy Information Administration, U.S. All Grades All Formulations Retail Gasoline Prices (Dollars per Gallon); Oxford Economics, U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics*, [http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/) and Swiss Re Analysis. Note: 2008 and prior restated to adjust for methodology changes in VMT and Registered vehicles

# Commercial Auto Severity is also impacted by rise in costs and drivers of accident severity

CPI, PPI & PCE Trends  
Indexed to 1995

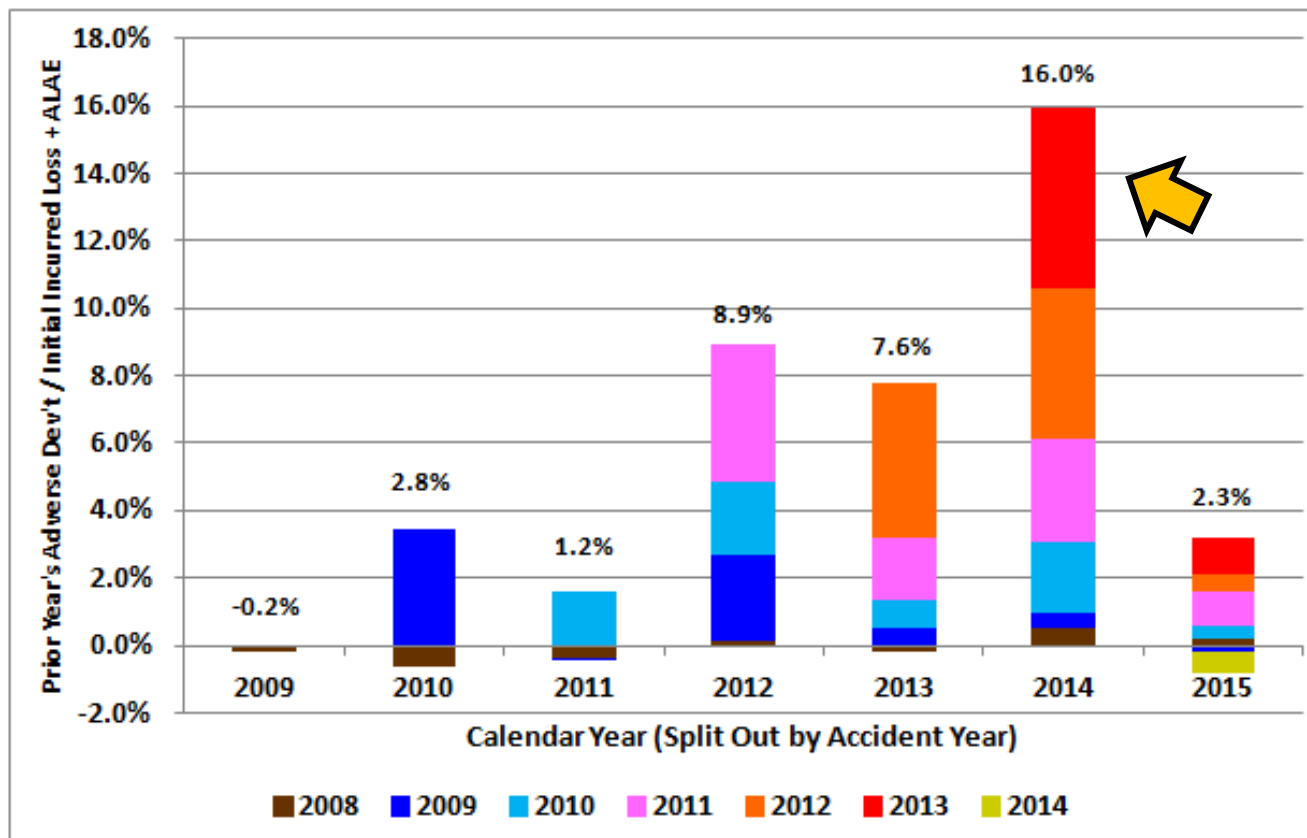




# Commercial Auto – TTT - ERLI Warning through 2015

## Adverse Development from Initial Estimate – Total by Calendar Year

*Illustrative*



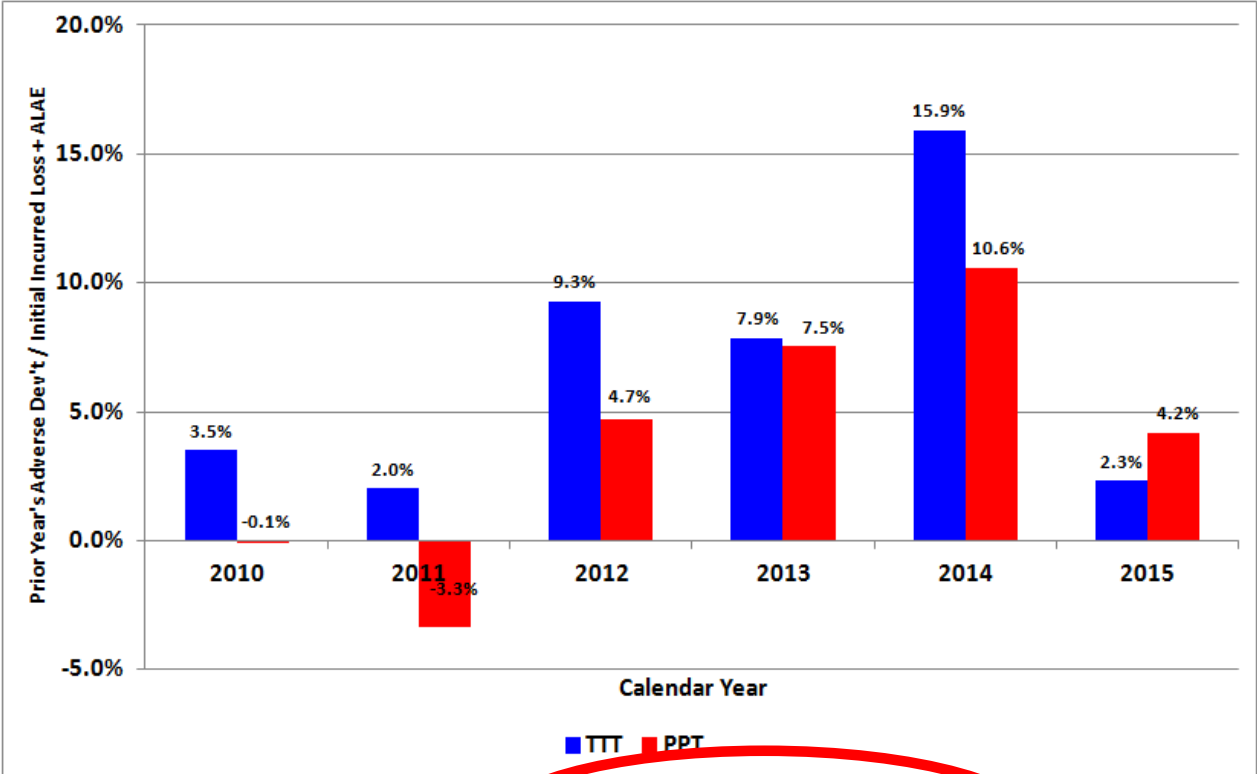
Source: ISO SOLM 2016 v1 - losses developed to ultimate using 5-year VWA (refresh each year); premiums developed to ultimate using Earned Premium triangle  
ISO MarketWatch for Rate changes - Auto Commercial Liability - through 12/31/2015 (adjusted policy year to accident year using 6 mo policy term assumption)  
CY adverse development for AYs 2009-2014: approximately 40% in CY2014 (about 20% each in CY2013 and CY2012)





# Commercial Auto – Comparing TTT to PPT

## Adverse Development from Initial Estimate – Total by Calendar Year *Illustrative*



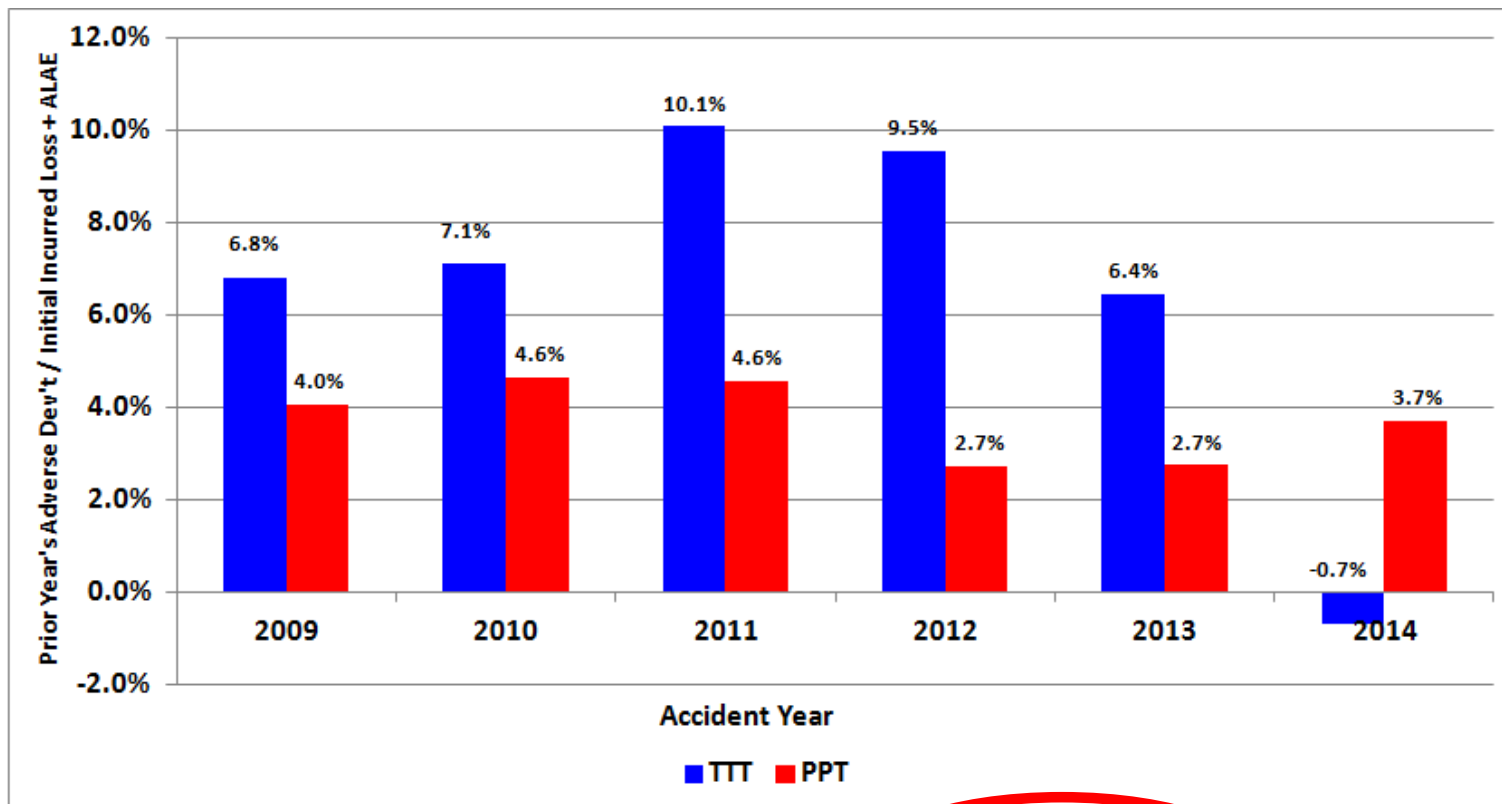
Cumulative % Deterioration	2010	2011	2012	2013	2014	2015
TTT	8.5%	13.5%	36.1%	55.3%	94.3%	100.0%
PPT	-0.4%	-14.5%	5.5%	37.4%	82.2%	100.0%

Source: ISO SOLM 2016 v1 - losses developed to ultimate using 5-year VWA (refresh each year); premiums developed to ultimate using Earned Premium triangle  
ISO MarketWatch for Rate changes - Auto Commercial Liability - through 12/31/2015 (adjusted policy year to accident year using 6 mo policy term assumption)



# Commercial Auto – Comparing TTT to PPT

## Adverse Development from Initial Estimate – Total by Accident Year *Illustrative*

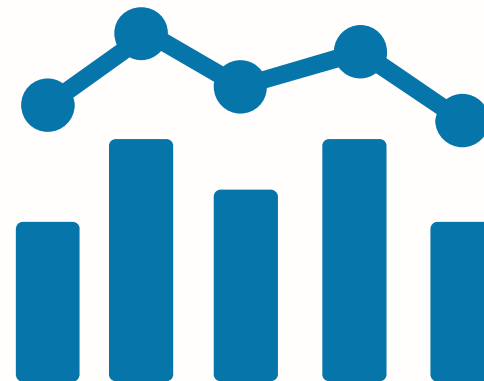


Cumulative % Deterioration	2009	2010	2011	2012	2013	2014
TTT	17.3%	35.4%	61.0%	85.3%	101.7%	100.0%
PPT	18.1%	38.7%	59.1%	71.2%	83.5%	100.0%

Source: ISO SOLM 2016 v1 - losses developed to ultimate using 5-year VWA (refresh each year); premiums developed to ultimate using Earned Premium triangle  
ISO MarketWatch for Rate changes - Auto Commercial Liability - through 12/31/2015 (adjusted policy year to accident year using 6 mo policy term assumption)

# Recap – Through Wave 2

- Industry caught off guard by shift in activity and trends post-2010
  - Delayed recognition and response – average payment duration up to 3.5 years
- Ground up experience
  - Loss costs increased close to 40%
  - Severity increase close to 30%
  - Development 7% – 16% worse than expected in calendar years 2012 to 2014, with continuing adverse in 2015
- Large loss experience
  - Excess Frequency 21% higher
  - Excess Loss ratios 53% higher
- Rates did not increase until 2012
  - Rate changes tapering
  - more impact on larger fleets



# Commercial Auto

The Story Doesn't End  
Forensic Analysis in 2017





# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
All Causes of Loss  
Unlimited xs 0

