

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	(Incur)	(Pd-24)
r^2		(Pd & Inc)		
4 Point	Linear	0.983	0.973	0.932
5 Point	Linear	0.436	0.748	0.043
6 Point	Linear	0.403	0.716	0.016
7 Point	Linear	0.626	0.806	0.266
8 Point	Linear	0.736	0.853	0.465
9 Point	Linear	0.790	0.882	0.614
10 Point	Linear	0.847	0.911	0.719
4 Point	Expon'l	0.984	0.977	0.932
5 Point	Expon'l	0.442	0.756	0.042
6 Point	Expon'l	0.410	0.722	0.016
7 Point	Expon'l	0.631	0.815	0.263
8 Point	Expon'l	0.739	0.858	0.460
9 Point	Expon'l	0.798	0.891	0.615
10 Point	Expon'l	0.853	0.916	0.720

MEDICAL		Average	(Incur)	(Pd-24)
r^2		(Pd & Inc)		
4 Point	Linear	0.196	0.169	0.238
5 Point	Linear	0.011	0.011	0.011
6 Point	Linear	0.047	0.053	0.039
7 Point	Linear	0.325	0.298	0.347
8 Point	Linear	0.347	0.298	0.394
9 Point	Linear	0.383	0.347	0.413
10 Point	Linear	0.298	0.233	0.364
4 Point	Expon'l	0.191	0.163	0.233
5 Point	Expon'l	0.010	0.010	0.010
6 Point	Expon'l	0.048	0.054	0.040
7 Point	Expon'l	0.321	0.294	0.344
8 Point	Expon'l	0.347	0.298	0.393
9 Point	Expon'l	0.384	0.348	0.414
10 Point	Expon'l	0.302	0.237	0.368

INDEMNITY		Loss Ratio	Loss	Loss
Linear	Policy	Average	Ratio	Ratio
<b>FITTED</b>	Year	(Pd & Inc)	(Incur)	(Pd-24)
4 Point	2007	0.5289	0.5125	0.5453
	2008	0.5156	0.4957	0.5354
	2009	0.5022	0.4789	0.5256
	2010	0.4889	0.4621	0.5157
5 Point	2006	0.5211	0.5113	0.5309
	2007	0.5148	0.5005	0.5291
	2008	0.5085	0.4897	0.5273
	2009	0.5022	0.4789	0.5256
	2010	0.4960	0.4680	0.5238
6 Point	2005	0.5215	0.5140	0.5291
	2006	0.5168	0.5054	0.5283
	2007	0.5121	0.4968	0.5275
	2008	0.5075	0.4882	0.5267
	2009	0.5028	0.4796	0.5259
	2010	0.4981	0.4710	0.5251
7 Point	2004	0.5387	0.5345	0.5431
	2005	0.5312	0.5231	0.5392
	2006	0.5236	0.5118	0.5354
	2007	0.5160	0.5004	0.5316
	2008	0.5084	0.4891	0.5277
	2009	0.5008	0.4778	0.5239
	2010	0.4933	0.4664	0.5200
8 Point	2003	0.5488	0.5441	0.5535
	2004	0.5407	0.5331	0.5484
	2005	0.5327	0.5221	0.5432
	2006	0.5246	0.5111	0.5380
	2007	0.5165	0.5001	0.5329
	2008	0.5084	0.4891	0.5277
	2009	0.5003	0.4781	0.5225
	2010	0.4923	0.4671	0.5174
9 Point	2002	0.5698	0.5650	0.5747
	2003	0.5595	0.5523	0.5667
	2004	0.5491	0.5395	0.5587
	2005	0.5388	0.5268	0.5507
	2006	0.5284	0.5140	0.5427
	2007	0.5180	0.5013	0.5348
	2008	0.5077	0.4885	0.5268
	2009	0.4973	0.4758	0.5188
	2010	0.4869	0.4630	0.5108
10 Point	2001	0.5851	0.5774	0.5928
	2002	0.5740	0.5647	0.5832
	2003	0.5628	0.5520	0.5737
	2004	0.5517	0.5393	0.5641
	2005	0.5406	0.5266	0.5545
	2006	0.5294	0.5139	0.5449
	2007	0.5183	0.5013	0.5353
	2008	0.5071	0.4886	0.5257
	2009	0.4960	0.4759	0.5161
	2010	0.4849	0.4632	0.5065

