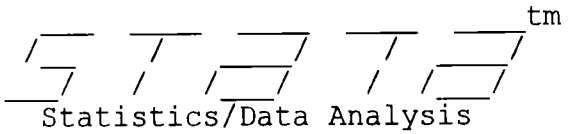


```
. set more 1;

2. gen annex1 = counindx == 54| counindx == 67| counindx == 72| counindx == 95|
 > counindx == 116| counindx == 117| counindx == 118| counindx == 120| counindx
 > == 121|
 > counindx == 122| counindx == 123| counindx == 124| counindx == 125| counindx
 > == 126|
 > counindx == 127| counindx == 128| counindx == 129| counindx == 130| counindx
 > == 131|
 > counindx == 133| counindx == 134| counindx == 135| counindx == 136| counindx
 > == 137|
 > counindx == 138| counindx == 139| counindx == 140| counindx == 142| counindx
 > == 143|
 > counindx == 144| counindx == 145| counindx == 147;

3. generate dev = popgdp[_n+20] if time==1;
(6403 missing values generated)

4. replace dev = popgdp[_n+19] if time==2;
(133 real changes made)

5. replace dev = popgdp[_n+18] if time==3;
(133 real changes made)

6. replace dev = popgdp[_n+17] if time==4;
(133 real changes made)

7. replace dev = popgdp[_n+16] if time==5;
(133 real changes made)

8. replace dev = popgdp[_n+15] if time==6;
(133 real changes made)

9. replace dev = popgdp[_n+14] if time==7;
(133 real changes made)

10. replace dev = popgdp[_n+13] if time==8;
(133 real changes made)

11. replace dev = popgdp[_n+12] if time==9;
(133 real changes made)

12. replace dev = popgdp[_n+11] if time==10;
(133 real changes made)

13. replace dev = popgdp[_n+10] if time==11;
(133 real changes made)

14. replace dev = popgdp[_n+9] if time==12;
(133 real changes made)

15. replace dev = popgdp[_n+8] if time==13;
```

(133 real changes made)

16. **replace dev = popgdp[_n+7] if time==14;**
(133 real changes made)

17. **replace dev = popgdp[_n+6] if time==15;**
(133 real changes made)

18. **replace dev = popgdp[_n+5] if time==16;**
(133 real changes made)

19. **replace dev = popgdp[_n+4] if time==17;**
(133 real changes made)

20. **replace dev = popgdp[_n+3] if time==18;**
(133 real changes made)

21. **replace dev = popgdp[_n+2] if time==19;**
(133 real changes made)

22. **replace dev = popgdp[_n+1] if time==20;**
(133 real changes made)

23. **replace dev = popgdp if time==21;**
(133 real changes made)

24. **replace dev = popgdp[_n-1] if time==22;**
(133 real changes made)

25. **replace dev = popgdp[_n-2] if time==23;**
(133 real changes made)

26. **replace dev = popgdp[_n-3] if time==24;**
(133 real changes made)

27. **replace dev = popgdp[_n-4] if time==25;**
(133 real changes made)

28. **replace dev = popgdp[_n-5] if time==26;**
(133 real changes made)

29. **replace dev = popgdp[_n-6] if time==27;**
(133 real changes made)

30. **replace dev = popgdp[_n-7] if time==28;**
(133 real changes made)

31. **replace dev = popgdp[_n-8] if time==29;**
(133 real changes made)

32. **replace dev = popgdp[_n-9] if time==30;**
(133 real changes made)

33. **replace dev = popgdp[_n-10] if time==31;**

(133 real changes made)

34. **replace dev = popgdp[_n-11] if time==32;**
(133 real changes made)

35. **replace dev = popgdp[_n-12] if time==33;**
(133 real changes made)

36. **replace dev = popgdp[_n-13] if time==34;**
(133 real changes made)

37. **replace dev = popgdp[_n-14] if time==35;**
(133 real changes made)

38. **replace dev = popgdp[_n-15] if time==36;**
(133 real changes made)

39. **replace dev = popgdp[_n-16] if time==37;**
(133 real changes made)

