

Asymptotic tables for cointegration tests based on the Gamma-distribution approximation

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These tables were generated using `ox/lib/coigamma.ox`, which implements the Gamma-distribution approximation of Doornik (1998).

Tables 1–5 replace Tables 15.1–15.5 in Johansen (1995).

Tables 11–13 replace Tables 4,3,2 in: Harbo, Johansen, Nielsen, and Rahbek (1998).

Table 14 replaces Table 4 in Rahbek, Kongsted, and Jørgensen (1999).

References

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Table 1: Asymptotic quantiles of Trace test for H_z

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	0.61	1.55	1.88	2.32	2.95	4.07	5.22	6.77
2	5.49	7.85	8.53	9.36	10.47	12.28	14.00	16.17
3	14.51	18.10	19.07	20.25	21.79	24.21	26.45	29.21
4	27.52	32.31	33.57	35.08	37.05	40.10	42.86	46.23
5	44.53	50.49	52.05	53.90	56.29	59.96	63.27	67.26
6	65.54	72.68	74.52	76.71	79.53	83.82	87.67	92.28
7	90.54	98.86	100.99	103.52	106.76	111.68	116.06	121.30
8	119.55	129.03	131.46	134.32	137.98	143.53	148.46	154.33
9	152.55	163.20	165.92	169.12	173.21	179.38	184.85	191.35
10	189.55	201.38	204.38	207.92	212.43	219.23	225.25	232.38
11	230.55	243.55	246.84	250.72	255.65	263.09	269.64	277.41
12	275.55	289.72	293.30	297.52	302.88	310.94	318.04	326.43

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 2: Asymptotic quantiles of Trace test for H_c

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	3.52	5.41	5.97	6.66	7.60	9.14	10.63	12.53
2	11.53	14.69	15.56	16.60	17.98	20.16	22.18	24.69
3	23.50	27.88	29.04	30.43	32.25	35.07	37.64	40.78
4	39.52	45.08	46.53	48.26	50.50	53.94	57.05	60.81
5	59.53	66.27	68.01	70.08	72.74	76.81	80.46	84.84
6	83.54	91.45	93.49	95.90	98.98	103.68	107.87	112.88
7	111.56	120.64	122.96	125.71	129.22	134.54	139.27	144.91
8	143.57	153.82	156.43	159.52	163.45	169.41	174.68	180.95
9	179.58	191.00	193.91	197.33	201.69	208.27	214.09	220.99
10	219.59	232.18	235.38	239.14	243.92	251.13	257.49	265.03
11	263.60	277.36	280.85	284.94	290.15	297.99	304.90	313.06
12	311.61	326.54	330.32	334.75	340.38	348.85	356.30	365.10

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 3: Asymptotic quantiles of Trace test for H_{lc}

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	0.45	1.32	1.64	2.07	2.71	3.84	5.02	6.63
2	7.75	10.48	11.24	12.18	13.42	15.41	17.28	19.62
3	19.05	23.08	24.16	25.46	27.16	29.80	32.23	35.21
4	34.12	39.33	40.70	42.33	44.45	47.71	50.66	54.23
5	53.18	59.57	61.22	63.19	65.73	69.61	73.10	77.29
6	76.23	83.79	85.74	88.05	91.01	95.51	99.54	104.36
7	103.29	112.02	114.26	116.90	120.28	125.42	129.98	135.43
8	134.34	144.24	146.77	149.75	153.56	159.32	164.43	170.50
9	169.39	180.46	183.28	186.60	190.83	197.22	202.87	209.58
10	208.44	220.69	223.79	227.45	232.10	239.12	245.32	252.66
11	251.49	264.91	268.30	272.30	277.38	285.02	291.77	299.74
12	298.54	313.13	316.81	321.14	326.65	334.92	342.21	350.81

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 4: Asymptotic quantiles of Trace test for H_l

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	5.77	8.11	8.77	9.59	10.68	12.45	14.12	16.22
2	16.01	19.63	20.61	21.78	23.32	25.73	27.95	30.67
3	30.14	34.97	36.24	37.76	39.73	42.77	45.53	48.87
4	48.19	54.19	55.75	57.61	60.00	63.66	66.95	70.91
5	70.25	77.42	79.26	81.46	84.27	88.55	92.38	96.97
6	96.30	104.64	106.78	109.30	112.54	117.45	121.82	127.04
7	126.35	135.86	138.28	141.15	144.81	150.35	155.26	161.11
8	160.40	171.08	173.79	177.00	181.08	187.25	192.71	199.18
9	198.45	210.30	213.30	216.84	221.35	228.15	234.15	241.26
10	240.50	253.52	256.81	260.69	265.62	273.04	279.59	287.34
11	286.55	300.73	304.32	308.53	313.89	321.94	329.04	337.41
12	336.60	351.95	355.83	360.38	366.16	374.84	382.48	391.49

