

PENNSYLVANIA COMPENSATION RATING BUREAU

Retrospective Test of Trend Projections for Severity Ratios

Attached is a retrospective test of the predictive accuracy of various trend procedures. Please note that instead of using ultimate loss ratios, as in Exhibit 11a, Exhibit 11b uses ultimate severity ratios, i.e., ultimate loss ratios adjusted by dividing out the frequency component. Please note that our analysis is limited to Policy Years 1997 through 2008, the years shown on Exhibit 6, page 6.

Results for both indemnity and medical are shown using both linear and exponential fits. All possible combinations of from four to ten data points, which permitted a test of the projected severity ratio three years hence, were used. Our current review trends policy year 2008 3.25 years, policy year 2007 4.25 years, and policy year 2006 5.25 years. An average of those three values is then calculated.

Current estimates of policy year ultimate severity ratios are compared with predicted values based on trending through earlier years. The results are shown for three loss development approaches: incurred, paid to twenty-second and the average of the incurred and paid to twenty-second methods.

As an illustration, the incurred loss development approach generated an indemnity severity ratio of 0.7504 for policy year 2003. Fitting the loss ratios for policy years 1997 to 2000 using a straight line and projecting that to 2003 yielded a severity ratio of 0.8276, which overstates our current estimate for 2003 by 0.0772.

Indemnity
Actual Ultimate Severity Ratios
Including Average of Paid and Incurred

INDEMNITY	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
	1997	0.5888	0.5726	0.6050
	1998	0.5976	0.5779	0.6173
	1999	0.6712	0.6484	0.6942
	2000	0.7282	0.6995	0.7570
	2001	0.7438	0.7102	0.7773
	2002	0.7633	0.7362	0.7902
	2003	0.7843	0.7504	0.8183
	2004	0.8349	0.8046	0.8652
	2005	0.8540	0.8136	0.8945
	2006	0.8875	0.8459	0.9291
	2007	1.0257	0.9591	1.0926
	2008	1.0984	1.0166	1.1803

Trend # Years = 3

**Indemnity
Linear Fit
Trended Severity Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
97-00 (4)	2003	0.8678	0.8276	0.9082
98-01 (4)	2004	0.9082	0.8606	0.9557
99-02 (4)	2005	0.8580	0.8219	0.8934
00-03 (4)	2006	0.8394	0.8045	0.8743
01-04 (4)	2007	0.9140	0.8842	0.9441
02-05 (4)	2008	0.9543	0.9051	1.0040
97-01 (5)	2004	0.8862	0.8401	0.9323
98-02 (5)	2005	0.9028	0.8636	0.9417
99-03 (5)	2006	0.8688	0.8293	0.9081
00-04 (5)	2007	0.8979	0.8654	0.9303
01-05 (5)	2008	0.9421	0.9006	0.9838
97-02 (6)	2005	0.8971	0.8564	0.9376
98-03 (6)	2006	0.9073	0.8657	0.9488
99-04 (6)	2007	0.9124	0.8757	0.9490
00-05 (6)	2008	0.9298	0.8888	0.9710
97-03 (7)	2006	0.9090	0.8661	0.9518
98-04 (7)	2007	0.9404	0.9012	0.9796
99-05 (7)	2008	0.9405	0.8974	0.9835
97-04 (8)	2007	0.9421	0.9011	0.9831
98-05 (8)	2008	0.9639	0.9195	1.0083
97-05 (9)	2008	0.9669	0.9214	1.0124

11b.2

Indemnity
Linear Fit
Differences: (Actual - Trended)

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
97-00 (4)	2003	-0.0835	-0.0772	-0.0899
98-01 (4)	2004	-0.0733	-0.0560	-0.0905
99-02 (4)	2005	-0.0040	-0.0083	0.0011
00-03 (4)	2006	0.0481	0.0414	0.0548
01-04 (4)	2007	0.1117	0.0749	0.1485
02-05 (4)	2008	0.1441	0.1115	0.1763
97-01 (5)	2004	-0.0513	-0.0355	-0.0671
98-02 (5)	2005	-0.0488	-0.0500	-0.0472
99-03 (5)	2006	0.0187	0.0166	0.0210
00-04 (5)	2007	0.1279	0.0937	0.1623
01-05 (5)	2008	0.1563	0.1160	0.1965
97-02 (6)	2005	-0.0431	-0.0428	-0.0431
98-03 (6)	2006	-0.0198	-0.0198	-0.0197
99-04 (6)	2007	0.1133	0.0834	0.1436
00-05 (6)	2008	0.1686	0.1278	0.2093
97-03 (7)	2006	-0.0215	-0.0202	-0.0227
98-04 (7)	2007	0.0853	0.0579	0.1130
99-05 (7)	2008	0.1580	0.1192	0.1969
97-04 (8)	2007	0.0836	0.0580	0.1095
98-05 (8)	2008	0.1345	0.0971	0.1720
97-05 (9)	2008	0.1315	0.0952	0.1679

