

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-24)
r ²				
4 Point	Linear	0.911	0.897	0.821
5 Point	Linear	0.934	0.943	0.845
6 Point	Linear	0.891	0.889	0.830
7 Point	Linear	0.891	0.861	0.863
8 Point	Linear	0.887	0.856	0.869
9 Point	Linear	0.906	0.890	0.881
10 Point	Linear	0.885	0.863	0.870
4 Point	Expon'l	0.910	0.903	0.829
5 Point	Expon'l	0.941	0.951	0.858
6 Point	Expon'l	0.903	0.900	0.847
7 Point	Expon'l	0.910	0.877	0.887
8 Point	Expon'l	0.911	0.879	0.897
9 Point	Expon'l	0.933	0.914	0.914
10 Point	Expon'l	0.914	0.889	0.906
MEDICAL		(Average)	(Incur)	(Pd-24)
r ²				
4 Point	Linear	0.882	0.822	0.933
5 Point	Linear	0.940	0.909	0.966
6 Point	Linear	0.956	0.932	0.976
7 Point	Linear	0.970	0.950	0.984
8 Point	Linear	0.959	0.941	0.973
9 Point	Linear	0.952	0.940	0.961
10 Point	Linear	0.935	0.920	0.946
4 Point	Expon'l	0.860	0.800	0.914
5 Point	Expon'l	0.930	0.900	0.957
6 Point	Expon'l	0.957	0.934	0.975
7 Point	Expon'l	0.972	0.958	0.980
8 Point	Expon'l	0.972	0.959	0.981
9 Point	Expon'l	0.975	0.967	0.979
10 Point	Expon'l	0.967	0.955	0.974

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.4671	0.4614	0.4730
	2010	0.5098	0.4996	0.5201
	2011	0.5525	0.5377	0.5671
	2012	0.5951	0.5759	0.6142
5 Point	2008	0.4366	0.4259	0.4474
	2009	0.4752	0.4632	0.4873
	2010	0.5138	0.5005	0.5272
	2011	0.5525	0.5377	0.5671
	2012	0.5911	0.5750	0.6070
6 Point	2007	0.4231	0.4145	0.4319
	2008	0.4549	0.4447	0.4652
	2009	0.4867	0.4749	0.4984
	2010	0.5184	0.5052	0.5316
	2011	0.5502	0.5354	0.5649
	2012	0.5819	0.5656	0.5981
7 Point	2006	0.4066	0.4041	0.4091
	2007	0.4349	0.4298	0.4399
	2008	0.4631	0.4554	0.4708
	2009	0.4913	0.4810	0.5016
	2010	0.5196	0.5067	0.5324
	2011	0.5478	0.5323	0.5633
	2012	0.5761	0.5580	0.5941
8 Point	2005	0.3928	0.3928	0.3929
	2006	0.4182	0.4156	0.4208
	2007	0.4435	0.4383	0.4487
	2008	0.4689	0.4611	0.4766
	2009	0.4942	0.4839	0.5045
	2010	0.5196	0.5067	0.5324
	2011	0.5449	0.5295	0.5603
	2012	0.5703	0.5523	0.5883
9 Point	2004	0.3742	0.3725	0.3759
	2005	0.3984	0.3949	0.4019
	2006	0.4225	0.4172	0.4278
	2007	0.4467	0.4395	0.4538
	2008	0.4709	0.4619	0.4798
	2009	0.4950	0.4842	0.5058
	2010	0.5192	0.5065	0.5318
	2011	0.5434	0.5289	0.5578
	2012	0.5675	0.5512	0.5838
	10 Point	2003	0.3659	0.3663
2004		0.3876	0.3861	0.3890
2005		0.4092	0.4059	0.4125
2006		0.4309	0.4257	0.4361
2007		0.4525	0.4455	0.4596
2008		0.4742	0.4653	0.4831
2009		0.4959	0.4850	0.5066
2010		0.5175	0.5048	0.5302
2011		0.5392	0.5246	0.5537
2012		0.5608	0.5444	0.5772

