

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	0.808	0.650	0.920
5 Point	Linear	0.824	0.600	0.944
6 Point	Linear	0.892	0.770	0.949
7 Point	Linear	0.903	0.839	0.936
8 Point	Linear	0.935	0.892	0.957
9 Point	Linear	0.954	0.924	0.970
10 Point	Linear	0.917	0.873	0.940
4 Point	Expon'l	0.818	0.652	0.930
5 Point	Expon'l	0.838	0.605	0.955
6 Point	Expon'l	0.889	0.774	0.939
7 Point	Expon'l	0.879	0.824	0.908
8 Point	Expon'l	0.918	0.881	0.937
9 Point	Expon'l	0.942	0.917	0.954
10 Point	Expon'l	0.904	0.862	0.928

MEDICAL		Average		
Freq Adj LR		(Pd & Inc)	(Incur)	(Pd-20)
r^2				
4 Point	Linear	0.940	0.921	0.958
5 Point	Linear	0.858	0.795	0.912
6 Point	Linear	0.896	0.843	0.938
7 Point	Linear	0.930	0.892	0.959
8 Point	Linear	0.952	0.927	0.970
9 Point	Linear	0.965	0.948	0.978
10 Point	Linear	0.967	0.956	0.975
4 Point	Expon'l	0.958	0.942	0.972
5 Point	Expon'l	0.878	0.813	0.932
6 Point	Expon'l	0.921	0.871	0.959
7 Point	Expon'l	0.951	0.918	0.974
8 Point	Expon'l	0.966	0.942	0.982
9 Point	Expon'l	0.974	0.957	0.986
10 Point	Expon'l	0.980	0.969	0.987

INDEMNITY		Severity	Severity	Severity
Linear	Policy	Ratio	Ratio	Ratio
<b>FITTED</b>	Year	(Avg Pd & Inc)	(Incur)	(Pd-20)
4 Point	2001	1.0078	0.9300	1.0859
	2002	1.0531	0.9703	1.1361
	2003	1.0985	1.0106	1.1864
	2004	1.1438	1.0509	1.2366
5 Point	2000	0.9855	0.9234	1.0479
	2001	1.0232	0.9525	1.0941
	2002	1.0608	0.9815	1.1402
	2003	1.0985	1.0106	1.1864
	2004	1.1361	1.0396	1.2325
6 Point	1999	0.9211	0.8699	0.9725
	2000	0.9660	0.9056	1.0266
	2001	1.0110	0.9413	1.0808
	2002	1.0559	0.9770	1.1349
	2003	1.1009	1.0128	1.1890
	2004	1.1459	1.0485	1.2432
7 Point	1998	0.8316	0.7915	0.8719
	1999	0.8869	0.8371	0.9368
	2000	0.9421	0.8827	1.0016
	2001	0.9973	0.9282	1.0665
	2002	1.0525	0.9738	1.1313
	2003	1.1077	1.0193	1.1962
	2004	1.1630	1.0649	1.2610
8 Point	1997	0.7635	0.7300	0.7971
	1998	0.8213	0.7787	0.8640
	1999	0.8791	0.8275	0.9308
	2000	0.9369	0.8763	0.9976
	2001	0.9947	0.9250	1.0645
	2002	1.0525	0.9738	1.1313
	2003	1.1103	1.0225	1.1982
	2004	1.1681	1.0713	1.2650
9 Point	1996	0.7002	0.6764	0.7242
	1997	0.7590	0.7260	0.7921
	1998	0.8178	0.7756	0.8600
	1999	0.8765	0.8252	0.9279
	2000	0.9353	0.8748	0.9958
	2001	0.9941	0.9244	1.0638
	2002	1.0528	0.9741	1.1317
	2003	1.1116	1.0237	1.1996
	2004	1.1704	1.0733	1.2675
10 Point	1995	0.6849	0.6693	0.7006
	1996	0.7368	0.7122	0.7615
	1997	0.7887	0.7551	0.8224
	1998	0.8406	0.7980	0.8834
	1999	0.8925	0.8409	0.9443
	2000	0.9444	0.8838	1.0052
	2001	0.9964	0.9267	1.0661
	2002	1.0483	0.9696	1.1270
	2003	1.1002	1.0125	1.1879
	2004	1.1521	1.0554	1.2488

