

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	(Pd & Inc)	(Incur)	(Pd-22)
Freq Adj LR					
r^2					
4 Point	Linear	0.954	0.960	0.949	
5 Point	Linear	0.910	0.905	0.913	
6 Point	Linear	0.916	0.923	0.909	
7 Point	Linear	0.908	0.916	0.901	
8 Point	Linear	0.898	0.916	0.882	
9 Point	Linear	0.886	0.905	0.868	
10 Point	Linear	0.903	0.922	0.886	
4 Point	Expon'l	0.955	0.961	0.951	
5 Point	Expon'l	0.919	0.911	0.924	
6 Point	Expon'l	0.933	0.936	0.928	
7 Point	Expon'l	0.930	0.935	0.926	
8 Point	Expon'l	0.925	0.938	0.912	
9 Point	Expon'l	0.917	0.931	0.904	
10 Point	Expon'l	0.936	0.948	0.925	
MEDICAL		Average	(Pd & Inc)	(Incur)	(Pd-22)
Freq Adj LR					
r^2					
4 Point	Linear	0.868	0.803	0.914	
5 Point	Linear	0.835	0.787	0.868	
6 Point	Linear	0.903	0.871	0.924	
7 Point	Linear	0.938	0.919	0.950	
8 Point	Linear	0.958	0.945	0.965	
9 Point	Linear	0.957	0.939	0.968	
10 Point	Linear	0.963	0.945	0.974	
4 Point	Expon'l	0.866	0.799	0.914	
5 Point	Expon'l	0.837	0.787	0.871	
6 Point	Expon'l	0.907	0.876	0.926	
7 Point	Expon'l	0.934	0.918	0.944	
8 Point	Expon'l	0.956	0.945	0.963	
9 Point	Expon'l	0.961	0.944	0.971	
10 Point	Expon'l	0.971	0.954	0.979	

INDEMNITY Linear <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
4 Point	2005	0.8357	0.8005	0.8710
	2006	0.9228	0.8727	0.9731
	2007	1.0100	0.9449	1.0752
	2008	1.0971	1.0171	1.1773
5 Point	2004	0.8004	0.7741	0.8267
	2005	0.8702	0.8310	0.9095
	2006	0.9401	0.8880	0.9923
	2007	1.0100	0.9449	1.0752
	2008	1.0798	1.0019	1.1580
6 Point	2003	0.7587	0.7345	0.7828
	2004	0.8209	0.7867	0.8550
	2005	0.8830	0.8389	0.9272
	2006	0.9452	0.8911	0.9994
	2007	1.0074	0.9433	1.0716
	2008	1.0696	0.9955	1.1438
7 Point	2002	0.7275	0.7074	0.7476
	2003	0.7825	0.7538	0.8113
	2004	0.8376	0.8002	0.8749
	2005	0.8926	0.8466	0.9386
	2006	0.9476	0.8931	1.0023
	2007	1.0026	0.9395	1.0659
	2008	1.0577	0.9859	1.1296
8 Point	2001	0.7022	0.6815	0.7228
	2002	0.7513	0.7238	0.7787
	2003	0.8004	0.7661	0.8346
	2004	0.8494	0.8084	0.8905
	2005	0.8985	0.8507	0.9464
	2006	0.9476	0.8931	1.0023
	2007	0.9967	0.9354	1.0582
	2008	1.0458	0.9777	1.1141
9 Point	2000	0.6815	0.6619	0.7010
	2001	0.7256	0.7002	0.7508
	2002	0.7696	0.7385	0.8007
	2003	0.8137	0.7768	0.8506
	2004	0.8578	0.8151	0.9005
	2005	0.9019	0.8534	0.9504
	2006	0.9459	0.8917	1.0003
	2007	0.9900	0.9300	1.0502
	2008	1.0341	0.9683	1.1000
10 Point	1999	0.6491	0.6322	0.6660
	2000	0.6913	0.6691	0.7135
	2001	0.7335	0.7061	0.7610
	2002	0.7758	0.7430	0.8086
	2003	0.8180	0.7800	0.8561
	2004	0.8602	0.8169	0.9036
	2005	0.9025	0.8539	0.9512
	2006	0.9447	0.8908	0.9987
	2007	0.9869	0.9278	1.0462
	2008	1.0292	0.9647	1.0938

