

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-24)
r ²				
4 Point	Linear	0.895	0.831	0.839
5 Point	Linear	0.931	0.915	0.841
6 Point	Linear	0.902	0.897	0.825
7 Point	Linear	0.905	0.884	0.857
8 Point	Linear	0.888	0.869	0.850
9 Point	Linear	0.889	0.879	0.850
10 Point	Linear	0.881	0.867	0.853
4 Point	Expon'l	0.892	0.830	0.846
5 Point	Expon'l	0.936	0.914	0.852
6 Point	Expon'l	0.913	0.902	0.841
7 Point	Expon'l	0.922	0.895	0.880
8 Point	Expon'l	0.910	0.885	0.878
9 Point	Expon'l	0.915	0.901	0.882
10 Point	Expon'l	0.912	0.893	0.890

MEDICAL		(Average)	(Incur)	(Pd-24)
r ²				
4 Point	Linear	0.895	0.816	0.944
5 Point	Linear	0.947	0.902	0.970
6 Point	Linear	0.964	0.935	0.978
7 Point	Linear	0.976	0.957	0.985
8 Point	Linear	0.961	0.948	0.967
9 Point	Linear	0.947	0.937	0.950
10 Point	Linear	0.933	0.924	0.937
4 Point	Expon'l	0.871	0.797	0.921
5 Point	Expon'l	0.932	0.884	0.960
6 Point	Expon'l	0.960	0.929	0.977
7 Point	Expon'l	0.973	0.955	0.982
8 Point	Expon'l	0.970	0.958	0.976
9 Point	Expon'l	0.966	0.958	0.970
10 Point	Expon'l	0.963	0.954	0.968

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.4963	0.4930	0.4995
	2010	0.5391	0.5274	0.5508
	2011	0.5819	0.5619	0.6020
	2012	0.6247	0.5964	0.6532
5 Point	2008	0.4628	0.4497	0.4758
	2009	0.5025	0.4871	0.5179
	2010	0.5422	0.5245	0.5599
	2011	0.5819	0.5619	0.6020
	2012	0.6216	0.5993	0.6441
6 Point	2007	0.4464	0.4329	0.4597
	2008	0.4797	0.4647	0.4947
	2009	0.5131	0.4965	0.5297
	2010	0.5464	0.5282	0.5647
	2011	0.5798	0.5600	0.5996
	2012	0.6132	0.5918	0.6346
7 Point	2006	0.4277	0.4190	0.4364
	2007	0.4577	0.4466	0.4687
	2008	0.4877	0.4743	0.5010
	2009	0.5176	0.5020	0.5333
	2010	0.5476	0.5296	0.5655
	2011	0.5775	0.5573	0.5978
	2012	0.6075	0.5850	0.6301
8 Point	2005	0.4154	0.4080	0.4228
	2006	0.4419	0.4323	0.4513
	2007	0.4683	0.4567	0.4799
	2008	0.4947	0.4810	0.5084
	2009	0.5212	0.5053	0.5370
	2010	0.5476	0.5296	0.5655
	2011	0.5740	0.5540	0.5941
	2012	0.6004	0.5783	0.6227
9 Point	2004	0.4017	0.3938	0.4096
	2005	0.4259	0.4163	0.4355
	2006	0.4501	0.4389	0.4613
	2007	0.4743	0.4614	0.4871
	2008	0.4985	0.4839	0.5130
	2009	0.5226	0.5065	0.5388
	2010	0.5468	0.5290	0.5646
	2011	0.5710	0.5516	0.5905
	2012	0.5952	0.5741	0.6163
10 Point	2003	0.3910	0.3851	0.3968
	2004	0.4130	0.4054	0.4206
	2005	0.4351	0.4258	0.4444
	2006	0.4572	0.4461	0.4682
	2007	0.4792	0.4665	0.4919
	2008	0.5013	0.4869	0.5157
	2009	0.5234	0.5072	0.5395
	2010	0.5454	0.5276	0.5633
	2011	0.5675	0.5479	0.5870
	2012	0.5895	0.5683	0.6108

