

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-25)
r <sup>2</sup>				
4 Point	Linear	0.969	0.970	0.915
5 Point	Linear	0.875	0.780	0.882
6 Point	Linear	0.907	0.862	0.891
7 Point	Linear	0.872	0.830	0.864
8 Point	Linear	0.849	0.819	0.839
9 Point	Linear	0.839	0.823	0.822
10 Point	Linear	0.854	0.855	0.827
4 Point	Expon'l	0.985	0.972	0.940
5 Point	Expon'l	0.893	0.773	0.916
6 Point	Expon'l	0.932	0.867	0.933
7 Point	Expon'l	0.902	0.840	0.910
8 Point	Expon'l	0.885	0.835	0.890
9 Point	Expon'l	0.880	0.847	0.878
10 Point	Expon'l	0.901	0.884	0.890
MEDICAL		(Average)	(Incur)	(Pd-25)
r <sup>2</sup>				
4 Point	Linear	0.966	0.933	0.989
5 Point	Linear	0.936	0.939	0.927
6 Point	Linear	0.958	0.957	0.955
7 Point	Linear	0.974	0.973	0.972
8 Point	Linear	0.982	0.980	0.981
9 Point	Linear	0.981	0.980	0.980
10 Point	Linear	0.977	0.979	0.974
4 Point	Expon'l	0.956	0.920	0.983
5 Point	Expon'l	0.911	0.919	0.898
6 Point	Expon'l	0.936	0.936	0.933
7 Point	Expon'l	0.957	0.954	0.957
8 Point	Expon'l	0.970	0.969	0.968
9 Point	Expon'l	0.978	0.978	0.976
10 Point	Expon'l	0.983	0.984	0.980

INDEMNITY Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	0.4488	0.4303	0.4674
	2011	0.5133	0.4833	0.5433
	2012	0.5778	0.5363	0.6192
	2013	0.6423	0.5893	0.6951
5 Point	2009	0.4333	0.4302	0.4366
	2010	0.4815	0.4656	0.4975
	2011	0.5296	0.5009	0.5583
	2012	0.5778	0.5363	0.6192
	2013	0.6260	0.5717	0.6800
6 Point	2008	0.3979	0.3940	0.4020
	2009	0.4426	0.4296	0.4557
	2010	0.4873	0.4652	0.5094
	2011	0.5319	0.5008	0.5631
	2012	0.5766	0.5364	0.6168
	2013	0.6213	0.5719	0.6705
7 Point	2007	0.3832	0.3834	0.3833
	2008	0.4209	0.4132	0.4289
	2009	0.4587	0.4430	0.4745
	2010	0.4965	0.4729	0.5202
	2011	0.5343	0.5027	0.5658
	2012	0.5720	0.5325	0.6114
	2013	0.6098	0.5623	0.6570
8 Point	2006	0.3706	0.3726	0.3689
	2007	0.4033	0.3986	0.4083
	2008	0.4361	0.4246	0.4476
	2009	0.4688	0.4507	0.4870
	2010	0.5015	0.4767	0.5264
	2011	0.5343	0.5027	0.5658
	2012	0.5670	0.5287	0.6052
	2013	0.5997	0.5547	0.6445
9 Point	2005	0.3583	0.3605	0.3563
	2006	0.3874	0.3841	0.3910
	2007	0.4166	0.4076	0.4256
	2008	0.4457	0.4312	0.4603
	2009	0.4748	0.4548	0.4949
	2010	0.5039	0.4783	0.5296
	2011	0.5331	0.5019	0.5642
	2012	0.5622	0.5254	0.5989
	2013	0.5913	0.5490	0.6335
10 Point	2004	0.3407	0.3417	0.3399
	2005	0.3680	0.3645	0.3716
	2006	0.3953	0.3873	0.4034
	2007	0.4226	0.4101	0.4352
	2008	0.4499	0.4329	0.4670
	2009	0.4772	0.4557	0.4987
	2010	0.5045	0.4786	0.5305
	2011	0.5318	0.5014	0.5623
	2012	0.5592	0.5242	0.5941
	2013	0.5865	0.5470	0.6258