INDEMNITY Expon'l <b>FITTED</b>	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-24)
4 Point	2007	0.5290	0.5126	0.5454
	2008	0.5154	0.4953	0.5353
	2009	0.5021	0.4786	0.5255
	2010	0.4891	0.4624	0.5158
5 Point	2006	0.5211	0.5116	0.5307
	2007	0.5147	0.5004	0.5289
	2008	0.5083	0.4894	0.5272
	2009	0.5021	0.4786	0.5255
	2010	0.4959	0.4681	0.5237
6 Point	2005	0.5216	0.5144	0.5290
	2006	0.5168	0.5054	0.5282
	2007	0.5120	0.4965	0.5274
	2008	0.5073	0.4879	0.5266
	2009	0.5026	0.4793	0.5258
	2010	0.4979	0.4710	0.5250
7 Point	2004	0.5387	0.5348	0.5429
	2005	0.5309	0.5229	0.5390
	2006	0.5232	0.5112	0.5352
	2007	0.5156	0.4998	0.5313
	2008	0.5082	0.4887	0.5276
	2009	0.5008	0.4778	0.5238
	2010	0.4936	0.4671	0.5201
8 Point	2003	0.5490	0.5448	0.5534
	2004	0.5406	0.5331	0.5481
	2005	0.5323	0.5216	0.5429
	2006	0.5241	0.5104	0.5377
	2007	0.5161	0.4994	0.5326
	2008	0.5082	0.4887	0.5276
	2009	0.5004	0.4781	0.5226
	2010	0.4927	0.4678	0.5176
	9 Point	2002	0.5700	0.5660
2003		0.5591	0.5522	0.5661
2004		0.5484	0.5387	0.5580
2005		0.5379	0.5256	0.5500
2006		0.5276	0.5128	0.5421
2007		0.5174	0.5004	0.5344
2008		0.5075	0.4882	0.5267
2009		0.4978	0.4763	0.5192
2010		0.4882	0.4647	0.5117
10 Point		2001	0.5857	0.5789
	2002	0.5738	0.5650	0.5826
	2003	0.5621	0.5514	0.5727
	2004	0.5506	0.5382	0.5630
	2005	0.5394	0.5252	0.5535
	2006	0.5284	0.5126	0.5441
	2007	0.5177	0.5003	0.5348
	2008	0.5071	0.4883	0.5258
	2009	0.4968	0.4766	0.5169
	2010	0.4867	0.4651	0.5081

MEDICAL Linear <b>FITTED</b>	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2007	0.5255	0.5129	0.5381
	2008	0.5193	0.5062	0.5324
	2009	0.5132	0.4995	0.5268
	2010	0.5070	0.4928	0.5212
5 Point	2006	0.5163	0.5032	0.5295
	2007	0.5153	0.5020	0.5286
	2008	0.5142	0.5007	0.5277
	2009	0.5132	0.4995	0.5268
	2010	0.5121	0.4983	0.5259
6 Point	2005	0.5198	0.5078	0.5319
	2006	0.5181	0.5056	0.5306
	2007	0.5164	0.5035	0.5293
	2008	0.5147	0.5013	0.5280
	2009	0.5129	0.4992	0.5267
	2010	0.5112	0.4970	0.5254
7 Point	2004	0.5373	0.5240	0.5506
	2005	0.5319	0.5186	0.5453
	2006	0.5266	0.5132	0.5399
	2007	0.5212	0.5078	0.5346
	2008	0.5159	0.5024	0.5293
	2009	0.5105	0.4970	0.5240
	2010	0.5052	0.4916	0.5187
8 Point	2003	0.5391	0.5249	0.5534
	2004	0.5345	0.5204	0.5486
	2005	0.5298	0.5159	0.5438
	2006	0.5252	0.5114	0.5390
	2007	0.5205	0.5069	0.5341
	2008	0.5159	0.5024	0.5293
	2009	0.5112	0.4979	0.5245
	2010	0.5066	0.4934	0.5197
9 Point	2002	0.5414	0.5278	0.5551
	2003	0.5372	0.5236	0.5508
	2004	0.5329	0.5194	0.5465
	2005	0.5287	0.5151	0.5423
	2006	0.5245	0.5109	0.5380
	2007	0.5202	0.5067	0.5338
	2008	0.5160	0.5025	0.5295
	2009	0.5118	0.4983	0.5252
	2010	0.5076	0.4941	0.5210
10 Point	2001	0.5390	0.5240	0.5541
	2002	0.5358	0.5210	0.5507
	2003	0.5326	0.5181	0.5472
	2004	0.5295	0.5151	0.5438
	2005	0.5263	0.5122	0.5404
	2006	0.5231	0.5092	0.5369
	2007	0.5199	0.5063	0.5335
	2008	0.5167	0.5034	0.5301
	2009	0.5135	0.5004	0.5266
	2010	0.5103	0.4975	0.5232