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 5: Asymptotic quantiles of Trace test for H_{ql}

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	0.45	1.32	1.64	2.07	2.71	3.84	5.02	6.63
2	9.88	12.92	13.76	14.79	16.14	18.30	20.30	22.81
3	23.23	27.69	28.87	30.29	32.15	35.03	37.65	40.87
4	40.47	46.11	47.58	49.33	51.60	55.08	58.22	62.01
5	61.66	68.46	70.22	72.31	75.00	79.10	82.77	87.17
6	86.80	94.78	96.83	99.25	102.36	107.09	111.30	116.33
7	115.92	125.07	127.41	130.17	133.70	139.05	143.81	149.47
8	149.02	159.34	161.97	165.07	169.03	175.00	180.30	186.59
9	186.10	197.59	200.51	203.95	208.33	214.94	220.78	227.70
10	227.17	239.83	243.04	246.82	251.62	258.86	265.25	272.80
11	272.23	286.06	289.56	293.68	298.91	306.77	313.70	321.89
12	321.28	336.28	340.07	344.52	350.18	358.67	366.15	374.97

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 6: Asymptotic quantiles of Max test for H_z

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	0.59	1.55	1.88	2.33	2.98	4.13	5.32	6.92
2	4.89	7.06	7.69	8.45	9.49	11.17	12.77	14.79
3	9.95	12.77	13.54	14.48	15.72	17.68	19.50	21.76
4	15.25	18.53	19.41	20.46	21.85	24.01	25.99	28.43
5	20.62	24.27	25.23	26.39	27.89	30.22	32.34	34.92
6	26.05	30.01	31.05	32.29	33.89	36.37	38.60	41.32
7	31.53	35.76	36.86	38.17	39.87	42.47	44.81	47.64
8	37.04	41.51	42.67	44.05	45.83	48.55	50.99	53.93
9	42.58	47.27	48.49	49.93	51.78	54.61	57.14	60.18
10	48.14	53.04	54.30	55.80	57.72	60.65	63.27	66.40
11	53.72	58.81	60.12	61.67	63.66	66.68	69.38	72.60
12	59.33	64.60	65.95	67.55	69.60	72.71	75.48	78.79

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 7: Asymptotic quantiles of Max test for H_c

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	3.51	5.41	5.96	6.66	7.60	9.14	10.63	12.53
2	8.51	11.14	11.87	12.75	13.93	15.79	17.53	19.69
3	13.72	16.87	17.72	18.74	20.08	22.17	24.10	26.47
4	19.07	22.61	23.54	24.67	26.13	28.41	30.48	33.00
5	24.49	28.34	29.36	30.57	32.14	34.56	36.75	39.42
6	29.95	34.09	35.17	36.45	38.12	40.67	42.98	45.76
7	35.45	39.84	40.98	42.33	44.08	46.75	49.16	52.05
8	40.98	45.60	46.79	48.21	50.03	52.82	55.31	58.31
9	46.54	51.36	52.61	54.08	55.98	58.86	61.45	64.54
10	52.11	57.13	58.43	59.95	61.92	64.90	67.56	70.75
11	57.71	62.91	64.25	65.83	67.85	70.93	73.67	76.94
12	63.32	68.69	70.07	71.70	73.79	76.95	79.76	83.12

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 8: Asymptotic quantiles of Max test for H_{lc}

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	0.45	1.32	1.64	2.07	2.71	3.84	5.02	6.63
2	6.98	9.53	10.24	11.12	12.29	14.16	15.92	18.14
3	12.64	15.74	16.59	17.60	18.94	21.03	22.97	25.36
4	18.08	21.59	22.53	23.65	25.11	27.38	29.46	31.99
5	23.57	27.41	28.42	29.63	31.20	33.62	35.82	38.49
6	29.08	33.21	34.29	35.57	37.23	39.79	42.10	44.88
7	34.62	39.00	40.14	41.49	43.24	45.91	48.32	51.22
8	40.18	44.78	45.98	47.39	49.22	52.00	54.50	57.51
9	45.75	50.57	51.81	53.29	55.18	58.07	60.66	63.75
10	51.33	56.35	57.64	59.17	61.13	64.12	66.78	69.97
11	56.93	62.13	63.46	65.04	67.07	70.15	72.89	76.17
12	62.53	67.90	69.28	70.91	73.00	76.16	78.98	82.34