INDEMNITY Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	0.4536	0.4332	0.4741
	2011	0.5100	0.4806	0.5390
	2012	0.5734	0.5333	0.6129
	2013	0.6447	0.5917	0.6968
5 Point	2009	0.4399	0.4338	0.4461
	2010	0.4805	0.4647	0.4960
	2011	0.5249	0.4978	0.5513
	2012	0.5734	0.5333	0.6129
	2013	0.6264	0.5712	0.6813
6 Point	2008	0.4062	0.3988	0.4140
	2009	0.4427	0.4290	0.4563
	2010	0.4824	0.4615	0.5030
	2011	0.5257	0.4964	0.5544
	2012	0.5730	0.5340	0.6111
	2013	0.6244	0.5744	0.6736
7 Point	2007	0.3930	0.3895	0.3972
	2008	0.4231	0.4142	0.4322
	2009	0.4555	0.4405	0.4703
	2010	0.4903	0.4685	0.5117
	2011	0.5279	0.4983	0.5568
	2012	0.5683	0.5300	0.6059
	2013	0.6118	0.5637	0.6593
8 Point	2006	0.3816	0.3796	0.3841
	2007	0.4071	0.4008	0.4137
	2008	0.4345	0.4232	0.4456
	2009	0.4636	0.4469	0.4800
	2010	0.4947	0.4719	0.5170
	2011	0.5279	0.4983	0.5568
	2012	0.5633	0.5262	0.5997
	2013	0.6011	0.5556	0.6460
9 Point	2005	0.3702	0.3684	0.3726
	2006	0.3926	0.3873	0.3983
	2007	0.4164	0.4072	0.4256
	2008	0.4416	0.4281	0.4549
	2009	0.4684	0.4501	0.4862
	2010	0.4967	0.4733	0.5196
	2011	0.5268	0.4976	0.5554
	2012	0.5587	0.5232	0.5936
	2013	0.5925	0.5501	0.6344
10 Point	2004	0.3536	0.3504	0.3573
	2005	0.3743	0.3684	0.3804
	2006	0.3961	0.3874	0.4050
	2007	0.4192	0.4073	0.4312
	2008	0.4437	0.4282	0.4590
	2009	0.4696	0.4502	0.4887
	2010	0.4971	0.4733	0.5203
	2011	0.5261	0.4976	0.5540
	2012	0.5568	0.5231	0.5898
	2013	0.5893	0.5500	0.6279

MEDICAL Linear FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	1.0467	1.0243	1.0692
	2011	1.1121	1.0896	1.1346
	2012	1.1775	1.1549	1.2000
	2013	1.2429	1.2202	1.2654
5 Point	2009	0.9188	0.9082	0.9295
	2010	1.0051	0.9904	1.0196
	2011	1.0913	1.0727	1.1098
	2012	1.1775	1.1549	1.2000
	2013	1.2637	1.2372	1.2901
6 Point	2008	0.7998	0.7901	0.8094
	2009	0.8950	0.8821	0.9077
	2010	0.9901	0.9742	1.0061
	2011	1.0853	1.0662	1.1044
	2012	1.1805	1.1582	1.2027
	2013	1.2756	1.2502	1.3010
7 Point	2007	0.6954	0.6842	0.7067
	2008	0.7927	0.7794	0.8060
	2009	0.8900	0.8746	0.9054
	2010	0.9873	0.9699	1.0047
	2011	1.0846	1.0651	1.1040
	2012	1.1819	1.1603	1.2034
	2013	1.2792	1.2556	1.3027
8 Point	2006	0.6027	0.5992	0.6061
	2007	0.6991	0.6924	0.7057
	2008	0.7954	0.7856	0.8053
	2009	0.8918	0.8787	0.9049
	2010	0.9882	0.9719	1.0045
	2011	1.0846	1.0651	1.1040
	2012	1.1810	1.1583	1.2036
	2013	1.2774	1.2515	1.3032
9 Point	2005	0.5312	0.5289	0.5335
	2006	0.6232	0.6180	0.6283
	2007	0.7152	0.7072	0.7232
	2008	0.8072	0.7963	0.8180
	2009	0.8991	0.8855	0.9128
	2010	0.9911	0.9746	1.0076
	2011	1.0831	1.0638	1.1024
	2012	1.1751	1.1529	1.1973
	2013	1.2671	1.2420	1.2921
10 Point	2004	0.4686	0.4642	0.4731
	2005	0.5560	0.5495	0.5625
	2006	0.6433	0.6348	0.6519
	2007	0.7307	0.7201	0.7412
	2008	0.8180	0.8053	0.8306
	2009	0.9053	0.8906	0.9200
	2010	0.9927	0.9759	1.0094
	2011	1.0800	1.0612	1.0988
	2012	1.1674	1.1465	1.1882
	2013	1.2547	1.2317	1.2776