MEDICAL Expon'l <b>FITTED</b>	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-22)
4 Point	2007	0.5252	0.5125	0.5379
	2008	0.5191	0.5058	0.5323
	2009	0.5130	0.4992	0.5267
	2010	0.5070	0.4927	0.5212
5 Point	2006	0.5161	0.5029	0.5293
	2007	0.5150	0.5016	0.5284
	2008	0.5140	0.5004	0.5276
	2009	0.5130	0.4992	0.5267
	2010	0.5120	0.4980	0.5258
6 Point	2005	0.5197	0.5076	0.5318
	2006	0.5179	0.5054	0.5305
	2007	0.5162	0.5032	0.5292
	2008	0.5145	0.5011	0.5279
	2009	0.5128	0.4989	0.5265
	2010	0.5110	0.4968	0.5252
7 Point	2004	0.5370	0.5237	0.5502
	2005	0.5316	0.5182	0.5449
	2006	0.5262	0.5128	0.5396
	2007	0.5209	0.5074	0.5343
	2008	0.5156	0.5021	0.5291
	2009	0.5104	0.4968	0.5240
	2010	0.5053	0.4916	0.5189
8 Point	2003	0.5390	0.5248	0.5533
	2004	0.5342	0.5202	0.5484
	2005	0.5295	0.5156	0.5435
	2006	0.5249	0.5111	0.5387
	2007	0.5202	0.5066	0.5339
	2008	0.5156	0.5021	0.5291
	2009	0.5111	0.4977	0.5244
	2010	0.5066	0.4933	0.5198
9 Point	2002	0.5414	0.5278	0.5550
	2003	0.5370	0.5235	0.5507
	2004	0.5327	0.5191	0.5463
	2005	0.5284	0.5148	0.5420
	2006	0.5242	0.5106	0.5378
	2007	0.5200	0.5064	0.5335
	2008	0.5158	0.5022	0.5293
	2009	0.5116	0.4981	0.5251
	2010	0.5075	0.4939	0.5210
10 Point	2001	0.5391	0.5240	0.5541
	2002	0.5358	0.5210	0.5506
	2003	0.5325	0.5179	0.5471
	2004	0.5292	0.5149	0.5436
	2005	0.5260	0.5119	0.5401
	2006	0.5228	0.5089	0.5367
	2007	0.5196	0.5060	0.5332
	2008	0.5165	0.5030	0.5298
	2009	0.5133	0.5001	0.5265
	2010	0.5102	0.4972	0.5231

INDEMNITY Linear RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-24)
4 Point	2007	0.0001	0.0027	-0.0025
	2008	0.0014	-0.0019	0.0049
	2009	-0.0032	-0.0041	-0.0024
	2010	0.0017	0.0034	0.0000
5 Point	2006	-0.0141	-0.0119	-0.0162
	2007	0.0142	0.0146	0.0137
	2008	0.0085	0.0040	0.0130
	2009	-0.0032	-0.0041	-0.0024
	2010	-0.0054	-0.0026	-0.0081
6 Point	2005	-0.0053	-0.0075	-0.0032
	2006	-0.0098	-0.0060	-0.0136
	2007	0.0169	0.0183	0.0153
	2008	0.0095	0.0055	0.0136
	2009	-0.0038	-0.0048	-0.0027
	2010	-0.0075	-0.0056	-0.0094
7 Point	2004	0.0145	0.0137	0.0152
	2005	-0.0150	-0.0166	-0.0133
	2006	-0.0166	-0.0124	-0.0207
	2007	0.0130	0.0147	0.0112
	2008	0.0086	0.0046	0.0126
	2009	-0.0018	-0.0030	-0.0007
	2010	-0.0027	-0.0010	-0.0043
8 Point	2003	0.0035	-0.0023	0.0093
	2004	0.0125	0.0151	0.0099
	2005	-0.0165	-0.0156	-0.0173
	2006	-0.0176	-0.0117	-0.0233
	2007	0.0125	0.0150	0.0099
	2008	0.0086	0.0046	0.0126
	2009	-0.0013	-0.0033	0.0007
	2010	-0.0017	-0.0017	-0.0017
	9 Point	2002	0.0214	0.0163
2003		-0.0072	-0.0105	-0.0039
2004		0.0041	0.0087	-0.0004
2005		-0.0226	-0.0203	-0.0248
2006		-0.0214	-0.0146	-0.0280
2007		0.0110	0.0138	0.0080
2008		0.0093	0.0052	0.0135
2009		0.0017	-0.0010	0.0044
2010		0.0037	0.0024	0.0049
10 Point		2001	0.0093	-0.0008
	2002	0.0172	0.0166	0.0178
	2003	-0.0105	-0.0102	-0.0109
	2004	0.0015	0.0089	-0.0058
	2005	-0.0244	-0.0201	-0.0286
	2006	-0.0224	-0.0145	-0.0302
	2007	0.0107	0.0138	0.0075
	2008	0.0099	0.0051	0.0146
	2009	0.0030	-0.0011	0.0071
	2010	0.0057	0.0022	0.0092

