

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		Average		
r ²		(Pd & Inc)	(Incur)	(Pd-22)
4 Point	Linear	0.772	0.673	0.813
5 Point	Linear	0.276	0.033	0.479
6 Point	Linear	0.157	0.001	0.336
7 Point	Linear	0.007	0.186	0.043
8 Point	Linear	0.136	0.381	0.014
9 Point	Linear	0.366	0.567	0.187
10 Point	Linear	0.489	0.669	0.302
4 Point	Expon'l	0.774	0.678	0.813
5 Point	Expon'l	0.270	0.034	0.469
6 Point	Expon'l	0.150	0.001	0.323
7 Point	Expon'l	0.007	0.178	0.039
8 Point	Expon'l	0.131	0.370	0.015
9 Point	Expon'l	0.355	0.559	0.181
10 Point	Expon'l	0.477	0.660	0.293

MEDICAL		Average		
r ²		(Pd & Inc)	(Incur)	(Pd-22)
4 Point	Linear	0.028	0.001	0.101
5 Point	Linear	0.195	0.239	0.147
6 Point	Linear	0.151	0.245	0.068
7 Point	Linear	0.077	0.212	0.004
8 Point	Linear	0.026	0.132	0.004
9 Point	Linear	0.197	0.369	0.031
10 Point	Linear	0.328	0.521	0.064
4 Point	Expon'l	0.028	0.001	0.102
5 Point	Expon'l	0.191	0.234	0.143
6 Point	Expon'l	0.153	0.245	0.069
7 Point	Expon'l	0.080	0.215	0.004
8 Point	Expon'l	0.028	0.136	0.004
9 Point	Expon'l	0.198	0.368	0.031
10 Point	Expon'l	0.328	0.518	0.066

INDEMNITY		Loss Ratio	Loss	Loss
Linear	Policy	Average	Ratio	Ratio
FITTED	Year	(Pd & Inc)	(Incur)	(Pd-22)
4 Point	2005	0.4966	0.4752	0.5181
	2006	0.5139	0.4862	0.5416
	2007	0.5312	0.4973	0.5651
	2008	0.5485	0.5084	0.5887
5 Point	2004	0.5091	0.4915	0.5267
	2005	0.5165	0.4934	0.5395
	2006	0.5238	0.4954	0.5523
	2007	0.5312	0.4973	0.5651
	2008	0.5386	0.4993	0.5780
6 Point	2003	0.5133	0.4957	0.5310
	2004	0.5175	0.4960	0.5392
	2005	0.5217	0.4962	0.5473
	2006	0.5259	0.4965	0.5554
	2007	0.5301	0.4967	0.5636
	2008	0.5343	0.4970	0.5717
7 Point	2002	0.5310	0.5145	0.5474
	2003	0.5301	0.5104	0.5499
	2004	0.5293	0.5062	0.5524
	2005	0.5285	0.5021	0.5549
	2006	0.5276	0.4980	0.5573
	2007	0.5268	0.4938	0.5598
	2008	0.5259	0.4897	0.5623
8 Point	2001	0.5457	0.5273	0.5639
	2002	0.5420	0.5215	0.5626
	2003	0.5384	0.5156	0.5613
	2004	0.5348	0.5097	0.5600
	2005	0.5312	0.5038	0.5586
	2006	0.5276	0.4980	0.5573
	2007	0.5240	0.4921	0.5560
	2008	0.5204	0.4862	0.5547
9 Point	2000	0.5686	0.5497	0.5875
	2001	0.5616	0.5409	0.5823
	2002	0.5546	0.5321	0.5770
	2003	0.5475	0.5233	0.5718
	2004	0.5405	0.5145	0.5665
	2005	0.5335	0.5058	0.5613
	2006	0.5265	0.4970	0.5560
	2007	0.5195	0.4882	0.5508
10 Point	1999	0.5807	0.5625	0.5988
	2000	0.5729	0.5531	0.5926
	2001	0.5650	0.5436	0.5864
	2002	0.5572	0.5342	0.5802
	2003	0.5494	0.5248	0.5740
	2004	0.5416	0.5154	0.5678
	2005	0.5338	0.5060	0.5616
	2006	0.5259	0.4966	0.5554
	2007	0.5181	0.4871	0.5492
2008	0.5103	0.4777	0.5430	

