

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-26)
r ²				
4 Point	Linear	0.986	0.962	0.961
5 Point	Linear	0.988	0.977	0.971
6 Point	Linear	0.912	0.802	0.947
7 Point	Linear	0.926	0.854	0.944
8 Point	Linear	0.906	0.832	0.929
9 Point	Linear	0.888	0.831	0.903
10 Point	Linear	0.888	0.849	0.893
4 Point	Expon'l	0.984	0.951	0.964
5 Point	Expon'l	0.991	0.974	0.979
6 Point	Expon'l	0.918	0.788	0.963
7 Point	Expon'l	0.940	0.854	0.966
8 Point	Expon'l	0.926	0.836	0.958
9 Point	Expon'l	0.913	0.842	0.936
10 Point	Expon'l	0.919	0.867	0.932

MEDICAL		(Average)	(Incur)	(Pd-26)
r ²				
4 Point	Linear	0.953	0.939	0.962
5 Point	Linear	0.917	0.902	0.929
6 Point	Linear	0.952	0.941	0.959
7 Point	Linear	0.970	0.963	0.974
8 Point	Linear	0.978	0.973	0.981
9 Point	Linear	0.982	0.978	0.985
10 Point	Linear	0.977	0.972	0.980
4 Point	Expon'l	0.971	0.959	0.978
5 Point	Expon'l	0.941	0.928	0.951
6 Point	Expon'l	0.961	0.958	0.959
7 Point	Expon'l	0.969	0.968	0.968
8 Point	Expon'l	0.979	0.978	0.978
9 Point	Expon'l	0.983	0.983	0.982
10 Point	Expon'l	0.986	0.985	0.986

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2011	0.4688	0.4440	0.4938
	2012	0.5187	0.4856	0.5519
	2013	0.5686	0.5273	0.6100
	2014	0.6186	0.5689	0.6681
5 Point	2010	0.4278	0.4071	0.4486
	2011	0.4747	0.4472	0.5024
	2012	0.5217	0.4872	0.5562
	2013	0.5686	0.5273	0.6100
	2014	0.6156	0.5673	0.6638
6 Point	2009	0.4156	0.4096	0.4217
	2010	0.4531	0.4380	0.4682
	2011	0.4905	0.4665	0.5146
	2012	0.5280	0.4949	0.5611
	2013	0.5655	0.5234	0.6076
	2014	0.6030	0.5518	0.6540
7 Point	2008	0.3897	0.3859	0.3936
	2009	0.4245	0.4133	0.4358
	2010	0.4593	0.4406	0.4780
	2011	0.4941	0.4680	0.5203
	2012	0.5289	0.4953	0.5625
	2013	0.5637	0.5226	0.6047
	2014	0.5985	0.5500	0.6470
8 Point	2007	0.3752	0.3773	0.3732
	2008	0.4060	0.4009	0.4111
	2009	0.4367	0.4245	0.4489
	2010	0.4674	0.4481	0.4868
	2011	0.4982	0.4717	0.5247
	2012	0.5289	0.4953	0.5625
	2013	0.5596	0.5189	0.6004
	2014	0.5904	0.5425	0.6382
9 Point	2006	0.3635	0.3669	0.3601
	2007	0.3909	0.3882	0.3936
	2008	0.4183	0.4095	0.4271
	2009	0.4457	0.4307	0.4606
	2010	0.4730	0.4520	0.4941
	2011	0.5004	0.4733	0.5276
	2012	0.5278	0.4945	0.5611
	2013	0.5551	0.5158	0.5945
	2014	0.5825	0.5370	0.6280
10 Point	2005	0.3496	0.3538	0.3454
	2006	0.3749	0.3738	0.3759
	2007	0.4001	0.3938	0.4064
	2008	0.4254	0.4137	0.4370
	2009	0.4506	0.4337	0.4675
	2010	0.4759	0.4537	0.4980
	2011	0.5011	0.4737	0.5285
	2012	0.5264	0.4937	0.5591
	2013	0.5516	0.5136	0.5896
	2014	0.5769	0.5336	0.6201

