PENNSYLVANIA COMPENSATION RATING BUREAU

Measures of Goodness of Fit in Trend Calculations Using Loss Ratios

Estimates of trended loss ratios using from 4 to 10 data points for each loss development technique are shown in Exhibit 6 of this mailing.

The first page of the attachment shows R^2 values for the regressions producing those trended loss ratios.

Pages 2 and 3 show indemnity fitted loss ratios for each loss development method using from 4 to 10 data points. Page 2 uses linear regression and page 3 uses exponential techniques. Pages 4 and 5 present analogous results for medical-linear and medical-exponential respectively.

Pages 6 through 9 show residuals resulting from the comparison of actual and fitted (actual minus fitted) values for the curves used in the trend projections. Page 6 shows indemnity results using linear regression, page 7 is for indemnity-exponential, page 8 for medical-linear and page 9 for medical-exponential.

INDEMNITY r^2		Average (Pd & Inc)	(Incur)	(Pd-26)
4 Point	Linear	0.956	0.958	0.953
5 Point	Linear	0.977	0.978	0.976
6 Point	Linear	0.987	0.986	0.986
7 Point	Linear	0.938	0.960	0.897
8 Point	Linear	0.921	0.945	0.874
9 Point	Linear	0.932	0.950	0.898
10 Point	Linear	0.949	0.961	0.926
4 Point	Expon'l	0.951	0.953	0.949
5 Point	Expon'l	0.974	0.973	0.974
6 Point	Expon'l	0.985	0.985	0.984
7 Point	Expon'l	0.935	0.955	0.895
8 Point	Expon'l	0.915	0.937	0.870
9 Point	Expon'l	0.935	0.952	0.902
10 Point	Expon'l	0.950	0.960	0.928

MEDICAL r^2		Average (Pd & Inc)	(Incur)	(Pd-26)
4 Point	Linear	0.097	0.148	0.046
5 Point	Linear	0.097	0.161	0.038
6 Point	Linear	0.449	0.504	0.374
7 Point	Linear	0.323	0.424	0.199
8 Point	Linear	0.429	0.545	0.265
9 Point	Linear	0.598	0.678	0.485
10 Point	Linear	0.642	0.709	0.545
4 Point	Expon'l	0.099	0.151	0.047
5 Point	Expon'l	0.101	0.166	0.040
6 Point	Expon'l	0.448	0.505	0.372
7 Point	Expon'l	0.327	0.429	0.200
8 Point	Expon'l	0.432	0.548	0.268
9 Point	Expon'l	0.601	0.682	0.487
10 Point	Expon'l	0.646	0.713	0.548

INDEMNITY Linear **FITTED**	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-26)
4 Point	2009	0.5167	0.4930	0.5403
	2010	0.4992	0.4728	0.5256
	2011	0.4818	0.4527	0.5109
	2012	0.4644	0.4325	0.4962
5 Point	2008	0.5342	0.5124	0.5560
	2009	0.5168	0.4925	0.5410
	2010	0.4993	0.4726	0.5260
	2011	0.4818	0.4527	0.5109
	2012	0.4643	0.4328	0.4959
6 Point	2007	0.5532	0.5355	0.5709
	2008	0.5353	0.5147	0.5559
	2009	0.5174	0.4939	0.5409
	2010	0.4995	0.4732	0.5259
	2011	0.4817	0.4524	0.5109
	2012	0.4638	0.4316	0.4960
7 Point	2006	0.5592	0.5455	0.5730
	2007	0.5441	0.5272	0.5610
	2008	0.5289	0.5089	0.5490
	2009	0.5138	0.4906	0.5370
	2010	0.4986	0.4723	0.5249
	2011	0.4835	0.4541	0.5129
	2012	0.4683	0.4358	0.5009
8 Point	2005	0.5661	0.5549	0.5773
	2006	0.5526	0.5384	0.5668
	2007	0.5391	0.5219	0.5564
	2008	0.5256	0.5054	0.5459
	2009	0.5121	0.4888	0.5354
	2010	0.4986	0.4723	0.5249
	2011	0.4851	0.4558	0.5145
	2012	0.4717	0.4393	0.5040
9 Point	2004	0.5885	0.5808	0.5963
	2005	0.5735	0.5627	0.5843
	2006	0.5584	0.5445	0.5723
	2007	0.5433	0.5263	0.5604
	2008	0.5283	0.5081	0.5484
	2009	0.5132	0.4900	0.5364
	2010	0.4981	0.4718	0.5244
	2011	0.4830	0.4536	0.5125
	2012	0.4680	0.4354	0.5005
10 Point	2003	0.6037	0.5972	0.6102
	2004	0.5886	0.5793	0.5979
	2005	0.5735	0.5615	0.5856
	2006	0.5585	0.5436	0.5734
	2007	0.5434	0.5257	0.5611
	2008	0.5283	0.5078	0.5488
	2009	0.5132	0.4899	0.5365
	2010	0.4981	0.4720	0.5242
	2011	0.4830	0.4541	0.5119
	2012	0.4679	0.4362	0.4997