INDEMNITY Expon'l <b>RESIDUALS</b>	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-24)
4 Point	2007	0.0000	0.0025	-0.0026
	2008	0.0016	-0.0016	0.0050
	2009	-0.0031	-0.0038	-0.0023
	2010	0.0015	0.0030	-0.0001
5 Point	2006	-0.0141	-0.0122	-0.0160
	2007	0.0143	0.0147	0.0139
	2008	0.0087	0.0043	0.0131
	2009	-0.0031	-0.0038	-0.0023
	2010	-0.0053	-0.0027	-0.0080
6 Point	2005	-0.0054	-0.0079	-0.0031
	2006	-0.0098	-0.0060	-0.0135
	2007	0.0170	0.0186	0.0154
	2008	0.0097	0.0058	0.0137
	2009	-0.0036	-0.0045	-0.0026
	2010	-0.0073	-0.0056	-0.0093
7 Point	2004	0.0145	0.0134	0.0154
	2005	-0.0147	-0.0164	-0.0131
	2006	-0.0162	-0.0118	-0.0205
	2007	0.0134	0.0153	0.0115
	2008	0.0088	0.0050	0.0127
	2009	-0.0018	-0.0030	-0.0006
	2010	-0.0030	-0.0017	-0.0044
8 Point	2003	0.0033	-0.0030	0.0094
	2004	0.0126	0.0151	0.0102
	2005	-0.0161	-0.0151	-0.0170
	2006	-0.0171	-0.0110	-0.0230
	2007	0.0129	0.0157	0.0102
	2008	0.0088	0.0050	0.0127
	2009	-0.0014	-0.0033	0.0006
	2010	-0.0021	-0.0024	-0.0019
	9 Point	2002	0.0212	0.0153
2003		-0.0068	-0.0104	-0.0033
2004		0.0048	0.0095	0.0003
2005		-0.0217	-0.0191	-0.0241
2006		-0.0206	-0.0134	-0.0274
2007		0.0116	0.0147	0.0084
2008		0.0095	0.0055	0.0136
2009		0.0012	-0.0015	0.0040
2010		0.0024	0.0007	0.0040
10 Point		2001	0.0087	-0.0023
	2002	0.0174	0.0163	0.0184
	2003	-0.0098	-0.0096	-0.0099
	2004	0.0026	0.0100	-0.0047
	2005	-0.0232	-0.0187	-0.0276
	2006	-0.0214	-0.0132	-0.0294
	2007	0.0113	0.0148	0.0080
	2008	0.0099	0.0054	0.0145
	2009	0.0022	-0.0018	0.0063
	2010	0.0039	0.0003	0.0076