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2011	0.4707	0.4446	0.4970
	2012	0.5163	0.4835	0.5491
	2013	0.5663	0.5257	0.6067
	2014	0.6212	0.5716	0.6703
5 Point	2010	0.4319	0.4097	0.4542
	2011	0.4727	0.4452	0.5003
	2012	0.5174	0.4838	0.5509
	2013	0.5663	0.5257	0.6067
	2014	0.6199	0.5712	0.6682
6 Point	2009	0.4213	0.4128	0.4298
	2010	0.4530	0.4376	0.4681
	2011	0.4870	0.4639	0.5097
	2012	0.5236	0.4918	0.5551
	2013	0.5630	0.5214	0.6044
	2014	0.6053	0.5527	0.6582
7 Point	2008	0.3970	0.3904	0.4039
	2009	0.4256	0.4136	0.4375
	2010	0.4562	0.4382	0.4739
	2011	0.4890	0.4643	0.5133
	2012	0.5241	0.4919	0.5560
	2013	0.5618	0.5212	0.6023
	2014	0.6022	0.5522	0.6524
8 Point	2007	0.3839	0.3826	0.3855
	2008	0.4086	0.4023	0.4148
	2009	0.4348	0.4231	0.4463
	2010	0.4628	0.4449	0.4802
	2011	0.4925	0.4678	0.5168
	2012	0.5241	0.4919	0.5560
	2013	0.5578	0.5173	0.5983
	2014	0.5936	0.5439	0.6438
9 Point	2006	0.3733	0.3731	0.3738
	2007	0.3949	0.3906	0.3992
	2008	0.4177	0.4089	0.4263
	2009	0.4419	0.4281	0.4553
	2010	0.4675	0.4482	0.4863
	2011	0.4945	0.4692	0.5193
	2012	0.5231	0.4912	0.5547
	2013	0.5533	0.5142	0.5924
	2014	0.5853	0.5383	0.6327
10 Point	2005	0.3604	0.3608	0.3604
	2006	0.3800	0.3770	0.3831
	2007	0.4006	0.3939	0.4073
	2008	0.4224	0.4115	0.4330
	2009	0.4453	0.4300	0.4603
	2010	0.4695	0.4493	0.4893
	2011	0.4950	0.4695	0.5201
	2012	0.5219	0.4906	0.5529
	2013	0.5503	0.5126	0.5878
	2014	0.5802	0.5356	0.6249

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2011	1.0213	0.9786	1.0639
	2012	1.1499	1.1037	1.1960
	2013	1.2785	1.2289	1.3281
	2014	1.4071	1.3540	1.4603
5 Point	2010	0.9649	0.9268	1.0029
	2011	1.0694	1.0275	1.1113
	2012	1.1740	1.1282	1.2197
	2013	1.2785	1.2289	1.3281
	2014	1.3830	1.3296	1.4366
6 Point	2009	0.8505	0.8266	0.8742
	2010	0.9577	0.9272	0.9881
	2011	1.0649	1.0277	1.1021
	2012	1.1722	1.1283	1.2160
	2013	1.2794	1.2288	1.3300
	2014	1.3866	1.3294	1.4439
7 Point	2008	0.7370	0.7214	0.7525
	2009	0.8456	0.8231	0.8682
	2010	0.9543	0.9247	0.9840
	2011	1.0630	1.0263	1.0997
	2012	1.1717	1.1279	1.2154
	2013	1.2804	1.2295	1.3312
	2014	1.3890	1.3312	1.4469
8 Point	2007	0.6409	0.6317	0.6501
	2008	0.7470	0.7309	0.7632
	2009	0.8532	0.8302	0.8762
	2010	0.9594	0.9294	0.9893
	2011	1.0655	1.0287	1.1024
	2012	1.1717	1.1279	1.2154
	2013	1.2778	1.2272	1.3285
	2014	1.3840	1.3264	1.4416
9 Point	2006	0.5486	0.5465	0.5507
	2007	0.6523	0.6433	0.6613
	2008	0.7560	0.7400	0.7720
	2009	0.8597	0.8368	0.8826
	2010	0.9634	0.9336	0.9933
	2011	1.0671	1.0303	1.1040
	2012	1.1709	1.1271	1.2146
	2013	1.2746	1.2239	1.3253
	2014	1.3783	1.3206	1.4360
10 Point	2005	0.4812	0.4863	0.4761
	2006	0.5792	0.5773	0.5811
	2007	0.6772	0.6683	0.6860
	2008	0.7751	0.7593	0.7910
	2009	0.8731	0.8503	0.8960
	2010	0.9711	0.9413	1.0009
	2011	1.0691	1.0323	1.1059
	2012	1.1670	1.1232	1.2108
	2013	1.2650	1.2142	1.3158
	2014	1.3630	1.3052	1.4207

