

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		Average		
Freq Adj LR		(Pd & Inc)	(Incur)	(Pd-20)
r <sup>2</sup>				
4 Point	Linear	0.730	0.525	0.853
5 Point	Linear	0.807	0.654	0.888
6 Point	Linear	0.828	0.672	0.904
7 Point	Linear	0.880	0.791	0.925
8 Point	Linear	0.878	0.821	0.912
9 Point	Linear	0.911	0.871	0.935
10 Point	Linear	0.931	0.902	0.948
4 Point	Expon'l	0.738	0.534	0.857
5 Point	Expon'l	0.816	0.665	0.893
6 Point	Expon'l	0.838	0.683	0.912
7 Point	Expon'l	0.876	0.792	0.918
8 Point	Expon'l	0.854	0.803	0.885
9 Point	Expon'l	0.890	0.854	0.912
10 Point	Expon'l	0.909	0.884	0.924

MEDICAL		Average		
Freq Adj LR		(Pd & Inc)	(Incur)	(Pd-20)
r <sup>2</sup>				
4 Point	Linear	0.939	0.947	0.926
5 Point	Linear	0.960	0.966	0.950
6 Point	Linear	0.925	0.905	0.938
7 Point	Linear	0.934	0.910	0.951
8 Point	Linear	0.950	0.927	0.965
9 Point	Linear	0.963	0.948	0.973
10 Point	Linear	0.973	0.962	0.981
4 Point	Expon'l	0.939	0.946	0.925
5 Point	Expon'l	0.965	0.971	0.955
6 Point	Expon'l	0.935	0.914	0.949
7 Point	Expon'l	0.950	0.927	0.965
8 Point	Expon'l	0.966	0.948	0.977
9 Point	Expon'l	0.975	0.961	0.983
10 Point	Expon'l	0.977	0.966	0.983

INDEMNITY Linear <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2002	0.8858	0.8370	0.9347
	2003	0.9161	0.8595	0.9728
	2004	0.9464	0.8820	1.0108
	2005	0.9767	0.9046	1.0489
5 Point	2001	0.8644	0.8192	0.9098
	2002	0.8917	0.8401	0.9435
	2003	0.9191	0.8611	0.9771
	2004	0.9464	0.8820	1.0108
	2005	0.9738	0.9030	1.0445
6 Point	2000	0.8497	0.8110	0.8885
	2001	0.8736	0.8285	0.9188
	2002	0.8975	0.8459	0.9491
	2003	0.9214	0.8634	0.9794
	2004	0.9453	0.8809	1.0097
	2005	0.9692	0.8984	1.0400
7 Point	1999	0.8052	0.7732	0.8371
	2000	0.8338	0.7954	0.8723
	2001	0.8625	0.8175	0.9074
	2002	0.8911	0.8397	0.9426
	2003	0.9198	0.8618	0.9778
	2004	0.9485	0.8840	1.0129
	2005	0.9771	0.9062	1.0481
8 Point	1998	0.7404	0.7158	0.7650
	1999	0.7763	0.7450	0.8076
	2000	0.8122	0.7742	0.8501
	2001	0.8480	0.8034	0.8927
	2002	0.8839	0.8326	0.9352
	2003	0.9198	0.8618	0.9778
	2004	0.9557	0.8911	1.0203
	2005	0.9916	0.9203	1.0629
9 Point	1997	0.6859	0.6665	0.7053
	1998	0.7251	0.6992	0.7509
	1999	0.7642	0.7320	0.7965
	2000	0.8034	0.7648	0.8420
	2001	0.8426	0.7975	0.8876
	2002	0.8817	0.8303	0.9332
	2003	0.9209	0.8630	0.9788
	2004	0.9601	0.8958	1.0244
	2005	0.9992	0.9285	1.0699
10 Point	1996	0.6284	0.6157	0.6410
	1997	0.6705	0.6513	0.6895
	1998	0.7125	0.6869	0.7381
	1999	0.7546	0.7225	0.7866
	2000	0.7966	0.7581	0.8351
	2001	0.8387	0.7937	0.8837
	2002	0.8808	0.8293	0.9322
	2003	0.9228	0.8649	0.9807
	2004	0.9649	0.9005	1.0293
	2005	1.0070	0.9361	1.0778