40. **replace dev = popgdp[_n-17] if time==38;**
(133 real changes made)

41. **replace dev = popgdp[_n-18] if time==39;**
(133 real changes made)

42. **replace dev = popgdp[_n-19] if time==40;**
(133 real changes made)

43. **replace dev = popgdp[_n-20] if time==41;**
(133 real changes made)

44. **replace dev = popgdp[_n-21] if time==42;**
(133 real changes made)

45. **replace dev = popgdp[_n-22] if time==43;**
(133 real changes made)

46. **generate dev2 = popgdp[_n+30] if time==1;**
(6394 missing values generated)

47. **replace dev2 = popgdp[_n+29] if time==2;**
(142 real changes made)

48. **replace dev2 = popgdp[_n+28] if time==3;**
(142 real changes made)

49. **replace dev2 = popgdp[_n+27] if time==4;**
(142 real changes made)

50. **replace dev2 = popgdp[_n+26] if time==5;**
(142 real changes made)

51. **replace dev2 = popgdp[_n+25] if time==6;**

(142 real changes made)

52. **replace dev2 = popgdp[_n+24] if time==7;**
(142 real changes made)

53. **replace dev2 = popgdp[_n+23] if time==8;**
(142 real changes made)

54. **replace dev2 = popgdp[_n+22] if time==9;**
(142 real changes made)

55. **replace dev2 = popgdp[_n+21] if time==10;**
(142 real changes made)

56. **replace dev2 = popgdp[_n+20] if time==11;**
(142 real changes made)

57. **replace dev2 = popgdp[_n+19] if time==12;**
(142 real changes made)

58. **replace dev2 = popgdp[_n+18] if time==13;**
(142 real changes made)

59. **replace dev2 = popgdp[_n+17] if time==14;**
(142 real changes made)

60. **replace dev2 = popgdp[_n+16] if time==15;**
(142 real changes made)

61. **replace dev2 = popgdp[_n+15] if time==16;**
(142 real changes made)

62. **replace dev2 = popgdp[_n+14] if time==17;**
(142 real changes made)

63. **replace dev2 = popgdp[_n+13] if time==18;**
(142 real changes made)

64. **replace dev2 = popgdp[_n+12] if time==19;**
(142 real changes made)

65. **replace dev2 = popgdp[_n+11] if time==20;**
(142 real changes made)

66. **replace dev2 = popgdp[_n+10] if time==21;**
(142 real changes made)

67. **replace dev2 = popgdp[_n+9] if time==22;**
(142 real changes made)

68. **replace dev2 = popgdp[_n+8] if time==23;**
(142 real changes made)

69. **replace dev2 = popgdp[_n+7] if time==24;**

(142 real changes made)

70. **replace dev2 = popgdp[_n+6] if time==25;**
(142 real changes made)

71. **replace dev2 = popgdp[_n+5] if time==26;**
(142 real changes made)

72. **replace dev2 = popgdp[_n+4] if time==27;**
(142 real changes made)

73. **replace dev2 = popgdp[_n+3] if time==28;**
(142 real changes made)

74. **replace dev2 = popgdp[_n+2] if time==29;**
(142 real changes made)

75. **replace dev2 = popgdp[_n+1] if time==30;**
(142 real changes made)

76. **replace dev2 = popgdp if time==31;**
(142 real changes made)

77. **replace dev2 = popgdp[_n-1] if time==32;**
(142 real changes made)

78. **replace dev2 = popgdp[_n-2] if time==33;**
(142 real changes made)

79. **replace dev2 = popgdp[_n-3] if time==34;**
(142 real changes made)

80. **replace dev2 = popgdp[_n-4] if time==35;**
(142 real changes made)

81. **replace dev2 = popgdp[_n-5] if time==36;**
(142 real changes made)

82. **replace dev2 = popgdp[_n-6] if time==37;**
(142 real changes made)

83. **replace dev2 = popgdp[_n-7] if time==38;**
(142 real changes made)

84. **replace dev2 = popgdp[_n-8] if time==39;**
(142 real changes made)

