

II. Term structure of interest rates in the debt securities market *

a) Term structure of interest rates in the debt securities market - estimated values, listed Federal securities

% per annum

Interest rate at a residual maturity of ... years										
End of year or month or trading day	1	2	3	4	5	6	7	8	9	10
2013	0.13	0.24	0.44	0.69	0.95	1.21	1.47	1.70	1.92	2.11
2014	0.10	0.10	0.10	0.06	0.02	0.12	0.24	0.36	0.49	0.60
2015	0.39	0.35	0.26	0.14	0.01	0.13	0.28	0.42	0.56	0.70
2016	0.84	0.80	0.76	0.65	0.51	0.35	0.18	0.03	0.10	0.22
2017	0.72	0.64	0.50	0.34	0.18	0.02	0.12	0.25	0.37	0.48
2018	0.70	0.65	0.56	0.44	0.31	0.18	0.06	0.06	0.16	0.25
2019	0.69	0.63	0.58	0.54	0.49	0.44	0.37	0.31	0.25	0.19
2020	0.73	0.75	0.77	0.77	0.75	0.72	0.68	0.65	0.61	0.57
2021	0.73	0.68	0.62	0.56	0.50	0.44	0.38	0.33	0.28	0.24
2022	2.39	2.59	2.55	2.50	2.47	2.47	2.48	2.50	2.51	2.53
2023	2.97	2.35	2.04	1.91	1.87	1.88	1.92	1.96	2.01	2.06
2023 May	2.97	2.71	2.53	2.41	2.33	2.28	2.26	2.25	2.26	2.28
June	3.43	3.14	2.86	2.66	2.55	2.48	2.45	2.43	2.43	2.43
July	3.39	3.07	2.80	2.62	2.53	2.48	2.47	2.48	2.50	2.52
Aug.	3.34	2.98	2.70	2.54	2.47	2.44	2.44	2.46	2.48	2.51
Sep.	3.58	3.19	2.92	2.80	2.76	2.76	2.78	2.80	2.84	2.87
Oct.	3.47	3.00	2.74	2.63	2.61	2.63	2.66	2.71	2.76	2.80
Nov.	3.26	2.77	2.48	2.32	2.26	2.26	2.29	2.34	2.40	2.45
Dec.	2.97	2.35	2.04	1.91	1.87	1.88	1.92	1.96	2.01	2.06
2024 Jan.	3.12	2.53	2.24	2.11	2.07	2.08	2.11	2.15	2.19	2.24
Feb.	3.40	2.97	2.70	2.55	2.47	2.44	2.44	2.45	2.48	2.51
Mar.	3.29	2.82	2.54	2.37	2.29	2.26	2.26	2.27	2.30	2.33
Apr.	3.34	2.97	2.73	2.59	2.52	2.49	2.48	2.50	2.53	2.56
May	3.36	3.07	2.88	2.76	2.69	2.65	2.65	2.66	2.68	2.71
June	3.12	2.78	2.57	2.45	2.39	2.38	2.39	2.42	2.45	2.49
July	2.95	2.54	2.32	2.22	2.19	2.20	2.22	2.26	2.30	2.35
Aug.	2.71	2.32	2.15	2.09	2.09	2.12	2.16	2.20	2.25	2.30
Sep.	2.44	2.05	1.92	1.90	1.93	1.98	2.04	2.10	2.16	2.21