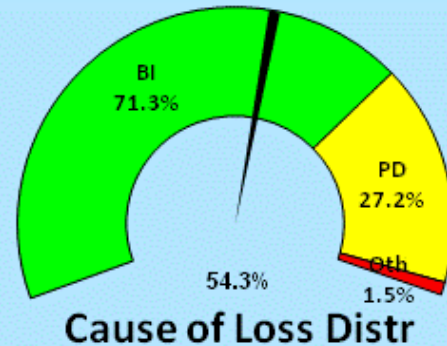
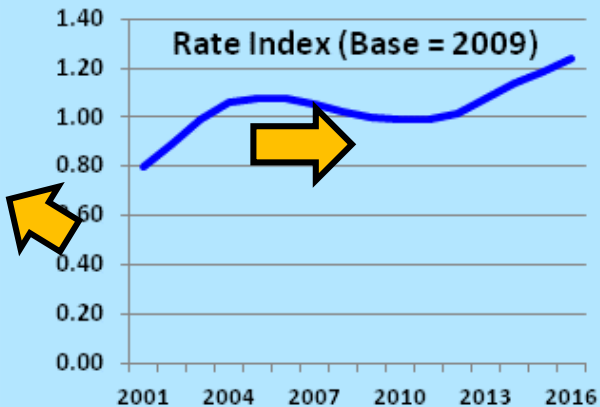
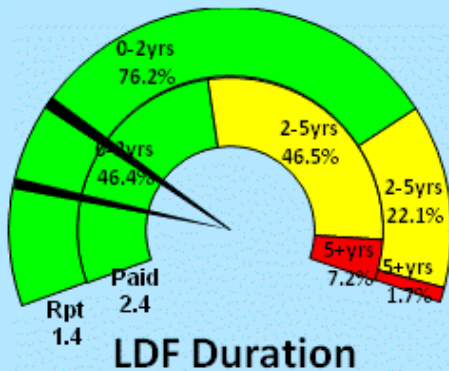
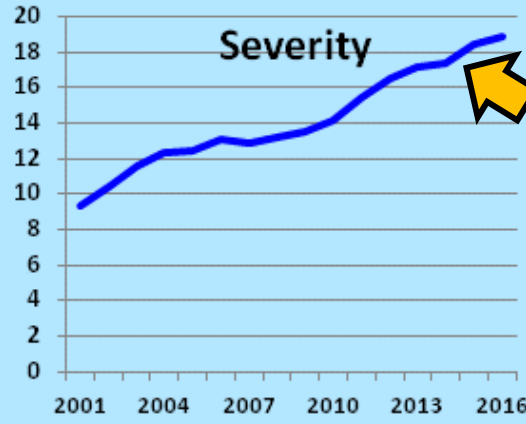
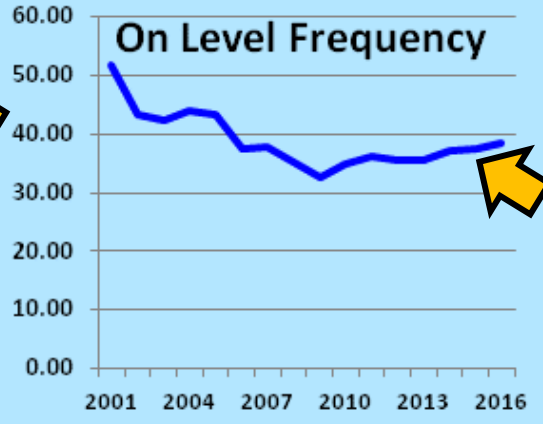
## Loss Ratio Analytics: **View At 2017 - TTT**

SOLM 2017 v0.4.2

### Illustrative

Est All Yr/Curr Yr LR: 54.3% / 73.0%  
7 Year Severity Trend: 4.50%  
All Year Trend: 4.18%  
Avg Rep / Pay Duration: 1.4 / 2.4 Years

Total Premium 12/2016: 66,691,448,966  
Total Incurred Loss & Alae: 50,729,706,680  
Total Occurrences: 4,356,050  
Total Exposure (Power Units): 492,788,066



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016

Source: SOLM 2017v1 pre-release



# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
All Causes of Loss  
Unlimited xs 0

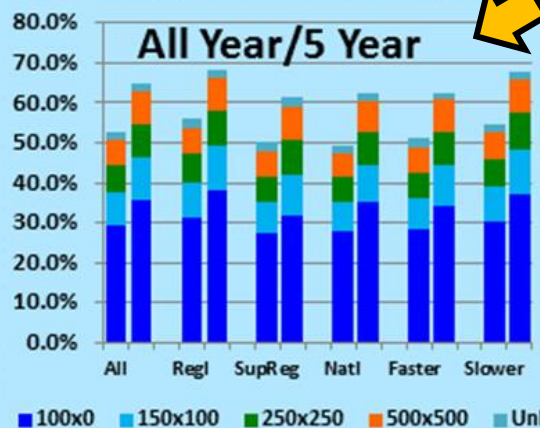
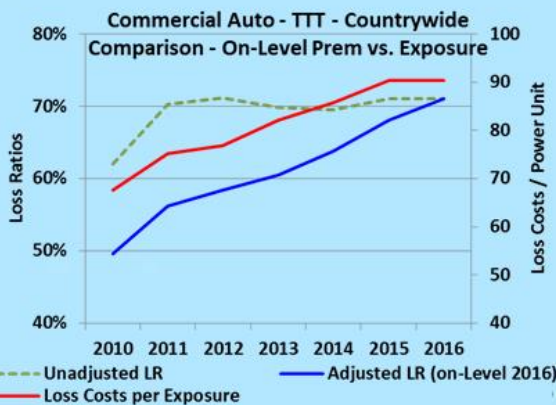
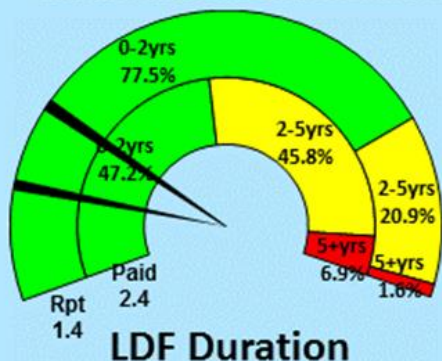
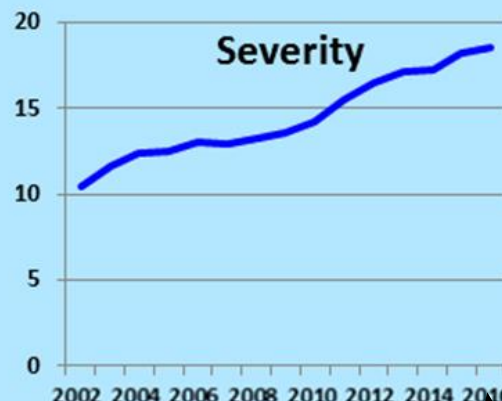
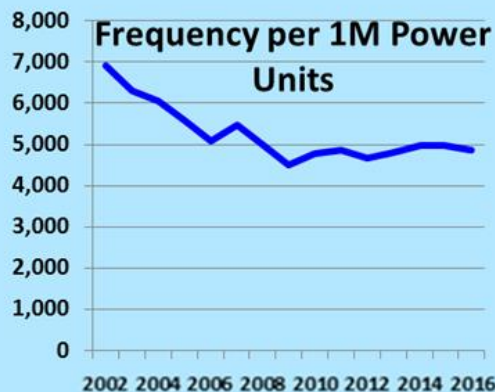
## Illustrative

Est All Yr/Curr Yr LC: 74.9 / 90.4  
7 Year Severity Trend: 4.16%  
All Year Trend: 3.84%  
Avg Rep / Pay Duration: 1.4 / 2.4 Years

## Loss Cost Analytics

SOLM 2017 v1

Total Premium 12/2016: 63,102,706,808  
Total Incurred Loss & Alae: 48,317,495,268  
Total Occurrences: 4,057,089  
Total Exposure (Power Units): 457,996,921



Note: Companies are split using SOLM Bifurcation Method (EV5)  
All triangles use 7-year VWA (3.0% detrended)  
Loss Costs are Total Losses / Power Units, Power Units are in months (multiply LC \* 12 for annual cost)

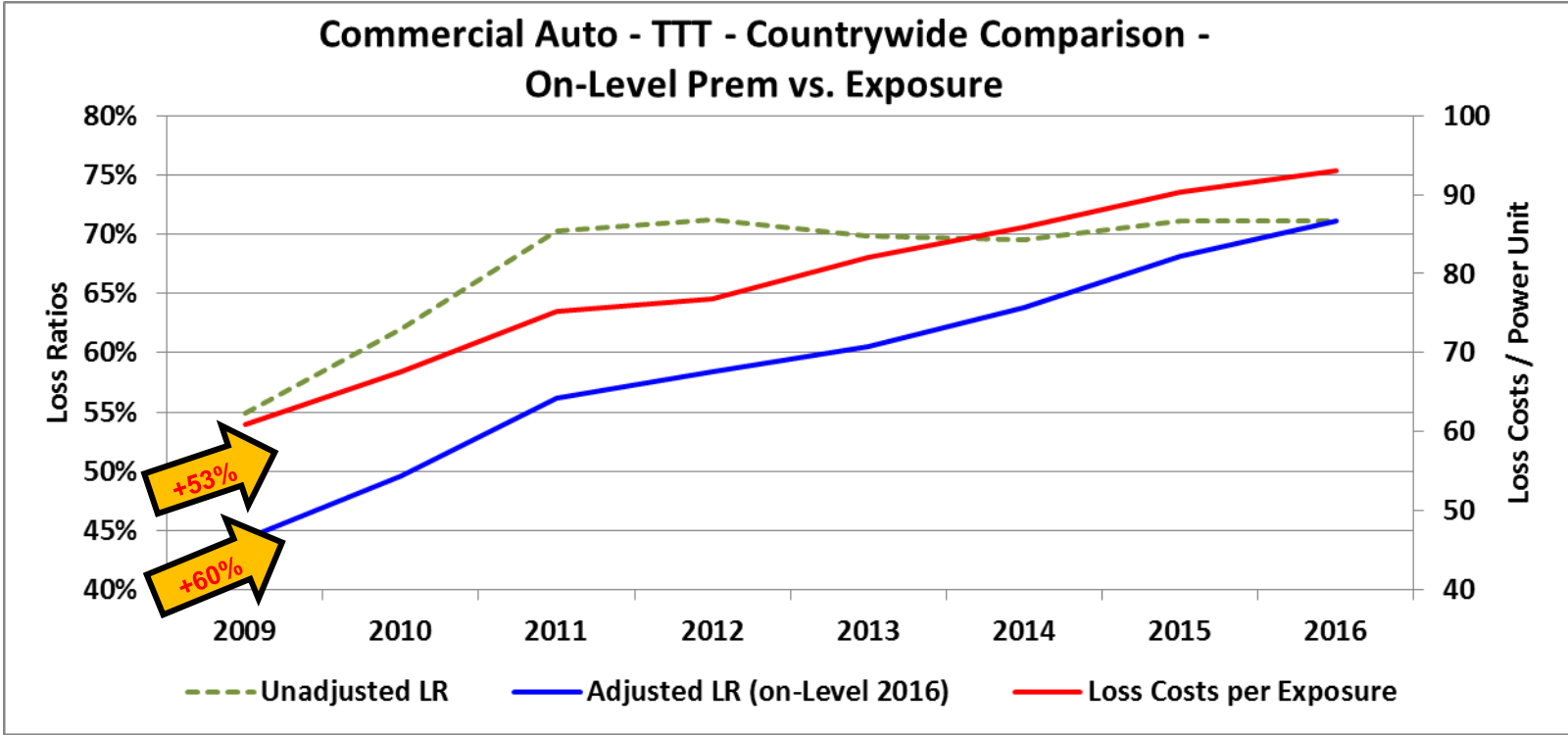
Source: SOLM 2017v1 pre-release



# Commercial Auto Trend – TTT

## Comparison On-Level Loss Ratios and Per Exposure Loss Costs

*Illustrative*



Source: SOLM 2017v1 pre-release; losses developed using 7-yr VWA; uses ISO MarketWatch 12/31/2016 rate changes – CA-TTT Liability; power units in months



# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

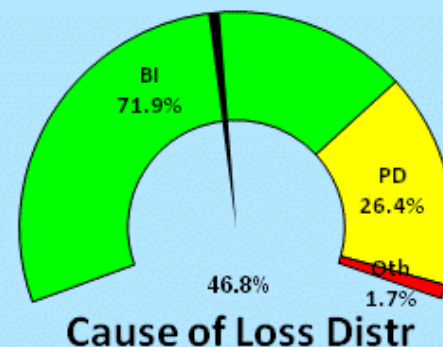
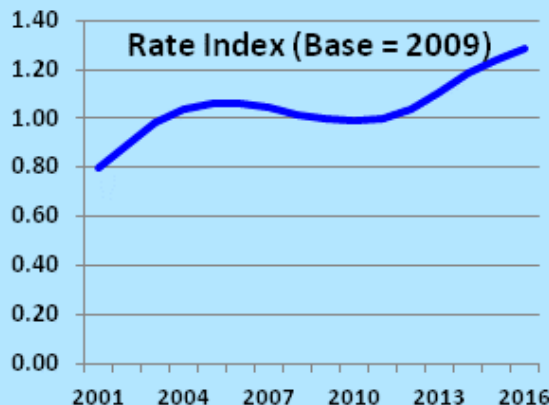
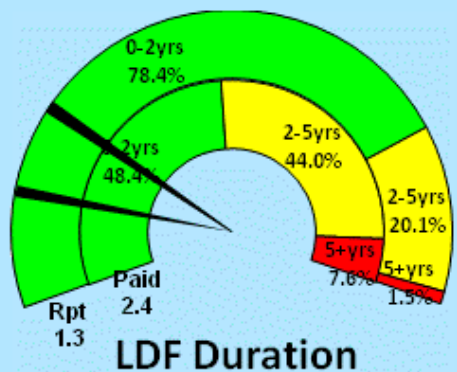
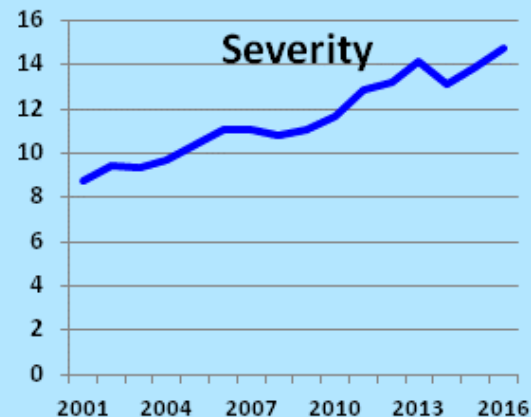
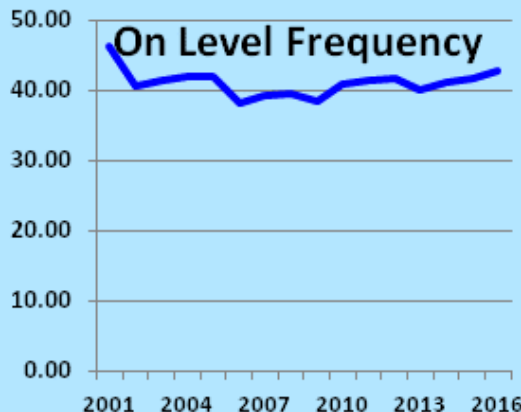
Market Segment: Commercial Auto  
Private Passenger Types - All Companies  
All Causes of Loss  
Unlimited xs 0

## Loss Ratio Analytics: View At 2017 - PPT

SOLM 2017 v0.4.2

Est All Yr/Curr Yr LR: 46.8% / 63.3%  
7 Year Severity Trend: 3.04%  
All Year Trend: 3.34%  
Avg Rep / Pay Duration: 1.3 / 2.4 Years

