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 severity 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-26)
4 Point	Linear	0.906	0.833	0.924
5 Point	Linear	0.692	0.230	0.808
6 Point	Linear	0.821	0.539	0.885
7 Point	Linear	0.793	0.609	0.868
8 Point	Linear	0.861	0.738	0.911
9 Point	Linear	0.887	0.781	0.929
10 Point	Linear	0.918	0.840	0.948
4 Point	Expon'l	0.906	0.832	0.925
5 Point	Expon'l	0.690	0.229	0.809
6 Point	Expon'l	0.818	0.539	0.882
7 Point	Expon'l	0.779	0.602	0.852
8 Point	Expon'l	0.851	0.733	0.900
9 Point	Expon'l	0.881	0.776	0.922
10 Point	Expon'l	0.913	0.836	0.943

MEDICAL Freq Adj LR r^2		Average (Pd & Inc)	(Incur)	(Pd-26)
4 Point	Linear	0.969	0.949	0.975
5 Point	Linear	0.965	0.954	0.967
6 Point	Linear	0.948	0.923	0.960
7 Point	Linear	0.952	0.934	0.962
8 Point	Linear	0.964	0.950	0.972
9 Point	Linear	0.957	0.946	0.964
10 Point	Linear	0.969	0.961	0.973
4 Point	Expon'l	0.964	0.942	0.973
5 Point	Expon'l	0.965	0.952	0.969
6 Point	Expon'l	0.952	0.924	0.966
7 Point	Expon'l	0.942	0.923	0.953
8 Point	Expon'l	0.959	0.944	0.967
9 Point	Expon'l	0.957	0.945	0.964
10 Point	Expon'l	0.967	0.957	0.973

INDEMNITY Linear **FITTED**	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2009	0.8111	0.7744	0.8478
	2010	0.8246	0.7807	0.8685
	2011	0.8382	0.7871	0.8892
	2012	0.8517	0.7934	0.9099
5 Point	2008	0.8122	0.7798	0.8447
	2009	0.8209	0.7822	0.8596
	2010	0.8295	0.7847	0.8744
	2011	0.8382	0.7871	0.8892
	2012	0.8468	0.7895	0.9040
6 Point	2007	0.7949	0.7704	0.8195
	2008	0.8059	0.7747	0.8372
	2009	0.8169	0.7790	0.8548
	2010	0.8279	0.7834	0.8725
	2011	0.8390	0.7877	0.8901
	2012	0.8500	0.7921	0.9078
7 Point	2006	0.7584	0.7410	0.7758
	2007	0.7753	0.7512	0.7995
	2008	0.7922	0.7613	0.8231
	2009	0.8091	0.7714	0.8468
	2010	0.8260	0.7815	0.8705
	2011	0.8429	0.7916	0.8942
	2012	0.8598	0.8017	0.9178
8 Point	2005	0.7307	0.7181	0.7434
	2006	0.7497	0.7307	0.7688
	2007	0.7688	0.7434	0.7942
	2008	0.7879	0.7561	0.8196
	2009	0.8069	0.7688	0.8451
	2010	0.8260	0.7815	0.8705
	2011	0.8450	0.7941	0.8959
	2012	0.8641	0.8068	0.9213
9 Point	2004	0.7159	0.7089	0.7230
	2005	0.7342	0.7210	0.7475
	2006	0.7525	0.7330	0.7721
	2007	0.7708	0.7451	0.7966
	2008	0.7891	0.7571	0.8211
	2009	0.8074	0.7692	0.8457
	2010	0.8257	0.7813	0.8702
	2011	0.8440	0.7933	0.8947
	2012	0.8623	0.8054	0.9192
10 Point	2003	0.6935	0.6892	0.6981
	2004	0.7125	0.7024	0.7227
	2005	0.7314	0.7157	0.7473
	2006	0.7504	0.7290	0.7718
	2007	0.7693	0.7422	0.7964
	2008	0.7883	0.7555	0.8210
	2009	0.8072	0.7688	0.8456
	2010	0.8262	0.7821	0.8702
	2011	0.8451	0.7953	0.8948
	2012	0.8640	0.8086	0.9194