INDEMNITY Expon'l <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2002	0.8859	0.8369	0.9350
	2003	0.9153	0.8589	0.9718
	2004	0.9458	0.8814	1.0100
	2005	0.9772	0.9046	1.0498
5 Point	2001	0.8651	0.8195	0.9109
	2002	0.8912	0.8397	0.9428
	2003	0.9181	0.8603	0.9758
	2004	0.9458	0.8814	1.0100
	2005	0.9743	0.9031	1.0454
6 Point	2000	0.8510	0.8117	0.8903
	2001	0.8735	0.8283	0.9186
	2002	0.8966	0.8453	0.9478
	2003	0.9203	0.8626	0.9779
	2004	0.9446	0.8803	1.0090
	2005	0.9696	0.8983	1.0411
7 Point	1999	0.8065	0.7739	0.8392
	2000	0.8331	0.7948	0.8715
	2001	0.8606	0.8162	0.9050
	2002	0.8890	0.8382	0.9397
	2003	0.9183	0.8608	0.9758
	2004	0.9486	0.8840	1.0133
	2005	0.9799	0.9078	1.0522
8 Point	1998	0.7415	0.7160	0.7672
	1999	0.7739	0.7428	0.8050
	2000	0.8077	0.7707	0.8447
	2001	0.8430	0.7996	0.8863
	2002	0.8799	0.8297	0.9300
	2003	0.9183	0.8608	0.9758
	2004	0.9585	0.8931	1.0239
	2005	1.0004	0.9266	1.0744
9 Point	1997	0.6891	0.6681	0.7103
	1998	0.7231	0.6971	0.7491
	1999	0.7588	0.7274	0.7900
	2000	0.7962	0.7591	0.8332
	2001	0.8355	0.7921	0.8788
	2002	0.8767	0.8265	0.9268
	2003	0.9200	0.8624	0.9775
	2004	0.9654	0.8999	1.0309
	2005	1.0130	0.9391	1.0873
10 Point	1996	0.6342	0.6193	0.6492
	1997	0.6691	0.6497	0.6886
	1998	0.7060	0.6815	0.7305
	1999	0.7450	0.7148	0.7749
	2000	0.7860	0.7498	0.8220
	2001	0.8294	0.7865	0.8720
	2002	0.8751	0.8251	0.9250
	2003	0.9234	0.8654	0.9813
	2004	0.9743	0.9078	1.0409
	2005	1.0280	0.9523	1.1042

MEDICAL Linear <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2002	0.8482	0.8430	0.8536
	2003	0.9332	0.9327	0.9337
	2004	1.0183	1.0225	1.0139
	2005	1.1033	1.1122	1.0940
5 Point	2001	0.7799	0.7689	0.7909
	2002	0.8593	0.8534	0.8652
	2003	0.9388	0.9380	0.9395
	2004	1.0183	1.0225	1.0139
	2005	1.0977	1.1070	1.0882
6 Point	2000	0.7468	0.7433	0.7503
	2001	0.8136	0.8117	0.8154
	2002	0.8804	0.8802	0.8805
	2003	0.9472	0.9487	0.9457
	2004	1.0140	1.0171	1.0108
	2005	1.0809	1.0856	1.0759
7 Point	1999	0.7019	0.7033	0.7004
	2000	0.7636	0.7652	0.7620
	2001	0.8254	0.8271	0.8236
	2002	0.8872	0.8890	0.8852
	2003	0.9489	0.9509	0.9468
	2004	1.0107	1.0127	1.0085
	2005	1.0724	1.0746	1.0701
8 Point	1998	0.6506	0.6569	0.6444
	1999	0.7103	0.7157	0.7049
	2000	0.7699	0.7745	0.7654
	2001	0.8296	0.8333	0.8259
	2002	0.8893	0.8921	0.8863
	2003	0.9489	0.9509	0.9468
	2004	1.0086	1.0096	1.0073
	2005	1.0682	1.0684	1.0678
9 Point	1997	0.5941	0.5977	0.5907
	1998	0.6532	0.6565	0.6500
	1999	0.7123	0.7154	0.7093
	2000	0.7714	0.7743	0.7686
	2001	0.8305	0.8331	0.8279
	2002	0.8896	0.8920	0.8872
	2003	0.9487	0.9509	0.9464
	2004	1.0078	1.0098	1.0057
	2005	1.0669	1.0686	1.0650
10 Point	1996	0.5336	0.5362	0.5312
	1997	0.5929	0.5955	0.5905
	1998	0.6522	0.6547	0.6498
	1999	0.7116	0.7140	0.7092
	2000	0.7709	0.7733	0.7685
	2001	0.8302	0.8326	0.8278
	2002	0.8896	0.8919	0.8871
	2003	0.9489	0.9512	0.9465
	2004	1.0082	1.0104	1.0058
	2005	1.0675	1.0697	1.0651

