

Zero Coupon Yield Curve for India: methodology and sources

Anshul Tayal
Finance Research Group

Panel 1: Daily ZCYC (Jun 2001 - October 2020)

Panel 1 is a video of the daily Zero Coupon Yield Curve (ZCYC) in India for the period Jun 2001 - October 2020. The ZCYC parameters are modeled using the Nelson-Siegel model (3-factor model) for the period Jun 2001 - Dec 2010 and using the Nelson-Siegel-Svensson (5-factor model) for the period Jan 2011 - October 2020. The Nelson-Siegel model parameters for the Jun 2001 - Dec 2010 period are from NSE and that for the Jan 2011 - October 2020 period, are from CCIL.

We calculate the ZCYC for daily maturities from 1 day to 30 years using the following formulae -

- For the period Jun 2001 - Dec 2010, we use Nelson-Siegel (3-factor model)

$$R(m) = \beta_0 + (\beta_1 + \beta_2) \cdot \frac{[1 - \exp(-\frac{m}{\tau})]}{\frac{m}{\tau}} - \beta_2 \cdot [\exp(-\frac{m}{\tau})] \quad (1)$$

where, m is maturity,

β_0 , β_1 , β_2 and τ are parameters of the equation,

and, R(m) is the yield for maturity (m).

- For the period Jan 2011 - October 2020, we use Nelson-Siegel-Svensson (5-factor model)

$$R(m) = \beta_0 + (\beta_1 + \beta_2) \cdot \left[\frac{[1 - \exp(-\frac{m}{\tau_1})]}{\frac{m}{\tau_1}} \right] - \beta_2 \cdot [\exp(-\frac{m}{\tau_1})] + \beta_3 \cdot \left[\frac{[1 - \exp(-\frac{m}{\tau_2})]}{\frac{m}{\tau_2}} \right] - \beta_3 \cdot [\exp(-\frac{m}{\tau_2})] \quad (2)$$

where, m is maturity,

β_0 , β_1 , β_2 , β_3 , τ_1 and τ_2 are parameters of the equation,

and, R(m) is the yield for maturity (m).

The daily ZCYC is colour coded to capture the inversion of the term structure using the 10 year and the 91 day maturity.

- When 10 year maturity is \geq 91 day maturity, the ZCYC curve is blue.
- When 10 year maturity is $<$ 91 day maturity, the ZCYC curve is red.

Panel 2: Evolution of ZCYC (Jun 2001 - October 2020)

It compares the ZCYC over time by showing one ZCYC for each year, which is as at the last day of March in that particular year. For example - for the year 2011, the curve represents ZCYC on 31st March 2011. The computation of ZCYC is as per the method described for Panel 1.

Panel 3: Term spread

The term spread is calculated for 2 maturity pair :

- 10 year and 91 day, and
- 10 year and 2 year.

The term spread is computed at a daily frequency as the rolling window average of the last 30 trading day spread.