

PENNSYLVANIA COMPENSATION RATING BUREAU

Measures of Goodness of Fit in Trend Calculations Using Severity Ratios

Estimates of trended severity 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 severity 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

Freq	Adj LR	r ²	Average (Pd & Inc)	(Incur)	(Pd-24)
4 Point	Linear		0.560	0.375	0.633
5 Point	Linear		0.728	0.643	0.772
6 Point	Linear		0.840	0.794	0.863
7 Point	Linear		0.872	0.835	0.890
8 Point	Linear		0.911	0.890	0.916
9 Point	Linear		0.927	0.918	0.925
10 Point	Linear		0.941	0.940	0.928
4 Point	Expon'l		0.561	0.378	0.632
5 Point	Expon'l		0.721	0.640	0.763
6 Point	Expon'l		0.837	0.792	0.858
7 Point	Expon'l		0.872	0.835	0.890
8 Point	Expon'l		0.913	0.890	0.920
9 Point	Expon'l		0.933	0.920	0.933
10 Point	Expon'l		0.948	0.942	0.939

MEDICAL

Freq	Adj LR	r ²	Average (Pd & Inc)	(Incur)	(Pd-24)
4 Point	Linear		0.860	0.746	0.932
5 Point	Linear		0.879	0.842	0.905
6 Point	Linear		0.921	0.892	0.939
7 Point	Linear		0.922	0.905	0.933
8 Point	Linear		0.948	0.936	0.955
9 Point	Linear		0.962	0.955	0.966
10 Point	Linear		0.972	0.966	0.975
4 Point	Expon'l		0.867	0.752	0.937
5 Point	Expon'l		0.865	0.830	0.889
6 Point	Expon'l		0.914	0.887	0.932
7 Point	Expon'l		0.921	0.905	0.931
8 Point	Expon'l		0.945	0.934	0.952
9 Point	Expon'l		0.954	0.949	0.957
10 Point	Expon'l		0.963	0.958	0.967

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2007	0.8890	0.8612	0.9167
	2008	0.9037	0.8683	0.9390
	2009	0.9184	0.8753	0.9612
	2010	0.9330	0.8824	0.9835
5 Point	2006	0.8228	0.8077	0.8381
	2007	0.8547	0.8302	0.8791
	2008	0.8865	0.8528	0.9202
	2009	0.9184	0.8753	0.9612
	2010	0.9502	0.8979	1.0023
6 Point	2005	0.7817	0.7714	0.7922
	2006	0.8161	0.7977	0.8346
	2007	0.8505	0.8240	0.8770
	2008	0.8848	0.8503	0.9193
	2009	0.9192	0.8766	0.9617
	2010	0.9536	0.9029	1.0040
7 Point	2004	0.7575	0.7531	0.7622
	2005	0.7896	0.7775	0.8017
	2006	0.8216	0.8020	0.8412
	2007	0.8536	0.8264	0.8807
	2008	0.8856	0.8509	0.9203
	2009	0.9176	0.8753	0.9598
	2010	0.9497	0.8998	0.9993
8 Point	2003	0.7259	0.7220	0.7300
	2004	0.7579	0.7478	0.7681
	2005	0.7898	0.7735	0.8061
	2006	0.8217	0.7993	0.8442
	2007	0.8537	0.8251	0.8822
	2008	0.8856	0.8509	0.9203
	2009	0.9176	0.8767	0.9583
	2010	0.9495	0.9025	0.9964
9 Point	2002	0.7011	0.6980	0.7043
	2003	0.7318	0.7234	0.7402
	2004	0.7625	0.7489	0.7760
	2005	0.7932	0.7744	0.8119
	2006	0.8238	0.7998	0.8478
	2007	0.8545	0.8253	0.8837
	2008	0.8852	0.8508	0.9195
	2009	0.9159	0.8762	0.9554
	2010	0.9466	0.9017	0.9913
10 Point	2001	0.6764	0.6706	0.6821
	2002	0.7061	0.6964	0.7158
	2003	0.7358	0.7222	0.7495
	2004	0.7656	0.7479	0.7833
	2005	0.7953	0.7737	0.8170
	2006	0.8251	0.7995	0.8507
	2007	0.8548	0.8252	0.8844
	2008	0.8846	0.8510	0.9181
	2009	0.9143	0.8767	0.9518
	2010	0.9441	0.9025	0.9855