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2009	0.8112	0.7744	0.8481
	2010	0.8245	0.7807	0.8683
	2011	0.8380	0.7870	0.8889
	2012	0.8518	0.7934	0.9100
5 Point	2008	0.8124	0.7798	0.8452
	2009	0.8208	0.7822	0.8595
	2010	0.8294	0.7846	0.8741
	2011	0.8380	0.7870	0.8889
	2012	0.8468	0.7895	0.9040
6 Point	2007	0.7951	0.7704	0.8200
	2008	0.8058	0.7747	0.8369
	2009	0.8167	0.7790	0.8543
	2010	0.8277	0.7833	0.8719
	2011	0.8389	0.7877	0.8900
	2012	0.8502	0.7921	0.9084
7 Point	2006	0.7582	0.7406	0.7761
	2007	0.7745	0.7506	0.7985
	2008	0.7911	0.7607	0.8215
	2009	0.8081	0.7709	0.8452
	2010	0.8255	0.7813	0.8696
	2011	0.8433	0.7918	0.8947
	2012	0.8614	0.8025	0.9205
8 Point	2005	0.7310	0.7178	0.7446
	2006	0.7490	0.7300	0.7680
	2007	0.7674	0.7425	0.7923
	2008	0.7863	0.7552	0.8173
	2009	0.8057	0.7682	0.8430
	2010	0.8255	0.7813	0.8696
	2011	0.8459	0.7947	0.8971
	2012	0.8667	0.8082	0.9253
9 Point	2004	0.7170	0.7091	0.7254
	2005	0.7340	0.7206	0.7476
	2006	0.7514	0.7323	0.7705
	2007	0.7692	0.7442	0.7941
	2008	0.7875	0.7563	0.8184
	2009	0.8062	0.7686	0.8435
	2010	0.8253	0.7811	0.8694
	2011	0.8449	0.7938	0.8960
	2012	0.8649	0.8067	0.9235
10 Point	2003	0.6953	0.6897	0.7016
	2004	0.7126	0.7022	0.7234
	2005	0.7304	0.7149	0.7460
	2006	0.7486	0.7278	0.7692
	2007	0.7672	0.7410	0.7932
	2008	0.7863	0.7544	0.8179
	2009	0.8059	0.7681	0.8434
	2010	0.8259	0.7820	0.8697
	2011	0.8465	0.7962	0.8968
	2012	0.8675	0.8106	0.9247

MEDICAL Linear **FITTED**	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2009	0.8525	0.8137	0.8911
	2010	0.8937	0.8502	0.9370
	2011	0.9348	0.8866	0.9829
	2012	0.9760	0.9231	1.0289
5 Point	2008	0.8251	0.7888	0.8614
	2009	0.8617	0.8214	0.9019
	2010	0.8983	0.8540	0.9424
	2011	0.9348	0.8866	0.9829
	2012	0.9714	0.9192	1.0235
6 Point	2007	0.8055	0.7748	0.8360
	2008	0.8374	0.8024	0.8724
	2009	0.8694	0.8299	0.9088
	2010	0.9013	0.8574	0.9452
	2011	0.9333	0.8849	0.9816
	2012	0.9653	0.9124	1.0179
7 Point	2006	0.7549	0.7285	0.7811
	2007	0.7911	0.7603	0.8218
	2008	0.8274	0.7922	0.8624
	2009	0.8636	0.8241	0.9031
	2010	0.8999	0.8559	0.9438
	2011	0.9362	0.8878	0.9844
	2012	0.9724	0.9197	1.0251
8 Point	2005	0.7238	0.7021	0.7455
	2006	0.7590	0.7329	0.7851
	2007	0.7942	0.7636	0.8248
	2008	0.8295	0.7944	0.8644
	2009	0.8647	0.8252	0.9041
	2010	0.8999	0.8559	0.9438
	2011	0.9351	0.8867	0.9834
	2012	0.9704	0.9175	1.0231
9 Point	2004	0.7030	0.6839	0.7222
	2005	0.7357	0.7124	0.7589
	2006	0.7684	0.7410	0.7957
	2007	0.8010	0.7695	0.8325
	2008	0.8337	0.7981	0.8692
	2009	0.8664	0.8266	0.9060
	2010	0.8991	0.8552	0.9428
	2011	0.9317	0.8838	0.9796
	2012	0.9644	0.9123	1.0163
10 Point	2003	0.6679	0.6507	0.6852
	2004	0.7010	0.6800	0.7220
	2005	0.7340	0.7093	0.7588
	2006	0.7671	0.7386	0.7956
	2007	0.8001	0.7678	0.8324
	2008	0.8332	0.7971	0.8692
	2009	0.8663	0.8264	0.9060
	2010	0.8993	0.8557	0.9428
	2011	0.9324	0.8850	0.9796
	2012	0.9654	0.9143	1.0164