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 9: Asymptotic quantiles of Max test for H_l

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	5.78	8.11	8.77	9.59	10.68	12.43	14.09	16.19
2	11.25	14.19	14.99	15.96	17.23	19.24	21.10	23.39
3	16.68	20.04	20.94	22.02	23.43	25.63	27.64	30.10
4	22.10	25.83	26.81	27.99	29.52	31.89	34.03	36.65
5	27.57	31.60	32.66	33.92	35.55	38.06	40.33	43.07
6	33.08	37.38	38.49	39.83	41.55	44.18	46.55	49.41
7	38.61	43.15	44.32	45.72	47.52	50.27	52.74	55.70
8	44.17	48.92	50.15	51.61	53.48	56.33	58.89	61.95
9	49.75	54.70	55.97	57.48	59.42	62.37	65.01	68.17
10	55.34	60.47	61.79	63.36	65.36	68.40	71.12	74.36
11	60.94	66.25	67.62	69.23	71.29	74.42	77.21	80.53
12	66.56	72.03	73.44	75.09	77.21	80.43	83.28	86.69

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 10: Asymptotic quantiles of Max test for H_{ql}

$p - r$	50.0%	75.0%	80.0%	85.0%	90.0%	95.0%	97.5%	99.0%
1	0.45	1.32	1.64	2.07	2.71	3.84	5.02	6.64
2	9.03	11.90	12.70	13.67	14.95	17.00	18.91	21.29
3	15.16	18.51	19.41	20.50	21.92	24.14	26.18	28.69
4	20.78	24.49	25.48	26.65	28.19	30.57	32.73	35.37
5	26.39	30.41	31.46	32.72	34.35	36.87	39.14	41.89
6	32.00	36.28	37.40	38.73	40.45	43.08	45.46	48.32
7	37.61	42.13	43.31	44.70	46.50	49.24	51.71	54.68
8	43.22	47.96	49.19	50.64	52.51	55.36	57.92	60.98
9	48.84	53.77	55.05	56.56	58.49	61.44	64.08	67.23
10	54.45	59.57	60.89	62.45	64.45	67.49	70.21	73.45
11	60.06	65.36	66.72	68.33	70.39	73.52	76.31	79.63
12	65.67	71.14	72.54	74.20	76.32	79.53	82.38	85.79

Generated from ox/lib/coigamma.ox, see Doornik(1998)

Table 11: Asymptotic quantiles of Partial test for H_z

p_2	$p_1 - r$	50.0%	80.0%	90.0%	95.0%	97.5%	99.0%	mean	var
1	1	2.34	4.74	6.45	8.13	9.78	11.93	3.04	6.67
1	2	9.41	13.45	15.96	18.24	20.38	23.05	10.05	19.51
1	3	20.45	26.01	29.28	32.17	34.83	38.08	21.05	38.41
1	4	35.47	42.53	46.56	50.06	53.24	57.10	36.06	63.32
1	5	54.49	63.02	67.81	71.94	75.65	80.12	55.06	94.24
1	6	77.50	87.50	93.05	97.80	102.05	107.14	78.06	131.17
2	1	4.31	7.40	9.47	11.42	13.31	15.73	5.02	11.03
2	2	13.37	18.20	21.12	23.74	26.19	29.22	14.04	28.15
2	3	26.41	32.81	36.53	39.80	42.78	46.43	27.04	51.30
2	4	43.44	51.37	55.86	59.77	63.29	67.56	44.05	80.47
2	5	64.46	73.89	79.16	83.69	87.76	92.65	65.05	115.66
3	1	6.30	9.93	12.27	14.45	16.52	19.15	7.02	15.34
3	2	17.35	22.83	26.10	29.02	31.71	35.03	18.03	36.74
3	3	32.39	39.52	43.63	47.22	50.49	54.46	33.04	64.17
3	4	51.42	60.12	65.03	69.28	73.11	77.74	52.04	97.61
4	1	8.30	12.38	14.95	17.32	19.55	22.36	9.01	19.64
4	2	21.34	27.40	30.97	34.14	37.05	40.62	22.02	45.32
4	3	38.37	46.16	50.61	54.50	58.02	62.29	39.03	77.01
5	1	10.30	14.78	17.56	20.09	22.47	25.44	11.01	23.93
5	2	25.33	31.91	35.76	39.15	42.26	46.06	26.02	53.88
6	1	12.29	17.14	20.11	22.80	25.30	28.42	13.01	28.21

Generated from ox/lib/coigamma.ox, see Doornik(1998)

p_2 is no of exogenous, p_1 number of endogenous variables.

