

PENNSYLVANIA COMPENSATION RATING BUREAU

Tail Factors for Loss Development

For a given calendar year, the PCRIB collects financial loss development data for the current policy year and the thirty previous individual policy years. A single aggregate line of experience is reported for all older policy years combined.

Thus, the 2012 vs. 2013, 2013 vs. 2014, 2014 vs. 2015 and 2015 vs. 2016 valuations in the tail factor calculation will use Policy Year 1986 as the earliest separate policy year and an aggregate line of experience for Policy Years 1985 and prior.

The following discussion focuses on data with an earliest available policy year of 1986 for illustrative purposes. The discussion for data starting with later policy years would, however, be analogous.

The PCRIB's tail factor methodology is applied separately for indemnity and medical loss experience and for each calendar year of experience, and outlined as follows:

1. A starting policy year loss amount based on the average reported incurred loss for Policy Years 1986-1988 was computed.
2. An annual loss inflation factor was selected based on observed changes in incurred losses by policy year for the older policy years having separate experience data reported.
3. A historical series of estimated incurred losses by policy year beginning with Policy Year 1985 was computed using the starting point from #1 and the selected inflation factor from #2.
4. A calendar year loss development factor was selected for Policy Year 1985 based on observed developments for the oldest years with actual separate experience available.
5. A rate of decline in calendar year loss development factors by policy year was then computed such that when the resulting series of loss development factors was applied to the historical series of estimated incurred losses in #3, the total implied dollar amount of loss development for the calendar year balanced to the observed amount of development on policy years prior to 1986.
6. The "tail factor" applicable to maturities prior to Policy Year 1986 based on that calendar year of experience was then computed as the cumulative product of the series of loss development factors constructed in #5.

In general, this approach produced policy year incurred losses and loss development factors such that measurable development terminated for policy years in the mid 1940's. Because the amount of calendar year development observed for policy years prior to 1986 varied considerably from year to year, some variations in the application of the initial selected loss development factor were necessary (i.e., whether the initial selection was applied to 1, 2 or 3 prior policy years before beginning the application of the selected rate of decline in loss development). In addition, the selected rates of decline in loss development factors vary from calendar year to calendar year in order to achieve the desired balance with observed calendar year development.

Recognizing the volatility of observed calendar year development for policy years prior to 1986 in the aggregate, the PCRБ elected to use an experience period comprising four calendar years of loss development in computing indicated tail factors for this filing.

A summary exhibit on Page 1 presents results of the tail development factor calculations. On the subsequent pages, eight exhibits presenting the derivation of indicated tail factors using the procedure outlined above are attached (four for indemnity and four for medical).

## SUMMARY OF LOSS DEVELOPMENT TAIL FACTOR CALCULATIONS

VALUATION	MATURITY	<u>INDEMNITY</u> Tail Factor	<u>MEDICAL</u> Tail Factor
15V16	29TH TO ULT.	1.0004	1.0230
14V15	29TH TO ULT.	1.0018	0.9951
13V14	29TH TO ULT.	1.0008	1.0165
12V13	29TH TO ULT.	1.0006	1.0035
AVERAGE OF LATEST 4 VALUATIONS		1.0009	1.0095

**INDEMNITY 15 vs 16**

Inputs and Notes for Tail Factor Estimation

Latest 12/31 Prior to 1986 PYs Incurred	4,680,991,716
Next Latest 12/31 Prior to 1986 PYs Incurred	4,680,989,260
CY Development of Prior to 1986 PYs	2,456
Next Latest PY 1986 Incurred	715,529,652
# of 1986 PYs in Prior to 1986 PYs Data	6.54
Selected Decrement Development Factor	0.75
Selected Average PY Deflation Factor	0.95

- 1 PY 1985 Incurred = (Average of 1986, 1987, 1988) x (PY Deflation Factor ^ 2)
- 2 PY 1984 & Prior Incurred = Subsequent Year x PY Deflation
- 3 PY 1985 LDF selected based on balancing Prior to 1986 PYs Total Dollar Dev. to Actual CY Dev.
- 4 PY 1984 & Prior LDFs = (Subsequent Year - 1.0) x Selected Decrement + 1.0

CY Development of Prior to 1986 PYs:	2,456
Total Dollar Development:	2,456
Difference:	0

