

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	1.2352	1.2528	1.2174
	2010	1.3854	1.3827	1.3880
	2011	1.5356	1.5126	1.5586
	2012	1.6857	1.6425	1.7291
5 Point	2008	1.0467	1.0374	1.0559
	2009	1.2097	1.1958	1.2235
	2010	1.3726	1.3542	1.3910
	2011	1.5356	1.5126	1.5586
	2012	1.6985	1.6710	1.7261
6 Point	2007	0.9096	0.9032	0.9160
	2008	1.0655	1.0550	1.0760
	2009	1.2214	1.2068	1.2360
	2010	1.3773	1.3586	1.3960
	2011	1.5332	1.5104	1.5561
	2012	1.6891	1.6622	1.7161
7 Point	2006	0.7638	0.7610	0.7666
	2007	0.9174	0.9106	0.9242
	2008	1.0710	1.0602	1.0817
	2009	1.2245	1.2098	1.2393
	2010	1.3781	1.3594	1.3969
	2011	1.5317	1.5089	1.5544
	2012	1.6852	1.6585	1.7120
8 Point	2005	0.6806	0.6775	0.6837
	2006	0.8201	0.8139	0.8263
	2007	0.9596	0.9503	0.9689
	2008	1.0991	1.0866	1.1116
	2009	1.2386	1.2230	1.2542
	2010	1.3781	1.3594	1.3969
	2011	1.5176	1.4957	1.5395
	2012	1.6571	1.6321	1.6821
9 Point	2004	0.6115	0.6074	0.6156
	2005	0.7386	0.7320	0.7451
	2006	0.8656	0.8567	0.8746
	2007	0.9927	0.9814	1.0040
	2008	1.1198	1.1061	1.1335
	2009	1.2469	1.2308	1.2630
	2010	1.3740	1.3555	1.3925
	2011	1.5010	1.4801	1.5219
	2012	1.6281	1.6048	1.6514
10 Point	2003	0.5525	0.5516	0.5533
	2004	0.6688	0.6654	0.6722
	2005	0.7852	0.7792	0.7911
	2006	0.9015	0.8930	0.9099
	2007	1.0178	1.0068	1.0288
	2008	1.1341	1.1206	1.1477
	2009	1.2505	1.2344	1.2665
	2010	1.3668	1.3482	1.3854
	2011	1.4831	1.4620	1.5043
	2012	1.5994	1.5758	1.6231

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	1.2337	1.2487	1.2189
	2010	1.3733	1.3719	1.3744
	2011	1.5287	1.5073	1.5497
	2012	1.7016	1.6561	1.7473
5 Point	2008	1.0552	1.0402	1.0696
	2009	1.1940	1.1771	1.2103
	2010	1.3510	1.3320	1.3695
	2011	1.5287	1.5073	1.5497
	2012	1.7297	1.7057	1.7535
6 Point	2007	0.9328	0.9223	0.9430
	2008	1.0554	1.0427	1.0677
	2009	1.1941	1.1789	1.2090
	2010	1.3511	1.3328	1.3689
	2011	1.5286	1.5068	1.5500
	2012	1.7295	1.7036	1.7550
7 Point	2006	0.8014	0.7952	0.8074
	2007	0.9127	0.9043	0.9208
	2008	1.0394	1.0285	1.0501
	2009	1.1837	1.1696	1.1975
	2010	1.3481	1.3302	1.3657
	2011	1.5353	1.5128	1.5574
	2012	1.7486	1.7205	1.7761
8 Point	2005	0.7342	0.7279	0.7403
	2006	0.8290	0.8212	0.8368
	2007	0.9362	0.9264	0.9458
	2008	1.0572	1.0452	1.0690
	2009	1.1938	1.1791	1.2083
	2010	1.3481	1.3302	1.3657
	2011	1.5224	1.5007	1.5436
	2012	1.7191	1.6930	1.7447
9 Point	2004	0.6783	0.6712	0.6853
	2005	0.7603	0.7520	0.7685
	2006	0.8521	0.8425	0.8616
	2007	0.9551	0.9438	0.9661
	2008	1.0705	1.0574	1.0833
	2009	1.1998	1.1846	1.2147
	2010	1.3448	1.3271	1.3620
	2011	1.5072	1.4868	1.5272
	2012	1.6894	1.6656	1.7124
10 Point	2003	0.6305	0.6267	0.6344
	2004	0.7021	0.6971	0.7071
	2005	0.7819	0.7755	0.7883
	2006	0.8707	0.8626	0.8787
	2007	0.9696	0.9596	0.9795
	2008	1.0798	1.0674	1.0918
	2009	1.2024	1.1874	1.2171
	2010	1.3390	1.3208	1.3567
	2011	1.4911	1.4693	1.5123
	2012	1.6604	1.6345	1.6858