INDEMNITY Expon'l <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2001	1.0096	0.9318	1.0876
	2002	1.0523	0.9695	1.1352
	2003	1.0969	1.0087	1.1849
	2004	1.1433	1.0495	1.2368
5 Point	2000	0.9879	0.9254	1.0504
	2001	1.0229	0.9524	1.0935
	2002	1.0593	0.9801	1.1383
	2003	1.0969	1.0087	1.1849
	2004	1.1358	1.0381	1.2335
6 Point	1999	0.9235	0.8718	0.9755
	2000	0.9648	0.9048	1.0249
	2001	1.0080	0.9391	1.0768
	2002	1.0530	0.9746	1.1313
	2003	1.1001	1.0115	1.1886
	2004	1.1493	1.0498	1.2488
7 Point	1998	0.8342	0.7932	0.8756
	1999	0.8833	0.8342	0.9324
	2000	0.9352	0.8773	0.9930
	2001	0.9902	0.9226	1.0575
	2002	1.0483	0.9703	1.1262
	2003	1.1100	1.0205	1.1994
	2004	1.1752	1.0732	1.2773
8 Point	1997	0.7699	0.7344	0.8057
	1998	0.8190	0.7765	0.8615
	1999	0.8711	0.8210	0.9212
	2000	0.9266	0.8680	0.9850
	2001	0.9856	0.9178	1.0532
	2002	1.0483	0.9703	1.1262
	2003	1.1151	1.0259	1.2042
	2004	1.1861	1.0847	1.2876
9 Point	1996	0.7113	0.6846	0.7384
	1997	0.7590	0.7257	0.7923
	1998	0.8098	0.7693	0.8503
	1999	0.8640	0.8154	0.9124
	2000	0.9218	0.8643	0.9791
	2001	0.9836	0.9162	1.0507
	2002	1.0494	0.9712	1.1275
	2003	1.1197	1.0294	1.2100
	2004	1.1947	1.0912	1.2984
10 Point	1995	0.6998	0.6800	0.7200
	1996	0.7410	0.7150	0.7671
	1997	0.7846	0.7518	0.8173
	1998	0.8307	0.7904	0.8708
	1999	0.8796	0.8310	0.9278
	2000	0.9313	0.8738	0.9886
	2001	0.9861	0.9187	1.0532
	2002	1.0441	0.9659	1.1222
	2003	1.1055	1.0156	1.1956
	2004	1.1705	1.0678	1.2739

MEDICAL Linear <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2001	0.9117	0.9013	0.9221
	2002	1.0121	1.0063	1.0179
	2003	1.1125	1.1113	1.1136
	2004	1.2129	1.2163	1.2094
5 Point	2000	0.8861	0.8887	0.8835
	2001	0.9616	0.9629	0.9602
	2002	1.0370	1.0371	1.0369
	2003	1.1125	1.1113	1.1136
	2004	1.1879	1.1855	1.1903
6 Point	1999	0.8295	0.8371	0.8221
	2000	0.8998	0.9051	0.8946
	2001	0.9701	0.9732	0.9672
	2002	1.0405	1.0412	1.0397
	2003	1.1108	1.1093	1.1123
	2004	1.1811	1.1773	1.1848
7 Point	1998	0.7645	0.7745	0.7547
	1999	0.8336	0.8413	0.8261
	2000	0.9027	0.9081	0.8974
	2001	0.9718	0.9748	0.9688
	2002	1.0409	1.0416	1.0401
	2003	1.1100	1.1084	1.1115
	2004	1.1790	1.1752	1.1828
8 Point	1997	0.6958	0.7011	0.6907
	1998	0.7648	0.7692	0.7605
	1999	0.8338	0.8373	0.8304
	2000	0.9028	0.9054	0.9003
	2001	0.9719	0.9735	0.9702
	2002	1.0409	1.0416	1.0401
	2003	1.1099	1.1097	1.1100
	2004	1.1789	1.1778	1.1799
9 Point	1996	0.6286	0.6322	0.6250
	1997	0.6973	0.7004	0.6942
	1998	0.7660	0.7687	0.7633
	1999	0.8347	0.8369	0.8324
	2000	0.9034	0.9052	0.9016
	2001	0.9721	0.9734	0.9707
	2002	1.0408	1.0417	1.0399
	2003	1.1095	1.1099	1.1090
	2004	1.1781	1.1782	1.1781
10 Point	1995	0.5785	0.5785	0.5785
	1996	0.6442	0.6445	0.6440
	1997	0.7100	0.7104	0.7096
	1998	0.7758	0.7764	0.7752
	1999	0.8415	0.8423	0.8408
	2000	0.9073	0.9083	0.9063
	2001	0.9730	0.9742	0.9719
	2002	1.0388	1.0401	1.0375
	2003	1.1046	1.1061	1.1031
	2004	1.1703	1.1720	1.1686