INDEMNITY Expon'l FITTED	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-26)
4 Point	2009	0.5171	0.4936	0.5407
	2010	0.4990	0.4724	0.5254
	2011	0.4814	0.4521	0.5107
	2012	0.4645	0.4327	0.4963
5 Point	2008	0.5350	0.5135	0.5565
	2009	0.5165	0.4922	0.5408
	2010	0.4986	0.4717	0.5255
	2011	0.4814	0.4521	0.5107
	2012	0.4648	0.4334	0.4962
6 Point	2007	0.5543	0.5371	0.5717
	2008	0.5351	0.5144	0.5558
	2009	0.5166	0.4927	0.5404
	2010	0.4987	0.4719	0.5253
	2011	0.4814	0.4520	0.5107
	2012	0.4647	0.4330	0.4966
7 Point	2006	0.5607	0.5477	0.5740
	2007	0.5443	0.5275	0.5611
	2008	0.5283	0.5080	0.5486
	2009	0.5128	0.4892	0.5363
	2010	0.4978	0.4711	0.5244
	2011	0.4832	0.4537	0.5126
	2012	0.4690	0.4369	0.5012
8 Point	2005	0.5679	0.5576	0.5784
	2006	0.5531	0.5391	0.5672
	2007	0.5387	0.5213	0.5562
	2008	0.5247	0.5040	0.5454
	2009	0.5111	0.4873	0.5348
	2010	0.4978	0.4711	0.5244
	2011	0.4848	0.4555	0.5142
	2012	0.4722	0.4404	0.5042
9 Point	2004	0.5906	0.5841	0.5975
	2005	0.5740	0.5635	0.5846
	2006	0.5578	0.5436	0.5719
	2007	0.5420	0.5244	0.5595
	2008	0.5267	0.5058	0.5474
	2009	0.5118	0.4880	0.5356
	2010	0.4974	0.4707	0.5240
	2011	0.4834	0.4541	0.5126
	2012	0.4697	0.4381	0.5015
10 Point	2003	0.6065	0.6015	0.6118
	2004	0.5895	0.5808	0.5984
	2005	0.5731	0.5609	0.5853
	2006	0.5571	0.5417	0.5725
	2007	0.5416	0.5231	0.5599
	2008	0.5265	0.5051	0.5476
	2009	0.5118	0.4878	0.5356
	2010	0.4975	0.4711	0.5239
	2011	0.4836	0.4549	0.5124
	2012	0.4701	0.4393	0.5011

MEDICAL Linear FITTED	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-26)
4 Point	2009	0.5438	0.5189	0.5686
	2010	0.5403	0.5140	0.5664
	2011	0.5367	0.5092	0.5642
	2012	0.5332	0.5043	0.5620
5 Point	2008	0.5443	0.5201	0.5684
	2009	0.5418	0.5165	0.5670
	2010	0.5393	0.5128	0.5656
	2011	0.5367	0.5092	0.5642
	2012	0.5342	0.5055	0.5628
6 Point	2007	0.5634	0.5416	0.5850
	2008	0.5563	0.5331	0.5795
	2009	0.5493	0.5246	0.5739
	2010	0.5423	0.5161	0.5684
	2011	0.5352	0.5075	0.5628
	2012	0.5282	0.4990	0.5573
7 Point	2006	0.5604	0.5403	0.5804
	2007	0.5557	0.5341	0.5772
	2008	0.5510	0.5278	0.5740
	2009	0.5462	0.5216	0.5708
	2010	0.5415	0.5153	0.5676
	2011	0.5368	0.5091	0.5644
	2012	0.5320	0.5028	0.5612
8 Point	2005	0.5657	0.5480	0.5834
	2006	0.5609	0.5415	0.5802
	2007	0.5560	0.5349	0.5771
	2008	0.5512	0.5284	0.5739
	2009	0.5463	0.5219	0.5707
	2010	0.5415	0.5153	0.5676
	2011	0.5367	0.5088	0.5644
	2012	0.5318	0.5022	0.5613
9 Point	2004	0.5841	0.5672	0.6011
	2005	0.5769	0.5584	0.5954
	2006	0.5697	0.5496	0.5896
	2007	0.5624	0.5409	0.5839
	2008	0.5552	0.5321	0.5782
	2009	0.5479	0.5233	0.5725
	2010	0.5407	0.5146	0.5667
	2011	0.5335	0.5058	0.5610
	2012	0.5262	0.4970	0.5553
10 Point	2003	0.5888	0.5722	0.6055
	2004	0.5820	0.5640	0.6000
	2005	0.5752	0.5559	0.5944
	2006	0.5683	0.5477	0.5889
	2007	0.5615	0.5395	0.5834
	2008	0.5546	0.5313	0.5779
	2009	0.5478	0.5231	0.5724
	2010	0.5410	0.5150	0.5669
	2011	0.5341	0.5068	0.5614
	2012	0.5273	0.4986	0.5559