Total Premium 12/2016: 12,676,100,357  
Total Incurred Loss & Alae: 9,218,392,009  
Total Occurrences: 919,791



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Private Passenger Types - Liability - 12/31/2016

Source: SOLM 2017v1 pre-release using on-level premium as base





# ISO Size-of-Loss Matrix

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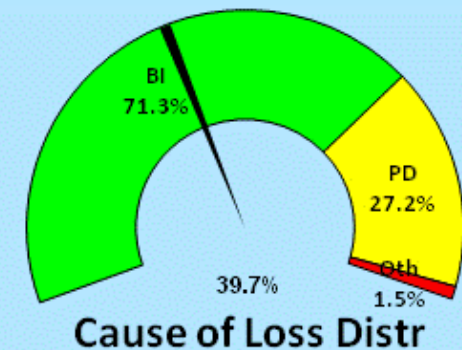
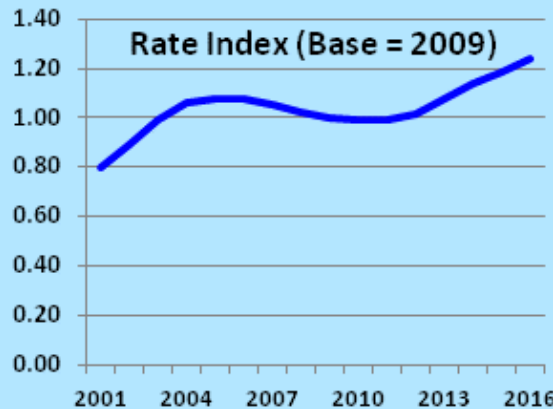
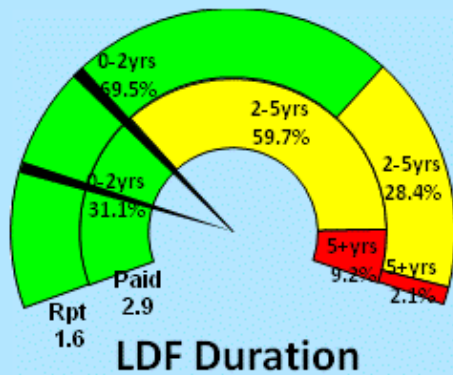
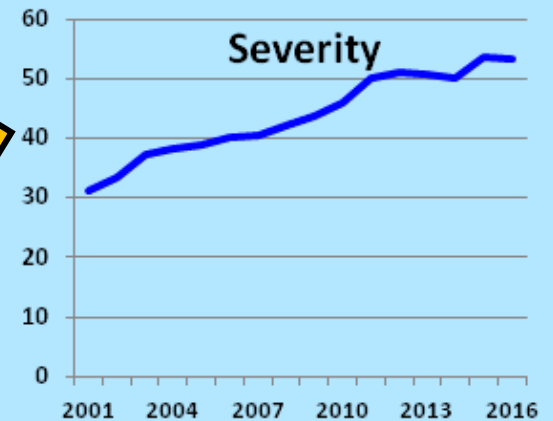
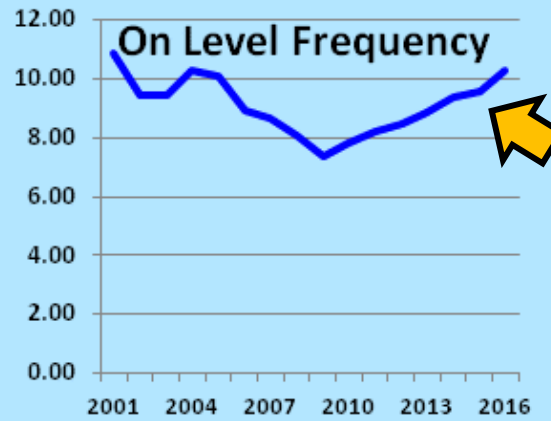
Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
Bodily Injury  
Unlimited xs 0

## Loss Ratio Analytics: View At 2017 - **TTT BI**

SOLM 2017 v0.4.2

**Illustrative**  
Est All Yr/Curr Yr LR: 39.7% / 55.1%  
7 Year Severity Trend: 1.99%  
All Year Trend: 3.46%  
Avg Rep / Pay Duration: 1.6 / 2.9 Years

Total Premium 12/2016: 66,691,448,966  
Total Incurred Loss & Alae: 36,154,325,106  
Total Occurrences: 996,078



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016

Source: SOLM 2017v1 pre-release using on-level premium as base



# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
Property Damage  
Unlimited xs 0

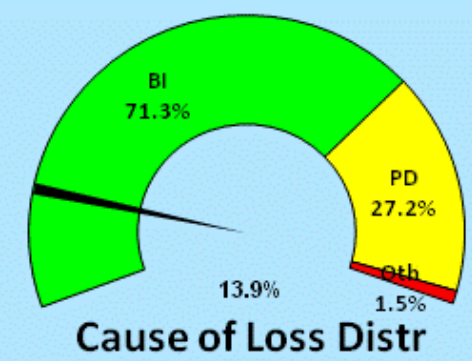
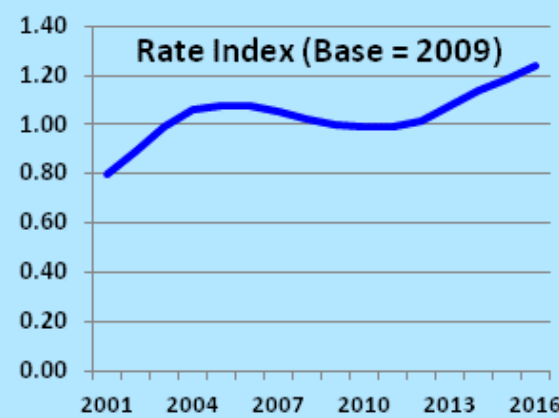
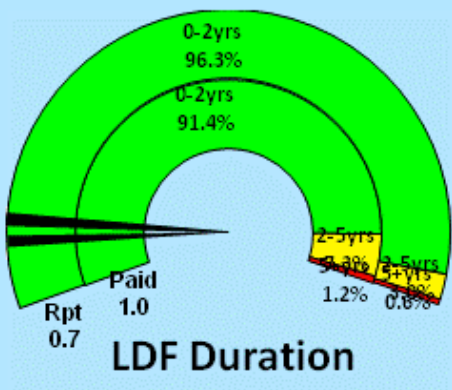
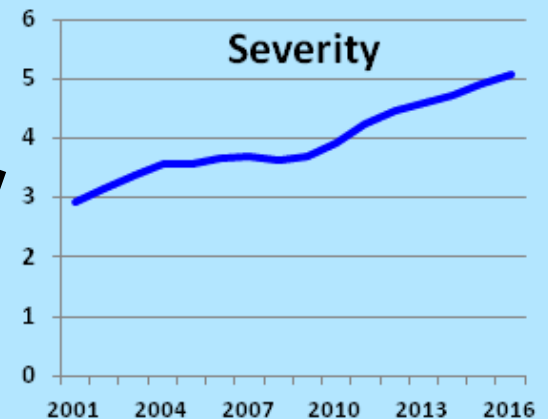
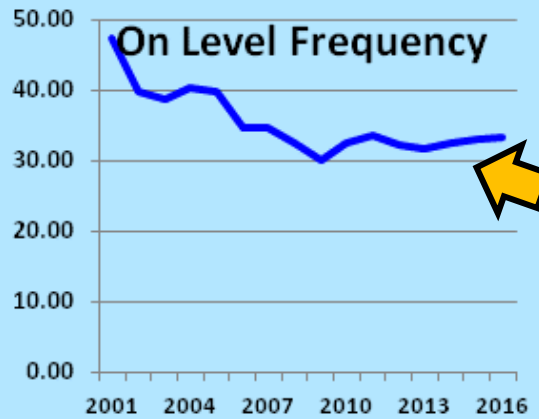
## Loss Ratio Analytics: View At 2017 **TTT PD**

Illustrative

SOLM 2017 v0.4.2

Est All Yr/Curr Yr LR: 13.9% / 17.0%  
7 Year Severity Trend: 4.05%  
All Year Trend: 3.31%  
Avg Rep / Pay Duration: 0.7 / 1.0 Years

Total Premium 12/2016: 66,691,448,966  
Total Incurred Loss & Alae: 13,796,309,612  
Total Occurrences: 3,973,848



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016

Source: SOLM 2017v1 pre-release using on-level premium as base



# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
All Causes of Loss  
**4,900,000 xs 100,000**

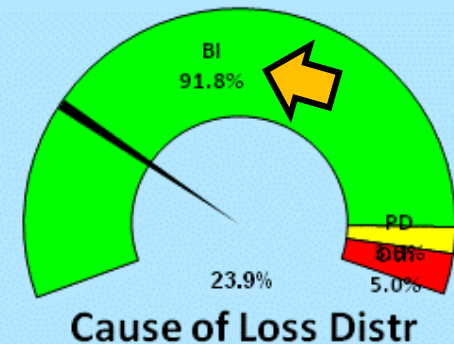
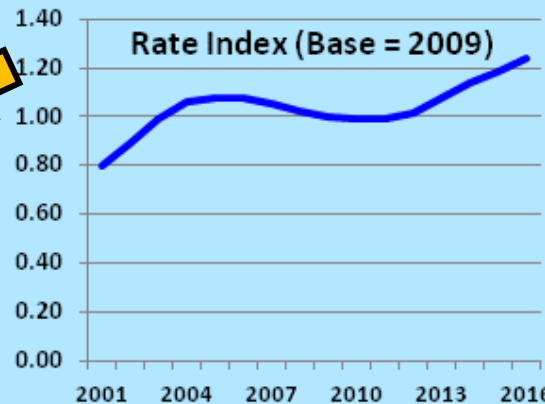
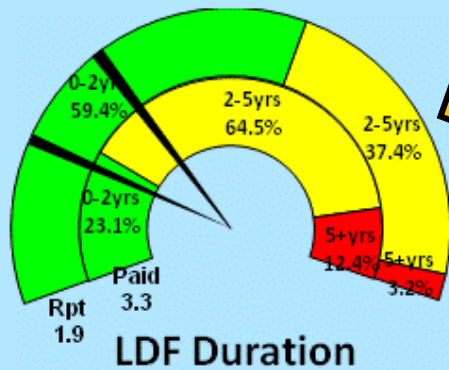
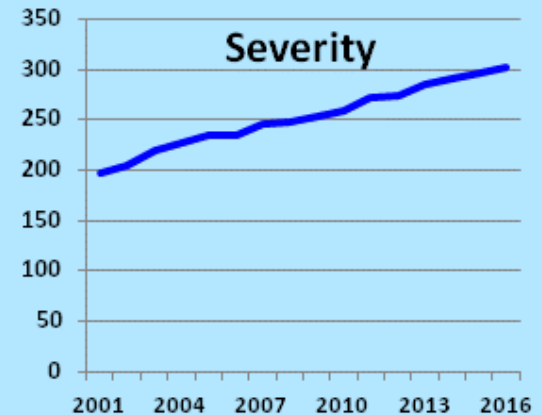
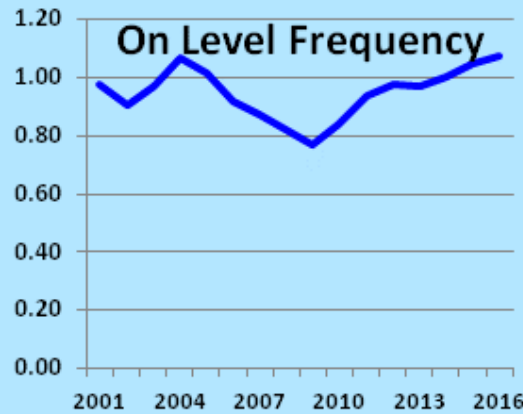
## Loss Ratio Analytics: View At 2017 - TTT **Excess**

*Illustrative*

SOLM 2017 v0.4.2

Est All Yr/Curr Yr LR: 23.9% / 32.4%  
7 Year Severity Trend: 2.49%  
All Year Trend: 2.68%  
Avg Rep / Pay Duration: 1.9 / 3.3 Years

Total Premium 12/2016: 66,691,448,966  
Total Incurred Loss & Alae: 21,043,839,881  
Total Occurrences: 92,828



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016

Source: SOLM 2017v1 pre-release using on-level premium as base



# ISO Size-of-Loss Matrix

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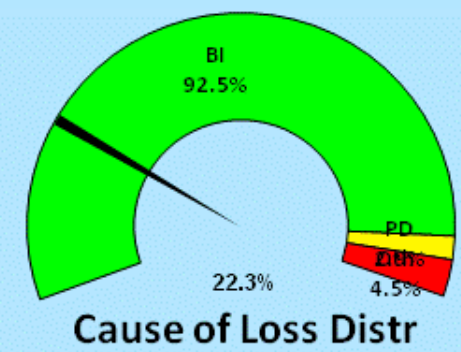
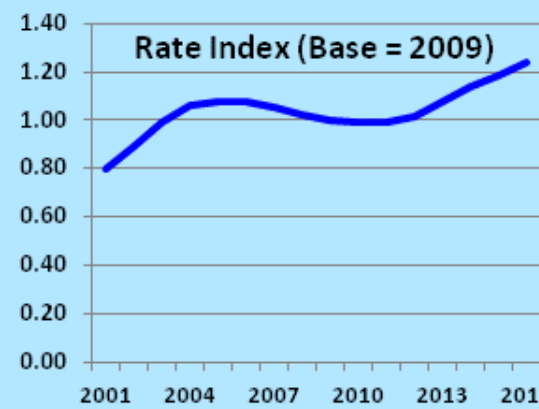
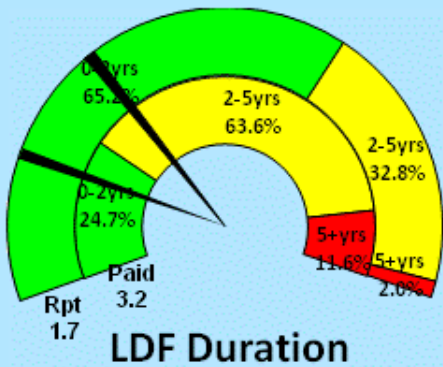
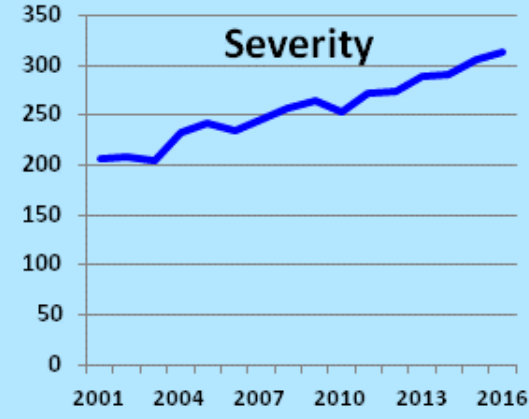
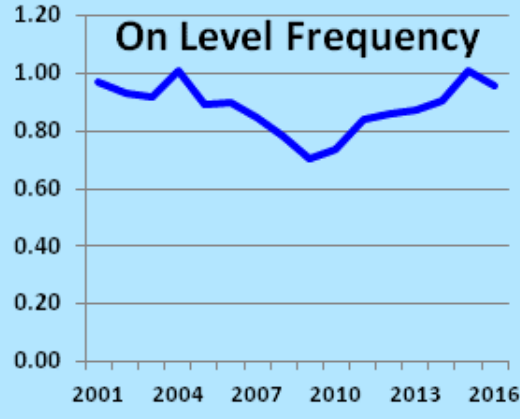
Market Segment: Commercial Auto  
Trucks Tractors and Trailers - National Companies  
All Causes of Loss  
4,900,000 xs 100,000

