

The Ordered Qualitative Model For Credit Rating Transitions

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1 Appendix 1: Additional Tables and Figures

Table a.1 Estimates of thresholds, $a_{1,t}^* = 0$

Year	a_2^*	a_3^*	a_4^*	a_5^*	a_6^*	a_7^*
1981	4.04	6.78	7.97	11.19	14.49	21.77
1982	5.40	5.71	6.39	7.40	12.53	13.11
1983	4.94	5.30	6.32	7.34	14.35	14.59
1984	4.57	5.06	6.02	7.03	13.57	13.84
1985	5.69	5.99	6.67	7.69	12.81	13.40
1986	6.11	6.86	8.29	9.31	15.65	16.24
1987	3.01	3.44	4.93	5.39	10.25	10.69
1988	6.35	6.58	7.49	8.51	12.44	12.82
1989	6.24	6.47	7.37	8.40	12.30	12.69
1990	6.35	6.58	7.49	8.51	12.43	12.82
1991	6.35	6.61	7.49	8.51	12.44	12.82
1992	6.34	6.80	7.46	8.47	12.48	13.05
1993	6.42	6.65	7.55	8.58	12.51	12.89
1994	5.66	6.10	6.85	7.86	12.62	13.16
1995	6.41	6.78	7.66	8.73	12.65	12.99
1996	5.97	6.30	7.08	8.09	12.35	12.99
1997	6.35	6.58	7.48	8.51	12.43	12.81
1998	6.34	6.57	7.47	8.50	12.43	12.81
1999	6.32	6.54	7.45	8.47	12.41	12.80
2000	6.27	6.49	7.40	8.43	12.36	12.75
2001	6.35	6.58	7.48	8.51	12.44	12.82
2002	6.35	6.58	7.49	8.51	12.43	12.82

Table a.2: Estimates of latent means

Year	m_1^*	m_2^*	m_3^*	m_4^*	m_5^*	m_6^*	m_7^*
1981	-1.36	2.92	5.50	7.37	10.44	11.29	14.53
1982	-1.23	4.84	5.68	6.12	6.95	10.23	12.93
1983	-0.88	4.31	5.25	5.81	6.89	11.01	14.42
1984	- 0.47	3.93	4.97	5.53	6.45	10.17	13.82
1985	- 1.47	5.22	5.72	6.40	7.23	10.50	12.97
1986	-1.39	4.22	6.18	7.66	8.77	13.54	16.13
1987	-1.67	2.44	3.32	4.27	5.16	7.89	10.49
1988	-1.75	5.84	6.54	7.04	8.04	10.58	12.69
1989	-1.60	5.54	6.44	6.93	7.76	10.38	12.67
1990	- 1.75	5.75	6.55	7.07	8.04	10.92	12.75
1991	- 1.75	5.68	6.55	7.07	8.04	11.01	12.75
1992	- 1.31	5.71	6.55	7.14	7.86	10.56	12.85
1993	- 1.77	5.69	6.60	7.14	8.03	10.03	12.61
1994	- 1.37	5.06	5.83	6.46	7.30	10.25	12.94
1995	- 1.73	5.78	6.72	7.19	8.15	10.62	12.89
1996	- 1.48	5.67	6.26	6.64	7.52	10.01	12.60
1997	-1.43	5.61	6.54	7.04	7.93	10.35	12.60
1998	-1.73	5.60	6.53	7.07	8.03	10.58	12.68
1999	- 1.73	5.61	6.46	6.94	7.96	10.82	12.69
2000	- 1.74	5.74	6.55	7.06	8.04	10.89	12.74
2001	-1.75	5.69	6.54	7.07	8.04	11.26	12.78
2002	-1.75	5.90	6.55	7.15	8.04	11.04	12.78

Table a.3: Estimates of latent standard deviations ($\sigma_{1t}^* = 1$)