INDEMNITY Expon'l FITTED	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2005	0.4968	0.4752	0.5184
	2006	0.5135	0.4860	0.5410
	2007	0.5308	0.4971	0.5645
	2008	0.5487	0.5085	0.5890
5 Point	2004	0.5090	0.4912	0.5270
	2005	0.5162	0.4931	0.5392
	2006	0.5234	0.4951	0.5517
	2007	0.5308	0.4971	0.5645
	2008	0.5383	0.4991	0.5776
6 Point	2003	0.5133	0.4955	0.5313
	2004	0.5174	0.4958	0.5391
	2005	0.5215	0.4960	0.5469
	2006	0.5256	0.4963	0.5548
	2007	0.5297	0.4965	0.5629
	2008	0.5339	0.4968	0.5711
7 Point	2002	0.5306	0.5140	0.5473
	2003	0.5297	0.5099	0.5496
	2004	0.5289	0.5058	0.5520
	2005	0.5281	0.5017	0.5543
	2006	0.5272	0.4977	0.5567
	2007	0.5264	0.4937	0.5591
	2008	0.5256	0.4898	0.5615
8 Point	2001	0.5452	0.5269	0.5635
	2002	0.5415	0.5210	0.5621
	2003	0.5379	0.5150	0.5607
	2004	0.5343	0.5092	0.5594
	2005	0.5308	0.5034	0.5581
	2006	0.5272	0.4977	0.5567
	2007	0.5237	0.4921	0.5554
	2008	0.5202	0.4865	0.5540
9 Point	2000	0.5678	0.5491	0.5866
	2001	0.5606	0.5400	0.5813
	2002	0.5536	0.5311	0.5760
	2003	0.5466	0.5223	0.5708
	2004	0.5397	0.5137	0.5657
	2005	0.5329	0.5052	0.5605
	2006	0.5262	0.4968	0.5555
	2007	0.5195	0.4886	0.5505
10 Point	1999	0.5802	0.5624	0.5982
	2000	0.5721	0.5525	0.5918
	2001	0.5641	0.5427	0.5855
	2002	0.5562	0.5331	0.5792
	2003	0.5484	0.5237	0.5730
	2004	0.5407	0.5145	0.5669
	2005	0.5332	0.5054	0.5609
	2006	0.5257	0.4965	0.5549
	2007	0.5183	0.4877	0.5489
2008	0.5111	0.4791	0.5431	

MEDICAL Linear FITTED	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2005	0.4876	0.4601	0.5151
	2006	0.4896	0.4605	0.5188
	2007	0.4917	0.4608	0.5225
	2008	0.4937	0.4612	0.5262
5 Point	2004	0.5085	0.4802	0.5368
	2005	0.5029	0.4737	0.5320
	2006	0.4973	0.4673	0.5272
	2007	0.4917	0.4608	0.5225
	2008	0.4861	0.4544	0.5177
6 Point	2003	0.5073	0.4815	0.5331
	2004	0.5035	0.4764	0.5306
	2005	0.4998	0.4714	0.5282
	2006	0.4960	0.4663	0.5257
	2007	0.4923	0.4613	0.5232
	2008	0.4885	0.4563	0.5208
7 Point	2002	0.5040	0.4809	0.5270
	2003	0.5019	0.4771	0.5265
	2004	0.4997	0.4734	0.5260
	2005	0.4976	0.4696	0.5255
	2006	0.4955	0.4659	0.5250
	2007	0.4934	0.4622	0.5246
	2008	0.4913	0.4584	0.5241
8 Point	2001	0.5005	0.4779	0.5231
	2002	0.4995	0.4755	0.5235
	2003	0.4985	0.4731	0.5239
	2004	0.4975	0.4707	0.5243
	2005	0.4965	0.4683	0.5246
	2006	0.4955	0.4659	0.5250
	2007	0.4945	0.4635	0.5254
	2008	0.4935	0.4611	0.5258
9 Point	2000	0.5126	0.4946	0.5307
	2001	0.5097	0.4896	0.5297
	2002	0.5067	0.4847	0.5286
	2003	0.5037	0.4798	0.5276
	2004	0.5008	0.4749	0.5266
	2005	0.4978	0.4700	0.5256
	2006	0.4948	0.4651	0.5246
	2007	0.4919	0.4602	0.5236
10 Point	1999	0.5199	0.5065	0.5334
	2000	0.5163	0.5005	0.5321
	2001	0.5126	0.4945	0.5308
	2002	0.5090	0.4884	0.5295
	2003	0.5053	0.4824	0.5282
	2004	0.5017	0.4764	0.5270
	2005	0.4980	0.4704	0.5257
	2006	0.4944	0.4643	0.5244
	2007	0.4907	0.4583	0.5231
2008	0.4871	0.4523	0.5218	