## Loss Ratio Analytics: View At 2017 - TTT Excess Illustrative

SOLM 2017 v0.4.2

Est All Yr/Curr Yr LR: 22.3% / 30.1%  
7 Year Severity Trend: 3.33%  
All Year Trend: 2.77%  
Avg Rep / Pay Duration: 1.7 / 3.2 Years

Total Premium 12/2016: 17,268,367,901  
Total Incurred Loss & Alae: 5,072,845,609  
Total Occurrences: 22,061



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016

Source: SOLM 2017 v1 using top 40 National Companies (market cap > \$1B); regional is <250M market cap)



# ISO Size-of-Loss Matrix

© Insurance Services Office, Inc., 2017

Market Segment: Commercial Auto  
Trucks Tractors and Trailers - **Slower Companies**  
All Causes of Loss  
900,000 xs 100,000

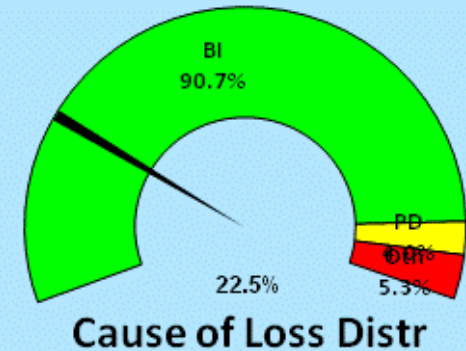
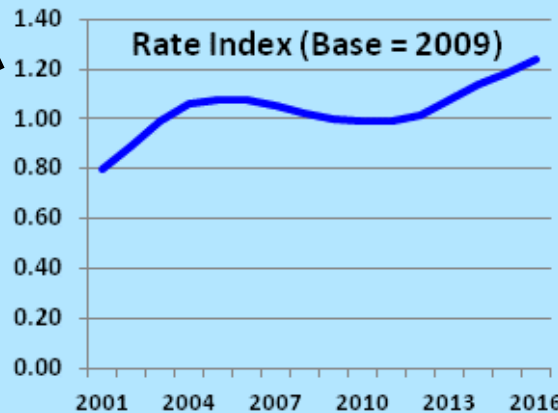
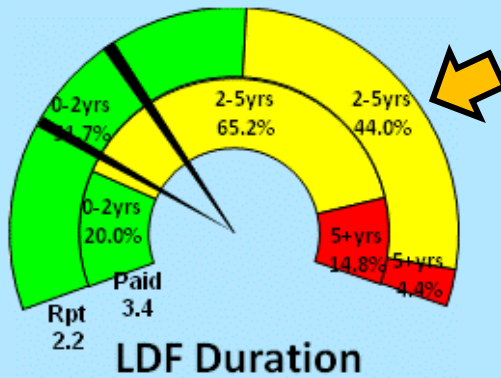
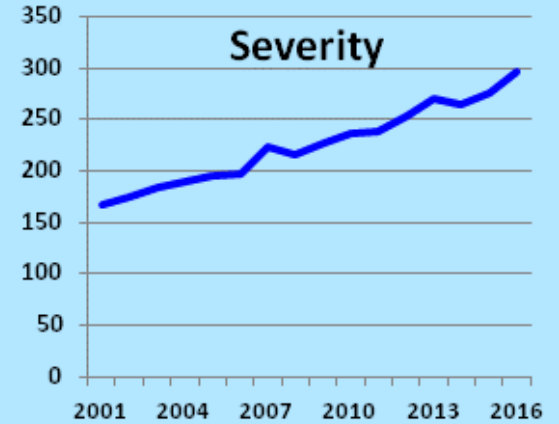
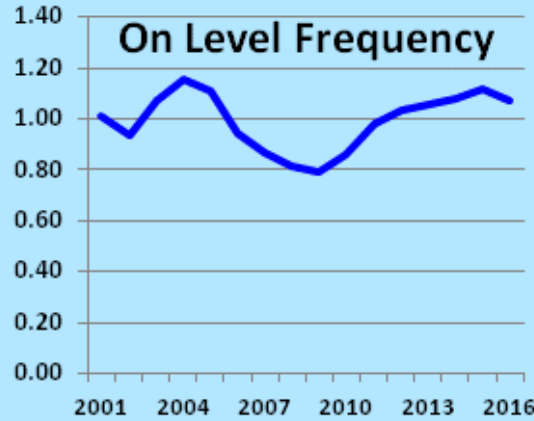
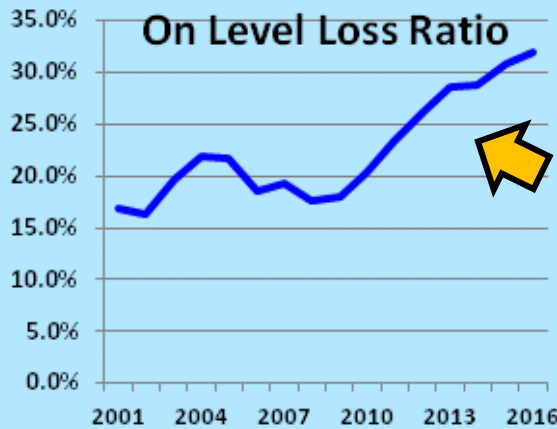
## Loss Ratio Analytics: View At 2017 - TTT Excess

*Illustrative*

SOLM 2017 v0.4.2

Est All Yr/Curr Yr LR: 22.5% / 32.0%  
7 Year Severity Trend: 3.58%  
All Year Trend: 3.63%  
Avg Rep / Pay Duration: 2.2 / 3.4 Years

Total Premium 12/2016: 32,406,488,048  
Total Incurred Loss & Alae: 9,332,457,513  
Total Occurrences: 47,391



Note: Loss development factors and durations use 5-year VWA and 3% detrending.  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016

Source: SOLM 2017 v1 using 108 slowest reporting companies for Commercial Auto (SOLM bifurcation analysis)



# Commercial Auto – Continuing Lengthening Loss Development Compare 2010 through 2016: Ex-ante 6 years – Ground-up

Illustrative

## Incurred Indemnity &amp; Alae Triangle

	12	24	36	48	60	72	84
AY 1997	295,029,612	508,830,129	630,484,926	704,967,496	762,073,360	785,567,742	793,985,106
AY 1998	304,884,069	514,995,905	661,963,156	772,997,530	818,464,183	833,607,568	837,724,730
AY 1999	310,361,394	528,988,549	722,550,041	836,782,478	878,043,598	899,682,427	907,243,356
AY 2000	309,595,461	573,249,318	770,677,775	883,332,921	930,757,768	941,401,127	942,928,619
AY 2001	313,406,412	556,302,392	737,036,130	866,011,465	895,217,180	901,250,845	904,923,206
AY 2002	316,903,152	562,819,266	724,820,541	803,823,013	828,500,990	844,824,951	849,102,874
AY 2003	335,649,333	594,527,215	751,992,680	845,459,401	880,483,607	896,377,124	898,132,931
AY 2004	380,737,844	658,697,607	822,709,452	908,519,586	949,876,612	965,732,217	966,901,666
AY 2005	386,235,607	667,311,016	835,754,791	931,001,879	964,350,713	982,481,640	988,795,181
AY 2006	386,902,969	667,472,043	846,358,160	935,375,941	981,168,247	995,838,362	995,912,211
AY 2007	399,974,601	683,914,621	859,417,694	950,244,458	986,140,708	1,005,862,550	1,010,419,225
AY 2008	368,322,990	624,429,542	779,338,479	870,176,891	905,822,631	918,615,244	926,440,499
AY 2009	283,596,930	538,404,749	679,033,258	782,267,848	822,831,207	841,130,117	842,214,879
AY 2010	321,452,347	579,946,996	759,134,293	856,677,844	917,366,801	933,034,586	943,744,646
AY 2011	361,937,353	673,748,236	865,886,526	994,675,522	1,059,713,691	1,079,412,963	
AY 2012	358,843,754	691,761,828	918,125,467	1,045,934,601	1,122,082,007		
AY 2013	387,107,663	740,511,437	968,060,259	1,147,226,998			
AY 2014	427,529,928	761,772,187	1,059,650,553				
AY 2015	449,207,548	883,773,560					
AY 2016	497,951,897						
ts-2014,2015,2016:	15,883,219,011	17,107,550,660	18,627,016,604				

	12	24	36	48	60	72	84
AY 1997	24/12	36/24	48/36	60/48	72/60	84/72	96/84
AY 1998	1.725	1.239	1.118	1.081	1.031	1.011	1.001
AY 1999	1.689	1.285	1.168	1.059	1.019	1.005	1.001
AY 1999	1.704	1.366	1.158	1.049	1.025	1.008	1.003
AY 2000	1.852	1.344	1.146	1.054	1.011	1.002	1.003
AY 2001	1.775	1.325	1.175	1.034	1.007	1.004	1.001
AY 2002	1.776	1.288	1.109	1.031	1.020	1.005	1.001
AY 2003	1.771	1.265	1.124	1.041	1.018	1.002	0.999
AY 2004	1.730	1.249	1.104	1.046	1.017	1.001	1.003
AY 2005	1.728	1.252	1.114	1.036	1.019	1.006	1.002
AY 2006	1.725	1.268	1.105	1.049	1.015	1.000	1.001
AY 2007	1.710	1.257	1.106	1.038	1.020	1.005	0.999
AY 2008	1.695	1.248	1.117	1.041	1.014	1.009	1.003
AY 2009	1.898	1.261	1.152	1.052	1.022	1.001	1.007
AY 2010	1.804	1.309	1.128	1.071	1.017	1.011	
AY 2011	1.862	1.285	1.149	1.065	1.019		
AY 2012	1.928	1.327	1.139	1.073			
AY 2013	1.913	1.307	1.185				
AY 2014	1.782	1.391					
AY 2015	1.967						





# ISO Size-of-Loss Matrix

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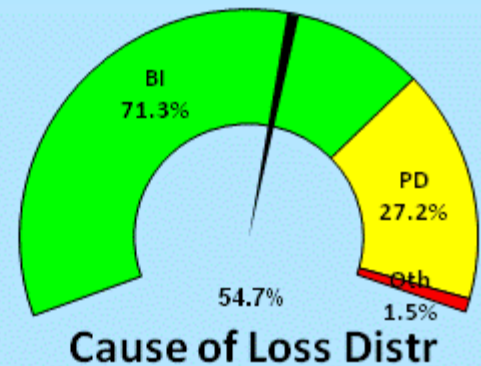
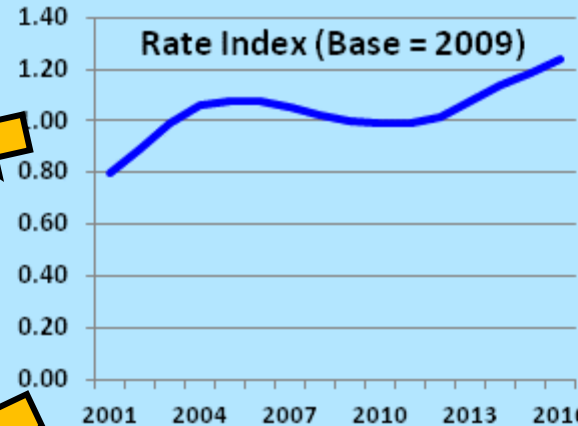
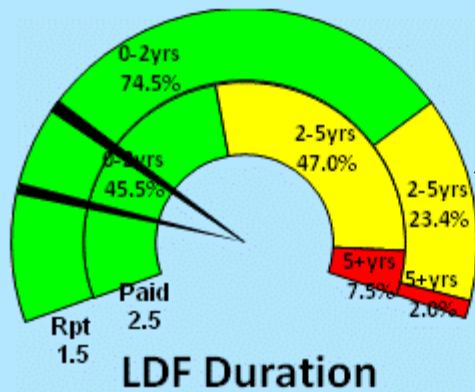
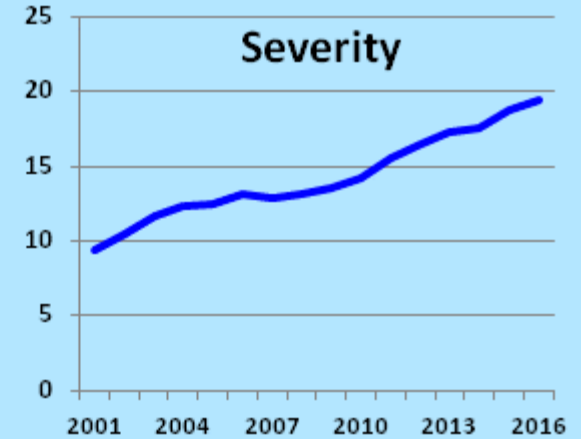
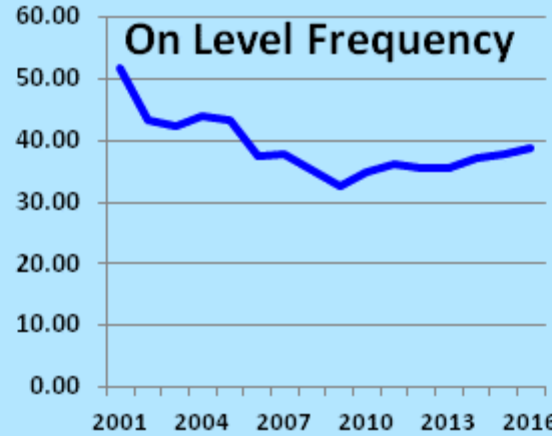
Market Segment: Commercial Auto  
Trucks Tractors and Trailers - All Companies  
All Causes of Loss  
Unlimited xs 0

Est All Yr/Curr Yr LR: 54.7% / 75.2%  
7 Year Severity Trend: 4.91%  
All Year Trend: 4.29%  
Avg Rep / Pay Duration: 1.5 / 2.5 Years

## Loss Ratio Analytics

SOLM 2017 v0.4.2

Total Premium 12/2016: 66,691,448,966  
Total Incurred Loss & Alae: 50,729,706,680  
Total Occurrences: 4,356,050  
Total Exposure (Power Units): 457,996,921