Table 12: Asymptotic quantiles of Partial test for H_c

p_2	$p_1 - r$	50.0%	80.0%	90.0%	95.0%	97.5%	99.0%	mean	var
1	1	5.45	8.50	10.46	12.28	14.01	16.21	6.04	10.89
1	2	15.44	20.21	23.04	25.57	27.90	30.77	16.02	27.83
1	3	29.47	35.79	39.43	42.60	45.49	49.00	30.03	50.56
1	4	47.49	55.33	59.74	63.56	67.00	71.14	48.04	79.26
1	5	69.51	78.84	84.03	88.48	92.47	97.25	70.05	113.95
1	6	95.52	106.34	112.30	117.39	121.92	127.33	96.06	154.64
2	1	7.40	10.96	13.20	15.25	17.19	19.63	8.01	14.98
2	2	19.43	24.81	27.97	30.78	33.35	36.51	20.02	35.84
2	3	35.45	42.47	46.47	49.96	53.12	56.95	36.03	62.65
2	4	55.47	64.05	68.87	73.02	76.74	81.23	56.04	95.43
2	5	79.49	89.60	95.21	100.01	104.30	109.44	80.05	134.20
3	1	9.39	13.38	15.84	18.08	20.18	22.81	10.01	18.99
3	2	23.41	29.35	32.81	35.85	38.64	42.05	24.02	43.90
3	3	41.44	49.08	53.42	57.19	60.59	64.72	42.03	74.77
3	4	63.46	72.72	77.90	82.35	86.35	91.15	64.04	111.62
4	1	11.38	15.75	18.42	20.83	23.08	25.88	12.01	23.01
4	2	27.40	33.84	37.57	40.84	43.82	47.46	28.02	51.98
4	3	47.43	55.65	60.30	64.32	67.95	72.33	48.03	86.91
5	1	13.37	18.10	20.95	23.52	25.89	28.85	14.01	27.05
5	2	31.40	38.30	42.27	45.74	48.90	52.75	32.02	60.07
6	1	15.37	20.42	23.44	26.15	28.65	31.74	16.01	31.10

Generated from ox/lib/coigamma.ox, see Doornik(1998)

p_2 is no of exogenous, p_1 number of endogenous variables.

Table 13: Asymptotic quantiles of Partial test for H_l

p_2	$p_1 - r$	50.0%	80.0%	90.0%	95.0%	97.5%	99.0%	mean	var
1	1	7.69	11.18	13.35	15.33	17.19	19.53	8.27	14.40
1	2	19.88	25.13	28.20	30.91	33.40	36.44	20.43	34.23
1	3	35.98	42.81	46.70	50.08	53.13	56.83	36.53	59.55
1	4	56.07	64.42	69.10	73.13	76.74	81.09	56.60	90.76
1	5	80.14	90.00	95.46	100.13	104.30	109.28	80.67	127.92
1	6	108.20	119.56	125.79	131.10	135.82	141.44	108.73	171.04
2	1	9.62	13.55	15.96	18.16	20.20	22.76	10.22	18.47
2	2	23.77	29.59	32.98	35.96	38.67	42.00	24.35	42.40
2	3	41.89	49.38	53.63	57.32	60.64	64.66	42.45	72.12
2	4	63.98	73.07	78.14	82.50	86.41	91.10	64.53	107.73
2	5	90.06	100.70	106.58	111.60	116.07	121.43	90.61	149.29
3	1	11.56	15.89	18.52	20.89	23.10	25.84	12.17	22.55
3	2	27.70	34.06	37.73	40.95	43.88	47.46	28.30	50.78
3	3	47.82	55.93	60.52	64.48	68.05	72.37	48.40	84.85
3	4	71.91	81.68	87.12	91.79	95.97	100.98	72.49	124.83
4	1	13.53	18.22	21.05	23.59	25.94	28.86	14.15	26.74
4	2	31.66	38.50	42.44	45.88	49.01	52.82	32.27	59.27
4	3	53.77	62.46	67.35	71.58	75.38	79.96	54.36	97.67
5	1	15.50	20.54	23.55	26.24	28.73	31.81	16.13	30.98
5	2	35.62	42.93	47.12	50.77	54.08	58.10	36.24	67.81
6	1	17.48	22.84	26.03	28.86	31.48	34.71	18.12	35.26

Generated from ox/lib/coigamma.ox, see Doornik(1998)

p_2 is no of exogenous, p_1 number of endogenous variables.