MEDICAL Expon'l FITTED	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2005	0.4875	0.4599	0.5150
	2006	0.4895	0.4603	0.5186
	2007	0.4915	0.4606	0.5223
	2008	0.4935	0.4609	0.5260
5 Point	2004	0.5081	0.4798	0.5364
	2005	0.5025	0.4733	0.5316
	2006	0.4970	0.4669	0.5269
	2007	0.4915	0.4606	0.5223
	2008	0.4860	0.4543	0.5177
6 Point	2003	0.5071	0.4814	0.5328
	2004	0.5033	0.4762	0.5304
	2005	0.4995	0.4711	0.5279
	2006	0.4958	0.4660	0.5255
	2007	0.4921	0.4610	0.5230
	2008	0.4884	0.4561	0.5206
7 Point	2002	0.5039	0.4808	0.5268
	2003	0.5017	0.4770	0.5263
	2004	0.4995	0.4732	0.5258
	2005	0.4974	0.4694	0.5253
	2006	0.4952	0.4656	0.5248
	2007	0.4931	0.4619	0.5243
	2008	0.4910	0.4582	0.5238
8 Point	2001	0.5004	0.4779	0.5229
	2002	0.4994	0.4754	0.5233
	2003	0.4984	0.4730	0.5237
	2004	0.4973	0.4705	0.5241
	2005	0.4963	0.4680	0.5244
	2006	0.4952	0.4656	0.5248
	2007	0.4942	0.4632	0.5252
	2008	0.4932	0.4607	0.5256
9 Point	2000	0.5124	0.4943	0.5305
	2001	0.5094	0.4893	0.5295
	2002	0.5064	0.4843	0.5284
	2003	0.5034	0.4793	0.5274
	2004	0.5005	0.4744	0.5264
	2005	0.4975	0.4696	0.5254
	2006	0.4946	0.4648	0.5244
	2007	0.4917	0.4601	0.5233
10 Point	1999	0.5198	0.5064	0.5332
	2000	0.5161	0.5001	0.5319
	2001	0.5123	0.4939	0.5306
	2002	0.5087	0.4878	0.5293
	2003	0.5050	0.4818	0.5280
	2004	0.5014	0.4758	0.5268
	2005	0.4978	0.4700	0.5255
	2006	0.4942	0.4641	0.5242
	2007	0.4906	0.4584	0.5229
	2008	0.4871	0.4527	0.5216

INDEMNITY Linear RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2005	0.0036	0.0013	0.0058
	2006	-0.0129	-0.0087	-0.0171
	2007	0.0151	0.0135	0.0168
	2008	-0.0058	-0.0061	-0.0055
5 Point	2004	0.0198	0.0182	0.0214
	2005	-0.0163	-0.0169	-0.0156
	2006	-0.0228	-0.0179	-0.0278
	2007	0.0151	0.0135	0.0168
	2008	0.0041	0.0030	0.0052
6 Point	2003	0.0106	0.0056	0.0156
	2004	0.0114	0.0137	0.0089
	2005	-0.0215	-0.0197	-0.0234
	2006	-0.0249	-0.0190	-0.0309
	2007	0.0162	0.0141	0.0183
	2008	0.0084	0.0053	0.0115
7 Point	2002	0.0252	0.0220	0.0284
	2003	-0.0062	-0.0091	-0.0033
	2004	-0.0004	0.0035	-0.0043
	2005	-0.0283	-0.0256	-0.0310
	2006	-0.0266	-0.0205	-0.0328
	2007	0.0195	0.0170	0.0221
	2008	0.0168	0.0126	0.0209
8 Point	2001	0.0193	0.0122	0.0265
	2002	0.0142	0.0151	0.0132
	2003	-0.0145	-0.0143	-0.0147
	2004	-0.0059	0.0000	-0.0119
	2005	-0.0310	-0.0273	-0.0347
	2006	-0.0266	-0.0205	-0.0328
	2007	0.0223	0.0187	0.0259
	2008	0.0223	0.0161	0.0285
9 Point	2000	0.0319	0.0271	0.0367
	2001	0.0034	-0.0014	0.0081
	2002	0.0016	0.0044	-0.0012
	2003	-0.0236	-0.0220	-0.0252
	2004	-0.0116	-0.0048	-0.0184
	2005	-0.0333	-0.0293	-0.0374
	2006	-0.0255	-0.0195	-0.0315
	2007	0.0268	0.0226	0.0311
2008	0.0303	0.0229	0.0377	
10 Point	1999	0.0095	0.0076	0.0116
	2000	0.0276	0.0237	0.0316
	2001	0.0000	-0.0041	0.0040
	2002	-0.0010	0.0023	-0.0044
	2003	-0.0255	-0.0235	-0.0274
	2004	-0.0127	-0.0057	-0.0197
	2005	-0.0336	-0.0295	-0.0377
	2006	-0.0249	-0.0191	-0.0309
	2007	0.0282	0.0237	0.0327
	2008	0.0324	0.0246	0.0402

