

TAB: NELSON-SIEGEL TERM STRUCTURE CALCULATOR

Total number of observations 476

A. Yield Sample

Maturity	1.89	2.19	4.15	5.19	5.40	5.77	6.44	7.20	7.40
Yields actual (end)	5.906	4.930	7.549	6.613	6.368	6.154	6.749	7.063	7.105
Yields actual (start)	7.073	5.686	7.999	7.387	5.199	7.524	5.498	7.740	5.847

Date	Row index			
End date	29-Aug-17	1	width	9
Start date	7-Oct-16	200	height	200

B. Calculator: java.util.HashMap@Sun, 24 Jun 2018 13:35:01:417..212475032f
jeconkr.finance.FSTP.lib.model.yts.calculator.CalculatorNelsonSiegelN(

Available method	α	Selected parameters	Parameter description
Diebold-Li	0.73	method	Diebold-Li
Fabozzi	0.33		Term structure estimation method
Nelson-Siegel	[0, 1]		
Ridge-OLS	[0, 1]		

C. Output

Coefficients	α	β_0	β_1	β_2
Date (end)	0.73	16.13	28.53	-77.83
Date (start)	0.73	16.63	38.46	-90.70

Fitted yields

Maturity	1.89	2.19	4.15	5.19	5.40	5.77	6.44	7.20	7.40
Yields fitted (end)	5.89	4.93	7.53	6.62	6.37	6.15	6.76	7.07	7.11
Yields fitted (start)	7.09	5.67	7.98	7.40	5.22	7.53	5.49	7.74	5.83

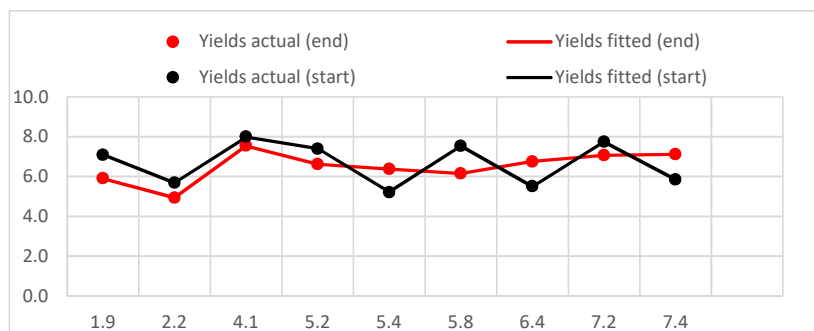
Goodness of fit

Maturity	1.89	2.19	4.15	5.19	5.40	5.77	6.44	7.20	7.40	Total
Δ Yield (end)	-0.01	0.00	-0.02	0.01	0.00	-0.01	0.01	0.01	0.01	0.028
Δ Yield (start)	0.02	-0.01	-0.02	0.01	0.02	0.01	-0.01	0.00	-0.01	0.043

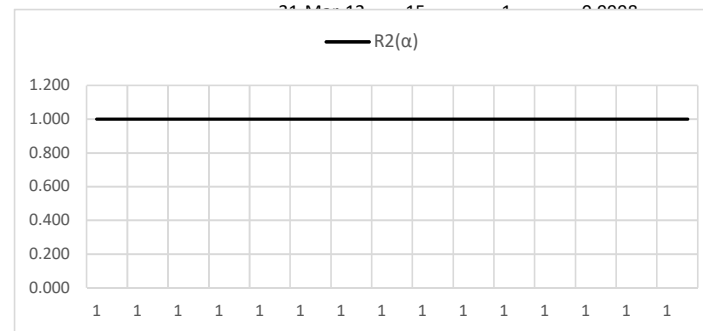
R2(α)

