

DELAWARE COMPENSATION RATING BUREAU, INC.

Measures of Goodness of Fit in Trend Calculations Using Severity Ratios – Unlimited 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-25)
r ²				
4 Point	Linear	0.965	0.938	0.916
5 Point	Linear	0.843	0.649	0.883
6 Point	Linear	0.884	0.779	0.883
7 Point	Linear	0.860	0.777	0.857
8 Point	Linear	0.844	0.786	0.833
9 Point	Linear	0.829	0.797	0.808
10 Point	Linear	0.834	0.820	0.803
4 Point	Expon'l	0.981	0.938	0.941
5 Point	Expon'l	0.858	0.631	0.916
6 Point	Expon'l	0.908	0.779	0.925
7 Point	Expon'l	0.890	0.783	0.903
8 Point	Expon'l	0.880	0.800	0.885
9 Point	Expon'l	0.871	0.818	0.863
10 Point	Expon'l	0.881	0.848	0.864
MEDICAL		(Average)	(Incur)	(Pd-25)
r ²				
4 Point	Linear	0.992	0.960	0.999
5 Point	Linear	0.911	0.945	0.876
6 Point	Linear	0.934	0.921	0.928
7 Point	Linear	0.958	0.949	0.955
8 Point	Linear	0.972	0.966	0.970
9 Point	Linear	0.973	0.970	0.969
10 Point	Linear	0.967	0.967	0.962
4 Point	Expon'l	0.988	0.952	1.000
5 Point	Expon'l	0.884	0.928	0.842
6 Point	Expon'l	0.906	0.885	0.905
7 Point	Expon'l	0.937	0.921	0.938
8 Point	Expon'l	0.955	0.946	0.955
9 Point	Expon'l	0.967	0.962	0.965
10 Point	Expon'l	0.971	0.969	0.969

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	0.4726	0.4496	0.4958
	2011	0.5400	0.5036	0.5766
	2012	0.6075	0.5577	0.6573
	2013	0.6749	0.6118	0.7381
5 Point	2009	0.4619	0.4605	0.4633
	2010	0.5104	0.4929	0.5280
	2011	0.5589	0.5253	0.5926
	2012	0.6075	0.5577	0.6573
	2013	0.6560	0.5901	0.7220
6 Point	2008	0.4261	0.4222	0.4300
	2009	0.4712	0.4562	0.4861
	2010	0.5162	0.4902	0.5422
	2011	0.5613	0.5242	0.5984
	2012	0.6063	0.5583	0.6545
	2013	0.6513	0.5923	0.7106
7 Point	2007	0.4099	0.4091	0.4106
	2008	0.4483	0.4383	0.4583
	2009	0.4867	0.4675	0.5059
	2010	0.5251	0.4967	0.5535
	2011	0.5635	0.5258	0.6012
	2012	0.6019	0.5550	0.6488
	2013	0.6403	0.5842	0.6965
8 Point	2006	0.3959	0.3961	0.3957
	2007	0.4294	0.4220	0.4368
	2008	0.4629	0.4480	0.4779
	2009	0.4964	0.4739	0.5190
	2010	0.5299	0.4999	0.5601
	2011	0.5635	0.5258	0.6012
	2012	0.5970	0.5518	0.6423
	2013	0.6305	0.5778	0.6834
9 Point	2005	0.3843	0.3837	0.3850
	2006	0.4140	0.4072	0.4207
	2007	0.4436	0.4308	0.4564
	2008	0.4733	0.4544	0.4922
	2009	0.5029	0.4779	0.5279
	2010	0.5325	0.5015	0.5637
	2011	0.5622	0.5250	0.5994
	2012	0.5918	0.5486	0.6351
	2013	0.6215	0.5722	0.6709
10 Point	2004	0.3701	0.3687	0.3716
	2005	0.3973	0.3909	0.4038
	2006	0.4245	0.4131	0.4360
	2007	0.4517	0.4353	0.4682
	2008	0.4789	0.4575	0.5004
	2009	0.5062	0.4797	0.5326
	2010	0.5334	0.5019	0.5648
	2011	0.5606	0.5241	0.5970
	2012	0.5878	0.5463	0.6292
	2013	0.6150	0.5686	0.6614