INDEMNITY Expon'l RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2005	0.0034	0.0013	0.0055
	2006	-0.0125	-0.0085	-0.0165
	2007	0.0155	0.0137	0.0174
	2008	-0.0060	-0.0062	-0.0058
5 Point	2004	0.0199	0.0185	0.0211
	2005	-0.0160	-0.0166	-0.0153
	2006	-0.0224	-0.0176	-0.0272
	2007	0.0155	0.0137	0.0174
	2008	0.0044	0.0032	0.0056
6 Point	2003	0.0106	0.0058	0.0153
	2004	0.0115	0.0139	0.0090
	2005	-0.0213	-0.0195	-0.0230
	2006	-0.0246	-0.0188	-0.0303
	2007	0.0166	0.0143	0.0190
	2008	0.0088	0.0055	0.0121
7 Point	2002	0.0256	0.0225	0.0285
	2003	-0.0058	-0.0086	-0.0030
	2004	0.0000	0.0039	-0.0039
	2005	-0.0279	-0.0252	-0.0304
	2006	-0.0262	-0.0202	-0.0322
	2007	0.0199	0.0171	0.0228
	2008	0.0171	0.0125	0.0217
8 Point	2001	0.0198	0.0126	0.0269
	2002	0.0147	0.0155	0.0137
	2003	-0.0140	-0.0137	-0.0141
	2004	-0.0054	0.0005	-0.0113
	2005	-0.0306	-0.0269	-0.0342
	2006	-0.0262	-0.0202	-0.0322
	2007	0.0226	0.0187	0.0265
	2008	0.0225	0.0158	0.0292
9 Point	2000	0.0327	0.0277	0.0376
	2001	0.0044	-0.0005	0.0091
	2002	0.0026	0.0054	-0.0002
	2003	-0.0227	-0.0210	-0.0242
	2004	-0.0108	-0.0040	-0.0176
	2005	-0.0327	-0.0287	-0.0366
	2006	-0.0252	-0.0193	-0.0310
	2007	0.0268	0.0222	0.0314
2008	0.0297	0.0218	0.0377	
10 Point	1999	0.0100	0.0077	0.0122
	2000	0.0284	0.0243	0.0324
	2001	0.0009	-0.0032	0.0049
	2002	0.0000	0.0034	-0.0034
	2003	-0.0245	-0.0224	-0.0264
	2004	-0.0118	-0.0048	-0.0188
	2005	-0.0330	-0.0289	-0.0370
	2006	-0.0247	-0.0190	-0.0304
	2007	0.0280	0.0231	0.0330
	2008	0.0316	0.0232	0.0401