85. **replace dev2 = popgdp[_n-9] if time==40;**
(142 real changes made)

86. **replace dev2 = popgdp[_n-10] if time==41;**
(142 real changes made)

87. **replace dev2 = popgdp[_n-11] if time==42;**

```
(142 real changes made)

88. replace dev2 = popgdp[_n-12] if time==43;
(142 real changes made)

89. gen devdum = dev >= 4000;

90. gen devduma = dev2 >=1610;

91. gen devdumb = dev2 >=4500;

92. gen afrdum = counindx<=50;

93. gen namdum = counindx<=72;

94. replace namdum = 0 if counindx<=50;
(2149 real changes made)

95. gen samdum = counindx<=84;

96. replace samdum = 0 if counindx<=72;
(3095 real changes made)

97. gen asiadum = counindx<=115;

98. replace asiadum = 0 if counindx<=84;
(3611 real changes made)

99. gen eurodum = counindx<=144;

100. replace eurodum = 0 if counindx<=115;
(4944 real changes made)

101. gen ausdum = counindx<=152;

102. replace ausdum = 0 if counindx<=144;
(6191 real changes made)

103. gen inv = (invest/100);
(1496 missing values generated)

104. generate la5emis = ln((totalcd + totalcd[_n-1] + totalcd[_n-2] + totalcd[_n-3
  > ] +
  > totalcd[_n-4])/5000);
(544 missing values generated)

105. generate lgdpl5 = ln(gdp_ppp[_n-5]);
(1501 missing values generated)

106. generate lgdpl6 = ln(gdp_ppp[_n-6]);
(1502 missing values generated)

107. generate lpopl5 = ln(pop[_n-5]);
(1466 missing values generated)
```

```
108. gen devdum2 = (devdum*lgdpl5);
(1501 missing values generated)

109. gen devdum3a = (devduma*lgdpl5);
(1501 missing values generated)

110. gen devdum3b = (devdumb*lgdpl5);
(1501 missing values generated)

111. generate timesq = time*time;

112. gen trend = time;

113. drop if counindx==23;
(43 observations deleted)

114. drop if counindx==32;
(43 observations deleted)

115. drop if counindx==59;
(43 observations deleted)

116. drop if counindx==68;
(43 observations deleted)

117. drop if counindx==99;
(43 observations deleted)

118. drop if counindx==101;
(43 observations deleted)

119. drop if counindx==151;
(43 observations deleted)

120. drop if time==42;
(145 observations deleted)

121. drop if time==41;
(145 observations deleted)

122. drop if time==40;
(145 observations deleted)

123. drop if time==39;
(145 observations deleted)

124. drop if time==37;
(145 observations deleted)

125. drop if time==36;
(145 observations deleted)

126. drop if time==35;
```

(145 observations deleted)

127. **drop if time==34;**
(145 observations deleted)

128. **drop if time==32;**
(145 observations deleted)

129. **drop if time==31;**
(145 observations deleted)

130. **drop if time==30;**
(145 observations deleted)

131. **drop if time==29;**
(145 observations deleted)

132. **drop if time==27;**
(145 observations deleted)

133. **drop if time==26;**
(145 observations deleted)

134. **drop if time==25;**
(145 observations deleted)

135. **drop if time==24;**
(145 observations deleted)

136. **drop if time==22;**
(145 observations deleted)

137. **drop if time==21;**
(145 observations deleted)

138. **drop if time==20;**
(145 observations deleted)

139. **drop if time==19;**
(145 observations deleted)

140. **drop if time==17;**
(145 observations deleted)

141. **drop if time==16;**
(145 observations deleted)

142. **drop if time==15;**
(145 observations deleted)

143. **drop if time==14;**
(145 observations deleted)

144. **drop if time==12;**

(145 observations deleted)

145. **drop if time==11;**
(145 observations deleted)

146. **drop if time==10;**
(145 observations deleted)

147. **drop if time==9;**
(145 observations deleted)

148. **drop if time==7;**
(145 observations deleted)

149. **drop if time==6;**
(145 observations deleted)

150. **drop if time==5;**
(145 observations deleted)