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	0.4777	0.4526	0.5029
	2011	0.5366	0.5010	0.5720
	2012	0.6028	0.5545	0.6506
	2013	0.6772	0.6137	0.7400
5 Point	2009	0.4685	0.4635	0.4734
	2010	0.5096	0.4920	0.5263
	2011	0.5542	0.5223	0.5852
	2012	0.6028	0.5545	0.6506
	2013	0.6557	0.5886	0.7234
6 Point	2008	0.4344	0.4261	0.4427
	2009	0.4714	0.4553	0.4870
	2010	0.5115	0.4866	0.5357
	2011	0.5551	0.5200	0.5893
	2012	0.6024	0.5557	0.6483
	2013	0.6537	0.5939	0.7132
7 Point	2007	0.4196	0.4145	0.4251
	2008	0.4504	0.4390	0.4618
	2009	0.4835	0.4649	0.5016
	2010	0.5190	0.4924	0.5449
	2011	0.5571	0.5216	0.5918
	2012	0.5980	0.5524	0.6429
	2013	0.6419	0.5851	0.6983
8 Point	2006	0.4067	0.4025	0.4115
	2007	0.4332	0.4239	0.4425
	2008	0.4613	0.4464	0.4759
	2009	0.4912	0.4702	0.5118
	2010	0.5231	0.4952	0.5503
	2011	0.5571	0.5216	0.5918
	2012	0.5933	0.5493	0.6365
	2013	0.6318	0.5785	0.6844
9 Point	2005	0.3961	0.3910	0.4016
	2006	0.4191	0.4101	0.4282
	2007	0.4435	0.4302	0.4566
	2008	0.4693	0.4513	0.4869
	2009	0.4965	0.4734	0.5191
	2010	0.5254	0.4965	0.5535
	2011	0.5559	0.5209	0.5902
	2012	0.5882	0.5464	0.6292
	2013	0.6224	0.5731	0.6709
10 Point	2004	0.3828	0.3769	0.3892
	2005	0.4036	0.3947	0.4128
	2006	0.4256	0.4133	0.4379
	2007	0.4487	0.4327	0.4645
	2008	0.4731	0.4531	0.4927
	2009	0.4989	0.4745	0.5227
	2010	0.5260	0.4968	0.5544
	2011	0.5546	0.5202	0.5881
	2012	0.5848	0.5447	0.6239
	2013	0.6166	0.5704	0.6618

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	1.3055	1.2117	1.3994
	2011	1.3712	1.2728	1.4696
	2012	1.4369	1.3340	1.5398
	2013	1.5026	1.3951	1.6100
5 Point	2009	1.1517	1.1007	1.2027
	2010	1.2467	1.1784	1.3150
	2011	1.3418	1.2562	1.4274
	2012	1.4369	1.3340	1.5398
	2013	1.5320	1.4117	1.6521
6 Point	2008	0.9946	0.9417	1.0475
	2009	1.1066	1.0416	1.1715
	2010	1.2186	1.1415	1.2956
	2011	1.3305	1.2414	1.4196
	2012	1.4425	1.3414	1.5437
	2013	1.5545	1.4413	1.6677
7 Point	2007	0.8596	0.8109	0.9083
	2008	0.9769	0.9180	1.0358
	2009	1.0942	1.0250	1.1634
	2010	1.2115	1.1320	1.2909
	2011	1.3288	1.2391	1.4185
	2012	1.4461	1.3461	1.5460
	2013	1.5634	1.4531	1.6735
8 Point	2006	0.7371	0.7008	0.7735
	2007	0.8554	0.8084	0.9025
	2008	0.9738	0.9161	1.0315
	2009	1.0921	1.0237	1.1605
	2010	1.2104	1.1314	1.2895
	2011	1.3288	1.2391	1.4185
	2012	1.4471	1.3467	1.5474
	2013	1.5654	1.4544	1.6764
9 Point	2005	0.6502	0.6162	0.6842
	2006	0.7630	0.7197	0.8062
	2007	0.8758	0.8233	0.9282
	2008	0.9886	0.9269	1.0502
	2009	1.1013	1.0305	1.1722
	2010	1.2141	1.1341	1.2941
	2011	1.3269	1.2377	1.4161
	2012	1.4397	1.3413	1.5381
	2013	1.5525	1.4449	1.6601
10 Point	2004	0.5801	0.5485	0.6118
	2005	0.6862	0.6464	0.7260
	2006	0.7922	0.7443	0.8401
	2007	0.8983	0.8423	0.9543
	2008	1.0043	0.9402	1.0684
	2009	1.1103	1.0381	1.1826
	2010	1.2164	1.1360	1.2967
	2011	1.3224	1.2339	1.4109
	2012	1.4285	1.3318	1.5250
	2013	1.5345	1.4298	1.6392