Oct.	2.46	2.24	2.17	2.17	2.21	2.25	2.31	2.36	2.41	2.46
2024 Oct. 7	2.51	2.19	2.06	2.04	2.06	2.10	2.15	2.20	2.26	2.31
8	2.50	2.16	2.04	2.02	2.04	2.09	2.14	2.20	2.25	2.30
9	2.50	2.16	2.03	2.01	2.03	2.07	2.12	2.18	2.23	2.28
10	2.53	2.21	2.08	2.06	2.07	2.12	2.17	2.22	2.27	2.32
11	2.51	2.18	2.07	2.05	2.07	2.12	2.17	2.23	2.28	2.33
14	2.50	2.17	2.05	2.03	2.06	2.10	2.15	2.21	2.26	2.31
15	2.48	2.15	2.03	2.01	2.03	2.07	2.13	2.18	2.23	2.28
16	2.47	2.12	1.99	1.97	1.99	2.03	2.09	2.14	2.19	2.24
17	2.49	2.13	2.01	1.98	2.00	2.05	2.10	2.16	2.21	2.26
18	2.41	2.06	1.95	1.94	1.97	2.03	2.09	2.15	2.20	2.26
21	2.40	2.07	1.97	1.96	2.00	2.05	2.11	2.17	2.23	2.28
22	2.44	2.14	2.04	2.03	2.07	2.13	2.19	2.25	2.31	2.37
23	2.38	2.09	2.00	2.01	2.05	2.11	2.18	2.25	2.31	2.37
24	2.34	2.04	1.96	1.97	2.01	2.08	2.14	2.21	2.27	2.33
25	2.36	2.08	1.99	1.99	2.03	2.09	2.15	2.21	2.27	2.33
28	2.34	2.06	1.98	1.99	2.04	2.10	2.16	2.22	2.29	2.34
29	2.36	2.09	2.02	2.03	2.07	2.13	2.19	2.26	2.32	2.37
30	2.38	2.13	2.05	2.05	2.08	2.13	2.19	2.25	2.31	2.36
31	2.46	2.24	2.17	2.17	2.21	2.25	2.31	2.36	2.41	2.46
Nov. 1	2.45	2.23	2.16	2.17	2.20	2.25	2.31	2.36	2.41	2.45
4	2.47	2.25	2.19	2.19	2.23	2.28	2.33	2.38	2.43	2.47
5	2.47	2.24	2.17	2.17	2.21	2.26	2.31	2.37	2.41	2.46
Memo item: yields, derived from the term structure of interest rates, on listed Federal securities with annual coupon payments										
2024 Oct. 31	2.46	2.24	2.17	2.17	2.21	2.25	2.30	2.35	2.40	2.44
Parameters for calculating the term structure of interest rates										
	Beta0	Beta1	Beta2	Beta3	Tau1	Tau2				
2024 Oct. 30	0.85072	2.17687	-0.00660	5.61775	0.92747	13.19301				
31	1.01483	1.98257	-0.00990	5.26292	1.00113	12.75351				
Nov. 1	1.10148	1.91536	-0.01277	4.99586	0.91950	12.86683				
4	1.08607	1.92505	0.00387	5.02300	0.94123	12.38789				
5	1.06746	1.98178	-0.04986	5.03663	0.94062	12.38104				