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2007	0.8887	0.8611	0.9161
	2008	0.9033	0.8681	0.9383
	2009	0.9182	0.8753	0.9610
	2010	0.9334	0.8825	0.9842
5 Point	2006	0.8218	0.8068	0.8369
	2007	0.8527	0.8290	0.8763
	2008	0.8849	0.8518	0.9177
	2009	0.9182	0.8753	0.9610
	2010	0.9528	0.8994	1.0063
6 Point	2005	0.7821	0.7712	0.7932
	2006	0.8143	0.7963	0.8323
	2007	0.8479	0.8223	0.8734
	2008	0.8829	0.8491	0.9164
	2009	0.9193	0.8767	0.9616
	2010	0.9572	0.9052	1.0090
7 Point	2004	0.7595	0.7540	0.7654
	2005	0.7888	0.7769	0.8008
	2006	0.8192	0.8004	0.8379
	2007	0.8508	0.8247	0.8767
	2008	0.8836	0.8497	0.9173
	2009	0.9177	0.8754	0.9598
	2010	0.9531	0.9020	1.0042
8 Point	2003	0.7293	0.7238	0.7352
	2004	0.7578	0.7474	0.7684
	2005	0.7875	0.7717	0.8032
	2006	0.8183	0.7969	0.8396
	2007	0.8503	0.8229	0.8776
	2008	0.8836	0.8497	0.9173
	2009	0.9182	0.8774	0.9588
	2010	0.9541	0.9059	1.0023
9 Point	2002	0.7060	0.7009	0.7113
	2003	0.7328	0.7238	0.7420
	2004	0.7607	0.7474	0.7741
	2005	0.7897	0.7717	0.8075
	2006	0.8197	0.7969	0.8424
	2007	0.8509	0.8229	0.8788
	2008	0.8833	0.8497	0.9167
	2009	0.9169	0.8774	0.9563
	2010	0.9518	0.9060	0.9976
10 Point	2001	0.6827	0.6747	0.6908
	2002	0.7082	0.6974	0.7191
	2003	0.7347	0.7208	0.7487
	2004	0.7622	0.7450	0.7794
	2005	0.7908	0.7700	0.8114
	2006	0.8204	0.7959	0.8447
	2007	0.8511	0.8226	0.8794
	2008	0.8830	0.8502	0.9155
	2009	0.9160	0.8788	0.9530
	2010	0.9503	0.9083	0.9921

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2007	0.8815	0.8601	0.9029
	2008	0.9102	0.8869	0.9334
	2009	0.9389	0.9138	0.9638
	2010	0.9675	0.9407	0.9943
5 Point	2006	0.8134	0.7926	0.8342
	2007	0.8552	0.8330	0.8774
	2008	0.8970	0.8734	0.9206
	2009	0.9389	0.9138	0.9638
	2010	0.9807	0.9542	1.0070
6 Point	2005	0.7770	0.7590	0.7952
	2006	0.8174	0.7975	0.8373
	2007	0.8577	0.8361	0.8793
	2008	0.8980	0.8746	0.9214
	2009	0.9384	0.9132	0.9634
	2010	0.9787	0.9517	1.0055
7 Point	2004	0.7533	0.7348	0.7719
	2005	0.7898	0.7701	0.8096
	2006	0.8263	0.8053	0.8474
	2007	0.8628	0.8405	0.8851
	2008	0.8993	0.8757	0.9228
	2009	0.9358	0.9110	0.9606
	2010	0.9723	0.9462	0.9983
8 Point	2003	0.7109	0.6923	0.7297
	2004	0.7486	0.7290	0.7683
	2005	0.7863	0.7657	0.8070
	2006	0.8240	0.8024	0.8456
	2007	0.8616	0.8391	0.8842
	2008	0.8993	0.8757	0.9228
	2009	0.9370	0.9124	0.9614
	2010	0.9747	0.9491	1.0001
9 Point	2002	0.6638	0.6471	0.6804
	2003	0.7031	0.6853	0.7209
	2004	0.7425	0.7235	0.7614
	2005	0.7818	0.7617	0.8019
	2006	0.8212	0.7999	0.8424
	2007	0.8605	0.8381	0.8829
	2008	0.8999	0.8762	0.9234
	2009	0.9392	0.9144	0.9639
	2010	0.9786	0.9526	1.0045
10 Point	2001	0.6191	0.6019	0.6364
	2002	0.6593	0.6412	0.6774
	2003	0.6995	0.6805	0.7185
	2004	0.7397	0.7198	0.7596
	2005	0.7799	0.7591	0.8006
	2006	0.8201	0.7984	0.8417
	2007	0.8602	0.8377	0.8828
	2008	0.9004	0.8770	0.9238
	2009	0.9406	0.9163	0.9649
	2010	0.9808	0.9556	1.0060

