

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-21)
r^2				
4 Point	Linear	0.858	0.798	0.907
5 Point	Linear	0.920	0.884	0.948
6 Point	Linear	0.929	0.894	0.955
7 Point	Linear	0.926	0.904	0.941
8 Point	Linear	0.915	0.891	0.932
9 Point	Linear	0.938	0.919	0.951
10 Point	Linear	0.954	0.941	0.962
4 Point	Expon'l	0.872	0.811	0.920
5 Point	Expon'l	0.933	0.900	0.959
6 Point	Expon'l	0.946	0.914	0.968
7 Point	Expon'l	0.946	0.927	0.958
8 Point	Expon'l	0.938	0.917	0.953
9 Point	Expon'l	0.957	0.942	0.966
10 Point	Expon'l	0.956	0.949	0.960

MEDICAL		Average		
Freq Adj LR		(Pd & Inc)	(Incur)	(Pd-21)
r^2				
4 Point	Linear	0.590	0.531	0.642
5 Point	Linear	0.791	0.752	0.821
6 Point	Linear	0.880	0.854	0.897
7 Point	Linear	0.924	0.909	0.934
8 Point	Linear	0.934	0.910	0.948
9 Point	Linear	0.952	0.932	0.963
10 Point	Linear	0.964	0.947	0.973
4 Point	Expon'l	0.589	0.526	0.644
5 Point	Expon'l	0.794	0.756	0.821
6 Point	Expon'l	0.882	0.860	0.894
7 Point	Expon'l	0.926	0.912	0.934
8 Point	Expon'l	0.940	0.918	0.953
9 Point	Expon'l	0.958	0.941	0.966
10 Point	Expon'l	0.969	0.957	0.974

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-21)
4 Point	2004	0.9094	0.8622	0.9568
	2005	0.9705	0.9201	1.0208
	2006	1.0315	0.9781	1.0849
	2007	1.0925	1.0360	1.1489
5 Point	2003	0.8525	0.8074	0.8977
	2004	0.9122	0.8643	0.9601
	2005	0.9718	0.9212	1.0225
	2006	1.0315	0.9781	1.0849
	2007	1.0911	1.0350	1.1472
6 Point	2002	0.8142	0.7747	0.8537
	2003	0.8680	0.8250	0.9111
	2004	0.9219	0.8753	0.9685
	2005	0.9757	0.9256	1.0258
	2006	1.0296	0.9759	1.0832
	2007	1.0834	1.0262	1.1405
7 Point	2001	0.7839	0.7441	0.8238
	2002	0.8323	0.7899	0.8748
	2003	0.8807	0.8356	0.9258
	2004	0.9291	0.8813	0.9769
	2005	0.9775	0.9271	1.0279
	2006	1.0259	0.9728	1.0790
	2007	1.0743	1.0186	1.1300
8 Point	2000	0.7605	0.7243	0.7967
	2001	0.8039	0.7648	0.8429
	2002	0.8473	0.8054	0.8892
	2003	0.8907	0.8460	0.9354
	2004	0.9341	0.8865	0.9817
	2005	0.9775	0.9271	1.0279
	2006	1.0209	0.9677	1.0742
	2007	1.0644	1.0082	1.1204
9 Point	1999	0.7188	0.6864	0.7510
	2000	0.7619	0.7265	0.7972
	2001	0.8050	0.7666	0.8433
	2002	0.8481	0.8067	0.8895
	2003	0.8912	0.8468	0.9356
	2004	0.9343	0.8868	0.9817
	2005	0.9774	0.9269	1.0279
	2006	1.0205	0.9670	1.0740
10 Point	1998	0.6644	0.6373	0.6914
	1999	0.7093	0.6788	0.7397
	2000	0.7542	0.7203	0.7880
	2001	0.7990	0.7618	0.8362
	2002	0.8439	0.8034	0.8845
	2003	0.8888	0.8449	0.9328
	2004	0.9337	0.8864	0.9810
	2005	0.9786	0.9279	1.0293
	2006	1.0235	0.9694	1.0776
2007	1.0684	1.0109	1.1258	