MEDICAL Expon'l FITTED	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-26)
4 Point	2009	0.5437	0.5188	0.5685
	2010	0.5401	0.5139	0.5663
	2011	0.5366	0.5090	0.5641
	2012	0.5330	0.5041	0.5619
5 Point	2008	0.5443	0.5201	0.5684
	2009	0.5417	0.5164	0.5670
	2010	0.5391	0.5127	0.5655
	2011	0.5366	0.5090	0.5641
	2012	0.5340	0.5053	0.5626
6 Point	2007	0.5632	0.5415	0.5849
	2008	0.5560	0.5327	0.5792
	2009	0.5490	0.5242	0.5737
	2010	0.5420	0.5157	0.5682
	2011	0.5351	0.5074	0.5628
	2012	0.5284	0.4993	0.5574
7 Point	2006	0.5603	0.5403	0.5803
	2007	0.5555	0.5339	0.5770
	2008	0.5507	0.5275	0.5738
	2009	0.5460	0.5212	0.5706
	2010	0.5413	0.5150	0.5674
	2011	0.5366	0.5089	0.5643
	2012	0.5320	0.5028	0.5611
8 Point	2005	0.5657	0.5482	0.5833
	2006	0.5608	0.5414	0.5801
	2007	0.5558	0.5346	0.5769
	2008	0.5509	0.5280	0.5737
	2009	0.5461	0.5215	0.5706
	2010	0.5413	0.5150	0.5674
	2011	0.5365	0.5086	0.5643
	2012	0.5318	0.5023	0.5612
9 Point	2004	0.5840	0.5672	0.6008
	2005	0.5765	0.5581	0.5950
	2006	0.5691	0.5490	0.5892
	2007	0.5619	0.5401	0.5835
	2008	0.5547	0.5314	0.5778
	2009	0.5476	0.5228	0.5722
	2010	0.5405	0.5143	0.5666
	2011	0.5336	0.5060	0.5611
	2012	0.5268	0.4978	0.5557
10 Point	2003	0.5890	0.5726	0.6054
	2004	0.5818	0.5640	0.5997
	2005	0.5748	0.5554	0.5941
	2006	0.5678	0.5470	0.5885
	2007	0.5609	0.5388	0.5830
	2008	0.5541	0.5306	0.5775
	2009	0.5474	0.5226	0.5721
	2010	0.5408	0.5147	0.5668
	2011	0.5343	0.5069	0.5614
	2012	0.5278	0.4993	0.5562

INDEMNITY Linear RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-26)
4 Point	2009	-0.0046	-0.0052	-0.0039
	2010	0.0057	0.0066	0.0047
	2011	0.0024	0.0023	0.0025
	2012	-0.0035	-0.0037	-0.0032
5 Point	2008	0.0001	-0.0004	0.0007
	2009	-0.0047	-0.0047	-0.0046
	2010	0.0056	0.0068	0.0043
	2011	0.0024	0.0023	0.0025
	2012	-0.0034	-0.0040	-0.0029
6 Point	2007	0.0013	0.0028	-0.0002
	2008	-0.0010	-0.0027	0.0008
	2009	-0.0053	-0.0061	-0.0045
	2010	0.0054	0.0062	0.0044
	2011	0.0025	0.0026	0.0025
	2012	-0.0029	-0.0028	-0.0030
7 Point	2006	-0.0136	-0.0124	-0.0148
	2007	0.0104	0.0111	0.0097
	2008	0.0054	0.0031	0.0077
	2009	-0.0017	-0.0028	-0.0006
	2010	0.0063	0.0071	0.0054
	2011	0.0007	0.0009	0.0005
	2012	-0.0074	-0.0070	-0.0079
8 Point	2005	-0.0116	-0.0125	-0.0108
	2006	-0.0070	-0.0053	-0.0086
	2007	0.0154	0.0164	0.0143
	2008	0.0087	0.0066	0.0108
	2009	0.0000	-0.0010	0.0010
	2010	0.0063	0.0071	0.0054
	2011	-0.0009	-0.0008	-0.0011
	2012	-0.0108	-0.0105	-0.0110
9 Point	2004	0.0148	0.0156	0.0140
	2005	-0.0190	-0.0203	-0.0178
	2006	-0.0128	-0.0114	-0.0141
	2007	0.0112	0.0120	0.0103
	2008	0.0060	0.0039	0.0083
	2009	-0.0011	-0.0022	0.0000
	2010	0.0068	0.0076	0.0059
	2011	0.0012	0.0014	0.0009
	2012	-0.0071	-0.0066	-0.0075
10 Point	2003	0.0002	-0.0033	0.0037
	2004	0.0147	0.0171	0.0124
	2005	-0.0190	-0.0191	-0.0191
	2006	-0.0129	-0.0105	-0.0152
	2007	0.0111	0.0126	0.0096
	2008	0.0060	0.0042	0.0079
	2009	-0.0011	-0.0021	-0.0001
	2010	0.0068	0.0074	0.0061
	2011	0.0012	0.0009	0.0015
	2012	-0.0070	-0.0074	-0.0067