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.4980	0.4947	0.5007
	2010	0.5374	0.5264	0.5478
	2011	0.5799	0.5602	0.5993
	2012	0.6258	0.5962	0.6556
5 Point	2008	0.4660	0.4522	0.4792
	2009	0.5012	0.4856	0.5163
	2010	0.5391	0.5216	0.5562
	2011	0.5799	0.5602	0.5993
	2012	0.6238	0.6017	0.6456
6 Point	2007	0.4508	0.4367	0.4646
	2008	0.4797	0.4644	0.4947
	2009	0.5104	0.4938	0.5266
	2010	0.5431	0.5251	0.5607
	2011	0.5778	0.5584	0.5969
	2012	0.6148	0.5937	0.6355
7 Point	2006	0.4333	0.4239	0.4426
	2007	0.4587	0.4474	0.4697
	2008	0.4855	0.4723	0.4984
	2009	0.5139	0.4986	0.5289
	2010	0.5440	0.5264	0.5613
	2011	0.5758	0.5557	0.5956
	2012	0.6095	0.5866	0.6321
8 Point	2005	0.4219	0.4137	0.4300
	2006	0.4439	0.4341	0.4536
	2007	0.4671	0.4555	0.4784
	2008	0.4914	0.4780	0.5046
	2009	0.5170	0.5016	0.5322
	2010	0.5440	0.5264	0.5613
	2011	0.5724	0.5523	0.5920
	2012	0.6022	0.5796	0.6244
9 Point	2004	0.4091	0.4003	0.4178
	2005	0.4289	0.4189	0.4388
	2006	0.4497	0.4384	0.4608
	2007	0.4715	0.4588	0.4839
	2008	0.4943	0.4802	0.5082
	2009	0.5183	0.5025	0.5337
	2010	0.5434	0.5259	0.5605
	2011	0.5697	0.5504	0.5886
	2012	0.5973	0.5760	0.6181
10 Point	2003	0.3991	0.3922	0.4059
	2004	0.4169	0.4088	0.4249
	2005	0.4356	0.4262	0.4448
	2006	0.4550	0.4442	0.4657
	2007	0.4754	0.4631	0.4875
	2008	0.4967	0.4827	0.5103
	2009	0.5189	0.5032	0.5343
	2010	0.5421	0.5245	0.5593
	2011	0.5663	0.5468	0.5855
	2012	0.5917	0.5699	0.6129

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	1.2246	1.2363	1.2127
	2010	1.3616	1.3542	1.3689
	2011	1.4986	1.4720	1.5251
	2012	1.6356	1.5899	1.6814
5 Point	2008	1.0410	1.0271	1.0549
	2009	1.1935	1.1754	1.2117
	2010	1.3460	1.3237	1.3684
	2011	1.4986	1.4720	1.5251
	2012	1.6511	1.6204	1.6819
6 Point	2007	0.9071	0.8966	0.9176
	2008	1.0545	1.0400	1.0690
	2009	1.2020	1.1835	1.2205
	2010	1.3494	1.3270	1.3719
	2011	1.4969	1.4704	1.5234
	2012	1.6443	1.6139	1.6748
7 Point	2006	0.7638	0.7573	0.7700
	2007	0.9103	0.8998	0.9206
	2008	1.0568	1.0423	1.0711
	2009	1.2032	1.1848	1.2217
	2010	1.3497	1.3273	1.3722
	2011	1.4962	1.4698	1.5228
	2012	1.6427	1.6123	1.6733
8 Point	2005	0.6820	0.6759	0.6881
	2006	0.8156	0.8062	0.8249
	2007	0.9491	0.9364	0.9617
	2008	1.0827	1.0667	1.0986
	2009	1.2162	1.1970	1.2354
	2010	1.3497	1.3273	1.3722
	2011	1.4833	1.4576	1.5091
	2012	1.6168	1.5879	1.6459
9 Point	2004	0.6140	0.6072	0.6207
	2005	0.7360	0.7266	0.7452
	2006	0.8580	0.8460	0.8698
	2007	0.9799	0.9654	0.9944
	2008	1.1019	1.0848	1.1190
	2009	1.2239	1.2043	1.2436
	2010	1.3459	1.3237	1.3681
	2011	1.4679	1.4431	1.4927
	2012	1.5898	1.5625	1.6173
10 Point	2003	0.5557	0.5525	0.5587
	2004	0.6676	0.6617	0.6734
	2005	0.7795	0.7709	0.7881
	2006	0.8915	0.8801	0.9028
	2007	1.0034	0.9893	1.0175
	2008	1.1153	1.0985	1.1322
	2009	1.2273	1.2077	1.2469
	2010	1.3392	1.3169	1.3615
	2011	1.4511	1.4260	1.4762
	2012	1.5630	1.5352	1.5909