Date	Row Index	Sample Index	R2(α)
30-Sep-15	1	1	0.9998
30-Jun-15	2	1	0.9998
31-Mar-15	3	1	0.9998
31-Dec-14	4	1	0.9998
30-Sep-14	5	1	0.9998
30-Jun-14	6	1	0.9998
31-Mar-14	7	1	0.9998
31-Dec-13	8	1	0.9998
30-Sep-13	9	1	0.9998
30-Jun-13	10	1	0.9998
31-Mar-13	11	1	0.9998
31-Dec-12	12	1	0.9998
30-Sep-12	13	1	0.9998
30-Jun-12	14	1	0.9998
31-Mar-12	15	1	0.9998
31-Dec-11	16	1	0.9998
30-Sep-11	17	1	0.9998
30-Jun-11	18	1	0.9998
31-Mar-11	19	1	0.9998
31-Dec-10	20	1	0.9998
30-Sep-10	21	1	0.9998
30-Jun-10	22	1	0.9998
31-Mar-10	23	1	0.9998
31-Dec-09	24	1	0.9998
30-Sep-09	25	1	0.9998
30-Jun-09	26	1	0.9998
31-Mar-09	27	1	0.9998
31-Dec-08	28	1	0.9998
30-Sep-08	29	1	0.9998
30-Jun-08	30	1	0.9998
31-Mar-08	31	1	0.9998
31-Dec-07	32	1	0.9998
30-Sep-07	33	1	0.9998

Yields and fitted yields



R²(α)

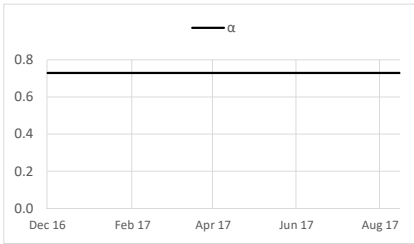


31-Dec-08	28	1	0.9998
30-Sep-08	29	1	0.9998
30-Jun-08	30	1	0.9998
31-Mar-08	31	1	0.9998
31-Dec-07	32	1	0.9998
30-Sep-07	33	1	0.9998

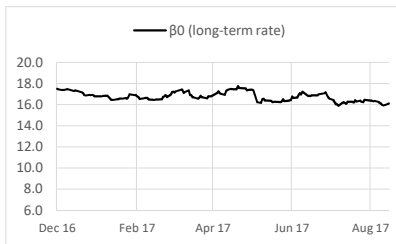
TAB: COEFFICIENTS

Date	α	β_0	β_1	β_2	$\beta_0 + \beta_1$
29-Aug-17	0.73	16.13	28.53	-77.83	44.66
28-Aug-17	0.73	16.06	27.57	-76.51	43.64
25-Aug-17	0.73	15.95	26.14	-74.42	42.08
24-Aug-17	0.73	15.97	26.43	-74.86	42.40
23-Aug-17	0.73	16.09	28.00	-77.09	44.09
22-Aug-17	0.73	16.18	29.18	-78.79	45.36
21-Aug-17	0.73	16.26	30.42	-80.48	46.68
18-Aug-17	0.73	16.38	32.01	-82.73	48.39
17-Aug-17	0.73	16.34	31.77	-82.28	48.11
16-Aug-17	0.73	16.36	32.14	-82.78	48.50
14-Aug-17	0.73	16.39	32.11	-82.90	48.51
10-Aug-17	0.73	16.45	33.17	-84.29	49.62
9-Aug-17	0.73	16.26	30.40	-80.42	46.66
8-Aug-17	0.73	16.26	30.37	-80.43	46.64
7-Aug-17	0.73	16.39	31.91	-82.66	48.30
4-Aug-17	0.73	16.30	30.69	-80.98	47.00
3-Aug-17	0.73	16.41	32.34	-83.26	48.76
2-Aug-17	0.73	16.21	30.08	-79.89	46.30
1-Aug-17	0.73	16.27	30.92	-81.02	47.19
31-Jul-17	0.73	16.26	30.76	-80.83	47.02
28-Jul-17	0.73	16.27	31.21	-81.31	47.47
27-Jul-17	0.73	16.08	27.66	-76.67	43.74
26-Jul-17	0.73	16.18	29.57	-79.15	45.74
25-Jul-17	0.73	16.25	30.83	-80.84	47.08
24-Jul-17	0.73	16.20	29.94	-79.65	46.14
21-Jul-17	0.73	15.90	24.54	-72.48	40.43
20-Jul-17	0.73	16.03	27.65	-76.41	43.68
19-Jul-17	0.73	16.05	28.04	-76.89	44.09
18-Jul-17	0.73	16.24	31.08	-81.06	47.32
17-Jul-17	0.73	16.45	34.58	-85.76	51.03
14-Jul-17	0.73	16.59	37.46	-89.46	54.05
13-Jul-17	0.73	16.71	39.82	-92.57	56.54
12-Jul-17	0.73	16.90	42.84	-96.69	59.74
11-Jul-17	0.73	17.17	48.79	-104.28	65.96
10-Jul-17	0.73	17.08	46.50	-101.41	63.58
6-Jul-17	0.73	16.99	44.06	-98.43	61.06
5-Jul-17	0.73	16.87	41.77	-95.39	58.64
30-Jun-17	0.73	16.88	42.26	-95.98	59.14
29-Jun-17	0.73	16.83	41.37	-94.78	58.20
28-Jun-17	0.73	16.82	40.64	-93.96	57.46
27-Jun-17	0.73	16.88	42.20	-95.92	59.08
23-Jun-17	0.73	17.23	51.44	-107.33	68.68
22-Jun-17	0.73	16.96	43.20	-97.36	60.16
21-Jun-17	0.73	17.08	45.81	-100.71	62.90
20-Jun-17	0.73	16.92	41.92	-95.77	58.83
19-Jun-17	0.73	16.66	34.78	-86.99	51.44
16-Jun-17	0.73	16.65	33.60	-85.70	50.24
15-Jun-17	0.73	16.80	38.01	-91.10	54.81
14-Jun-17	0.73	16.43	28.66	-79.42	45.08
13-Jun-17	0.73	16.44	28.66	-79.49	45.11
12-Jun-17	0.73	16.36	27.78	-78.19	44.15
9-Jun-17	0.73	16.34	27.49	-77.76	43.84
8-Jun-17	0.73	16.50	31.41	-82.68	47.91
7-Jun-17	0.73	16.35	29.32	-79.72	45.67
6-Jun-17	0.73	16.25	28.30	-78.18	44.56
1-Jun-17	0.73	16.29	28.02	-78.04	44.31
31-May-17	0.73	16.26	26.89	-76.70	43.16
30-May-17	0.73	16.36	28.50	-78.88	44.86
25-May-17	0.73	16.39	28.64	-79.19	45.03
24-May-17	0.73	16.58	32.78	-84.49	49.37
23-May-17	0.73	16.54	31.68	-83.12	48.22
22-May-17	0.73	16.20	27.33	-76.88	43.53
19-May-17	0.73	16.26	28.53	-78.46	44.79