INDEMNITY Expon'l <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
4 Point	2005	0.8399	0.8035	0.8766
	2006	0.9190	0.8699	0.9681
	2007	1.0055	0.9417	1.0693
	2008	1.1002	1.0195	1.1811
5 Point	2004	0.8073	0.7790	0.8358
	2005	0.8686	0.8299	0.9074
	2006	0.9346	0.8840	0.9850
	2007	1.0055	0.9417	1.0693
	2008	1.0819	1.0032	1.1608
6 Point	2003	0.7679	0.7412	0.7949
	2004	0.8210	0.7867	0.8555
	2005	0.8778	0.8350	0.9206
	2006	0.9385	0.8862	0.9907
	2007	1.0034	0.9406	1.0662
	2008	1.0728	0.9983	1.1474
7 Point	2002	0.7388	0.7157	0.7621
	2003	0.7848	0.7553	0.8143
	2004	0.8336	0.7971	0.8700
	2005	0.8855	0.8413	0.9295
	2006	0.9405	0.8879	0.9931
	2007	0.9991	0.9370	1.0611
	2008	1.0612	0.9889	1.1337
8 Point	2001	0.7153	0.6913	0.7393
	2002	0.7555	0.7268	0.7843
	2003	0.7981	0.7641	0.8320
	2004	0.8430	0.8033	0.8825
	2005	0.8904	0.8445	0.9362
	2006	0.9405	0.8879	0.9931
	2007	0.9935	0.9334	1.0535
	2008	1.0494	0.9813	1.1176
9 Point	2000	0.6960	0.6731	0.7191
	2001	0.7316	0.7047	0.7586
	2002	0.7691	0.7379	0.8003
	2003	0.8084	0.7725	0.8443
	2004	0.8498	0.8088	0.8907
	2005	0.8933	0.8469	0.9397
	2006	0.9390	0.8867	0.9913
	2007	0.9871	0.9283	1.0458
10 Point	1999	0.6652	0.6448	0.6859
	2000	0.6988	0.6748	0.7229
	2001	0.7340	0.7062	0.7619
	2002	0.7710	0.7390	0.8030
	2003	0.8098	0.7734	0.8463
	2004	0.8507	0.8093	0.8919
	2005	0.8935	0.8470	0.9400
	2006	0.9386	0.8864	0.9907
	2007	0.9859	0.9276	1.0441
2008	1.0356	0.9707	1.1004	

MEDICAL Linear <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
4 Point	2005	0.8228	0.7765	0.8690
	2006	0.8779	0.8255	0.9303
	2007	0.9331	0.8744	0.9916
	2008	0.9882	0.9234	1.0529
5 Point	2004	0.8031	0.7587	0.8475
	2005	0.8464	0.7973	0.8955
	2006	0.8898	0.8358	0.9436
	2007	0.9331	0.8744	0.9916
	2008	0.9764	0.9130	1.0397
6 Point	2003	0.7547	0.7168	0.7927
	2004	0.7994	0.7563	0.8426
	2005	0.8441	0.7958	0.8925
	2006	0.8888	0.8352	0.9423
	2007	0.9335	0.8747	0.9922
	2008	0.9782	0.9142	1.0421
7 Point	2002	0.6963	0.6651	0.7275
	2003	0.7441	0.7074	0.7809
	2004	0.7920	0.7497	0.8343
	2005	0.8399	0.7920	0.8877
	2006	0.8878	0.8343	0.9412
	2007	0.9357	0.8766	0.9946
	2008	0.9835	0.9189	1.0480
8 Point	2001	0.6485	0.6203	0.6767
	2002	0.6963	0.6631	0.7296
	2003	0.7442	0.7059	0.7825
	2004	0.7921	0.7487	0.8354
	2005	0.8399	0.7915	0.8883
	2006	0.8878	0.8343	0.9412
	2007	0.9356	0.8771	0.9941
	2008	0.9835	0.9199	1.0470
9 Point	2000	0.6169	0.5967	0.6373
	2001	0.6619	0.6361	0.6878
	2002	0.7069	0.6755	0.7383
	2003	0.7519	0.7149	0.7888
	2004	0.7969	0.7543	0.8394
	2005	0.8418	0.7937	0.8899
	2006	0.8868	0.8332	0.9404
	2007	0.9318	0.8726	0.9909
	2008	0.9768	0.9120	1.0414
10 Point	1999	0.5819	0.5690	0.5949
	2000	0.6253	0.6066	0.6441
	2001	0.6687	0.6441	0.6933
	2002	0.7121	0.6817	0.7426
	2003	0.7555	0.7193	0.7918
	2004	0.7989	0.7568	0.8410
	2005	0.8424	0.7944	0.8903
	2006	0.8858	0.8319	0.9395
	2007	0.9292	0.8695	0.9888
	2008	0.9726	0.9070	1.0380

