



QUANTIFYING RISK, ENABLING OPPORTUNITY

Paul Truyens
Smoothed Bonus Model Office

LAC: Smooth Bonus Debate

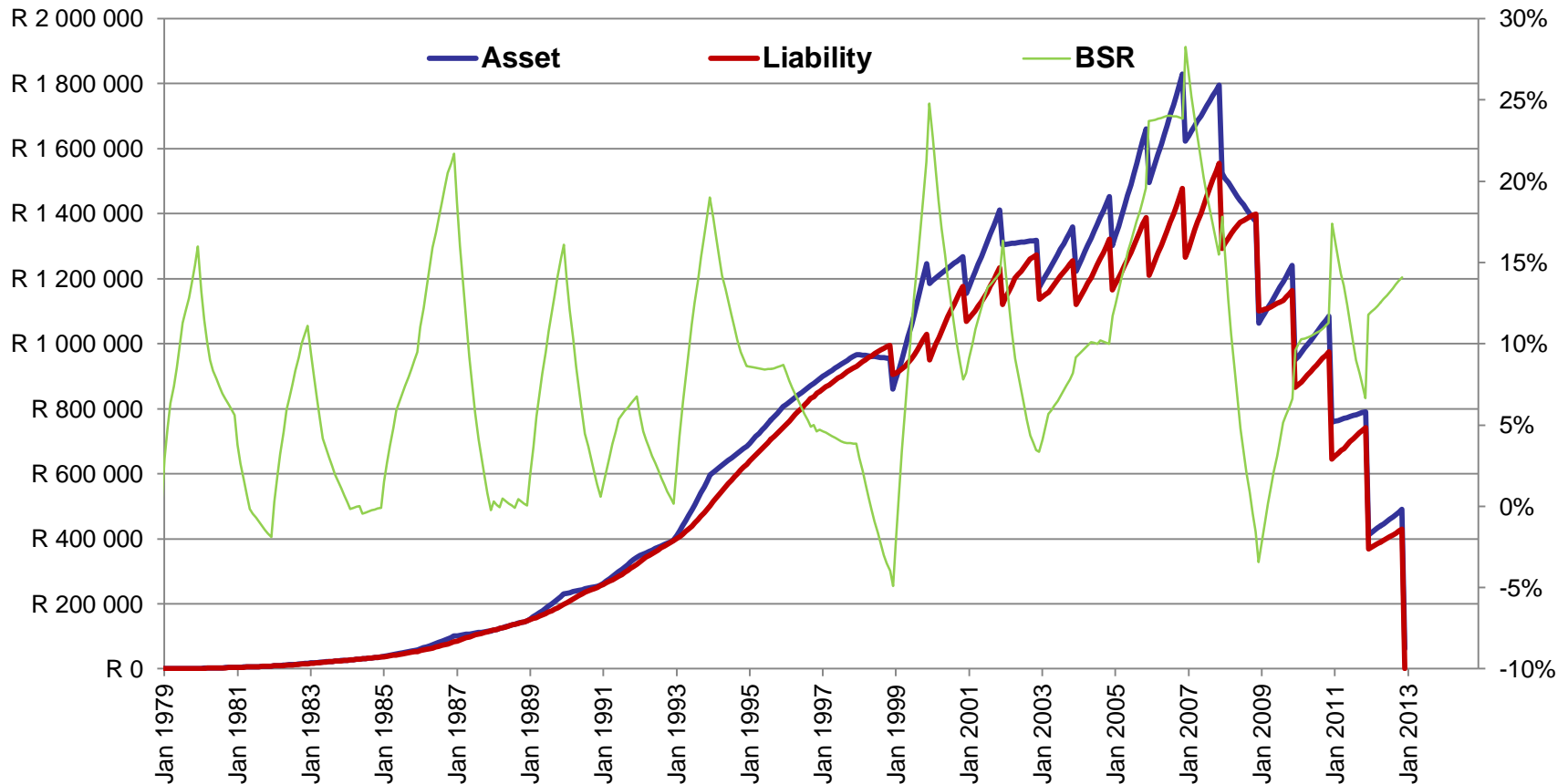
Objective

Analyse the extent of **cross subsidies** between smoothed bonus policies by **comparing surrender values and benefit payments** of smoothed bonus policies relative to that of a **corresponding market linked policies** for different policy cohorts.

Assumptions

- Model Office based on 15 * 20-year recurring premium policy cohorts. Fund life-time = $15 + 20 = 35$ years.
- Annual Premium increase 10%
- Termination value (lower of Smooth Value and Market Value) based on Fund level or Policy Cohort Level funding level.
- Annualized (Calendar Year) market returns used and converted back to monthly returns.
- Smoothing formula used (Old Mutual Absolute Growth Portfolio)
- 0% Smoothing Charge / Capital Charge

Smoothed Bonus Fund Build-Up



Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

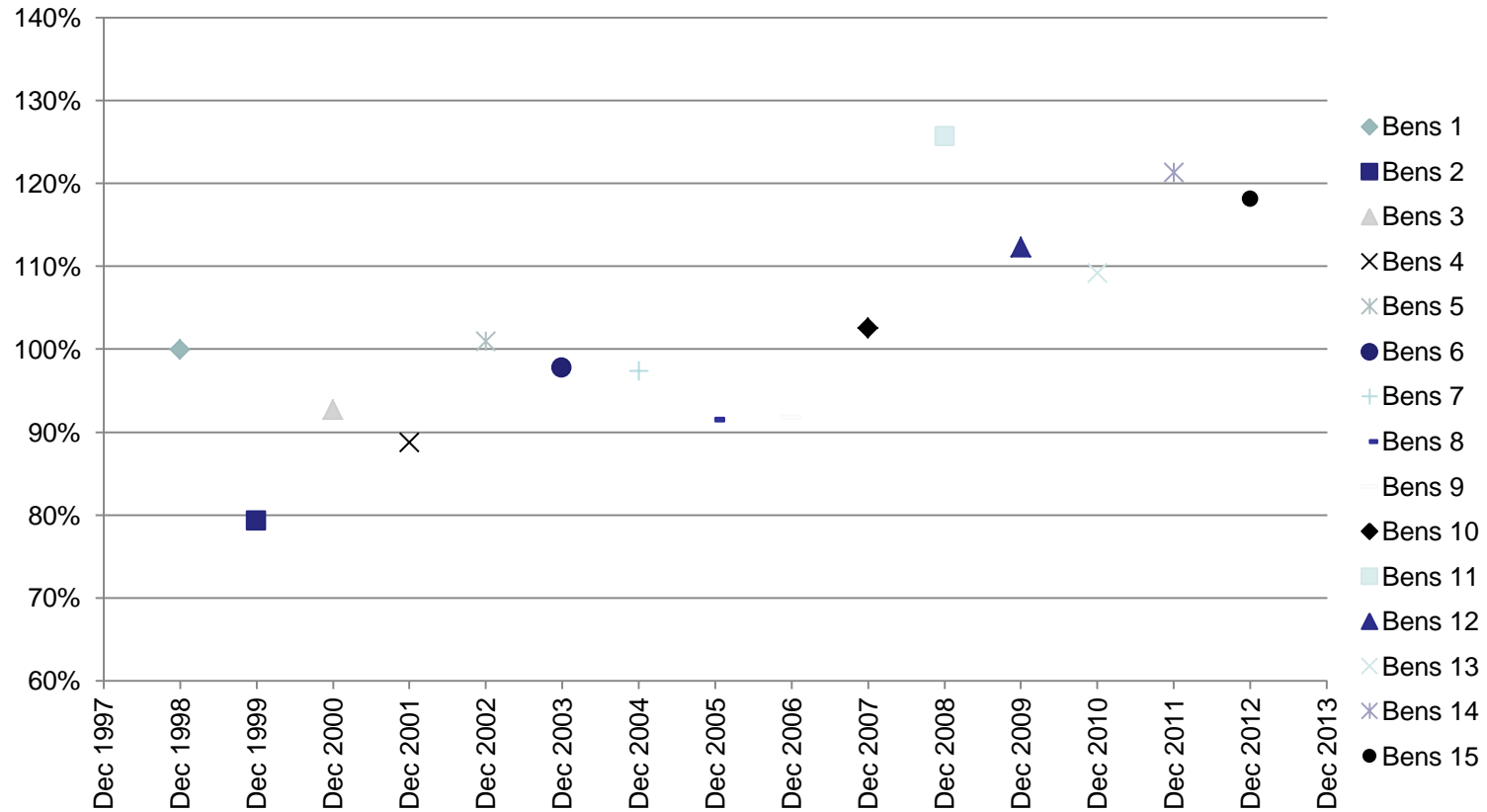
Smoothed Bonus vs Underlying Return I

Year Ended	Smoothed Bonus	Market Return
Dec-79	17%	55%
Dec-80	21%	20%
Dec-81	10%	2%
Dec-82	18%	36%
Dec-83	16%	7%
Dec-84	8%	7%
Dec-85	16%	28%
Dec-86	27%	45%
Dec-87	23%	2%
Dec-88	13%	13%
Dec-89	21%	41%
Dec-90	18%	3%
Dec-91	17%	25%
Dec-92	15%	8%
Dec-93	20%	43%
Dec-94	21%	11%
Dec-95	15%	15%

Smoothed Bonus vs Underlying Return II

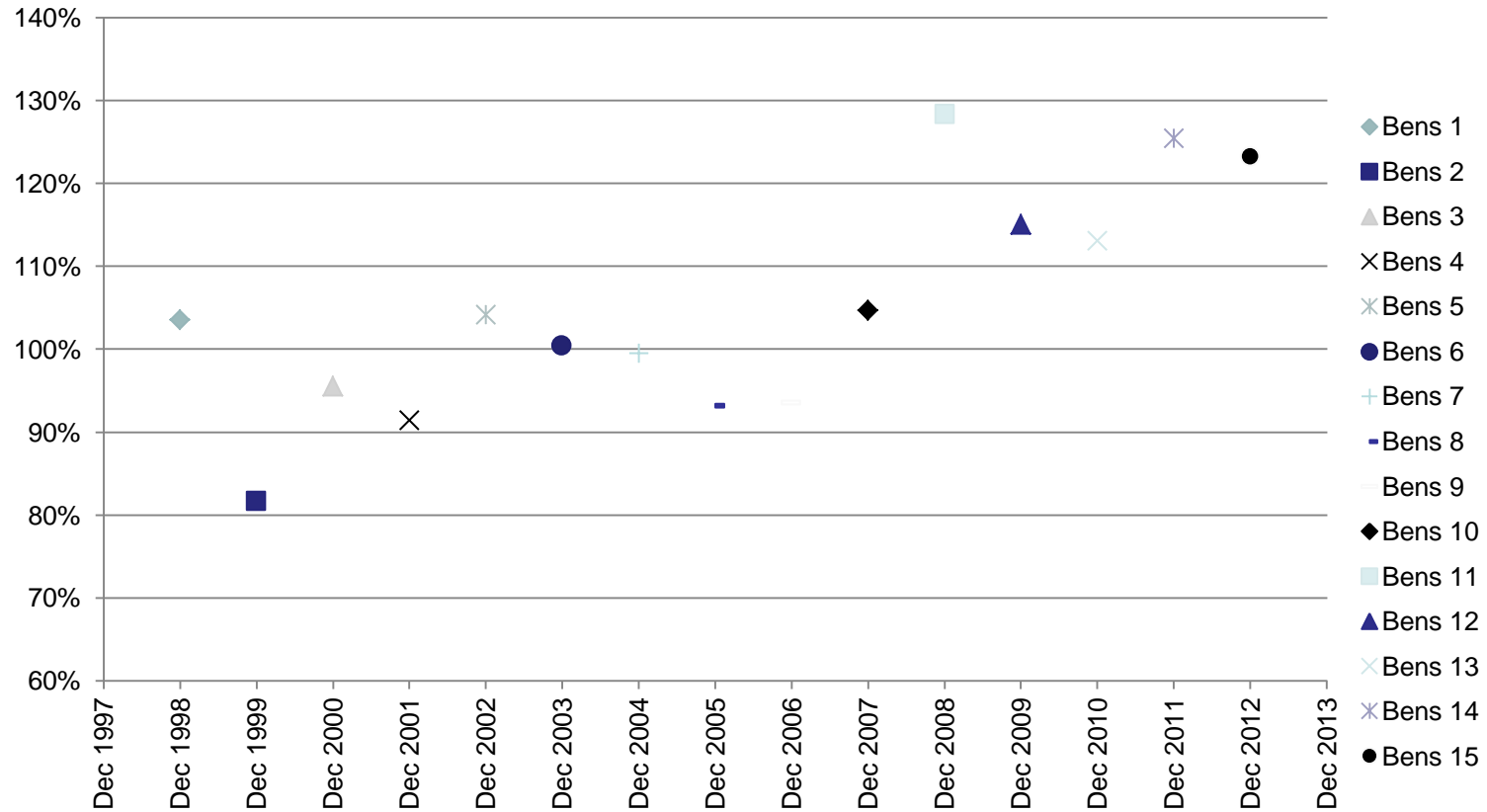
Year Ended	Smoothed Bonus	Market Return
Dec-96	13%	9%
Dec-97	8%	7%
Dec-98	6%	-3%
Dec-99	14%	46%
Dec-00	24%	7%
Dec-01	17%	24%
Dec-02	14%	1%
Dec-03	12%	17%
Dec-04	20%	21%
Dec-05	22%	31%
Dec-06	26%	26%
Dec-07	28%	14%
Dec-08	12%	-9%
Dec-09	9%	19%
Dec-10	16%	17%
Dec-11	19%	5%
Dec-12	21%	21%

Benefit Payout Ratio (Smoothed Value / Market Value)



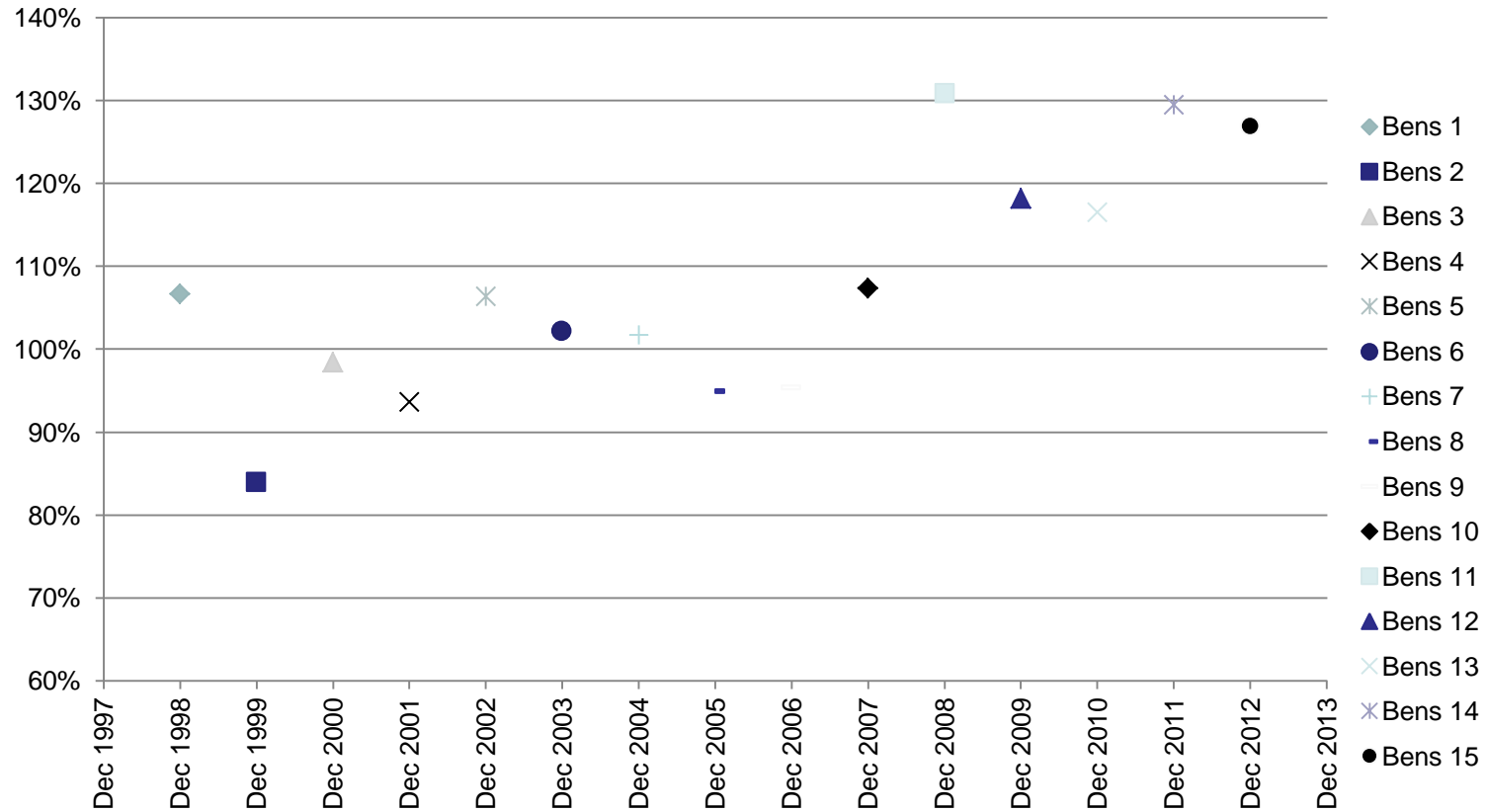
Termination Rate	0%
Market Value Adjustment	N/A