151. **drop if time==4;**
(145 observations deleted)

152. **drop if time==3;**
(145 observations deleted)

153. **drop if time==2;**
(145 observations deleted)

154. **drop if time==1;**
(144 observations deleted)

155. **set matsize 300;**

156. **generate time2=1 if time==8;**
(1015 missing values generated)

157. **replace time2=2 if time==13;**
(145 real changes made)

158. **replace time2=3 if time==18;**
(145 real changes made)

159. **replace time2=4 if time==23;**
(145 real changes made)

160. **replace time2=5 if time==28;**
(145 real changes made)

161. **replace time2=6 if time==33;**
(145 real changes made)

162. **replace time2=7 if time==38;**
(145 real changes made)

163. **replace time2=8 if time==43;**
(145 real changes made)

164. **generate time2sq = time2*time2;**

165. **tab counindx, generate(count);**

counindx	Freq.	Percent	Cum.
1	8	0.69	0.69
2	8	0.69	1.38
3	8	0.69	2.07
4	8	0.69	2.76
5	8	0.69	3.45
6	8	0.69	4.14
7	8	0.69	4.83
8	8	0.69	5.52
9	8	0.69	6.21
10	8	0.69	6.90
11	8	0.69	7.59
12	8	0.69	8.28
13	8	0.69	8.97
14	8	0.69	9.66
15	8	0.69	10.34
16	8	0.69	11.03
17	8	0.69	11.72
18	8	0.69	12.41
19	8	0.69	13.10
20	8	0.69	13.79
21	8	0.69	14.48
22	8	0.69	15.17
24	8	0.69	15.86
25	8	0.69	16.55
26	8	0.69	17.24
27	8	0.69	17.93
28	8	0.69	18.62
29	8	0.69	19.31
30	8	0.69	20.00
31	8	0.69	20.69
33	8	0.69	21.38
34	8	0.69	22.07
35	8	0.69	22.76
36	8	0.69	23.45
37	8	0.69	24.14
38	8	0.69	24.83
39	8	0.69	25.52
40	8	0.69	26.21
41	8	0.69	26.90
42	8	0.69	27.59
43	8	0.69	28.28
44	8	0.69	28.97
45	8	0.69	29.66
46	8	0.69	30.34

47	8	0.69	31.03
48	8	0.69	31.72
49	8	0.69	32.41
50	8	0.69	33.10
51	8	0.69	33.79
52	8	0.69	34.48
53	8	0.69	35.17
54	8	0.69	35.86
55	8	0.69	36.55
56	8	0.69	37.24
57	8	0.69	37.93
58	8	0.69	38.62
60	8	0.69	39.31
61	8	0.69	40.00
62	8	0.69	40.69
63	8	0.69	41.38
64	8	0.69	42.07
65	8	0.69	42.76
66	8	0.69	43.45
67	8	0.69	44.14
69	8	0.69	44.83
70	8	0.69	45.52
71	8	0.69	46.21
72	8	0.69	46.90
73	8	0.69	47.59
74	8	0.69	48.28
75	8	0.69	48.97
76	8	0.69	49.66
77	8	0.69	50.34
78	8	0.69	51.03
79	8	0.69	51.72
80	8	0.69	52.41
81	8	0.69	53.10
82	8	0.69	53.79
83	8	0.69	54.48
84	8	0.69	55.17
85	8	0.69	55.86
86	8	0.69	56.55
87	8	0.69	57.24
88	8	0.69	57.93
89	8	0.69	58.62
90	8	0.69	59.31
91	8	0.69	60.00
92	8	0.69	60.69
93	8	0.69	61.38
94	8	0.69	62.07
95	8	0.69	62.76
96	8	0.69	63.45
97	8	0.69	64.14
98	8	0.69	64.83
100	8	0.69	65.52
102	8	0.69	66.21
103	8	0.69	66.90
104	8	0.69	67.59