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-21)
4 Point	2004	0.9128	0.8656	0.9599
	2005	0.9690	0.9187	1.0192
	2006	1.0287	0.9750	1.0822
	2007	1.0920	1.0348	1.1490
5 Point	2003	0.8571	0.8119	0.9023
	2004	0.9108	0.8630	0.9587
	2005	0.9680	0.9173	1.0185
	2006	1.0287	0.9750	1.0822
	2007	1.0931	1.0364	1.1498
6 Point	2002	0.8205	0.7809	0.8603
	2003	0.8679	0.8250	0.9108
	2004	0.9180	0.8717	0.9643
	2005	0.9710	0.9210	1.0209
	2006	1.0270	0.9731	1.0809
	2007	1.0863	1.0281	1.1444
7 Point	2001	0.7920	0.7519	0.8322
	2002	0.8337	0.7912	0.8762
	2003	0.8776	0.8327	0.9226
	2004	0.9239	0.8763	0.9714
	2005	0.9725	0.9222	1.0228
	2006	1.0238	0.9705	1.0769
	2007	1.0777	1.0214	1.1339
8 Point	2000	0.7700	0.7333	0.8067
	2001	0.8068	0.7677	0.8459
	2002	0.8454	0.8037	0.8870
	2003	0.8858	0.8414	0.9302
	2004	0.9282	0.8809	0.9754
	2005	0.9725	0.9222	1.0228
	2006	1.0190	0.9655	1.0725
	2007	1.0678	1.0108	1.1247
9 Point	1999	0.7298	0.6968	0.7627
	2000	0.7656	0.7302	0.8010
	2001	0.8032	0.7651	0.8412
	2002	0.8427	0.8018	0.8835
	2003	0.8840	0.8401	0.9278
	2004	0.9274	0.8804	0.9744
	2005	0.9729	0.9225	1.0233
	2006	1.0207	0.9666	1.0747
2007	1.0708	1.0129	1.1287	
10 Point	1998	0.6770	0.6492	0.7049
	1999	0.7133	0.6828	0.7437
	2000	0.7515	0.7183	0.7848
	2001	0.7918	0.7555	0.8281
	2002	0.8343	0.7947	0.8738
	2003	0.8790	0.8359	0.9220
	2004	0.9261	0.8792	0.9729
	2005	0.9757	0.9248	1.0266
	2006	1.0280	0.9728	1.0832
2007	1.0831	1.0232	1.1430	

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-21)
4 Point	2004	0.8839	0.8482	0.9194
	2005	0.9186	0.8815	0.9557
	2006	0.9534	0.9148	0.9920
	2007	0.9881	0.9480	1.0283
5 Point	2003	0.8246	0.7936	0.8556
	2004	0.8675	0.8340	0.9011
	2005	0.9104	0.8744	0.9465
	2006	0.9534	0.9148	0.9920
	2007	0.9963	0.9552	1.0375
6 Point	2002	0.7665	0.7425	0.7905
	2003	0.8136	0.7858	0.8413
	2004	0.8606	0.8291	0.8921
	2005	0.9077	0.8724	0.9430
	2006	0.9547	0.9157	0.9938
	2007	1.0018	0.9590	1.0446
7 Point	2001	0.7142	0.6907	0.7378
	2002	0.7625	0.7359	0.7891
	2003	0.8108	0.7812	0.8403
	2004	0.8590	0.8265	0.8916
	2005	0.9073	0.8718	0.9428
	2006	0.9555	0.9170	0.9941
	2007	1.0038	0.9623	1.0453
8 Point	2000	0.6809	0.6651	0.6967
	2001	0.7261	0.7064	0.7459
	2002	0.7714	0.7477	0.7951
	2003	0.8167	0.7891	0.8444
	2004	0.8620	0.8304	0.8936
	2005	0.9073	0.8718	0.9428
	2006	0.9526	0.9131	0.9920
	2007	0.9978	0.9545	1.0413
9 Point	1999	0.6385	0.6288	0.6483
	2000	0.6833	0.6692	0.6974
	2001	0.7281	0.7097	0.7464
	2002	0.7728	0.7501	0.7955
	2003	0.8176	0.7906	0.8446
	2004	0.8623	0.8310	0.8937
	2005	0.9071	0.8715	0.9428
	2006	0.9519	0.9119	0.9919
	2007	0.9966	0.9524	1.0409
10 Point	1998	0.5959	0.5930	0.5986
	1999	0.6403	0.6327	0.6478
	2000	0.6847	0.6724	0.6970
	2001	0.7292	0.7122	0.7461
	2002	0.7736	0.7519	0.7953
	2003	0.8180	0.7916	0.8445
	2004	0.8624	0.8313	0.8937
	2005	0.9069	0.8710	0.9428
	2006	0.9513	0.9107	0.9920
	2007	0.9957	0.9504	1.0412