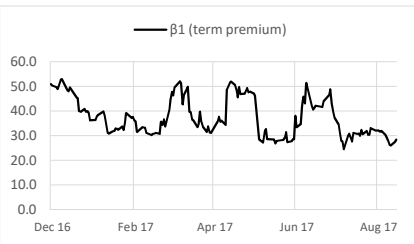
α



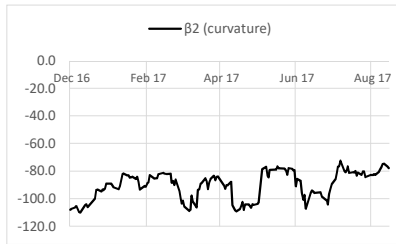
β_0 (long-term rate)



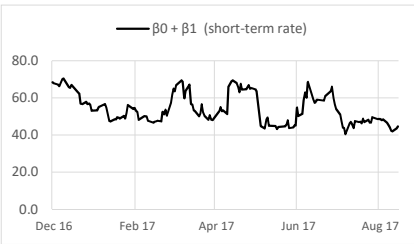
β_1 (term premium)



β_2 (curvature)



$\beta_0 + \beta_1$ (short-term rate)



TAB: CHARTS

TAB: FITTED YIELD TERM STRUCTURE

Mean (in bps)	-1.06	1.38	-0.85	-2.07	2.14	-2.80	0.41	3.69	-0.83
StDev (in bps)	1.72	2.08	1.13	1.36	1.25	2.19	1.14	2.60	1.07

