Breakeven occurs when return of credit bond equals return of govt bond.

If credit bond initially has rating :

where

is the probability of bond currently rated ending up rated

is the return of a bond currently rated which ends up rated

is the return of a government bond

Now

where

is the current price of bond rated

is the final price of a bond which ends up rated

is the coupon of a bond which end up rated

= , for = 1,…,7 where is the (annualised) yield of a government bond

= , for = 8

) since

) -

) - (note summation range)

where is the assumed recovery rate

Rewrite this as:

In other words, this gives us the final prices of all credit bonds for breakeven, from which we can calculate the corresponding yields and spreads.