Benefit Payout Ratio (Smoothed Value / Market Value)



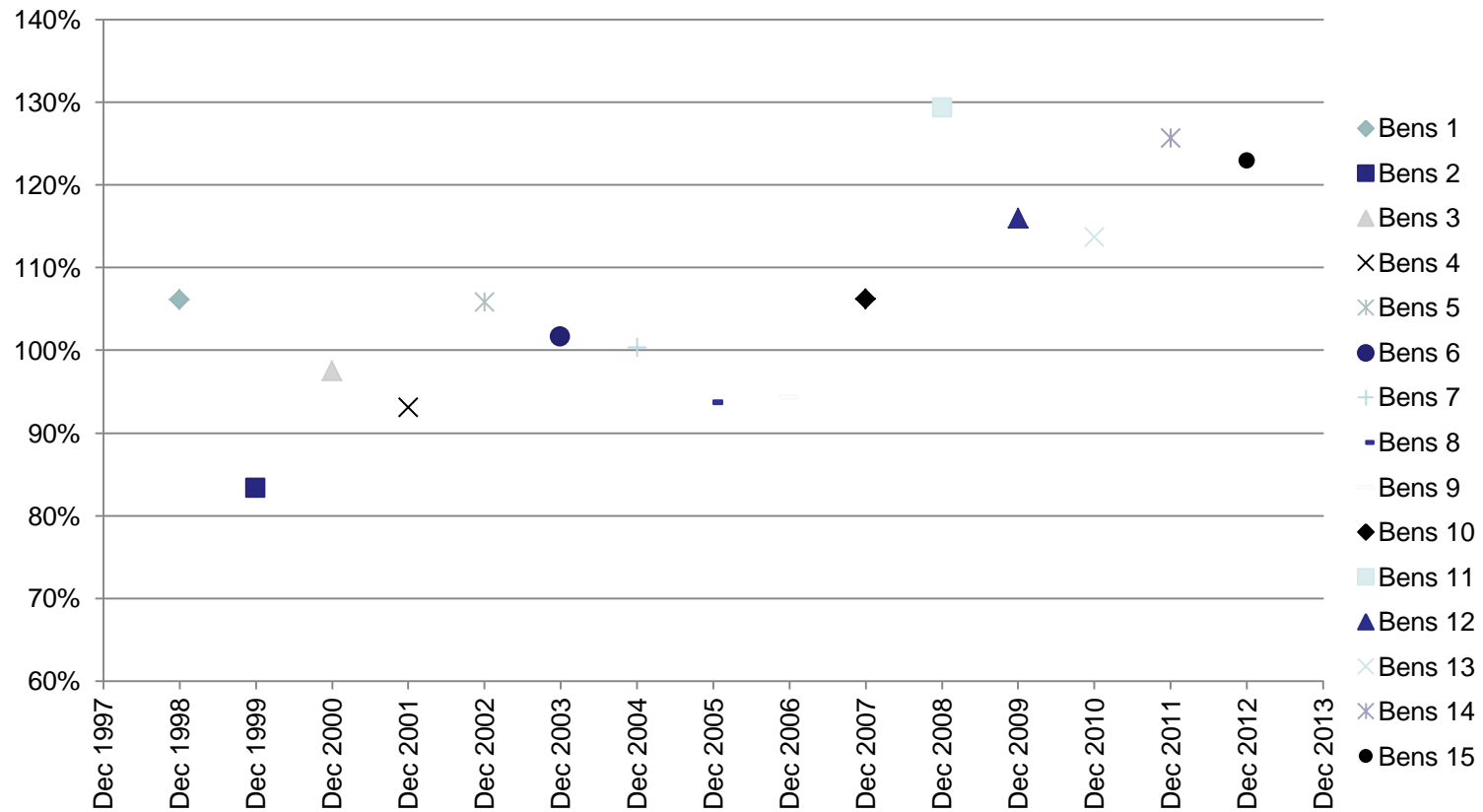
Termination Rate	5% p.a.
Market Value Adjustment	Individual Policy @ 100%

Benefit Payout Ratio (Smoothed Value / Market Value)



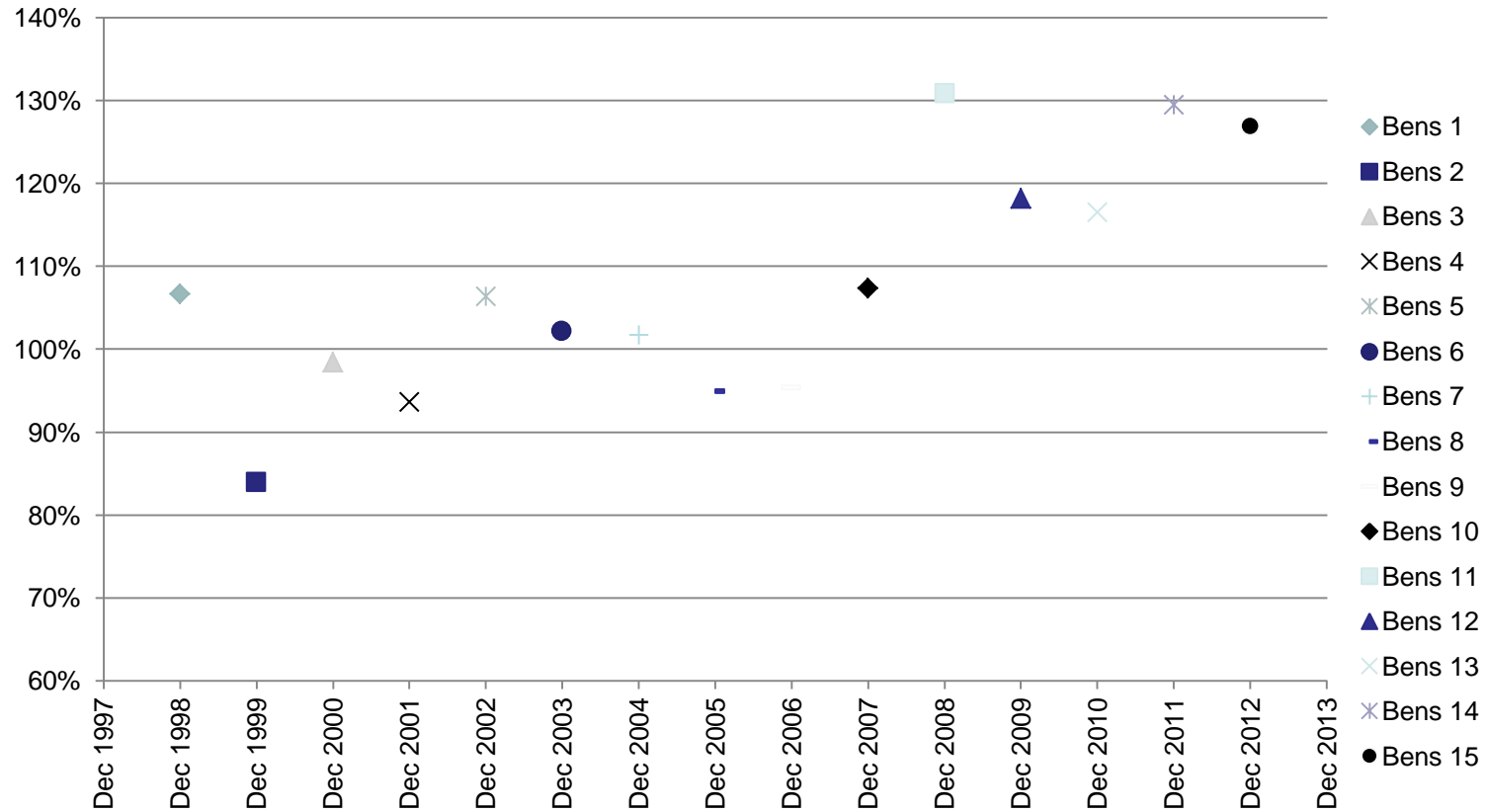
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Benefit Payout Ratio (Smoothed Value / Market Value)



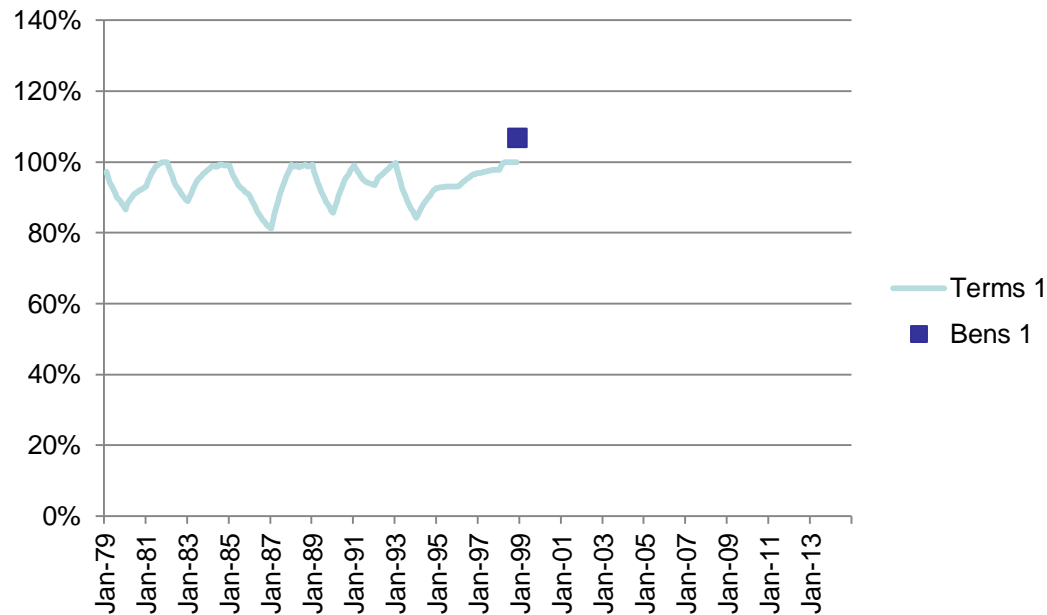
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 95%

Benefit Payout Ratio (Smoothed Value / Market Value)



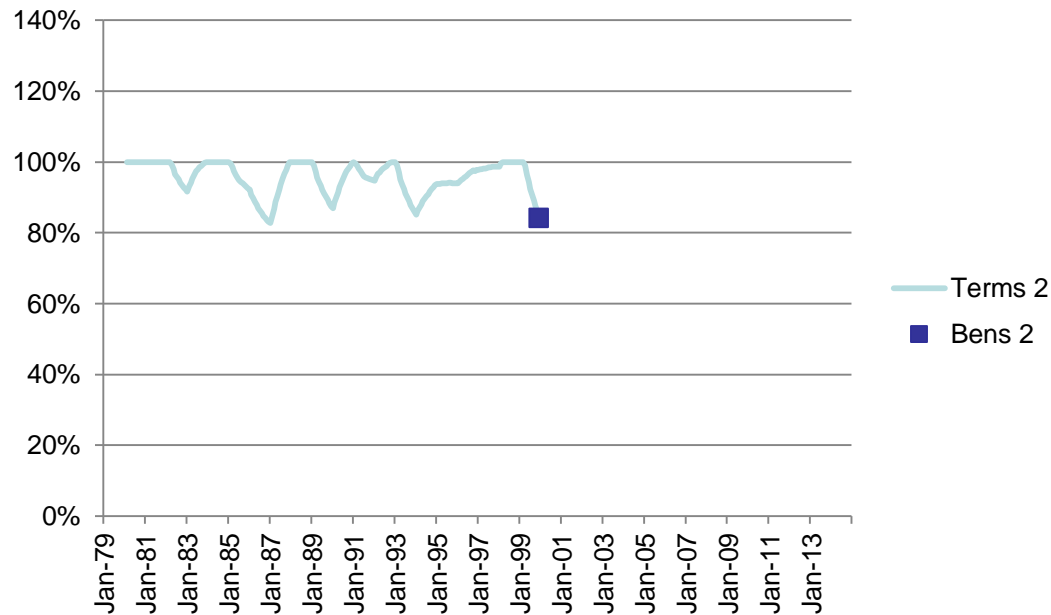
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



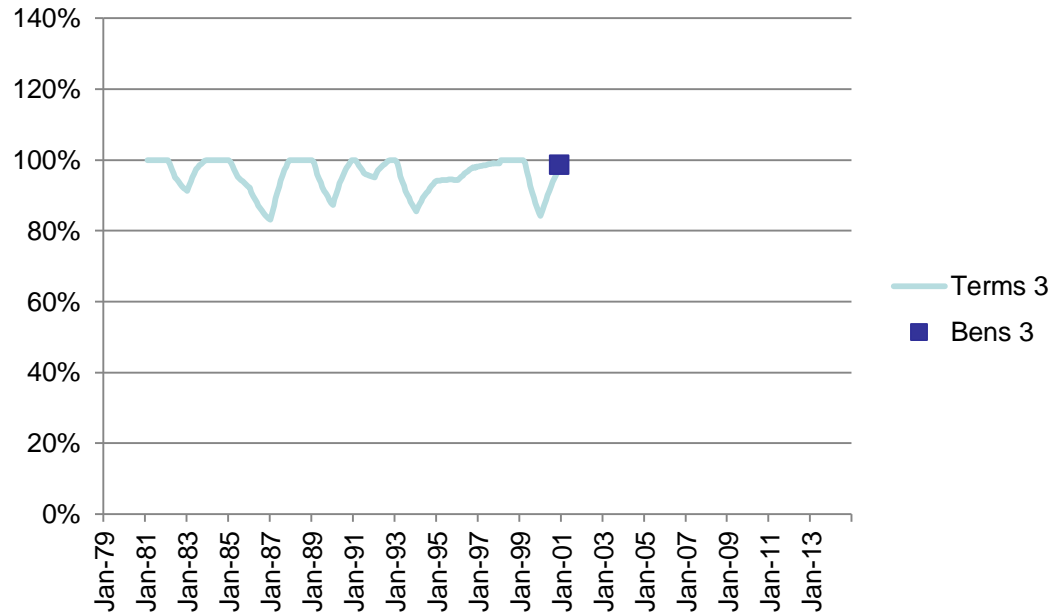
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



