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

If credit bond initially has rating i :

$t_{i1}r_{i1} + \cdots + t_{i8}r_{i8} = g$

where

t_{ij} is the probability of bond currently rated i ending up rated j

r_{ij} is the return of a bond currently rated i which ends up rated j

g is the return of a government bond

Now

$$r_{ij} = \frac{q_j + c_j}{p_i} - 1$$

where

p_i is the current price of a bond rated i

q_j is the final price of a bond which ends up rated j

c_j is the coupon of a bond which end up rated j

$c_j = y$, for $j = 1,\ldots,7$ where y is the (annualised) yield of a government bond

$c_j = 0$, for $j = 8$

$$\therefore \sum_{j=1}^{8} t_{ij}\left(\frac{q_j + c_j}{p_i} - 1\right) = g$$

$\therefore \sum_{j=1}^{8} t_{ij}q_j + y(1 - t_{i8}) = p_i\,(g+1)$ since $\sum_j^8 t_{ij} = 1$

$\therefore \sum_{j=1}^{8} t_{ij}q_j = p_i\,(g+1) - y(1 - t_{i8})$

$\therefore \sum_{j=1}^{7} t_{ij}q_j = p_i\,(g+1) - (y(1 - t_{i8}) + t_{i8}q_8)$ (note summation range)

where q_8 is the assumed recovery rate

Rewrite this as:

$T\boldsymbol{q} = \boldsymbol{p}^*$

$\therefore \boldsymbol{q} = T^{-1}\boldsymbol{p}^*$

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.