

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 ²				
4 Point	Linear	0.817	0.686	0.895
5 Point	Linear	0.905	0.821	0.948
6 Point	Linear	0.938	0.889	0.961
7 Point	Linear	0.949	0.907	0.968
8 Point	Linear	0.956	0.928	0.969
9 Point	Linear	0.939	0.918	0.951
10 Point	Linear	0.954	0.938	0.963
4 Point	Expon'l	0.809	0.683	0.887
5 Point	Expon'l	0.902	0.820	0.944
6 Point	Expon'l	0.938	0.890	0.960
7 Point	Expon'l	0.952	0.910	0.971
8 Point	Expon'l	0.948	0.921	0.961
9 Point	Expon'l	0.914	0.896	0.924
10 Point	Expon'l	0.933	0.919	0.941

MEDICAL		Average		
Freq	Adj LR	(Pd & Inc)	(Incur)	(Pd-20)
r ²				
4 Point	Linear	0.582	0.492	0.669
5 Point	Linear	0.791	0.743	0.828
6 Point	Linear	0.880	0.853	0.900
7 Point	Linear	0.902	0.864	0.928
8 Point	Linear	0.932	0.903	0.951
9 Point	Linear	0.951	0.929	0.966
10 Point	Linear	0.965	0.948	0.975
4 Point	Expon'l	0.583	0.499	0.665
5 Point	Expon'l	0.790	0.748	0.822
6 Point	Expon'l	0.880	0.856	0.898
7 Point	Expon'l	0.906	0.869	0.931
8 Point	Expon'l	0.937	0.911	0.954
9 Point	Expon'l	0.956	0.937	0.965
10 Point	Expon'l	0.964	0.949	0.973

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2003	0.9295	0.8786	0.9803
	2004	0.9612	0.9047	1.0176
	2005	0.9928	0.9308	1.0549
	2006	1.0245	0.9568	1.0922
5 Point	2002	0.8939	0.8505	0.9371
	2003	0.9268	0.8773	0.9764
	2004	0.9598	0.9040	1.0156
	2005	0.9928	0.9308	1.0549
	2006	1.0258	0.9575	1.0941
6 Point	2001	0.8652	0.8239	0.9065
	2002	0.8970	0.8506	0.9434
	2003	0.9288	0.8773	0.9803
	2004	0.9606	0.9040	1.0172
	2005	0.9924	0.9308	1.0541
	2006	1.0242	0.9575	1.0910
7 Point	2000	0.8416	0.8060	0.8773
	2001	0.8715	0.8307	0.9124
	2002	0.9014	0.8553	0.9475
	2003	0.9313	0.8800	0.9827
	2004	0.9612	0.9047	1.0178
	2005	0.9911	0.9294	1.0529
	2006	1.0210	0.9541	1.0880
8 Point	1999	0.7965	0.7663	0.8266
	2000	0.8294	0.7939	0.8649
	2001	0.8624	0.8216	0.9031
	2002	0.8953	0.8493	0.9413
	2003	0.9283	0.8770	0.9796
	2004	0.9612	0.9047	1.0178
	2005	0.9942	0.9324	1.0560
	2006	1.0272	0.9601	1.0942
9 Point	1998	0.7353	0.7119	0.7586
	1999	0.7732	0.7443	0.8021
	2000	0.8112	0.7767	0.8456
	2001	0.8491	0.8091	0.8891
	2002	0.8870	0.8415	0.9326
	2003	0.9250	0.8739	0.9760
	2004	0.9629	0.9063	1.0195
	2005	1.0008	0.9387	1.0630
10 Point	1997	0.6863	0.6677	0.7049
	1998	0.7260	0.7019	0.7500
	1999	0.7657	0.7362	0.7951
	2000	0.8054	0.7705	0.8402
	2001	0.8450	0.8047	0.8853
	2002	0.8847	0.8390	0.9304
	2003	0.9244	0.8733	0.9755
	2004	0.9641	0.9075	1.0206
	2005	1.0037	0.9418	1.0657
	2006	1.0434	0.9761	1.1108