MEDICAL Linear RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-24)
4 Point	2007	0.0124	0.0151	0.0098
	2008	-0.0099	-0.0124	-0.0075
	2009	-0.0174	-0.0204	-0.0144
	2010	0.0149	0.0177	0.0121
5 Point	2006	-0.0102	-0.0110	-0.0095
	2007	0.0226	0.0260	0.0193
	2008	-0.0048	-0.0069	-0.0028
	2009	-0.0174	-0.0204	-0.0144
	2010	0.0098	0.0122	0.0074
6 Point	2005	0.0022	0.0030	0.0014
	2006	-0.0120	-0.0134	-0.0106
	2007	0.0215	0.0245	0.0186
	2008	-0.0053	-0.0075	-0.0031
	2009	-0.0171	-0.0201	-0.0143
	2010	0.0107	0.0135	0.0079
7 Point	2004	0.0182	0.0163	0.0200
	2005	-0.0099	-0.0078	-0.0120
	2006	-0.0205	-0.0210	-0.0199
	2007	0.0167	0.0202	0.0133
	2008	-0.0065	-0.0086	-0.0044
	2009	-0.0147	-0.0179	-0.0116
	2010	0.0167	0.0189	0.0146
8 Point	2003	-0.0049	-0.0064	-0.0034
	2004	0.0210	0.0199	0.0220
	2005	-0.0078	-0.0051	-0.0105
	2006	-0.0191	-0.0192	-0.0190
	2007	0.0174	0.0211	0.0138
	2008	-0.0065	-0.0086	-0.0044
	2009	-0.0154	-0.0188	-0.0121
	2010	0.0153	0.0171	0.0136
9 Point	2002	-0.0039	-0.0026	-0.0053
	2003	-0.0030	-0.0051	-0.0008
	2004	0.0226	0.0209	0.0241
	2005	-0.0067	-0.0043	-0.0090
	2006	-0.0184	-0.0187	-0.0180
	2007	0.0177	0.0213	0.0141
	2008	-0.0066	-0.0087	-0.0046
	2009	-0.0160	-0.0192	-0.0128
	2010	0.0143	0.0164	0.0123
10 Point	2001	-0.0125	-0.0152	-0.0099
	2002	0.0017	0.0042	-0.0009
	2003	0.0016	0.0004	0.0028
	2004	0.0260	0.0252	0.0268
	2005	-0.0043	-0.0014	-0.0071
	2006	-0.0170	-0.0170	-0.0169
	2007	0.0180	0.0217	0.0144
	2008	-0.0073	-0.0096	-0.0052
	2009	-0.0177	-0.0213	-0.0142
	2010	0.0116	0.0130	0.0101

MEDICAL Expon'l RESIDUALS	Policy Year	Loss Ratio Average (Pd & Inc)	Loss Ratio (Incur)	Loss Ratio (Pd-24)
4 Point	2007	0.0127	0.0155	0.0100
	2008	-0.0097	-0.0120	-0.0074
	2009	-0.0172	-0.0201	-0.0143
	2010	0.0149	0.0178	0.0121
5 Point	2006	-0.0100	-0.0107	-0.0093
	2007	0.0229	0.0264	0.0195
	2008	-0.0046	-0.0066	-0.0027
	2009	-0.0172	-0.0201	-0.0143
	2010	0.0099	0.0125	0.0075
6 Point	2005	0.0023	0.0032	0.0015
	2006	-0.0118	-0.0132	-0.0105
	2007	0.0217	0.0248	0.0187
	2008	-0.0051	-0.0073	-0.0030
	2009	-0.0170	-0.0198	-0.0141
	2010	0.0109	0.0137	0.0081
7 Point	2004	0.0185	0.0166	0.0204
	2005	-0.0096	-0.0074	-0.0116
	2006	-0.0201	-0.0206	-0.0196
	2007	0.0170	0.0206	0.0136
	2008	-0.0062	-0.0083	-0.0042
	2009	-0.0146	-0.0177	-0.0116
	2010	0.0166	0.0189	0.0144
8 Point	2003	-0.0048	-0.0063	-0.0033
	2004	0.0213	0.0201	0.0222
	2005	-0.0075	-0.0048	-0.0102
	2006	-0.0188	-0.0189	-0.0187
	2007	0.0177	0.0214	0.0140
	2008	-0.0062	-0.0083	-0.0042
	2009	-0.0153	-0.0186	-0.0120
	2010	0.0153	0.0172	0.0135
9 Point	2002	-0.0039	-0.0026	-0.0052
	2003	-0.0028	-0.0050	-0.0007
	2004	0.0228	0.0212	0.0243
	2005	-0.0064	-0.0040	-0.0087
	2006	-0.0181	-0.0184	-0.0178
	2007	0.0179	0.0216	0.0144
	2008	-0.0064	-0.0084	-0.0044
	2009	-0.0158	-0.0190	-0.0127
	2010	0.0144	0.0166	0.0123
10 Point	2001	-0.0126	-0.0152	-0.0099
	2002	0.0017	0.0042	-0.0008
	2003	0.0017	0.0006	0.0029
	2004	0.0263	0.0254	0.0270
	2005	-0.0040	-0.0011	-0.0068
	2006	-0.0167	-0.0167	-0.0167
	2007	0.0183	0.0220	0.0147
	2008	-0.0071	-0.0092	-0.0049
	2009	-0.0175	-0.0210	-0.0141
	2010	0.0117	0.0133	0.0102