

DELAWARE COMPENSATION RATING BUREAU, INC.

Measures of Goodness of Fit in Trend Calculations Using Severity Ratios – Limited Losses

Estimates of trended severity ratios using from 4 to 10 data points for each loss development technique are shown in Exhibit 3.

The first page of the attachment shows  $R^2$  values for the regressions producing those trended severity ratios.

Pages 2 through 5 show fitted values for the curves used in the trend projections. Page 2 shows indemnity results using linear regression, page 3 is for indemnity-exponential, page 4 for medical-linear, and page 5 for medical-exponential.

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)	(Incur)	(Pd-23)
r <sup>2</sup>				
4 Point	Linear	0.623	0.693	0.547
5 Point	Linear	0.585	0.633	0.528
6 Point	Linear	0.604	0.613	0.579
7 Point	Linear	0.626	0.618	0.617
8 Point	Linear	0.698	0.707	0.674
9 Point	Linear	0.679	0.675	0.666
10 Point	Linear	0.686	0.688	0.670
4 Point	Expon'l	0.624	0.700	0.537
5 Point	Expon'l	0.595	0.644	0.532
6 Point	Expon'l	0.627	0.631	0.603
7 Point	Expon'l	0.661	0.644	0.655
8 Point	Expon'l	0.745	0.744	0.725
9 Point	Expon'l	0.726	0.711	0.719
10 Point	Expon'l	0.738	0.729	0.727

MEDICAL		(Average)	(Incur)	(Pd-23)
r <sup>2</sup>				
4 Point	Linear	0.964	0.969	0.959
5 Point	Linear	0.929	0.932	0.925
6 Point	Linear	0.936	0.935	0.937
7 Point	Linear	0.909	0.901	0.916
8 Point	Linear	0.894	0.889	0.899
9 Point	Linear	0.876	0.865	0.887
10 Point	Linear	0.864	0.853	0.874
4 Point	Expon'l	0.982	0.985	0.978
5 Point	Expon'l	0.961	0.963	0.957
6 Point	Expon'l	0.975	0.975	0.974
7 Point	Expon'l	0.957	0.949	0.963
8 Point	Expon'l	0.953	0.949	0.956
9 Point	Expon'l	0.943	0.933	0.953
10 Point	Expon'l	0.939	0.930	0.948

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-23)
4 Point	2008	0.5205	0.5103	0.5306
	2009	0.5737	0.5624	0.5849
	2010	0.6268	0.6146	0.6391
	2011	0.6799	0.6667	0.6934
5 Point	2007	0.5106	0.5019	0.5192
	2008	0.5493	0.5395	0.5592
	2009	0.5881	0.5770	0.5991
	2010	0.6268	0.6146	0.6391
	2011	0.6655	0.6521	0.6791
6 Point	2006	0.4968	0.4936	0.4999
	2007	0.5287	0.5232	0.5342
	2008	0.5607	0.5528	0.5685
	2009	0.5926	0.5823	0.6029
	2010	0.6245	0.6119	0.6372
	2011	0.6564	0.6415	0.6716
7 Point	2005	0.4842	0.4844	0.4837
	2006	0.5116	0.5093	0.5139
	2007	0.5391	0.5342	0.5440
	2008	0.5666	0.5590	0.5741
	2009	0.5941	0.5839	0.6043
	2010	0.6216	0.6088	0.6344
	2011	0.6490	0.6336	0.6646
8 Point	2004	0.4619	0.4601	0.4635
	2005	0.4883	0.4848	0.4916
	2006	0.5147	0.5096	0.5198
	2007	0.5412	0.5344	0.5480
	2008	0.5676	0.5591	0.5761
	2009	0.5941	0.5839	0.6043
	2010	0.6205	0.6087	0.6325
	2011	0.6470	0.6334	0.6606
9 Point	2003	0.4565	0.4568	0.4562
	2004	0.4792	0.4777	0.4807
	2005	0.5020	0.4987	0.5052
	2006	0.5247	0.5197	0.5296
	2007	0.5474	0.5407	0.5541
	2008	0.5701	0.5617	0.5786
	2009	0.5928	0.5826	0.6031
	2010	0.6156	0.6036	0.6275
	2011	0.6383	0.6246	0.6520
10 Point	2002	0.4481	0.4482	0.4481
	2003	0.4686	0.4672	0.4700
	2004	0.4891	0.4863	0.4919
	2005	0.5095	0.5053	0.5138
	2006	0.5300	0.5243	0.5357
	2007	0.5504	0.5433	0.5575
	2008	0.5709	0.5623	0.5794
	2009	0.5913	0.5813	0.6013
	2010	0.6118	0.6004	0.6232
	2011	0.6322	0.6194	0.6451

