

APPENDIX D

ANALYSIS AT DIVISION LEVEL FOR THE SUB-PERIODS

Results of Analysis for the Sub-Periods

This study conducts two analyses while measuring productivity growth for a particular division. In the main analysis, productivity growth is measured in terms of Malmquist productivity indexes. Besides, an alternative analysis is conducted using the growth accounting technique with the assumption that the factor income shares for the national level is applicable for all divisions. The measured Malmquist Productivity Indexes for different sub-periods (1984-85 to 1989-90, 1989-90 to 1995-96, 1995-96 to 1999-2000) is shown in Table D1, Table D2 and Table D3.

Table D1
Productivity change in divisions between years 1984-85 and 1989-90

Division	Efficiency in 84-85 w.r.to 84-85 frontier (A)	Efficiency in 84-85 w.r.to 89-90 frontier (B)	Efficiency in 89-90 w.r.to 84-85 Frontier (C)	Efficiency in 89-90 w.r.to 89-90 frontier (D)	MPI ¹ (E)	Catch -Up Term (F = D/A)	Boundary -Shift Term (G = E/F)
Barisal	100.00	86.70	124.62	100.00	1.199	1.000	1.199
Chittagong	100.00	91.73	114.00	100.00	1.115	1.000	1.115
Dhaka	85.70	80.27	97.66	90.71	1.135	1.058	1.072
Khulna	100.00	100.46	105.17	100.00	0.986	1.000	0.986
Rajshahi	93.25	85.91	88.05	81.14	0.944	0.870	1.085
Sylhet	100.00	93.51	105.88	98.29	1.055	0.983	1.073

Note:

- 1 MPI (Malmquist Productivity Index) is the product of the Catch-up term and the Boundary-shift term. Here, $E = [(C \times D) / (A \times B)]^{1/2}$

Table D2
Productivity change in divisions between years 1989-90 and 1995-96

Division	Efficiency in 89-90 w.r.to 89-90 frontier (A)	Efficiency in 89-90 w.r.to 95-96 frontier (B)	Efficiency In 95-96 w.r.to 89-90 Frontier (C)	Efficiency in 95-96 w.r.to 95-96 frontier (D)	MPI ¹ (E)	Catch -Up Term (F = D/A)	Boundary -Shift Term (G = E/F)
Barisal	100.00	136.65	117.26	100.00	0.926	1.000	0.926
Chittagong	100.00	85.00	138.59	100.00	1.277	1.000	1.277
Dhaka	90.71	77.63	116.34	99.35	1.281	1.095	1.170
Khulna	100.00	106.07	96.69	82.19	0.949	0.822	1.155
Rajshahi	81.14	82.63	98.80	91.50	1.161	1.128	1.030
Sylhet	98.29	100.25	117.76	100.00	1.093	1.017	1.075

Note:

- 1 MPI (Malmquist Productivity Index) is the product of the Catch-up term and the Boundary-shift term. Here, $E = [(C \times D) / (A \times B)]^{1/2}$

Table D3
Productivity change in divisions between years 1995-96 and 1999-2000

Division	Efficiency in 95-96 w.r.to 95-96 frontier (A)	Efficiency in 95-96 w.r.to 99-00 frontier (B)	Efficiency in 99-00 w.r.to 95-96 frontier (C)	Efficiency in 99-00 w.r.to 99-00 frontier (D)	MPI ¹ (E)	Catch -up Term (F = D/A)	Boundary -shift Term (G = E/F)
Barisal	100.00	142.54	111.31	100.00	0.884	1.000	0.884
Chittagong	100.00	89.01	125.66	100.00	1.188	1.000	1.188
Dhaka	99.35	81.87	106.73	86.77	1.067	0.873	1.222
Khulna	82.19	68.08	104.75	87.14	1.289	1.060	1.216
Rajshahi	91.50	84.17	101.91	93.73	1.114	1.024	1.087
Sylhet	100.00	91.92	122.78	100.00	1.156	1.000	1.156