MEDICAL Expon'l <b>FITTED</b>	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
4 Point	2005	0.8242	0.7776	0.8707
	2006	0.8760	0.8237	0.9282
	2007	0.9310	0.8725	0.9894
	2008	0.9895	0.9241	1.0547
5 Point	2004	0.8059	0.7610	0.8507
	2005	0.8456	0.7965	0.8946
	2006	0.8873	0.8336	0.9408
	2007	0.9310	0.8725	0.9894
	2008	0.9769	0.9131	1.0405
6 Point	2003	0.7586	0.7201	0.7971
	2004	0.7987	0.7557	0.8416
	2005	0.8409	0.7930	0.8886
	2006	0.8853	0.8322	0.9383
	2007	0.9321	0.8732	0.9907
	2008	0.9813	0.9164	1.0461
7 Point	2002	0.7016	0.6696	0.7336
	2003	0.7432	0.7067	0.7797
	2004	0.7873	0.7458	0.8288
	2005	0.8340	0.7870	0.8809
	2006	0.8835	0.8306	0.9362
	2007	0.9359	0.8765	0.9951
	2008	0.9914	0.9251	1.0577
	8 Point	2001	0.6566	0.6271
2002		0.6967	0.6634	0.7301
2003		0.7393	0.7017	0.7770
2004		0.7846	0.7423	0.8268
2005		0.8326	0.7852	0.8798
2006		0.8835	0.8306	0.9362
2007		0.9375	0.8786	0.9963
2008		0.9949	0.9294	1.0602
9 Point		2000	0.6281	0.6059
	2001	0.6647	0.6385	0.6910
	2002	0.7035	0.6728	0.7342
	2003	0.7446	0.7090	0.7801
	2004	0.7880	0.7471	0.8289
	2005	0.8340	0.7872	0.8807
	2006	0.8827	0.8295	0.9358
	2007	0.9342	0.8741	0.9943
	2008	0.9887	0.9211	1.0564
10 Point	1999	0.5959	0.5806	0.6114
	2000	0.6303	0.6109	0.6497
	2001	0.6666	0.6427	0.6905
	2002	0.7051	0.6762	0.7338
	2003	0.7457	0.7115	0.7798
	2004	0.7887	0.7486	0.8287
	2005	0.8342	0.7876	0.8806
	2006	0.8823	0.8287	0.9359
	2007	0.9332	0.8719	0.9946
	2008	0.9870	0.9173	1.0569

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
4 Point	2005	0.0183	0.0131	0.0235
	2006	-0.0353	-0.0268	-0.0440
	2007	0.0157	0.0142	0.0174
	2008	0.0013	-0.0005	0.0030
5 Point	2004	0.0345	0.0305	0.0385
	2005	-0.0162	-0.0174	-0.0150
	2006	-0.0526	-0.0421	-0.0632
	2007	0.0157	0.0142	0.0174
	2008	0.0186	0.0147	0.0223
6 Point	2003	0.0256	0.0159	0.0355
	2004	0.0140	0.0179	0.0102
	2005	-0.0290	-0.0253	-0.0327
	2006	-0.0577	-0.0452	-0.0703
	2007	0.0183	0.0158	0.0210
	2008	0.0288	0.0211	0.0365
7 Point	2002	0.0358	0.0288	0.0426
	2003	0.0018	-0.0034	0.0070
	2004	-0.0027	0.0044	-0.0097
	2005	-0.0386	-0.0330	-0.0441
	2006	-0.0601	-0.0472	-0.0732
	2007	0.0231	0.0196	0.0267
	2008	0.0407	0.0307	0.0507
	2009	0.0407	0.0307	0.0507
8 Point	2001	0.0416	0.0287	0.0545
	2002	0.0120	0.0124	0.0115
	2003	-0.0161	-0.0157	-0.0163
	2004	-0.0145	-0.0038	-0.0253
	2005	-0.0445	-0.0371	-0.0519
	2006	-0.0601	-0.0472	-0.0732
	2007	0.0290	0.0237	0.0344
	2008	0.0526	0.0389	0.0663
	2009	0.0526	0.0389	0.0663
9 Point	2000	0.0467	0.0376	0.0560
	2001	0.0182	0.0100	0.0265
	2002	-0.0063	-0.0023	-0.0105
	2003	-0.0294	-0.0264	-0.0323
	2004	-0.0229	-0.0105	-0.0353
	2005	-0.0479	-0.0398	-0.0559
	2006	-0.0584	-0.0458	-0.0712
	2007	0.0357	0.0291	0.0424
	2008	0.0643	0.0483	0.0803
10 Point	1999	0.0221	0.0162	0.0282
	2000	0.0369	0.0304	0.0435
	2001	0.0103	0.0041	0.0163
	2002	-0.0125	-0.0068	-0.0184
	2003	-0.0337	-0.0296	-0.0378
	2004	-0.0253	-0.0123	-0.0384
	2005	-0.0485	-0.0403	-0.0567
	2006	-0.0572	-0.0449	-0.0696
	2007	0.0388	0.0313	0.0464
	2008	0.0692	0.0519	0.0865