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	-0.0602	-0.0726	-0.0478
	2010	0.0661	0.0810	0.0510
	2011	0.0484	0.0557	0.0414
	2012	-0.0543	-0.0641	-0.0446
5 Point	2008	-0.0255	-0.0569	0.0061
	2009	-0.0347	-0.0156	-0.0539
	2010	0.0789	0.1095	0.0480
	2011	0.0484	0.0557	0.0414
	2012	-0.0671	-0.0926	-0.0416
6 Point	2007	0.0235	0.0220	0.0250
	2008	-0.0443	-0.0745	-0.0140
	2009	-0.0464	-0.0266	-0.0664
	2010	0.0742	0.1051	0.0430
	2011	0.0508	0.0579	0.0439
	2012	-0.0577	-0.0838	-0.0316
7 Point	2006	0.0117	0.0110	0.0124
	2007	0.0157	0.0146	0.0168
	2008	-0.0498	-0.0797	-0.0197
	2009	-0.0495	-0.0296	-0.0697
	2010	0.0734	0.1044	0.0421
	2011	0.0523	0.0594	0.0456
	2012	-0.0538	-0.0801	-0.0275
8 Point	2005	0.0985	0.0926	0.1044
	2006	-0.0446	-0.0419	-0.0473
	2007	-0.0265	-0.0251	-0.0279
	2008	-0.0779	-0.1061	-0.0496
	2009	-0.0636	-0.0428	-0.0846
	2010	0.0734	0.1044	0.0421
	2011	0.0664	0.0726	0.0605
	2012	-0.0257	-0.0537	0.0024
9 Point	2004	0.1159	0.1090	0.1228
	2005	0.0405	0.0381	0.0430
	2006	-0.0901	-0.0847	-0.0956
	2007	-0.0596	-0.0562	-0.0630
	2008	-0.0986	-0.1256	-0.0715
	2009	-0.0719	-0.0506	-0.0934
	2010	0.0775	0.1082	0.0465
	2011	0.0830	0.0882	0.0781
	2012	0.0033	-0.0264	0.0331
10 Point	2003	0.1290	0.1307	0.1274
	2004	0.0586	0.0510	0.0662
	2005	-0.0061	-0.0091	-0.0030
	2006	-0.1260	-0.1210	-0.1309
	2007	-0.0847	-0.0816	-0.0878
	2008	-0.1129	-0.1401	-0.0857
	2009	-0.0755	-0.0542	-0.0969
	2010	0.0847	0.1155	0.0536
	2011	0.1009	0.1063	0.0957
	2012	0.0320	0.0026	0.0614

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	-0.0587	-0.0685	-0.0493
	2010	0.0782	0.0918	0.0646
	2011	0.0553	0.0610	0.0503
	2012	-0.0702	-0.0777	-0.0628
5 Point	2008	-0.0340	-0.0597	-0.0076
	2009	-0.0190	0.0031	-0.0407
	2010	0.1005	0.1317	0.0695
	2011	0.0553	0.0610	0.0503
	2012	-0.0983	-0.1273	-0.0690
6 Point	2007	0.0003	0.0029	-0.0020
	2008	-0.0342	-0.0622	-0.0057
	2009	-0.0191	0.0013	-0.0394
	2010	0.1004	0.1309	0.0701
	2011	0.0554	0.0615	0.0500
	2012	-0.0981	-0.1252	-0.0705
7 Point	2006	-0.0259	-0.0232	-0.0284
	2007	0.0204	0.0209	0.0202
	2008	-0.0182	-0.0480	0.0119
	2009	-0.0087	0.0106	-0.0279
	2010	0.1034	0.1335	0.0733
	2011	0.0487	0.0555	0.0426
	2012	-0.1172	-0.1421	-0.0916
8 Point	2005	0.0449	0.0422	0.0478
	2006	-0.0535	-0.0492	-0.0578
	2007	-0.0031	-0.0012	-0.0048
	2008	-0.0360	-0.0647	-0.0070
	2009	-0.0188	0.0011	-0.0387
	2010	0.1034	0.1335	0.0733
	2011	0.0616	0.0676	0.0564
	2012	-0.0877	-0.1146	-0.0602
9 Point	2004	0.0491	0.0452	0.0531
	2005	0.0188	0.0181	0.0196
	2006	-0.0766	-0.0705	-0.0826
	2007	-0.0220	-0.0186	-0.0251
	2008	-0.0493	-0.0769	-0.0213
	2009	-0.0248	-0.0044	-0.0451
	2010	0.1067	0.1366	0.0770
	2011	0.0768	0.0815	0.0728
	2012	-0.0580	-0.0872	-0.0279
10 Point	2003	0.0510	0.0556	0.0463
	2004	0.0253	0.0193	0.0313
	2005	-0.0028	-0.0054	-0.0002
	2006	-0.0952	-0.0906	-0.0997
	2007	-0.0365	-0.0344	-0.0385
	2008	-0.0586	-0.0869	-0.0298
	2009	-0.0274	-0.0072	-0.0475
	2010	0.1125	0.1429	0.0823
	2011	0.0929	0.0990	0.0877
	2012	-0.0290	-0.0561	-0.0013