Note:

- 1 MPI (Malmquist Productivity Index) is the product of the Catch-up term and the Boundary-shift term. Here, $E = [(C \times D) / (A \times B)]^{1/2}$

Results of analysis for the sub-periods for Barisal division

Table D4
Results of DEA for Barisal division

Period		Catch-up Term	Boundary-shift Term	Malmquist Index
From	To			
1984-85	1989-90	1.000	1.199	1.199
1989-90	1995-96	1.000	0.926	0.926
1995-96	1999-00	1.000	0.884	0.884
1984-85	1999-00	1.000	1.008	1.008

Table D5
Results of growth accounting for Barisal division

Period		Percentage Growth Per Annum				
From	To	GDP	Capital	Land	Labor	TFP
1984-85	1989-90	7.43	2.01	4.06	3.19	4.639
1989-90	1995-96	2.19	4.15	-1.27	11.85	-4.618
1995-96	1999-00	5.69	18.74	0.28	-3.00	-1.200
1984-85	1999-00	6.03	9.36	0.82	4.97	-0.322

Table D6
Contribution of factors in output growth in Barisal division

Period		Percentage Contribution			
From	To	Capital	Land	Labor	TFP
1984-85	1989-90	11.76	7.05	18.72	62.47
1989-90	1995-96	82.68	-7.50	235.99	-211.16
1995-96	1999-00	143.49	0.63	-23.00	-21.11
1984-85	1999-00	67.65	1.76	35.93	-5.34

Results of analysis for the sub-periods for Chittagong division

Table D7
Results of DEA for Chittagong division

Period		Catch-up	Boundary-shift	Malmquist
From	To	Term	Term	Index
1984-85	1989-90	1.000	1.115	1.115
1989-90	1995-96	1.000	1.277	1.277
1995-96	1999-00	1.000	1.188	1.188
1984-85	1999-00	1.000	1.726	1.726

Table D8
Results of growth accounting for Chittagong division

Period		Percentage Growth Per Annum				
From	To	GDP	Capital	Land	Labor	TFP
1984-85	1989-90	4.03	0.10	2.04	1.31	3.148
1989-90	1995-96	4.92	4.22	-1.09	0.29	3.093
1995-96	1999-00	6.83	-0.06	0.90	3.33	5.288
1984-85	1999-00	6.54	1.71	0.44	1.52	5.071

Table D9
Contribution of factors in output growth in Chittagong division

Period		Percentage Contribution			
From	To	Capital	Land	Labor	TFP
1984-85	1989-90	1.11	6.54	14.21	78.14
1989-90	1995-96	37.39	-2.87	2.56	62.92
1995-96	1999-00	-0.38	1.69	21.24	77.44
1984-85	1999-00	11.40	0.88	10.15	77.57

Results of analysis for the sub-periods for Dhaka division

Table D10
Results of DEA for Dhaka division

Period		Catch-up	Boundary-shift	Malmquist
From	To	Term	Term	Index
1984-85	1989-90	1.058	1.072	1.135
1989-90	1995-96	1.095	1.170	1.281
1995-96	1999-00	0.873	1.222	1.067
1984-85	1999-00	1.012	1.549	1.568

Table D11
Results of growth accounting for Dhaka division

Period		Percentage Growth Per Annum				
From	To	GDP	Capital	Land	Labor	TFP
1984-85	1989-90	4.37	3.91	0.32	1.74	1.870
1989-90	1995-96	5.34	2.16	-0.56	-0.40	4.644
1995-96	1999-00	6.19	7.82	1.11	3.73	1.022
1984-85	1999-00	6.72	5.15	0.17	1.47	3.815

Table D12
Contribution of factors in output growth in Dhaka division

Period		Percentage Contribution			
From	To	Capital	Land	Labor	TFP
1984-85	1989-90	38.91	0.95	17.38	42.76
1989-90	1995-96	17.58	-1.34	-3.24	87.01
1995-96	1999-00	54.96	2.31	26.25	16.49
1984-85	1999-00	33.37	0.33	9.50	56.80