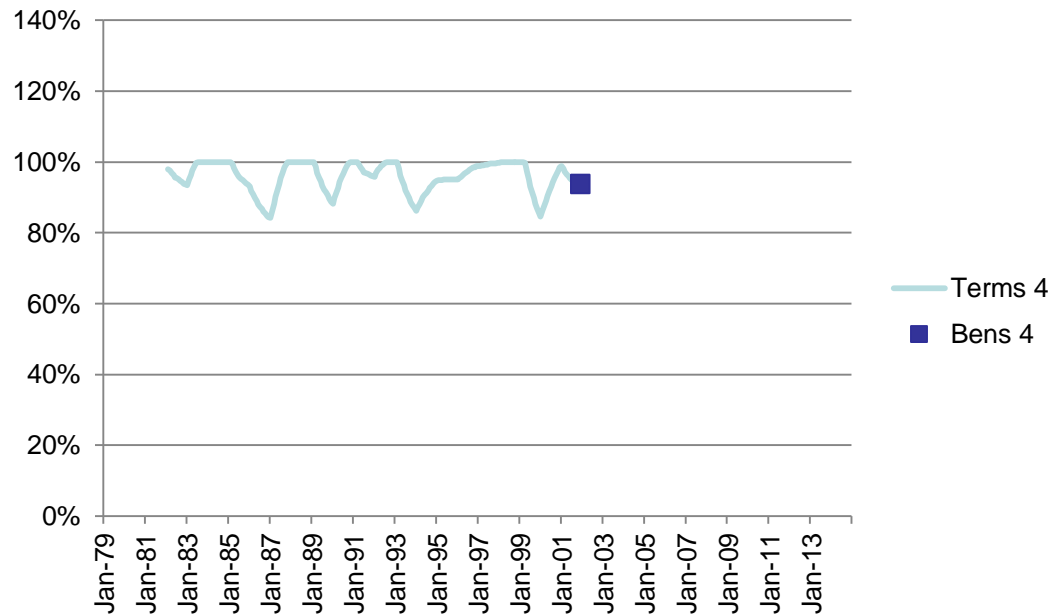
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



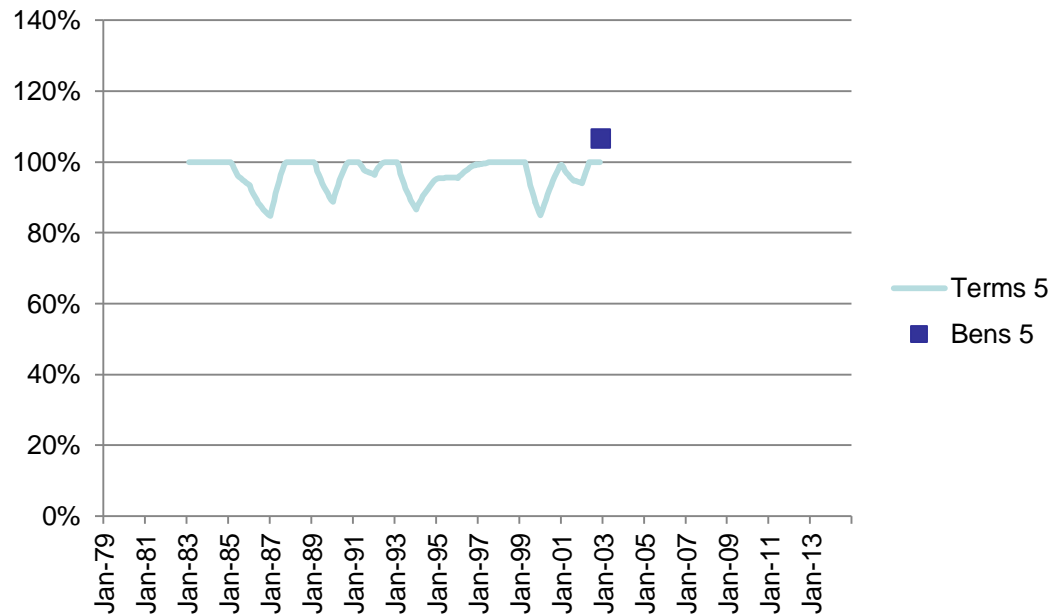
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



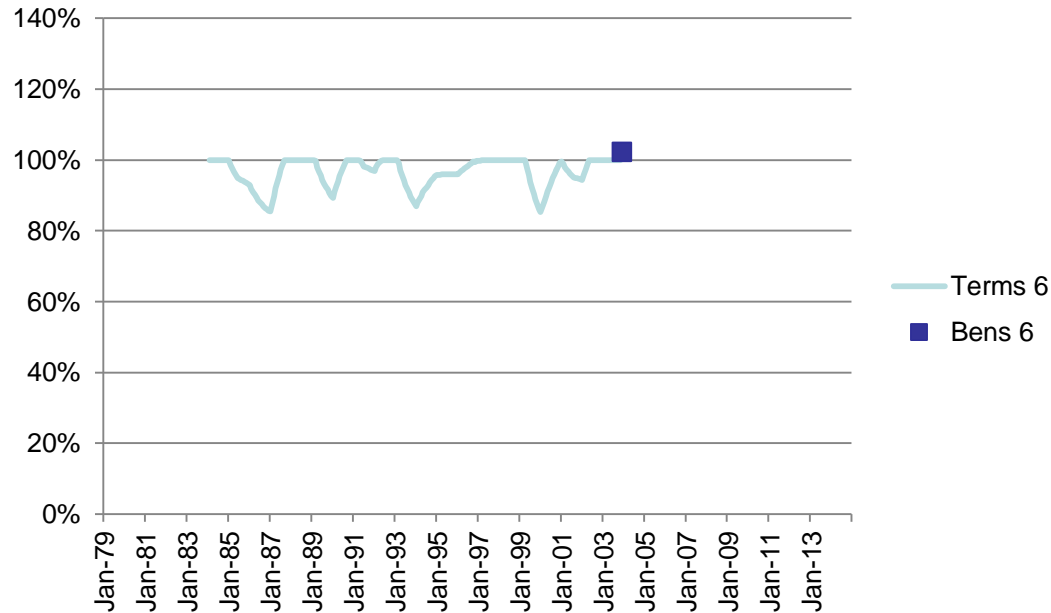
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



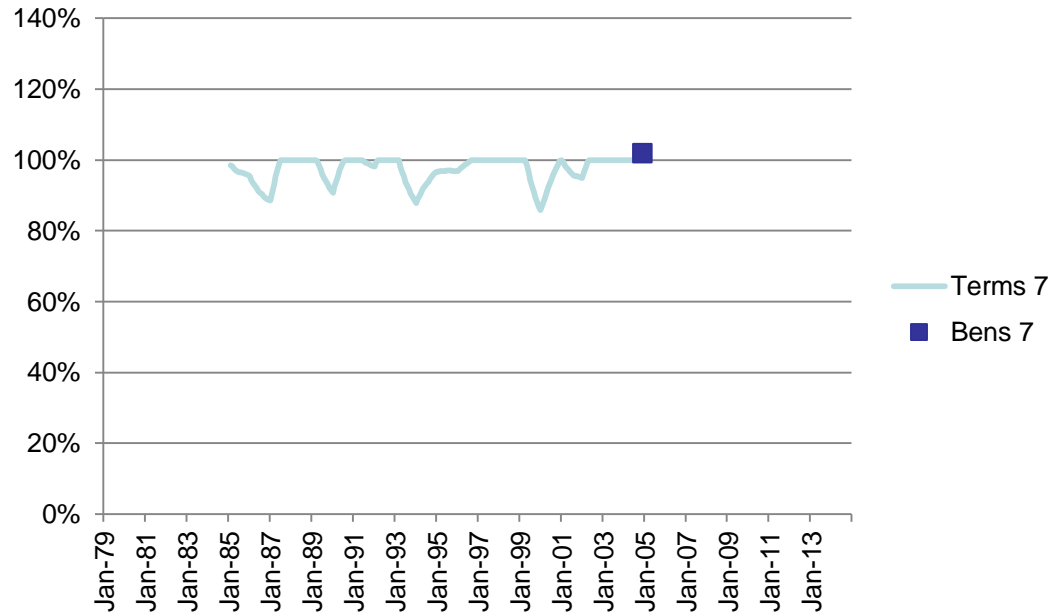
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



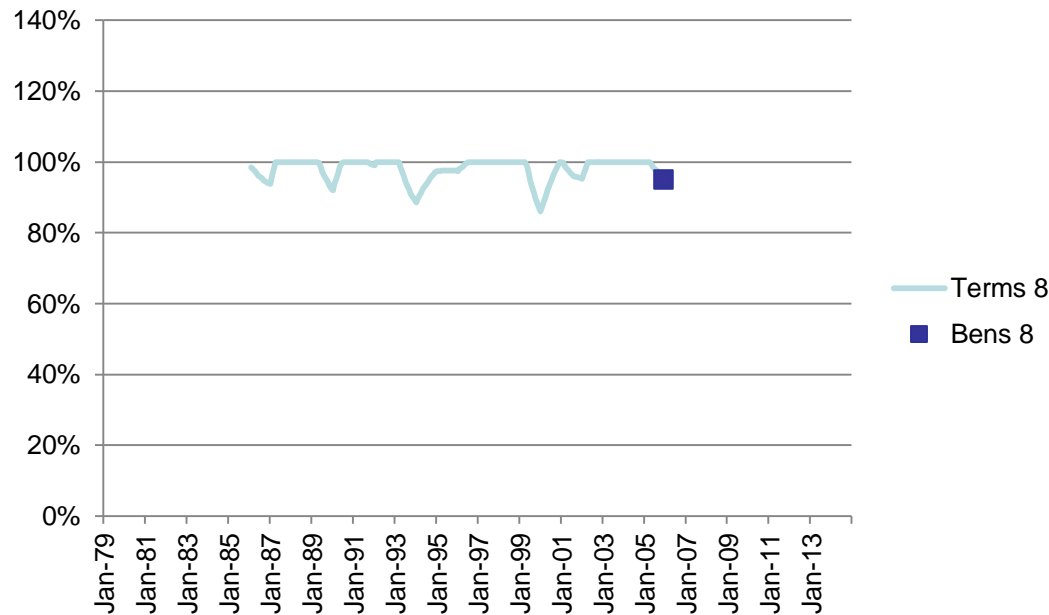
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



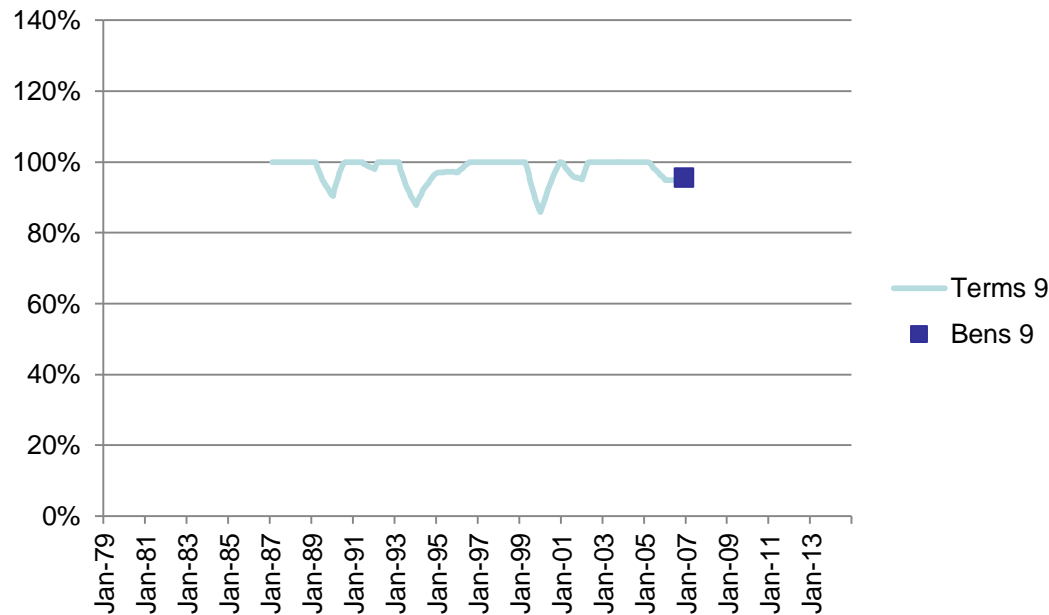
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



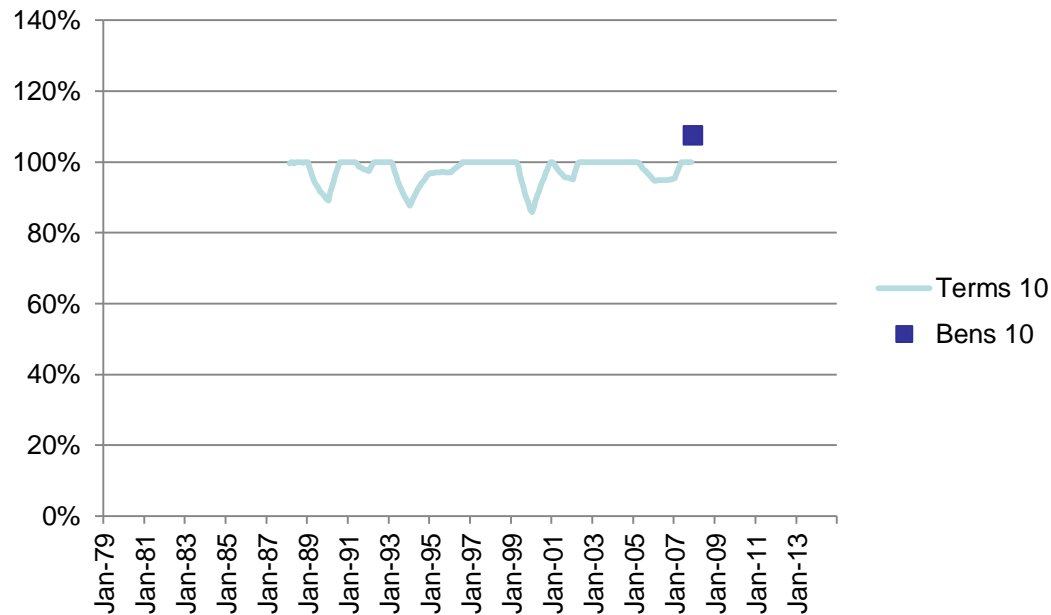
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



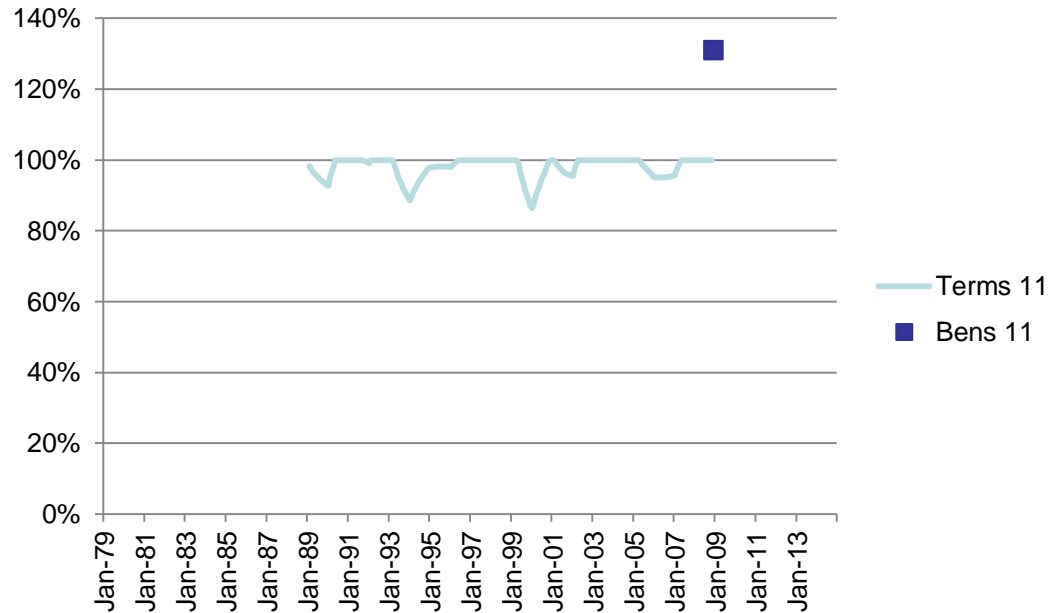
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



