MF 728 hw1

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1 CDS Pricing

Assumptions for all computations in my solution to this homework:
1. The maturity = T denominator is 1.03^{-T}.
For instance, the 1y denominator = 1.03^{-1}, the 2.5y denominator is $1.03^{-2.5}$.
2. The premium payments are made **semi-annually** for CDS contracts of all maturities.
2. Interest rate curve shift in parallel.
4. Day count convention is simplified: we assumed half a year to be 0.5y.

1.1 solution to question (a)

The bootstrapping results are as follows:
(for the nominal value of one dollar)

bootstrapping step 1
1y CDS with: premium leg = 0.00948870036222606
1y CDS with: protection leg = 0.009488700425423598
hazard rate of 0y - 1y = 0.01666676322929561
prob survival till 0.5y = 0.9917012447582352
prob survival till 1y = 0.983471358855033

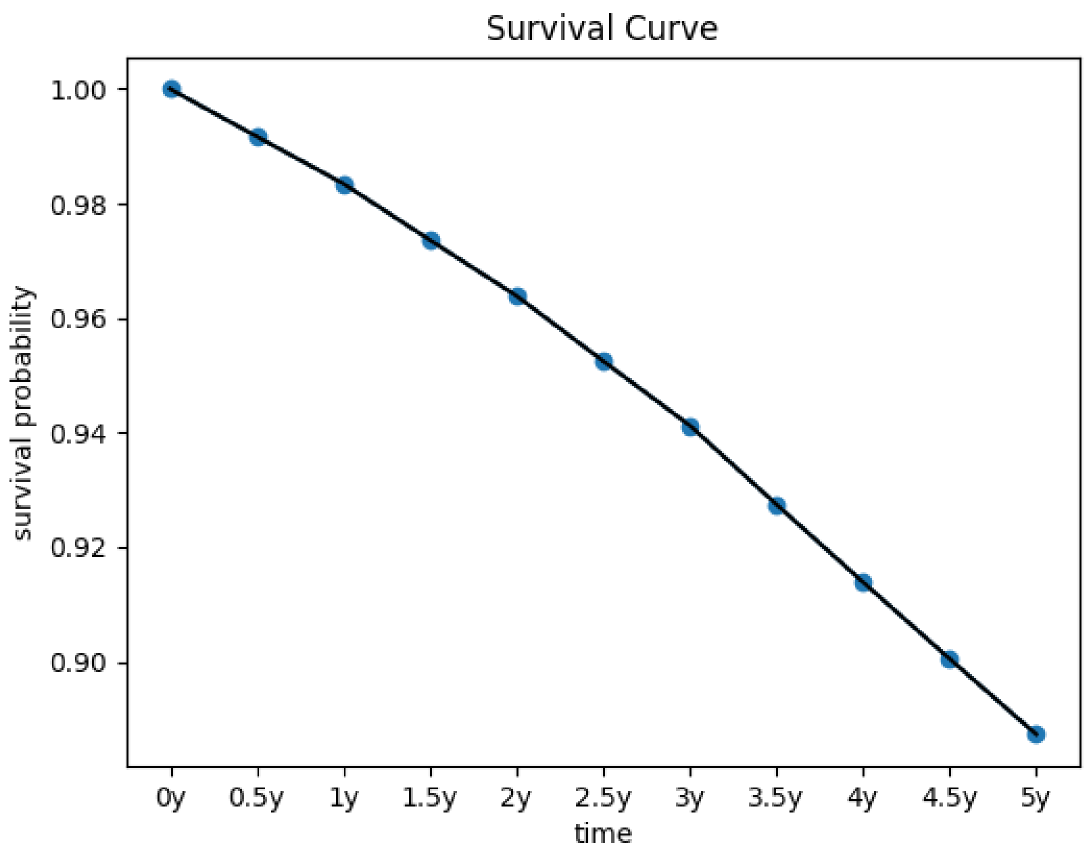
bootstrapping step 2
2y CDS with: premium leg = 0.020096804852169515
2y CDS with: protection leg = 0.020096809999385228
hazard rate of 1y - 2y = 0.02013447880744934
prob survival till 1.5y = 0.9736201874896481
prob survival till 2y = 0.963867692691096