MEDICAL Expon'l FITTED	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	1.0474	1.0245	1.0704
	2011	1.1098	1.0870	1.1325
	2012	1.1758	1.1533	1.1983
	2013	1.2458	1.2236	1.2678
5 Point	2009	0.9202	0.9098	0.9304
	2010	0.9985	0.9846	1.0123
	2011	1.0835	1.0656	1.1014
	2012	1.1758	1.1533	1.1983
	2013	1.2759	1.2482	1.3037
6 Point	2008	0.8062	0.7960	0.8162
	2009	0.8870	0.8744	0.8994
	2010	0.9759	0.9605	0.9910
	2011	1.0736	1.0551	1.0921
	2012	1.1812	1.1590	1.2034
	2013	1.2996	1.2731	1.3260
7 Point	2007	0.7101	0.6978	0.7223
	2008	0.7869	0.7733	0.8005
	2009	0.8721	0.8568	0.8873
	2010	0.9665	0.9494	0.9834
	2011	1.0710	1.0521	1.0899
	2012	1.1869	1.1658	1.2080
	2013	1.3154	1.2917	1.3389
8 Point	2006	0.6273	0.6229	0.6315
	2007	0.6982	0.6918	0.7044
	2008	0.7770	0.7682	0.7856
	2009	0.8647	0.8531	0.8762
	2010	0.9624	0.9474	0.9772
	2011	1.0710	1.0521	1.0899
	2012	1.1920	1.1683	1.2156
	2013	1.3266	1.2974	1.3558
9 Point	2005	0.5669	0.5631	0.5706
	2006	0.6303	0.6249	0.6356
	2007	0.7007	0.6935	0.7079
	2008	0.7791	0.7696	0.7885
	2009	0.8662	0.8541	0.8782
	2010	0.9630	0.9478	0.9781
	2011	1.0707	1.0518	1.0894
	2012	1.1904	1.1673	1.2134
	2013	1.3235	1.2954	1.3515
10 Point	2004	0.5148	0.5085	0.5211
	2005	0.5715	0.5641	0.5789
	2006	0.6345	0.6258	0.6430
	2007	0.7043	0.6943	0.7143
	2008	0.7819	0.7702	0.7934
	2009	0.8679	0.8544	0.8813
	2010	0.9635	0.9479	0.9790
	2011	1.0696	1.0516	1.0875
	2012	1.1874	1.1666	1.2080
	2013	1.3181	1.2942	1.3419

INDEMNITY Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	0.0106	0.0089	0.0123
	2011	-0.0073	-0.0172	0.0026
	2012	-0.0172	0.0078	-0.0423
	2013	0.0139	0.0005	0.0273
5 Point	2009	0.0327	0.0352	0.0301
	2010	-0.0221	-0.0264	-0.0178
	2011	-0.0236	-0.0348	-0.0124
	2012	-0.0172	0.0078	-0.0423
	2013	0.0302	0.0181	0.0424
6 Point	2008	0.0115	-0.0007	0.0238
	2009	0.0234	0.0358	0.0110
	2010	-0.0279	-0.0260	-0.0297
	2011	-0.0259	-0.0347	-0.0172
	2012	-0.0160	0.0077	-0.0399
	2013	0.0349	0.0179	0.0519
7 Point	2007	0.0346	0.0288	0.0404
	2008	-0.0115	-0.0199	-0.0031
	2009	0.0073	0.0224	-0.0078
	2010	-0.0371	-0.0337	-0.0405
	2011	-0.0283	-0.0366	-0.0199
	2012	-0.0114	0.0116	-0.0345
	2013	0.0464	0.0275	0.0654
8 Point	2006	0.0353	0.0266	0.0437
	2007	0.0145	0.0136	0.0154
	2008	-0.0267	-0.0313	-0.0218
	2009	-0.0028	0.0147	-0.0203
	2010	-0.0421	-0.0375	-0.0467
	2011	-0.0283	-0.0366	-0.0199
	2012	-0.0064	0.0154	-0.0283
	2013	0.0565	0.0351	0.0779
9 Point	2005	0.0337	0.0230	0.0442
	2006	0.0185	0.0151	0.0216
	2007	0.0012	0.0046	-0.0019
	2008	-0.0363	-0.0379	-0.0345
	2009	-0.0088	0.0106	-0.0282
	2010	-0.0445	-0.0391	-0.0499
	2011	-0.0271	-0.0358	-0.0183
	2012	-0.0016	0.0187	-0.0220
	2013	0.0649	0.0408	0.0889
10 Point	2004	0.0217	0.0089	0.0344
	2005	0.0240	0.0190	0.0289
	2006	0.0106	0.0119	0.0092
	2007	-0.0048	0.0021	-0.0115
	2008	-0.0405	-0.0396	-0.0412
	2009	-0.0112	0.0097	-0.0320
	2010	-0.0451	-0.0394	-0.0508
	2011	-0.0258	-0.0353	-0.0164
	2012	0.0014	0.0199	-0.0172
	2013	0.0697	0.0428	0.0966