* Interest rates on (theoretical) zero coupon bonds without a default risk, estimated according to the procedure outlined in the explanatory notes. The estimates are based on the prices of Federal bonds, five-year Federal notes and Federal Treasury notes with

a residual maturity of at least three months. The interest rates are estimated using a non-linear, parametric approach.

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still: a) Term structure of interest rates in the debt securities market - estimated values, listed Federal securities

% per annum

		Interest rate at a residual maturity of ... years									
End of year or month or trading day		11	12	13	14	15	16	17	18	19	20
2013		2.28	2.42	2.55	2.66	2.75	2.82	2.87	2.92	2.95	2.97
2014		0.71	0.81	0.90	0.98	1.05	1.12	1.18	1.23	1.27	1.32
2015		0.82	0.94	1.04	1.14	1.22	1.30	1.36	1.41	1.46	1.50
2016		0.33	0.42	0.49	0.56	0.62	0.67	0.72	0.76	0.80	0.83
2017		0.57	0.66	0.74	0.81	0.87	0.92	0.97	1.02	1.06	1.10
2018		0.33	0.40	0.47	0.52	0.57	0.62	0.66	0.69	0.73	0.76
2019		-	0.14	-	0.09	-	0.04	0.07	0.11	0.13	0.16
2020		-	0.53	-	0.50	-	0.46	-	0.43	-	0.40
2021		-	0.20	-	0.16	-	0.13	-	0.10	-	0.07
2022		2.55	2.56	2.57	2.57	2.58	2.58	2.57	2.57	2.56	2.55
2023		2.11	2.15	2.19	2.22	2.25	2.27	2.28	2.30	2.30	2.31
2023	Apr.	2.37	2.38	2.39	2.40	2.41	2.41	2.42	2.43	2.43	2.44
	May	2.30	2.32	2.35	2.37	2.40	2.42	2.43	2.45	2.46	2.46
	June	2.43	2.43	2.43	2.43	2.44	2.44	2.44	2.44	2.44	2.44
	July	2.54	2.56	2.58	2.59	2.61	2.62	2.63	2.63	2.63	2.63
	Aug.	2.53	2.56	2.58	2.60	2.62	2.63	2.64	2.65	2.65	2.65
	Sep.	2.90	2.92	2.95	2.97	2.99	3.00	3.02	3.02	3.03	3.03
	Oct.	2.84	2.88	2.92	2.95	2.98	3.00	3.02	3.04	3.05	3.06
	Nov.	2.51	2.56	2.60	2.64	2.66	2.69	2.70	2.71	2.71	2.72
	Dec.	2.11	2.15	2.19	2.22	2.25	2.27	2.28	2.30	2.30	2.31
2024	Jan.	2.28	2.32	2.35	2.38	2.41	2.43	2.44	2.46	2.47	2.47
	Feb.	2.54	2.57	2.60	2.62	2.64	2.65	2.66	2.67	2.68	2.68
	Mar.	2.36	2.39	2.42	2.44	2.46	2.48	2.49	2.50	2.50	2.50
	Apr.	2.59	2.63	2.65	2.68	2.70	2.71	2.72	2.73	2.73	2.73
	May	2.74	2.77	2.80	2.83	2.85	2.87	2.88	2.89	2.89	2.89