INDEMNITY Expon'l <b>FITTED</b>	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-23)
4 Point	2008	0.5255	0.5142	0.5364
	2009	0.5714	0.5601	0.5825
	2010	0.6213	0.6101	0.6325
	2011	0.6756	0.6646	0.6867
5 Point	2007	0.5162	0.5066	0.5256
	2008	0.5491	0.5390	0.5591
	2009	0.5841	0.5735	0.5946
	2010	0.6213	0.6101	0.6325
	2011	0.6609	0.6491	0.6727
6 Point	2006	0.5029	0.4988	0.5068
	2007	0.5298	0.5240	0.5354
	2008	0.5581	0.5505	0.5655
	2009	0.5879	0.5783	0.5974
	2010	0.6193	0.6075	0.6310
	2011	0.6524	0.6383	0.6665
7 Point	2005	0.4907	0.4899	0.4912
	2006	0.5136	0.5110	0.5161
	2007	0.5377	0.5329	0.5422
	2008	0.5628	0.5558	0.5696
	2009	0.5892	0.5797	0.5984
	2010	0.6167	0.6046	0.6287
	2011	0.6456	0.6306	0.6605
8 Point	2004	0.4689	0.4660	0.4716
	2005	0.4908	0.4868	0.4946
	2006	0.5137	0.5085	0.5187
	2007	0.5377	0.5312	0.5441
	2008	0.5629	0.5549	0.5706
	2009	0.5892	0.5797	0.5984
	2010	0.6167	0.6056	0.6276
	2011	0.6455	0.6326	0.6583
9 Point	2003	0.4639	0.4629	0.4647
	2004	0.4826	0.4804	0.4846
	2005	0.5020	0.4986	0.5053
	2006	0.5222	0.5175	0.5269
	2007	0.5433	0.5370	0.5494
	2008	0.5652	0.5574	0.5728
	2009	0.5879	0.5784	0.5973
	2010	0.6116	0.6003	0.6228
	2011	0.6363	0.6230	0.6494
10 Point	2002	0.4558	0.4548	0.4569
	2003	0.4726	0.4706	0.4746
	2004	0.4899	0.4869	0.4929
	2005	0.5079	0.5037	0.5119
	2006	0.5265	0.5212	0.5317
	2007	0.5458	0.5392	0.5522
	2008	0.5658	0.5579	0.5736
	2009	0.5866	0.5773	0.5957
	2010	0.6081	0.5973	0.6187
	2011	0.6304	0.6180	0.6426

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-23)
4 Point	2008	0.9289	0.9533	0.9046
	2009	1.1545	1.1943	1.1148
	2010	1.3801	1.4352	1.3250
	2011	1.6057	1.6762	1.5352
5 Point	2007	0.8262	0.8433	0.8091
	2008	1.0108	1.0406	0.9811
	2009	1.1955	1.2379	1.1530
	2010	1.3801	1.4352	1.3250
	2011	1.5647	1.6326	1.4970
6 Point	2006	0.7059	0.7199	0.6917
	2007	0.8730	0.8971	0.8488
	2008	1.0401	1.0742	1.0059
	2009	1.2071	1.2514	1.1630
	2010	1.3742	1.4285	1.3201
	2011	1.5413	1.6057	1.4772
7 Point	2005	0.6391	0.6568	0.6214
	2006	0.7830	0.8076	0.7585
	2007	0.9270	0.9585	0.8955
	2008	1.0709	1.1093	1.0326
	2009	1.2149	1.2601	1.1696
	2010	1.3588	1.4110	1.3067
	2011	1.5028	1.5618	1.4438
8 Point	2004	0.5767	0.5900	0.5635
	2005	0.7043	0.7240	0.6847
	2006	0.8320	0.8580	0.8060
	2007	0.9596	0.9921	0.9272
	2008	1.0872	1.1261	1.0484
	2009	1.2149	1.2601	1.1696
	2010	1.3425	1.3942	1.2909
	2011	1.4701	1.5282	1.4121
9 Point	2003	0.5295	0.5469	0.5121
	2004	0.6429	0.6649	0.6210
	2005	0.7564	0.7829	0.7299
	2006	0.8698	0.9008	0.8388
	2007	0.9833	1.0188	0.9477
	2008	1.0967	1.1368	1.0566
	2009	1.2101	1.2548	1.1655
	2010	1.3236	1.3728	1.2744
	2011	1.4370	1.4908	1.3833
10 Point	2002	0.4868	0.5036	0.4700
	2003	0.5891	0.6098	0.5683
	2004	0.6913	0.7160	0.6667
	2005	0.7936	0.8222	0.7651
	2006	0.8959	0.9284	0.8634
	2007	0.9981	1.0346	0.9618
	2008	1.1004	1.1407	1.0601
	2009	1.2027	1.2469	1.1585
	2010	1.3050	1.3531	1.2569
	2011	1.4072	1.4593	1.3552