11b.3

**Indemnity
Exponential Fit
Trended Loss Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Incur)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
97-00 (4)	2003	0.9040	0.8589	0.9496
98-01 (4)	2004	0.9517	0.8977	1.0057
99-02 (4)	2005	0.8717	0.8340	0.9085
00-03 (4)	2006	0.8439	0.8088	0.8789
01-04 (4)	2007	0.9239	0.8948	0.9533
02-05 (4)	2008	0.9674	0.9158	1.0196
97-01 (5)	2004	0.9243	0.8720	0.9768
98-02 (5)	2005	0.9387	0.8960	0.9810
99-03 (5)	2006	0.8819	0.8406	0.9228
00-04 (5)	2007	0.9066	0.8741	0.9390
01-05 (5)	2008	0.9546	0.9125	0.9969
97-02 (6)	2005	0.9344	0.8890	0.9797
98-03 (6)	2006	0.9395	0.8944	0.9845
99-04 (6)	2007	0.9290	0.8908	0.9669
00-05 (6)	2008	0.9416	0.8998	0.9835
97-03 (7)	2006	0.9457	0.8981	0.9933
98-04 (7)	2007	0.9749	0.9327	1.0171
99-05 (7)	2008	0.9595	0.9144	1.0044
97-04 (8)	2007	0.9823	0.9369	1.0277
98-05 (8)	2008	0.9998	0.9518	1.0478
97-05 (9)	2008	1.0094	0.9589	1.0599

11b.4

**Indemnity
Exponential Fit
Differences: (Actual - Trended)**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
97-00 (4)	2003	-0.1197	-0.1085	-0.1313
98-01 (4)	2004	-0.1168	-0.0931	-0.1405
99-02 (4)	2005	-0.0177	-0.0204	-0.0140
00-03 (4)	2006	0.0436	0.0371	0.0502
01-04 (4)	2007	0.1018	0.0643	0.1393
02-05 (4)	2008	0.1310	0.1008	0.1607
97-01 (5)	2004	-0.0894	-0.0674	-0.1116
98-02 (5)	2005	-0.0847	-0.0824	-0.0865
99-03 (5)	2006	0.0056	0.0053	0.0063
00-04 (5)	2007	0.1191	0.0850	0.1536
01-05 (5)	2008	0.1438	0.1041	0.1834
97-02 (6)	2005	-0.0804	-0.0754	-0.0852
98-03 (6)	2006	-0.0520	-0.0485	-0.0554
99-04 (6)	2007	0.0967	0.0683	0.1257
00-05 (6)	2008	0.1568	0.1168	0.1968
97-03 (7)	2006	-0.0582	-0.0522	-0.0642
98-04 (7)	2007	0.0508	0.0264	0.0755
99-05 (7)	2008	0.1389	0.1022	0.1759
97-04 (8)	2007	0.0434	0.0222	0.0649
98-05 (8)	2008	0.0986	0.0648	0.1325
97-05 (9)	2008	0.0890	0.0577	0.1204

11b.5

Medical
Actual Ultimate Severity Ratios
Including Average of Paid and Incurred

MEDICAL	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
	1997	0.5178	0.5116	0.5240
	1998	0.5627	0.5610	0.5644
	1999	0.6007	0.5913	0.6101
	2000	0.6438	0.6282	0.6596
	2001	0.6486	0.6169	0.6804
	2002	0.6804	0.6509	0.7098
	2003	0.7501	0.7138	0.7865
	2004	0.8268	0.7795	0.8740
	2005	0.8363	0.7929	0.8796
	2006	0.8430	0.7851	0.9010
	2007	0.9623	0.9059	1.0186
	2008	0.9804	0.9158	1.0447

Trend # Years = 3

Medical
Linear Fit
Trended Severity Ratios

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
97-00 (4)	2003	0.7685	0.7441	0.7932
98-01 (4)	2004	0.7493	0.6914	0.8075
99-02 (4)	2005	0.7531	0.6972	0.8089
00-03 (4)	2006	0.8385	0.7833	0.8936
01-04 (4)	2007	0.9984	0.9381	1.0586
02-05 (4)	2008	1.0184	0.9555	1.0811
97-01 (5)	2004	0.7661	0.7207	0.8117
98-02 (5)	2005	0.7689	0.7124	0.8254
99-03 (5)	2006	0.8324	0.7741	0.8908
00-04 (5)	2007	0.9437	0.8776	1.0095
01-05 (5)	2008	1.0093	0.9511	1.0674
97-02 (6)	2005	0.7840	0.7349	0.8332
98-03 (6)	2006	0.8333	0.7734	0.8932
99-04 (6)	2007	0.9245	0.8570	0.9919
00-05 (6)	2008	0.9772	0.9130	1.0412
97-03 (7)	2006	0.8392	0.7845	0.8940
98-04 (7)	2007	0.9150	0.8466	0.9832
99-05 (7)	2008	0.9640	0.8971	1.0307
97-04 (8)	2007	0.9126	0.8488	0.9764
98-05 (8)	2008	0.9565	0.8877	1.0251
97-05 (9)	2008	0.9543	0.8885	1.0200