	June	2.53	2.57	2.60	2.63	2.65	2.67	2.68	2.69	2.70	2.70
	July	2.39	2.42	2.46	2.49	2.51	2.54	2.55	2.57	2.58	2.58
	Aug.	2.34	2.38	2.41	2.44	2.46	2.49	2.50	2.52	2.53	2.53
	Sep.	2.26	2.31	2.35	2.38	2.42	2.44	2.47	2.48	2.50	2.51
2024	Oct. 7	2.35	2.39	2.43	2.46	2.48	2.51	2.52	2.54	2.55	2.56
	8	2.35	2.39	2.43	2.46	2.49	2.51	2.53	2.55	2.56	2.57
	9	2.33	2.37	2.41	2.44	2.47	2.49	2.51	2.52	2.54	2.55
	10	2.37	2.41	2.44	2.47	2.50	2.52	2.54	2.56	2.57	2.58
	11	2.38	2.42	2.46	2.49	2.52	2.55	2.56	2.58	2.59	2.60
	14	2.36	2.40	2.43	2.47	2.49	2.52	2.54	2.55	2.56	2.57
	15	2.32	2.36	2.40	2.43	2.46	2.48	2.50	2.51	2.53	2.54
	16	2.29	2.33	2.36	2.40	2.42	2.45	2.47	2.48	2.50	2.51
	17	2.31	2.35	2.38	2.42	2.45	2.47	2.49	2.51	2.52	2.53
	18	2.30	2.35	2.39	2.42	2.45	2.47	2.49	2.51	2.52	2.53
	21	2.33	2.38	2.42	2.45	2.48	2.51	2.53	2.55	2.56	2.57
	22	2.42	2.47	2.51	2.54	2.57	2.60	2.62	2.63	2.65	2.66
	23	2.42	2.47	2.51	2.55	2.58	2.60	2.62	2.64	2.66	2.67
	24	2.38	2.42	2.47	2.50	2.53	2.56	2.58	2.59	2.61	2.62
	25	2.38	2.43	2.47	2.50	2.53	2.56	2.58	2.59	2.61	2.61
	28	2.39	2.44	2.48	2.51	2.54	2.56	2.58	2.60	2.61	2.62
	29	2.42	2.47	2.51	2.54	2.57	2.59	2.61	2.63	2.64	2.65
	30	2.40	2.44	2.48	2.51	2.54	2.56	2.58	2.59	2.60	2.61
	31	2.50	2.54	2.57	2.60	2.62	2.64	2.65	2.66	2.67	2.67
Nov.	1	2.49	2.53	2.56	2.59	2.61	2.63	2.64	2.66	2.66	2.67
	4	2.51	2.55	2.58	2.60	2.62	2.64	2.65	2.66	2.67	2.67
	5	2.50	2.53	2.56	2.59	2.61	2.63	2.64	2.65	2.65	2.66
Memo item: yields, derived from the term structure of interest rates, on listed Federal securities with annual coupon payments											
2024	Oct. 31	2.48	2.51	2.54	2.56	2.58	2.60	2.61	2.62	2.63	2.64
Parameters for calculating the term structure of interest rates											
		Beta0	Beta1	Beta2	Beta3	Tau1	Tau2				
2024	Oct. 30	0.85072	2.17687	-0.00660	5.61775	0.92747	13.19301				
	31	1.01483	1.98257	-0.00990	5.26292	1.00113	12.75351				
Nov.	1	1.10148	1.91536	-0.01277	4.99586	0.91950	12.86683				
	4	1.08607	1.92505	0.00387	5.02300	0.94123	12.38789				
	5	1.06746	1.98178	-0.04986	5.03663	0.94062	12.38104				