#	Date	Fitted yields (in %)										Term structure residuals (in %)										Test
		1.89	2.19	4.15	5.19	5.40	5.77	6.44	7.20	7.40	0.00	1.89	2.19	4.15	5.19	5.40	5.77	6.44	7.20	7.40	SUM	
1	29-Aug-17	5.891	4.934	7.533	6.621	6.370	6.148	6.759	7.070	7.111	0.015	-0.004	0.016	-0.008	-0.002	0.006	-0.010	-0.007	-0.006	0.000		
2	28-Aug-17	5.922	4.923	7.470	6.575	6.309	6.147	6.820	7.071	7.054	0.013	-0.003	0.015	-0.007	-0.001	0.005	-0.009	-0.006	-0.006	0.000		
3	25-Aug-17	5.682	4.931	7.378	6.607	6.265	6.134	6.801	7.067	7.048	0.015	-0.004	0.014	-0.009	-0.002	0.001	-0.009	-0.003	-0.004	0.000		
4	24-Aug-17	5.764	4.924	7.362	6.603	6.452	6.262	6.958	7.118	7.082	0.015	-0.003	0.012	-0.008	-0.005	-0.001	-0.006	-0.001	-0.002	0.000		
5	23-Aug-17	5.868	4.928	7.471	6.597	6.503	6.280	6.961	7.116	7.178	0.015	-0.003	0.014	-0.007	-0.005	0.001	-0.008	-0.005	-0.002	0.000		
6	22-Aug-17	6.058	4.927	7.608	6.565	6.456	6.052	7.052	7.098	7.193	0.010	-0.003	0.018	-0.007	-0.004	0.011	-0.010	-0.009	-0.006	0.000		
7	21-Aug-17	6.136	4.949	7.607	6.644	6.276	6.296	6.909	7.354	7.154	0.010	-0.002	0.014	-0.007	0.004	0.003	-0.011	-0.002	-0.009	0.000		
8	18-Aug-17	6.157	4.941	7.614	6.919	6.211	6.588	6.638	7.599	6.945	0.013	-0.003	0.007	-0.012	0.010	-0.004	-0.006	0.006	-0.012	0.000		
9	17-Aug-17	6.187	4.975	7.602	6.919	5.953	6.601	6.628	7.584	6.921	0.008	-0.004	0.009	-0.012	0.018	-0.006	-0.007	0.007	-0.012	0.000		
10	16-Aug-17	6.244	4.981	7.613	6.853	5.945	6.575	6.613	7.572	6.852	0.007	-0.004	0.008	-0.011	0.019	-0.005	-0.006	0.005	-0.011	0.000		
11	14-Aug-17	6.154	4.938	7.771	6.826	5.942	6.547	6.567	7.505	6.893	0.011	-0.005	0.016	-0.013	0.020	-0.005	-0.006	-0.003	-0.014	0.000		
12	10-Aug-17	6.173	4.964	7.786	6.955	5.986	6.597	6.671	7.591	6.868	0.011	-0.005	0.015	-0.014	0.020	-0.006	-0.008	0.000	-0.013	0.000		
13	9-Aug-17	6.175	4.951	7.477	6.928	5.901	6.598	6.609	7.564	6.821	0.007	-0.004	0.005	-0.011	0.018	-0.007	-0.007	0.011	-0.011	0.000		
14	8-Aug-17	6.173	4.941	7.456	6.770	5.936	6.505	6.549	7.582	6.839	0.007	-0.004	0.002	-0.011	0.017	-0.005	-0.006	0.010	-0.012	0.000		
15	7-Aug-17	6.417	4.916	7.691	6.765	5.956	6.602	6.585	7.512	6.831	0.002	-0.004	0.011	-0.010	0.022	-0.005	-0.005	-0.001	-0.011	0.000		
16	4-Aug-17	6.406	4.900	7.641	6.859	5.934	6.547	6.578	7.427	6.870	0.001	-0.004	0.013	-0.011	0.021	-0.004	-0.005	-0.001	-0.011	0.000		
17	3-Aug-17	6.675	4.911	7.695	7.008	5.986	6.590	6.577	7.569	6.872	-0.006	-0.004	0.012	-0.012	0.023	-0.003	-0.003	0.003	-0.010	0.000		
18	2-Aug-17	5.286	4.911	6.927	6.924	6.024	6.572	6.604	7.622	6.929	0.022	-0.014	-0.009	-0.009	0.012	-0.006	-0.006	0.020	-0.009	0.000		
19	1-Aug-17	5.262	4.924	7.000	7.011	5.966	6.690	6.572	7.674	6.915	0.021	-0.015	-0.010	-0.009	0.015	-0.008	-0.005	0.021	-0.010	0.000		
20	31-Jul-17	5.276	4.911	7.007	7.055	5.949	6.669	6.657	7.695	6.905	0.022	-0.016	-0.010	-0.009	0.016	-0.008	-0.007	0.023	-0.010	0.000		
21	28-Jul-17	5.293	4.966	7.067	7.145	5.955	6.702	6.618	7.654	6.933	0.018	-0.014	-0.008	-0.007	0.014	-0.008	-0.006	0.021	-0.010	0.000		
22	27-Jul-17	5.299	4.853	7.079	7.099	5.781	6.692	6.471	7.634	6.855	0.022	-0.015	-0.009	-0.008	0.016	-0.011	-0.007	0.026	-0.012	0.000		
23	26-Jul-17	5.301	4.926	7.073	7.136	5.685	6.808	6.345	7.662	6.661	0.018	-0.016	-0.010	-0.008	0.018	-0.012	-0.003	0.023	-0.010	0.000		
24	25-Jul-17	5.195	4.949	7.097	6.945	5.702	6.636	6.380	7.646	6.700	0.013	-0.015	-0.009	-0.011	0.020	-0.008	-0.001	0.020	-0.009	0.000		
25	24-Jul-17	5.259	4.924	7.056	6.977	5.712	6.637	6.396	7.646	6.726	0.017	-0.016	-0.009	-0.011	0.019	-0.009	-0.003	0.022	-0.010	0.000		
26	21-Jul-17	5.307	4.758	7.115	6.919	5.678	6.664	6.400	7.548	6.682	0.023	-0.014	-0.005	-0.011	0.016	-0.013	-0.009	0.026	-0.013	0.000		
27	20-Jul-17	5.412	4.946	7.087	6.890	5.681	6.661	6.398	7.493	6.717	0.016	-0.012	-0.004	-0.009	0.014	-0.009	-0.006	0.020	-0.010	0.000		
28	19-Jul-17	5.487	4.980	7.095	6.875	5.697	6.698	6.343	7.492	6.751	0.015	-0.011	-0.004	-0.009	0.013	-0.010	-0.004	0.019	-0.010	0.000		
29	18-Jul-17	5.087	5.030	7.067	6.965	5.696	6.772	6.314	7.566	6.666	0.000	-0.007	-0.007	-0.008	0.020	-0.008	0.002	0.016	-0.007	0.000		
30	17-Jul-17	5.170	5.068	7.193	7.017	5.680	6.980	6.302	7.764	6.643	0.002	-0.011	-0.010	-0.011	0.022	-0.011	0.005	0.019	-0.006	0.000		
31	14-Jul-17	5.327	5.141	7.213	7.149	5.835	7.091	6.383	7.849	6.723	0.008	-0.014	-0.010	-0.011	0.020	-0.011	0.004	0.020	-0.006	0.000		
32	13-Jul-17	5.328	5.177	7.050	7.350	5.835	7.229	6.422	7.944	6.742	0.006	-0.014	-0.012	-0.011	0.022	-0.012	0.005	0.021	-0.006	0.000		
33	12-Jul-17	5.231	5.202	7.113	7.441	5.856	7.276	6.463	8.140	6.696	-0.004	-0.009	-0.014	-0.015	0.029	-0.016	0.008	0.024	-0.002	0.000		