Tail Factor Model - 2018 Loss Cost Filing

Policy Year	(*=Estimate)	Incurred as of 12/31/16	Prior Year LDF	Dollar Development	Cumulative LDF	Policy Year	(*=Estimate)	Incurred as of 12/31/16	Prior Year LDF	Dollar Development	Cumulative LDF	
1945	*	99,150,530	1.000000	0	1.0000	1981	*	628,413,128	1.000000	182	1.0000	34TH TO ULT
1946	*	104,368,979	1.000000	0	1.0000	1982	*	661,487,503	1.000000	256	1.0000	33RD TO ULT
1947	*	109,862,083	1.000000	0	1.0000	1983	*	696,302,635	1.000001	359	1.0000	32ND TO ULT
1948	*	115,644,298	1.000000	0	1.0000	1984	*	732,950,142	1.000001	503	1.0000	31ST TO ULT
1949	*	121,730,840	1.000000	0	1.0000	1985	*	771,526,465	1.00000092	706	1.0000	30TH TO ULT
1950	*	128,137,726	1.000000	0	1.0000	1986		715,795,145	1.0004		1.0004	29TH TO ULT
1951	*	134,881,817	1.000000	0	1.0000	1987		866,280,939	0.9992			
1952	*	141,980,860	1.000000	0	1.0000	1988		982,554,826	1.0004			
1953	*	149,453,537	1.000000	0	1.0000	1989		1,143,500,362	1.0005			
1954	*	157,319,513	1.000000	0	1.0000	1990		1,169,073,351	1.0006			
1955	*	165,599,487	1.000000	0	1.0000	1991		1,017,162,457	1.0008			
1956	*	174,315,249	1.000000	0	1.0000	1992		862,729,147	1.0011			
1957	*	183,489,736	1.000000	0	1.0000	1993		753,937,302	1.0002			
1958	*	193,147,091	1.000000	0	1.0000	1994		693,344,871	1.0017			
1959	*	203,312,727	1.000000	0	1.0000	1995		587,692,565	0.9984			
1960	*	214,013,397	1.000000	0	1.0000	1996		506,812,436	1.0003			
1961	*	225,277,260	1.000000	0	1.0000	1997		515,949,062	1.0021			
1962	*	237,133,958	1.000000	0	1.0000	1998		517,272,656	1.0003			
1963	*	249,614,692	1.000000	0	1.0000	1999		588,765,409	1.0005			
1964	*	262,752,308	1.000000	1	1.0000	2000		630,701,216	0.9996			
1965	*	276,581,377	1.000000	1	1.0000	2001		642,664,471	1.0021			
1966	*	291,138,291	1.000000	1	1.0000	2002		671,622,783	1.0010			
1967	*	306,461,359	1.000000	2	1.0000	2003		659,536,834	1.0013			
1968	*	322,590,904	1.000000	2	1.0000	2004		700,956,523	1.0012			
1969	*	339,569,373	1.000000	3	1.0000	2005		706,934,267	1.0009			
1970	*	357,441,445	1.000000	4	1.0000	2006		730,928,075	1.0023			
1971	*	376,254,153	1.000000	6	1.0000	2007		759,875,681	1.0017			
1972	*	396,057,003	1.000000	9	1.0000	2008		711,416,963	1.0005			
1973	*	416,902,108	1.000000	12	1.0000	2009		644,870,680	1.0074			
1974	*	438,844,325	1.000000	17	1.0000	2010		669,471,174	1.0000			
1975	*	461,941,394	1.000000	24	1.0000	2011		652,364,081	1.0092			
1976	*	486,254,099	1.000000	33	1.0000	2012		615,205,664	1.0468			
1977	*	511,846,420	1.000000	47	1.0000	2013		629,326,300	1.1276			
1978	*	538,785,706	1.000000	66	1.0000	2014		565,769,467	1.4018			
1979	*	567,142,848	1.000000	92	1.0000	2015		406,187,268	3.4519			
1980	*	596,992,472	1.000000	130	1.0000	2016		118,755,612				

**MEDICAL 15 vs 16**

Inputs and Notes for Tail Factor Estimation

Latest 12/31 Prior to 1986 PYs Incurred	1,502,718,079
Next Latest 12/31 Prior to 1986 PYs Incurred	1,498,458,547
CY Development of Prior to 1986 PYs	4,259,532
Next Latest PY 1986 Incurred	326,926,543
# of 1986 PYs in Prior to 1986 PYs Data	4.60
Selected Decrement Development Factor	0.75
Selected Average PY Deflation Factor	0.93

- 1 PY 1985 Incurred = (Average of 1986, 1987, 1988) x (PY Deflation Factor ^ 2)
- 2 PY 1984 & Prior Incurred = Subsequent Year x PY Deflation
- 3 PY 1985 LDF selected based on balancing Prior to 1986 PYs Total Dollar Dev. to Actual CY Dev.
- 4 PY 1984 & Prior LDFs = (Subsequent Year - 1.0) x Selected Decrement + 1.0

CY Development of Prior to 1986 PYs:	4,259,532
Total Dollar Development:	4,259,532
Difference:	0