INDEMNITY Expon'l RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-26)
4 Point	2009	-0.0050	-0.0058	-0.0043
	2010	0.0059	0.0070	0.0049
	2011	0.0028	0.0029	0.0027
	2012	-0.0036	-0.0039	-0.0033
5 Point	2008	-0.0007	-0.0015	0.0002
	2009	-0.0044	-0.0044	-0.0044
	2010	0.0063	0.0077	0.0048
	2011	0.0028	0.0029	0.0027
	2012	-0.0039	-0.0046	-0.0032
6 Point	2007	0.0002	0.0012	-0.0010
	2008	-0.0008	-0.0024	0.0009
	2009	-0.0045	-0.0049	-0.0040
	2010	0.0062	0.0075	0.0050
	2011	0.0028	0.0030	0.0027
	2012	-0.0038	-0.0042	-0.0036
7 Point	2006	-0.0151	-0.0146	-0.0158
	2007	0.0102	0.0108	0.0096
	2008	0.0060	0.0040	0.0081
	2009	-0.0007	-0.0014	0.0001
	2010	0.0071	0.0083	0.0059
	2011	0.0010	0.0013	0.0008
	2012	-0.0081	-0.0081	-0.0082
8 Point	2005	-0.0134	-0.0152	-0.0119
	2006	-0.0075	-0.0060	-0.0090
	2007	0.0158	0.0170	0.0145
	2008	0.0096	0.0080	0.0113
	2009	0.0010	0.0005	0.0016
	2010	0.0071	0.0083	0.0059
	2011	-0.0006	-0.0005	-0.0008
	2012	-0.0113	-0.0116	-0.0112
9 Point	2004	0.0127	0.0123	0.0128
	2005	-0.0195	-0.0211	-0.0181
	2006	-0.0122	-0.0105	-0.0137
	2007	0.0125	0.0139	0.0112
	2008	0.0076	0.0062	0.0093
	2009	0.0003	-0.0002	0.0008
	2010	0.0075	0.0087	0.0063
	2011	0.0008	0.0009	0.0008
	2012	-0.0088	-0.0093	-0.0085
10 Point	2003	-0.0026	-0.0076	0.0021
	2004	0.0138	0.0156	0.0119
	2005	-0.0186	-0.0185	-0.0188
	2006	-0.0115	-0.0086	-0.0143
	2007	0.0129	0.0152	0.0108
	2008	0.0078	0.0069	0.0091
	2009	0.0003	0.0000	0.0008
	2010	0.0074	0.0083	0.0064
	2011	0.0006	0.0001	0.0010
	2012	-0.0092	-0.0105	-0.0081