Year	σ_2^*	σ_3^*	σ_4^*	σ_5^*	σ_6^*	σ_7^*
1981	0.75	0.86	0.36	1.55	0.06	0.03
1982	0.43	0.02	0.22	0.37	1.65	0.28
1983	0.41	0.03	0.36	0.47	2.13	0.05
1984	0.41	0.04	0.44	0.38	1.90	0.01
1985	0.43	0.01	0.22	0.37	1.65	0.28
1986	1.42	0.04	0.59	0.35	2.27	0.12
1987	0.36	0.00	0.54	0.17	1.58	0.16
1988	0.46	0.02	0.29	0.35	1.35	0.20
1989	0.46	0.02	0.29	0.37	1.35	0.21
1990	0.46	0.02	0.29	0.35	1.35	0.20
1991	0.46	0.02	0.29	0.35	1.36	0.22
1992	0.45	0.01	0.24	0.34	1.65	0.29
1993	0.46	0.02	0.28	0.36	1.35	0.20
1994	0.42	0.02	0.20	0.31	1.57	0.25
1995	0.42	0.03	0.26	0.36	1.35	0.19
1996	0.18	0.01	0.22	0.36	1.43	0.24
1997	0.46	0.02	0.29	0.35	1.35	0.20
1998	0.46	0.02	0.29	0.35	1.35	0.20
1999	0.46	0.02	0.29	0.35	1.36	0.20
2000	0.46	0.02	0.29	0.35	1.35	0.20
2001	0.46	0.02	0.29	0.35	1.35	0.20
2002	0.46	0.02	0.29	0.35	1.35	0.20

Table a.4: Estimated latent means when thresholds and variances are constant

	Year	AAA	AA	A	BBB	BB	B	CCC
m e a n s	1990	-1.72	5.72	6.52	7.03	7.97	10.95	12.87
	1991	-1.73	5.66	6.52	7.02	7.93	11.06	12.87
	1992	-1.69	5.67	6.52	7.00	7.83	10.56	12.80
	1993	-1.42	5.61	6.52	7.02	7.90	9.98	12.64
	1994	-1.72	5.65	6.52	6.97	7.89	10.48	12.79
	1995	-1.51	5.64	6.52	6.95	7.89	10.43	12.83
	1996	-1.62	5.56	6.51	6.94	7.87	10.28	12.70
	1997	-1.47	5.57	6.52	7.00	7.87	10.38	12.72
	1998	-1.73	5.58	6.52	7.04	7.94	10.62	12.80
	1999	-1.71	5.59	6.52	6.98	7.99	10.93	12.88
n s	2000	-1.69	5.71	6.52	7.02	7.97	10.93	12.86
	2001	-1.65	5.67	6.52	7.02	7.99	11.31	12.91
	2002	-1.68	5.87	6.53	7.11	7.98	11.09	12.91

Table a.6 The key cells in $Q^{(2)}(H|f_T) - Q^{(1)}(H|f_T) \otimes Q^{(1)}(H|f_T)$ for horizon 1 year

co-movement		AAA	AA	A	BBB	BB	B	CCC
up 1 bucket	AAA	—	—	—	—	—	—	—
	AA	—	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	A	—	0.0000	0.0298	0.0010	0.0231	0.0002	0.0274
	BBB	—	0.0000	0.0010	0.0002	-0.0003	0.0000	0.0034
	BB	—	0.0000	0.0237	0.0012	0.0234	1e-04	0.0367
	B	—	0.0000	0.0002	0.0000	-0.0004	0.0000	0.0006
	CCC	—	0.0000	0.0274	0.0034	0.0307	0.0006	0.1184
unchanged	AAA	-0.0001	-0.0001	0.0000	0.0000	0.0705	0.0000	0.0000
	AA	-0.0001	0.0000	0.0001	0.0000	0.0608	0.0000	0.0000
	A	0.0000	0.0001	0.1300	-0.0008	0.1627	0.0016	0.0733
	BBB	0.0000	0.0000	-0.0008	0.0001	-0.0616	0.0001	-0.0005
	BB	0.0705	0.0680	0.1627	0.0616	0.2037	0.0599	0.1244
	B	-1e-04	-1e-04	0.0017	0.0000	0.0020	0.0000	0.0011
	CCC	0.0000	0.0000	0.0733	-0.0005	0.1244	0.0011	0.1407
down 1 bucket	AAA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	AA	0.0000	0.0000	0.0002	0.0000	0.0003	0.0000	0.0004
	A	0.0000	0.0003	0.1099	0.0011	0.0868	0.0018	0.0886
	BBB	0.0000	0.0000	0.0011	0.0000	-0.0001	0.0000	0.0018
	BB	-0.0019	-0.003	0.0868	-0.0001	0.0823	-0.0034	0.1085
	B	0.0000	0.0000	0.0018	0.0000	-0.0034	0.0001	0.0029
	CCC	0.0000	4e-04	0.0886	0.0018	0.1085	0.0029	0.1789