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	1.3066	1.2122	1.4010
	2011	1.3695	1.2710	1.4680
	2012	1.4355	1.3327	1.5381
	2013	1.5046	1.3974	1.6116
5 Point	2009	1.1520	1.1020	1.2012
	2010	1.2396	1.1741	1.3044
	2011	1.3339	1.2509	1.4164
	2012	1.4355	1.3327	1.5381
	2013	1.5447	1.4199	1.6703
6 Point	2008	0.9990	0.9435	1.0539
	2009	1.0955	1.0307	1.1597
	2010	1.2013	1.1260	1.2760
	2011	1.3173	1.2301	1.4040
	2012	1.4445	1.3439	1.5449
	2013	1.5840	1.4682	1.6999
7 Point	2007	0.8739	0.8215	0.9261
	2008	0.9676	0.9079	1.0270
	2009	1.0712	1.0033	1.1388
	2010	1.1860	1.1088	1.2629
	2011	1.3131	1.2254	1.4004
	2012	1.4538	1.3543	1.5529
	2013	1.6095	1.4967	1.7220
8 Point	2006	0.7640	0.7234	0.8044
	2007	0.8514	0.8038	0.8987
	2008	0.9488	0.8932	1.0041
	2009	1.0573	0.9925	1.1219
	2010	1.1783	1.1028	1.2534
	2011	1.3131	1.2254	1.4004
	2012	1.4633	1.3617	1.5646
	2013	1.6307	1.5130	1.7481
9 Point	2005	0.6917	0.6522	0.7311
	2006	0.7696	0.7245	0.8146
	2007	0.8563	0.8047	0.9077
	2008	0.9528	0.8939	1.0114
	2009	1.0601	0.9930	1.1269
	2010	1.1795	1.1030	1.2557
	2011	1.3124	1.2253	1.3991
	2012	1.4602	1.3611	1.5590
	2013	1.6247	1.5119	1.7371
10 Point	2004	0.6350	0.5971	0.6729
	2005	0.7042	0.6615	0.7468
	2006	0.7809	0.7329	0.8288
	2007	0.8660	0.8119	0.9198
	2008	0.9603	0.8995	1.0208
	2009	1.0649	0.9965	1.1329
	2010	1.1808	1.1040	1.2573
	2011	1.3095	1.2231	1.3954
	2012	1.4521	1.3550	1.5487
	2013	1.6103	1.5012	1.7188

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	0.0131	0.0139	0.0122
	2011	-0.0109	-0.0259	0.0041
	2012	-0.0174	0.0101	-0.0447
	2013	0.0152	0.0019	0.0284
5 Point	2009	0.0378	0.0434	0.0321
	2010	-0.0247	-0.0294	-0.0200
	2011	-0.0298	-0.0476	-0.0119
	2012	-0.0174	0.0101	-0.0447
	2013	0.0341	0.0236	0.0445
6 Point	2008	0.0116	-0.0055	0.0286
	2009	0.0285	0.0477	0.0093
	2010	-0.0305	-0.0267	-0.0342
	2011	-0.0322	-0.0465	-0.0177
	2012	-0.0162	0.0095	-0.0419
	2013	0.0388	0.0214	0.0559
7 Point	2007	0.0332	0.0243	0.0424
	2008	-0.0106	-0.0216	0.0003
	2009	0.0130	0.0364	-0.0105
	2010	-0.0394	-0.0332	-0.0455
	2011	-0.0344	-0.0481	-0.0205
	2012	-0.0118	0.0128	-0.0362
	2013	0.0498	0.0295	0.0700
8 Point	2006	0.0341	0.0225	0.0457
	2007	0.0137	0.0114	0.0162
	2008	-0.0252	-0.0313	-0.0193
	2009	0.0033	0.0300	-0.0236
	2010	-0.0442	-0.0364	-0.0521
	2011	-0.0344	-0.0481	-0.0205
	2012	-0.0069	0.0160	-0.0297
	2013	0.0596	0.0359	0.0831
9 Point	2005	0.0363	0.0223	0.0500
	2006	0.0160	0.0114	0.0207
	2007	-0.0005	0.0026	-0.0034
	2008	-0.0356	-0.0377	-0.0336
	2009	-0.0032	0.0260	-0.0325
	2010	-0.0468	-0.0380	-0.0557
	2011	-0.0331	-0.0473	-0.0187
	2012	-0.0017	0.0192	-0.0225
	2013	0.0686	0.0415	0.0956
10 Point	2004	0.0293	0.0163	0.0424
	2005	0.0233	0.0151	0.0312
	2006	0.0055	0.0055	0.0054
	2007	-0.0086	-0.0019	-0.0152
	2008	-0.0412	-0.0408	-0.0418
	2009	-0.0065	0.0242	-0.0372
	2010	-0.0477	-0.0384	-0.0568
	2011	-0.0315	-0.0464	-0.0163
	2012	0.0023	0.0215	-0.0166
	2013	0.0751	0.0451	0.1051