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2003	0.9292	0.8780	0.9802
	2004	0.9602	0.9038	1.0166
	2005	0.9924	0.9304	1.0543
	2006	1.0256	0.9578	1.0934
5 Point	2002	0.8943	0.8507	0.9380
	2003	0.9259	0.8765	0.9752
	2004	0.9586	0.9030	1.0140
	2005	0.9924	0.9304	1.0543
	2006	1.0274	0.9586	1.0962
6 Point	2001	0.8667	0.8248	0.9085
	2002	0.8964	0.8500	0.9428
	2003	0.9272	0.8761	0.9784
	2004	0.9591	0.9029	1.0153
	2005	0.9921	0.9305	1.0536
	2006	1.0262	0.9590	1.0934
7 Point	2000	0.8440	0.8076	0.8804
	2001	0.8715	0.8306	0.9124
	2002	0.9000	0.8542	0.9457
	2003	0.9293	0.8785	0.9801
	2004	0.9596	0.9035	1.0157
	2005	0.9910	0.9292	1.0527
	2006	1.0233	0.9556	1.0910
8 Point	1999	0.7995	0.7683	0.8306
	2000	0.8292	0.7936	0.8647
	2001	0.8600	0.8198	0.9002
	2002	0.8920	0.8468	0.9372
	2003	0.9252	0.8747	0.9757
	2004	0.9596	0.9035	1.0157
	2005	0.9954	0.9333	1.0574
	2006	1.0324	0.9640	1.1009
9 Point	1998	0.7387	0.7142	0.7633
	1999	0.7720	0.7431	0.8008
	2000	0.8067	0.7731	0.8403
	2001	0.8430	0.8043	0.8816
	2002	0.8810	0.8367	0.9251
	2003	0.9206	0.8705	0.9706
	2004	0.9620	0.9057	1.0184
	2005	1.0053	0.9422	1.0685
10 Point	1997	0.6923	0.6720	0.7127
	1998	0.7258	0.7015	0.7502
	1999	0.7610	0.7323	0.7897
	2000	0.7979	0.7644	0.8313
	2001	0.8366	0.7979	0.8750
	2002	0.8771	0.8330	0.9211
	2003	0.9196	0.8695	0.9696
	2004	0.9642	0.9077	1.0206
	2005	1.0109	0.9475	1.0743
2006	1.0599	0.9891	1.1309	

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2003	0.9213	0.9168	0.9256
	2004	0.9565	0.9511	0.9618
	2005	0.9917	0.9854	0.9981
	2006	1.0269	1.0197	1.0343
5 Point	2002	0.8447	0.8433	0.8461
	2003	0.8937	0.8906	0.8967
	2004	0.9427	0.9380	0.9474
	2005	0.9917	0.9854	0.9981
	2006	1.0407	1.0328	1.0487
6 Point	2001	0.7801	0.7739	0.7862
	2002	0.8333	0.8273	0.8394
	2003	0.8866	0.8806	0.8925
	2004	0.9399	0.9340	0.9457
	2005	0.9931	0.9874	0.9989
	2006	1.0464	1.0408	1.0521
7 Point	2000	0.7431	0.7445	0.7416
	2001	0.7926	0.7924	0.7928
	2002	0.8421	0.8402	0.8440
	2003	0.8916	0.8880	0.8952
	2004	0.9411	0.9359	0.9464
	2005	0.9906	0.9837	0.9976
	2006	1.0401	1.0315	1.0488
8 Point	1999	0.6949	0.6994	0.6903
	2000	0.7442	0.7467	0.7415
	2001	0.7934	0.7940	0.7927
	2002	0.8426	0.8413	0.8440
	2003	0.8919	0.8886	0.8952
	2004	0.9411	0.9359	0.9464
	2005	0.9904	0.9832	0.9976
	2006	1.0396	1.0304	1.0488
9 Point	1998	0.6456	0.6550	0.6360
	1999	0.6948	0.7018	0.6878
	2000	0.7441	0.7486	0.7395
	2001	0.7934	0.7954	0.7913
	2002	0.8426	0.8421	0.8431
	2003	0.8919	0.8889	0.8948
	2004	0.9411	0.9357	0.9466
	2005	0.9904	0.9825	0.9983
10 Point	2006	1.0396	1.0293	1.0501
	1997	0.5925	0.6003	0.5845
	1998	0.6423	0.6483	0.6362
	1999	0.6922	0.6964	0.6880
	2000	0.7421	0.7444	0.7397
	2001	0.7919	0.7924	0.7914
	2002	0.8418	0.8405	0.8431
	2003	0.8917	0.8885	0.8948
	2004	0.9415	0.9365	0.9465
2005	0.9914	0.9846	0.9983	
2006	1.0413	1.0326	1.0500	