Table a.7: The key cells in $Q^{(2)}(H|f_T) - Q^{(1)}(H|f_T) \otimes Q^{(1)}(H|f_T)$ for 2-year horizon

co-movement		AAA	AA	A	BBB	BB	B	CCC
up 1 bucket	AAA	—	—	—	—	—	—	—
	AA	—	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	A	—	0.0000	0.0445	-0.0009	0.0292	0.0001	0.0260
	BBB	—	0.0000	-0.0009	0.0023	-0.0099	0.0005	0.0037
	BB	—	0.0000	0.0292	-0.0099	0.0187	-0.0011	0.0230
	B	—	0.0000	0.0001	0.0005	-0.0011	0.0001	0.0009
	CCC	—	0.0000	0.0260	0.0037	0.0230	0.0009	0.1008
unchanged	AAA	0.0001	0.0000	0.0000	-0.0012	0.0930	-0.0006	0.0001
	AA	0.0000	0.0001	-0.0014	-0.0013	0.0856	-0.0003	-0.0003
	A	0.0000	-0.0014	0.1678	-0.0129	0.1915	0.0006	0.0513
	BBB	-0.0012	-0.0013	-0.0129	-0.0002	0.0655	-0.0020	-0.0039
	BB	0.0930	0.0856	0.1915	0.0655	0.2104	0.0678	0.0861
	B	-0.0006	-0.0003	0.0006	-0.0020	0.0678	0.0018	-0.0021
	CCC	0.0001	-0.0003	0.0513	-0.0039	0.0861	-0.0021	0.0672
AAA	0.0000	0.0000	0.0000	0.0003	-0.0037	0.0000	-0.0001	
down 1 bucket	AA	0.0000	0.0009	-0.0070	0.0007	-0.0107	0.0008	-0.0024
	A	0.0000	-0.0070	0.1425	-0.0005	0.0907	-0.0053	0.0821
	BBB	0.0003	0.0007	-0.0005	0.0004	-0.0021	0.0009	0.0017
	BB	-0.0037	-0.0107	0.0907	-0.0021	0.0672	-0.0131	0.0817
	B	0.0000	0.0008	-0.0053	0.0009	-0.0131	0.0028	-0.0050
	CCC	-0.0001	-0.0024	0.0821	0.0017	0.0817	-0.0050	0.1685

Table a.8: The key cells in $Q^{(2)}(H|f_T) - Q^{(1)}(H|f_T) \otimes Q^{(1)}(H|f_T)$ for 5-year horizon

co-movement		AAA	AA	A	BBB	BB	B	CCC
up 1 bucket	AAA	—	—	—	—	—	—	—
	AA	—	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	A	—	0.0000	0.0643	-0.0080	0.0287	0.0002	0.0174
	BBB	—	0.0000	-0.0080	0.0191	-0.0172	0.0034	0.0030
	BB	—	0.0000	0.0287	-0.0172	0.0124	-0.0006	0.0124
	B	—	0.0000	0.0002	0.0034	-0.0006	0.0005	0.0018
	CCC	—	0.0000	0.0174	0.0030	0.0124	0.0018	0.0454
unchanged	AAA	0.0000	0.0000	0.0000	-0.0045	0.0623	-0.0011	0.0000
	AA	0.0000	0.0036	-0.0070	-0.0045	0.0508	0.0013	-0.0002
	A	0.0000	-0.0070	0.1413	-0.0385	0.1110	0.0015	0.0113
	BBB	-0.0045	-0.0045	-0.0385	0.0094	0.0249	-0.0052	-0.0035
	BB	0.0623	0.0508	0.1110	0.0249	0.0813	0.0363	0.0177
	B	-0.0011	0.0013	0.0015	-0.0052	0.0363	0.0065	0.0006
	CCC	0.0000	-0.0002	0.0113	-0.0035	0.0177	0.0006	0.0079
down 1 bucket	AAA	0.0000	-0.0002	-0.0004	0.0021	0.0005	-0.0002	-0.0001
	AA	-0.0002	0.0113	-0.0258	0.0053	-0.0090	0.0033	-0.0039
	A	-0.0004	-0.0258	0.1216	-0.0007	0.0531	-0.0087	0.0385
	BBB	0.0021	0.0053	-0.0007	0.0024	0.0023	0.0028	0.0076
	BB	0.0005	-0.0090	0.0531	0.0023	0.0404	-0.0062	0.0360
	B	-0.0002	0.0033	-0.0087	0.0028	-0.0062	0.0046	-0.0048
	CCC	-0.0001	-0.0039	0.0385	0.0076	0.0360	-0.0048	0.0893