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	1.2218	1.2314	1.2124
	2010	1.3505	1.3443	1.3565
	2011	1.4927	1.4674	1.5176
	2012	1.6498	1.6019	1.6979
5 Point	2008	1.0471	1.0280	1.0657
	2009	1.1785	1.1574	1.1990
	2010	1.3263	1.3033	1.3489
	2011	1.4927	1.4674	1.5176
	2012	1.6799	1.6523	1.7074
6 Point	2007	0.9271	0.9129	0.9409
	2008	1.0444	1.0279	1.0605
	2009	1.1765	1.1574	1.1953
	2010	1.3254	1.3032	1.3473
	2011	1.4932	1.4674	1.5185
	2012	1.6821	1.6523	1.7115
7 Point	2006	0.7972	0.7878	0.8062
	2007	0.9047	0.8930	0.9161
	2008	1.0267	1.0122	1.0408
	2009	1.1651	1.1472	1.1826
	2010	1.3222	1.3004	1.3437
	2011	1.5005	1.4739	1.5267
	2012	1.7028	1.6706	1.7346
8 Point	2005	0.7309	0.7219	0.7397
	2006	0.8229	0.8121	0.8335
	2007	0.9265	0.9135	0.9392
	2008	1.0431	1.0276	1.0583
	2009	1.1744	1.1560	1.1925
	2010	1.3222	1.3004	1.3437
	2011	1.4886	1.4628	1.5140
	2012	1.6760	1.6455	1.7060
9 Point	2004	0.6758	0.6663	0.6851
	2005	0.7555	0.7446	0.7662
	2006	0.8445	0.8320	0.8569
	2007	0.9441	0.9298	0.9583
	2008	1.0555	1.0390	1.0717
	2009	1.1799	1.1611	1.1985
	2010	1.3191	1.2975	1.3403
	2011	1.4746	1.4499	1.4989
	2012	1.6485	1.6203	1.6763
10 Point	2003	0.6284	0.6224	0.6343
	2004	0.6982	0.6908	0.7055
	2005	0.7758	0.7667	0.7846
	2006	0.8620	0.8510	0.8727
	2007	0.9577	0.9446	0.9706
	2008	1.0641	1.0484	1.0795
	2009	1.1823	1.1637	1.2007
	2010	1.3137	1.2917	1.3354
	2011	1.4597	1.4337	1.4853
	2012	1.6218	1.5913	1.6519

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.0118	0.0190	0.0045
	2010	-0.0258	-0.0254	-0.0262
	2011	0.0164	-0.0062	0.0389
	2012	-0.0023	0.0126	-0.0172
5 Point	2008	0.0062	-0.0058	0.0183
	2009	0.0056	0.0249	-0.0138
	2010	-0.0289	-0.0225	-0.0353
	2011	0.0164	-0.0062	0.0389
	2012	0.0008	0.0097	-0.0081
6 Point	2007	0.0211	0.0186	0.0237
	2008	-0.0107	-0.0208	-0.0006
	2009	-0.0050	0.0155	-0.0257
	2010	-0.0331	-0.0262	-0.0401
	2011	0.0185	-0.0043	0.0413
	2012	0.0092	0.0172	0.0014
7 Point	2006	0.0170	0.0206	0.0134
	2007	0.0098	0.0049	0.0147
	2008	-0.0187	-0.0304	-0.0069
	2009	-0.0095	0.0100	-0.0293
	2010	-0.0343	-0.0276	-0.0409
	2011	0.0208	-0.0016	0.0431
	2012	0.0149	0.0240	0.0059
8 Point	2005	0.0248	0.0234	0.0261
	2006	0.0028	0.0073	-0.0015
	2007	-0.0008	-0.0051	0.0035
	2008	-0.0257	-0.0371	-0.0143
	2009	-0.0131	0.0067	-0.0330
	2010	-0.0343	-0.0276	-0.0409
	2011	0.0243	0.0017	0.0468
	2012	0.0220	0.0307	0.0133
9 Point	2004	0.0209	0.0166	0.0254
	2005	0.0143	0.0151	0.0134
	2006	-0.0054	0.0007	-0.0115
	2007	-0.0068	-0.0099	-0.0037
	2008	-0.0295	-0.0400	-0.0189
	2009	-0.0145	0.0055	-0.0348
	2010	-0.0335	-0.0270	-0.0400
	2011	0.0273	0.0041	0.0504
	2012	0.0272	0.0349	0.0197
10 Point	2003	0.0255	0.0262	0.0248
	2004	0.0096	0.0050	0.0144
	2005	0.0051	0.0056	0.0045
	2006	-0.0125	-0.0065	-0.0184
	2007	-0.0117	-0.0150	-0.0085
	2008	-0.0323	-0.0430	-0.0216
	2009	-0.0153	0.0048	-0.0355
	2010	-0.0321	-0.0256	-0.0387
	2011	0.0308	0.0078	0.0539
	2012	0.0329	0.0407	0.0252