TAB: CONFIGURATION FILE

Calculation enabled

TRUE

Test connection host: home-pc; user: Konstantin Rybakov; key: null

Term structure estimation methods	Term structure output keys	Alpha (α) range
Diebold-Li	TS-coeffs Array of term structure regression coefficients	minimum 0.1
Fabozzi	TS-yields-fitted Fitted term structure yields	maximum 1
Nelson-Siegel	TS-R2 Mapping sample index => R2 (term structure ols)	delta 0.05
Ridge-OLS	TS-cov (H) Term structure residuals covariance matrix (matrix H)	

Array formula cell address	number of rows	number of cols	Description
'calc'!\$S\$16	200	2	Function R2(α^*)
'TS'!\$C\$5	200	4	Term structure regression model coefficients
'fitted'!\$D\$6	200	9	Term structure fitted yields
'res'!\$D\$10	9	9	Term structure fitted yields

Package: IRB.TS

Available functions for term structure estimation:

CalculatorNelsonSiegel calc = calcTS(Map<Double, Double> sample, String method)

where sample is the mapping $t \Rightarrow y[t]$ of maturity term into related yield rate and method parameter is the method used to estimate the term structure. The list of methods includes:

Diebold-Li

Fabozzi

Nelson-Siegel

Ridge-OLS

double[][] (double[]) CalculatorNelsonSiegel calc, String key)

where key represents the key for a specific retrieved field. The following keys can be used:

1. **TS-coeffs**: coefficients of the term structure (as a list $(\alpha, \beta_0, \beta_1, \beta_2)$);
2. **TS-yields-fitted**: fitted term structure values;
3. **TS-R2**: the values $R^2(\alpha)$ for a grid of α values;