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
4 Point	2005	0.0141	0.0101	0.0179
	2006	-0.0315	-0.0240	-0.0390
	2007	0.0202	0.0174	0.0233
	2008	-0.0018	-0.0029	-0.0008
5 Point	2004	0.0276	0.0256	0.0294
	2005	-0.0146	-0.0163	-0.0129
	2006	-0.0471	-0.0381	-0.0559
	2007	0.0202	0.0174	0.0233
	2008	0.0165	0.0134	0.0195
6 Point	2003	0.0164	0.0092	0.0234
	2004	0.0139	0.0179	0.0097
	2005	-0.0238	-0.0214	-0.0261
	2006	-0.0510	-0.0403	-0.0616
	2007	0.0223	0.0185	0.0264
	2008	0.0256	0.0183	0.0329
7 Point	2002	0.0245	0.0205	0.0281
	2003	-0.0005	-0.0049	0.0040
	2004	0.0013	0.0075	-0.0048
	2005	-0.0315	-0.0277	-0.0350
	2006	-0.0530	-0.0420	-0.0640
	2007	0.0266	0.0221	0.0315
	2008	0.0372	0.0277	0.0466
	2008	0.0372	0.0277	0.0466
8 Point	2001	0.0285	0.0189	0.0380
	2002	0.0078	0.0094	0.0059
	2003	-0.0138	-0.0137	-0.0137
	2004	-0.0081	0.0013	-0.0173
	2005	-0.0364	-0.0309	-0.0417
	2006	-0.0530	-0.0420	-0.0640
	2007	0.0322	0.0257	0.0391
	2008	0.0490	0.0353	0.0627
	2008	0.0490	0.0353	0.0627
9 Point	2000	0.0322	0.0264	0.0379
	2001	0.0122	0.0055	0.0187
	2002	-0.0058	-0.0017	-0.0101
	2003	-0.0241	-0.0221	-0.0260
	2004	-0.0149	-0.0042	-0.0255
	2005	-0.0393	-0.0333	-0.0452
	2006	-0.0515	-0.0408	-0.0622
	2007	0.0386	0.0308	0.0468
	2008	0.0608	0.0447	0.0770
10 Point	1999	0.0060	0.0036	0.0083
	2000	0.0294	0.0247	0.0341
	2001	0.0098	0.0040	0.0154
	2002	-0.0077	-0.0028	-0.0128
	2003	-0.0255	-0.0230	-0.0280
	2004	-0.0158	-0.0047	-0.0267
	2005	-0.0395	-0.0334	-0.0455
	2006	-0.0511	-0.0405	-0.0616
	2007	0.0398	0.0315	0.0485
	2008	0.0628	0.0459	0.0799



MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
4 Point	2005	0.0135	0.0164	0.0106
	2006	-0.0349	-0.0404	-0.0293
	2007	0.0292	0.0315	0.0270
	2008	-0.0078	-0.0076	-0.0082
5 Point	2004	0.0237	0.0208	0.0265
	2005	-0.0101	-0.0044	-0.0159
	2006	-0.0468	-0.0507	-0.0426
	2007	0.0292	0.0315	0.0270
	2008	0.0040	0.0028	0.0050
6 Point	2003	-0.0046	-0.0030	-0.0062
	2004	0.0274	0.0232	0.0314
	2005	-0.0078	-0.0029	-0.0129
	2006	-0.0458	-0.0501	-0.0413
	2007	0.0288	0.0312	0.0264
	2008	0.0022	0.0016	0.0026
7 Point	2002	-0.0159	-0.0142	-0.0177
	2003	0.0060	0.0064	0.0056
	2004	0.0348	0.0298	0.0397
	2005	-0.0036	0.0009	-0.0081
	2006	-0.0448	-0.0492	-0.0402
	2007	0.0266	0.0293	0.0240
	2008	-0.0031	-0.0031	-0.0033
8 Point	2001	0.0001	-0.0034	0.0037
	2002	-0.0159	-0.0122	-0.0198
	2003	0.0059	0.0079	0.0040
	2004	0.0347	0.0308	0.0386
	2005	-0.0036	0.0014	-0.0087
	2006	-0.0448	-0.0492	-0.0402
	2007	0.0267	0.0288	0.0245
	2008	-0.0031	-0.0041	-0.0023
9 Point	2000	0.0269	0.0315	0.0223
	2001	-0.0133	-0.0192	-0.0074
	2002	-0.0265	-0.0246	-0.0285
	2003	-0.0018	-0.0011	-0.0023
	2004	0.0299	0.0252	0.0346
	2005	-0.0055	-0.0008	-0.0103
	2006	-0.0438	-0.0481	-0.0394
	2007	0.0305	0.0333	0.0277
	2008	0.0036	0.0038	0.0033
10 Point	1999	0.0188	0.0223	0.0152
	2000	0.0185	0.0216	0.0155
	2001	-0.0201	-0.0272	-0.0129
	2002	-0.0317	-0.0308	-0.0328
	2003	-0.0054	-0.0055	-0.0053
	2004	0.0279	0.0227	0.0330
	2005	-0.0061	-0.0015	-0.0107
	2006	-0.0428	-0.0468	-0.0385
	2007	0.0331	0.0364	0.0298
	2008	0.0078	0.0088	0.0067

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
4 Point	2005	0.0121	0.0153	0.0089
	2006	-0.0330	-0.0386	-0.0272
	2007	0.0313	0.0334	0.0292
	2008	-0.0091	-0.0083	-0.0100
5 Point	2004	0.0209	0.0185	0.0233
	2005	-0.0093	-0.0036	-0.0150
	2006	-0.0443	-0.0485	-0.0398
	2007	0.0313	0.0334	0.0292
	2008	0.0035	0.0027	0.0042
6 Point	2003	-0.0085	-0.0063	-0.0106
	2004	0.0281	0.0238	0.0324
	2005	-0.0046	-0.0001	-0.0090
	2006	-0.0423	-0.0471	-0.0373
	2007	0.0302	0.0327	0.0279
	2008	-0.0009	-0.0006	-0.0014
7 Point	2002	-0.0212	-0.0187	-0.0238
	2003	0.0069	0.0071	0.0068
	2004	0.0395	0.0337	0.0452
	2005	0.0023	0.0059	-0.0013
	2006	-0.0405	-0.0455	-0.0352
	2007	0.0264	0.0294	0.0235
	2008	-0.0110	-0.0093	-0.0130
8 Point	2001	-0.0080	-0.0102	-0.0057
	2002	-0.0163	-0.0125	-0.0203
	2003	0.0108	0.0121	0.0095
	2004	0.0422	0.0372	0.0472
	2005	0.0037	0.0077	-0.0002
	2006	-0.0405	-0.0455	-0.0352
	2007	0.0248	0.0273	0.0223
	2008	-0.0145	-0.0136	-0.0155
9 Point	2000	0.0157	0.0223	0.0093
	2001	-0.0161	-0.0216	-0.0106
	2002	-0.0231	-0.0219	-0.0244
	2003	0.0055	0.0048	0.0064
	2004	0.0388	0.0324	0.0451
	2005	0.0023	0.0057	-0.0011
	2006	-0.0397	-0.0444	-0.0348
	2007	0.0281	0.0318	0.0243
10 Point	1999	0.0048	0.0107	-0.0013
	2000	0.0135	0.0173	0.0099
	2001	-0.0180	-0.0258	-0.0101
	2002	-0.0247	-0.0253	-0.0240
	2003	0.0044	0.0023	0.0067
	2004	0.0381	0.0309	0.0453
	2005	0.0021	0.0053	-0.0010
	2006	-0.0393	-0.0436	-0.0349
	2007	0.0291	0.0340	0.0240
2008	-0.0066	-0.0015	-0.0122	