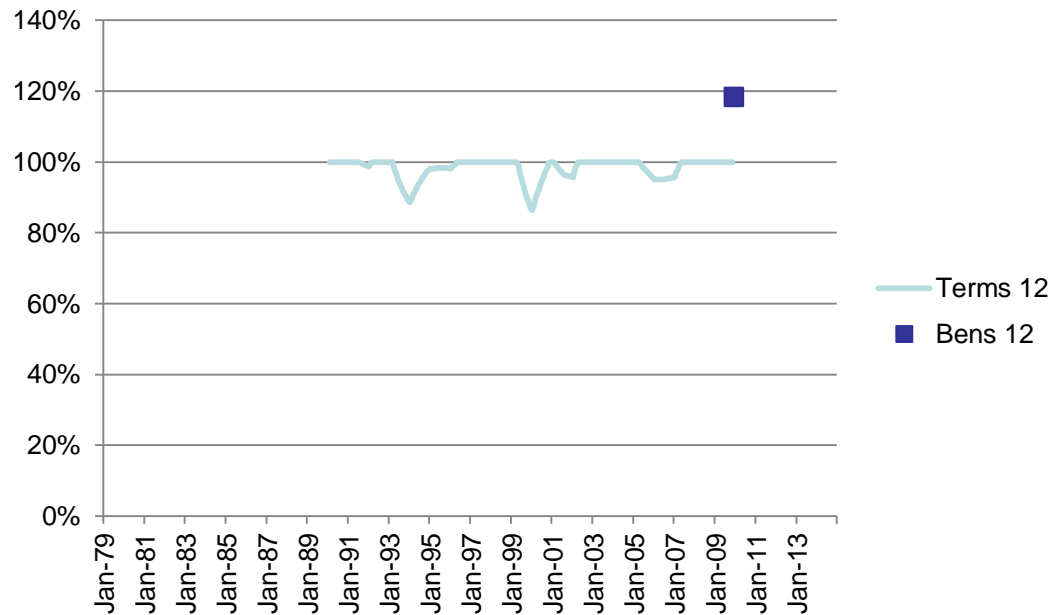
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



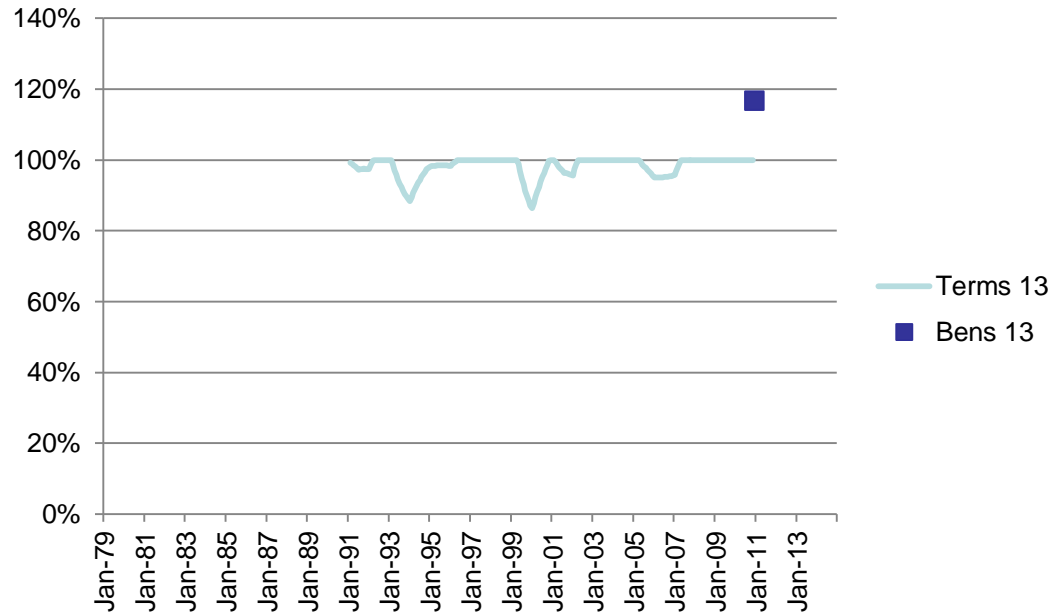
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



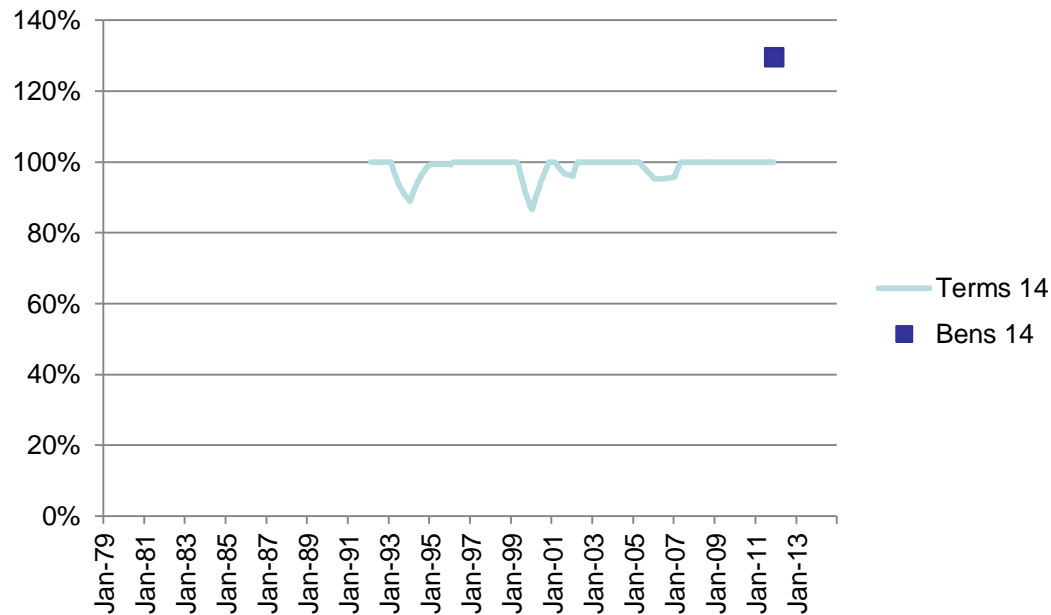
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



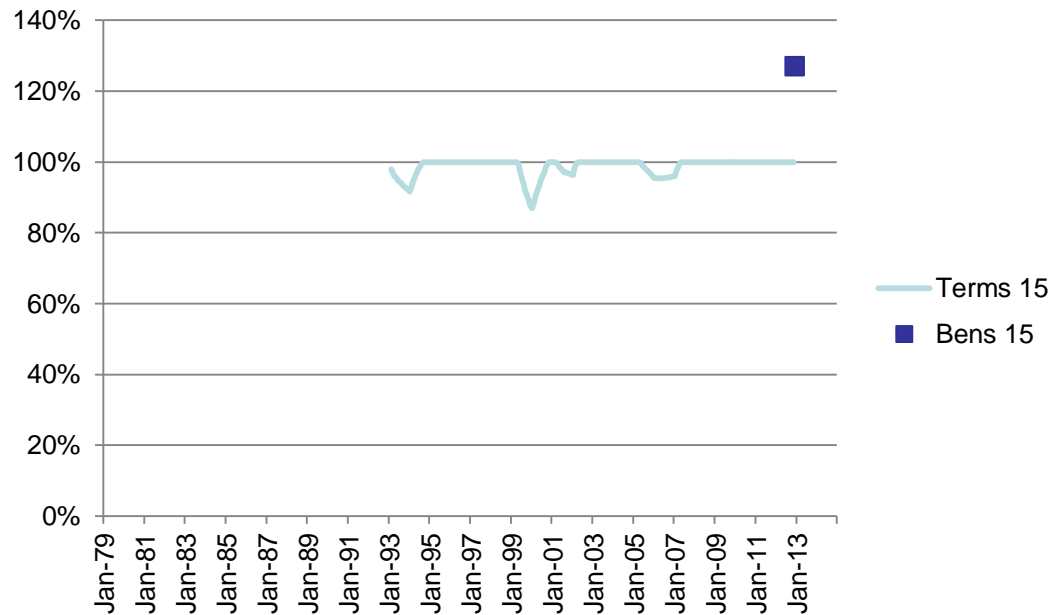
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Summary: Cross Subsidy between Terminations and Benefits

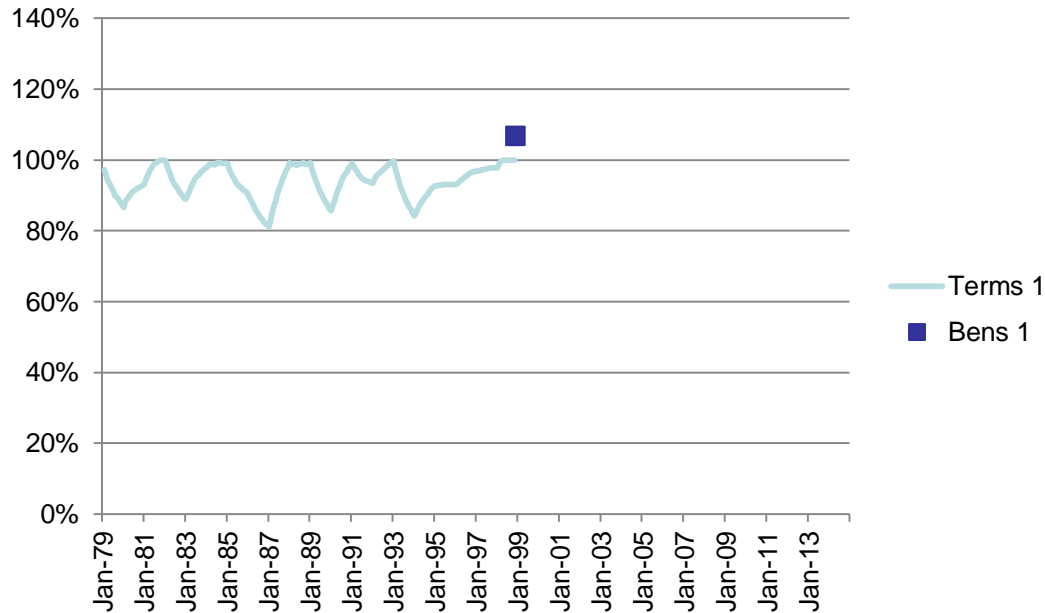
	Terminations			Benefits		
	Smoothed Bonus	Market Linked	Ratio	Smoothed Bonus	Market Linked	Ratio
Policy Cohort 1	68 323.23	72 413.42	94%	94 183.54	88 313.69	107%
Policy Cohort 2	73 048.21	76 690.88	95%	102 378.76	121 927.19	84%
Policy Cohort 3	79 196.44	83 519.01	95%	120 501.34	122 433.05	98%
Policy Cohort 4	86 254.84	90 382.29	95%	133 780.40	142 859.08	94%
Policy Cohort 5	93 831.60	97 601.96	96%	144 853.10	136 149.98	106%
Policy Cohort 6	101 434.33	104 709.08	97%	154 186.59	150 960.63	102%
Policy Cohort 7	109 627.62	112 189.28	98%	175 370.99	172 413.93	102%
Policy Cohort 8	119 266.60	121 628.08	98%	202 370.33	213 190.25	95%
Policy Cohort 9	132 042.47	135 517.74	97%	240 968.67	252 681.93	95%
Policy Cohort 10	148 533.33	152 171.71	98%	289 522.33	269 779.98	107%
Policy Cohort 11	163 524.17	166 524.95	98%	302 344.87	231 051.91	131%
Policy Cohort 12	176 831.55	179 596.51	98%	310 852.29	262 981.47	118%
Policy Cohort 13	192 840.35	195 394.91	99%	341 763.46	293 392.08	116%
Policy Cohort 14	209 564.82	211 764.44	99%	383 942.73	296 549.17	129%
Policy Cohort 15	227 338.67	229 171.22	99%	438 747.13	345 773.12	127%
Total	1 981 658.23	2 029 275.49	98%	3 435 766.54	3 100 457.45	111%

Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

MVA at Fund Level

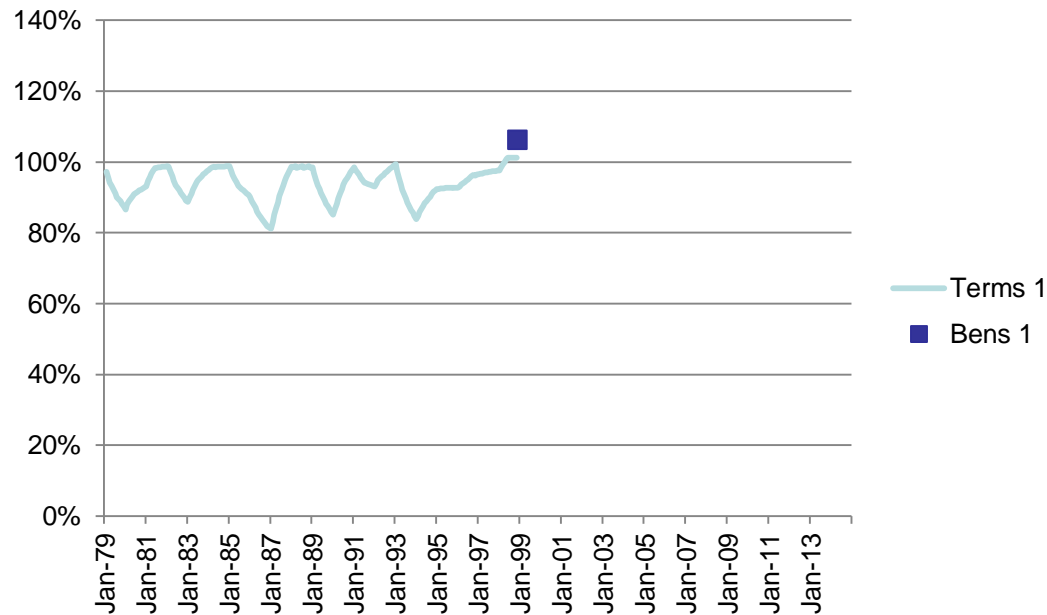
- We now modelled the same smoothing formula and surrender value basis but applying the MVA at the overall fund level.

Policy Cohort Payout Ratio Comparison



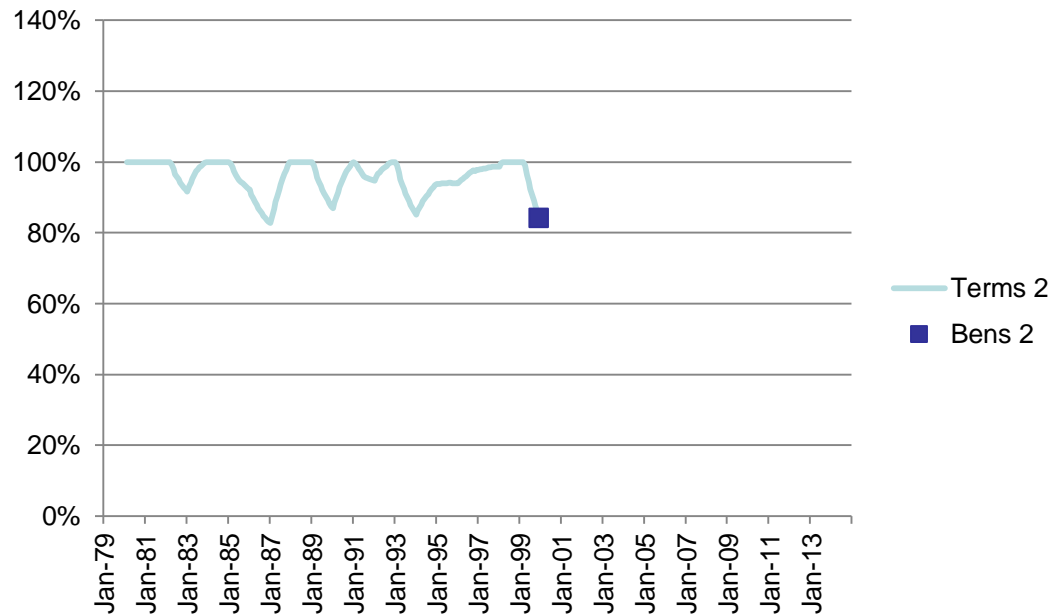
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