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.4688	0.4635	0.4740
	2010	0.5080	0.4984	0.5173
	2011	0.5504	0.5358	0.5646
	2012	0.5964	0.5761	0.6162
5 Point	2008	0.4398	0.4291	0.4506
	2009	0.4740	0.4620	0.4858
	2010	0.5108	0.4976	0.5237
	2011	0.5504	0.5358	0.5646
	2012	0.5932	0.5770	0.6087
6 Point	2007	0.4276	0.4187	0.4365
	2008	0.4549	0.4448	0.4650
	2009	0.4841	0.4726	0.4955
	2010	0.5151	0.5021	0.5279
	2011	0.5481	0.5334	0.5624
	2012	0.5832	0.5667	0.5992
7 Point	2006	0.4121	0.4090	0.4150
	2007	0.4359	0.4309	0.4408
	2008	0.4612	0.4538	0.4682
	2009	0.4879	0.4780	0.4974
	2010	0.5161	0.5035	0.5284
	2011	0.5460	0.5304	0.5613
	2012	0.5776	0.5586	0.5962
8 Point	2005	0.3992	0.3984	0.4000
	2006	0.4202	0.4175	0.4229
	2007	0.4424	0.4375	0.4471
	2008	0.4657	0.4585	0.4727
	2009	0.4903	0.4805	0.4998
	2010	0.5161	0.5035	0.5284
	2011	0.5433	0.5277	0.5586
	2012	0.5720	0.5530	0.5906
9 Point	2004	0.3814	0.3788	0.3841
	2005	0.4011	0.3972	0.4050
	2006	0.4218	0.4165	0.4270
	2007	0.4436	0.4368	0.4503
	2008	0.4665	0.4580	0.4748
	2009	0.4906	0.4803	0.5006
	2010	0.5159	0.5036	0.5279
	2011	0.5426	0.5281	0.5566
	2012	0.5706	0.5537	0.5870
10 Point	2003	0.3739	0.3732	0.3746
	2004	0.3913	0.3893	0.3933
	2005	0.4095	0.4061	0.4128
	2006	0.4286	0.4237	0.4334
	2007	0.4486	0.4420	0.4550
	2008	0.4695	0.4611	0.4776
	2009	0.4914	0.4811	0.5014
	2010	0.5143	0.5019	0.5263
	2011	0.5382	0.5236	0.5525
	2012	0.5633	0.5462	0.5801

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.9475	0.9478	0.9473
	2010	1.0688	1.0694	1.0682
	2011	1.1900	1.1910	1.1890
	2012	1.3113	1.3126	1.3099
5 Point	2008	0.8135	0.8054	0.8215
	2009	0.9390	0.9340	0.9440
	2010	1.0645	1.0625	1.0665
	2011	1.1900	1.1910	1.1890
	2012	1.3155	1.3195	1.3116
6 Point	2007	0.7142	0.7099	0.7184
	2008	0.8325	0.8294	0.8356
	2009	0.9509	0.9490	0.9528
	2010	1.0693	1.0685	1.0700
	2011	1.1876	1.1880	1.1873
	2012	1.3060	1.3075	1.3045
7 Point	2006	0.6086	0.6111	0.6059
	2007	0.7240	0.7259	0.7220
	2008	0.8394	0.8406	0.8382
	2009	0.9548	0.9553	0.9543
	2010	1.0703	1.0701	1.0704
	2011	1.1857	1.1848	1.1865
	2012	1.3011	1.2995	1.3027
8 Point	2005	0.5428	0.5492	0.5363
	2006	0.6483	0.6533	0.6431
	2007	0.7538	0.7575	0.7500
	2008	0.8593	0.8617	0.8568
	2009	0.9648	0.9659	0.9636
	2010	1.0703	1.0701	1.0704
	2011	1.1758	1.1743	1.1772
	2012	1.2813	1.2784	1.2841
9 Point	2004	0.4821	0.4859	0.4784
	2005	0.5797	0.5828	0.5765
	2006	0.6773	0.6798	0.6747
	2007	0.7749	0.7768	0.7729
	2008	0.8724	0.8737	0.8711
	2009	0.9700	0.9707	0.9693
	2010	1.0676	1.0677	1.0675
	2011	1.1652	1.1646	1.1657
	2012	1.2628	1.2616	1.2639
	10 Point	2003	0.4395	0.4478
2004		0.5284	0.5355	0.5214
2005		0.6173	0.6231	0.6115
2006		0.7062	0.7108	0.7016
2007		0.7951	0.7985	0.7918
2008		0.8840	0.8861	0.8819
2009		0.9729	0.9738	0.9720
2010		1.0618	1.0615	1.0622
2011		1.1507	1.1491	1.1523
2012		1.2396	1.2368	1.2424