MEDICAL Expon'l <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2002	0.8505	0.8460	0.8552
	2003	0.9289	0.9281	0.9296
	2004	1.0145	1.0182	1.0106
	2005	1.1080	1.1170	1.0986
5 Point	2001	0.7861	0.7761	0.7961
	2002	0.8558	0.8496	0.8620
	2003	0.9318	0.9301	0.9334
	2004	1.0145	1.0182	1.0106
	2005	1.1045	1.1146	1.0942
6 Point	2000	0.7563	0.7537	0.7588
	2001	0.8131	0.8114	0.8146
	2002	0.8741	0.8736	0.8745
	2003	0.9397	0.9405	0.9387
	2004	1.0102	1.0125	1.0077
	2005	1.0860	1.0901	1.0818
7 Point	1999	0.7144	0.7166	0.7120
	2000	0.7653	0.7674	0.7631
	2001	0.8198	0.8217	0.8178
	2002	0.8782	0.8799	0.8764
	2003	0.9408	0.9422	0.9392
	2004	1.0078	1.0089	1.0066
	2005	1.0796	1.0804	1.0787
8 Point	1998	0.6662	0.6731	0.6593
	1999	0.7138	0.7199	0.7076
	2000	0.7648	0.7700	0.7595
	2001	0.8195	0.8236	0.8153
	2002	0.8781	0.8809	0.8751
	2003	0.9408	0.9422	0.9392
	2004	1.0080	1.0077	1.0081
	2005	1.0801	1.0778	1.0821
9 Point	1997	0.6132	0.6169	0.6096
	1998	0.6586	0.6621	0.6552
	1999	0.7074	0.7107	0.7042
	2000	0.7599	0.7628	0.7568
	2001	0.8162	0.8188	0.8134
	2002	0.8766	0.8788	0.8743
	2003	0.9416	0.9433	0.9397
	2004	1.0113	1.0125	1.0099
10 Point	1996	0.5568	0.5593	0.5543
	1997	0.6004	0.6029	0.5979
	1998	0.6474	0.6499	0.6450
	1999	0.6982	0.7006	0.6957
	2000	0.7529	0.7552	0.7505
	2001	0.8119	0.8141	0.8095
	2002	0.8755	0.8776	0.8732
	2003	0.9441	0.9460	0.9419
	2004	1.0180	1.0198	1.0161
2005	1.0978	1.0993	1.0960	

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2002	-0.0009	0.0020	-0.0036
	2003	-0.0156	-0.0222	-0.0093
	2004	0.0340	0.0384	0.0295
	2005	-0.0174	-0.0182	-0.0166
5 Point	2001	0.0059	0.0031	0.0087
	2002	-0.0068	-0.0011	-0.0124
	2003	-0.0186	-0.0238	-0.0136
	2004	0.0340	0.0384	0.0295
	2005	-0.0145	-0.0166	-0.0122
6 Point	2000	0.0116	0.0116	0.0112
	2001	-0.0033	-0.0062	-0.0003
	2002	-0.0126	-0.0069	-0.0180
	2003	-0.0209	-0.0261	-0.0159
	2004	0.0351	0.0395	0.0306
	2005	-0.0099	-0.0120	-0.0077
7 Point	1999	-0.0239	-0.0234	-0.0243
	2000	0.0275	0.0272	0.0274
	2001	0.0078	0.0048	0.0111
	2002	-0.0062	-0.0007	-0.0115
	2003	-0.0193	-0.0245	-0.0143
	2004	0.0319	0.0364	0.0274
	2005	-0.0178	-0.0198	-0.0158
8 Point	1998	-0.0506	-0.0494	-0.0517
	1999	0.0050	0.0048	0.0052
	2000	0.0491	0.0484	0.0496
	2001	0.0223	0.0189	0.0258
	2002	0.0010	0.0064	-0.0041
	2003	-0.0193	-0.0245	-0.0143
	2004	0.0247	0.0293	0.0200
	2005	-0.0323	-0.0339	-0.0306
9 Point	1997	-0.0306	-0.0331	-0.0282
	1998	-0.0353	-0.0328	-0.0376
	1999	0.0171	0.0178	0.0163
	2000	0.0579	0.0578	0.0577
	2001	0.0277	0.0248	0.0309
	2002	0.0032	0.0087	-0.0021
	2003	-0.0204	-0.0257	-0.0153
	2004	0.0203	0.0246	0.0159
	2005	-0.0399	-0.0421	-0.0376
10 Point	1996	-0.0348	-0.0341	-0.0355
	1997	-0.0152	-0.0179	-0.0124
	1998	-0.0227	-0.0205	-0.0248
	1999	0.0267	0.0273	0.0262
	2000	0.0647	0.0645	0.0646
	2001	0.0316	0.0286	0.0348
	2002	0.0041	0.0097	-0.0011
	2003	-0.0223	-0.0276	-0.0172
	2004	0.0155	0.0199	0.0110
	2005	-0.0477	-0.0497	-0.0455