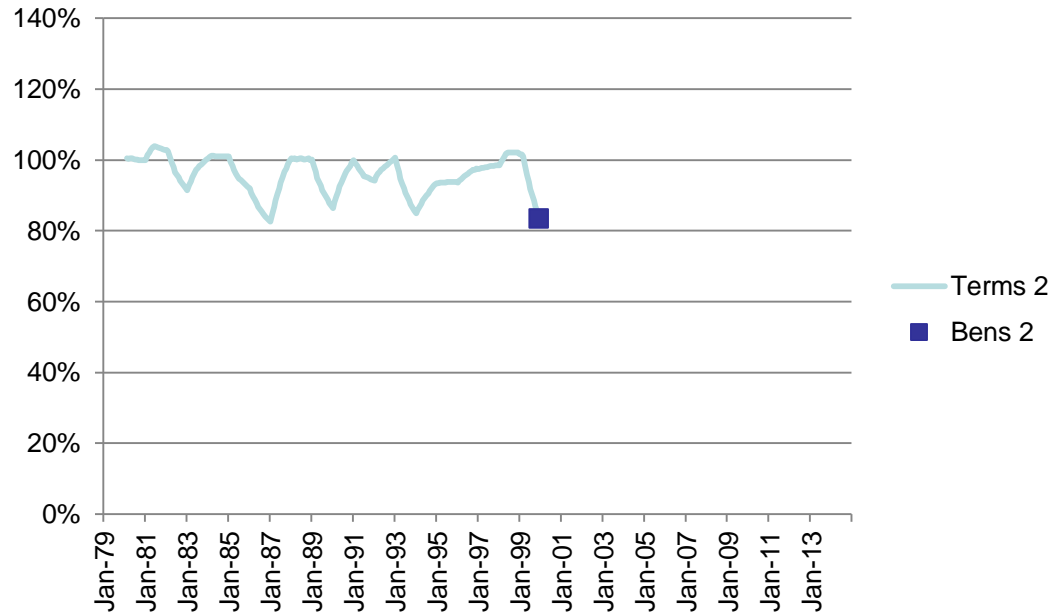
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



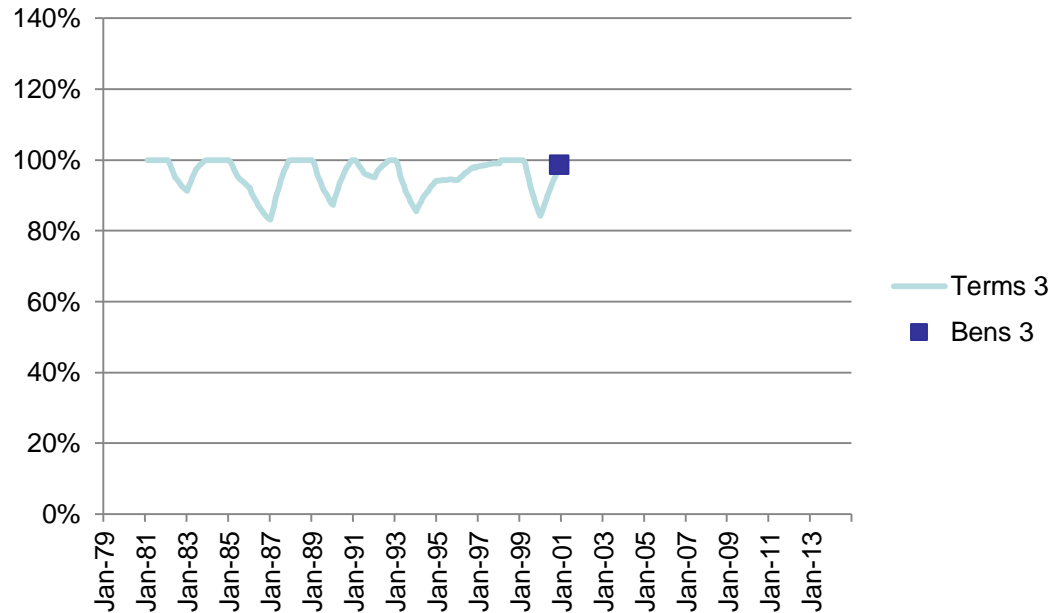
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



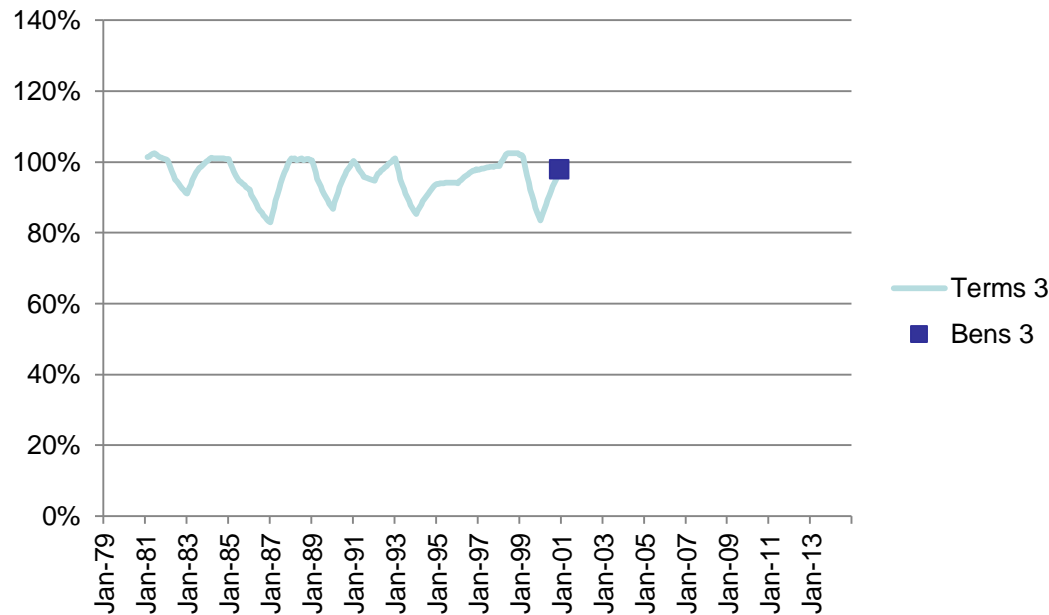
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



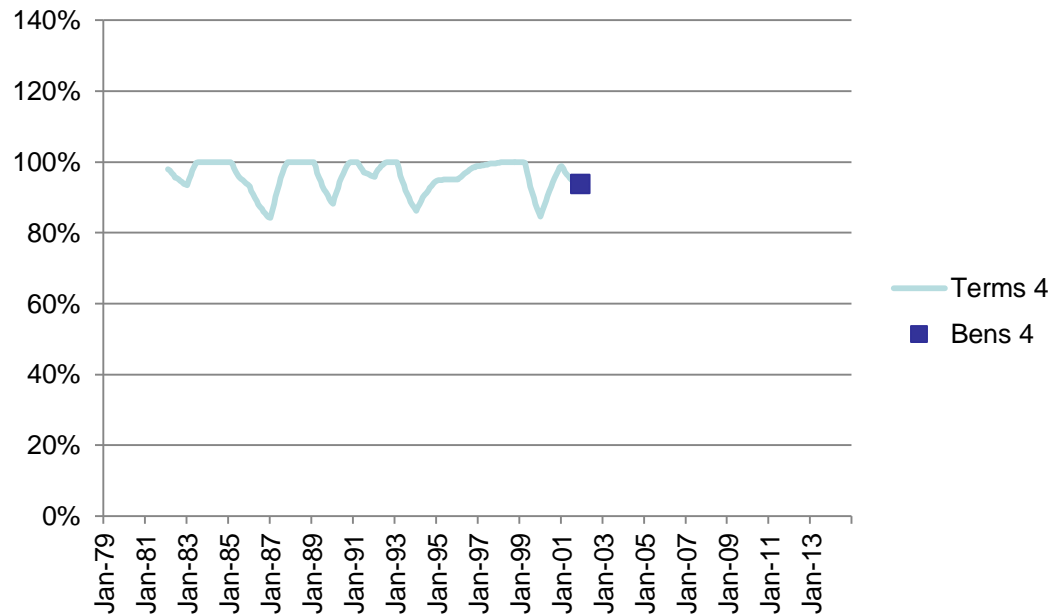
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



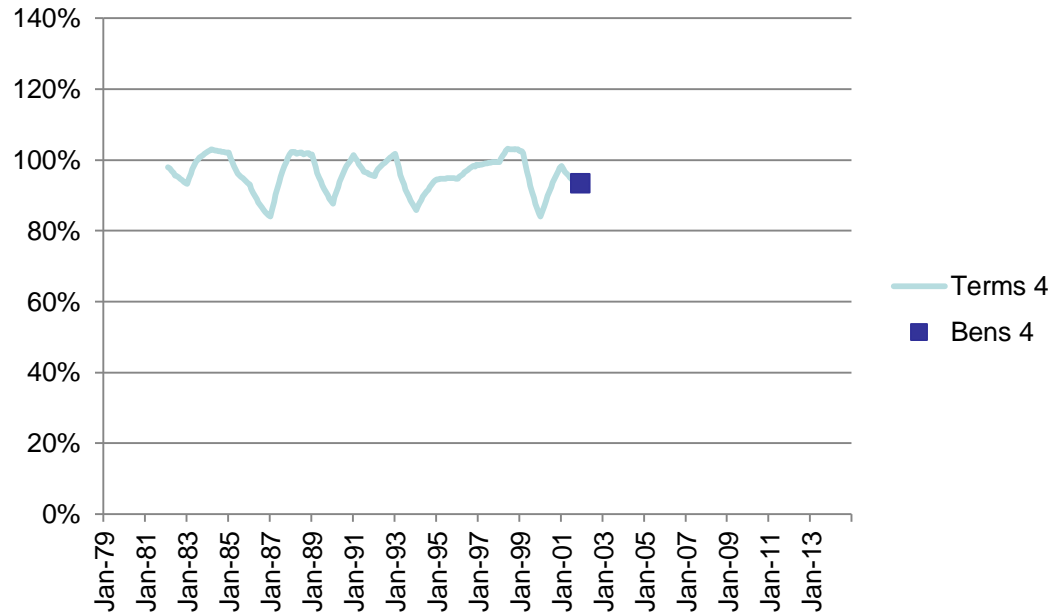
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



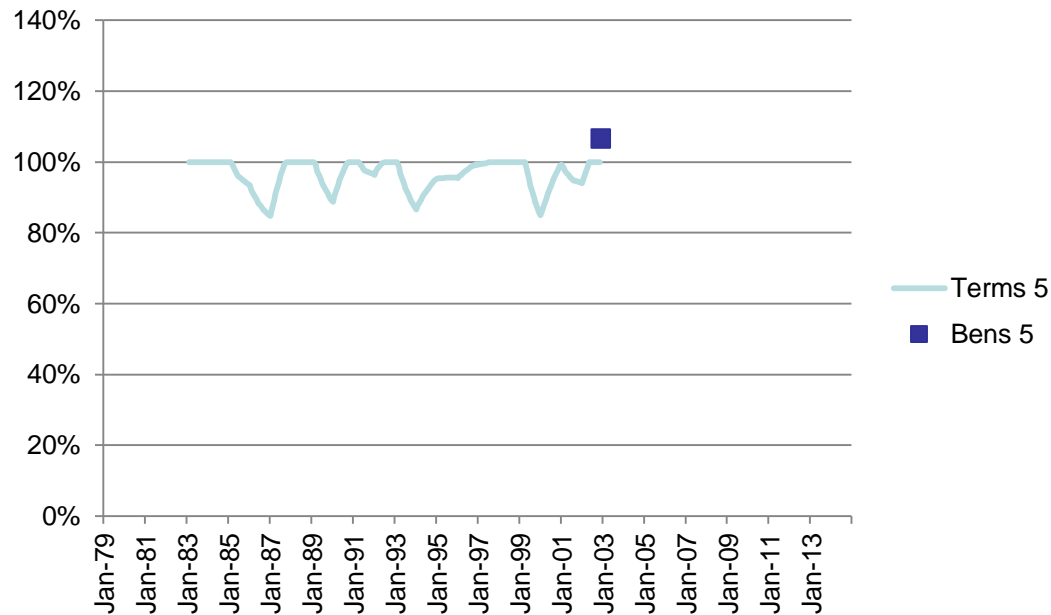
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



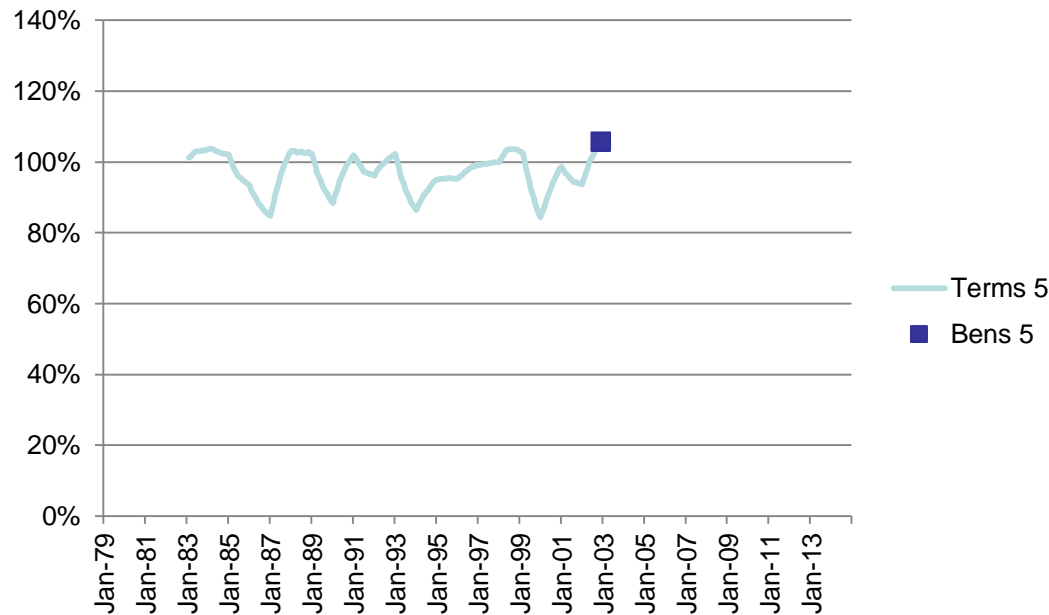
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



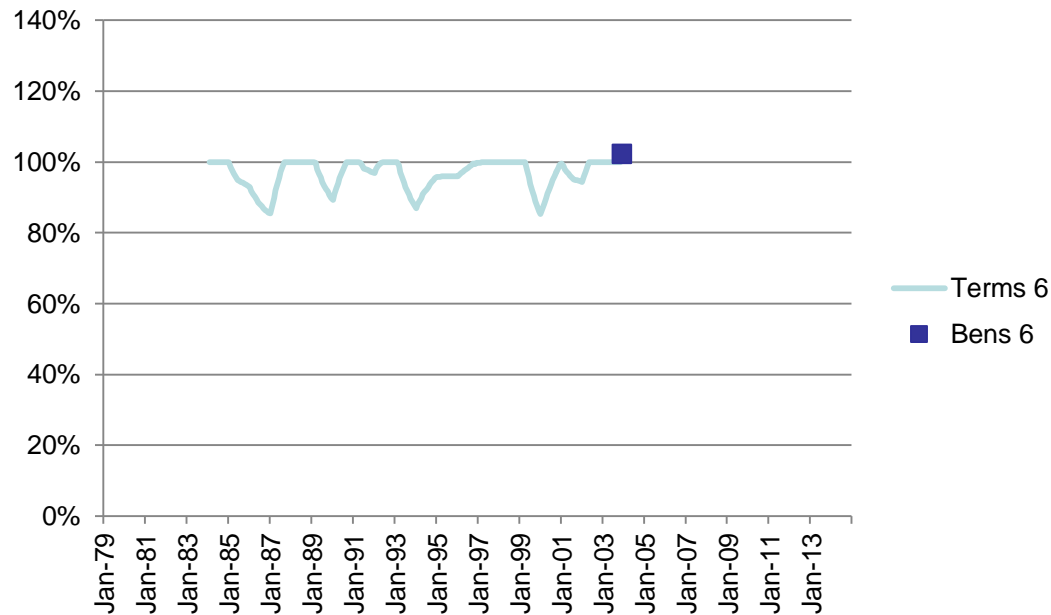
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



