Reserve Increases from year to year- Debunking a Myth

Here is a simple example that illustrates the main ideas that reserve increases do not represent under reserving. Indeed, they are necessary in order to manintain consient estimates of prior year ultimates as the company writes new underwriting (accident) years.

On a logarithmic scale the data were generated as follows

$Y(w,d) = 10 - 0.3*d + 0.05 (w+d-1)$ where w is the accident year 1,...,7 and d is the devlopment year 0,..., 5.

The numbers down each column increase by 0.05 on a log scale (approximately 5% annual).
The numbers along each row decrease by 0.25 (=-0.3+0.05) on a log scale
We have assumed that the paid losses run-off after five years. Even if this is the case for 1999, this may not be the case for subsequent accident years especially if inflation is 'high'

Reserves and ultimates as at year end 2004

Accident Period vs Development Period									
Cal. Per. Total		0	1	2	3	4	5	Reserve	Ultimate
1999	22,026	22,026	17,154	13,360	10,405	8,103	6,311	0	77,359
2000	40,310	23,156	18,034	14,045	10,938	8,519	6,634	6,634	81,325
2001	55,736	24,343	18,958	14,765	11,499	8,955	6,974	15,930	85,494
2002	68,999	25,591	19,930	15,522	12,088	9,414	7,332	28,835	89,878
2003	80,639	26,903	20,952	16,318	12,708	9,897	7,708	46,631	94,486
2004	91,085	28,283	22,026	17,154	13,360	10,405	8,103	71,048	99,331
Total Fitted/Paid			2005	2006	2007	2008	2009	Total Reserve	Total Ultimate
Cal. Per. Total	358,796		66,022	46,251	30,589	18,112	8,103	169,078	527,873
1 Unit = $1									

Reserves and ultimates as at year end 2005

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2003	80,639	26,903	20,952	16,318	12,708	9,897	7,708	30,313	94,486
2004	91,085	28,283	22,026	17,154	13,360	10,405	8,103	49,022	99,331
2005	95,755	29,733	23,156	18,034	14,045	10,938	8,519	74,691	104,424
Total Fitted/Paid			2006	2007	2008	2009	2010	Total Reserve	Total Ultimate
Cal. Per. Total	454,550		69,407	48,623	32,157	19,041	8,519	177,746	632,298
1 Unit = $1									

Reserve and ultimate as at year end 2004

Accident Year	Mean Reserve	Ultimate
1999	0	77,359
2000	6,634	81,325
2001	15,930	85,494
2002	28,835	89,878
2003	46,631	94,486
2004	71,048	99,331
Total	169,078	527,873

Reserve and ultimate as at year end 2005

Accident Year	Mean Reserve	Ultimate
1999	0	77,359
2000	0	81,325
2001	6,974	85,495
2002	16,746	89,878
2003	30,313	94,486
2004	49,022	99,331
2005	74,691	104,424
Total	177,746	632,298

Ratio of year t ultimate to year t-1
1.051267467
1.051275745
1.051266156
1.051269499
1.051277438
1.051273016
1.051266279
Ratio of Reserves

N.B.

1. Estimtes of ultimate losses by accident year (1999- 2004) remain the same on update at end of 2005
2. The ratio of ultimate for year t to year t-1 is 1.05
3. Increase in total reserves from 2004 to 2005 is 1.05

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