Complementary Tables: A segmented and observable Yield Curve

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Abstract

Following Almeida et al. (2018) we implement a segmented three factor Nelson-Siegel model for the yield curve using daily observable bond prices and short term inter-bank rates for Colombia. The flexible estimation for each segment (short, medium, and long) provides an improvement over the classical Nelson-Siegel approach in particular in terms of in-sample and out-of-sample forecasting performance. A segmented term structure model based on observable bond prices, provides a tool closer to the needs of practitioners in terms of reproducing the market quotes and allowing for independent local shocks in the different segments of the curve.

Keywords: Term structure, Nelson-Siegel, Preferred habitat theory.

JEL codes: G12, E43, C53, C58.

1 Tables

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years	NS3	NS3S	NS3WS	NS3SS
0.004	10.2	288.3	8.2	6.6
0.1	4.9	280.9	3.6	2.5
0.3	6.8	267.3	6.9	7.1
1.5	9.0	213.7	9.2	7.9
3.8	14.3	109.0	17.6	9.2
3.9	19.5	139.0	16.0	24.3
4.7	9.9	103.3	8.0	9.9
5.6	5.6	68.6	5.5	7.2
7.3	11.7	30.8	3.3	17.8
9.6	10.2	1.2	7.3	8.0
11.7	7.1	4.5	10.3	5.6
13.3	9.6	4.4	6.6	5.9
15.7	9.1	1.2	11.2	12.5
	15.1	**91.8**	**13**	**8.9**

Table 1: In-sample root-mean-square error (RMSE) in basis points between modeled and observed yields, for 2015.

years	NS3	NS3S	NS3WS	NS3SS
0.004	9.7	97.2	8.6	12.8
0.1	7.6	94.9	4.1	3.9
0.3	12.1	90.4	9.6	9.1
0.5	12.6	82.8	12.4	14.4
2.8	11.4	42.7	6.8	9.5
2.9	37.6	60.3	26.9	21.5
3.7	14.4	42.7	5.6	6.6
4.6	7.9	26.7	11.5	9.1
6.3	5.7	22.1	6.4	5.2
8.6	21.4	0.9	3.2	4.4
10.7	15.5	3.2	18.5	3.8
12.3	4.4	3.2	11.2	4.6
14.7	16.8	0.8	16.1	5.6
	15.1	**91.8**	**13**	**8.9**

Table 2: In-sample root-mean-square error (RMSE) in basis points between modeled and observed yields, for 2016.

years	NS3	NS3S	NS3WS	NS3SS
0.004	31.9	170.7	24.7	11.2
0.1	20.3	174.2	14.3	5.1
0.3	5.6	176.0	5.0	6.2
0.5	15.2	179.2	16.7	13.5
1.8	21.5	150.0	14.0	13.9
1.9	34.8	152.7	26.3	9.7
2.7	16.2	121.1	6.2	5.0
3.6	7.4	84.5	15.7	9.9
5.3	6.8	53.5	6.8	5.1
7.6	15.4	18.6	11.7	6.1
9.7	14.0	0.7	9.0	12.3
11.3	6.7	1.7	13.9	9.7
13.7	5.5	1.7	4.3	2.0
15.5	9.5	0.7	13.0	14.7
	15.1	**91.8**	**13**	**8.9**

Table 3: In-sample root-mean-square error (RMSE) in basis points between modeled and observed yields, for 2017.

years	NS3	NS3S	NS3WS	NS3SS
0.004	14.4	167.4	14.8	10.9
0.1	6.5	171.4	6.8	4.9
0.3	8.4	178.4	8.3	6.5
0.5	20.0	182.2	20.0	14.4
1.7	7.4	126.7	7.3	8.9
2.6	13.7	79.4	12.9	13.6
4.3	5.3	47.2	4.5	7.2
6.6	4.3	11.7	4.3	5.0
7.9	3.7	5.4	1.7	3.5
8.7	2.1	0.7	1.9	13.1
10.3	8.9	1.7	9.2	10.7
12.7	2.3	1.7	2.6	3.4
14.5	6.0	0.7	6.0	12.1
	15.1	**91.8**	**13**	**8.9**

Table 4: In-sample root-mean-square error (RMSE) in basis points between modeled and observed yields, for 2018.

	day			week			month		
years	NS	SM	RW	NS	SM	RW	NS	SM	RW
0.004	12.4	9.2	12.4	11.7	8.9	11.8	12.1	13.0	11.2
0.1	6.0	3.4	6.1	7.4	7.2	7.0	14.1	16.7	13.1
0.3	11.6	12.9	11.4	15.4	17.6	14.3	25.4	28.3	24.0
1.5	11.9	9.7	11.9	14.1	14.4	13.9	20.7	26.7	19.7
3.8	18.4	13.5	18.0	23.8	20.2	22.5	37.5	33.8	34.8
3.9	20.9	25.1	21.2	21.6	25.7	22.2	22.3	25.0	23.2
4.7	12.4	12.8	12.4	16.2	17.3	15.8	24.9	25.4	23.1
5.6	9.0	10.6	8.6	16.2	18.1	15.0	30.2	32.0	27.2
7.3	14.8	21.4	14.7	18.8	24.6	18.1	30.9	36.4	28.2
9.6	13.3	9.6	13.3	18.3	13.0	17.7	31.1	22.1	28.3
11.7	10.4	8.1	10.3	15.3	12.9	14.8	27.7	25.2	24.9
13.3	11.2	8.2	11.4	13.6	12.8	14.1	21.9	24.8	21.2
15.7	11.9	14.5	11.9	15.5	20.5	15.1	27.3	36.6	25.9
	12.6	**12.2**	**12.6**	**16.0**	**16.4**	**15.6**	**25.1**	**26.6**	**23.4**