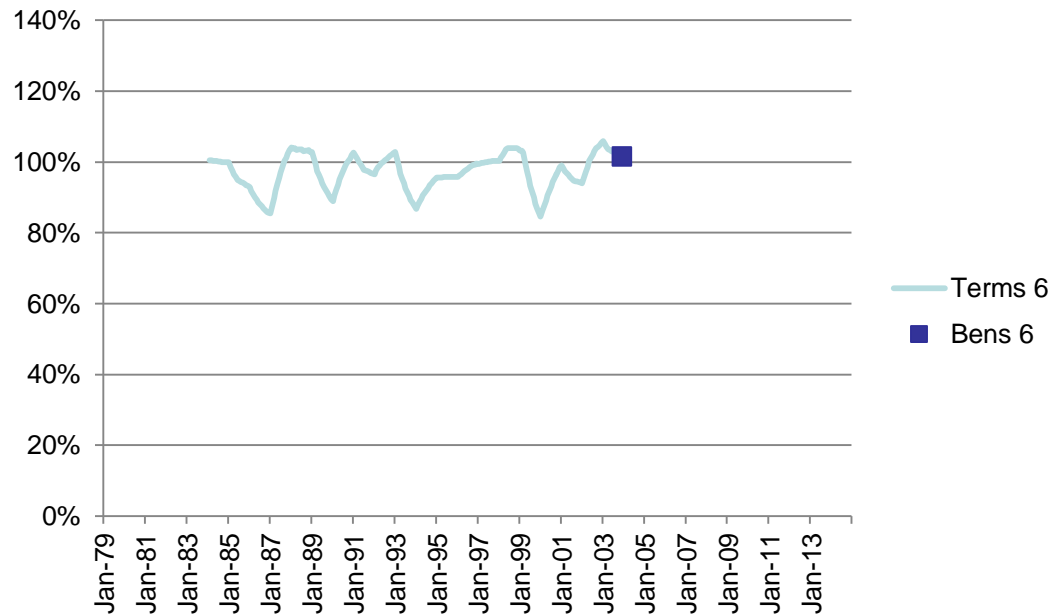
Termination Rate	10% p.a.
Market Value Adjustment	Fud Level @ 100%

Policy Cohort Payout Ratio Comparison



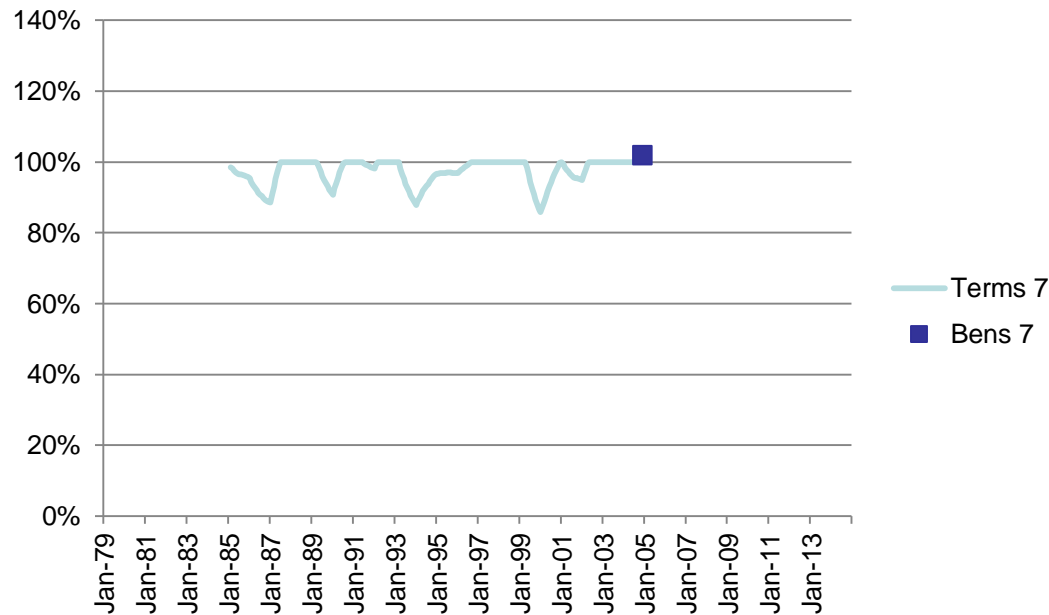
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



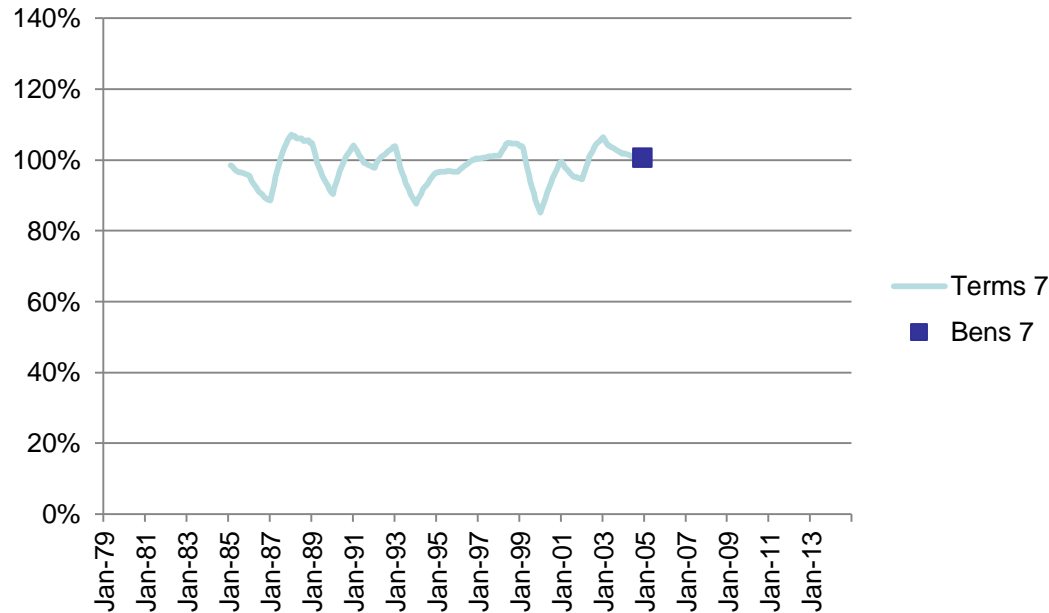
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



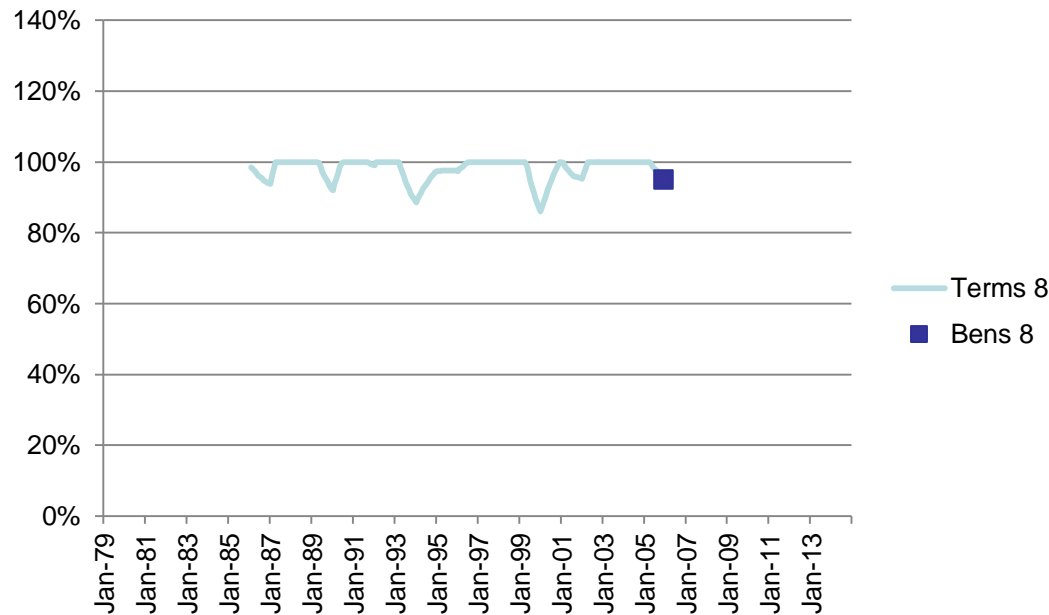
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



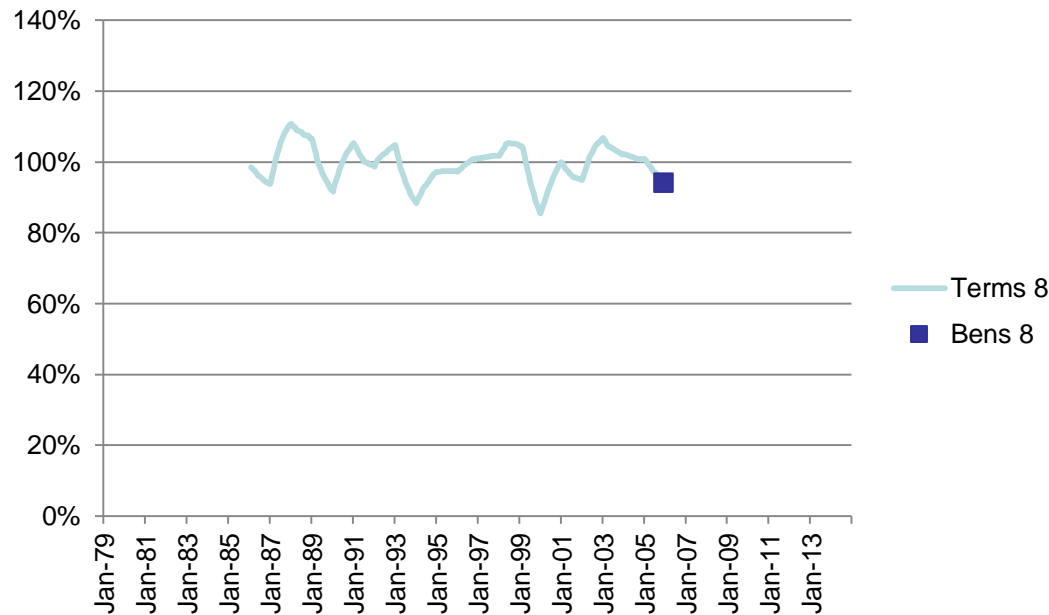
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



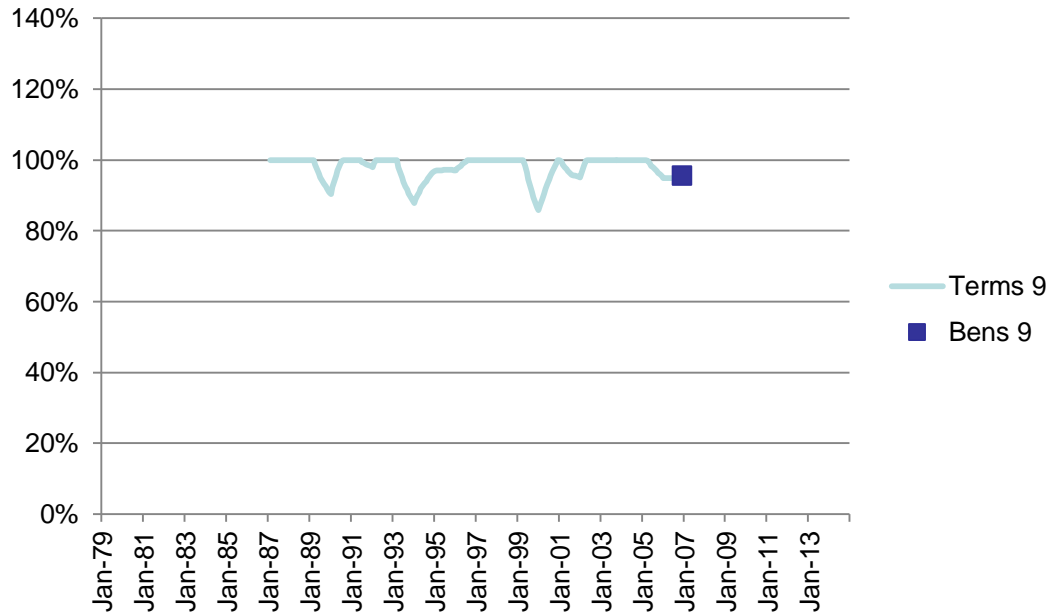
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



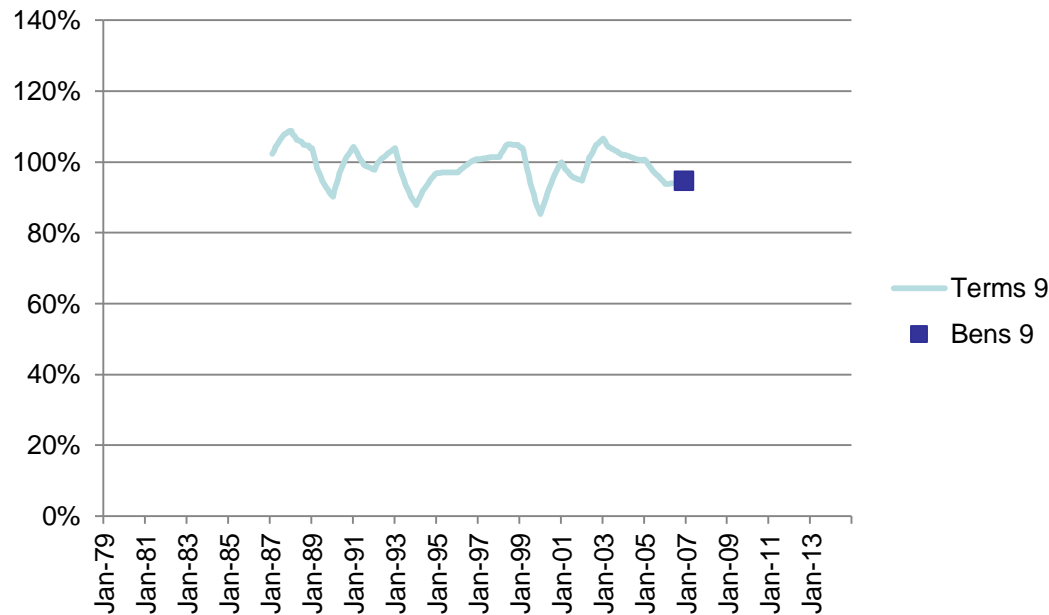
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



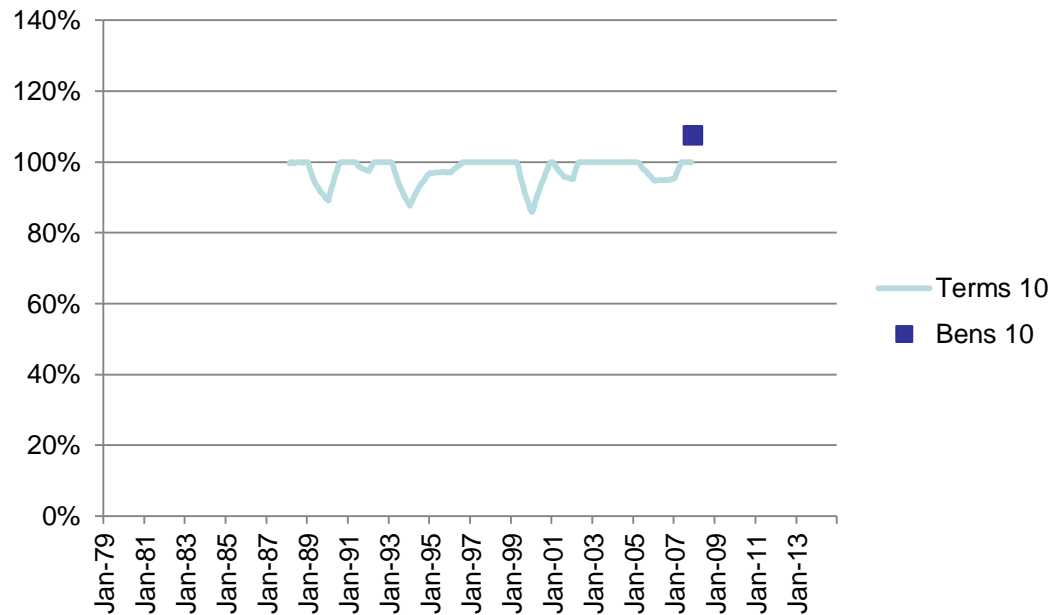
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