Table 14: Asymptotic quantiles of I2 test for H_t

s	$p - r - s$	50.0%	80.0%	90.0%	95.0%	97.5%	99.0%	mean	var
0	1	11.62	15.55	17.91	20.02	21.97	24.40	12.13	18.74
0	2	35.62	41.89	45.44	48.52	51.30	54.65	36.08	50.55
0	3	71.60	80.20	84.96	89.02	92.65	96.98	72.05	97.42
0	4	119.60	130.51	136.48	141.53	146.01	151.34	120.04	159.35
0	5	179.61	192.84	200.01	206.06	211.40	217.73	180.04	236.34
0	6	251.63	267.18	275.55	282.60	288.80	296.13	252.07	328.39
0	7	335.67	353.53	363.11	371.15	378.22	386.55	336.10	435.49
0	8	431.73	451.90	462.69	471.72	479.66	488.99	432.16	557.66
1	0	5.77	8.77	10.68	12.45	14.12	16.22	6.32	10.60
1	1	23.73	29.13	32.25	34.98	37.47	40.50	24.24	36.69
1	2	53.71	61.40	65.69	69.38	72.68	76.66	54.18	76.98
1	3	95.69	105.67	111.15	115.82	119.97	124.91	96.15	132.32
1	4	149.68	161.96	168.64	174.29	179.29	185.22	150.13	202.73
1	5	215.68	230.27	238.15	244.79	250.65	257.57	216.13	288.19
1	6	293.70	310.60	319.68	327.31	334.02	341.94	294.15	388.71
1	7	383.74	402.94	413.22	421.85	429.42	438.34	384.18	504.30
2	0	16.01	20.61	23.32	25.73	27.95	30.67	16.53	26.10
2	1	39.83	46.69	50.57	53.92	56.95	60.60	40.33	60.51
2	2	75.80	84.90	89.94	94.24	98.08	102.67	76.27	109.27
2	3	123.77	135.15	141.36	146.64	151.31	156.87	124.23	173.09
2	4	183.75	197.42	204.82	211.07	216.60	223.14	184.21	251.97
2	5	255.75	271.71	280.31	287.54	293.92	301.45	256.20	345.91
2	6	339.77	358.02	367.82	376.04	383.27	391.79	340.22	454.91
3	0	30.14	36.24	39.73	42.77	45.53	48.87	30.65	47.30
3	1	59.92	68.23	72.86	76.84	80.40	84.68	60.42	90.20
3	2	101.88	112.41	118.19	123.11	127.49	132.70	102.35	147.43
3	3	155.84	168.63	175.58	181.46	186.67	192.85	156.31	219.73
3	4	221.82	236.88	245.01	251.87	257.92	265.07	222.28	307.08
3	5	299.82	317.15	326.48	334.31	341.21	349.34	300.27	409.50
4	0	48.19	55.75	60.00	63.66	66.95	70.91	48.70	74.00
4	1	84.00	93.76	99.15	103.75	107.85	112.75	84.49	125.75
4	2	131.94	143.91	150.44	155.98	160.89	166.73	132.43	191.47
4	3	191.90	206.11	213.80	220.30	226.03	232.83	192.38	272.24
4	4	263.88	280.34	289.21	296.67	303.25	311.01	264.34	368.07
5	0	70.25	79.26	84.27	88.55	92.38	96.97	70.75	106.70
5	1	112.07	123.28	129.42	134.64	139.28	144.81	112.56	167.18
5	2	166.01	179.40	186.68	192.84	198.29	204.75	166.49	241.37
5	3	231.96	247.58	256.02	263.13	269.40	276.81	232.43	330.62
6	0	96.30	106.78	112.54	117.45	121.82	127.04	96.80	145.40
6	1	144.13	156.78	163.68	169.52	174.70	180.85	144.62	214.48
6	2	204.06	218.89	226.92	233.70	239.68	246.77	204.54	297.14
7	0	126.35	138.28	144.81	150.35	155.26	161.11	126.85	190.10
7	1	180.18	194.28	201.93	208.40	214.11	220.89	180.67	267.65
8	0	160.40	173.79	181.08	187.25	192.71	199.18	160.90	240.80

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 s is no of I(1) and $p - r - s$ no of I(2) variables