11b.7

Medical
Linear Fit
Differences: (Actual - Trended)

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
97-00 (4)	2003	-0.0184	-0.0303	-0.0067
98-01 (4)	2004	0.0775	0.0881	0.0665
99-02 (4)	2005	0.0832	0.0957	0.0707
00-03 (4)	2006	0.0045	0.0018	0.0074
01-04 (4)	2007	-0.0361	-0.0322	-0.0400
02-05 (4)	2008	-0.0380	-0.0397	-0.0364
97-01 (5)	2004	0.0607	0.0588	0.0623
98-02 (5)	2005	0.0674	0.0805	0.0542
99-03 (5)	2006	0.0106	0.0110	0.0102
00-04 (5)	2007	0.0186	0.0283	0.0091
01-05 (5)	2008	-0.0289	-0.0353	-0.0227
97-02 (6)	2005	0.0523	0.0580	0.0464
98-03 (6)	2006	0.0097	0.0117	0.0078
99-04 (6)	2007	0.0378	0.0489	0.0267
00-05 (6)	2008	0.0032	0.0028	0.0035
97-03 (7)	2006	0.0038	0.0006	0.0070
98-04 (7)	2007	0.0473	0.0593	0.0354
99-05 (7)	2008	0.0164	0.0187	0.0140
97-04 (8)	2007	0.0497	0.0571	0.0422
98-05 (8)	2008	0.0239	0.0281	0.0196
97-05 (9)	2008	0.0261	0.0273	0.0247

11b.8

**Medical
Exponential Fit
Trended Loss Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
97-00 (4)	2003	0.8006	0.7720	0.8299
98-01 (4)	2004	0.7660	0.6995	0.8358
99-02 (4)	2005	0.7630	0.7017	0.8260
00-03 (4)	2006	0.8533	0.7929	0.9144
01-04 (4)	2007	1.0488	0.9828	1.1147
02-05 (4)	2008	1.0639	0.9941	1.1338
97-01 (5)	2004	0.7940	0.7404	0.8491
98-02 (5)	2005	0.7864	0.7216	0.8536
99-03 (5)	2006	0.8510	0.7851	0.9185
00-04 (5)	2007	0.9759	0.9012	1.0514
01-05 (5)	2008	1.0583	0.9950	1.1215
97-02 (6)	2005	0.8124	0.7545	0.8718
98-03 (6)	2006	0.8584	0.7882	0.9311
99-04 (6)	2007	0.9572	0.8789	1.0372
00-05 (6)	2008	1.0163	0.9434	1.0896
97-03 (7)	2006	0.8748	0.8094	0.9421
98-04 (7)	2007	0.9526	0.8708	1.0371
99-05 (7)	2008	1.0047	0.9265	1.0843
97-04 (8)	2007	0.9601	0.8825	1.0399
98-05 (8)	2008	1.0025	0.9192	1.0880
97-05 (9)	2008	1.0103	0.9293	1.0934

11b.9

Medical
Exponential Fit
Differences: (Actual - Trended)

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-22)
97-00 (4)	2003	-0.0505	-0.0582	-0.0434
98-01 (4)	2004	0.0608	0.0800	0.0382
99-02 (4)	2005	0.0733	0.0912	0.0536
00-03 (4)	2006	-0.0103	-0.0078	-0.0134
01-04 (4)	2007	-0.0865	-0.0769	-0.0961
02-05 (4)	2008	-0.0835	-0.0783	-0.0891
97-01 (5)	2004	0.0328	0.0391	0.0249
98-02 (5)	2005	0.0499	0.0713	0.0260
99-03 (5)	2006	-0.0080	0.0000	-0.0175
00-04 (5)	2007	-0.0136	0.0047	-0.0328
01-05 (5)	2008	-0.0779	-0.0792	-0.0768
97-02 (6)	2005	0.0239	0.0384	0.0078
98-03 (6)	2006	-0.0154	-0.0031	-0.0301
99-04 (6)	2007	0.0051	0.0270	-0.0186
00-05 (6)	2008	-0.0359	-0.0276	-0.0449
97-03 (7)	2006	-0.0318	-0.0243	-0.0411
98-04 (7)	2007	0.0097	0.0351	-0.0185
99-05 (7)	2008	-0.0243	-0.0107	-0.0396
97-04 (8)	2007	0.0022	0.0234	-0.0213
98-05 (8)	2008	-0.0221	-0.0034	-0.0433
97-05 (9)	2008	-0.0299	-0.0135	-0.0487