Tail Factor Model - 2018 Loss Cost Filing

Policy Year	(*=Estimate)	Incurred as of 12/31/16	Prior Year LDF	Dollar Development	Cumulative LDF	Policy Year	(*=Estimate)	Incurred as of 12/31/16	Prior Year LDF	Dollar Development	Cumulative LDF	
1945	*	20,549,087	1.000000	1	1.0000	1981	*	280,160,162	1.001091	305,309	1.0044	34TH TO ULT
1946	*	22,095,792	1.000000	1	1.0000	1982	*	301,247,486	1.001455	437,560	1.0058	33RD TO ULT
1947	*	23,758,916	1.000000	1	1.0000	1983	*	323,922,027	1.001939	627,022	1.0078	32ND TO ULT
1948	*	25,547,222	1.000000	2	1.0000	1984	*	348,303,255	1.002586	898,376	1.0104	31ST TO ULT
1949	*	27,470,131	1.000000	3	1.0000	1985	*	374,519,629	1.00344795	1,286,889	1.0139	30TH TO ULT
1950	*	29,537,775	1.000000	4	1.0000	1986		329,855,306	1.0090		1.0230	29TH TO ULT
1951	*	31,761,049	1.000000	6	1.0000	1987		439,110,143	1.0014			
1952	*	34,151,665	1.000000	9	1.0000	1988		530,096,741	1.0019			
1953	*	36,722,221	1.000000	13	1.0000	1989		650,931,988	1.0066			
1954	*	39,486,259	1.000000	18	1.0000	1990		675,236,229	1.0054			
1955	*	42,458,343	1.000001	26	1.0000	1991		624,796,766	0.9988			
1956	*	45,654,132	1.000001	37	1.0000	1992		572,316,006	1.0044			
1957	*	49,090,465	1.000001	54	1.0000	1993		487,423,444	1.0049			
1958	*	52,785,446	1.000001	77	1.0000	1994		459,685,357	1.0044			
1959	*	56,758,544	1.000002	110	1.0000	1995		417,082,865	0.9995			
1960	*	61,030,693	1.000003	158	1.0000	1996		409,645,488	1.0060			
1961	*	65,624,401	1.000003	227	1.0000	1997		425,592,114	1.0044			
1962	*	70,563,872	1.000005	325	1.0000	1998		447,683,004	1.0005			
1963	*	75,875,131	1.000006	467	1.0000	1999		475,065,809	1.0037			
1964	*	81,586,162	1.000008	669	1.0000	2000		507,246,267	1.0052			
1965	*	87,727,056	1.000011	959	1.0000	2001		495,406,609	1.0046			
1966	*	94,330,168	1.000015	1,375	1.0001	2002		543,750,938	1.0044			
1967	*	101,430,288	1.000019	1,972	1.0001	2003		556,046,559	1.0076			
1968	*	109,064,826	1.000026	2,827	1.0001	2004		607,439,108	0.9996			
1969	*	117,274,006	1.000035	4,053	1.0001	2005		632,091,760	1.0096			
1970	*	126,101,082	1.000046	5,810	1.0002	2006		641,590,242	1.0039			
1971	*	135,592,561	1.000061	8,330	1.0002	2007		683,097,618	1.0056			
1972	*	145,798,453	1.000082	11,942	1.0003	2008		620,979,499	0.9996			
1973	*	156,772,530	1.000109	17,121	1.0004	2009		574,580,269	1.0154			
1974	*	168,572,613	1.000146	24,545	1.0006	2010		632,800,603	1.0002			
1975	*	181,260,874	1.000194	35,188	1.0008	2011		629,184,365	1.0097			
1976	*	194,904,166	1.000259	50,445	1.0010	2012		587,904,549	1.0126			
1977	*	209,574,372	1.000345	72,317	1.0014	2013		641,740,885	1.0357			
1978	*	225,348,787	1.000460	103,668	1.0018	2014		616,540,479	1.0905			
1979	*	242,310,524	1.000614	148,605	1.0025	2015		570,486,086	2.2597			
1980	*	260,548,950	1.000818	213,011	1.0033	2016		380,236,004				

**INDEMNITY 14 vs 15**

Inputs and Notes for Tail Factor Estimation

Latest 12/31 Prior to 1986 PYs Incurred	4,681,301,566	1 PY 1985 Incurred = (Average of 1986, 1987, 1988) x (PY Deflation Factor ^ 2)
Next Latest 12/31 Prior to 1986 PYs Incurred	4,680,071,625	2 PY 1984 & Prior Incurred = Subsequent Year x PY Deflation
CY Development of Prior to 1986 PYs	1,229,941	3 PY 1985 LDF selected based on balancing Prior to 1986 PYs Total Dollar Dev. to Actual CY Dev.
Next Latest PY 1986 Incurred	714,807,350	4 PY 1984 & Prior LDFs = (Subsequent Year - 1.0) x Selected Decrement + 1.0
# of 1986 PYs in Prior to 1986 PYs Data	6.55	
Selected Decrement Development Factor	0.75	CY Development of Prior to 1986 PYs:
Selected Average PY Deflation Factor	0.95	Total Dollar Development:
		Difference:
		0

Tail Factor Model - 2018 Loss Cost Filing

Policy Year	(*=Estimate)	Incurred as of 12/31/15	Prior Year LDF	Dollar Development	Cumulative LDF	Policy Year	(*=Estimate)	Incurred as of 12/31/15	Prior Year LDF	Dollar Development	Cumulative LDF	
1944	*	94,189,412	1.000000	0	1.0000	1980	*	596,969,712	1.000109	64,941	1.0004	34TH TO ULT
1945	*	99,146,750	1.000000	0	1.0000	1981	*	628,389,171	1.000145	91,143	1.0006	33RD TO ULT
1946	*	104,365,000	1.000000	1	1.0000	1982	*	661,462,285	1.000193	127,913	1.0008	32ND TO ULT
1947	*	109,857,895	1.000000	1	1.0000	1983	*	696,276,090	1.000258	179,516	1.0010	31ST TO ULT
1948	*	115,639,889	1.000000	1	1.0000	1984	*	732,922,200	1.000344	251,931	1.0014	30TH TO ULT
1949	*	121,726,199	1.000000	2	1.0000	1985	*	771,497,052	1.00045847	353,546	1.0018	29TH TO ULT
1950	*	128,132,841	1.000000	2	1.0000	1986		715,516,906	1.0010			
1951	*	134,876,675	1.000000	3	1.0000	1987		866,931,127	1.0005			
1952	*	141,975,447	1.000000	5	1.0000	1988		982,085,105	0.9996			
1953	*	149,447,839	1.000000	7	1.0000	1989		1,142,902,544	1.0019			
1954	*	157,313,515	1.000000	10	1.0000	1990		1,168,287,167	1.0002			
1955	*	165,593,174	1.000000	14	1.0000	1991		1,016,385,928	1.0006			
1956	*	174,308,604	1.000000	19	1.0000	1992		861,793,648	0.9989			
1957	*	183,482,741	1.000000	27	1.0000	1993		753,773,119	1.0003			
1958	*	193,139,727	1.000000	37	1.0000	1994		692,130,367	1.0008			
1959	*	203,304,976	1.000000	53	1.0000	1995		588,598,325	1.0004			
1960	*	214,005,238	1.000000	74	1.0000	1996		506,643,542	0.9970			
1961	*	225,268,672	1.000000	104	1.0000	1997		514,875,882	0.9996			
1962	*	237,124,917	1.000001	145	1.0000	1998		517,111,579	0.9996			
1963	*	249,605,176	1.000001	204	1.0000	1999		588,441,705	0.9995			
1964	*	262,742,291	1.000001	287	1.0000	2000		630,932,722	0.9998			
1965	*	276,570,832	1.000001	402	1.0000	2001		641,302,318	0.9996			
1966	*	291,127,192	1.000002	564	1.0000	2002		670,956,683	0.9986			
1967	*	306,449,676	1.000003	792	1.0000	2003		663,124,433	0.9998			
1968	*	322,578,606	1.000003	1,112	1.0000	2004		702,827,748	0.9996			
1969	*	339,556,428	1.000005	1,560	1.0000	2005		710,682,018	1.0013			
1970	*	357,427,818	1.000006	2,190	1.0000	2006		732,756,067	0.9989			
1971	*	376,239,809	1.000008	3,073	1.0000	2007		762,842,530	1.0003			
1972	*	396,041,904	1.000011	4,314	1.0000	2008		716,095,162	1.0028			
1973	*	416,886,215	1.000015	6,054	1.0001	2009		646,516,614	1.0112			
1974	*	438,827,595	1.000019	8,497	1.0001	2010		674,662,838	1.0060			
1975	*	461,923,784	1.000026	11,926	1.0001	2011		651,348,938	1.0240			
1976	*	486,235,562	1.000034	16,738	1.0001	2012		592,377,519	1.1086			
1977	*	511,826,907	1.000046	23,491	1.0002	2013		567,711,709	1.3936			
1978	*	538,765,165	1.000061	32,970	1.0002	2014		407,476,651	3.3485			
1979	*	567,121,227	1.000082	46,272	1.0003	2015		117,270,981				