INDEMNITY Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	0.0058	0.0060	0.0056
	2011	-0.0040	-0.0145	0.0069
	2012	-0.0128	0.0108	-0.0360
	2013	0.0115	-0.0019	0.0256
5 Point	2009	0.0261	0.0316	0.0206
	2010	-0.0211	-0.0255	-0.0163
	2011	-0.0189	-0.0317	-0.0054
	2012	-0.0128	0.0108	-0.0360
	2013	0.0298	0.0186	0.0411
6 Point	2008	0.0032	-0.0055	0.0118
	2009	0.0233	0.0364	0.0104
	2010	-0.0230	-0.0223	-0.0233
	2011	-0.0197	-0.0303	-0.0085
	2012	-0.0124	0.0101	-0.0342
	2013	0.0318	0.0154	0.0488
7 Point	2007	0.0248	0.0227	0.0265
	2008	-0.0137	-0.0209	-0.0064
	2009	0.0105	0.0249	-0.0036
	2010	-0.0309	-0.0293	-0.0320
	2011	-0.0219	-0.0322	-0.0109
	2012	-0.0077	0.0141	-0.0290
	2013	0.0444	0.0261	0.0631
8 Point	2006	0.0243	0.0196	0.0285
	2007	0.0107	0.0114	0.0100
	2008	-0.0251	-0.0299	-0.0198
	2009	0.0024	0.0185	-0.0133
	2010	-0.0353	-0.0327	-0.0373
	2011	-0.0219	-0.0322	-0.0109
	2012	-0.0027	0.0179	-0.0228
	2013	0.0551	0.0342	0.0764
9 Point	2005	0.0218	0.0151	0.0279
	2006	0.0133	0.0119	0.0143
	2007	0.0014	0.0050	-0.0019
	2008	-0.0322	-0.0348	-0.0291
	2009	-0.0024	0.0153	-0.0195
	2010	-0.0373	-0.0341	-0.0399
	2011	-0.0208	-0.0315	-0.0095
	2012	0.0019	0.0209	-0.0167
	2013	0.0637	0.0397	0.0880
10 Point	2004	0.0088	0.0002	0.0170
	2005	0.0177	0.0151	0.0201
	2006	0.0098	0.0118	0.0076
	2007	-0.0014	0.0049	-0.0075
	2008	-0.0343	-0.0349	-0.0332
	2009	-0.0036	0.0152	-0.0220
	2010	-0.0377	-0.0341	-0.0406
	2011	-0.0201	-0.0315	-0.0081
	2012	0.0038	0.0210	-0.0129
	2013	0.0669	0.0398	0.0945