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	0.0080	0.0109	0.0051
	2011	-0.0075	-0.0233	0.0087
	2012	-0.0127	0.0133	-0.0380
	2013	0.0129	0.0000	0.0265
5 Point	2009	0.0312	0.0404	0.0220
	2010	-0.0239	-0.0285	-0.0183
	2011	-0.0251	-0.0446	-0.0045
	2012	-0.0127	0.0133	-0.0380
	2013	0.0344	0.0251	0.0431
6 Point	2008	0.0033	-0.0094	0.0159
	2009	0.0283	0.0486	0.0084
	2010	-0.0258	-0.0231	-0.0277
	2011	-0.0260	-0.0423	-0.0086
	2012	-0.0123	0.0121	-0.0357
	2013	0.0364	0.0198	0.0533
7 Point	2007	0.0235	0.0189	0.0279
	2008	-0.0127	-0.0223	-0.0032
	2009	0.0162	0.0390	-0.0062
	2010	-0.0333	-0.0289	-0.0369
	2011	-0.0280	-0.0439	-0.0111
	2012	-0.0079	0.0154	-0.0303
	2013	0.0482	0.0286	0.0682
8 Point	2006	0.0233	0.0161	0.0299
	2007	0.0099	0.0095	0.0105
	2008	-0.0236	-0.0297	-0.0173
	2009	0.0085	0.0337	-0.0164
	2010	-0.0374	-0.0317	-0.0423
	2011	-0.0280	-0.0439	-0.0111
	2012	-0.0032	0.0185	-0.0239
	2013	0.0583	0.0352	0.0821
9 Point	2005	0.0245	0.0150	0.0334
	2006	0.0109	0.0085	0.0132
	2007	-0.0004	0.0032	-0.0036
	2008	-0.0316	-0.0346	-0.0283
	2009	0.0032	0.0305	-0.0237
	2010	-0.0397	-0.0330	-0.0455
	2011	-0.0268	-0.0432	-0.0095
	2012	0.0019	0.0214	-0.0166
	2013	0.0677	0.0406	0.0956
10 Point	2004	0.0166	0.0081	0.0248
	2005	0.0170	0.0113	0.0222
	2006	0.0044	0.0053	0.0035
	2007	-0.0056	0.0007	-0.0115
	2008	-0.0354	-0.0364	-0.0341
	2009	0.0008	0.0294	-0.0273
	2010	-0.0403	-0.0333	-0.0464
	2011	-0.0255	-0.0425	-0.0074
	2012	0.0053	0.0231	-0.0113
	2013	0.0735	0.0433	0.1047

MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	-0.0071	-0.0152	0.0008
	2011	0.0101	0.0201	0.0004
	2012	0.0011	0.0054	-0.0033
	2013	-0.0041	-0.0103	0.0020
5 Point	2009	-0.0588	-0.0333	-0.0844
	2010	0.0517	0.0181	0.0852
	2011	0.0395	0.0367	0.0426
	2012	0.0011	0.0054	-0.0033
	2013	-0.0335	-0.0269	-0.0401
6 Point	2008	-0.0564	-0.0739	-0.0389
	2009	-0.0137	0.0258	-0.0532
	2010	0.0798	0.0550	0.1046
	2011	0.0508	0.0515	0.0504
	2012	-0.0045	-0.0020	-0.0072
	2013	-0.0560	-0.0565	-0.0557
7 Point	2007	-0.0266	-0.0355	-0.0175
	2008	-0.0387	-0.0502	-0.0272
	2009	-0.0013	0.0424	-0.0451
	2010	0.0869	0.0645	0.1093
	2011	0.0525	0.0538	0.0515
	2012	-0.0081	-0.0067	-0.0095
	2013	-0.0649	-0.0683	-0.0615
8 Point	2006	-0.0072	-0.0044	-0.0102
	2007	-0.0224	-0.0330	-0.0117
	2008	-0.0356	-0.0483	-0.0229
	2009	0.0008	0.0437	-0.0422
	2010	0.0880	0.0651	0.1107
	2011	0.0525	0.0538	0.0515
	2012	-0.0091	-0.0073	-0.0109
	2013	-0.0669	-0.0696	-0.0644
9 Point	2005	0.0517	0.0379	0.0655
	2006	-0.0331	-0.0233	-0.0429
	2007	-0.0428	-0.0479	-0.0374
	2008	-0.0504	-0.0591	-0.0416
	2009	-0.0084	0.0369	-0.0539
	2010	0.0843	0.0624	0.1061
	2011	0.0544	0.0552	0.0539
	2012	-0.0017	-0.0019	-0.0016
	2013	-0.0540	-0.0601	-0.0481
10 Point	2004	0.0810	0.0681	0.0940
	2005	0.0157	0.0077	0.0237
	2006	-0.0623	-0.0479	-0.0768
	2007	-0.0653	-0.0669	-0.0635
	2008	-0.0661	-0.0724	-0.0598
	2009	-0.0174	0.0293	-0.0643
	2010	0.0820	0.0605	0.1035
	2011	0.0589	0.0590	0.0591
	2012	0.0095	0.0076	0.0115
	2013	-0.0360	-0.0450	-0.0272

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	-0.0082	-0.0157	-0.0008
	2011	0.0118	0.0219	0.0020
	2012	0.0025	0.0067	-0.0016
	2013	-0.0061	-0.0126	0.0004
5 Point	2009	-0.0591	-0.0346	-0.0829
	2010	0.0588	0.0224	0.0958
	2011	0.0474	0.0420	0.0536
	2012	0.0025	0.0067	-0.0016
	2013	-0.0462	-0.0351	-0.0583
6 Point	2008	-0.0608	-0.0757	-0.0453
	2009	-0.0026	0.0367	-0.0414
	2010	0.0971	0.0705	0.1242
	2011	0.0640	0.0628	0.0660
	2012	-0.0065	-0.0045	-0.0084
	2013	-0.0855	-0.0834	-0.0879
7 Point	2007	-0.0409	-0.0461	-0.0353
	2008	-0.0294	-0.0401	-0.0184
	2009	0.0217	0.0641	-0.0205
	2010	0.1124	0.0877	0.1373
	2011	0.0682	0.0675	0.0696
	2012	-0.0158	-0.0149	-0.0164
	2013	-0.1110	-0.1119	-0.1100
8 Point	2006	-0.0341	-0.0270	-0.0411
	2007	-0.0184	-0.0284	-0.0079
	2008	-0.0106	-0.0254	0.0045
	2009	0.0356	0.0749	-0.0036
	2010	0.1201	0.0937	0.1468
	2011	0.0682	0.0675	0.0696
	2012	-0.0253	-0.0223	-0.0281
	2013	-0.1322	-0.1282	-0.1361
9 Point	2005	0.0102	0.0019	0.0186
	2006	-0.0397	-0.0281	-0.0513
	2007	-0.0233	-0.0293	-0.0169
	2008	-0.0146	-0.0261	-0.0028
	2009	0.0328	0.0744	-0.0086
	2010	0.1189	0.0935	0.1445
	2011	0.0689	0.0676	0.0709
	2012	-0.0222	-0.0217	-0.0225
	2013	-0.1262	-0.1271	-0.1251
10 Point	2004	0.0261	0.0195	0.0329
	2005	-0.0023	-0.0074	0.0029
	2006	-0.0510	-0.0365	-0.0655
	2007	-0.0330	-0.0365	-0.0290
	2008	-0.0221	-0.0317	-0.0122
	2009	0.0280	0.0709	-0.0146
	2010	0.1176	0.0925	0.1429
	2011	0.0718	0.0698	0.0746
	2012	-0.0141	-0.0156	-0.0122
	2013	-0.1118	-0.1164	-0.1068