**MEDICAL 14 vs 15**

Inputs and Notes for Tail Factor Estimation

Latest 12/31 Prior to 1986 PYs Incurred	1,498,465,515	1 PY 1985 Incurred = (Average of 1986, 1987, 1988) x (PY Deflation Factor ^ 2)
Next Latest 12/31 Prior to 1986 PYs Incurred	1,499,990,552	2 PY 1984 & Prior Incurred = Subsequent Year x PY Deflation
CY Development of Prior to 1986 PYs	-1,525,037	3 PY 1985 LDF selected based on balancing Prior to 1986 PYs Total Dollar Dev. to Actual CY Dev.
Next Latest PY 1986 Incurred	327,480,386	4 PY 1984 & Prior LDFs = (Subsequent Year - 1.0) x Selected Decrement + 1.0
# of 1986 PYs in Prior to 1986 PYs Data	4.58	
Selected Decrement Development Factor	0.75	CY Development of Prior to 1986 PYs: -1,525,037
Selected Average PY Deflation Factor	0.93	Total Dollar Development: -1,525,037
		Difference: 0

Tail Factor Model - 2018 Loss Cost Filing

Policy Year	(*=Estimate)	Incurred as of 12/31/15	Prior Year LDF	Dollar Development	Cumulative LDF	Policy Year	(*=Estimate)	Incurred as of 12/31/15	Prior Year LDF	Dollar Development	Cumulative LDF	
1944	*	19,041,702	1.000000	0	1.0000	1980	*	259,608,920	0.999707	-76,123	0.9988	34TH TO ULT
1945	*	20,474,948	1.000000	0	1.0000	1981	*	279,149,377	0.999609	-109,147	0.9984	33RD TO ULT
1946	*	22,016,073	1.000000	0	1.0000	1982	*	300,160,620	0.999479	-156,504	0.9979	32ND TO ULT
1947	*	23,673,197	1.000000	-1	1.0000	1983	*	322,753,355	0.999305	-224,417	0.9972	31ST TO ULT
1948	*	25,455,051	1.000000	-1	1.0000	1984	*	347,046,618	0.999074	-321,819	0.9963	30TH TO ULT
1949	*	27,371,022	1.000000	-1	1.0000	1985	*	373,168,407	0.99876473	-461,532	0.9951	29TH TO ULT
1950	*	29,431,207	1.000000	-2	1.0000	1986		326,929,174	0.9983			
1951	*	31,646,459	1.000000	-2	1.0000	1987		438,367,942	1.0022			
1952	*	34,028,450	1.000000	-3	1.0000	1988		529,078,211	0.9993			
1953	*	36,589,731	1.000000	-5	1.0000	1989		646,608,388	1.0096			
1954	*	39,343,797	1.000000	-7	1.0000	1990		671,537,263	1.0037			
1955	*	42,305,158	1.000000	-9	1.0000	1991		625,512,975	1.0042			
1956	*	45,489,418	1.000000	-13	1.0000	1992		569,707,864	1.0016			
1957	*	48,913,352	1.000000	-19	1.0000	1993		484,920,238	1.0060			
1958	*	52,595,002	0.999999	-28	1.0000	1994		457,561,385	1.0070			
1959	*	56,553,766	0.999999	-39	1.0000	1995		417,259,600	1.0103			
1960	*	60,810,501	0.999999	-57	1.0000	1996		407,125,971	0.9937			
1961	*	65,387,636	0.999999	-81	1.0000	1997		423,699,072	1.0024			
1962	*	70,309,286	0.999998	-116	1.0000	1998		447,328,094	1.0001			
1963	*	75,601,382	0.999998	-167	1.0000	1999		473,240,552	0.9998			
1964	*	81,291,809	0.999997	-239	1.0000	2000		504,529,986	1.0052			
1965	*	87,410,547	0.999996	-342	1.0000	2001		493,054,786	1.0038			
1966	*	93,989,836	0.999995	-491	1.0000	2002		541,294,324	1.0094			
1967	*	101,064,340	0.999993	-704	1.0000	2003		555,162,740	1.0064			
1968	*	108,671,333	0.999991	-1,009	1.0000	2004		609,582,175	1.0012			
1969	*	116,850,896	0.999988	-1,447	1.0000	2005		627,516,086	1.0033			
1970	*	125,646,124	0.999983	-2,074	0.9999	2006		640,510,673	1.0075			
1971	*	135,103,359	0.999978	-2,974	0.9999	2007		681,729,415	0.9987			
1972	*	145,272,429	0.999971	-4,263	0.9999	2008		623,859,577	1.0086			
1973	*	156,206,913	0.999961	-6,112	0.9998	2009		570,994,426	0.9982			
1974	*	167,964,423	0.999948	-8,763	0.9998	2010		636,561,157	1.0061			
1975	*	180,606,906	0.999930	-12,564	0.9997	2011		627,520,380	0.9925			
1976	*	194,200,975	0.999907	-18,014	0.9996	2012		584,354,981	1.0252			
1977	*	208,818,252	0.999876	-25,827	0.9995	2013		628,309,384	1.0874			
1978	*	224,535,755	0.999835	-37,029	0.9993	2014		574,985,747	2.2152			
1979	*	241,436,296	0.999780	-53,092	0.9991	2015		251,291,768				