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2003	0.9196	0.9147	0.9245
	2004	0.9547	0.9490	0.9602
	2005	0.9910	0.9846	0.9974
	2006	1.0288	1.0215	1.0360
5 Point	2002	0.8440	0.8423	0.8456
	2003	0.8904	0.8873	0.8934
	2004	0.9394	0.9347	0.9440
	2005	0.9910	0.9846	0.9974
	2006	1.0455	1.0372	1.0539
6 Point	2001	0.7819	0.7753	0.7884
	2002	0.8301	0.8236	0.8364
	2003	0.8812	0.8750	0.8874
	2004	0.9355	0.9295	0.9414
	2005	0.9931	0.9874	0.9988
	2006	1.0543	1.0489	1.0596
7 Point	2000	0.7482	0.7492	0.7470
	2001	0.7914	0.7911	0.7916
	2002	0.8371	0.8353	0.8388
	2003	0.8855	0.8820	0.8888
	2004	0.9366	0.9313	0.9418
	2005	0.9907	0.9834	0.9980
	2006	1.0479	1.0384	1.0575
8 Point	1999	0.7029	0.7069	0.6988
	2000	0.7445	0.7470	0.7418
	2001	0.7884	0.7894	0.7874
	2002	0.8350	0.8341	0.8358
	2003	0.8844	0.8814	0.8872
	2004	0.9366	0.9313	0.9418
	2005	0.9919	0.9841	0.9997
	2006	1.0505	1.0399	1.0612
9 Point	1998	0.6567	0.6655	0.6478
	1999	0.6968	0.7039	0.6896
	2000	0.7394	0.7445	0.7341
	2001	0.7845	0.7874	0.7815
	2002	0.8324	0.8328	0.8319
	2003	0.8833	0.8808	0.8856
	2004	0.9372	0.9316	0.9427
	2005	0.9944	0.9854	1.0035
10 Point	1997	0.6071	0.6137	0.6003
	1998	0.6461	0.6516	0.6404
	1999	0.6877	0.6919	0.6832
	2000	0.7319	0.7347	0.7289
	2001	0.7790	0.7802	0.7776
	2002	0.8290	0.8284	0.8295
	2003	0.8824	0.8797	0.8849
	2004	0.9391	0.9341	0.9440
	2005	0.9995	0.9919	1.0071
2006	1.0638	1.0532	1.0744	

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2003	-0.0183	-0.0215	-0.0151
	2004	0.0236	0.0300	0.0171
	2005	0.0078	0.0045	0.0110
	2006	-0.0131	-0.0130	-0.0131
5 Point	2002	-0.0027	-0.0013	-0.0039
	2003	-0.0156	-0.0202	-0.0112
	2004	0.0249	0.0307	0.0191
	2005	0.0078	0.0045	0.0110
	2006	-0.0144	-0.0137	-0.0150
6 Point	2001	0.0040	0.0001	0.0078
	2002	-0.0058	-0.0014	-0.0102
	2003	-0.0176	-0.0202	-0.0151
	2004	0.0241	0.0307	0.0175
	2005	0.0082	0.0045	0.0118
	2006	-0.0128	-0.0137	-0.0119
7 Point	2000	0.0095	0.0101	0.0089
	2001	-0.0023	-0.0067	0.0019
	2002	-0.0102	-0.0061	-0.0143
	2003	-0.0201	-0.0229	-0.0175
	2004	0.0235	0.0300	0.0169
	2005	0.0095	0.0059	0.0130
	2006	-0.0096	-0.0103	-0.0089
8 Point	1999	-0.0214	-0.0211	-0.0217
	2000	0.0217	0.0222	0.0213
	2001	0.0068	0.0024	0.0112
	2002	-0.0041	-0.0001	-0.0081
	2003	-0.0171	-0.0199	-0.0144
	2004	0.0235	0.0300	0.0169
	2005	0.0064	0.0029	0.0099
	2006	-0.0157	-0.0163	-0.0151
9 Point	1998	-0.0465	-0.0438	-0.0491
	1999	0.0019	0.0009	0.0028
	2000	0.0399	0.0394	0.0406
	2001	0.0201	0.0149	0.0252
	2002	0.0042	0.0077	0.0006
	2003	-0.0138	-0.0168	-0.0108
	2004	0.0218	0.0284	0.0152
	2005	-0.0002	-0.0034	0.0029
10 Point	1997	-0.0209	-0.0225	-0.0193
	1998	-0.0372	-0.0338	-0.0405
	1999	0.0094	0.0090	0.0098
	2000	0.0457	0.0456	0.0460
	2001	0.0242	0.0193	0.0290
	2002	0.0065	0.0102	0.0028
	2003	-0.0132	-0.0162	-0.0103
	2004	0.0206	0.0272	0.0141
	2005	-0.0031	-0.0065	0.0002
	2006	-0.0320	-0.0323	-0.0317