105	8	0.69	68.28
106	8	0.69	68.97
107	8	0.69	69.66
108	8	0.69	70.34
109	8	0.69	71.03
110	8	0.69	71.72
111	8	0.69	72.41
112	8	0.69	73.10
113	8	0.69	73.79
114	8	0.69	74.48
115	8	0.69	75.17
116	8	0.69	75.86
117	8	0.69	76.55
118	8	0.69	77.24
119	8	0.69	77.93
120	8	0.69	78.62
121	8	0.69	79.31
122	8	0.69	80.00
123	8	0.69	80.69
124	8	0.69	81.38
125	8	0.69	82.07
126	8	0.69	82.76
127	8	0.69	83.45
128	8	0.69	84.14
129	8	0.69	84.83
130	8	0.69	85.52
131	8	0.69	86.21
132	8	0.69	86.90
133	8	0.69	87.59
134	8	0.69	88.28
135	8	0.69	88.97
136	8	0.69	89.66
137	8	0.69	90.34
138	8	0.69	91.03
139	8	0.69	91.72
140	8	0.69	92.41
141	8	0.69	93.10
142	8	0.69	93.79
143	8	0.69	94.48
144	8	0.69	95.17
145	8	0.69	95.86
146	8	0.69	96.55
147	8	0.69	97.24
148	8	0.69	97.93
149	8	0.69	98.62
150	8	0.69	99.31
152	8	0.69	100.00
Total	1160	100.00	

166. **xtreg la5emis lgdpl5 lgdpl6 lpopl5 time2 if time<=42, fe i(counindx);**

Fixed-effects (within) regression

sd(u_counindx) = 1.669983 Number of obs = 770

```
sd(e_counindx_t)             =  .2818878                      n =       140
sd(e_counindx_t + u_counindx)=  1.693606                  T-bar =       5.5

corr(u_counindx, Xb)         =   -0.5956          R-sq within  =    0.7853
                                                       between  =    0.7244
                                                       overall  =    0.7410

                                                  F(  4,   626) =    572.58
                                                       Prob > F =    0.0000
```

la5emis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpl5	1.236777	.197011	6.278	0.000	.8498944	1.623659
lgdpl6	-.3988323	.1995847	-1.998	0.046	-.7907689	-.0068958
lpopl5	.9225978	.1212832	7.607	0.000	.6844266	1.160769
time2	-.0239808	.01761	-1.362	0.174	-.0585626	.010601
_cons	-15.27227	1.022394	-14.938	0.000	-17.28001	-13.26453
counindx	F(139,626) =	36.586	0.000	(140 categories)		

167. regress la5emis lgdpl5 lgdpl6 lpopl5 time2 count* if time<=42, noconstant;

Source	SS	df	MS		
Model	5192.29074	144	36.0575746	Number of obs =	770
Residual	49.7424293	626	.07946075	F(144, 626) =	453.78
				Prob > F =	0.0000
				R-squared =	0.9905
				Adj R-squared =	0.9883
Total	5242.03317	770	6.80783529	Root MSE =	.28189

la5emis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpl5	1.236777	.197011	6.278	0.000	.8498941	1.623659
lgdpl6	-.398832	.1995847	-1.998	0.046	-.7907686	-.0068954
lpopl5	.9225978	.1212832	7.607	0.000	.6844267	1.160769
time2	-.0239808	.01761	-1.362	0.174	-.0585627	.010601
count1	-15.35134	1.126502	-13.627	0.000	-17.56352	-13.13916
count2	-15.28351	1.00919	-15.144	0.000	-17.26532	-13.3017
count3	-16.39027	.9140446	-17.932	0.000	-18.18523	-14.5953
count4	-13.55318	.7612296	-17.804	0.000	-15.04806	-12.05831
count5	-17.28261	.9912381	-17.435	0.000	-19.22916	-15.33606
count6	-17.50608	.9317218	-18.789	0.000	-19.33576	-15.6764
count7	-16.36233	1.022211	-16.007	0.000	-18.36971	-14.35495
count8	-13.44722	.6200568	-21.687	0.000	-14.66487	-12.22958
count9	-16.2615	.8653137	-18.793	0.000	-17.96076	-14.56223
count10	-17.12918	.9437765	-18.150	0.000	-18.98253	-15.27582
count11	-14.29976	.6278484	-22.776	0.000	-15.53271	-13.06682
count12	-14.61984	.8269062	-17.680	0.000	-16.24369	-12.996
count13	-12.73517	.6263172	-20.333	0.000	-13.96511	-11.50523
count14	-16.16064	1.216499	-13.285	0.000	-18.54956	-13.77173
count15	-18.2323	1.182181	-15.423	0.000	-20.55382	-15.91078
count16	-12.63065	.7484683	-16.875	0.000	-14.10047	-11.16084
count17	-14.43806	.7014346	-20.584	0.000	-15.81551	-13.06061