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2011	1.0305	0.9879	1.0730
	2012	1.1441	1.0981	1.1901
	2013	1.2703	1.2206	1.3199
	2014	1.4103	1.3567	1.4640
5 Point	2010	0.9782	0.9399	1.0164
	2011	1.0672	1.0255	1.1089
	2012	1.1643	1.1188	1.2098
	2013	1.2703	1.2206	1.3199
	2014	1.3858	1.3316	1.4401
6 Point	2009	0.8673	0.8433	0.8910
	2010	0.9548	0.9254	0.9840
	2011	1.0512	1.0155	1.0867
	2012	1.1573	1.1144	1.2001
	2013	1.2741	1.2229	1.3253
	2014	1.4027	1.3420	1.4636
7 Point	2008	0.7603	0.7437	0.7768
	2009	0.8439	0.8223	0.8654
	2010	0.9367	0.9092	0.9641
	2011	1.0398	1.0053	1.0741
	2012	1.1541	1.1116	1.1966
	2013	1.2811	1.2291	1.3330
	2014	1.4220	1.3590	1.4851
8 Point	2007	0.6738	0.6624	0.6853
	2008	0.7504	0.7346	0.7661
	2009	0.8356	0.8148	0.8564
	2010	0.9306	0.9037	0.9574
	2011	1.0364	1.0023	1.0704
	2012	1.1541	1.1116	1.1966
	2013	1.2853	1.2329	1.3377
	2014	1.4314	1.3674	1.4954
9 Point	2006	0.5921	0.5866	0.5976
	2007	0.6619	0.6527	0.6711
	2008	0.7399	0.7262	0.7536
	2009	0.8272	0.8080	0.8463
	2010	0.9247	0.8989	0.9503
	2011	1.0337	1.0002	1.0672
	2012	1.1556	1.1128	1.1984
	2013	1.2919	1.2381	1.3457
	2014	1.4442	1.3775	1.5112
10 Point	2005	0.5366	0.5369	0.5364
	2006	0.5987	0.5957	0.6016
	2007	0.6679	0.6608	0.6748
	2008	0.7451	0.7332	0.7568
	2009	0.8312	0.8134	0.8487
	2010	0.9273	0.9024	0.9519
	2011	1.0344	1.0011	1.0676
	2012	1.1540	1.1107	1.1974
	2013	1.2874	1.2322	1.3429
	2014	1.4362	1.3670	1.5061

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2011	0.0022	-0.0077	0.0122
	2012	-0.0082	0.0054	-0.0218
	2013	0.0098	0.0125	0.0070
	2014	-0.0038	-0.0101	0.0026
5 Point	2010	0.0059	0.0032	0.0086
	2011	-0.0037	-0.0110	0.0036
	2012	-0.0112	0.0038	-0.0261
	2013	0.0098	0.0125	0.0070
	2014	-0.0008	-0.0085	0.0069
6 Point	2009	0.0316	0.0386	0.0245
	2010	-0.0194	-0.0277	-0.0110
	2011	-0.0195	-0.0303	-0.0086
	2012	-0.0175	-0.0039	-0.0310
	2013	0.0129	0.0163	0.0094
	2014	0.0118	0.0070	0.0167
7 Point	2008	0.0134	0.0056	0.0211
	2009	0.0227	0.0349	0.0104
	2010	-0.0256	-0.0303	-0.0208
	2011	-0.0231	-0.0318	-0.0143
	2012	-0.0184	-0.0043	-0.0324
	2013	0.0147	0.0171	0.0123
	2014	0.0163	0.0088	0.0237
8 Point	2007	0.0285	0.0261	0.0307
	2008	-0.0029	-0.0094	0.0036
	2009	0.0105	0.0237	-0.0027
	2010	-0.0337	-0.0378	-0.0296
	2011	-0.0272	-0.0355	-0.0187
	2012	-0.0184	-0.0043	-0.0324
	2013	0.0188	0.0208	0.0166
	2014	0.0244	0.0163	0.0325
9 Point	2006	0.0314	0.0219	0.0407
	2007	0.0128	0.0152	0.0103
	2008	-0.0152	-0.0180	-0.0124
	2009	0.0015	0.0175	-0.0144
	2010	-0.0393	-0.0417	-0.0369
	2011	-0.0294	-0.0371	-0.0216
	2012	-0.0173	-0.0035	-0.0309
	2013	0.0233	0.0239	0.0225
	2014	0.0323	0.0218	0.0427
10 Point	2005	0.0255	0.0154	0.0356
	2006	0.0200	0.0150	0.0249
	2007	0.0036	0.0096	-0.0025
	2008	-0.0223	-0.0222	-0.0223
	2009	-0.0034	0.0145	-0.0213
	2010	-0.0422	-0.0434	-0.0408
	2011	-0.0301	-0.0375	-0.0225
	2012	-0.0159	-0.0027	-0.0290
	2013	0.0268	0.0261	0.0274
	2014	0.0379	0.0252	0.0506