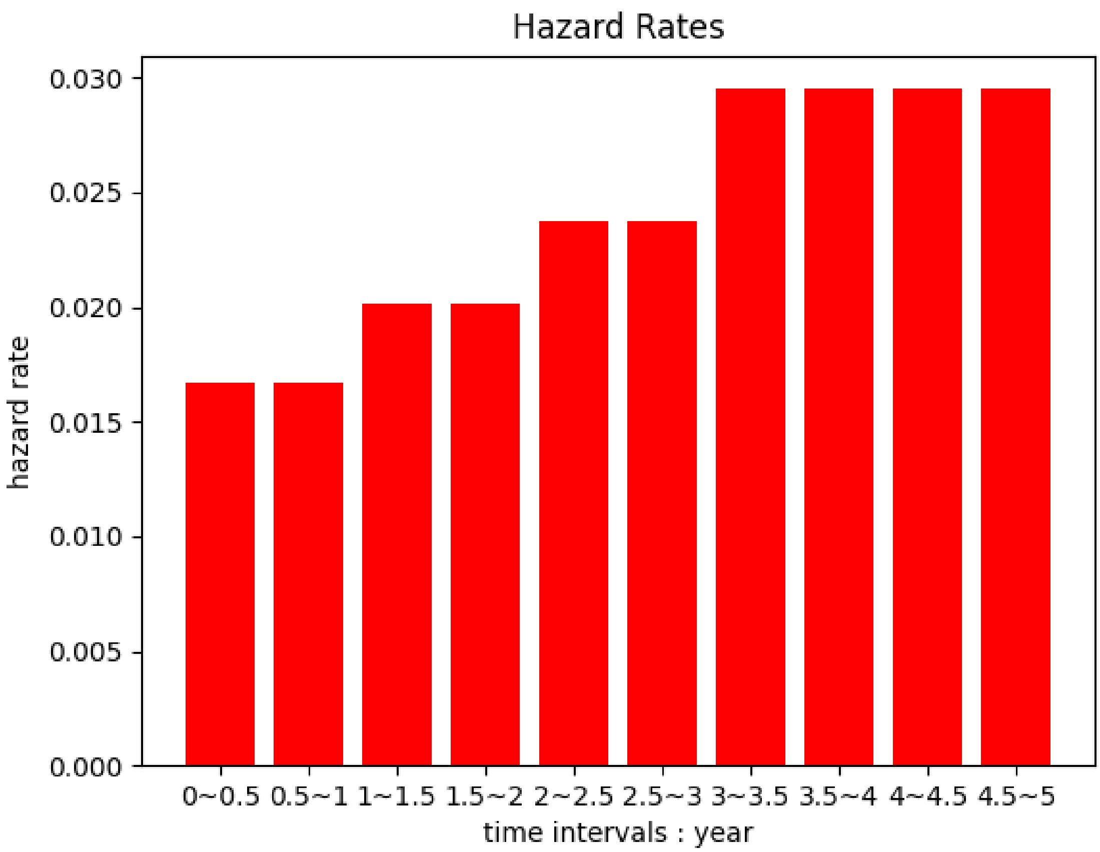
bootstrapping step 3
3y CDS : premium leg = 0.03164085547485252
3y CDS : protection leg = 0.03164085110093703
hazard rate of 2y - 3y = 0.023760616779327393
prob survival till 2.5y = 0.952484399658771

prob survival till 3y = 0.9412355435011772

bootstrapping step 4
5y CDS : premium leg = 0.056842586237920274
5y CDS : protection leg = 0.05684258616927825
hazard rate of 3y - 5y = 0.02950841188430786
prob survival till 3.5y = 0.9274503056423324
prob survival till 4y = 0.91386696494317
prob survival till 4.5y = 0.9004825644388913
prob survival till 5y = 0.8872941904720968

The above results are pictured below.





1.2 solution to question b

A fair spread for a (nominal 1 dollar) 4y CDS that starts today would be -0.0254932645660233
which is approximately -0.02549

1.3 solution to question c

The amount I would charge you for the CDS contract = 0.017759901243872604, which is approximately 0.01776

1.4 solution to question d

The DV01 of the 4-y maturity CDS price with respect to CDS curve = -0.0254932645660233

1.5 solution to question e

The 4y-maturity CDS price DV01 w.r.t. the interest rate curve = -0.001386143155812647

1.6 solution to question f

The sensitivity of the 4-year CDS price with respect to R = 13.786765507006749