MEDICAL Expon'l <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2001	0.9185	0.9091	0.9279
	2002	1.0081	1.0021	1.0142
	2003	1.1065	1.1045	1.1085
	2004	1.2145	1.2174	1.2115
5 Point	2000	0.8950	0.8980	0.8919
	2001	0.9606	0.9621	0.9589
	2002	1.0310	1.0308	1.0310
	2003	1.1065	1.1045	1.1085
	2004	1.1876	1.1834	1.1918
6 Point	1999	0.8406	0.8483	0.8329
	2000	0.9002	0.9059	0.8945
	2001	0.9641	0.9674	0.9607
	2002	1.0325	1.0331	1.0318
	2003	1.1057	1.1033	1.1081
	2004	1.1842	1.1782	1.1900
7 Point	1998	0.7782	0.7880	0.7686
	1999	0.8351	0.8431	0.8272
	2000	0.8961	0.9020	0.8902
	2001	0.9615	0.9650	0.9580
	2002	1.0318	1.0325	1.0310
	2003	1.1072	1.1046	1.1096
	2004	1.1881	1.1818	1.1942
8 Point	1997	0.7131	0.7176	0.7086
	1998	0.7678	0.7718	0.7638
	1999	0.8266	0.8300	0.8233
	2000	0.8900	0.8926	0.8874
	2001	0.9583	0.9600	0.9565
	2002	1.0318	1.0325	1.0310
	2003	1.1109	1.1104	1.1113
	2004	1.1961	1.1942	1.1979
9 Point	1996	0.6505	0.6532	0.6477
	1997	0.7026	0.7052	0.7000
	1998	0.7589	0.7612	0.7565
	1999	0.8197	0.8218	0.8175
	2000	0.8853	0.8871	0.8835
	2001	0.9563	0.9576	0.9549
	2002	1.0329	1.0338	1.0319
	2003	1.1156	1.1160	1.1152
	2004	1.2050	1.2047	1.2053
10 Point	1995	0.6062	0.6055	0.6068
	1996	0.6541	0.6536	0.6545
	1997	0.7057	0.7055	0.7060
	1998	0.7615	0.7615	0.7614
	1999	0.8217	0.8219	0.8213
	2000	0.8866	0.8872	0.8859
	2001	0.9566	0.9577	0.9555
	2002	1.0322	1.0337	1.0306
	2003	1.1137	1.1158	1.1116
	2004	1.2017	1.2044	1.1990

INDEMNITY Linear <b>RESIDUALS</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2001	0.0128	0.0153	0.0103
	2002	0.0008	0.0042	-0.0027
	2003	-0.0399	-0.0540	-0.0256
	2004	0.0263	0.0347	0.0180
5 Point	2000	0.0154	0.0225	0.0082
	2001	-0.0026	-0.0072	0.0021
	2002	-0.0069	-0.0071	-0.0068
	2003	-0.0399	-0.0540	-0.0256
	2004	0.0340	0.0459	0.0221
6 Point	1999	-0.0244	-0.0223	-0.0266
	2000	0.0349	0.0403	0.0295
	2001	0.0096	0.0039	0.0154
	2002	-0.0020	-0.0026	-0.0015
	2003	-0.0423	-0.0563	-0.0282
	2004	0.0242	0.0370	0.0114
7 Point	1998	-0.0513	-0.0491	-0.0536
	1999	0.0098	0.0105	0.0091
	2000	0.0588	0.0632	0.0545
	2001	0.0233	0.0170	0.0297
	2002	0.0014	0.0006	0.0021
	2003	-0.0491	-0.0628	-0.0354
	2004	0.0071	0.0206	-0.0064
8 Point	1997	-0.0181	-0.0224	-0.0139
	1998	-0.0410	-0.0363	-0.0457
	1999	0.0176	0.0201	0.0151
	2000	0.0640	0.0696	0.0585
	2001	0.0259	0.0202	0.0317
	2002	0.0014	0.0006	0.0021
	2003	-0.0517	-0.0660	-0.0374
	2004	0.0020	0.0142	-0.0104
9 Point	1996	-0.0090	-0.0079	-0.0101
	1997	-0.0136	-0.0184	-0.0089
	1998	-0.0375	-0.0332	-0.0417
	1999	0.0202	0.0224	0.0180
	2000	0.0656	0.0711	0.0603
	2001	0.0265	0.0208	0.0324
	2002	0.0011	0.0003	0.0017
	2003	-0.0530	-0.0672	-0.0388
	2004	-0.0003	0.0122	-0.0129
10 Point	1995	0.0823	0.0805	0.0841
	1996	-0.0456	-0.0437	-0.0474
	1997	-0.0433	-0.0475	-0.0392
	1998	-0.0603	-0.0556	-0.0651
	1999	0.0042	0.0067	0.0016
	2000	0.0565	0.0621	0.0509
	2001	0.0242	0.0185	0.0301
	2002	0.0056	0.0048	0.0064
	2003	-0.0416	-0.0560	-0.0271
	2004	0.0180	0.0301	0.0058