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2009	0.8529	0.8139	0.8918
	2010	0.8926	0.8492	0.9358
	2011	0.9340	0.8859	0.9819
	2012	0.9774	0.9243	1.0303
5 Point	2008	0.8266	0.7899	0.8632
	2009	0.8609	0.8207	0.9011
	2010	0.8967	0.8527	0.9406
	2011	0.9340	0.8859	0.9819
	2012	0.9728	0.9205	1.0250
6 Point	2007	0.8078	0.7766	0.8388
	2008	0.8373	0.8022	0.8722
	2009	0.8679	0.8287	0.9070
	2010	0.8996	0.8560	0.9431
	2011	0.9325	0.8842	0.9806
	2012	0.9666	0.9134	1.0197
7 Point	2006	0.7576	0.7305	0.7846
	2007	0.7904	0.7596	0.8211
	2008	0.8247	0.7899	0.8593
	2009	0.8604	0.8214	0.8992
	2010	0.8977	0.8541	0.9411
	2011	0.9366	0.8881	0.9848
	2012	0.9771	0.9235	1.0306
8 Point	2005	0.7282	0.7056	0.7508
	2006	0.7593	0.7330	0.7855
	2007	0.7918	0.7616	0.8218
	2008	0.8256	0.7913	0.8598
	2009	0.8609	0.8221	0.8995
	2010	0.8977	0.8541	0.9411
	2011	0.9360	0.8874	0.9845
	2012	0.9760	0.9219	1.0300
9 Point	2004	0.7090	0.6886	0.7294
	2005	0.7373	0.7137	0.7609
	2006	0.7668	0.7396	0.7938
	2007	0.7974	0.7666	0.8281
	2008	0.8293	0.7945	0.8639
	2009	0.8624	0.8234	0.9012
	2010	0.8969	0.8534	0.9402
	2011	0.9327	0.8845	0.9808
	2012	0.9700	0.9167	1.0232
10 Point	2003	0.6753	0.6566	0.6942
	2004	0.7033	0.6818	0.7250
	2005	0.7325	0.7079	0.7572
	2006	0.7630	0.7351	0.7908
	2007	0.7946	0.7632	0.8259
	2008	0.8276	0.7925	0.8626
	2009	0.8620	0.8229	0.9009
	2010	0.8978	0.8545	0.9409
	2011	0.9350	0.8872	0.9826
	2012	0.9738	0.9213	1.0263

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2009	0.0050	0.0030	0.0070
	2010	-0.0080	-0.0053	-0.0108
	2011	0.0010	0.0015	0.0006
	2012	0.0020	0.0008	0.0032
5 Point	2008	0.0098	0.0079	0.0118
	2009	-0.0048	-0.0048	-0.0048
	2010	-0.0129	-0.0093	-0.0167
	2011	0.0010	0.0015	0.0006
	2012	0.0069	0.0047	0.0091
6 Point	2007	-0.0079	-0.0064	-0.0095
	2008	0.0161	0.0130	0.0193
	2009	-0.0008	-0.0016	0.0000
	2010	-0.0113	-0.0080	-0.0148
	2011	0.0002	0.0009	-0.0003
	2012	0.0037	0.0021	0.0053
7 Point	2006	-0.0295	-0.0288	-0.0300
	2007	0.0117	0.0129	0.0105
	2008	0.0298	0.0264	0.0334
	2009	0.0070	0.0060	0.0080
	2010	-0.0094	-0.0061	-0.0128
	2011	-0.0037	-0.0030	-0.0044
	2012	-0.0061	-0.0075	-0.0047
8 Point	2005	-0.0151	-0.0181	-0.0123
	2006	-0.0208	-0.0185	-0.0230
	2007	0.0182	0.0206	0.0158
	2008	0.0341	0.0316	0.0369
	2009	0.0092	0.0086	0.0097
	2010	-0.0094	-0.0061	-0.0128
	2011	-0.0058	-0.0055	-0.0061
	2012	-0.0104	-0.0126	-0.0082
9 Point	2004	0.0070	0.0058	0.0083
	2005	-0.0186	-0.0210	-0.0164
	2006	-0.0236	-0.0208	-0.0263
	2007	0.0162	0.0189	0.0134
	2008	0.0329	0.0306	0.0354
	2009	0.0087	0.0082	0.0091
	2010	-0.0091	-0.0059	-0.0125
	2011	-0.0048	-0.0047	-0.0049
	2012	-0.0086	-0.0112	-0.0061
10 Point	2003	-0.0076	-0.0146	-0.0008
	2004	0.0104	0.0123	0.0086
	2005	-0.0158	-0.0157	-0.0162
	2006	-0.0215	-0.0168	-0.0260
	2007	0.0177	0.0218	0.0136
	2008	0.0337	0.0322	0.0355
	2009	0.0089	0.0086	0.0092
	2010	-0.0096	-0.0067	-0.0125
	2011	-0.0059	-0.0067	-0.0050
	2012	-0.0103	-0.0144	-0.0063