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2003	-0.0180	-0.0209	-0.0150
	2004	0.0245	0.0309	0.0181
	2005	0.0082	0.0049	0.0116
	2006	-0.0142	-0.0140	-0.0143
5 Point	2002	-0.0031	-0.0015	-0.0048
	2003	-0.0147	-0.0194	-0.0100
	2004	0.0261	0.0317	0.0207
	2005	0.0082	0.0049	0.0116
	2006	-0.0160	-0.0148	-0.0171
6 Point	2001	0.0025	-0.0008	0.0058
	2002	-0.0052	-0.0008	-0.0096
	2003	-0.0160	-0.0190	-0.0132
	2004	0.0256	0.0318	0.0194
	2005	0.0085	0.0048	0.0123
	2006	-0.0148	-0.0152	-0.0143
7 Point	2000	0.0071	0.0085	0.0058
	2001	-0.0023	-0.0066	0.0019
	2002	-0.0088	-0.0050	-0.0125
	2003	-0.0181	-0.0214	-0.0149
	2004	0.0251	0.0312	0.0190
	2005	0.0096	0.0061	0.0132
	2006	-0.0119	-0.0118	-0.0119
8 Point	1999	-0.0244	-0.0231	-0.0257
	2000	0.0219	0.0225	0.0215
	2001	0.0092	0.0042	0.0141
	2002	-0.0008	0.0024	-0.0040
	2003	-0.0140	-0.0176	-0.0105
	2004	0.0251	0.0312	0.0190
	2005	0.0052	0.0020	0.0085
	2006	-0.0210	-0.0202	-0.0218
9 Point	1998	-0.0499	-0.0461	-0.0538
	1999	0.0031	0.0021	0.0041
	2000	0.0444	0.0430	0.0459
	2001	0.0262	0.0197	0.0327
	2002	0.0102	0.0125	0.0081
	2003	-0.0094	-0.0134	-0.0054
	2004	0.0227	0.0290	0.0163
	2005	-0.0047	-0.0069	-0.0026
10 Point	1997	-0.0269	-0.0268	-0.0271
	1998	-0.0370	-0.0334	-0.0407
	1999	0.0141	0.0129	0.0152
	2000	0.0532	0.0517	0.0549
	2001	0.0326	0.0261	0.0393
	2002	0.0141	0.0162	0.0121
	2003	-0.0084	-0.0124	-0.0044
	2004	0.0205	0.0270	0.0141
	2005	-0.0103	-0.0122	-0.0084
	2006	-0.0485	-0.0453	-0.0518

MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2003	-0.0365	-0.0418	-0.0311
	2004	0.0464	0.0494	0.0435
	2005	0.0166	0.0266	0.0064
	2006	-0.0265	-0.0342	-0.0188
5 Point	2002	-0.0275	-0.0262	-0.0289
	2003	-0.0089	-0.0156	-0.0022
	2004	0.0602	0.0625	0.0579
	2005	0.0166	0.0266	0.0064
	2006	-0.0403	-0.0473	-0.0332
6 Point	2001	-0.0143	-0.0200	-0.0084
	2002	-0.0161	-0.0102	-0.0222
	2003	-0.0018	-0.0056	0.0020
	2004	0.0630	0.0665	0.0596
	2005	0.0152	0.0246	0.0056
	2006	-0.0460	-0.0553	-0.0366
7 Point	2000	0.0188	0.0277	0.0099
	2001	-0.0268	-0.0385	-0.0150
	2002	-0.0249	-0.0231	-0.0268
	2003	-0.0068	-0.0130	-0.0007
	2004	0.0618	0.0646	0.0589
	2005	0.0177	0.0283	0.0069
	2006	-0.0397	-0.0460	-0.0333
8 Point	1999	0.0019	0.0039	-0.0001
	2000	0.0177	0.0255	0.0100
	2001	-0.0276	-0.0401	-0.0149
	2002	-0.0254	-0.0242	-0.0268
	2003	-0.0071	-0.0136	-0.0007
	2004	0.0618	0.0646	0.0589
	2005	0.0179	0.0288	0.0069
	2006	-0.0392	-0.0449	-0.0333
9 Point	1998	-0.0002	0.0047	-0.0050
	1999	0.0020	0.0015	0.0024
	2000	0.0178	0.0236	0.0120
	2001	-0.0276	-0.0415	-0.0135
	2002	-0.0254	-0.0250	-0.0259
	2003	-0.0071	-0.0139	-0.0003
	2004	0.0618	0.0648	0.0587
	2005	0.0179	0.0295	0.0062
10 Point	1997	-0.0073	-0.0150	0.0005
	1998	0.0031	0.0114	-0.0052
	1999	0.0046	0.0069	0.0022
	2000	0.0198	0.0278	0.0118
	2001	-0.0261	-0.0385	-0.0136
	2002	-0.0246	-0.0234	-0.0259
	2003	-0.0069	-0.0135	-0.0003
	2004	0.0614	0.0640	0.0588
	2005	0.0169	0.0274	0.0062
	2006	-0.0409	-0.0471	-0.0345

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2003	-0.0348	-0.0397	-0.0300
	2004	0.0482	0.0515	0.0451
	2005	0.0173	0.0274	0.0071
	2006	-0.0284	-0.0360	-0.0205
5 Point	2002	-0.0268	-0.0252	-0.0284
	2003	-0.0056	-0.0123	0.0011
	2004	0.0635	0.0658	0.0613
	2005	0.0173	0.0274	0.0071
	2006	-0.0451	-0.0517	-0.0384
6 Point	2001	-0.0161	-0.0214	-0.0106
	2002	-0.0129	-0.0065	-0.0192
	2003	0.0036	0.0000	0.0071
	2004	0.0674	0.0710	0.0639
	2005	0.0152	0.0246	0.0057
	2006	-0.0539	-0.0634	-0.0441
7 Point	2000	0.0137	0.0230	0.0045
	2001	-0.0256	-0.0372	-0.0138
	2002	-0.0199	-0.0182	-0.0216
	2003	-0.0007	-0.0070	0.0057
	2004	0.0663	0.0692	0.0635
	2005	0.0176	0.0286	0.0065
	2006	-0.0475	-0.0529	-0.0420
8 Point	1999	-0.0061	-0.0036	-0.0086
	2000	0.0174	0.0252	0.0097
	2001	-0.0226	-0.0355	-0.0096
	2002	-0.0178	-0.0170	-0.0186
	2003	0.0004	-0.0064	0.0073
	2004	0.0663	0.0692	0.0635
	2005	0.0164	0.0279	0.0048
	2006	-0.0501	-0.0544	-0.0457
9 Point	1998	-0.0113	-0.0058	-0.0168
	1999	0.0000	-0.0006	0.0006
	2000	0.0225	0.0277	0.0174
	2001	-0.0187	-0.0335	-0.0037
	2002	-0.0152	-0.0157	-0.0147
	2003	0.0015	-0.0058	0.0089
	2004	0.0657	0.0689	0.0626
	2005	0.0139	0.0266	0.0010
10 Point	1997	-0.0219	-0.0284	-0.0153
	1998	-0.0007	0.0081	-0.0094
	1999	0.0091	0.0114	0.0070
	2000	0.0300	0.0375	0.0226
	2001	-0.0132	-0.0263	0.0002
	2002	-0.0118	-0.0113	-0.0123
	2003	0.0024	-0.0047	0.0096
	2004	0.0638	0.0664	0.0613
	2005	0.0088	0.0201	-0.0026
	2006	-0.0634	-0.0677	-0.0589