INDEMNITY Expon'l <b>RESIDUALS</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2001	0.0110	0.0134	0.0086
	2002	0.0016	0.0049	-0.0018
	2003	-0.0383	-0.0522	-0.0241
	2004	0.0268	0.0360	0.0178
5 Point	2000	0.0130	0.0205	0.0057
	2001	-0.0023	-0.0072	0.0027
	2002	-0.0054	-0.0057	-0.0049
	2003	-0.0383	-0.0522	-0.0241
	2004	0.0343	0.0474	0.0211
6 Point	1999	-0.0268	-0.0242	-0.0296
	2000	0.0361	0.0411	0.0312
	2001	0.0126	0.0061	0.0194
	2002	0.0009	-0.0002	0.0021
	2003	-0.0415	-0.0550	-0.0278
	2004	0.0208	0.0357	0.0058
7 Point	1998	-0.0539	-0.0508	-0.0573
	1999	0.0134	0.0134	0.0135
	2000	0.0657	0.0686	0.0631
	2001	0.0304	0.0226	0.0387
	2002	0.0056	0.0041	0.0072
	2003	-0.0514	-0.0640	-0.0386
	2004	-0.0051	0.0123	-0.0227
8 Point	1997	-0.0245	-0.0268	-0.0225
	1998	-0.0387	-0.0341	-0.0432
	1999	0.0256	0.0266	0.0247
	2000	0.0743	0.0779	0.0711
	2001	0.0350	0.0274	0.0430
	2002	0.0056	0.0041	0.0072
	2003	-0.0565	-0.0694	-0.0434
	2004	-0.0160	0.0008	-0.0330
9 Point	1996	-0.0201	-0.0161	-0.0243
	1997	-0.0136	-0.0181	-0.0091
	1998	-0.0295	-0.0269	-0.0320
	1999	0.0327	0.0322	0.0335
	2000	0.0791	0.0816	0.0770
	2001	0.0370	0.0290	0.0455
	2002	0.0045	0.0032	0.0059
	2003	-0.0611	-0.0729	-0.0492
	2004	-0.0246	-0.0057	-0.0438
10 Point	1995	0.0674	0.0698	0.0647
	1996	-0.0498	-0.0465	-0.0530
	1997	-0.0392	-0.0442	-0.0341
	1998	-0.0504	-0.0480	-0.0525
	1999	0.0171	0.0166	0.0181
	2000	0.0696	0.0721	0.0675
	2001	0.0345	0.0265	0.0430
	2002	0.0098	0.0085	0.0112
	2003	-0.0469	-0.0591	-0.0348
	2004	-0.0004	0.0177	-0.0193



MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2001	0.0242	0.0292	0.0193
	2002	-0.0179	-0.0213	-0.0145
	2003	-0.0370	-0.0451	-0.0290
	2004	0.0306	0.0372	0.0242
5 Point	2000	0.0499	0.0616	0.0382
	2001	-0.0257	-0.0324	-0.0188
	2002	-0.0428	-0.0521	-0.0335
	2003	-0.0370	-0.0451	-0.0290
	2004	0.0556	0.0680	0.0433
6 Point	1999	0.0172	0.0205	0.0139
	2000	0.0362	0.0452	0.0271
	2001	-0.0342	-0.0427	-0.0258
	2002	-0.0463	-0.0562	-0.0363
	2003	-0.0353	-0.0431	-0.0277
	2004	0.0624	0.0762	0.0488
7 Point	1998	0.0061	0.0063	0.0059
	1999	0.0131	0.0163	0.0099
	2000	0.0333	0.0422	0.0243
	2001	-0.0359	-0.0443	-0.0274
	2002	-0.0467	-0.0566	-0.0367
	2003	-0.0345	-0.0422	-0.0269
	2004	0.0645	0.0783	0.0508
8 Point	1997	0.0006	-0.0092	0.0102
	1998	0.0058	0.0116	0.0001
	1999	0.0129	0.0203	0.0056
	2000	0.0332	0.0449	0.0214
	2001	-0.0360	-0.0430	-0.0288
	2002	-0.0467	-0.0566	-0.0367
	2003	-0.0344	-0.0435	-0.0254
	2004	0.0646	0.0757	0.0537
9 Point	1996	0.0029	-0.0014	0.0070
	1997	-0.0009	-0.0085	0.0067
	1998	0.0046	0.0121	-0.0027
	1999	0.0120	0.0207	0.0036
	2000	0.0326	0.0451	0.0201
	2001	-0.0362	-0.0429	-0.0293
	2002	-0.0466	-0.0567	-0.0365
	2003	-0.0340	-0.0437	-0.0244
	2004	0.0654	0.0753	0.0555
10 Point	1995	0.0352	0.0277	0.0428
	1996	-0.0127	-0.0137	-0.0120
	1997	-0.0136	-0.0185	-0.0087
	1998	-0.0052	0.0044	-0.0146
	1999	0.0052	0.0153	-0.0048
	2000	0.0287	0.0420	0.0154
	2001	-0.0371	-0.0437	-0.0305
	2002	-0.0446	-0.0551	-0.0341
	2003	-0.0291	-0.0399	-0.0185
	2004	0.0732	0.0815	0.0650

MEDICAL Expon'l <b>RESIDUALS</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
4 Point	2001	0.0174	0.0214	0.0135
	2002	-0.0139	-0.0171	-0.0108
	2003	-0.0310	-0.0383	-0.0239
	2004	0.0290	0.0361	0.0221
5 Point	2000	0.0410	0.0523	0.0298
	2001	-0.0247	-0.0316	-0.0175
	2002	-0.0368	-0.0458	-0.0276
	2003	-0.0310	-0.0383	-0.0239
	2004	0.0559	0.0701	0.0418
6 Point	1999	0.0061	0.0093	0.0031
	2000	0.0358	0.0444	0.0272
	2001	-0.0282	-0.0369	-0.0193
	2002	-0.0383	-0.0481	-0.0284
	2003	-0.0302	-0.0371	-0.0235
	2004	0.0593	0.0753	0.0436
7 Point	1998	-0.0076	-0.0072	-0.0080
	1999	0.0116	0.0145	0.0088
	2000	0.0399	0.0483	0.0315
	2001	-0.0256	-0.0345	-0.0166
	2002	-0.0376	-0.0475	-0.0276
	2003	-0.0317	-0.0384	-0.0250
	2004	0.0554	0.0717	0.0394
8 Point	1997	-0.0167	-0.0257	-0.0077
	1998	0.0028	0.0090	-0.0032
	1999	0.0201	0.0276	0.0127
	2000	0.0460	0.0577	0.0343
	2001	-0.0224	-0.0295	-0.0151
	2002	-0.0376	-0.0475	-0.0276
	2003	-0.0354	-0.0442	-0.0267
	2004	0.0474	0.0593	0.0357
9 Point	1996	-0.0190	-0.0224	-0.0157
	1997	-0.0062	-0.0133	0.0009
	1998	0.0117	0.0196	0.0041
	1999	0.0270	0.0358	0.0185
	2000	0.0507	0.0632	0.0382
	2001	-0.0204	-0.0271	-0.0135
	2002	-0.0387	-0.0488	-0.0285
	2003	-0.0401	-0.0498	-0.0306
	2004	0.0385	0.0488	0.0283
10 Point	1995	0.0075	0.0007	0.0145
	1996	-0.0226	-0.0228	-0.0225
	1997	-0.0093	-0.0136	-0.0051
	1998	0.0091	0.0193	-0.0008
	1999	0.0250	0.0357	0.0147
	2000	0.0494	0.0631	0.0358
	2001	-0.0207	-0.0272	-0.0141
	2002	-0.0380	-0.0487	-0.0272
	2003	-0.0382	-0.0496	-0.0270
	2004	0.0418	0.0491	0.0346