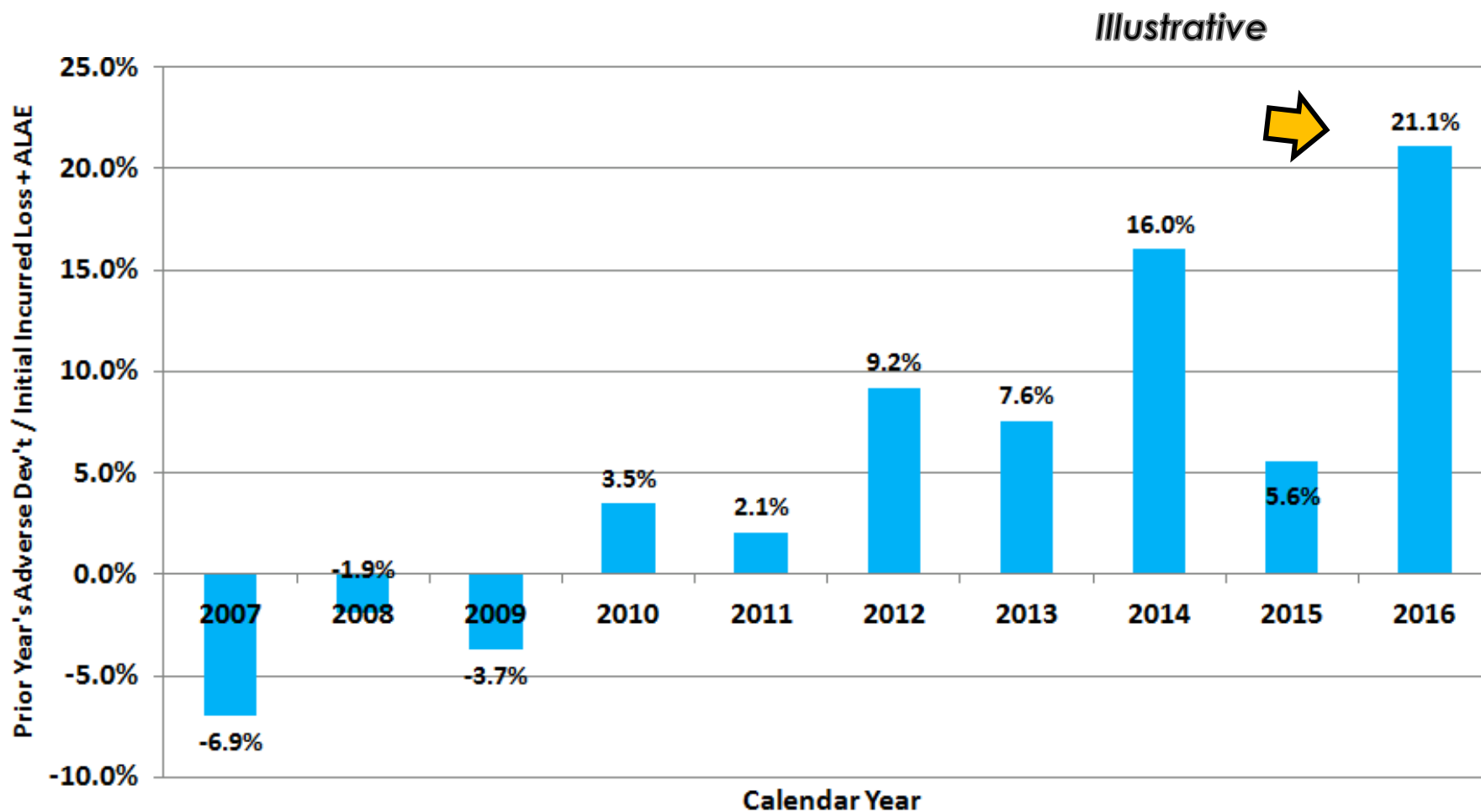


Note: Loss development factors and durations use 3-year VWA and 3% detrending  
Rate changes from MarketWatch - Trucks Tractors and Trailers - Liability - 12/31/2016



# Commercial Auto – TTT - ERLI Warning through 2016

## Adverse Development from Initial Estimate – Total by Calendar Year



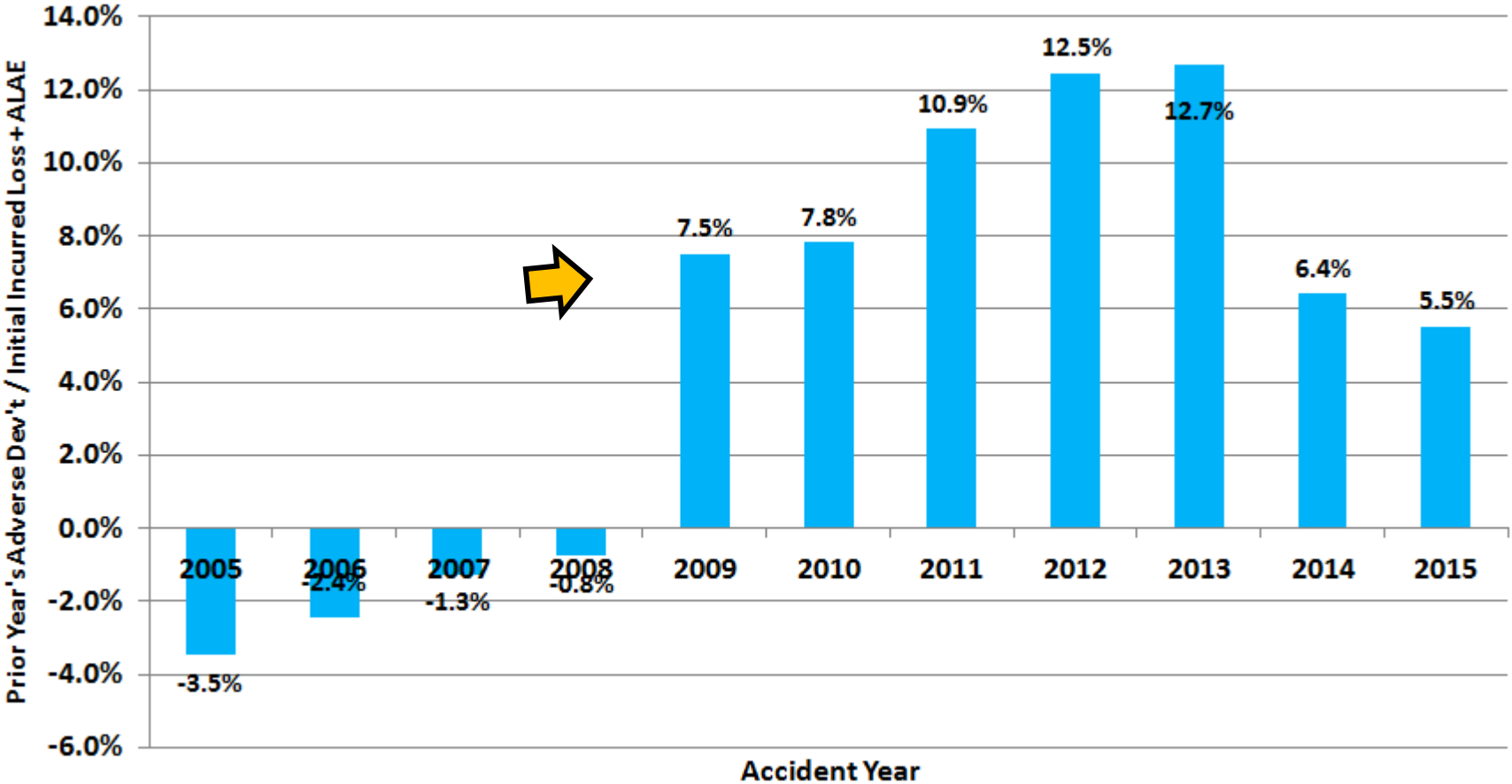




# Commercial Auto – TTT - ERLI Warning through 2016

## Adverse Development from Initial Estimate – Total by Accident Year

*Illustrative*

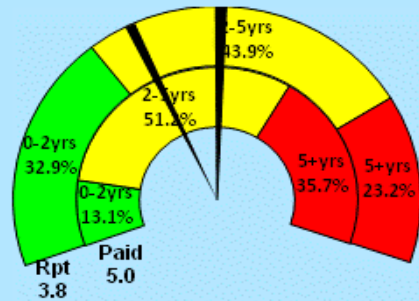




# Commercial Auto Trend Components – Umbrella

## ISO Size-of-Loss Matrix

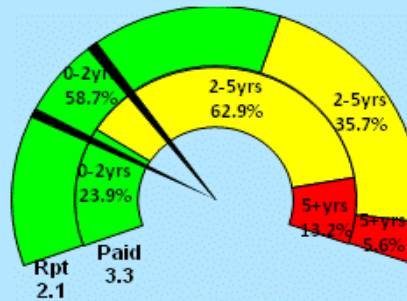
Market Segment: Umbrella  
Total Umbrella - All Companies  
All Causes of Loss  
Unlimited xs 0



UXS- Total Duration

## Illustrative

Est All Yr/Curr Yr LR: 42.3% / 49.4%  
7 Year Severity Trend: -1.25%  
All Year Trend: 5.51%  
Avg Rep / Pay Duration: 3.8 / 5.0 Years

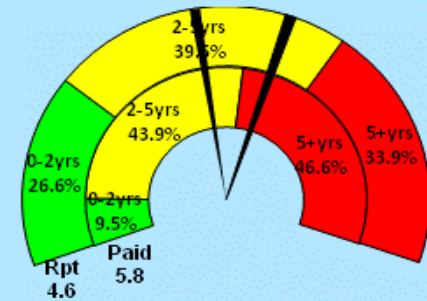


UXS- Auto Duration

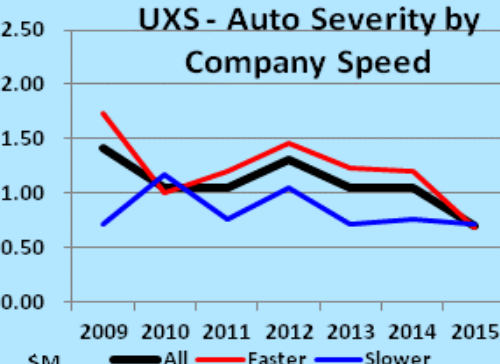
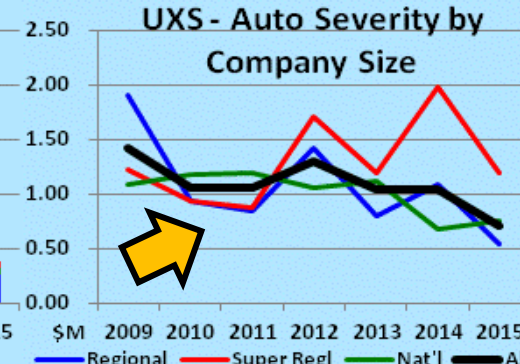
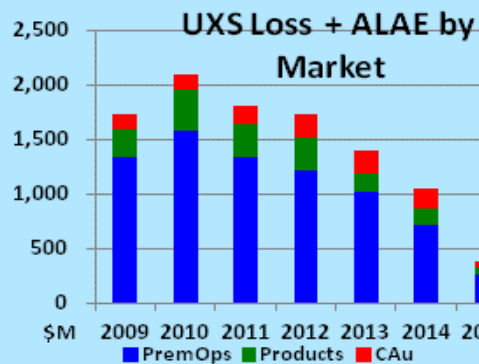
## UXS-Auto Analysis

SOLM 2016 v4.0

Total Premium 12/2015: 75,100,000,000  
Total Incurred Loss & Alae: 40,603,223,307  
Total Occurrences: 99,162



UXS- Prod Duration



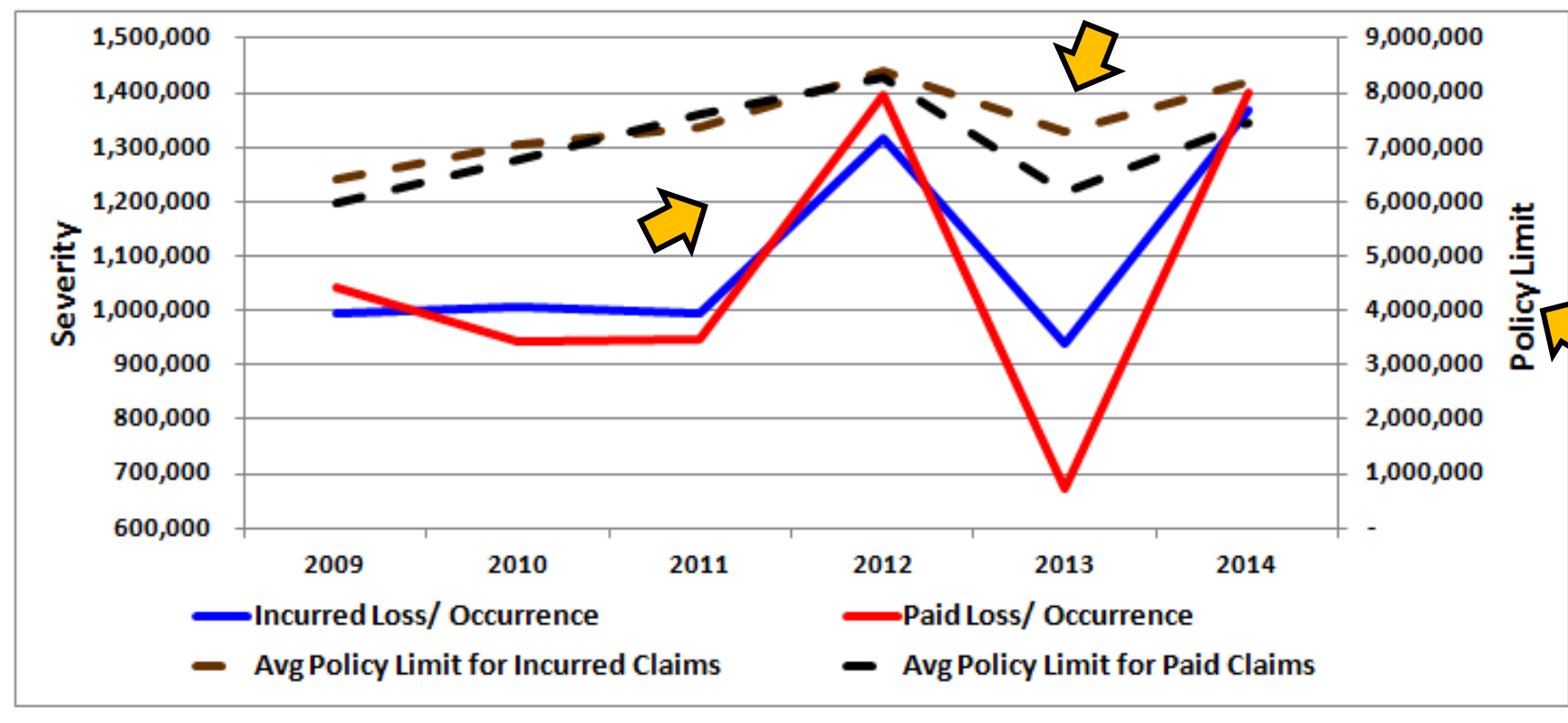
Note: UXS - Auto Duration tail factor for 96:Ult estimated at 1.025 based on Unl x 1M from standard CAU. Companies split into Regional (402 Companies), Super Regional (50 Companies) and National (26 Companies). Companies split into Faster (423 Companies) and Slower (55 Companies).

