

Question 2

October 2025

1 Yield Curve Modeling Task

1. We picked Hong Kong government securities. The data source is from investing.com.
2. We picked a range of government bond/notes of different tenor. Eight tenors are selected, they are: 6 months, 1 year, 3 years, 5 years, 7 years, 10 years, 15 years and 20 years.
3. We fit the data using the Nelson-Siegel(NS) model. The blue line is the fitted line and the red dot are the actual data.
4. We have also fit the data using the Cubic-Spline(CS) model. The blue line is the fitted line and the red dot are the actual data.
5. Comparing the fit of NS and CS, we can observe that NS does not perfectly fit all observed data, only a single smooth curve that passes through most points. In contrast, CS demonstrates the ability to fit observed data closely, but its fitted line may exhibit a "kink."

In terms of interpretation:

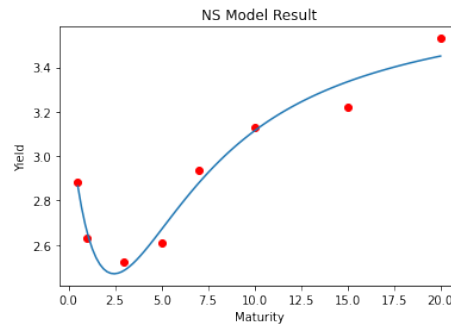


Figure 1:

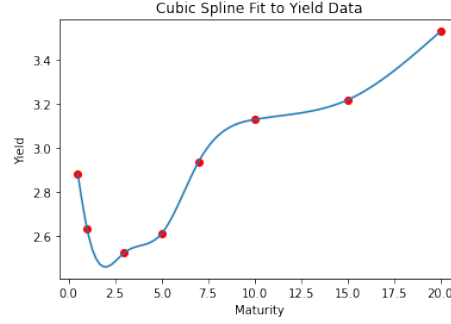


Figure 2:

beta 0	3.7992
beta 1	-0.5993
beta 2	-3.450
tau	1.730.

Table 1: Nelson Siegel Curve, the fitted values

6. NS offers better interpretability because its fitted line is smooth, potentially yielding more explainable results. Additionally, NS can handle extrapolation effectively. Since CS relies on interpolation, it may not be well-defined for out-of-sample calculations. However, as a parametric method, NS can provide results for out-of-sample inputs.
7. NS also provides intuitive meaning for its model parameters. According to M1L3, γ represents the decay rate, which ranges between 0 and 1. The parameter β_0 describes the level of the yield curve, β_1 describes its slope, and β_2 describes its shape.
8. For Nelson Siegel Curve, the fitted values are :
For Cubic spline the model parameter is:
9. Although Nelson-Siegel is smoothing the yield curve, this is not necessarily considered unethical. It is because:

	(0.5 to 1.0)	(1.0 to 3.0)	(3.0 to 5.0)	(5.0 to 7.0)	(7.0 to 10.0)	(10.0 TO 15.0)
Cubic(x^3)	0.1938	-0.0574 0.0206	-0.0189	0.0045	0.0007	-0.0005
Quadratic(x^2)	0.0000	0.2907	-0.0540	0.0699	-0.0434	-0.0028
Linear(x^1)	-0.5504	-0.4051	0.0683	0.1002	0.1532	0.0147
Constant(x^0)	2.8810	2.6300	2.5230	2.6090	2.9380	3.1290

Table 2: Cubic spline the model parameter

10. The smoothing is not intended to mislead the true. The smoothing is by construction of the model design. It is also intend to produce a interpretable representation of the yield curve for analysis.
11. In Econometrics, you will smooth time series to filter out noise. Nelson-Siegel can filter out the noise to prevent overfitting. So the intention is not unethical.