MEDICAL Expon'l <b>FITTED</b>	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-23)
4 Point	2008	0.9531	0.9792	0.9271
	2009	1.1372	1.1750	1.0994
	2010	1.3568	1.4099	1.3037
	2011	1.6188	1.6918	1.5460
5 Point	2007	0.8627	0.8829	0.8425
	2008	1.0032	1.0320	0.9744
	2009	1.1667	1.2062	1.1271
	2010	1.3568	1.4099	1.3037
	2011	1.5778	1.6479	1.5079
6 Point	2006	0.7535	0.7719	0.7351
	2007	0.8726	0.8969	0.8481
	2008	1.0104	1.0422	0.9785
	2009	1.1700	1.2110	1.1290
	2010	1.3548	1.4071	1.3026
	2011	1.5689	1.6350	1.5029
7 Point	2005	0.6971	0.7192	0.6750
	2006	0.7945	0.8205	0.7685
	2007	0.9055	0.9361	0.8749
	2008	1.0320	1.0680	0.9961
	2009	1.1762	1.2184	1.1340
	2010	1.3406	1.3900	1.2911
	2011	1.5279	1.5858	1.4698
8 Point	2004	0.6435	0.6615	0.6256
	2005	0.7260	0.7475	0.7046
	2006	0.8191	0.8446	0.7936
	2007	0.9241	0.9543	0.8939
	2008	1.0426	1.0783	1.0068
	2009	1.1762	1.2184	1.1340
	2010	1.3270	1.3767	1.2773
	2011	1.4972	1.5556	1.4387
9 Point	2003	0.6034	0.6252	0.5815
	2004	0.6740	0.6983	0.6497
	2005	0.7529	0.7799	0.7259
	2006	0.8411	0.8711	0.8110
	2007	0.9395	0.9729	0.9061
	2008	1.0495	1.0867	1.0123
	2009	1.1723	1.2137	1.1310
	2010	1.3096	1.3556	1.2636
	2011	1.4629	1.5141	1.4117
10 Point	2002	0.5668	0.5879	0.5455
	2003	0.6283	0.6516	0.6050
	2004	0.6966	0.7221	0.6709
	2005	0.7722	0.8003	0.7441
	2006	0.8561	0.8870	0.8251
	2007	0.9491	0.9830	0.9151
	2008	1.0522	1.0895	1.0148
	2009	1.1664	1.2075	1.1254
	2010	1.2931	1.3382	1.2480
	2011	1.4336	1.4831	1.3840

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-23)
4 Point	2008	0.0217	0.0095	0.0338
	2009	0.0052	0.0182	-0.0076
	2010	-0.0755	-0.0650	-0.0861
	2011	0.0486	0.0373	0.0600
5 Point	2007	0.0288	0.0292	0.0286
	2008	-0.0071	-0.0197	0.0052
	2009	-0.0092	0.0036	-0.0219
	2010	-0.0755	-0.0650	-0.0861
	2011	0.0630	0.0519	0.0742
6 Point	2006	0.0227	0.0266	0.0187
	2007	0.0107	0.0079	0.0136
	2008	-0.0185	-0.0330	-0.0041
	2009	-0.0137	-0.0017	-0.0257
	2010	-0.0732	-0.0623	-0.0842
	2011	0.0721	0.0625	0.0817
7 Point	2005	0.0222	0.0236	0.0210
	2006	0.0079	0.0109	0.0047
	2007	0.0003	-0.0031	0.0038
	2008	-0.0244	-0.0392	-0.0097
	2009	-0.0152	-0.0033	-0.0271
	2010	-0.0703	-0.0592	-0.0814
	2011	0.0795	0.0704	0.0887
8 Point	2004	0.0072	0.0007	0.0138
	2005	0.0181	0.0232	0.0131
	2006	0.0048	0.0106	-0.0012
	2007	-0.0018	-0.0033	-0.0002
	2008	-0.0254	-0.0393	-0.0117
	2009	-0.0152	-0.0033	-0.0271
	2010	-0.0692	-0.0591	-0.0795
	2011	0.0815	0.0706	0.0927
9 Point	2003	0.0348	0.0353	0.0345
	2004	-0.0101	-0.0169	-0.0034
	2005	0.0044	0.0093	-0.0005
	2006	-0.0052	0.0005	-0.0110
	2007	-0.0080	-0.0096	-0.0063
	2008	-0.0279	-0.0419	-0.0142
	2009	-0.0139	-0.0020	-0.0259
	2010	-0.0643	-0.0540	-0.0745
	2011	0.0902	0.0794	0.1013
10 Point	2002	0.0272	0.0236	0.0309
	2003	0.0227	0.0249	0.0207
	2004	-0.0200	-0.0255	-0.0146
	2005	-0.0031	0.0027	-0.0091
	2006	-0.0105	-0.0041	-0.0171
	2007	-0.0110	-0.0122	-0.0097
	2008	-0.0287	-0.0425	-0.0150
	2009	-0.0124	-0.0007	-0.0241
	2010	-0.0605	-0.0508	-0.0702
	2011	0.0963	0.0846	0.1082