Source: SOLM 2015 v4; data as of 12/31/2015.



# Umbrella and Excess: Commercial Auto Component Average Severities and Policy Limits

Illustrative



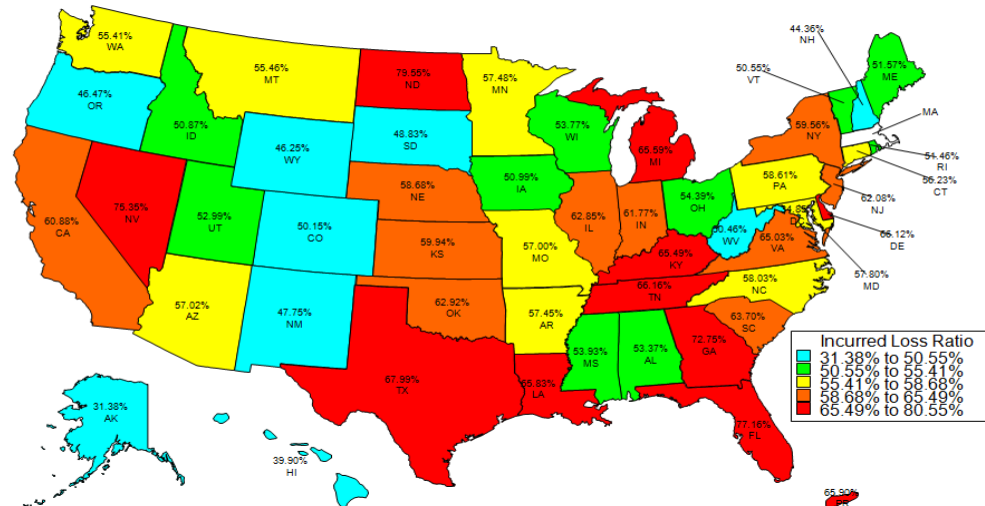
Source: ISO SOLM-UXS



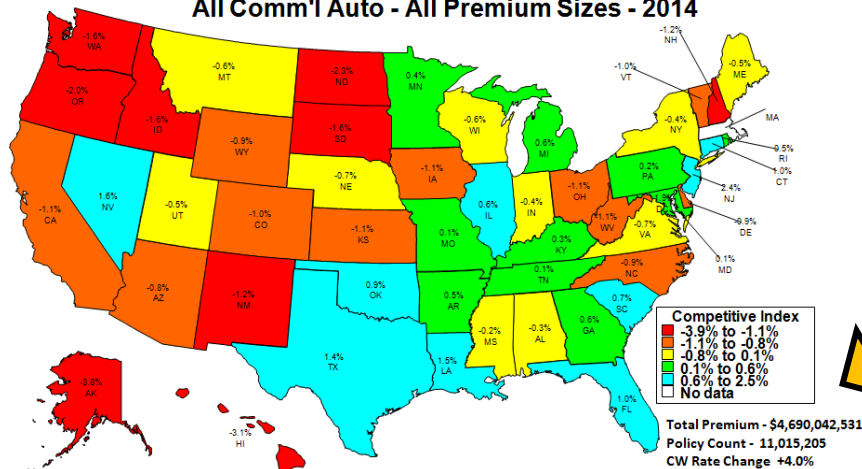
# Comparison: 2009-2013 Loss Ratios to 2014 and 2015 Rate Changes

Illustrative

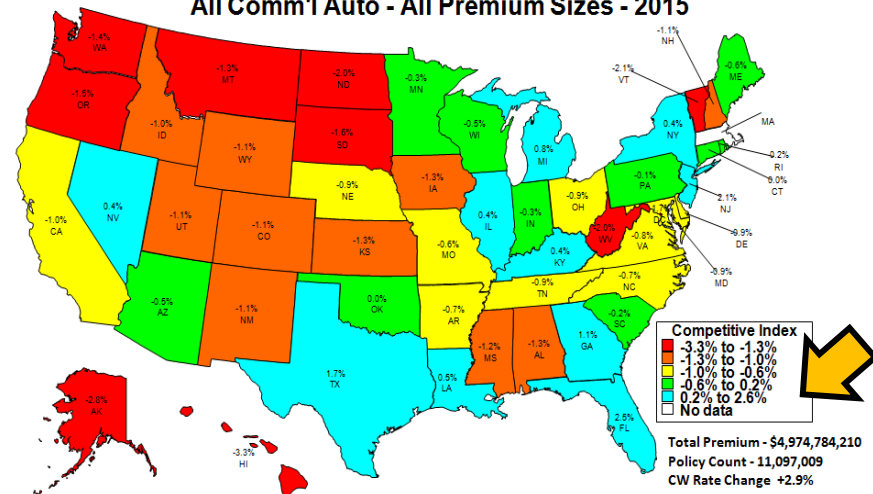
## Commercial Auto Liability - Incurred Loss Ratios



## NextGen MarketWatch - Competitive Ranking All Comm'l Auto - All Premium Sizes - 2014



## ISO MarketWatch - Competitive Ranking All Comm'l Auto - All Premium Sizes - 2015



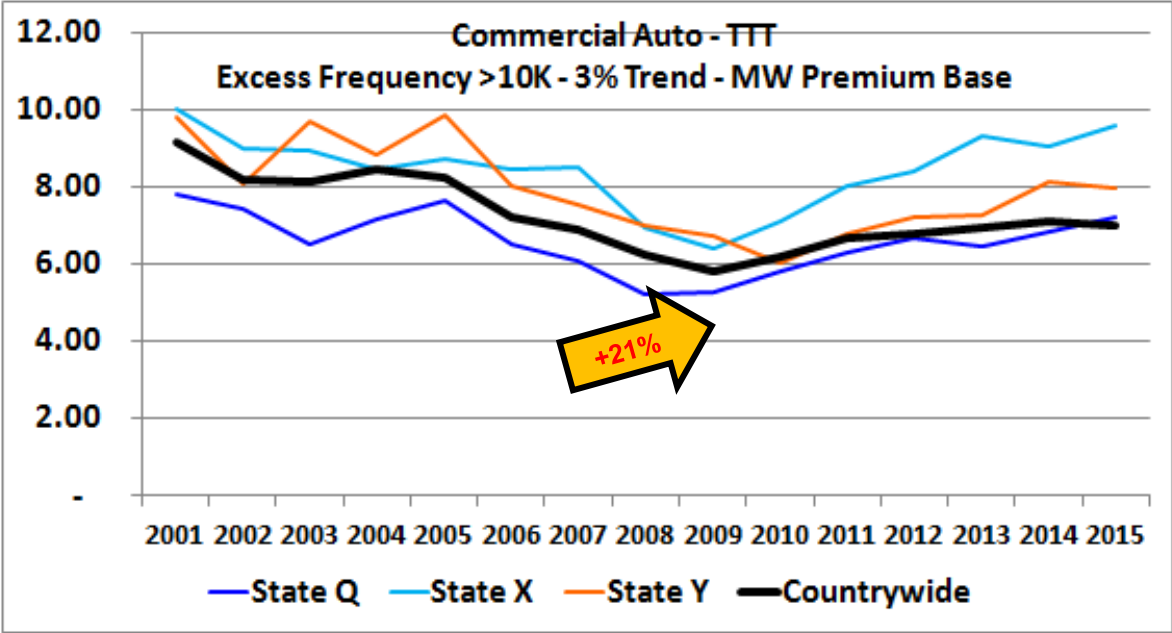


# Commercial Auto – TTT – State Differences

Excess Frequency >10k @ 12/2015

*Illustrative*

Using On-Level Premium and Assuming 3% Severity Trend



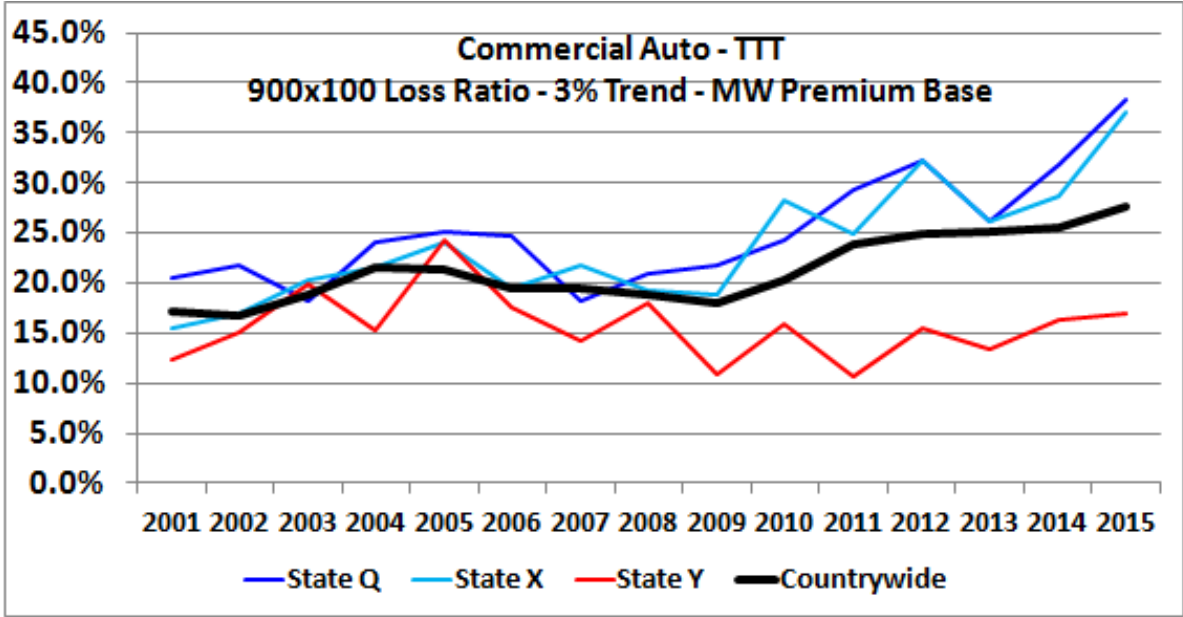
Excess Frequency >10K - 3% Trend - MW Premium Base				
	Countrywide	State Q	State X	State Y
2009	5.78	5.25	6.38	6.74
2010	6.20	5.80	7.10	6.03
2011	6.67	6.29	7.99	6.79
2012	6.77	6.68	8.42	7.22
2013	6.92	6.45	9.30	7.24
2014	7.09	6.83	9.05	8.11
2015	7.01	7.22	9.55	7.98
7 Year Trend	3.15%	4.67%	6.60%	4.17%
Total Occurrences	723,394	48,635	25,544	11,015
Excess vs GU trend	1.25%	1.19%	3.17%	0.06%



# Commercial Auto – TTT – State Differences

*Illustrative*

Excess Partial Loss Ratios 900x100k @12/2015  
Using On-Level Premium and Assuming 3% Severity Trend

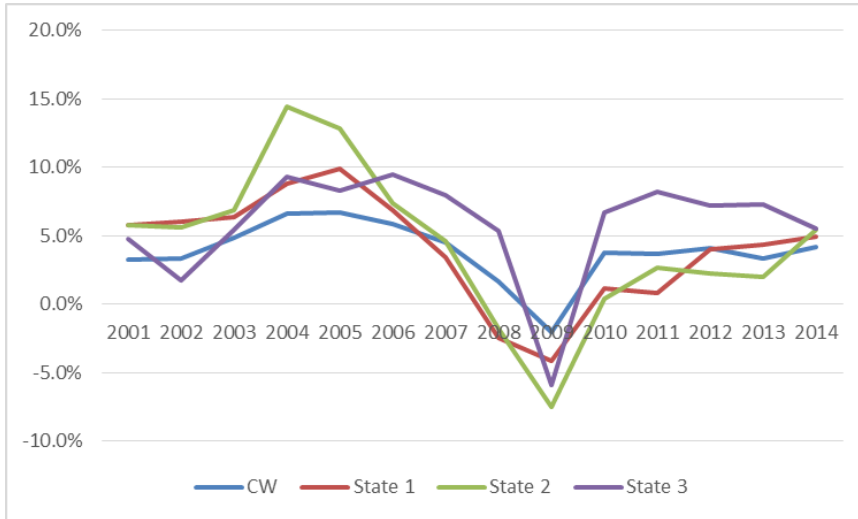


900x100 Loss Ratio - 3% Trend - MW Premium Base

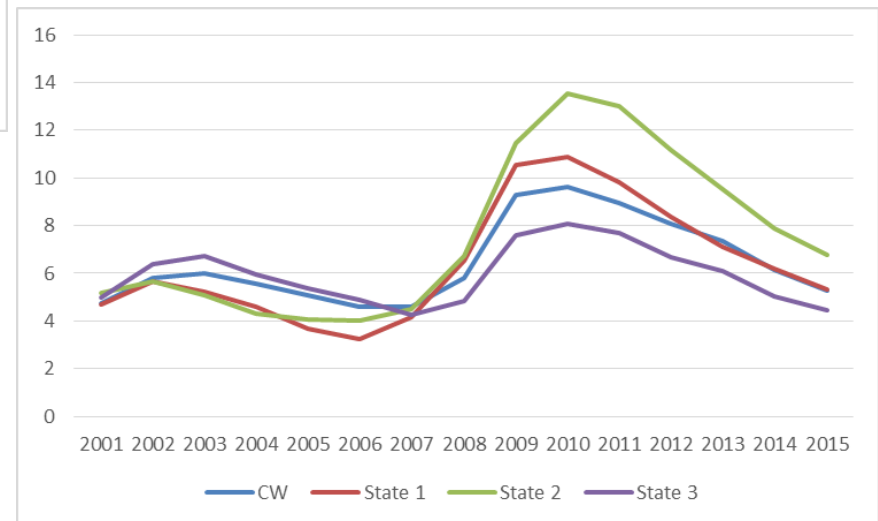
	Countrywide	State Q	State X	State Y
2009	18.0%	21.8%	18.9%	10.9%
2010	20.4%	24.3%	28.3%	16.0%
2011	23.8%	29.3%	24.9%	10.6%
2012	25.0%	32.2%	32.2%	15.4%
2013	25.1%	26.2%	26.1%	13.3%
2014	25.5%	31.9%	28.6%	16.4%
2015	27.6%	38.3%	37.1%	16.9%
7 Year Trend	6.36%	7.58%	7.47%	5.69%
Total Indemnity	17,036,053,171	1,513,152,397	570,861,128	187,616,942
Excess vs GU trend	0.52%	0.52%	-0.55%	-0.07%