MEDICAL Linear RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-26)
4 Point	2009	-0.0127	-0.0141	-0.0113
	2010	0.0142	0.0170	0.0115
	2011	0.0096	0.0083	0.0108
	2012	-0.0111	-0.0112	-0.0110
5 Point	2008	-0.0020	-0.0024	-0.0015
	2009	-0.0107	-0.0117	-0.0097
	2010	0.0152	0.0182	0.0123
	2011	0.0096	0.0083	0.0108
	2012	-0.0121	-0.0124	-0.0118
6 Point	2007	0.0150	0.0163	0.0138
	2008	-0.0140	-0.0154	-0.0126
	2009	-0.0182	-0.0198	-0.0166
	2010	0.0122	0.0149	0.0095
	2011	0.0111	0.0100	0.0122
	2012	-0.0061	-0.0059	-0.0063
7 Point	2006	-0.0115	-0.0113	-0.0117
	2007	0.0227	0.0238	0.0216
	2008	-0.0087	-0.0101	-0.0071
	2009	-0.0151	-0.0168	-0.0135
	2010	0.0130	0.0157	0.0103
	2011	0.0095	0.0084	0.0106
	2012	-0.0099	-0.0097	-0.0102
8 Point	2005	0.0008	0.0020	-0.0004
	2006	-0.0120	-0.0125	-0.0115
	2007	0.0224	0.0230	0.0217
	2008	-0.0089	-0.0107	-0.0070
	2009	-0.0152	-0.0171	-0.0134
	2010	0.0130	0.0157	0.0103
	2011	0.0096	0.0087	0.0106
	2012	-0.0097	-0.0091	-0.0103
9 Point	2004	0.0224	0.0207	0.0240
	2005	-0.0104	-0.0084	-0.0124
	2006	-0.0208	-0.0206	-0.0209
	2007	0.0160	0.0170	0.0149
	2008	-0.0129	-0.0144	-0.0113
	2009	-0.0168	-0.0185	-0.0152
	2010	0.0138	0.0164	0.0112
	2011	0.0128	0.0117	0.0140
	2012	-0.0041	-0.0039	-0.0043
10 Point	2003	-0.0048	-0.0070	-0.0026
	2004	0.0245	0.0239	0.0251
	2005	-0.0087	-0.0059	-0.0114
	2006	-0.0194	-0.0187	-0.0202
	2007	0.0169	0.0184	0.0154
	2008	-0.0123	-0.0136	-0.0110
	2009	-0.0167	-0.0183	-0.0151
	2010	0.0135	0.0160	0.0110
	2011	0.0122	0.0107	0.0136
	2012	-0.0052	-0.0055	-0.0049

MEDICAL Expon'l RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-26)
4 Point	2009	-0.0126	-0.0140	-0.0112
	2010	0.0144	0.0171	0.0116
	2011	0.0097	0.0085	0.0109
	2012	-0.0109	-0.0110	-0.0109
5 Point	2008	-0.0020	-0.0024	-0.0015
	2009	-0.0106	-0.0116	-0.0097
	2010	0.0154	0.0183	0.0124
	2011	0.0097	0.0085	0.0109
	2012	-0.0119	-0.0122	-0.0116
6 Point	2007	0.0152	0.0164	0.0139
	2008	-0.0137	-0.0150	-0.0123
	2009	-0.0179	-0.0194	-0.0164
	2010	0.0125	0.0153	0.0097
	2011	0.0112	0.0101	0.0122
	2012	-0.0063	-0.0062	-0.0064
7 Point	2006	-0.0114	-0.0113	-0.0116
	2007	0.0229	0.0240	0.0218
	2008	-0.0084	-0.0098	-0.0069
	2009	-0.0149	-0.0164	-0.0133
	2010	0.0132	0.0160	0.0105
	2011	0.0097	0.0086	0.0107
	2012	-0.0099	-0.0097	-0.0101
8 Point	2005	0.0008	0.0018	-0.0003
	2006	-0.0119	-0.0124	-0.0114
	2007	0.0226	0.0233	0.0219
	2008	-0.0086	-0.0103	-0.0068
	2009	-0.0150	-0.0167	-0.0133
	2010	0.0132	0.0160	0.0105
	2011	0.0098	0.0089	0.0107
	2012	-0.0097	-0.0092	-0.0102
9 Point	2004	0.0225	0.0207	0.0243
	2005	-0.0100	-0.0081	-0.0120
	2006	-0.0202	-0.0200	-0.0205
	2007	0.0165	0.0178	0.0153
	2008	-0.0124	-0.0137	-0.0109
	2009	-0.0165	-0.0180	-0.0149
	2010	0.0140	0.0167	0.0113
	2011	0.0127	0.0115	0.0139
	2012	-0.0047	-0.0047	-0.0047
10 Point	2003	-0.0050	-0.0074	-0.0025
	2004	0.0247	0.0239	0.0254
	2005	-0.0083	-0.0054	-0.0111
	2006	-0.0189	-0.0180	-0.0198
	2007	0.0175	0.0191	0.0158
	2008	-0.0118	-0.0129	-0.0106
	2009	-0.0163	-0.0178	-0.0148
	2010	0.0137	0.0163	0.0111
	2011	0.0120	0.0106	0.0136
	2012	-0.0057	-0.0062	-0.0052