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2011	0.0003	-0.0084	0.0090
	2012	-0.0058	0.0075	-0.0190
	2013	0.0121	0.0140	0.0103
	2014	-0.0064	-0.0128	0.0004
5 Point	2010	0.0018	0.0006	0.0030
	2011	-0.0017	-0.0090	0.0057
	2012	-0.0069	0.0072	-0.0208
	2013	0.0121	0.0140	0.0103
	2014	-0.0051	-0.0124	0.0025
6 Point	2009	0.0259	0.0354	0.0164
	2010	-0.0193	-0.0273	-0.0109
	2011	-0.0160	-0.0277	-0.0037
	2012	-0.0131	-0.0008	-0.0250
	2013	0.0154	0.0183	0.0126
	2014	0.0095	0.0061	0.0125
7 Point	2008	0.0061	0.0011	0.0108
	2009	0.0216	0.0346	0.0087
	2010	-0.0225	-0.0279	-0.0167
	2011	-0.0180	-0.0281	-0.0073
	2012	-0.0136	-0.0009	-0.0259
	2013	0.0166	0.0185	0.0147
	2014	0.0126	0.0066	0.0183
8 Point	2007	0.0198	0.0208	0.0184
	2008	-0.0055	-0.0108	-0.0001
	2009	0.0124	0.0251	-0.0001
	2010	-0.0291	-0.0346	-0.0230
	2011	-0.0215	-0.0316	-0.0108
	2012	-0.0136	-0.0009	-0.0259
	2013	0.0206	0.0224	0.0187
	2014	0.0212	0.0149	0.0269
9 Point	2006	0.0216	0.0157	0.0270
	2007	0.0088	0.0128	0.0047
	2008	-0.0146	-0.0174	-0.0116
	2009	0.0053	0.0201	-0.0091
	2010	-0.0338	-0.0379	-0.0291
	2011	-0.0235	-0.0330	-0.0133
	2012	-0.0126	-0.0002	-0.0246
	2013	0.0251	0.0255	0.0246
	2014	0.0295	0.0205	0.0380
10 Point	2005	0.0147	0.0084	0.0206
	2006	0.0149	0.0118	0.0177
	2007	0.0031	0.0095	-0.0034
	2008	-0.0193	-0.0200	-0.0183
	2009	0.0019	0.0182	-0.0141
	2010	-0.0358	-0.0390	-0.0321
	2011	-0.0240	-0.0333	-0.0141
	2012	-0.0114	0.0004	-0.0228
	2013	0.0281	0.0271	0.0292
	2014	0.0346	0.0232	0.0458

MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2011	0.0250	0.0234	0.0265
	2012	-0.0149	-0.0079	-0.0219
	2013	-0.0451	-0.0544	-0.0357
	2014	0.0350	0.0389	0.0311
5 Point	2010	0.0481	0.0489	0.0474
	2011	-0.0231	-0.0255	-0.0209
	2012	-0.0390	-0.0324	-0.0456
	2013	-0.0451	-0.0544	-0.0357
	2014	0.0591	0.0633	0.0548
6 Point	2009	-0.0090	0.0005	-0.0185
	2010	0.0553	0.0485	0.0622
	2011	-0.0186	-0.0257	-0.0117
	2012	-0.0372	-0.0325	-0.0419
	2013	-0.0460	-0.0543	-0.0376
	2014	0.0555	0.0635	0.0475
7 Point	2008	-0.0073	-0.0053	-0.0089
	2009	-0.0041	0.0040	-0.0125
	2010	0.0587	0.0510	0.0663
	2011	-0.0167	-0.0243	-0.0093
	2012	-0.0367	-0.0321	-0.0413
	2013	-0.0470	-0.0550	-0.0388
	2014	0.0531	0.0617	0.0445
8 Point	2007	0.0176	0.0166	0.0187
	2008	-0.0173	-0.0148	-0.0196
	2009	-0.0117	-0.0031	-0.0205
	2010	0.0536	0.0463	0.0610
	2011	-0.0192	-0.0267	-0.0120
	2012	-0.0367	-0.0321	-0.0413
	2013	-0.0444	-0.0527	-0.0361
	2014	0.0581	0.0665	0.0498
9 Point	2006	0.0228	0.0231	0.0224
	2007	0.0062	0.0050	0.0075
	2008	-0.0263	-0.0239	-0.0284
	2009	-0.0182	-0.0097	-0.0269
	2010	0.0496	0.0421	0.0570
	2011	-0.0208	-0.0283	-0.0136
	2012	-0.0359	-0.0313	-0.0405
	2013	-0.0412	-0.0494	-0.0329
	2014	0.0638	0.0723	0.0554
10 Point	2005	0.0689	0.0694	0.0685
	2006	-0.0078	-0.0077	-0.0080
	2007	-0.0187	-0.0200	-0.0172
	2008	-0.0454	-0.0432	-0.0474
	2009	-0.0316	-0.0232	-0.0403
	2010	0.0419	0.0344	0.0494
	2011	-0.0228	-0.0303	-0.0155
	2012	-0.0320	-0.0274	-0.0367
	2013	-0.0316	-0.0397	-0.0234
	2014	0.0791	0.0877	0.0707

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-26)
4 Point	2011	0.0158	0.0141	0.0174
	2012	-0.0091	-0.0023	-0.0160
	2013	-0.0369	-0.0461	-0.0275
	2014	0.0318	0.0362	0.0274
5 Point	2010	0.0348	0.0358	0.0339
	2011	-0.0209	-0.0235	-0.0185
	2012	-0.0293	-0.0230	-0.0357
	2013	-0.0369	-0.0461	-0.0275
	2014	0.0563	0.0613	0.0513
6 Point	2009	-0.0258	-0.0162	-0.0353
	2010	0.0582	0.0503	0.0663
	2011	-0.0049	-0.0135	0.0037
	2012	-0.0223	-0.0186	-0.0260
	2013	-0.0407	-0.0484	-0.0329
	2014	0.0394	0.0509	0.0278
7 Point	2008	-0.0306	-0.0276	-0.0332
	2009	-0.0024	0.0048	-0.0097
	2010	0.0763	0.0665	0.0862
	2011	0.0065	-0.0033	0.0163
	2012	-0.0191	-0.0158	-0.0225
	2013	-0.0477	-0.0546	-0.0406
	2014	0.0201	0.0339	0.0063
8 Point	2007	-0.0153	-0.0141	-0.0165
	2008	-0.0207	-0.0185	-0.0225
	2009	0.0059	0.0123	-0.0007
	2010	0.0824	0.0720	0.0929
	2011	0.0099	-0.0003	0.0200
	2012	-0.0191	-0.0158	-0.0225
	2013	-0.0519	-0.0584	-0.0453
	2014	0.0107	0.0255	-0.0040
9 Point	2006	-0.0207	-0.0170	-0.0245
	2007	-0.0034	-0.0044	-0.0023
	2008	-0.0102	-0.0101	-0.0100
	2009	0.0143	0.0191	0.0094
	2010	0.0883	0.0768	0.1000
	2011	0.0126	0.0018	0.0232
	2012	-0.0206	-0.0170	-0.0243
	2013	-0.0585	-0.0636	-0.0533
	2014	-0.0021	0.0154	-0.0198
10 Point	2005	0.0135	0.0188	0.0082
	2006	-0.0273	-0.0261	-0.0285
	2007	-0.0094	-0.0125	-0.0060
	2008	-0.0154	-0.0171	-0.0132
	2009	0.0103	0.0137	0.0070
	2010	0.0857	0.0733	0.0984
	2011	0.0119	0.0009	0.0228
	2012	-0.0190	-0.0149	-0.0233
	2013	-0.0540	-0.0577	-0.0505
	2014	0.0059	0.0259	-0.0147