MEDICAL Linear RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2005	0.0022	0.0043	0.0001
	2006	-0.0137	-0.0173	-0.0102
	2007	0.0208	0.0217	0.0200
	2008	-0.0093	-0.0087	-0.0100
5 Point	2004	0.0153	0.0136	0.0169
	2005	-0.0131	-0.0093	-0.0168
	2006	-0.0214	-0.0241	-0.0186
	2007	0.0208	0.0217	0.0200
	2008	-0.0017	-0.0019	-0.0015
6 Point	2003	-0.0062	-0.0047	-0.0077
	2004	0.0203	0.0174	0.0231
	2005	-0.0100	-0.0070	-0.0130
	2006	-0.0201	-0.0231	-0.0171
	2007	0.0202	0.0212	0.0193
	2008	-0.0041	-0.0038	-0.0046
7 Point	2002	-0.0082	-0.0066	-0.0098
	2003	-0.0008	-0.0003	-0.0011
	2004	0.0241	0.0204	0.0277
	2005	-0.0078	-0.0052	-0.0103
	2006	-0.0196	-0.0227	-0.0164
	2007	0.0191	0.0203	0.0180
	2008	-0.0069	-0.0059	-0.0079
	2009			
8 Point	2001	-0.0078	-0.0093	-0.0063
	2002	-0.0037	-0.0012	-0.0063
	2003	0.0026	0.0037	0.0015
	2004	0.0263	0.0231	0.0294
	2005	-0.0067	-0.0039	-0.0094
	2006	-0.0196	-0.0227	-0.0164
	2007	0.0180	0.0190	0.0171
	2008	-0.0091	-0.0086	-0.0096
	2009			
9 Point	2000	0.0183	0.0234	0.0132
	2001	-0.0170	-0.0210	-0.0129
	2002	-0.0109	-0.0104	-0.0114
	2003	-0.0026	-0.0030	-0.0022
	2004	0.0230	0.0189	0.0271
	2005	-0.0080	-0.0056	-0.0104
	2006	-0.0189	-0.0219	-0.0160
	2007	0.0206	0.0223	0.0189
	2008	-0.0045	-0.0027	-0.0063
10 Point	1999	0.0083	0.0134	0.0031
	2000	0.0146	0.0175	0.0118
	2001	-0.0199	-0.0259	-0.0140
	2002	-0.0132	-0.0141	-0.0123
	2003	-0.0042	-0.0056	-0.0028
	2004	0.0221	0.0174	0.0267
	2005	-0.0082	-0.0060	-0.0105
	2006	-0.0185	-0.0211	-0.0158
	2007	0.0218	0.0242	0.0194
	2008	-0.0027	0.0002	-0.0056

MEDICAL Expon'l RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2005	0.0023	0.0045	0.0002
	2006	-0.0136	-0.0171	-0.0100
	2007	0.0210	0.0219	0.0202
	2008	-0.0091	-0.0084	-0.0098
5 Point	2004	0.0157	0.0140	0.0173
	2005	-0.0127	-0.0089	-0.0164
	2006	-0.0211	-0.0237	-0.0183
	2007	0.0210	0.0219	0.0202
	2008	-0.0016	-0.0018	-0.0015
6 Point	2003	-0.0060	-0.0046	-0.0074
	2004	0.0205	0.0176	0.0233
	2005	-0.0097	-0.0067	-0.0127
	2006	-0.0199	-0.0228	-0.0169
	2007	0.0204	0.0215	0.0195
	2008	-0.0040	-0.0036	-0.0044
7 Point	2002	-0.0081	-0.0065	-0.0096
	2003	-0.0006	-0.0002	-0.0009
	2004	0.0243	0.0206	0.0279
	2005	-0.0076	-0.0050	-0.0101
	2006	-0.0193	-0.0224	-0.0162
	2007	0.0194	0.0206	0.0182
	2008	-0.0066	-0.0057	-0.0076
8 Point	2001	-0.0077	-0.0093	-0.0061
	2002	-0.0036	-0.0011	-0.0061
	2003	0.0027	0.0038	0.0017
	2004	0.0265	0.0233	0.0296
	2005	-0.0065	-0.0036	-0.0092
	2006	-0.0193	-0.0224	-0.0162
	2007	0.0183	0.0193	0.0173
	2008	-0.0088	-0.0082	-0.0094
9 Point	2000	0.0185	0.0237	0.0134
	2001	-0.0167	-0.0207	-0.0127
	2002	-0.0106	-0.0100	-0.0112
	2003	-0.0023	-0.0025	-0.0020
	2004	0.0233	0.0194	0.0273
	2005	-0.0077	-0.0052	-0.0102
	2006	-0.0187	-0.0216	-0.0158
	2007	0.0208	0.0224	0.0192
	2008	-0.0044	-0.0029	-0.0061
10 Point	1999	0.0084	0.0135	0.0033
	2000	0.0148	0.0179	0.0120
	2001	-0.0196	-0.0253	-0.0138
	2002	-0.0129	-0.0135	-0.0121
	2003	-0.0039	-0.0050	-0.0026
	2004	0.0224	0.0180	0.0269
	2005	-0.0080	-0.0056	-0.0103
	2006	-0.0183	-0.0209	-0.0156
	2007	0.0219	0.0241	0.0196
	2008	-0.0027	-0.0002	-0.0054