# Individual state activity can vary, resulting in varied commercial auto responses

Change in Real GDP



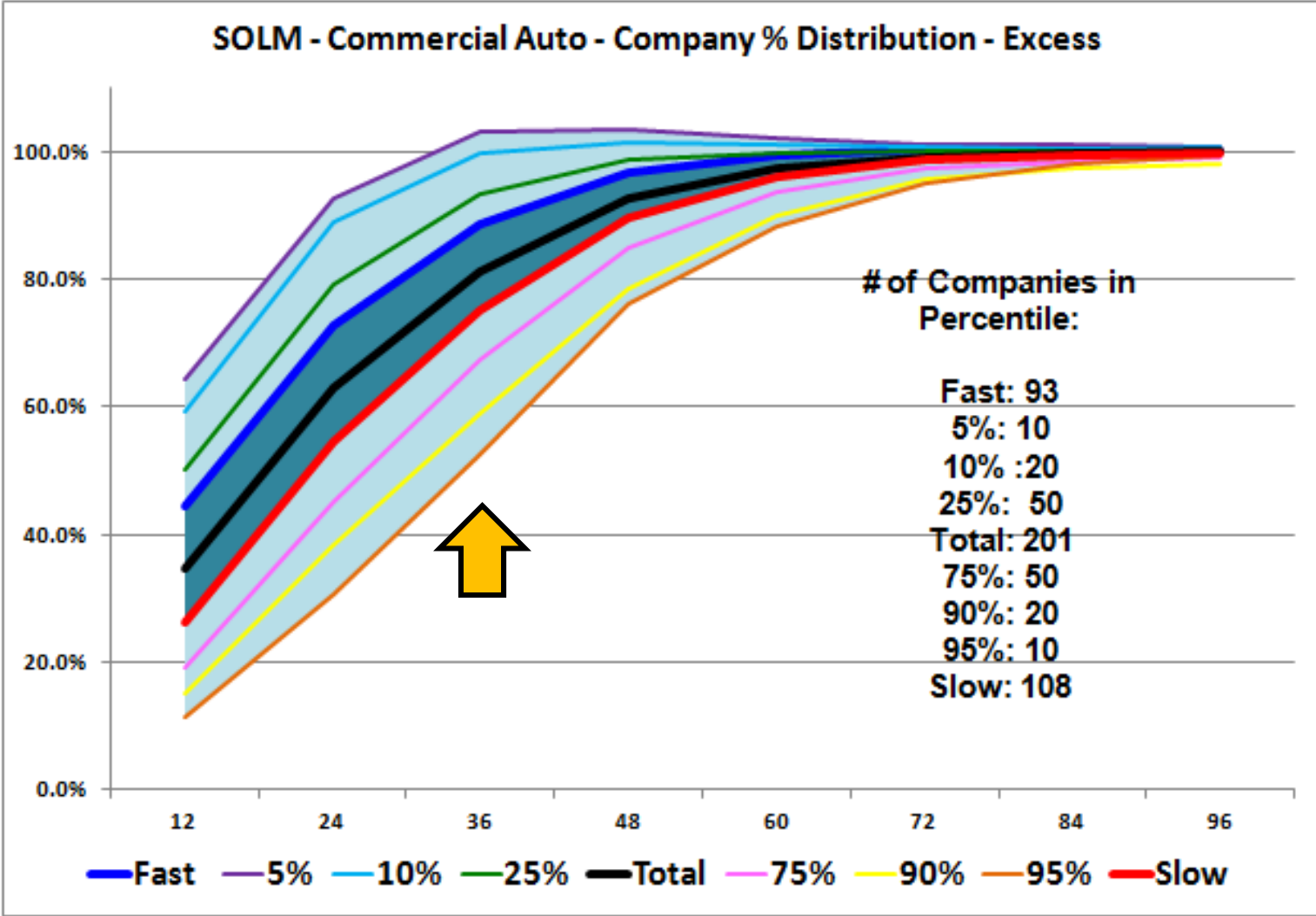
Unemployment





# Loss Development Variations by Company

*Illustrative*

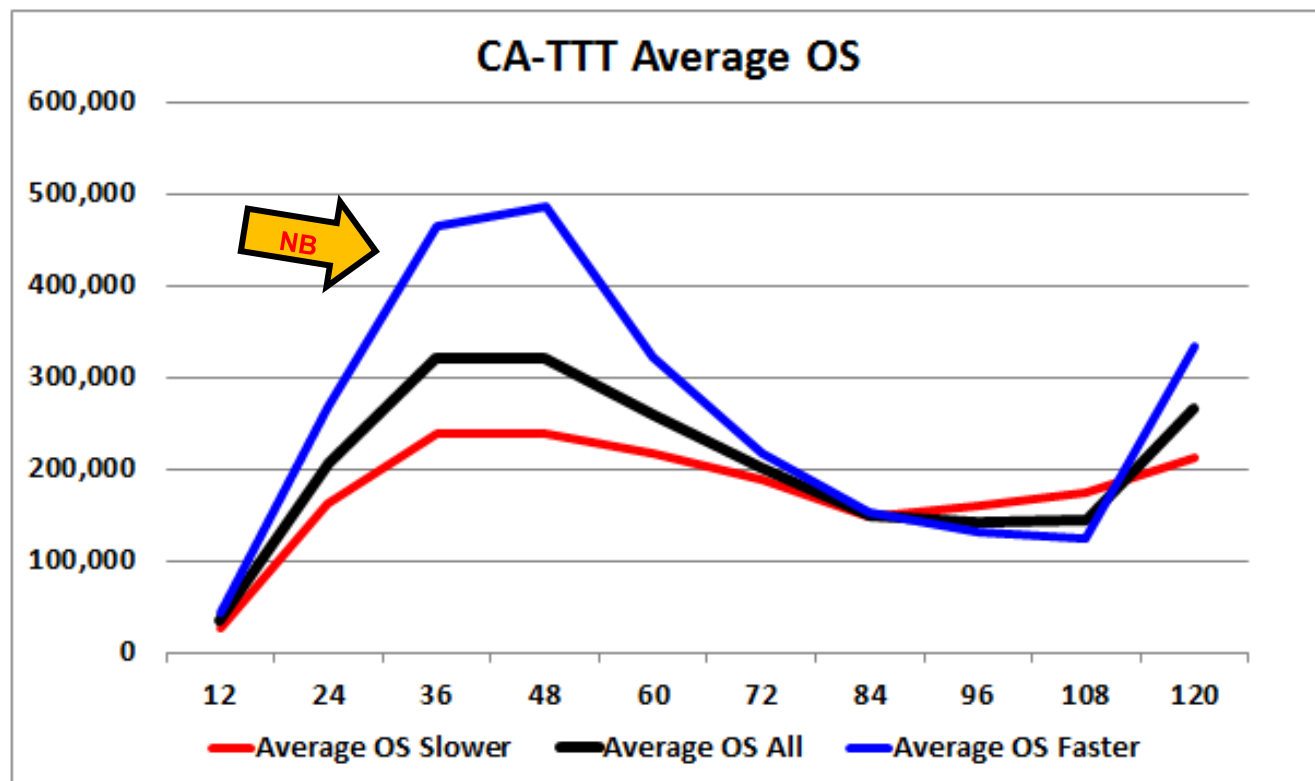






# Impact of Company Speed and Average Outstanding Case Reserves

*Illustrative*



Source: ISO SOLM 2017 v1 (pre-release); further details on Market Differentiation see ISO London Workshop March 2017 and CARE DC 2017 C24 Size of Loss Trend Matters

# Commercial Auto Conclusions

- Early to mid-2000's: frequency and rate changes in alignment
- Mid-to-late 2000's: frequency leveled off and rates continued to softened
- Wave 1: Loss ratios increased over 25%, from mid 50%'s to close to 70%:
  - long-term severities increased
  - development factors lengthened
  - frequencies started to rise, excess layer %'s increased
  - rates were still dropping
- Wave 2: prices started to rise, improving loss ratios
  - frequency continued upward trend
  - currently, loss ratios trending up again towards the mid 60% and low 70s
- It appears trends may not have been spotted by many carriers
  - late emerging losses
  - significant subsequent years reserve strengthening
- Significant state and commercial auto type differences

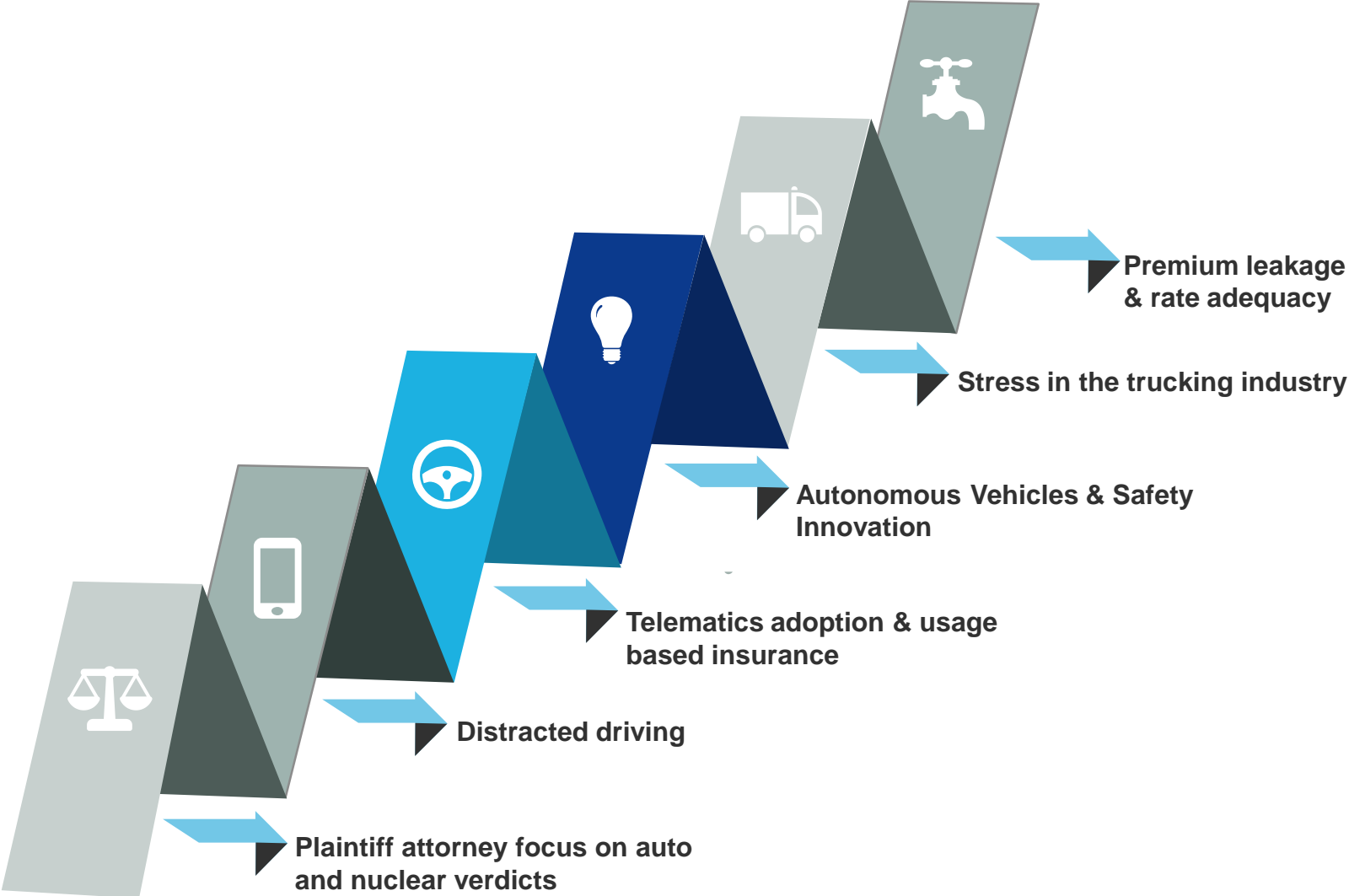


# Commercial Auto

## A Look to the Future



# What's the next wave for commercial auto?



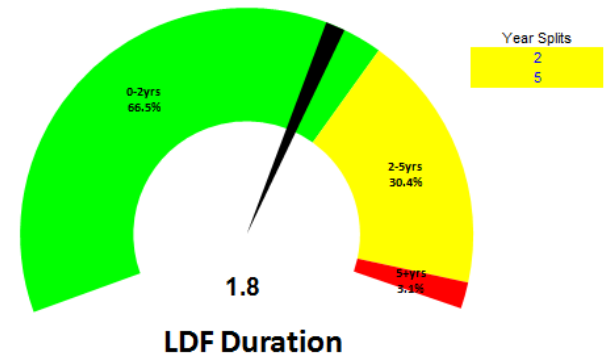
# Appendix



# Commercial Auto – PPT – 900x100k Loss – National Carriers Illustrative

Threshold Min	Threshold Max		12	24	36	48	60	72	84	96
58,741	587,394	AY 1997	16,935,724	34,520,711	42,140,691	47,118,495	48,457,582	50,680,351	52,888,862	52,096,605
60,503	605,016	AY 1998	15,819,633	35,822,543	46,532,515	53,268,997	56,955,759	57,266,157	55,872,090	57,194,395
62,318	623,166	AY 1999	22,679,441	37,942,408	44,979,292	49,763,704	54,381,894	55,827,943	57,015,887	57,295,100
64,187	641,861	AY 2000	19,166,599	35,207,024	45,262,644	51,637,569	52,054,303	53,606,042	53,614,221	53,775,833
66,113	661,117	AY 2001	17,903,741	34,332,785	46,858,479	52,675,217	54,938,258	54,621,987	55,046,413	54,692,978
68,096	680,951	AY 2002	15,966,470	33,949,194	43,064,292	49,903,980	53,809,618	54,988,518	55,630,108	56,154,287
70,139	701,379	AY 2003	19,123,347	44,567,904	54,425,964	60,042,988	63,616,986	64,665,755	65,608,163	65,857,227
72,243	722,421	AY 2004	20,551,291	37,407,936	47,927,368	51,114,118	53,271,671	54,290,675	53,547,851	54,073,712
74,411	744,093	AY 2005	34,217,245	53,778,284	58,395,919	63,473,484	65,537,296	65,532,345	66,301,732	65,963,496
76,643	766,416	AY 2006	21,047,763	36,114,499	44,594,661	50,790,089	54,125,736	56,622,159	57,568,454	57,360,092
78,942	789,409	AY 2007	26,193,488	42,691,607	50,052,583	54,562,803	54,508,251	54,298,935	55,862,688	56,140,653
81,310	813,091	AY 2008	19,435,688	30,934,178	39,877,392	41,820,104	41,722,434	43,679,680	44,166,068	44,413,960
83,750	837,484	AY 2009	20,096,787	33,064,887	40,798,199	46,941,390	51,806,175	52,046,397	52,065,952	
86,262	862,608	AY 2010	17,314,640	31,670,996	38,244,116	44,063,439	47,844,083	47,937,546		
88,850	888,487	AY 2011	19,618,529	35,200,593	44,989,693	50,699,342	54,491,417			
91,516	915,141	AY 2012	16,914,114	34,159,637	47,534,151	53,286,274				
94,261	942,595	AY 2013	19,795,400	36,391,231	43,449,666					
97,089	970,873	AY 2014	14,907,493	27,123,002						
100,001	1,000,000	AY 2015	17,259,591							
CY tots-2014,2015:			923,977,968	970,691,735						