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-21)
4 Point	2004	0.8855	0.8499	0.9211
	2005	0.9180	0.8808	0.9551
	2006	0.9517	0.9129	0.9904
	2007	0.9866	0.9462	1.0270
5 Point	2003	0.8263	0.7953	0.8573
	2004	0.8662	0.8327	0.8995
	2005	0.9079	0.8719	0.9439
	2006	0.9517	0.9129	0.9904
	2007	0.9975	0.9559	1.0392
6 Point	2002	0.7695	0.7454	0.7935
	2003	0.8119	0.7845	0.8392
	2004	0.8567	0.8256	0.8877
	2005	0.9039	0.8689	0.9389
	2006	0.9537	0.9145	0.9930
	2007	1.0063	0.9624	1.0503
7 Point	2001	0.7194	0.6954	0.7434
	2002	0.7615	0.7350	0.7880
	2003	0.8060	0.7768	0.8352
	2004	0.8531	0.8210	0.8852
	2005	0.9030	0.8677	0.9382
	2006	0.9557	0.9171	0.9944
	2007	1.0116	0.9693	1.0540
8 Point	2000	0.6888	0.6722	0.7053
	2001	0.7271	0.7074	0.7467
	2002	0.7676	0.7445	0.7906
	2003	0.8103	0.7835	0.8370
	2004	0.8554	0.8245	0.8862
	2005	0.9030	0.8677	0.9382
	2006	0.9532	0.9132	0.9933
	2007	1.0063	0.9610	1.0516
9 Point	1999	0.6490	0.6381	0.6599
	2000	0.6858	0.6717	0.6998
	2001	0.7246	0.7070	0.7421
	2002	0.7657	0.7441	0.7870
	2003	0.8090	0.7833	0.8347
	2004	0.8548	0.8244	0.8852
	2005	0.9032	0.8677	0.9387
	2006	0.9544	0.9134	0.9955
	2007	1.0084	0.9614	1.0558
10 Point	1998	0.6092	0.6048	0.6136
	1999	0.6445	0.6368	0.6522
	2000	0.6819	0.6705	0.6932
	2001	0.7215	0.7061	0.7367
	2002	0.7633	0.7435	0.7830
	2003	0.8076	0.7828	0.8322
	2004	0.8545	0.8243	0.8845
	2005	0.9040	0.8680	0.9401
	2006	0.9565	0.9140	0.9992
	2007	1.0119	0.9624	1.0620

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-21)
4 Point	2004	0.0247	0.0287	0.0207
	2005	-0.0197	-0.0225	-0.0168
	2006	-0.0347	-0.0411	-0.0283
	2007	0.0297	0.0349	0.0245
5 Point	2003	0.0028	0.0021	0.0034
	2004	0.0219	0.0266	0.0173
	2005	-0.0210	-0.0236	-0.0185
	2006	-0.0347	-0.0411	-0.0284
	2007	0.0311	0.0359	0.0262
6 Point	2002	0.0193	0.0219	0.0167
	2003	-0.0127	-0.0155	-0.0100
	2004	0.0122	0.0156	0.0089
	2005	-0.0249	-0.0280	-0.0218
	2006	-0.0328	-0.0389	-0.0267
	2007	0.0388	0.0447	0.0329
7 Point	2001	0.0272	0.0228	0.0316
	2002	0.0012	0.0067	-0.0044
	2003	-0.0254	-0.0261	-0.0247
	2004	0.0050	0.0096	0.0005
	2005	-0.0267	-0.0295	-0.0239
	2006	-0.0291	-0.0358	-0.0225
	2007	0.0479	0.0523	0.0434
8 Point	2000	0.0349	0.0362	0.0335
	2001	0.0072	0.0021	0.0125
	2002	-0.0138	-0.0088	-0.0188
	2003	-0.0354	-0.0365	-0.0343
	2004	0.0000	0.0044	-0.0043
	2005	-0.0267	-0.0295	-0.0239
	2006	-0.0241	-0.0307	-0.0177
	2007	0.0579	0.0627	0.0530
9 Point	1999	0.0028	0.0046	0.0010
	2000	0.0335	0.0340	0.0330
	2001	0.0061	0.0003	0.0121
	2002	-0.0146	-0.0101	-0.0191
	2003	-0.0359	-0.0373	-0.0345
	2004	-0.0002	0.0041	-0.0043
	2005	-0.0266	-0.0293	-0.0239
	2006	-0.0237	-0.0300	-0.0175
2007	0.0586	0.0638	0.0532	
10 Point	1998	-0.0214	-0.0171	-0.0254
	1999	0.0123	0.0122	0.0123
	2000	0.0412	0.0402	0.0422
	2001	0.0121	0.0051	0.0192
	2002	-0.0104	-0.0068	-0.0141
	2003	-0.0335	-0.0354	-0.0317
	2004	0.0004	0.0045	-0.0036
	2005	-0.0278	-0.0303	-0.0253
	2006	-0.0267	-0.0324	-0.0211
2007	0.0538	0.0600	0.0476	