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.9459	0.9434	0.9480
	2010	1.0583	1.0573	1.0591
	2011	1.1842	1.1850	1.1832
	2012	1.3250	1.3280	1.3219
5 Point	2008	0.8208	0.8113	0.8302
	2009	0.9275	0.9205	0.9343
	2010	1.0480	1.0444	1.0514
	2011	1.1842	1.1850	1.1832
	2012	1.3380	1.3444	1.3315
6 Point	2007	0.7325	0.7280	0.7368
	2008	0.8258	0.8219	0.8295
	2009	0.9310	0.9280	0.9338
	2010	1.0496	1.0478	1.0512
	2011	1.1833	1.1830	1.1833
	2012	1.3340	1.3357	1.3321
7 Point	2006	0.6373	0.6402	0.6341
	2007	0.7217	0.7241	0.7191
	2008	0.8173	0.8188	0.8155
	2009	0.9255	0.9260	0.9247
	2010	1.0480	1.0472	1.0486
	2011	1.1868	1.1843	1.1891
	2012	1.3439	1.3393	1.3484
8 Point	2005	0.5829	0.5892	0.5765
	2006	0.6554	0.6610	0.6497
	2007	0.7370	0.7416	0.7323
	2008	0.8288	0.8320	0.8254
	2009	0.9320	0.9334	0.9304
	2010	1.0480	1.0472	1.0486
	2011	1.1785	1.1749	1.1819
	2012	1.3252	1.3181	1.3322
9 Point	2004	0.5323	0.5356	0.5288
	2005	0.5957	0.5988	0.5926
	2006	0.6668	0.6695	0.6640
	2007	0.7463	0.7485	0.7440
	2008	0.8353	0.8368	0.8336
	2009	0.9349	0.9356	0.9340
	2010	1.0464	1.0460	1.0466
	2011	1.1712	1.1695	1.1726
	2012	1.3108	1.3075	1.3139
	10 Point	2003	0.4981	0.5054
2004		0.5534	0.5603	0.5464
2005		0.6149	0.6211	0.6085
2006		0.6832	0.6886	0.6777
2007		0.7591	0.7634	0.7547
2008		0.8435	0.8463	0.8404
2009		0.9372	0.9382	0.9359
2010		1.0413	1.0401	1.0423
2011		1.1570	1.1531	1.1607
2012		1.2855	1.2783	1.2926

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.0102	0.0158	0.0045
	2010	-0.0231	-0.0203	-0.0258
	2011	0.0156	-0.0068	0.0380
	2012	P	0.0113	-0.0168
5 Point	2008	0.0081	0.0018	0.0143
	2009	0.0021	0.0140	-0.0098
	2010	-0.0271	-0.0212	-0.0329
	2011	0.0156	-0.0068	0.0380
	2012	0.0013	0.0122	-0.0096
6 Point	2007	0.0229	0.0235	0.0222
	2008	-0.0102	-0.0170	-0.0035
	2009	-0.0094	0.0023	-0.0209
	2010	-0.0317	-0.0259	-0.0373
	2011	0.0179	-0.0045	0.0402
	2012	0.0105	0.0216	-0.0007
7 Point	2006	0.0176	0.0229	0.0120
	2007	0.0111	0.0082	0.0142
	2008	-0.0184	-0.0277	-0.0091
	2009	-0.0140	-0.0038	-0.0241
	2010	-0.0329	-0.0274	-0.0381
	2011	0.0203	-0.0014	0.0418
	2012	0.0163	0.0292	0.0033
8 Point	2005	0.0203	0.0200	0.0205
	2006	0.0060	0.0114	0.0003
	2007	0.0025	-0.0003	0.0054
	2008	-0.0242	-0.0334	-0.0149
	2009	-0.0169	-0.0067	-0.0270
	2010	-0.0329	-0.0274	-0.0381
	2011	0.0232	0.0014	0.0448
	2012	0.0221	0.0349	0.0091
9 Point	2004	0.0110	0.0042	0.0179
	2005	0.0147	0.0179	0.0115
	2006	0.0017	0.0098	-0.0067
	2007	-0.0007	-0.0015	0.0003
	2008	-0.0262	-0.0342	-0.0181
	2009	-0.0177	-0.0070	-0.0283
	2010	-0.0325	-0.0272	-0.0375
	2011	0.0247	0.0020	0.0473
	2012	0.0249	0.0360	0.0136
	10 Point	2003	0.0301	0.0305
2004		-0.0024	-0.0094	0.0048
2005		0.0039	0.0069	0.0009
2006		-0.0067	0.0013	-0.0150
2007		-0.0065	-0.0075	-0.0055
2008		-0.0295	-0.0376	-0.0214
2009		-0.0186	-0.0078	-0.0291
2010		-0.0308	-0.0255	-0.0359
2011		0.0289	0.0063	0.0514
2012		0.0316	0.0428	0.0202