	5 year ATA/ATU Factor				0 Ex Ante			
	12 - 24	24 - 36	36 - 48	48 - 60	60 - 72	72 - 84	84 - 96	96 - 108
5-Yr ATA	1.858	1.261	1.120	1.052	1.018	1.014	1.002	1.001
5-Yr ATU	2.860	1.539	1.220	1.090	1.036	1.018	1.004	1.002
All-Yr ATA	1.831	1.241	1.116	1.052	1.017	1.010	1.003	1.000
All-Yr ATU	2.753	1.503	1.211	1.085	1.032	1.014	1.004	1.002
Sel ATA	1.831	1.241	1.116	1.052	1.017	1.010	1.003	1.000
Sel ATU	2.753	1.503	1.211	1.085	1.032	1.014	1.004	1.002
% Reptd	36.3%	66.5%	82.6%	92.1%	96.9%	98.6%	99.6%	99.8%
To Date	17,259,591	27,123,002	43,449,666	53,286,274	54,491,417	47,937,546	52,065,952	44,413,960
Est Ult Unadjusted	47,507,417	40,776,596	52,631,071	57,826,915	56,231,496	48,626,645	52,300,115	44,488,410
Threshold Adj*	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Est Ult Adj	47,507,417	40,776,596	52,631,071	57,826,915	56,231,496	48,626,645	52,300,115	44,488,410
Act Prem To Date	227,806,868	217,692,361	209,532,793	192,971,144	209,213,348	219,040,311	235,088,247	251,397,730
Ultimate Prem	227,284,899	217,593,213	209,518,386	192,963,171	209,209,795	219,039,760	235,088,751	251,397,730
Factor (Premium)**	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sel On-Level Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Level Ultimate Prem	227,284,899	217,593,213	209,518,386	192,963,171	209,209,795	219,039,760	235,088,751	251,397,730
Partial Loss Ratio	20.9%	18.7%	25.1%	30.0%	26.9%	22.2%	22.2%	17.7%



### Duration Calculation

# of years: 1.8	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5
100.0% % Reptd - All Yr	36.3%	30.2%	16.0%	9.6%	4.8%	1.7%	1.0%	0.3%
	18.2%	45.3%	40.1%	33.6%	21.4%	9.2%	6.3%	2.1%

Source: Gauge pointer is on the same year scale as the gauge values (1.8 years is near the green endpoint of 2 years)  
 The Infographics Gauge pointers denote the duration from 0-10 years for easier comparison across segments



# Frequency Trend Assessment Matrix - Illustrative

## Impact Illustration #1 – Personal and Commercial Auto Cycle Components

ISSUE/TOPIC	Personal Auto - Total					Commercial Auto - TTT				
	2H 1990s	1H 2000s	2H 2000s	2010-15	FUTURE	2H 1990s	1H 2000s	2H 2000s	2010-15	FUTURE
Seat Belt Laws	M				✓	✓	✓	✓	✓	
Seat Belt Usage		L	L		✓					
Airbags Laws/Technology	L	M	M	L		✓	✓	✓	✓	
Automobile Design	L	L	L			✓	✓	✓	✓	
Auto Performance (more HP)		L	L	L						
Roadway Design	L	L	L			✓	✓	✓	✓	
Electronic Stability Control		L	H	L		✓	✓	✓	✓	
Vehicle Type (Unequal Size)		L	L	L						
Bumper Height		✓	✓	✓						
Graduated Licensing (Teenagers)		M	L							
Distracted Driving (use of Cell Phones, etc.)		L	M	M						
Miles Driven (Price of Gasoline)			L	L		✓	✓	✓	✓	
Economy (good mean more driving, vice-versa)	✓	L	M	L		✓	✓	✓	✓	
Crash/testing Avoidance Systems (autobrake, forward collision warning, adaptive headlights, lane departure warning, AEB)										
Small overlap frontal										
Google driverless car										
Improved Risk Management Programs						✓	✓	✓	✓	
Mandatory Training						✓	✓	✓	✓	
Telematics / improved class plans / exposure bases									✓	
Tort Reform	✓	✓	✓	✓						
Propensity to sue										
Social changes / Political Ideology										
Deductible Increases										

Historical Perspective

Source: CArE Seminar (IT1)– JBuchanan – 6/2015



# Frequency/Severity Trend Assessment Matrix – Illustrative

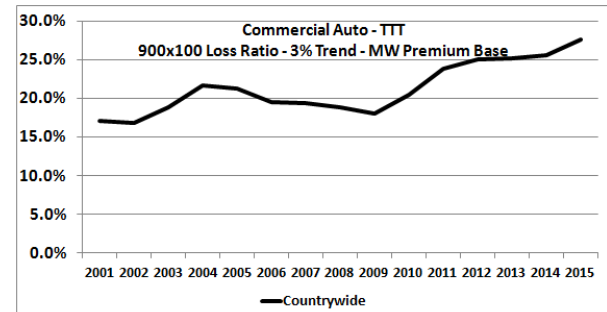
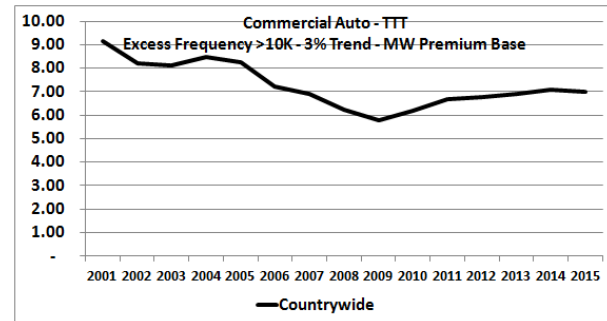
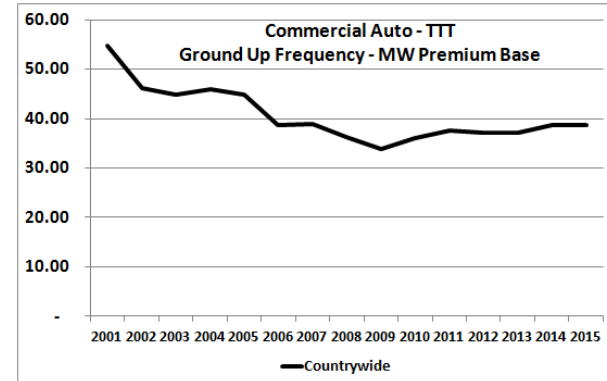
## Impact Illustration #1 – Commercial Auto Cycle Components (In Progress)

ISSUE/TOPIC	Commercial Auto - TTT				
	2H 1990s	1H 2000s	2H 2000s	2010-15	FUTURE
Seat Belt Laws	✓	✓	✓	✓	
Seat Belt Usage					
Airbags Laws/Technology	✓	✓	✓	✓	
Automobile / Truck Design	✓	✓	✓	✓	
Auto Performance (more HP)					
Roadway Design	✓	✓	✓	✓	
Electronic Stability Control	✓	✓	✓	✓	
Vehicle Type (Unequal Size)					
Bumper Height					
Graduated Licensing (Teenagers)					
Distracted Driving (use of Cell Phones, etc.)					
Miles Driven (Price of Gasoline)	✓	✓	✓	✓	
Economy (good means more driving, vice-versa)	✓	✓	✓	✓	
Crash/testing Avoidance Systems (autobrake, forward collision warning, adaptive headlights, lane departure warning, AEB)					
Small overlap frontal					
Google driverless car					
TNC (Uber, Lyft, etc.)					
Changing demographics (younger as boomers retire)					
Budget Constraints					
Regulatory changes (minimum age, mandatory rest)					
Improved Risk Management Programs	✓	✓	✓	✓	
Mandatory Training	✓	✓	✓	✓	
Telematics / improved class plans / exposure bases				✓	
Tort Reform					
Propensity to sue					
Social changes / Political Ideology					
Deductible Increases					
Limit Increases					

Historical Perspective

Impact Color Keys:
Positive (Lower Frequency)
Negative (Higher Frequency)
No Impact/Unknown
Blank = N/A
✓ = Some impact expected (TBD)

Impact Levels:
H = High
M = Medium
L = Low



Source: ISO SOLM 2016 v1





# Qualitative Matrix (Frequency)

ISSUE/TOPIC		Commercial Auto - TTT				
		2H 1990s	1H 2000s	2H 2000s	2010-15	FUTURE
Historical Perspective	Seat Belt Laws					
	Seat Belt Usage					
	Airbags Laws/Technology					
	Automobile / Truck Design					✓
	Auto Performance (more HP)					✓
	Roadway Design					✓
	Electronic Stability Control					
	Vehicle Type (Unequal Size)					
	Bumper Height					
	Graduated Licensing (Teenagers)					L
	Distracted Driving (use of Cell Phones, etc.)					M
	Miles Driven (Price of Gasoline)					M
	Economy (good means more driving, vice-versa)					M
	Crash/testing Avoidance Systems (autobrake, forward collision warning, adaptive headlights, lane departure warning, AEB)					H
	Small overlap frontal					
	Autonomous Vehicles					H
	TNC (Uber, Lyft, etc.)					M
	Changing demographics (younger as boomers retire)					M
	Budget Constraints					
	Regulatory changes (minimum age, mandatory rest)					L
	Improved Risk Management Programs					
	Mandatory Training					
	Telematics / improved class plans / exposure bases					M
	Tort Reform					
	Propensity to sue					L
	Social changes / Political Ideology					
	Deductible Increases					
	Limit Increases					

<b>Impact Color Keys:</b>
Positive (Lower Frequency)
Negative (Higher Frequency)
No Impact/Unknown
Blank = N/A
✓ = Some impact expected (TBD)

<b>Impact Levels:</b>
H = High
M = Medium
L = Low



# NAICS accuracy

*40-50% of 2-digit NAICS is typically classified incorrectly*

- **Accurate:** Supported by manual verification
- **Comprehensive:** Information on 26 million businesses
- **Current:** Targeted currency of 6 months, with 24 month max
- **Actionable:** 8 digit proprietary NAICS code provides 10x more granularity



OR



A recent study showed over 80% of businesses classified as local delivery (NAICS 48411) are actually long distance trucking companies (NAICS 48412)

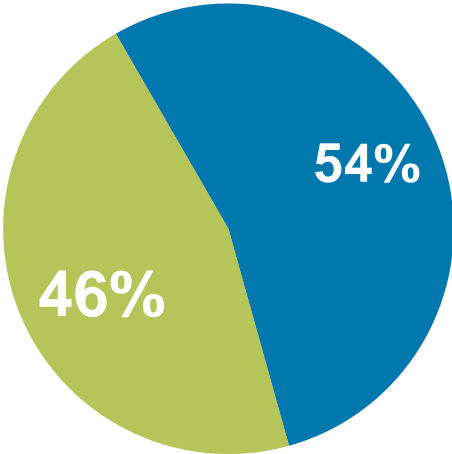


# Profitability requires good data

*Studies show that in nearly 50 percent of policies, the commercial property rating data is wrong; early indications say the same for BOP.*

**Construction Class for carrier's book of business**

46%



- Correct Construction Class
- Incorrect Construction Class



21% of risks were underpriced (premium leakage)

25% of risks were overpriced

- Adverse selection
- Retention threats

# John W. Buchanan

*Verisk / ISO - Principal, Excess and Reinsurance*

[John.Buchanan@verisk.com](mailto:John.Buchanan@verisk.com)



John Buchanan, FCAS, MAAA, is a principal in charge of ISO's Excess and Reinsurance Division. He has over 30 years of experience as a front-line pricing actuary and consultant in the US, London, and other international reinsurance marketplaces.

In John's career, he has conceptualized, developed and implemented extensive benchmarking and modeling services for various reinsurers, excess carriers, and industry groups. He has pioneered extensive work to extend information gathered in mature benchmarking markets, and extending that information to other International markets making use of local and customized knowledge. He was a frontline sign-off actuary for many domestic and international lines of business. While a consultant, he was also the main contact for many years for the Reinsurance Association of America and the Reinsurance Research Council of Canada as well as having worked extensively with the London and European reinsurance market through the Casualty Actuaries in Reinsurance in London. He also formed and is the chairperson of the joint IFoA-CAS International Pricing Research Working Party. The paper prepared for the 2016 GIRO Conference, *"Analyzing the Disconnect Between the Reinsurance Submission and Global Underwriter's Needs - Property Per Risk"*, won the UK Brian Hey award for best paper presented at the conference.

John's professional accomplishments in the property area also include being heavily involved with many international meteorological groups including NOAA, UK-Met, GLOBE, ACRE, and as chairperson of the CAS Climate Change Student Outreach subcommittee. He was in charge of the reinsurance educational tracks at the annual CARE conference, and previously at the CAS Ratemaking Seminar. He has been a moderator and panelist at dozens of industry seminars on the topic of domestic and international reinsurance pricing, the underwriting cycle, international benchmarking, etc.

Prior to joining Verisk, John was a Senior Vice President at Platinum Underwriters (previously St. Paul Reinsurance), a Principal at Tillinghast (now Towers Watson), and a Senior Consultant at KPMG, Peat Marwick. He also is competing as an amateur in the Global Salsa Championships, and is determined to write the book "The Mathematician's Guide to Salsa Dancing".



# Kirsten C. Hernan

*Swiss Re – Senior Vice President, Head Trend Spotting*

[Kirsten.Hernan@swissre.com](mailto:Kirsten.Hernan@swissre.com)



Kirsten Hernan leads Swiss Re's Trend Spotting efforts, where she is charged with providing forward looking analysis, rooted in and quantitative methods, to help position Swiss Re's underwriting and improve risk assessment.

Prior to joining Swiss Re, Kirsten was a managing director at Deloitte Consulting, focusing on strategy, operations and advanced analytics. As a leader in Deloitte's Insurance, she lead numerous engagements focused on leveraging analytics to deliver insights and enable understanding of business trends to drive better business decisions and processes. She was also a co-inventor of Deloitte's Claims Predictive Modeling solutions that enables enhanced segmentation strategies.

Prior to joining Deloitte, Kirsten was a Senior Vice President of ACE Limited (now Chubb), functioning in a variety of financial, operational and actuarial roles. Most recently, she was responsible for assessing and revamping internal pricing and cost allocation processes to more accurately project costs and improving the integrity and confidence in projected results for ACE's subsidiary ESIS, Inc.

Prior roles include Division Financial and Operations Officer for several ACE USA divisions, where Kirsten was charged with all planning and financial analysis and management, identifying opportunities to improve results and maximize profit potential, increasing the efficiency and effectiveness of the organization through improved process flow and increased capabilities, and ensuring compliance with corporate and regulatory requirements and existence of adequate management controls for this business. Additionally, Kirsten has served in a variety of actuarial pricing and reserving functions related to both traditional and specialty lines.

She is a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries



# Questions and Discussion