INDEMNITY Expon'l <b>RESIDUALS</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2002	-0.0010	0.0021	-0.0039
	2003	-0.0148	-0.0216	-0.0083
	2004	0.0346	0.0390	0.0303
	2005	-0.0179	-0.0182	-0.0175
5 Point	2001	0.0052	0.0028	0.0076
	2002	-0.0063	-0.0007	-0.0117
	2003	-0.0176	-0.0230	-0.0123
	2004	0.0346	0.0390	0.0303
	2005	-0.0150	-0.0167	-0.0131
6 Point	2000	0.0103	0.0109	0.0094
	2001	-0.0032	-0.0060	-0.0001
	2002	-0.0117	-0.0063	-0.0167
	2003	-0.0198	-0.0253	-0.0144
	2004	0.0358	0.0401	0.0313
	2005	-0.0103	-0.0119	-0.0088
7 Point	1999	-0.0252	-0.0241	-0.0264
	2000	0.0282	0.0278	0.0282
	2001	0.0097	0.0061	0.0135
	2002	-0.0041	0.0008	-0.0086
	2003	-0.0178	-0.0235	-0.0123
	2004	0.0318	0.0364	0.0270
	2005	-0.0206	-0.0214	-0.0199
8 Point	1998	-0.0517	-0.0496	-0.0539
	1999	0.0074	0.0070	0.0078
	2000	0.0536	0.0519	0.0550
	2001	0.0273	0.0227	0.0322
	2002	0.0050	0.0093	0.0011
	2003	-0.0178	-0.0235	-0.0123
	2004	0.0219	0.0273	0.0164
	2005	-0.0411	-0.0402	-0.0421
9 Point	1997	-0.0338	-0.0347	-0.0332
	1998	-0.0333	-0.0307	-0.0358
	1999	0.0225	0.0224	0.0228
	2000	0.0651	0.0635	0.0665
	2001	0.0348	0.0302	0.0397
	2002	0.0082	0.0125	0.0043
	2003	-0.0195	-0.0251	-0.0140
	2004	0.0150	0.0205	0.0094
	2005	-0.0537	-0.0527	-0.0550
10 Point	1996	-0.0406	-0.0377	-0.0437
	1997	-0.0138	-0.0163	-0.0115
	1998	-0.0162	-0.0151	-0.0172
	1999	0.0363	0.0350	0.0379
	2000	0.0753	0.0728	0.0777
	2001	0.0409	0.0358	0.0465
	2002	0.0098	0.0139	0.0061
	2003	-0.0229	-0.0281	-0.0178
	2004	0.0061	0.0126	-0.0006
	2005	-0.0687	-0.0659	-0.0719



MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2002	-0.0007	0.0045	-0.0061
	2003	-0.0187	-0.0252	-0.0120
	2004	0.0396	0.0368	0.0423
	2005	-0.0202	-0.0161	-0.0242
5 Point	2001	0.0111	0.0105	0.0116
	2002	-0.0118	-0.0059	-0.0177
	2003	-0.0243	-0.0305	-0.0178
	2004	0.0396	0.0368	0.0423
	2005	-0.0146	-0.0109	-0.0184
6 Point	2000	0.0421	0.0535	0.0306
	2001	-0.0226	-0.0323	-0.0129
	2002	-0.0329	-0.0327	-0.0330
	2003	-0.0327	-0.0412	-0.0240
	2004	0.0439	0.0422	0.0454
	2005	0.0022	0.0105	-0.0061
7 Point	1999	0.0253	0.0329	0.0176
	2000	0.0253	0.0316	0.0189
	2001	-0.0344	-0.0477	-0.0211
	2002	-0.0397	-0.0415	-0.0377
	2003	-0.0344	-0.0434	-0.0251
	2004	0.0472	0.0466	0.0477
	2005	0.0107	0.0215	-0.0003
8 Point	1998	0.0147	0.0217	0.0078
	1999	0.0169	0.0205	0.0131
	2000	0.0190	0.0223	0.0155
	2001	-0.0386	-0.0539	-0.0234
	2002	-0.0418	-0.0446	-0.0388
	2003	-0.0344	-0.0434	-0.0251
	2004	0.0493	0.0497	0.0489
	2005	0.0149	0.0277	0.0020
9 Point	1997	0.0052	-0.0008	0.0113
	1998	0.0121	0.0221	0.0022
	1999	0.0149	0.0208	0.0087
	2000	0.0175	0.0225	0.0123
	2001	-0.0395	-0.0537	-0.0254
	2002	-0.0421	-0.0445	-0.0397
	2003	-0.0342	-0.0434	-0.0247
	2004	0.0501	0.0495	0.0505
	2005	0.0162	0.0275	0.0048
10 Point	1996	-0.0027	-0.0050	-0.0005
	1997	0.0064	0.0014	0.0115
	1998	0.0131	0.0239	0.0024
	1999	0.0156	0.0222	0.0088
	2000	0.0180	0.0235	0.0124
	2001	-0.0392	-0.0532	-0.0253
	2002	-0.0421	-0.0444	-0.0396
	2003	-0.0344	-0.0437	-0.0248
	2004	0.0497	0.0489	0.0504
	2005	0.0156	0.0264	0.0047

MEDICAL Expon'l <b>RESIDUALS</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2002	-0.0030	0.0015	-0.0077
	2003	-0.0144	-0.0206	-0.0079
	2004	0.0434	0.0411	0.0456
	2005	-0.0249	-0.0209	-0.0288
5 Point	2001	0.0049	0.0033	0.0064
	2002	-0.0083	-0.0021	-0.0145
	2003	-0.0173	-0.0226	-0.0117
	2004	0.0434	0.0411	0.0456
	2005	-0.0214	-0.0185	-0.0244
6 Point	2000	0.0326	0.0431	0.0221
	2001	-0.0221	-0.0320	-0.0121
	2002	-0.0266	-0.0261	-0.0270
	2003	-0.0252	-0.0330	-0.0170
	2004	0.0477	0.0468	0.0485
	2005	-0.0029	0.0060	-0.0120
7 Point	1999	0.0128	0.0196	0.0060
	2000	0.0236	0.0294	0.0178
	2001	-0.0288	-0.0423	-0.0153
	2002	-0.0307	-0.0324	-0.0289
	2003	-0.0263	-0.0347	-0.0175
	2004	0.0501	0.0504	0.0496
	2005	0.0035	0.0157	-0.0089
8 Point	1998	-0.0009	0.0055	-0.0071
	1999	0.0134	0.0163	0.0104
	2000	0.0241	0.0268	0.0214
	2001	-0.0285	-0.0442	-0.0128
	2002	-0.0306	-0.0334	-0.0276
	2003	-0.0263	-0.0347	-0.0175
	2004	0.0499	0.0516	0.0481
	2005	0.0030	0.0183	-0.0123
9 Point	1997	-0.0139	-0.0200	-0.0076
	1998	0.0067	0.0165	-0.0030
	1999	0.0198	0.0255	0.0138
	2000	0.0290	0.0340	0.0241
	2001	-0.0252	-0.0394	-0.0109
	2002	-0.0291	-0.0313	-0.0268
	2003	-0.0271	-0.0358	-0.0180
	2004	0.0466	0.0468	0.0463
	2005	-0.0032	0.0093	-0.0157
10 Point	1996	-0.0259	-0.0281	-0.0236
	1997	-0.0011	-0.0060	0.0041
	1998	0.0179	0.0287	0.0072
	1999	0.0290	0.0356	0.0223
	2000	0.0360	0.0416	0.0304
	2001	-0.0209	-0.0347	-0.0070
	2002	-0.0280	-0.0301	-0.0257
	2003	-0.0296	-0.0385	-0.0202
	2004	0.0399	0.0395	0.0401
	2005	-0.0147	-0.0032	-0.0262