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2009	0.0049	0.0030	0.0067
	2010	-0.0079	-0.0053	-0.0106
	2011	0.0012	0.0016	0.0009
	2012	0.0019	0.0008	0.0031
5 Point	2008	0.0096	0.0079	0.0113
	2009	-0.0047	-0.0048	-0.0047
	2010	-0.0128	-0.0092	-0.0164
	2011	0.0012	0.0016	0.0009
	2012	0.0069	0.0047	0.0091
6 Point	2007	-0.0081	-0.0064	-0.0100
	2008	0.0162	0.0130	0.0196
	2009	-0.0006	-0.0016	0.0005
	2010	-0.0111	-0.0079	-0.0142
	2011	0.0003	0.0009	-0.0002
	2012	0.0035	0.0021	0.0047
7 Point	2006	-0.0293	-0.0284	-0.0303
	2007	0.0125	0.0134	0.0115
	2008	0.0309	0.0270	0.0350
	2009	0.0080	0.0065	0.0096
	2010	-0.0089	-0.0059	-0.0119
	2011	-0.0041	-0.0032	-0.0049
	2012	-0.0077	-0.0083	-0.0074
8 Point	2005	-0.0154	-0.0178	-0.0135
	2006	-0.0201	-0.0178	-0.0222
	2007	0.0196	0.0215	0.0177
	2008	0.0357	0.0325	0.0392
	2009	0.0104	0.0092	0.0118
	2010	-0.0089	-0.0059	-0.0119
	2011	-0.0067	-0.0061	-0.0073
	2012	-0.0130	-0.0140	-0.0122
9 Point	2004	0.0059	0.0056	0.0059
	2005	-0.0184	-0.0206	-0.0165
	2006	-0.0225	-0.0201	-0.0247
	2007	0.0178	0.0198	0.0159
	2008	0.0345	0.0314	0.0381
	2009	0.0099	0.0088	0.0113
	2010	-0.0087	-0.0057	-0.0117
	2011	-0.0057	-0.0052	-0.0062
	2012	-0.0112	-0.0125	-0.0104
10 Point	2003	-0.0094	-0.0151	-0.0043
	2004	0.0103	0.0125	0.0079
	2005	-0.0148	-0.0149	-0.0149
	2006	-0.0197	-0.0156	-0.0234
	2007	0.0198	0.0230	0.0168
	2008	0.0357	0.0333	0.0386
	2009	0.0102	0.0093	0.0114
	2010	-0.0093	-0.0066	-0.0120
	2011	-0.0073	-0.0076	-0.0070
	2012	-0.0138	-0.0164	-0.0116

