Caselet #49 – Party Boy and Effective Duration

Renowned Darla Moore School of Business graduate and bond analyst, Ms. Jane Gotzrox, calls to her intern, “Sparky,” she says, “I’m back from lunch; come in here.”

“Was your lunch nice, Ms. Gotzrox?”

“A delight, as always,” she says dryly, “now stand up, Sparky, this morning was a once in a lifetime event, eh?”

“Yes, Ms. Gotzrox.”

“Did you get ‘Party Boy’s’ spreadsheet done?”

“Mostly”

“That rounds to ‘no’, but never mind, you’ll have plenty of opportunity to finish it and the next step before you go home tonight . . . if you go home tonight.”

“The next step is to show how to compute effective duration and effective convexity. That’s done by shifting the par curve up and down. Typically, those shifts are 50bp each. Once the par curve is shifted, the spot curve is bootstrapped and the forward tree is recalibrated to the new par and spot curves. Finally, the new price of the callable bond is calculated using a constant OAS – the original OAS found in this morning’s exercise. Are you following this, Sparky? Yeah?"

“Okay, once we have new bond prices for an up-shifted par curve and a down-shifted par curve, we calculate effective duration and effective convexity from:

\[
\text{Effective duration} = \frac{(P_- - P_+)}{2*P_0*dY}
\]

And:

\[
\text{Effective convexity} = \frac{(P_+ + P_- - 2*P_0)}{(P_0*dy^2)}
\]

Put those formulas in your spreadsheet and you’re almost done."

“The final step is to show what happens if the up and down shifts of the yield curve are too small. So repeat the exercise with shifts of +/- 1bp instead of 50bp. What happens to effective duration and effective convexity? Sparky, for an immediate promotion to ‘top analyst’, can you tell me why that happens?”