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2007	0.8823	0.8609	0.9036
	2008	0.9098	0.8866	0.9329
	2009	0.9382	0.9130	0.9632
	2010	0.9675	0.9403	0.9945
5 Point	2006	0.8138	0.7930	0.8347
	2007	0.8533	0.8311	0.8755
	2008	0.8948	0.8711	0.9183
	2009	0.9382	0.9130	0.9632
	2010	0.9837	0.9570	1.0103
6 Point	2005	0.7792	0.7611	0.7974
	2006	0.8162	0.7964	0.8360
	2007	0.8549	0.8334	0.8763
	2008	0.8954	0.8721	0.9187
	2009	0.9379	0.9125	0.9630
	2010	0.9823	0.9549	1.0095
7 Point	2004	0.7571	0.7384	0.7758
	2005	0.7898	0.7700	0.8096
	2006	0.8239	0.8029	0.8448
	2007	0.8595	0.8373	0.8816
	2008	0.8966	0.8731	0.9200
	2009	0.9353	0.9104	0.9601
	2010	0.9757	0.9494	1.0020
8 Point	2003	0.7160	0.6972	0.7350
	2004	0.7490	0.7292	0.7688
	2005	0.7834	0.7628	0.8041
	2006	0.8195	0.7979	0.8410
	2007	0.8572	0.8347	0.8796
	2008	0.8966	0.8731	0.9200
	2009	0.9378	0.9133	0.9623
	2010	0.9810	0.9553	1.0065
9 Point	2002	0.6705	0.6537	0.6874
	2003	0.7039	0.6861	0.7218
	2004	0.7390	0.7202	0.7579
	2005	0.7758	0.7559	0.7958
	2006	0.8145	0.7934	0.8356
	2007	0.8551	0.8328	0.8774
	2008	0.8977	0.8741	0.9212
	2009	0.9424	0.9174	0.9673
	2010	0.9894	0.9629	1.0157
10 Point	2001	0.6283	0.6108	0.6459
	2002	0.6613	0.6430	0.6797
	2003	0.6961	0.6770	0.7152
	2004	0.7327	0.7128	0.7525
	2005	0.7712	0.7505	0.7918
	2006	0.8117	0.7901	0.8332
	2007	0.8543	0.8319	0.8767
	2008	0.8992	0.8759	0.9226
	2009	0.9465	0.9222	0.9708
	2010	0.9962	0.9709	1.0215

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2007	-0.0159	-0.0111	-0.0208
	2008	0.0212	0.0149	0.0275
	2009	0.0053	0.0036	0.0073
	2010	-0.0106	-0.0074	-0.0140
5 Point	2006	-0.0343	-0.0310	-0.0376
	2007	0.0184	0.0199	0.0168
	2008	0.0384	0.0304	0.0463
	2009	0.0053	0.0036	0.0073
	2010	-0.0278	-0.0229	-0.0328
6 Point	2005	-0.0084	-0.0126	-0.0043
	2006	-0.0276	-0.0210	-0.0341
	2007	0.0226	0.0261	0.0189
	2008	0.0401	0.0329	0.0472
	2009	0.0045	0.0023	0.0068
	2010	-0.0312	-0.0279	-0.0345
7 Point	2004	0.0118	0.0092	0.0142
	2005	-0.0163	-0.0187	-0.0138
	2006	-0.0331	-0.0253	-0.0407
	2007	0.0195	0.0237	0.0152
	2008	0.0393	0.0323	0.0462
	2009	0.0061	0.0036	0.0087
	2010	-0.0273	-0.0248	-0.0298
8 Point	2003	0.0006	-0.0093	0.0103
	2004	0.0114	0.0145	0.0083
	2005	-0.0165	-0.0147	-0.0182
	2006	-0.0332	-0.0226	-0.0437
	2007	0.0194	0.0250	0.0137
	2008	0.0393	0.0323	0.0462
	2009	0.0061	0.0022	0.0102
	2010	-0.0271	-0.0275	-0.0269
9 Point	2002	0.0117	0.0029	0.0203
	2003	-0.0053	-0.0107	0.0001
	2004	0.0068	0.0134	0.0004
	2005	-0.0199	-0.0156	-0.0240
	2006	-0.0353	-0.0231	-0.0473
	2007	0.0186	0.0248	0.0122
	2008	0.0397	0.0324	0.0470
	2009	0.0078	0.0027	0.0131
	2010	-0.0242	-0.0267	-0.0218
10 Point	2001	0.0112	-0.0035	0.0260
	2002	0.0067	0.0045	0.0088
	2003	-0.0093	-0.0095	-0.0092
	2004	0.0037	0.0144	-0.0069
	2005	-0.0220	-0.0149	-0.0291
	2006	-0.0366	-0.0228	-0.0502
	2007	0.0183	0.0249	0.0115
	2008	0.0403	0.0322	0.0484
	2009	0.0094	0.0022	0.0167
	2010	-0.0217	-0.0275	-0.0160