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	0.0085	0.0137	0.0035
	2010	-0.0213	-0.0191	-0.0230
	2011	0.0177	-0.0049	0.0405
	2012	-0.0040	0.0111	-0.0188
5 Point	2008	0.0049	-0.0014	0.0111
	2009	0.0033	0.0152	-0.0083
	2010	-0.0241	-0.0183	-0.0294
	2011	0.0177	-0.0049	0.0405
	2012	-0.0008	0.0102	-0.0113
6 Point	2007	0.0184	0.0193	0.0176
	2008	-0.0102	-0.0171	-0.0033
	2009	-0.0068	0.0046	-0.0180
	2010	-0.0284	-0.0228	-0.0336
	2011	0.0200	-0.0025	0.0427
	2012	0.0092	0.0205	-0.0018
7 Point	2006	0.0121	0.0180	0.0061
	2007	0.0101	0.0071	0.0133
	2008	-0.0165	-0.0261	-0.0065
	2009	-0.0106	-0.0008	-0.0199
	2010	-0.0294	-0.0242	-0.0341
	2011	0.0221	0.0005	0.0438
	2012	0.0148	0.0286	0.0012
8 Point	2005	0.0139	0.0144	0.0134
	2006	0.0040	0.0095	-0.0018
	2007	0.0036	0.0005	0.0070
	2008	-0.0210	-0.0308	-0.0110
	2009	-0.0130	-0.0033	-0.0223
	2010	-0.0294	-0.0242	-0.0341
	2011	0.0248	0.0032	0.0465
	2012	0.0204	0.0342	0.0068
9 Point	2004	0.0038	-0.0021	0.0097
	2005	0.0120	0.0156	0.0084
	2006	0.0024	0.0105	-0.0059
	2007	0.0024	0.0012	0.0038
	2008	-0.0218	-0.0303	-0.0131
	2009	-0.0133	-0.0031	-0.0231
	2010	-0.0292	-0.0243	-0.0336
	2011	0.0255	0.0028	0.0485
	2012	0.0218	0.0335	0.0104
10 Point	2003	0.0221	0.0236	0.0205
	2004	-0.0061	-0.0126	0.0005
	2005	0.0036	0.0067	0.0006
	2006	-0.0044	0.0033	-0.0123
	2007	-0.0026	-0.0040	-0.0009
	2008	-0.0248	-0.0334	-0.0159
	2009	-0.0141	-0.0039	-0.0239
	2010	-0.0276	-0.0226	-0.0320
	2011	0.0299	0.0073	0.0526
	2012	0.0291	0.0410	0.0173

MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	-0.0502	-0.0660	-0.0344
	2010	0.0518	0.0725	0.0310
	2011	0.0471	0.0530	0.0411
	2012	-0.0487	-0.0595	-0.0377
5 Point	2008	-0.0086	-0.0138	-0.0033
	2009	-0.0417	-0.0522	-0.0311
	2010	0.0561	0.0794	0.0327
	2011	0.0471	0.0530	0.0411
	2012	-0.0529	-0.0664	-0.0394
6 Point	2007	0.0238	0.0300	0.0176
	2008	-0.0276	-0.0378	-0.0174
	2009	-0.0536	-0.0672	-0.0399
	2010	0.0513	0.0734	0.0292
	2011	0.0495	0.0560	0.0428
	2012	-0.0434	-0.0544	-0.0323
7 Point	2006	0.0147	0.0240	0.0055
	2007	0.0140	0.0140	0.0140
	2008	-0.0345	-0.0490	-0.0200
	2009	-0.0575	-0.0735	-0.0414
	2010	0.0504	0.0718	0.0288
	2011	0.0514	0.0592	0.0436
	2012	-0.0385	-0.0464	-0.0305
8 Point	2005	0.0695	0.0738	0.0652
	2006	-0.0250	-0.0182	-0.0317
	2007	-0.0157	-0.0176	-0.0140
	2008	-0.0544	-0.0701	-0.0386
	2009	-0.0675	-0.0841	-0.0507
	2010	0.0503	0.0718	0.0288
	2011	0.0614	0.0697	0.0529
	2012	-0.0187	-0.0253	-0.0119
9 Point	2004	0.0739	0.0673	0.0804
	2005	0.0325	0.0402	0.0250
	2006	-0.0540	-0.0447	-0.0633
	2007	-0.0369	-0.0369	-0.0369
	2008	-0.0675	-0.0821	-0.0529
	2009	-0.0727	-0.0889	-0.0564
	2010	0.0530	0.0742	0.0317
	2011	0.0719	0.0794	0.0644
	2012	-0.0002	-0.0085	0.0083
10 Point	2003	0.1042	0.1116	0.0968
	2004	0.0276	0.0177	0.0374
	2005	-0.0051	-0.0001	-0.0100
	2006	-0.0829	-0.0757	-0.0902
	2007	-0.0571	-0.0586	-0.0558
	2008	-0.0791	-0.0945	-0.0637
	2009	-0.0756	-0.0920	-0.0591
	2010	0.0588	0.0804	0.0370
	2011	0.0864	0.0949	0.0778
	2012	0.0230	0.0163	0.0298

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-24)
4 Point	2009	-0.0486	-0.0616	-0.0351
	2010	0.0623	0.0846	0.0401
	2011	0.0529	0.0590	0.0469
	2012	-0.0624	-0.0749	-0.0497
5 Point	2008	-0.0159	-0.0197	-0.0120
	2009	-0.0302	-0.0387	-0.0214
	2010	0.0726	0.0975	0.0478
	2011	0.0529	0.0590	0.0469
	2012	-0.0754	-0.0913	-0.0593
6 Point	2007	0.0055	0.0119	-0.0008
	2008	-0.0209	-0.0303	-0.0113
	2009	-0.0337	-0.0462	-0.0209
	2010	0.0710	0.0941	0.0480
	2011	0.0538	0.0610	0.0468
	2012	-0.0714	-0.0826	-0.0599
7 Point	2006	-0.0140	-0.0051	-0.0227
	2007	0.0163	0.0158	0.0169
	2008	-0.0124	-0.0272	0.0027
	2009	-0.0282	-0.0442	-0.0118
	2010	0.0726	0.0947	0.0506
	2011	0.0503	0.0597	0.0410
	2012	-0.0813	-0.0862	-0.0762
8 Point	2005	0.0293	0.0338	0.0250
	2006	-0.0321	-0.0259	-0.0383
	2007	0.0010	-0.0017	0.0037
	2008	-0.0239	-0.0404	-0.0072
	2009	-0.0347	-0.0516	-0.0175
	2010	0.0726	0.0947	0.0506
	2011	0.0586	0.0691	0.0482
	2012	-0.0626	-0.0650	-0.0600
9 Point	2004	0.0237	0.0176	0.0300
	2005	0.0165	0.0242	0.0089
	2006	-0.0435	-0.0344	-0.0526
	2007	-0.0083	-0.0086	-0.0080
	2008	-0.0304	-0.0452	-0.0154
	2009	-0.0376	-0.0538	-0.0211
	2010	0.0742	0.0959	0.0526
	2011	0.0659	0.0745	0.0575
	2012	-0.0482	-0.0544	-0.0417
	10 Point	2003	0.0456	0.0540
2004		0.0026	-0.0071	0.0124
2005		-0.0027	0.0019	-0.0070
2006		-0.0599	-0.0535	-0.0663
2007		-0.0211	-0.0235	-0.0187
2008		-0.0386	-0.0547	-0.0222
2009		-0.0399	-0.0564	-0.0230
2010		0.0793	0.1018	0.0569
2011		0.0801	0.0909	0.0694
2012		-0.0229	-0.0252	-0.0204