INDEMNITY 13 vs 14

Inputs and Notes for Tail Factor Estimation

Latest 12/31 Prior to 1986 PYs Incurred	4,786,919,665
Next Latest 12/31 Prior to 1986 PYs Incurred	4,786,182,375
CY Development of Prior to 1986 PYs	737,290
Next Latest PY 1986 Incurred	725,101,800
# of 1986 PYs in Prior to 1986 PYs Data	6.60
Selected Decrement Development Factor	0.75
Selected Average PY Deflation Factor	0.95

- 1 PY 1985 Incurred = (Average of 1986, 1987, 1988) x (PY Deflation Factor ^ 2)
- 2 PY 1984 & Prior Incurred = Subsequent Year x PY Deflation
- 3 PY 1985 LDF selected based on balancing Prior to 1986 PYs Total Dollar Dev. to Actual CY Dev.
- 4 PY 1984 & Prior LDFs = (Subsequent Year - 1.0) x Selected Decrement + 1.0

CY Development of Prior to 1986 PYs:	737,290
Total Dollar Development:	737,290
Difference:	0

Tail Factor Model - 2018 Loss Cost Filing

Policy Year	(*=Estimate)	Incurred as of 12/31/14	Prior Year LDF	Dollar Development	Cumulative LDF	Policy Year	(*=Estimate)	Incurred as of 12/31/14	Prior Year LDF	Dollar Development	Cumulative LDF	
1943	*	90,715,332	1.000000	0	1.0000	1979	*	574,951,094	1.000048	27,736	1.0002	34TH TO ULT
1944	*	95,489,823	1.000000	0	1.0000	1980	*	605,211,678	1.000064	38,927	1.0003	33RD TO ULT
1945	*	100,515,603	1.000000	0	1.0000	1981	*	637,064,924	1.000086	54,633	1.0003	32ND TO ULT
1946	*	105,805,898	1.000000	0	1.0000	1982	*	670,594,657	1.000114	76,675	1.0005	31ST TO ULT
1947	*	111,374,630	1.000000	1	1.0000	1983	*	705,889,112	1.000152	107,610	1.0006	30TH TO ULT
1948	*	117,236,452	1.000000	1	1.0000	1984	*	743,041,171	1.000203	151,024	1.0008	29TH TO ULT
1949	*	123,406,792	1.000000	1	1.0000	1985	*	782,148,601	1.00027106	211,950	1.0011	28TH TO ULT
1950	*	129,901,886	1.000000	1	1.0000	1986		725,185,434	1.0001			
1951	*	136,738,828	1.000000	2	1.0000	1987		877,603,995	1.0006			
1952	*	143,935,608	1.000000	3	1.0000	1988		997,150,518	1.0002			
1953	*	151,511,167	1.000000	4	1.0000	1989		1,158,043,777	0.9996			
1954	*	159,485,438	1.000000	6	1.0000	1990		1,187,075,451	1.0001			
1955	*	167,879,409	1.000000	8	1.0000	1991		1,039,310,399	1.0000			
1956	*	176,715,167	1.000000	11	1.0000	1992		885,410,644	0.9995			
1957	*	186,015,966	1.000000	16	1.0000	1993		767,693,588	1.0017			
1958	*	195,806,279	1.000000	22	1.0000	1994		709,000,472	1.0002			
1959	*	206,111,873	1.000000	32	1.0000	1995		613,761,927	1.0011			
1960	*	216,959,866	1.000000	44	1.0000	1996		535,392,246	1.0002			
1961	*	228,378,807	1.000000	62	1.0000	1997		554,980,072	0.9983			
1962	*	240,398,744	1.000000	87	1.0000	1998		569,318,194	1.0010			
1963	*	253,051,309	1.000000	122	1.0000	1999		639,809,812	1.0004			
1964	*	266,369,799	1.000001	172	1.0000	2000		679,801,883	0.9993			
1965	*	280,389,263	1.000001	241	1.0000	2001		676,510,143	1.0014			
1966	*	295,146,592	1.000001	338	1.0000	2002		699,333,942	1.0007			
1967	*	310,680,623	1.000002	475	1.0000	2003		673,508,608	1.0024			
1968	*	327,032,235	1.000002	666	1.0000	2004		704,174,079	1.0018			
1969	*	344,244,458	1.000003	935	1.0000	2005		709,786,061	1.0026			
1970	*	362,362,587	1.000004	1,313	1.0000	2006		734,030,743	1.0035			
1971	*	381,434,303	1.000005	1,842	1.0000	2007		766,781,282	1.0025			
1972	*	401,509,792	1.000006	2,586	1.0000	2008		715,805,845	1.0034			
1973	*	422,641,886	1.000009	3,629	1.0000	2009		643,201,472	1.0037			
1974	*	444,886,196	1.000011	5,093	1.0000	2010		677,045,260	1.0337			
1975	*	468,301,259	1.000015	7,148	1.0001	2011		642,000,667	1.0992			
1976	*	492,948,694	1.000020	10,032	1.0001	2012		539,269,831	1.3808			
1977	*	518,893,362	1.000027	14,080	1.0001	2013		406,227,129	3.4334			
1978	*	546,203,539	1.000036	19,762	1.0001	2014		121,301,791				