MEDICAL Linear RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	-0.0150	-0.0214	-0.0086
	2011	0.0195	0.0270	0.0121
	2012	0.0059	0.0103	0.0015
	2013	-0.0105	-0.0158	-0.0051
5 Point	2009	-0.0416	-0.0339	-0.0496
	2010	0.0267	0.0125	0.0410
	2011	0.0403	0.0439	0.0369
	2012	0.0059	0.0103	0.0015
	2013	-0.0313	-0.0328	-0.0298
6 Point	2008	-0.0298	-0.0325	-0.0271
	2009	-0.0178	-0.0078	-0.0278
	2010	0.0416	0.0287	0.0545
	2011	0.0463	0.0504	0.0423
	2012	0.0029	0.0070	-0.0012
	2013	-0.0432	-0.0458	-0.0407
7 Point	2007	-0.0106	-0.0161	-0.0051
	2008	-0.0227	-0.0218	-0.0237
	2009	-0.0128	-0.0003	-0.0255
	2010	0.0444	0.0330	0.0559
	2011	0.0470	0.0515	0.0427
	2012	0.0015	0.0049	-0.0019
	2013	-0.0468	-0.0512	-0.0424
8 Point	2006	0.0063	0.0143	-0.0017
	2007	-0.0143	-0.0243	-0.0041
	2008	-0.0254	-0.0279	-0.0230
	2009	-0.0146	-0.0044	-0.0250
	2010	0.0435	0.0310	0.0561
	2011	0.0470	0.0515	0.0427
	2012	0.0024	0.0069	-0.0021
	2013	-0.0449	-0.0471	-0.0429
9 Point	2005	0.0410	0.0377	0.0444
	2006	-0.0142	-0.0045	-0.0239
	2007	-0.0304	-0.0391	-0.0216
	2008	-0.0372	-0.0387	-0.0357
	2009	-0.0219	-0.0112	-0.0329
	2010	0.0406	0.0283	0.0530
	2011	0.0485	0.0528	0.0443
	2012	0.0083	0.0123	0.0042
	2013	-0.0347	-0.0376	-0.0318
10 Point	2004	0.0558	0.0464	0.0651
	2005	0.0162	0.0171	0.0154
	2006	-0.0343	-0.0213	-0.0475
	2007	-0.0459	-0.0520	-0.0396
	2008	-0.0480	-0.0477	-0.0483
	2009	-0.0281	-0.0163	-0.0401
	2010	0.0390	0.0270	0.0512
	2011	0.0516	0.0554	0.0479
	2012	0.0160	0.0187	0.0133
	2013	-0.0223	-0.0273	-0.0173

MEDICAL Expon'l RESIDUALS	Policy Year	Severity Ratio (Average)	Severity Ratio (Incur)	Severity Ratio (Pd-25)
4 Point	2010	-0.0157	-0.0216	-0.0098
	2011	0.0218	0.0296	0.0142
	2012	0.0076	0.0119	0.0032
	2013	-0.0134	-0.0192	-0.0075
5 Point	2009	-0.0430	-0.0355	-0.0505
	2010	0.0332	0.0183	0.0483
	2011	0.0481	0.0510	0.0453
	2012	0.0076	0.0119	0.0032
	2013	-0.0435	-0.0438	-0.0434
6 Point	2008	-0.0362	-0.0384	-0.0339
	2009	-0.0098	-0.0001	-0.0195
	2010	0.0558	0.0424	0.0696
	2011	0.0580	0.0615	0.0546
	2012	0.0022	0.0062	-0.0019
	2013	-0.0672	-0.0687	-0.0657
7 Point	2007	-0.0253	-0.0297	-0.0207
	2008	-0.0169	-0.0157	-0.0182
	2009	0.0051	0.0175	-0.0074
	2010	0.0652	0.0535	0.0772
	2011	0.0606	0.0645	0.0568
	2012	-0.0035	-0.0006	-0.0065
	2013	-0.0830	-0.0873	-0.0786
8 Point	2006	-0.0183	-0.0094	-0.0271
	2007	-0.0134	-0.0237	-0.0028
	2008	-0.0070	-0.0106	-0.0033
	2009	0.0125	0.0212	0.0037
	2010	0.0693	0.0555	0.0834
	2011	0.0606	0.0645	0.0568
	2012	-0.0086	-0.0031	-0.0141
	2013	-0.0942	-0.0930	-0.0955
9 Point	2005	0.0053	0.0035	0.0073
	2006	-0.0213	-0.0114	-0.0312
	2007	-0.0159	-0.0254	-0.0063
	2008	-0.0091	-0.0120	-0.0062
	2009	0.0110	0.0202	0.0017
	2010	0.0687	0.0551	0.0825
	2011	0.0609	0.0648	0.0573
	2012	-0.0070	-0.0021	-0.0119
	2013	-0.0911	-0.0910	-0.0912
10 Point	2004	0.0096	0.0021	0.0171
	2005	0.0007	0.0025	-0.0010
	2006	-0.0255	-0.0123	-0.0386
	2007	-0.0195	-0.0262	-0.0127
	2008	-0.0119	-0.0126	-0.0111
	2009	0.0093	0.0199	-0.0014
	2010	0.0682	0.0550	0.0816
	2011	0.0620	0.0650	0.0592
	2012	-0.0040	-0.0014	-0.0065
	2013	-0.0857	-0.0898	-0.0816