Table 5: Out-of-sample root-mean-square error (RMSE) in basis points for 2015.

	day			week			month		
years	NS	SM	RW	NS	SM	RW	NS	SM	RW
0.004	13.6	16.0	11.2	16.4	26.6	10.2	28.8	63.9	8.0
0.1	13.4	11.7	9.8	17.8	25.4	9.6	31.8	62.2	11.2
0.3	16.2	14.5	12.8	20.9	25.7	13.9	34.1	60.5	17.6
0.5	17.8	19.0	14.8	23.2	28.4	17.3	36.3	60.5	23.0
2.8	15.4	11.1	14.5	20.9	17.2	18.0	34.3	30.3	26.0
2.9	40.1	22.7	39.7	44.5	28.5	42.4	56.3	40.8	49.8
3.7	16.8	9.6	16.3	24.3	18.6	21.3	41.0	32.7	32.5
4.6	9.8	11.2	9.9	17.2	17.7	15.7	34.8	30.1	26.6
6.3	9.4	8.6	9.3	18.6	16.5	16.9	36.6	29.1	27.5
8.6	22.6	8.3	22.9	25.0	15.7	25.4	34.5	27.2	29.5
10.7	17.3	8.0	17.2	21.6	15.9	21.3	33.3	27.3	26.6
12.3	9.8	9.4	7.9	19.2	17.1	15.5	36.7	31.1	24.8
14.7	20.0	8.9	19.6	25.5	15.8	23.6	40.4	29.7	29.3
	17.1	**12.2**	**15.8**	**22.7**	**20.7**	**19.3**	**36.8**	**40.4**	**25.6**

Table 6: Out-of-sample root-mean-square error (RMSE) in basis points for 2016.

	day			week			month		
years	NS	SM	RW	NS	SM	RW	NS	SM	RW
0.004	16.4	11.6	15.6	17.7	10.9	14.7	12.0	9.3	8.7
0.1	7.5	5.0	6.7	9.9	5.1	6.0	8.7	8.8	5.3
0.3	8.6	7.3	8.9	10.9	9.2	10.4	15.3	15.6	16.5
0.5	20.0	15.1	20.6	20.0	16.0	21.5	24.0	20.4	26.3
1.7	8.5	9.8	8.6	11.3	11.2	10.3	17.7	18.0	16.4
2.6	15.4	14.6	14.6	18.5	16.1	15.0	24.2	22.0	16.4
4.3	7.3	8.5	6.4	11.8	10.8	8.6	21.2	18.6	15.2
6.6	6.2	6.0	5.6	10.2	8.8	8.2	18.3	15.6	14.0
7.9	4.3	4.6	4.7	7.8	7.9	7.7	16.8	16.1	15.3
8.7	4.0	13.8	3.7	9.2	15.9	8.0	18.4	22.4	16.5
10.3	9.8	11.8	10.0	12.3	14.4	12.5	20.5	22.1	20.7
12.7	4.0	4.6	4.0	8.4	7.9	7.9	17.0	14.6	16.3
14.5	7.2	12.6	7.2	10.5	13.9	10.6	15.9	16.0	15.9
	9.2	**9.6**	**9**	**12.2**	**11.4**	**10.9**	**17.7**	**16.9**	**15.7**

Table 7: Out-of-sample root-mean-square error (RMSE) in basis points for 2018.

	day		week		month	
years	NS	RW	NS	RW	NS	RW
0.004	0.00	0.00	0.00	0.00	0.37	0.00
0.1	0.00	0.00	0.00	0.00	0.01	0.00
0.3	0.00	0.00	0.04	0.00	0.86	0.00
0.5	0.00	0.30	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.00	0.00
1.9	0.00	0.00	0.00	0.00	0.00	0.00
2.7	0.00	0.00	0.00	0.00	0.00	0.56
3.6	0.00	0.00	0.16	0.00	0.27	0.00
5.3	0.05	0.00	0.01	0.04	0.00	0.00
7.6	0.00	0.00	0.00	0.00	0.72	0.57
9.7	0.08	0.01	0.11	0.72	0.00	0.00
11.3	0.00	0.00	0.00	0.00	0.00	0.00
13.7	0.00	0.00	0.00	0.33	0.94	0.00
15.5	0.00	0.00	0.53	0.00	0.36	0.00

Table 8: p-values for the Diebold and Mariano test of forecast accuracy, 2017.