

This Excel sheet displays change in price of the bond in response to change in interest rates using duration and convexity



Bond Characteristics

Par Value (Rs.)	100
Price	126.5
Coupon	12%
YTM	9%
Term of bond	18 years

Modified Duration	8.32
Convexity	107.20

Estimate of Price change due to Duration = - Duration * Change in Yield* Price

Estimate of Price change due to Convexity = $1/2 * \text{Price} * \text{Convexity} * (\text{Change in Yield})^2$

Let's assume Yield increases by 1%

a Change in Yield +1%

Change in price due to Duration = $-8.32 * (1\%) * 126.5$
= -10.52

Change in price due to Convexity = $.5 * 126.5 * 107.20 * (1\%)^2$
= 0.68

Combined Effect = Original Price + Duration effect + Convexity Effect

= $126.50 + (-10.52) + 0.68$

= 116.66

b Change in yield -3%

Change in price due to Duration = $-8.32 * (-3\%) * 126.5$
= 31.57

Change in price due to Convexity = $.5 * 126.5 * 107.20 * (1\%)^2$
= 6.10

Combined Effect = Original Price + Duration effect + Convexity Effect

= $126.50 + 31.57 + 6.10$

= 164.18

Check

Bond prices calculated by discounting cash flows under different interest rate environments

Year	CF	PVF @ 9%	PV of CF	PVF @ 10%	PV of CF	PVF @ 6%	PV of CF
1	12	0.9174	11.01	0.9091	10.91	0.9434	11.32
2	12	0.8417	10.10	0.8264	9.92	0.8900	10.68
3	12	0.7722	9.27	0.7513	9.02	0.8396	10.08
4	12	0.7084	8.50	0.6830	8.20	0.7921	9.51
5	12	0.6499	7.80	0.6209	7.45	0.7473	8.97
6	12	0.5963	7.16	0.5645	6.77	0.7050	8.46
7	12	0.5470	6.56	0.5132	6.16	0.6651	7.98
8	12	0.5019	6.02	0.4665	5.60	0.6274	7.53
9	12	0.4604	5.53	0.4241	5.09	0.5919	7.10
10	12	0.4224	5.07	0.3855	4.63	0.5584	6.70
11	12	0.3875	4.65	0.3505	4.21	0.5268	6.32
12	12	0.3555	4.27	0.3186	3.82	0.4970	5.96
13	12	0.3262	3.91	0.2897	3.48	0.4688	5.63
14	12	0.2992	3.59	0.2633	3.16	0.4423	5.31
15	12	0.2745	3.29	0.2394	2.87	0.4173	5.01
16	12	0.2519	3.02	0.2176	2.61	0.3936	4.72
17	12	0.2311	2.77	0.1978	2.37	0.3714	4.46
18	112	0.2120	23.74	0.1799	20.14	0.3503	39.24

126.27

116.40

164.97

For best coaching for SFM (Final) contact : info@ascentfinancials.com or visit website www.ascentfinancials.com