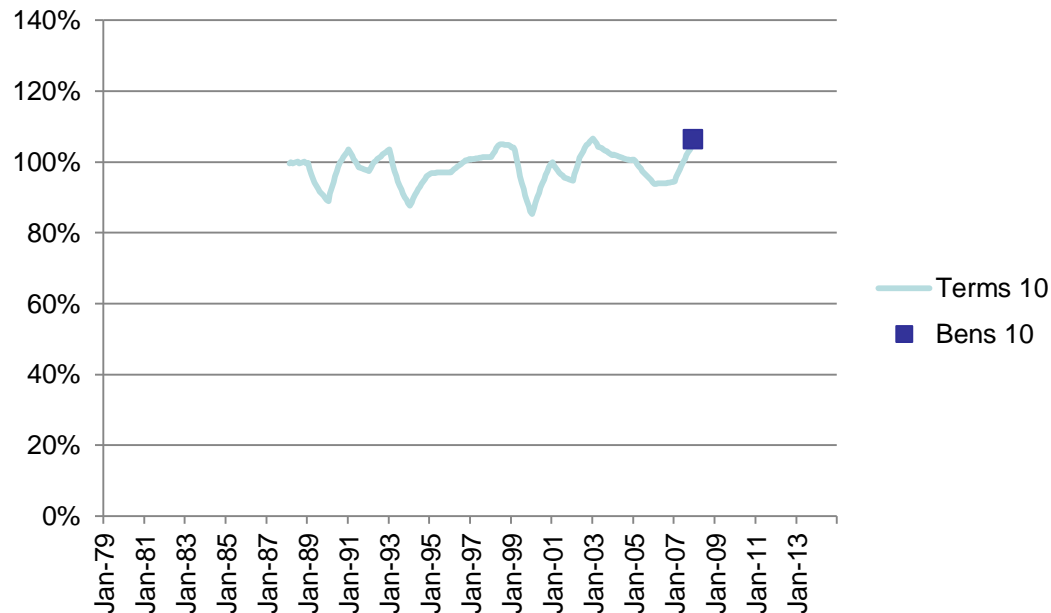
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



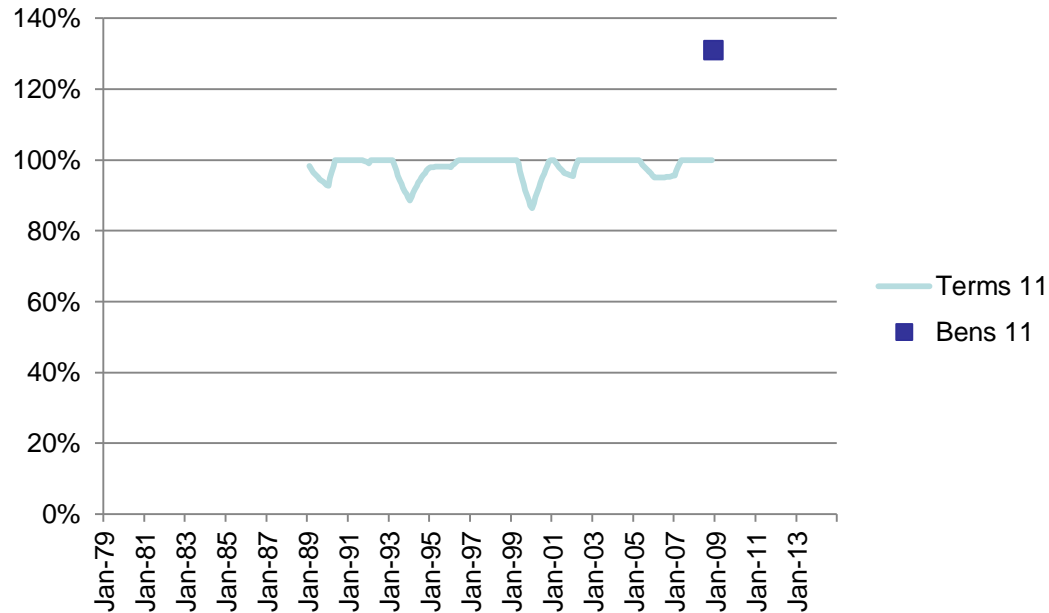
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



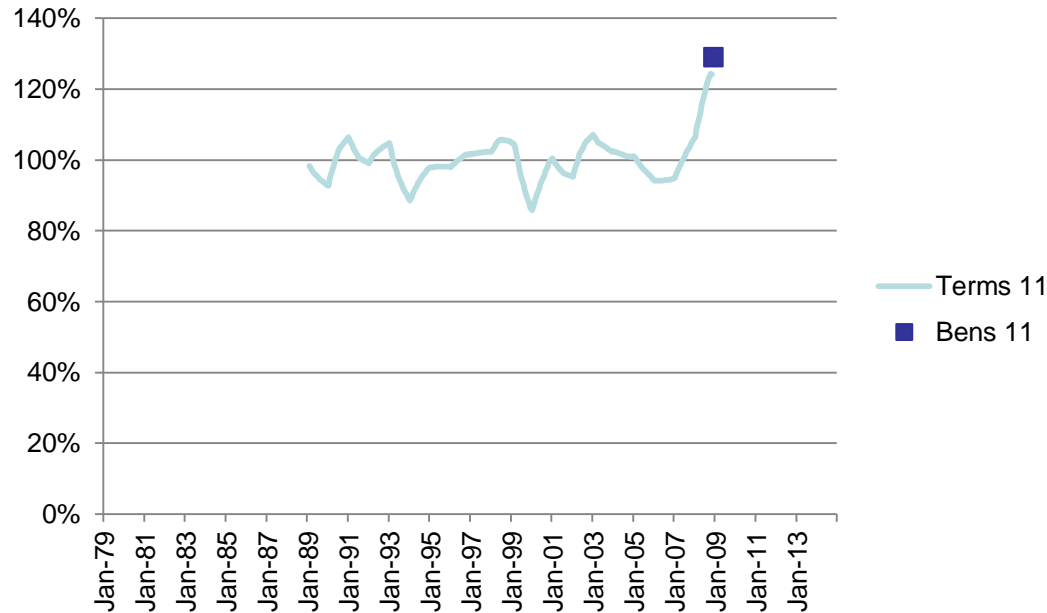
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



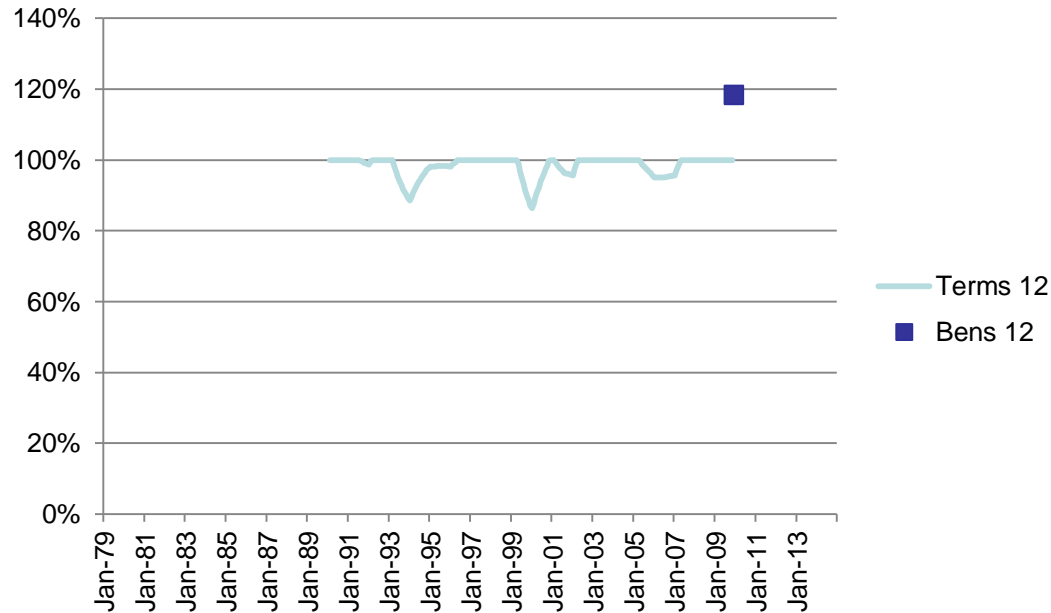
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



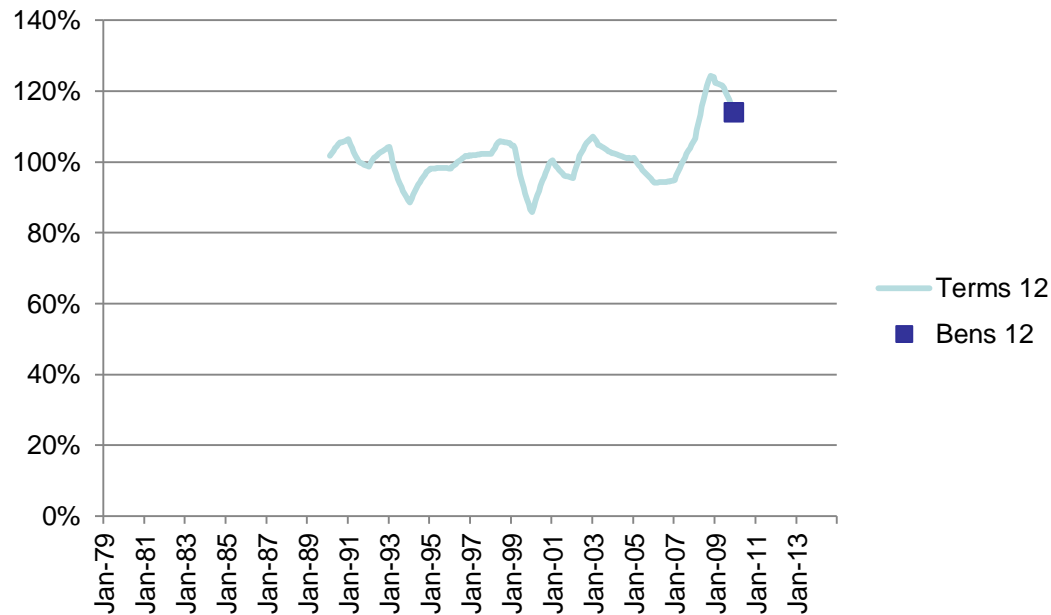
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



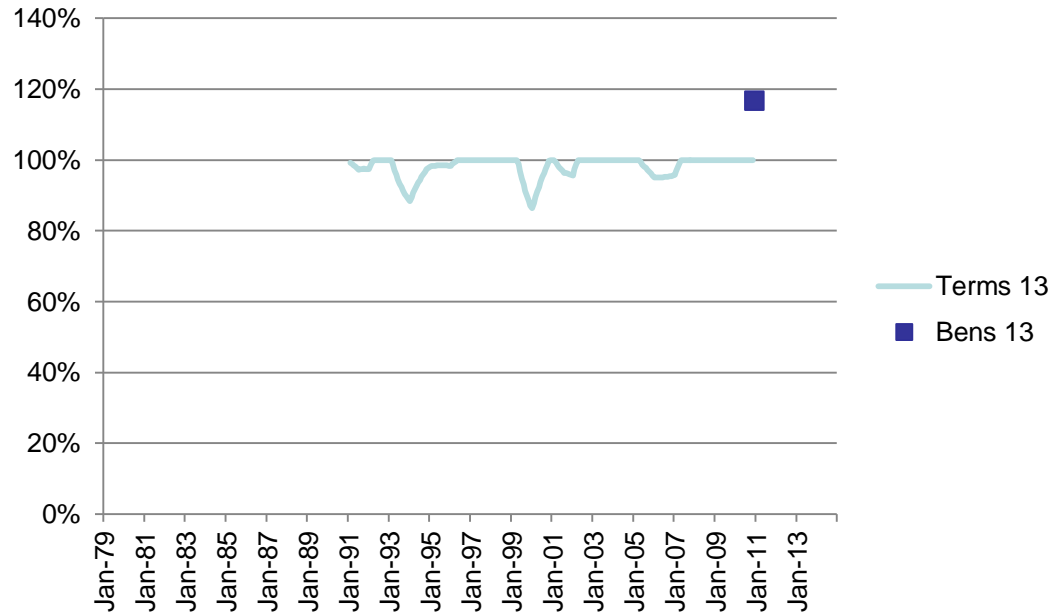
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



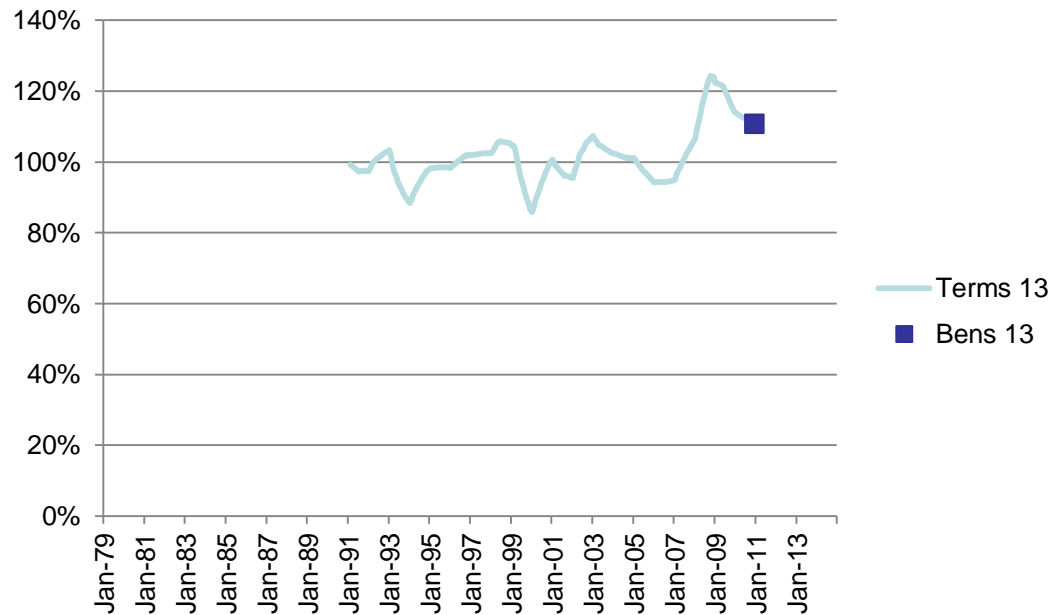
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



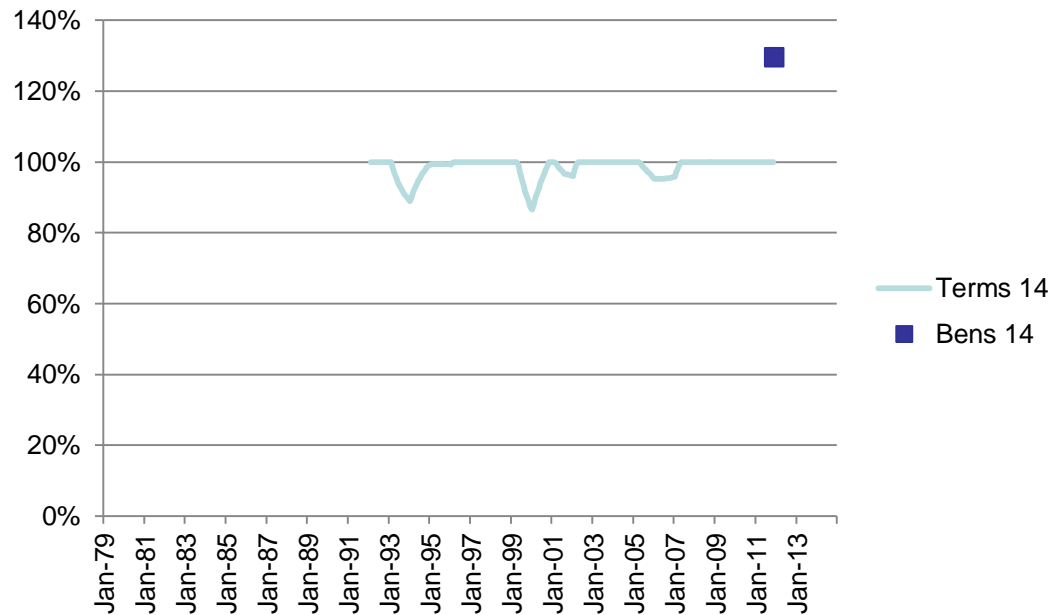
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