MEDICAL 13 vs 14

Inputs and Notes for Tail Factor Estimation

Latest 12/31 Prior to 1986 PYs Incurred	1,535,833,614
Next Latest 12/31 Prior to 1986 PYs Incurred	1,529,012,701
CY Development of Prior to 1986 PYs	6,820,913
Next Latest PY 1986 Incurred	333,235,655
# of 1986 PYs in Prior to 1986 PYs Data	4.61
Selected Decrement Development Factor	0.75
Selected Average PY Deflation Factor	0.93

- 1 PY 1985 Incurred = (Average of 1986, 1987, 1988) x (PY Deflation Factor ^ 2)
- 2 PY 1984 & Prior Incurred = Subsequent Year x PY Deflation
- 3 PY 1985 LDF selected based on balancing Prior to 1986 PYs Total Dollar Dev. to Actual CY Dev.
- 4 PY 1984 & Prior LDFs = (Subsequent Year - 1.0) x Selected Decrement + 1.0

CY Development of Prior to 1986 PYs:	6,820,913
Total Dollar Development:	6,820,913
Difference:	0

Tail Factor Model - 2018 Loss Cost Filing

Policy Year	(*=Estimate)	Incurred as of 12/31/14	Prior Year LDF	Dollar Development	Cumulative LDF	Policy Year	(*=Estimate)	Incurred as of 12/31/14	Prior Year LDF	Dollar Development	Cumulative LDF	
1941	*	15,592,222	1.000000	0	1.0000	1978	*	228,580,356	1.000728	166,173	1.0029	35TH TO ULT
1942	*	16,765,830	1.000000	0	1.0000	1979	*	245,785,329	1.000970	238,182	1.0039	34TH TO ULT
1943	*	18,027,774	1.000000	1	1.0000	1980	*	264,285,300	1.001293	341,370	1.0052	33RD TO ULT
1944	*	19,384,703	1.000000	1	1.0000	1981	*	284,177,742	1.001724	489,209	1.0069	32ND TO ULT
1945	*	20,843,767	1.000000	1	1.0000	1982	*	305,567,465	1.002299	700,972	1.0092	31ST TO ULT
1946	*	22,412,653	1.000000	2	1.0000	1983	*	328,567,166	1.003066	1,004,210	1.0123	30TH TO ULT
1947	*	24,099,626	1.000000	2	1.0000	1984	*	353,298,028	1.004088	1,438,263	1.0165	29TH TO ULT
1948	*	25,913,577	1.000000	3	1.0000	1985	*	379,890,353	1.00545014	2,059,231	1.0220	28TH TO ULT
1949	*	27,864,061	1.000000	5	1.0000	1986		334,437,160	1.0036			
1950	*	29,961,356	1.000000	7	1.0000	1987		443,328,536	1.0056			
1951	*	32,216,512	1.000000	10	1.0000	1988		539,925,435	1.0062			
1952	*	34,641,411	1.000000	14	1.0000	1989		653,842,383	1.0043			
1953	*	37,248,829	1.000001	20	1.0000	1990		683,033,004	1.0089			
1954	*	40,052,504	1.000001	29	1.0000	1991		641,995,830	1.0018			
1955	*	43,067,208	1.000001	42	1.0000	1992		589,216,438	1.0051			
1956	*	46,308,826	1.000001	60	1.0000	1993		494,848,573	1.0097			
1957	*	49,794,437	1.000002	86	1.0000	1994		470,995,174	1.0085			
1958	*	53,542,405	1.000002	124	1.0000	1995		434,300,392	1.0015			
1959	*	57,572,479	1.000003	177	1.0000	1996		436,518,599	1.0120			
1960	*	61,905,891	1.000004	254	1.0000	1997		459,104,367	1.0061			
1961	*	66,565,474	1.000005	364	1.0000	1998		496,754,577	1.0040			
1962	*	71,575,779	1.000007	522	1.0000	1999		536,084,691	1.0135			
1963	*	76,963,203	1.000010	748	1.0000	2000		542,993,485	1.0042			
1964	*	82,756,132	1.000013	1,073	1.0001	2001		521,986,810	1.0044			
1965	*	88,985,088	1.000017	1,538	1.0001	2002		561,451,272	1.0165			
1966	*	95,682,891	1.000023	2,205	1.0001	2003		564,711,064	1.0102			
1967	*	102,884,829	1.000031	3,161	1.0001	2004		610,212,629	1.0118			
1968	*	110,628,848	1.000041	4,532	1.0002	2005		626,188,106	1.0111			
1969	*	118,955,751	1.000055	6,498	1.0002	2006		636,577,050	1.0219			
1970	*	127,909,409	1.000073	9,315	1.0003	2007		685,448,814	1.0063			
1971	*	137,536,999	1.000097	13,355	1.0004	2008		619,623,232	1.0076			
1972	*	147,889,247	1.000129	19,146	1.0005	2009		575,055,060	1.0166			
1973	*	159,020,695	1.000173	27,449	1.0007	2010		638,933,140	1.0139			
1974	*	170,989,995	1.000230	39,351	1.0009	2011		635,066,803	1.0316			
1975	*	183,860,210	1.000307	56,412	1.0012	2012		574,127,831	1.0682			
1976	*	197,699,150	1.000409	80,870	1.0016	2013		576,736,880	2.2140			
1977	*	212,579,731	1.000546	115,926	1.0022	2014		259,714,934				