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-21)
4 Point	2004	0.0213	0.0253	0.0175
	2005	-0.0182	-0.0211	-0.0152
	2006	-0.0319	-0.0380	-0.0257
	2007	0.0302	0.0361	0.0244
5 Point	2003	-0.0018	-0.0024	-0.0012
	2004	0.0233	0.0279	0.0187
	2005	-0.0172	-0.0197	-0.0145
	2006	-0.0319	-0.0380	-0.0257
	2007	0.0291	0.0345	0.0236
6 Point	2002	0.0130	0.0157	0.0101
	2003	-0.0126	-0.0155	-0.0097
	2004	0.0161	0.0192	0.0131
	2005	-0.0202	-0.0234	-0.0169
	2006	-0.0302	-0.0361	-0.0244
	2007	0.0359	0.0428	0.0290
7 Point	2001	0.0191	0.0150	0.0232
	2002	-0.0002	0.0054	-0.0058
	2003	-0.0223	-0.0232	-0.0215
	2004	0.0102	0.0146	0.0060
	2005	-0.0217	-0.0246	-0.0188
	2006	-0.0270	-0.0335	-0.0204
	2007	0.0445	0.0495	0.0395
8 Point	2000	0.0254	0.0272	0.0235
	2001	0.0043	-0.0008	0.0095
	2002	-0.0119	-0.0071	-0.0166
	2003	-0.0305	-0.0319	-0.0291
	2004	0.0059	0.0100	0.0020
	2005	-0.0217	-0.0246	-0.0188
	2006	-0.0222	-0.0285	-0.0160
	2007	0.0544	0.0601	0.0487
9 Point	1999	-0.0082	-0.0058	-0.0107
	2000	0.0298	0.0303	0.0292
	2001	0.0079	0.0018	0.0142
	2002	-0.0092	-0.0052	-0.0131
	2003	-0.0287	-0.0306	-0.0267
	2004	0.0067	0.0105	0.0030
	2005	-0.0221	-0.0249	-0.0193
	2006	-0.0239	-0.0296	-0.0182
	2007	0.0514	0.0580	0.0447
10 Point	1998	-0.0340	-0.0290	-0.0389
	1999	0.0083	0.0082	0.0083
	2000	0.0439	0.0422	0.0454
	2001	0.0193	0.0114	0.0273
	2002	-0.0008	0.0019	-0.0034
	2003	-0.0237	-0.0264	-0.0209
	2004	0.0080	0.0117	0.0045
	2005	-0.0249	-0.0272	-0.0226
	2006	-0.0312	-0.0358	-0.0267
	2007	0.0391	0.0477	0.0304

MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-21)
4 Point	2004	0.0230	0.0217	0.0243
	2005	-0.0104	-0.0054	-0.0155
	2006	-0.0480	-0.0543	-0.0418
	2007	0.0355	0.0380	0.0330
5 Point	2003	-0.0163	-0.0143	-0.0184
	2004	0.0393	0.0359	0.0427
	2005	-0.0022	0.0017	-0.0063
	2006	-0.0481	-0.0543	-0.0418
	2007	0.0273	0.0308	0.0238
6 Point	2002	-0.0138	-0.0097	-0.0178
	2003	-0.0053	-0.0065	-0.0041
	2004	0.0462	0.0408	0.0516
	2005	0.0005	0.0037	-0.0028
	2006	-0.0494	-0.0552	-0.0436
	2007	0.0218	0.0270	0.0167
7 Point	2001	-0.0060	-0.0098	-0.0021
	2002	-0.0098	-0.0031	-0.0164
	2003	-0.0025	-0.0019	-0.0031
	2004	0.0478	0.0434	0.0521
	2005	0.0009	0.0043	-0.0026
	2006	-0.0502	-0.0565	-0.0439
	2007	0.0198	0.0237	0.0160
8 Point	2000	0.0208	0.0276	0.0141
	2001	-0.0179	-0.0256	-0.0102
	2002	-0.0187	-0.0149	-0.0224
	2003	-0.0084	-0.0098	-0.0072
	2004	0.0448	0.0395	0.0501
	2005	0.0009	0.0043	-0.0026
	2006	-0.0473	-0.0526	-0.0418
	2007	0.0258	0.0316	0.0200
9 Point	1999	0.0049	0.0084	0.0013
	2000	0.0184	0.0234	0.0135
	2001	-0.0199	-0.0289	-0.0107
	2002	-0.0201	-0.0173	-0.0228
	2003	-0.0093	-0.0113	-0.0074
	2004	0.0445	0.0389	0.0500
	2005	0.0011	0.0046	-0.0026
	2006	-0.0466	-0.0514	-0.0417
2007	0.0270	0.0336	0.0204	
10 Point	1998	0.0039	0.0089	-0.0010
	1999	0.0031	0.0045	0.0018
	2000	0.0170	0.0202	0.0138
	2001	-0.0210	-0.0314	-0.0104
	2002	-0.0209	-0.0191	-0.0226
	2003	-0.0097	-0.0123	-0.0073
	2004	0.0444	0.0386	0.0500
	2005	0.0013	0.0051	-0.0026
	2006	-0.0460	-0.0502	-0.0418
	2007	0.0279	0.0356	0.0201

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-21)
4 Point	2004	0.0213	0.0200	0.0226
	2005	-0.0098	-0.0047	-0.0149
	2006	-0.0464	-0.0524	-0.0402
	2007	0.0370	0.0398	0.0343
5 Point	2003	-0.0180	-0.0160	-0.0201
	2004	0.0406	0.0372	0.0442
	2005	0.0003	0.0042	-0.0037
	2006	-0.0464	-0.0524	-0.0402
	2007	0.0261	0.0301	0.0221
6 Point	2002	-0.0168	-0.0126	-0.0208
	2003	-0.0036	-0.0052	-0.0020
	2004	0.0501	0.0443	0.0560
	2005	0.0043	0.0072	0.0013
	2006	-0.0484	-0.0540	-0.0428
	2007	0.0173	0.0236	0.0110
7 Point	2001	-0.0112	-0.0146	-0.0077
	2002	-0.0088	-0.0022	-0.0153
	2003	0.0023	0.0025	0.0020
	2004	0.0537	0.0489	0.0585
	2005	0.0052	0.0084	0.0020
	2006	-0.0504	-0.0566	-0.0442
	2007	0.0120	0.0167	0.0073
8 Point	2000	0.0129	0.0204	0.0055
	2001	-0.0189	-0.0266	-0.0110
	2002	-0.0149	-0.0117	-0.0179
	2003	-0.0020	-0.0042	0.0002
	2004	0.0514	0.0454	0.0575
	2005	0.0052	0.0084	0.0020
	2006	-0.0479	-0.0527	-0.0431
	2007	0.0173	0.0250	0.0097
9 Point	1999	-0.0056	-0.0009	-0.0103
	2000	0.0159	0.0209	0.0110
	2001	-0.0164	-0.0262	-0.0064
	2002	-0.0130	-0.0113	-0.0143
	2003	-0.0007	-0.0040	0.0025
	2004	0.0520	0.0455	0.0585
	2005	0.0050	0.0084	0.0015
	2006	-0.0491	-0.0529	-0.0453
2007	0.0152	0.0246	0.0055	
10 Point	1998	-0.0094	-0.0029	-0.0160
	1999	-0.0011	0.0004	-0.0026
	2000	0.0198	0.0221	0.0176
	2001	-0.0133	-0.0253	-0.0010
	2002	-0.0106	-0.0107	-0.0103
	2003	0.0007	-0.0035	0.0050
	2004	0.0523	0.0456	0.0592
	2005	0.0042	0.0081	0.0001
	2006	-0.0512	-0.0535	-0.0490
2007	0.0117	0.0236	-0.0007	