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2007	-0.0156	-0.0110	-0.0202
	2008	0.0216	0.0151	0.0282
	2009	0.0055	0.0036	0.0075
	2010	-0.0110	-0.0075	-0.0147
5 Point	2006	-0.0333	-0.0301	-0.0364
	2007	0.0204	0.0211	0.0196
	2008	0.0400	0.0314	0.0488
	2009	0.0055	0.0036	0.0075
	2010	-0.0304	-0.0244	-0.0368
6 Point	2005	-0.0088	-0.0124	-0.0053
	2006	-0.0258	-0.0196	-0.0318
	2007	0.0252	0.0278	0.0225
	2008	0.0420	0.0341	0.0501
	2009	0.0044	0.0022	0.0069
	2010	-0.0348	-0.0302	-0.0395
7 Point	2004	0.0098	0.0083	0.0110
	2005	-0.0155	-0.0181	-0.0129
	2006	-0.0307	-0.0237	-0.0374
	2007	0.0223	0.0254	0.0192
	2008	0.0413	0.0335	0.0492
	2009	0.0060	0.0035	0.0087
	2010	-0.0307	-0.0270	-0.0347
8 Point	2003	-0.0028	-0.0111	0.0051
	2004	0.0115	0.0149	0.0080
	2005	-0.0142	-0.0129	-0.0153
	2006	-0.0298	-0.0202	-0.0391
	2007	0.0228	0.0272	0.0183
	2008	0.0413	0.0335	0.0492
	2009	0.0055	0.0015	0.0097
	2010	-0.0317	-0.0309	-0.0328
9 Point	2002	0.0068	0.0000	0.0133
	2003	-0.0063	-0.0111	-0.0017
	2004	0.0086	0.0149	0.0023
	2005	-0.0164	-0.0129	-0.0196
	2006	-0.0312	-0.0202	-0.0419
	2007	0.0222	0.0272	0.0171
	2008	0.0416	0.0335	0.0498
	2009	0.0068	0.0015	0.0122
	2010	-0.0294	-0.0310	-0.0281
10 Point	2001	0.0049	-0.0076	0.0173
	2002	0.0046	0.0035	0.0055
	2003	-0.0082	-0.0081	-0.0084
	2004	0.0071	0.0173	-0.0030
	2005	-0.0175	-0.0112	-0.0235
	2006	-0.0319	-0.0192	-0.0442
	2007	0.0220	0.0275	0.0165
	2008	0.0419	0.0330	0.0510
	2009	0.0077	0.0001	0.0155
	2010	-0.0279	-0.0333	-0.0226

MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2007	0.0063	0.0113	0.0014
	2008	0.0011	-0.0035	0.0056
	2009	-0.0211	-0.0269	-0.0153
	2010	0.0137	0.0191	0.0083
5 Point	2006	-0.0263	-0.0271	-0.0255
	2007	0.0326	0.0384	0.0269
	2008	0.0143	0.0100	0.0184
	2009	-0.0211	-0.0269	-0.0153
	2010	0.0005	0.0056	-0.0044
6 Point	2005	0.0050	0.0062	0.0038
	2006	-0.0303	-0.0320	-0.0286
	2007	0.0301	0.0353	0.0250
	2008	0.0133	0.0088	0.0176
	2009	-0.0206	-0.0263	-0.0149
	2010	0.0025	0.0081	-0.0029
7 Point	2004	0.0192	0.0166	0.0216
	2005	-0.0078	-0.0049	-0.0106
	2006	-0.0392	-0.0398	-0.0387
	2007	0.0250	0.0309	0.0192
	2008	0.0120	0.0077	0.0162
	2009	-0.0180	-0.0241	-0.0121
	2010	0.0089	0.0136	0.0043
8 Point	2003	-0.0082	-0.0102	-0.0062
	2004	0.0239	0.0224	0.0252
	2005	-0.0043	-0.0005	-0.0080
	2006	-0.0369	-0.0369	-0.0369
	2007	0.0262	0.0323	0.0201
	2008	0.0120	0.0077	0.0162
	2009	-0.0192	-0.0255	-0.0129
	2010	0.0065	0.0107	0.0025
9 Point	2002	-0.0157	-0.0139	-0.0175
	2003	-0.0004	-0.0032	0.0026
	2004	0.0300	0.0279	0.0321
	2005	0.0002	0.0035	-0.0029
	2006	-0.0341	-0.0344	-0.0337
	2007	0.0273	0.0333	0.0214
	2008	0.0114	0.0072	0.0156
	2009	-0.0214	-0.0275	-0.0154
	2010	0.0026	0.0072	-0.0019
10 Point	2001	-0.0100	-0.0133	-0.0068
	2002	-0.0112	-0.0080	-0.0145
	2003	0.0032	0.0016	0.0050
	2004	0.0328	0.0316	0.0339
	2005	0.0021	0.0061	-0.0016
	2006	-0.0330	-0.0329	-0.0330
	2007	0.0276	0.0337	0.0215
	2008	0.0109	0.0064	0.0152
	2009	-0.0228	-0.0294	-0.0164
	2010	0.0004	0.0042	-0.0034

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2007	0.0055	0.0105	0.0007
	2008	0.0015	-0.0032	0.0061
	2009	-0.0204	-0.0261	-0.0147
	2010	0.0137	0.0195	0.0081
5 Point	2006	-0.0267	-0.0275	-0.0260
	2007	0.0345	0.0403	0.0288
	2008	0.0165	0.0123	0.0207
	2009	-0.0204	-0.0261	-0.0147
	2010	-0.0025	0.0028	-0.0077
6 Point	2005	0.0028	0.0041	0.0016
	2006	-0.0291	-0.0309	-0.0273
	2007	0.0329	0.0380	0.0280
	2008	0.0159	0.0113	0.0203
	2009	-0.0201	-0.0256	-0.0145
	2010	-0.0011	0.0049	-0.0069
7 Point	2004	0.0154	0.0130	0.0177
	2005	-0.0078	-0.0048	-0.0106
	2006	-0.0368	-0.0374	-0.0361
	2007	0.0283	0.0341	0.0227
	2008	0.0147	0.0103	0.0190
	2009	-0.0175	-0.0235	-0.0116
	2010	0.0055	0.0104	0.0006
8 Point	2003	-0.0133	-0.0151	-0.0115
	2004	0.0235	0.0222	0.0247
	2005	-0.0014	0.0024	-0.0051
	2006	-0.0324	-0.0324	-0.0323
	2007	0.0306	0.0367	0.0247
	2008	0.0147	0.0103	0.0190
	2009	-0.0200	-0.0264	-0.0138
	2010	0.0002	0.0045	-0.0039
9 Point	2002	-0.0224	-0.0205	-0.0245
	2003	-0.0012	-0.0040	0.0017
	2004	0.0335	0.0312	0.0356
	2005	0.0062	0.0093	0.0032
	2006	-0.0274	-0.0279	-0.0269
	2007	0.0327	0.0386	0.0269
	2008	0.0136	0.0093	0.0178
	2009	-0.0246	-0.0305	-0.0188
	2010	-0.0082	-0.0031	-0.0131
10 Point	2001	-0.0192	-0.0222	-0.0163
	2002	-0.0132	-0.0098	-0.0168
	2003	0.0066	0.0051	0.0083
	2004	0.0398	0.0386	0.0410
	2005	0.0108	0.0147	0.0072
	2006	-0.0246	-0.0246	-0.0245
	2007	0.0335	0.0395	0.0276
	2008	0.0121	0.0075	0.0164
	2009	-0.0287	-0.0353	-0.0223
	2010	-0.0150	-0.0111	-0.0189