INDEMNITY 12 vs 13

Inputs and Notes for Tail Factor Estimation

Latest 12/31 Prior to 1986 PYs Incurred	4,786,422,894	1 PY 1985 Incurred = (Average of 1986, 1987, 1988) x (PY Deflation Factor ^ 2)
Next Latest 12/31 Prior to 1986 PYs Incurred	4,785,732,069	2 PY 1984 & Prior Incurred = Subsequent Year x PY Deflation
CY Development of Prior to 1986 PYs	690,825	3 PY 1985 LDF selected based on balancing Prior to 1986 PYs Total Dollar Dev. to Actual CY Dev.
Next Latest PY 1986 Incurred	724,447,259	4 PY 1984 & Prior LDFs = (Subsequent Year - 1.0) x Selected Decrement + 1.0
# of 1986 PYs in Prior to 1986 PYs Data	6.61	
Selected Decrement Development Factor	0.75	CY Development of Prior to 1986 PYs:
Selected Average PY Deflation Factor	0.95	Total Dollar Development:
		Difference:
		0

Tail Factor Model - 2018 Loss Cost Filing

Policy Year	(*=Estimate)	Incurred as of 12/31/13	Prior Year LDF	Dollar Development	Cumulative LDF	Policy Year	(*=Estimate)	Incurred as of 12/31/13	Prior Year LDF	Dollar Development	Cumulative LDF	
1942	*	86,154,410	1.000000	0	1.0000	1978	*	546,044,101	1.000034	18,516	1.0001	34TH TO ULT
1943	*	90,688,852	1.000000	0	1.0000	1979	*	574,783,265	1.000045	25,987	1.0002	33RD TO ULT
1944	*	95,461,950	1.000000	0	1.0000	1980	*	605,035,015	1.000060	36,473	1.0002	32ND TO ULT
1945	*	100,486,263	1.000000	0	1.0000	1981	*	636,878,964	1.000080	51,189	1.0003	31ST TO ULT
1946	*	105,775,013	1.000000	0	1.0000	1982	*	670,398,909	1.000107	71,843	1.0004	30TH TO ULT
1947	*	111,342,119	1.000000	1	1.0000	1983	*	705,683,062	1.000143	100,828	1.0006	29TH TO ULT
1948	*	117,202,231	1.000000	1	1.0000	1984	*	742,824,276	1.000191	141,506	1.0008	28TH TO ULT
1949	*	123,370,769	1.000000	1	1.0000	1985	*	781,920,290	1.00025405	198,593	1.0010	27TH TO ULT
1950	*	129,863,968	1.000000	1	1.0000	1986		725,182,614	1.0010			
1951	*	136,698,914	1.000000	2	1.0000	1987		877,078,060	0.9994			
1952	*	143,893,593	1.000000	3	1.0000	1988		996,920,347	0.9999			
1953	*	151,466,940	1.000000	4	1.0000	1989		1,158,437,660	1.0009			
1954	*	159,438,884	1.000000	5	1.0000	1990		1,186,746,571	1.0009			
1955	*	167,830,405	1.000000	8	1.0000	1991		1,039,274,399	0.9990			
1956	*	176,663,584	1.000000	11	1.0000	1992		885,471,978	0.9992			
1957	*	185,961,667	1.000000	15	1.0000	1993		766,415,267	1.0011			
1958	*	195,749,123	1.000000	21	1.0000	1994		708,799,517	1.0025			
1959	*	206,051,709	1.000000	30	1.0000	1995		613,092,228	1.0009			
1960	*	216,896,536	1.000000	41	1.0000	1996		535,289,820	0.9998			
1961	*	228,312,143	1.000000	58	1.0000	1997		556,100,776	1.0014			
1962	*	240,328,571	1.000000	82	1.0000	1998		569,027,758	1.0005			
1963	*	252,977,443	1.000000	115	1.0000	1999		639,401,482	0.9997			
1964	*	266,292,046	1.000001	161	1.0000	2000		681,117,418	1.0015			
1965	*	280,307,417	1.000001	226	1.0000	2001		675,300,456	1.0051			
1966	*	295,060,439	1.000001	317	1.0000	2002		699,285,680	1.0020			
1967	*	310,589,935	1.000001	445	1.0000	2003		672,559,618	1.0022			
1968	*	326,936,774	1.000002	624	1.0000	2004		702,935,309	1.0050			
1969	*	344,143,973	1.000003	876	1.0000	2005		708,118,183	1.0025			
1970	*	362,256,813	1.000003	1,230	1.0000	2006		731,450,002	1.0068			
1971	*	381,322,961	1.000005	1,726	1.0000	2007		764,845,111	1.0000			
1972	*	401,392,591	1.000006	2,423	1.0000	2008		713,326,485	1.0089			
1973	*	422,518,517	1.000008	3,400	1.0000	2009		640,223,240	1.0291			
1974	*	444,756,333	1.000011	4,772	1.0000	2010		652,940,395	1.1100			
1975	*	468,164,561	1.000014	6,698	1.0001	2011		581,366,135	1.3937			
1976	*	492,804,802	1.000019	9,400	1.0001	2012		388,302,639	3.3336			
1977	*	518,741,896	1.000025	13,193	1.0001	2013		118,254,472				