Results of analysis for the sub-periods for Khulna division

Table D13
Results of DEA for Khulna division

Period		Catch-up Term	Boundary-shift Term	Malmquist Index
From	To			
1984-85	1989-90	1.000	0.986	0.986
1989-90	1995-96	0.822	1.155	0.949
1995-96	1999-00	1.060	1.216	1.289
1984-85	1999-00	0.871	1.335	1.163

Table D14
Results of growth accounting for Khulna division

Period		Percentage Growth Per Annum				
From	To	GDP	Capital	Land	Labor	TFP
1984-85	1989-90	3.70	1.06	4.43	2.79	1.453
1989-90	1995-96	4.82	38.67	-0.69	1.48	-12.574
1995-96	1999-00	6.96	-1.00	0.83	0.55	7.045
1984-85	1999-00	6.35	15.71	1.40	1.79	-1.447

Table D15
Contribution of factors in output growth in Khulna division

Period		Percentage Contribution			
From	To	Capital	Land	Labor	TFP
1984-85	1989-90	12.44	15.43	32.88	39.25
1989-90	1995-96	349.42	-1.84	13.37	-260.96
1995-96	1999-00	-6.23	1.54	3.42	101.27
1984-85	1999-00	107.68	2.84	12.25	-22.77

Results of analysis for the sub-periods for Rajshahi division

Table D16
Results of DEA for Rajshahi division

Period		Catch-up	Boundary-shift	Malmquist
From	To	Term	Term	Index
1984-85	1989-90	0.870	1.085	0.944
1989-90	1995-96	1.128	1.030	1.161
1995-96	1999-00	1.024	1.087	1.114
1984-85	1999-00	1.005	1.218	1.224

Table D17
Results of growth accounting for Rajshahi division

Period		Percentage Growth Per Annum				
From	To	GDP	Capital	Land	Labor	TFP
1984-85	1989-90	1.86	2.95	-0.05	3.17	-0.792
1989-90	1995-96	4.66	3.46	-0.48	1.55	2.536
1995-96	1999-00	5.86	3.80	2.96	1.25	3.275
1984-85	1999-00	4.84	3.97	0.56	2.20	2.083

Table D18
Contribution of factors in output growth in Rajshahi division

Period		Percentage Contribution			
From	To	Capital	Land	Labor	TFP
1984-85	1989-90	68.78	-0.35	74.07	-42.50
1989-90	1995-96	32.31	-1.33	14.54	54.48
1995-96	1999-00	28.27	6.52	9.27	55.93
1984-85	1999-00	35.72	1.48	19.78	43.02

Results of analysis for the sub-periods for Sylhet division

Table D19
Results of DEA for Sylhet division

Period		Catch-up Term	Boundary-shift term	Malmquist Index
From	To			
1984-85	1989-90	0.983	1.073	1.055
1989-90	1995-96	1.017	1.075	1.093
1995-96	1999-00	1.000	1.156	1.156
1984-85	1999-00	1.000	1.326	1.326

Table D20
Results of growth accounting for Sylhet division

Period		Percentage Growth Per Annum				
From	To	GDP	Capital	Land	Labor	TFP
1984-85	1989-90	3.58	4.15	2.10	2.15	0.563
1989-90	1995-96	5.72	9.59	0.16	1.30	0.962
1995-96	1999-00	6.41	6.34	-0.14	-0.43	3.852
1984-85	1999-00	6.60	9.23	0.73	1.16	1.981

Table D21
Contribution of factors in output growth in Sylhet division

Period		Percentage Contribution			
From	To	Capital	Land	Labor	TFP
1984-85	1989-90	50.48	7.57	26.21	15.74
1989-90	1995-96	72.95	0.37	9.88	16.80
1995-96	1999-00	43.09	-0.28	-2.94	60.14
1984-85	1999-00	60.91	1.43	7.63	30.03