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.0101	0.0173	0.0033
	2010	-0.0241	-0.0244	-0.0232
	2011	0.0184	-0.0045	0.0416
	2012	-0.0034	0.0128	-0.0196
5 Point	2008	0.0030	-0.0083	0.0149
	2009	0.0069	0.0264	-0.0123
	2010	-0.0258	-0.0196	-0.0316
	2011	0.0184	-0.0045	0.0416
	2012	-0.0014	0.0073	-0.0096
6 Point	2007	0.0167	0.0148	0.0188
	2008	-0.0107	-0.0205	-0.0006
	2009	-0.0023	0.0182	-0.0226
	2010	-0.0298	-0.0231	-0.0361
	2011	0.0205	-0.0027	0.0440
	2012	0.0076	0.0153	0.0005
7 Point	2006	0.0114	0.0157	0.0072
	2007	0.0088	0.0041	0.0137
	2008	-0.0165	-0.0284	-0.0043
	2009	-0.0058	0.0134	-0.0249
	2010	-0.0307	-0.0244	-0.0367
	2011	0.0225	0.0000	0.0453
	2012	0.0129	0.0224	0.0039
8 Point	2005	0.0183	0.0177	0.0189
	2006	0.0008	0.0055	-0.0038
	2007	0.0004	-0.0040	0.0050
	2008	-0.0224	-0.0341	-0.0105
	2009	-0.0089	0.0104	-0.0282
	2010	-0.0307	-0.0244	-0.0367
	2011	0.0259	0.0034	0.0489
	2012	0.0202	0.0294	0.0116
9 Point	2004	0.0135	0.0101	0.0172
	2005	0.0113	0.0125	0.0101
	2006	-0.0050	0.0012	-0.0110
	2007	-0.0040	-0.0073	-0.0005
	2008	-0.0253	-0.0363	-0.0141
	2009	-0.0102	0.0095	-0.0297
	2010	-0.0301	-0.0239	-0.0359
	2011	0.0286	0.0053	0.0523
	2012	0.0251	0.0330	0.0179
10 Point	2003	0.0174	0.0191	0.0157
	2004	0.0057	0.0016	0.0101
	2005	0.0046	0.0052	0.0041
	2006	-0.0103	-0.0046	-0.0159
	2007	-0.0079	-0.0116	-0.0041
	2008	-0.0277	-0.0388	-0.0162
	2009	-0.0108	0.0088	-0.0303
	2010	-0.0288	-0.0225	-0.0347
	2011	0.0320	0.0089	0.0554
	2012	0.0307	0.0391	0.0231

MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	-0.0642	-0.0751	-0.0531
	2010	0.0683	0.0821	0.0544
	2011	0.0558	0.0610	0.0505
	2012	-0.0600	-0.0680	-0.0518
5 Point	2008	-0.0310	-0.0609	-0.0010
	2009	-0.0331	-0.0142	-0.0521
	2010	0.0839	0.1126	0.0549
	2011	0.0558	0.0610	0.0505
	2012	-0.0755	-0.0985	-0.0523
6 Point	2007	0.0169	0.0162	0.0176
	2008	-0.0445	-0.0738	-0.0151
	2009	-0.0416	-0.0223	-0.0609
	2010	0.0805	0.1093	0.0514
	2011	0.0574	0.0626	0.0522
	2012	-0.0687	-0.0920	-0.0452
7 Point	2006	0.0047	0.0049	0.0045
	2007	0.0137	0.0130	0.0146
	2008	-0.0468	-0.0761	-0.0172
	2009	-0.0428	-0.0236	-0.0621
	2010	0.0802	0.1090	0.0511
	2011	0.0581	0.0632	0.0528
	2012	-0.0671	-0.0904	-0.0437
8 Point	2005	0.0907	0.0854	0.0960
	2006	-0.0471	-0.0440	-0.0504
	2007	-0.0251	-0.0236	-0.0265
	2008	-0.0727	-0.1005	-0.0447
	2009	-0.0558	-0.0358	-0.0758
	2010	0.0802	0.1090	0.0511
	2011	0.0710	0.0754	0.0665
	2012	-0.0412	-0.0660	-0.0163
9 Point	2004	0.1079	0.1015	0.1143
	2005	0.0367	0.0347	0.0389
	2006	-0.0895	-0.0838	-0.0953
	2007	-0.0559	-0.0526	-0.0592
	2008	-0.0919	-0.1186	-0.0651
	2009	-0.0635	-0.0431	-0.0840
	2010	0.0840	0.1126	0.0552
	2011	0.0864	0.0899	0.0829
	2012	-0.0142	-0.0406	0.0123
	10 Point	2003	0.1206	0.1226
2004		0.0543	0.0470	0.0616
2005		-0.0068	-0.0096	-0.0040
2006		-0.1230	-0.1179	-0.1283
2007		-0.0794	-0.0765	-0.0823
2008		-0.1053	-0.1323	-0.0783
2009		-0.0669	-0.0465	-0.0873
2010		0.0907	0.1194	0.0618
2011		0.1032	0.1070	0.0994
2012		0.0126	-0.0133	0.0387

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	-0.0614	-0.0702	-0.0528
	2010	0.0794	0.0920	0.0668
	2011	0.0616	0.0656	0.0580
	2012	-0.0742	-0.0800	-0.0683
5 Point	2008	-0.0371	-0.0618	-0.0118
	2009	-0.0181	0.0038	-0.0394
	2010	0.1036	0.1330	0.0744
	2011	0.0616	0.0656	0.0580
	2012	-0.1043	-0.1304	-0.0778
6 Point	2007	-0.0031	-0.0001	-0.0057
	2008	-0.0344	-0.0617	-0.0066
	2009	-0.0161	0.0038	-0.0357
	2010	0.1045	0.1331	0.0760
	2011	0.0611	0.0656	0.0571
	2012	-0.1065	-0.1304	-0.0819
7 Point	2006	-0.0287	-0.0256	-0.0317
	2007	0.0193	0.0198	0.0191
	2008	-0.0167	-0.0460	0.0131
	2009	-0.0047	0.0140	-0.0230
	2010	0.1077	0.1359	0.0796
	2011	0.0538	0.0591	0.0489
	2012	-0.1272	-0.1487	-0.1050
8 Point	2005	0.0418	0.0394	0.0444
	2006	-0.0544	-0.0499	-0.0590
	2007	-0.0025	-0.0007	-0.0040
	2008	-0.0331	-0.0614	-0.0044
	2009	-0.0140	0.0052	-0.0329
	2010	0.1077	0.1359	0.0796
	2011	0.0657	0.0702	0.0616
	2012	-0.1004	-0.1236	-0.0764
9 Point	2004	0.0461	0.0424	0.0499
	2005	0.0172	0.0167	0.0179
	2006	-0.0760	-0.0698	-0.0824
	2007	-0.0201	-0.0170	-0.0231
	2008	-0.0455	-0.0728	-0.0178
	2009	-0.0195	0.0001	-0.0389
	2010	0.1108	0.1388	0.0830
	2011	0.0797	0.0831	0.0767
	2012	-0.0729	-0.0984	-0.0467
10 Point	2003	0.0479	0.0527	0.0432
	2004	0.0237	0.0179	0.0295
	2005	-0.0031	-0.0054	-0.0005
	2006	-0.0935	-0.0888	-0.0982
	2007	-0.0337	-0.0318	-0.0354
	2008	-0.0541	-0.0822	-0.0256
	2009	-0.0219	-0.0025	-0.0411
	2010	0.1162	0.1446	0.0879
	2011	0.0946	0.0993	0.0903
	2012	-0.0462	-0.0694	-0.0223