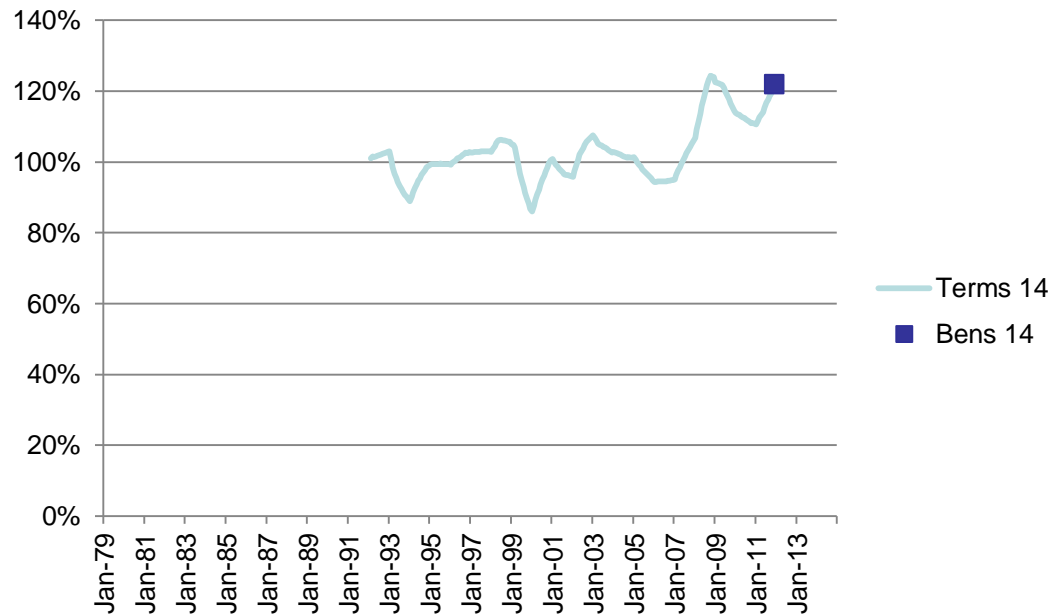
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



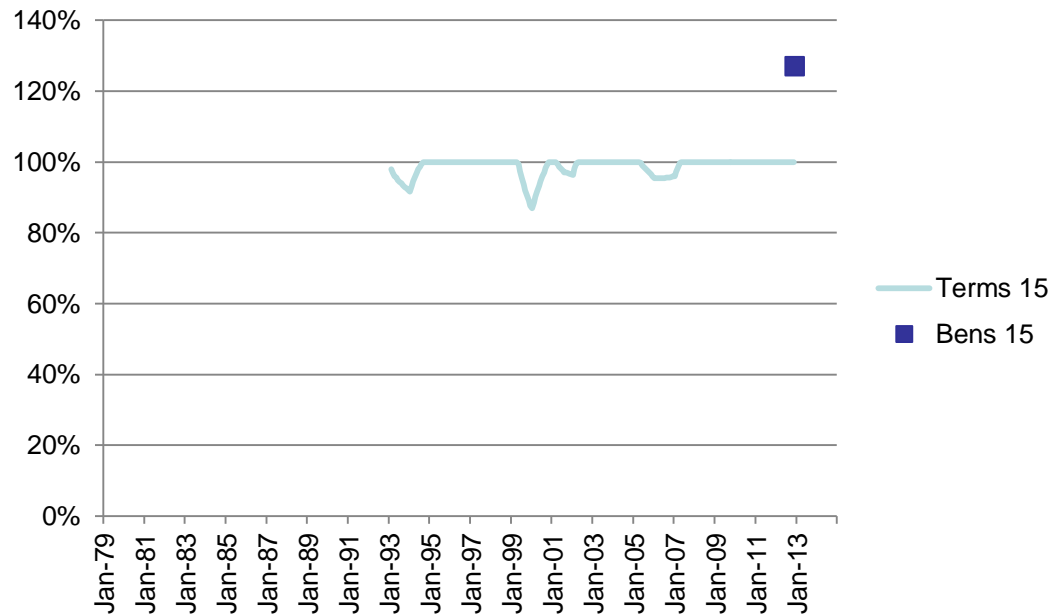
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



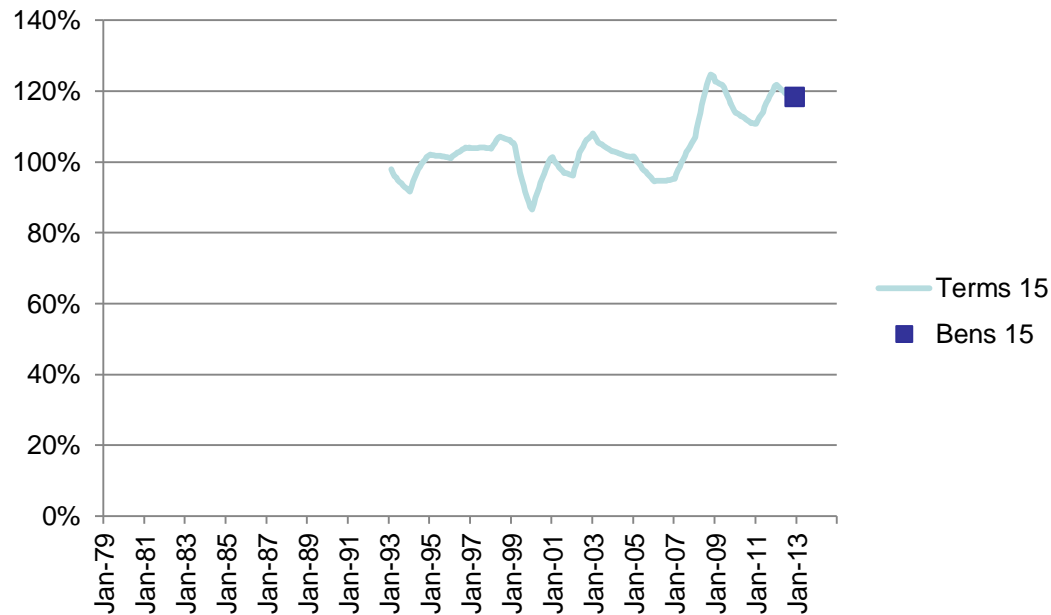
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Policy Cohort Payout Ratio Comparison



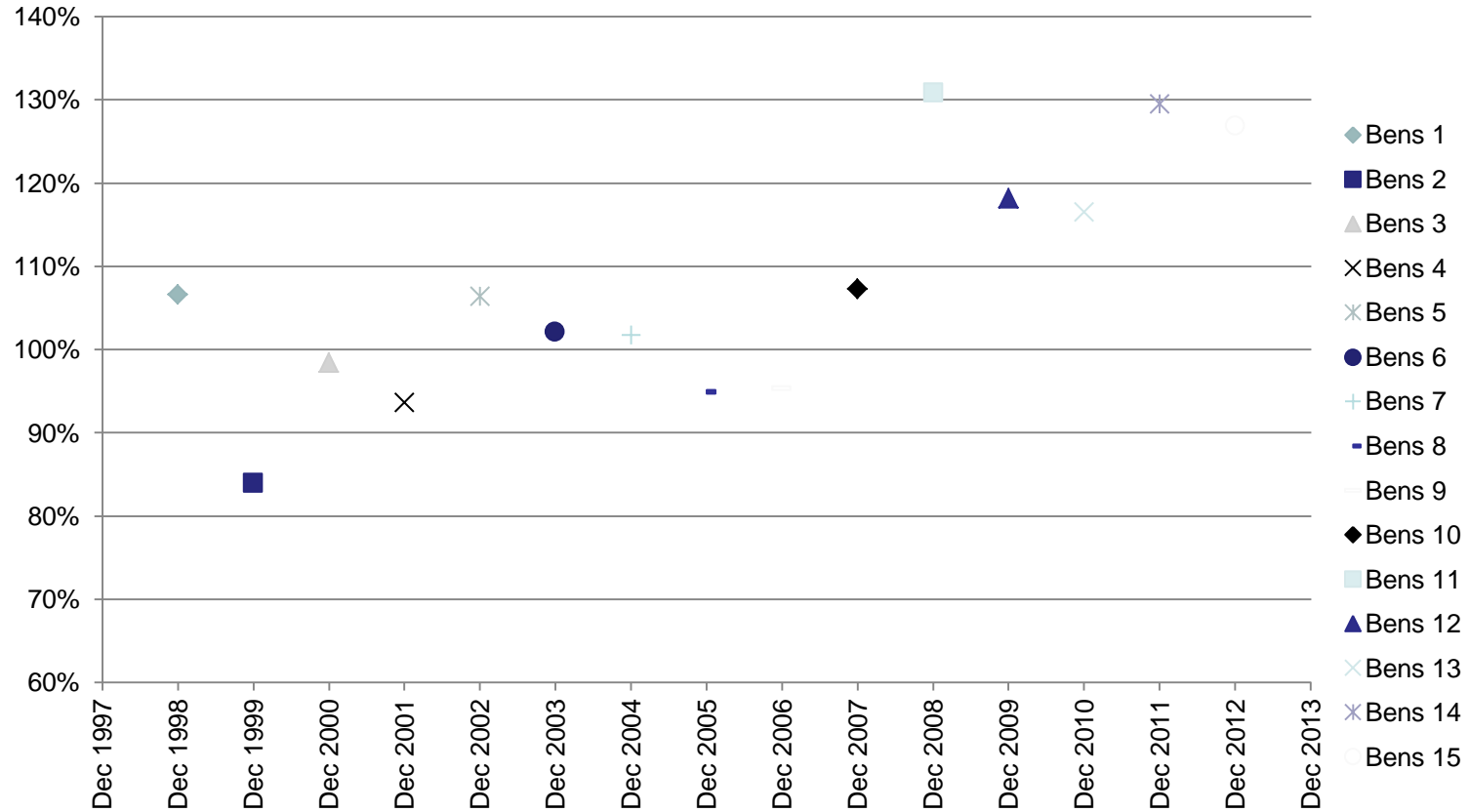
Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Policy Cohort Payout Ratio Comparison



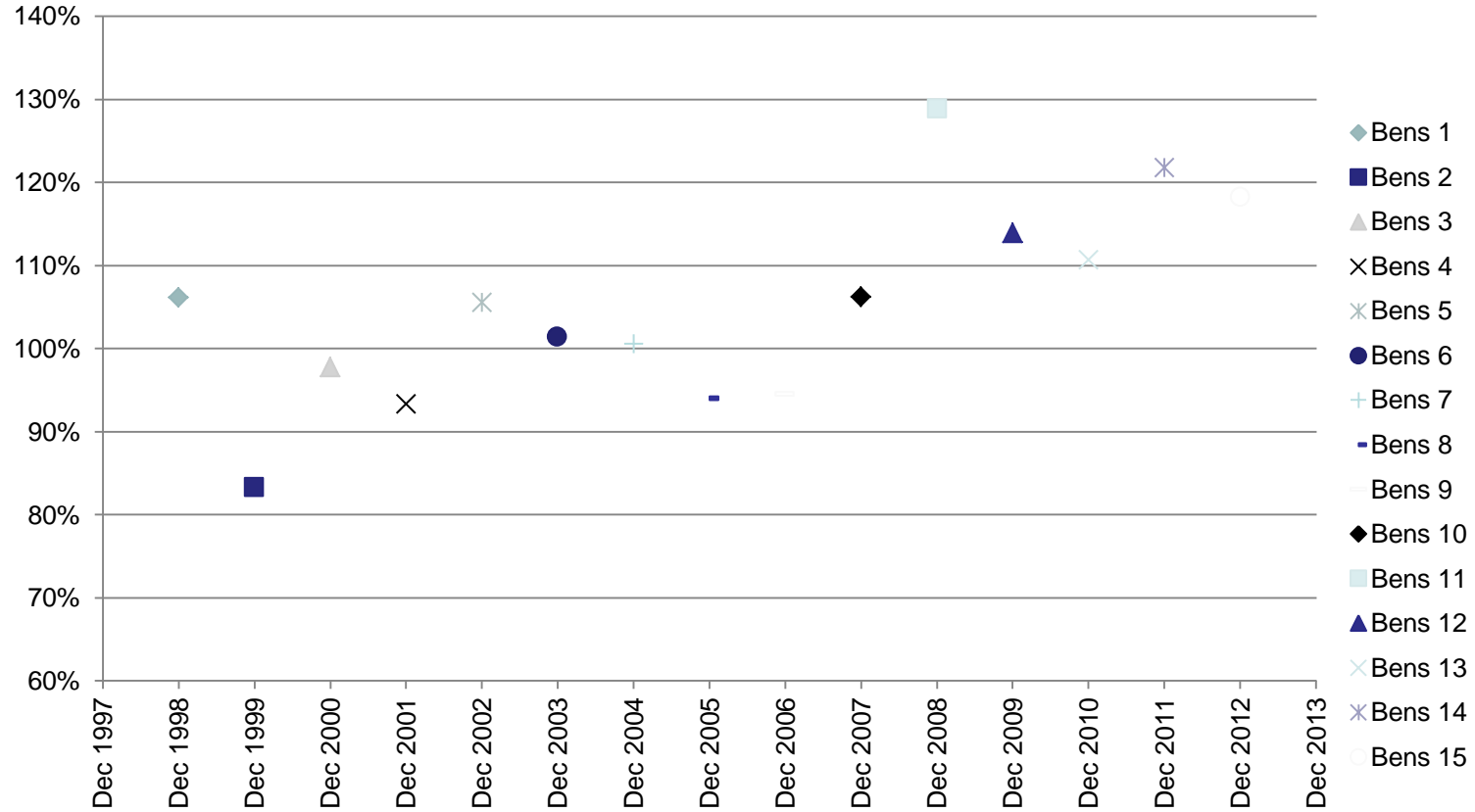
Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Benefit Payout Ratio (Smoothed Value / Market Value)



Termination Rate	10% p.a.
Market Value Adjustment	Individual Policy @ 100%

Benefit Payout Ratio (Smoothed Value / Market Value)



Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%

Summary: Cross Subsidy between Terminations and Benefits

	Terminations			Benefits		
	Smoothed Bonus	Market Linked	Ratio	Smoothed Bonus	Market Linked	Ratio
Policy Cohort 1	68 152.97	72 413.42	94%	93 741.29	88 313.69	106%
Policy Cohort 2	73 001.15	76 690.88	95%	101 567.11	121 927.19	83%
Policy Cohort 3	79 127.37	83 519.01	95%	119 645.30	122 433.05	98%
Policy Cohort 4	86 252.10	90 382.29	95%	133 245.90	142 859.08	93%
Policy Cohort 5	94 100.13	97 601.96	96%	143 647.57	136 149.98	106%
Policy Cohort 6	102 264.41	104 709.08	98%	153 033.95	150 960.63	101%
Policy Cohort 7	110 921.37	112 189.28	99%	173 374.61	172 413.93	101%
Policy Cohort 8	120 662.10	121 628.08	99%	200 300.01	213 190.25	94%
Policy Cohort 9	132 996.56	135 517.74	98%	238 751.67	252 681.93	94%
Policy Cohort 10	149 591.21	152 171.71	98%	286 447.95	269 779.98	106%
Policy Cohort 11	168 767.66	166 524.95	101%	297 702.43	231 051.91	129%
Policy Cohort 12	186 649.38	179 596.51	104%	299 489.98	262 981.47	114%
Policy Cohort 13	205 621.44	195 394.91	105%	324 730.88	293 392.08	111%
Policy Cohort 14	226 389.43	211 764.44	107%	361 011.79	296 549.17	122%
Policy Cohort 15	249 903.62	229 171.22	109%	408 683.47	345 773.12	118%
Total	2 054 400.87	2 029 275.49	101%	3 335 373.90	3 100 457.45	108%

Termination Rate	10% p.a.
Market Value Adjustment	Fund Level @ 100%