MEDICAL Linear **RESIDUALS**	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2009	-0.0061	-0.0092	-0.0030
	2010	0.0031	0.0087	-0.0023
	2011	0.0120	0.0103	0.0136
	2012	-0.0090	-0.0097	-0.0083
5 Point	2008	0.0092	0.0077	0.0108
	2009	-0.0153	-0.0169	-0.0138
	2010	-0.0015	0.0048	-0.0077
	2011	0.0120	0.0103	0.0136
	2012	-0.0044	-0.0059	-0.0029
6 Point	2007	0.0154	0.0170	0.0138
	2008	-0.0031	-0.0059	-0.0002
	2009	-0.0230	-0.0254	-0.0207
	2010	-0.0045	0.0014	-0.0105
	2011	0.0135	0.0120	0.0149
	2012	0.0017	0.0009	0.0027
7 Point	2006	-0.0215	-0.0218	-0.0213
	2007	0.0298	0.0315	0.0280
	2008	0.0069	0.0043	0.0098
	2009	-0.0172	-0.0196	-0.0150
	2010	-0.0031	0.0029	-0.0091
	2011	0.0106	0.0091	0.0121
	2012	-0.0054	-0.0064	-0.0045
8 Point	2005	0.0073	0.0077	0.0069
	2006	-0.0257	-0.0262	-0.0253
	2007	0.0267	0.0282	0.0250
	2008	0.0048	0.0021	0.0078
	2009	-0.0183	-0.0207	-0.0160
	2010	-0.0031	0.0029	-0.0091
	2011	0.0117	0.0102	0.0131
	2012	-0.0033	-0.0042	-0.0025
9 Point	2004	0.0238	0.0206	0.0269
	2005	-0.0046	-0.0026	-0.0065
	2006	-0.0351	-0.0343	-0.0359
	2007	0.0199	0.0223	0.0173
	2008	0.0006	-0.0016	0.0030
	2009	-0.0200	-0.0221	-0.0179
	2010	-0.0023	0.0036	-0.0081
	2011	0.0151	0.0131	0.0169
	2012	0.0026	0.0010	0.0043
10 Point	2003	-0.0046	-0.0087	-0.0004
	2004	0.0258	0.0245	0.0271
	2005	-0.0029	0.0005	-0.0064
	2006	-0.0338	-0.0319	-0.0358
	2007	0.0208	0.0240	0.0174
	2008	0.0011	-0.0006	0.0030
	2009	-0.0199	-0.0219	-0.0179
	2010	-0.0025	0.0031	-0.0081
	2011	0.0144	0.0119	0.0169
	2012	0.0016	-0.0010	0.0042

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2009	-0.0065	-0.0094	-0.0037
	2010	0.0042	0.0096	-0.0011
	2011	0.0128	0.0110	0.0146
	2012	-0.0104	-0.0110	-0.0097
5 Point	2008	0.0077	0.0066	0.0090
	2009	-0.0145	-0.0162	-0.0130
	2010	0.0001	0.0061	-0.0059
	2011	0.0128	0.0110	0.0146
	2012	-0.0058	-0.0072	-0.0044
6 Point	2007	0.0131	0.0152	0.0110
	2008	-0.0030	-0.0057	0.0000
	2009	-0.0215	-0.0242	-0.0189
	2010	-0.0028	0.0028	-0.0084
	2011	0.0143	0.0127	0.0159
	2012	0.0004	-0.0001	0.0009
7 Point	2006	-0.0243	-0.0238	-0.0248
	2007	0.0305	0.0322	0.0287
	2008	0.0096	0.0066	0.0129
	2009	-0.0140	-0.0169	-0.0111
	2010	-0.0009	0.0047	-0.0064
	2011	0.0102	0.0088	0.0117
	2012	-0.0101	-0.0102	-0.0100
8 Point	2005	0.0029	0.0042	0.0016
	2006	-0.0260	-0.0263	-0.0257
	2007	0.0291	0.0302	0.0280
	2008	0.0087	0.0052	0.0124
	2009	-0.0145	-0.0176	-0.0114
	2010	-0.0009	0.0047	-0.0064
	2011	0.0108	0.0095	0.0120
	2012	-0.0090	-0.0086	-0.0094
9 Point	2004	0.0178	0.0159	0.0197
	2005	-0.0062	-0.0039	-0.0085
	2006	-0.0335	-0.0329	-0.0340
	2007	0.0235	0.0252	0.0217
	2008	0.0050	0.0020	0.0083
	2009	-0.0160	-0.0189	-0.0131
	2010	-0.0001	0.0054	-0.0055
	2011	0.0141	0.0124	0.0157
	2012	-0.0030	-0.0034	-0.0026
10 Point	2003	-0.0120	-0.0146	-0.0094
	2004	0.0235	0.0227	0.0241
	2005	-0.0014	0.0019	-0.0048
	2006	-0.0297	-0.0284	-0.0310
	2007	0.0263	0.0286	0.0239
	2008	0.0067	0.0040	0.0096
	2009	-0.0156	-0.0184	-0.0128
	2010	-0.0010	0.0043	-0.0062
	2011	0.0118	0.0097	0.0139
	2012	-0.0068	-0.0080	-0.0057