MF728 Homework2
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Problem Set#2

Xuyang Liu

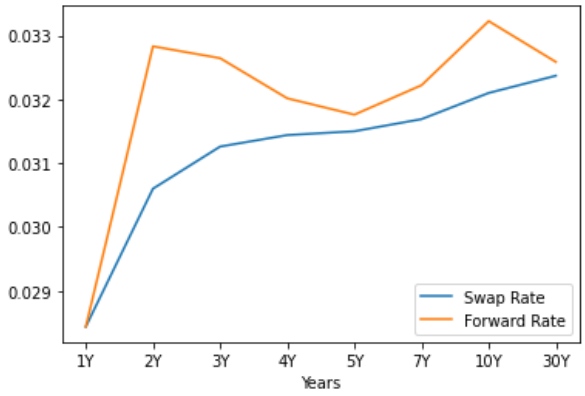
1. Yield Curve Construction:

(a) According to the formular, the forward rate matching the 1Y market swap rate is about: **0.028437999999999963.**

(b) The forward rate from one year to two year is about: **0.032831130386269 17.**

(c) Using the same methods, I could get the result form and the plot shown below:

Years	Swap Rate	Forward Rate
1Y	0.028438	0.028438
2Y	0.030600	0.032831
3Y	0.031260	0.032645
4Y	0.031440	0.032016
5Y	0.031500	0.031760
7Y	0.031690	0.032222
10Y	0.032100	0.033226
30Y	0.032370	0.032587



From the plot I find that the forward rate is fluctuating but always above the swap rate.

(d) The Swap rate of a 15Y swap is about: **0.032236725172570015**.

(e) Using the Formular, I got the result of series of zero rate and shown below:

Years	Swap Rate	Forward Rate	Zero Rate
1Y	0.028438	0.028438	0.028640
2Y	0.030600	0.032831	0.033101
3Y	0.031260	0.032645	0.032912
4Y	0.031440	0.032016	0.032272
5Y	0.031500	0.031760	0.032012
7Y	0.031690	0.032222	0.032481
10Y	0.032100	0.033226	0.033502
30Y	0.032370	0.032587	0.032852

From the data, I can figure out that because I use forward rate to compute zero rate, it has the same tendency of the forward rate, which means the zero rate is always above the swap rate but fluctuate over time.

(f) The new swap rate and the original swap rate are shown below:

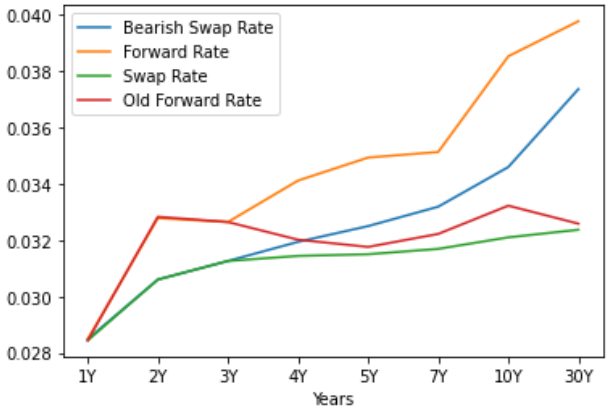
Years	Swap Rate	New Swap Rate
1Y	0.028438	0.038438
2Y	0.030600	0.0405892216751763
3Y	0.031260	0.0412460606310313
4Y	0.031440	0.0414266185713621
5Y	0.031500	0.0414878674854213
7Y	0.031690	0.0416761235130120
10Y	0.032100	0.0420747604574928
30Y	0.032370	0.0423411969475766

From the data I could figure out that these rates aren't equivalent to having shifted the swap rates directly. Because the forward rate rises 100 bps but the swap rate rises less than 100 bps.

(g) (h) The results of these two problems are shown below:

Years	Bearish Swap Rate	Forward Rate
1Y	0.028483	0.028483
2Y	0.030600	0.032785
3Y	0.031260	0.032645
4Y	0.031940	0.034119
5Y	0.032500	0.034937
7Y	0.033190	0.035135
10Y	0.034600	0.038538
30Y	0.037370	0.039784

To compared with the original data, I plot the relation:



From this plot, we can see that in a bearish market, as the swap rate increase in a more future time, the forward rate would increase in a steeper tendency.

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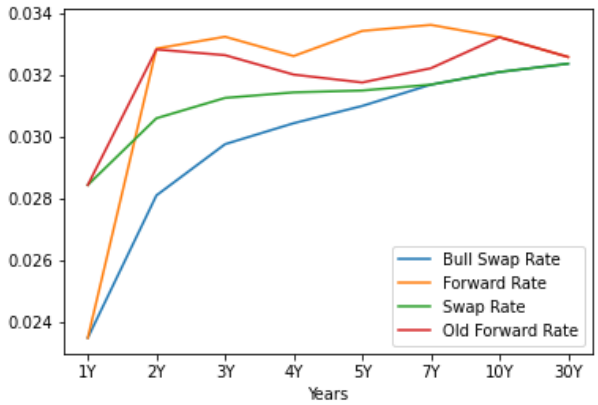
(i)(j) The results of these two problems are shown below:

Years	Bull Swap Rate	Forward Rate
1Y	0.023483	0.023483
2Y	0.028100	0.032859
3Y	0.029760	0.033244
4Y	0.030440	0.032617
5Y	0.031000	0.033431
7Y	0.031690	0.033627
10Y	0.032100	0.033230
30Y	0.032370	0.032587

To compared with the original data, I plot the relation:



From this plot, we can find that in a Bull market, the new forward rate is below the old forward rate only at the beginning, but it would increase quite quickly later. And then is would above the old forward rate for a while. For the really long term forward rate there's no significant difference.