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-23)
4 Point	2008	0.0167	0.0056	0.0280
	2009	0.0075	0.0205	-0.0053
	2010	-0.0700	-0.0605	-0.0795
	2011	0.0529	0.0394	0.0666
5 Point	2007	0.0232	0.0245	0.0222
	2008	-0.0069	-0.0192	0.0053
	2009	-0.0052	0.0071	-0.0174
	2010	-0.0700	-0.0605	-0.0795
	2011	0.0676	0.0549	0.0806
6 Point	2006	0.0166	0.0214	0.0118
	2007	0.0096	0.0071	0.0124
	2008	-0.0159	-0.0307	-0.0011
	2009	-0.0090	0.0023	-0.0202
	2010	-0.0680	-0.0579	-0.0780
	2011	0.0761	0.0657	0.0868
7 Point	2005	0.0157	0.0181	0.0135
	2006	0.0059	0.0092	0.0025
	2007	0.0017	-0.0018	0.0056
	2008	-0.0206	-0.0360	-0.0052
	2009	-0.0103	0.0009	-0.0212
	2010	-0.0654	-0.0550	-0.0757
	2011	0.0829	0.0734	0.0928
8 Point	2004	0.0002	-0.0052	0.0057
	2005	0.0156	0.0212	0.0101
	2006	0.0058	0.0117	-0.0001
	2007	0.0017	-0.0001	0.0037
	2008	-0.0207	-0.0351	-0.0062
	2009	-0.0103	0.0009	-0.0212
	2010	-0.0654	-0.0560	-0.0746
	2011	0.0830	0.0714	0.0950
9 Point	2003	0.0274	0.0292	0.0260
	2004	-0.0135	-0.0196	-0.0073
	2005	0.0044	0.0094	-0.0006
	2006	-0.0027	0.0027	-0.0083
	2007	-0.0039	-0.0059	-0.0016
	2008	-0.0230	-0.0376	-0.0084
	2009	-0.0090	0.0022	-0.0201
	2010	-0.0603	-0.0507	-0.0698
	2011	0.0922	0.0810	0.1039
10 Point	2002	0.0195	0.0170	0.0221
	2003	0.0187	0.0215	0.0161
	2004	-0.0208	-0.0261	-0.0156
	2005	-0.0015	0.0043	-0.0072
	2006	-0.0070	-0.0010	-0.0131
	2007	-0.0064	-0.0081	-0.0044
	2008	-0.0236	-0.0381	-0.0092
	2009	-0.0077	0.0033	-0.0185
	2010	-0.0568	-0.0477	-0.0657
	2011	0.0981	0.0860	0.1107



MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-23)
4 Point	2008	0.0521	0.0525	0.0517
	2009	-0.0617	-0.0640	-0.0595
	2010	-0.0328	-0.0296	-0.0359
	2011	0.0424	0.0411	0.0438
5 Point	2007	0.0819	0.0873	0.0764
	2008	-0.0298	-0.0348	-0.0248
	2009	-0.1027	-0.1076	-0.0977
	2010	-0.0328	-0.0296	-0.0359
	2011	0.0834	0.0847	0.0820
6 Point	2006	0.0584	0.0673	0.0496
	2007	0.0351	0.0335	0.0367
	2008	-0.0591	-0.0684	-0.0496
	2009	-0.1143	-0.1211	-0.1077
	2010	-0.0269	-0.0229	-0.0310
	2011	0.1068	0.1116	0.1018
7 Point	2005	0.1157	0.1315	0.1002
	2006	-0.0187	-0.0204	-0.0172
	2007	-0.0189	-0.0279	-0.0100
	2008	-0.0899	-0.1035	-0.0763
	2009	-0.1221	-0.1298	-0.1143
	2010	-0.0115	-0.0054	-0.0176
	2011	0.1453	0.1555	0.1352
8 Point	2004	0.1142	0.1176	0.1108
	2005	0.0505	0.0643	0.0369
	2006	-0.0677	-0.0708	-0.0647
	2007	-0.0515	-0.0615	-0.0417
	2008	-0.1062	-0.1203	-0.0921
	2009	-0.1221	-0.1298	-0.1143
	2010	0.0048	0.0114	-0.0018
	2011	0.1780	0.1891	0.1669
9 Point	2003	0.1325	0.1498	0.1151
	2004	0.0480	0.0427	0.0533
	2005	-0.0016	0.0054	-0.0083
	2006	-0.1055	-0.1136	-0.0975
	2007	-0.0752	-0.0882	-0.0622
	2008	-0.1157	-0.1310	-0.1003
	2009	-0.1173	-0.1245	-0.1102
	2010	0.0237	0.0328	0.0147
	2011	0.2111	0.2265	0.1957
10 Point	2002	0.1340	0.1416	0.1264
	2003	0.0729	0.0869	0.0589
	2004	-0.0004	-0.0084	0.0076
	2005	-0.0388	-0.0339	-0.0435
	2006	-0.1316	-0.1412	-0.1221
	2007	-0.0900	-0.1040	-0.0763
	2008	-0.1194	-0.1349	-0.1038
	2009	-0.1099	-0.1166	-0.1032
	2010	0.0423	0.0525	0.0322
	2011	0.2409	0.2580	0.2238

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-23)
4 Point	2008	0.0279	0.0266	0.0292
	2009	-0.0444	-0.0447	-0.0441
	2010	-0.0095	-0.0043	-0.0146
	2011	0.0293	0.0255	0.0330
5 Point	2007	0.0454	0.0477	0.0430
	2008	-0.0222	-0.0262	-0.0181
	2009	-0.0739	-0.0759	-0.0718
	2010	-0.0095	-0.0043	-0.0146
	2011	0.0703	0.0694	0.0711
6 Point	2006	0.0108	0.0153	0.0062
	2007	0.0355	0.0337	0.0374
	2008	-0.0294	-0.0364	-0.0222
	2009	-0.0772	-0.0807	-0.0737
	2010	-0.0075	-0.0015	-0.0135
	2011	0.0792	0.0823	0.0761
7 Point	2005	0.0577	0.0691	0.0466
	2006	-0.0302	-0.0333	-0.0272
	2007	0.0026	-0.0055	0.0106
	2008	-0.0510	-0.0622	-0.0398
	2009	-0.0834	-0.0881	-0.0787
	2010	0.0067	0.0156	-0.0020
	2011	0.1202	0.1315	0.1092
8 Point	2004	0.0474	0.0461	0.0487
	2005	0.0288	0.0408	0.0170
	2006	-0.0548	-0.0574	-0.0523
	2007	-0.0160	-0.0237	-0.0084
	2008	-0.0616	-0.0725	-0.0505
	2009	-0.0834	-0.0881	-0.0787
	2010	0.0203	0.0289	0.0118
	2011	0.1509	0.1617	0.1403
9 Point	2003	0.0586	0.0715	0.0457
	2004	0.0169	0.0093	0.0246
	2005	0.0019	0.0084	-0.0043
	2006	-0.0768	-0.0839	-0.0697
	2007	-0.0314	-0.0423	-0.0206
	2008	-0.0685	-0.0809	-0.0560
	2009	-0.0795	-0.0834	-0.0757
	2010	0.0377	0.0500	0.0255
	2011	0.1852	0.2032	0.1673
10 Point	2002	0.0540	0.0573	0.0509
	2003	0.0337	0.0451	0.0222
	2004	-0.0057	-0.0145	0.0034
	2005	-0.0174	-0.0120	-0.0225
	2006	-0.0918	-0.0998	-0.0838
	2007	-0.0410	-0.0524	-0.0296
	2008	-0.0712	-0.0837	-0.0585
	2009	-0.0736	-0.0772	-0.0701
	2010	0.0542	0.0674	0.0411
	2011	0.2145	0.2342	0.1950