* Interest rates on (theoretical) zero coupon bonds without a default risk, estimated according to the procedure outlined in the explanatory notes. The estimates are based on the prices of Federal bonds, five-year Federal notes and Federal Treasury notes with

a residual maturity of at least three months. The interest rates are estimated using a non-linear, parametric approach.

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% per annum

		Interest rate at a residual maturity of ... years									
End of year or month or trading day	21	22	23	24	25	26	27	28	29	30	
2013	2.99	2.99	2.99	2.98	2.97	2.96	2.94	2.92	2.89	2.86	
2014	1.36	1.39	1.43	1.46	1.48	1.51	1.53	1.55	1.57	1.59	
2015	1.53	1.56	1.57	1.59	1.59	1.60	1.60	1.59	1.59	1.58	
2016	0.86	0.89	0.91	0.94	0.96	0.98	1.00	1.01	1.03	1.04	
2017	1.13	1.16	1.19	1.22	1.24	1.26	1.28	1.30	1.32	1.34	
2018	0.78	0.81	0.83	0.85	0.87	0.89	0.90	0.92	0.93	0.95	
2019	0.21	0.23	0.25	0.26	0.28	0.29	0.31	0.32	0.33	0.34	
2020	-	0.26	-	0.23	-	0.21	-	0.17	-	0.14	
2021	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.12	
2022	2.53	2.52	2.50	2.48	2.47	2.45	2.43	2.41	2.39	2.36	
2023	2.31	2.31	2.30	2.30	2.29	2.28	2.27	2.25	2.24	2.22	
2023 Apr.	2.44	2.44	2.45	2.45	2.45	2.46	2.46	2.46	2.46	2.46	
May	2.47	2.47	2.46	2.46	2.44	2.43	2.42	2.40	2.38	2.36	
June	2.44	2.44	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	
July	2.63	2.62	2.62	2.61	2.60	2.58	2.57	2.56	2.54	2.52	
Aug.	2.65	2.65	2.64	2.63	2.62	2.61	2.60	2.59	2.57	2.56	
Sep.	3.03	3.03	3.03	3.02	3.02	3.01	3.00	2.99	2.98	2.96	
Oct.	3.07	3.07	3.07	3.07	3.06	3.06	3.05	3.04	3.03	3.02	
Nov.	2.71	2.71	2.70	2.69	2.68	2.67	2.66	2.65	2.63	2.62	
Dec.	2.31	2.31	2.30	2.30	2.29	2.28	2.27	2.25	2.24	2.22	
2024 Jan.	2.48	2.48	2.47	2.47	2.46	2.45	2.44	2.43	2.41	2.40	
Feb.	2.67	2.67	2.66	2.65	2.64	2.63	2.62	2.60	2.59	2.57	
Mar.	2.50	2.50	2.49	2.49	2.48	2.47	2.45	2.44	2.43	2.41	
Apr.	2.73	2.72	2.71	2.70	2.69	2.68	2.66	2.65	2.63	2.62	
May	2.89	2.89	2.88	2.86	2.85	2.83	2.82	2.80	2.78	2.76	
June	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.62	2.61	2.59	
July	2.59	2.59	2.59	2.58	2.58	2.57	2.56	2.55	2.53	2.52	
Aug.	2.54	2.54	2.54	2.54	2.53	2.53	2.52	2.51	2.50	2.49	
Sep.	2.52	2.52	2.53	2.53	2.52	2.52	2.51	2.51	2.50	2.49	
2024 Oct. 7	2.56	2.56	2.56	2.56	2.56	2.55	2.54	2.53	2.52	2.51	
8	2.57	2.58	2.58	2.58	2.57	2.57	2.56	2.55	2.54	2.53	
9	2.55	2.55	2.56	2.55	2.55	2.54	2.54	2.53	2.52	2.51	
10	2.58	2.58	2.58	2.58	2.58	2.57	2.56	2.55	2.54	2.53	
11	2.61	2.61	2.61	2.61	2.60	2.60	2.59	2.58	2.57	2.56	
14	2.58	2.58	2.58	2.58	2.58	2.57	2.56	2.56	2.55	2.54	
15	2.54	2.54	2.55	2.54	2.54	2.54	2.53	2.52	2.51	2.50	
16	2.51	2.52	2.52	2.52	2.52	2.51	2.51	2.50	2.49	2.48	
17	2.53	2.54	2.54	2.54	2.53	2.53	2.52	2.51	2.50	2.49	
18	2.54	2.55	2.55	2.55	2.54	2.54	2.53	2.52	2.52	2.51	
21	2.58	2.58	2.59	2.59	2.58	2.58	2.57	2.57	2.56	2.55	
22	2.66	2.67	2.67	2.67	2.66	2.66	2.65	2.64	2.63	2.62	
23	2.67	2.68	2.68	2.67	2.67	2.67	2.66	2.65	2.64	2.63	
24	2.62	2.63	2.63	2.62	2.62	2.61	2.61	2.60	2.59	2.57	
25	2.62	2.62	2.62	2.62	2.62	2.61	2.60	2.59	2.58	2.57	
28	2.63	2.63	2.63	2.63	2.62	2.62	2.61	2.60	2.59	2.57	
29	2.65	2.65	2.65	2.65	2.65	2.64	2.63	2.62	2.61	2.60	
30	2.61	2.62	2.61	2.61	2.61	2.60	2.59	2.58	2.57	2.56	
31	2.68	2.67	2.67	2.67	2.66	2.65	2.64	2.63	2.62	2.60	
Nov. 1	2.67	2.67	2.67	2.66	2.66	2.65	2.64	2.63	2.62	2.61	
4	2.67	2.67	2.66	2.66	2.65	2.64	2.63	2.62	2.60	2.59	
5	2.66	2.65	2.65	2.64	2.64	2.63	2.62	2.60	2.59	2.58	
Memo item: yields, derived from the term structure of interest rates, on listed Federal securities with annual coupon payments											
2024 Oct. 31	2.64	2.64	2.64	2.64	2.63	2.63	2.62	2.61	2.61	2.60	
Parameters for calculating the term structure of interest rates											
		Beta0	Beta1	Beta2	Beta3	Tau1	Tau2				
2024 Oct. 30		0.85072	2.17687	- 0.00660	5.61775	0.92747	13.19301				
31		1.01483	1.98257	- 0.00990	5.26292	1.00113	12.75351				
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4		1.08607	1.92505	0.00387	5.02300	0.94123	12.38789				
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a residual maturity of at least three months. The interest rates are estimated using a non-linear, parametric approach.