**MEDICAL 12 vs 13**

Inputs and Notes for Tail Factor Estimation

Latest 12/31 Prior to 1986 PYs Incurred	1,528,379,608	1 PY 1985 Incurred = (Average of 1986, 1987, 1988) x (PY Deflation Factor ^ 2)
Next Latest 12/31 Prior to 1986 PYs Incurred	1,526,420,124	2 PY 1984 & Prior Incurred = Subsequent Year x PY Deflation
CY Development of Prior to 1986 PYs	1,959,484	3 PY 1985 LDF selected based on balancing Prior to 1986 PYs Total Dollar Dev. to Actual CY Dev.
Next Latest PY 1986 Incurred	331,519,451	4 PY 1984 & Prior LDFs = (Subsequent Year - 1.0) x Selected Decrement + 1.0
# of 1986 PYs in Prior to 1986 PYs Data	4.61	
Selected Decrement Development Factor	0.75	CY Development of Prior to 1986 PYs:
Selected Average PY Deflation Factor	0.93	Total Dollar Development:
		Difference:
		0

Tail Factor Model - 2018 Loss Cost Filing

Policy Year	(*=Estimate)	Incurred as of 12/31/13	Prior Year LDF	Dollar Development	Cumulative LDF	Policy Year	(*=Estimate)	Incurred as of 12/31/13	Prior Year LDF	Dollar Development	Cumulative LDF	
1942	*	16,677,804	1.000000	0	1.0000	1978	*	227,380,235	1.000210	47,645	1.0008	34TH TO ULT
1943	*	17,933,122	1.000000	0	1.0000	1979	*	244,494,877	1.000279	68,304	1.0011	33RD TO ULT
1944	*	19,282,927	1.000000	0	1.0000	1980	*	262,897,717	1.000373	97,917	1.0015	32ND TO ULT
1945	*	20,734,330	1.000000	0	1.0000	1981	*	282,685,717	1.000497	140,366	1.0020	31ST TO ULT
1946	*	22,294,979	1.000000	0	1.0000	1982	*	303,963,137	1.000662	201,208	1.0027	30TH TO ULT
1947	*	23,973,096	1.000000	1	1.0000	1983	*	326,842,082	1.000883	288,406	1.0035	29TH TO ULT
1948	*	25,777,522	1.000000	1	1.0000	1984	*	351,443,099	1.001178	413,364	1.0047	28TH TO ULT
1949	*	27,717,766	1.000000	1	1.0000	1985	*	377,895,806	1.00157010	592,404	1.0063	27TH TO ULT
1950	*	29,804,049	1.000000	2	1.0000	1986		333,434,609	1.0058			
1951	*	32,047,365	1.000000	3	1.0000	1987		440,861,457	1.0099			
1952	*	34,459,532	1.000000	4	1.0000	1988		536,476,760	1.0109			
1953	*	37,053,260	1.000000	6	1.0000	1989		650,977,336	1.0055			
1954	*	39,842,215	1.000000	8	1.0000	1990		676,887,464	1.0066			
1955	*	42,841,092	1.000000	12	1.0000	1991		640,752,923	1.0101			
1956	*	46,065,690	1.000000	17	1.0000	1992		586,149,650	1.0091			
1957	*	49,533,000	1.000000	25	1.0000	1993		490,017,752	1.0054			
1958	*	53,261,290	1.000001	35	1.0000	1994		466,939,664	1.0051			
1959	*	57,270,205	1.000001	51	1.0000	1995		433,686,738	1.0073			
1960	*	61,580,865	1.000001	73	1.0000	1996		431,311,608	1.0111			
1961	*	66,215,984	1.000002	104	1.0000	1997		456,569,044	1.0092			
1962	*	71,199,983	1.000002	150	1.0000	1998		494,827,392	1.0073			
1963	*	76,559,121	1.000003	214	1.0000	1999		528,718,215	1.0064			
1964	*	82,321,636	1.000004	307	1.0000	2000		541,438,177	1.0079			
1965	*	88,517,888	1.000005	441	1.0000	2001		519,499,955	1.0071			
1966	*	95,180,525	1.000007	632	1.0000	2002		552,365,217	1.0103			
1967	*	102,344,650	1.000009	906	1.0000	2003		559,053,388	1.0026			
1968	*	110,048,011	1.000012	1,299	1.0000	2004		603,230,387	1.0145			
1969	*	118,331,195	1.000016	1,862	1.0001	2005		619,384,306	1.0135			
1970	*	127,237,844	1.000021	2,670	1.0001	2006		622,858,959	1.0067			
1971	*	136,814,886	1.000028	3,827	1.0001	2007		681,134,995	1.0120			
1972	*	147,112,780	1.000037	5,487	1.0001	2008		615,105,189	1.0130			
1973	*	158,185,785	1.000050	7,867	1.0002	2009		564,865,755	1.0146			
1974	*	170,092,242	1.000066	11,279	1.0003	2010		626,486,592	1.0340			
1975	*	182,894,884	1.000088	16,170	1.0004	2011		614,544,405	1.0904			
1976	*	196,661,166	1.000118	23,182	1.0005	2012		535,491,700	2.1620			
1977	*	211,463,619	1.000157	33,234	1.0006	2013		261,026,434				