count18	-16.24267	1.051391	-15.449	0.000	-18.30735	-14.17799
count19	-15.66085	.9556492	-16.388	0.000	-17.53752	-13.78418
count20	-14.5431	.7241476	-20.083	0.000	-15.96515	-13.12105
count21	-15.82089	1.012894	-15.619	0.000	-17.80997	-13.83181
count22	-16.07515	1.08237	-14.852	0.000	-18.20066	-13.94963
count23	-13.92118	.8337312	-16.697	0.000	-15.55843	-12.28393
count24	-16.89819	1.026775	-16.458	0.000	-18.91453	-14.88185
count25	-16.24967	.9731447	-16.698	0.000	-18.1607	-14.33865
count26	-16.97319	.9851284	-17.229	0.000	-18.90775	-15.03864
count27	-14.45535	.8162763	-17.709	0.000	-16.05832	-12.85238
count28	-14.74893	.7848908	-18.791	0.000	-16.29027	-13.20759
count29	-16.21544	1.125379	-14.409	0.000	-18.42541	-14.00546
count30	-16.73012	1.070299	-15.631	0.000	-18.83193	-14.62831
count31	-16.75261	.9630037	-17.396	0.000	-18.64372	-14.8615
count32	-17.28153	1.280373	-13.497	0.000	-19.79587	-14.76718
count33	-13.43922	.7022153	-19.138	0.000	-14.81821	-12.06024
count34	-17.50027	.9487909	-18.445	0.000	-19.36347	-15.63707
count35	-15.61575	.9743388	-16.027	0.000	-17.52912	-13.70238
count36	-11.88028	.4488321	-26.469	0.000	-12.76168	-10.99888
count37	-15.90469	.9137672	-17.406	0.000	-17.69911	-14.11027
count38	-16.88927	.9619026	-17.558	0.000	-18.77822	-15.00033
count39	-14.55282	1.188041	-12.249	0.000	-16.88585	-12.2198
count40	-16.92195	1.125334	-15.037	0.000	-19.13184	-14.71206
count41	-13.72798	.7088076	-19.368	0.000	-15.11991	-12.33605
count42	-16.47818	1.11659	-14.758	0.000	-18.67089	-14.28546
count43	-15.23161	.8708369	-17.491	0.000	-16.94173	-13.5215
count44	-15.00891	1.000399	-15.003	0.000	-16.97346	-13.04437
count45	-17.3252	1.055062	-16.421	0.000	-19.39709	-15.25331
count46	-16.91925	1.148919	-14.726	0.000	-19.17545	-14.66304
count47	-14.85143	.9740126	-15.248	0.000	-16.76416	-12.9387
count48	-14.36162	1.002295	-14.329	0.000	-16.32989	-12.39336
count49	-12.09646	.6720363	-18.000	0.000	-13.41618	-10.77674
count50	-12.83062	.6444768	-19.909	0.000	-14.09621	-11.56502
count51	-12.7005	.6098259	-20.826	0.000	-13.89805	-11.50294
count52	-14.84233	1.206731	-12.300	0.000	-17.21206	-12.4726
count53	-14.76985	.8672642	-17.030	0.000	-16.47295	-13.06675
count54	(dropped)					
count55	-15.16226	.9754841	-15.543	0.000	-17.07788	-13.24665
count56	-15.65044	.948385	-16.502	0.000	-17.51284	-13.78803
count57	-15.90118	1.000302	-15.896	0.000	-17.86554	-13.93683
count58	-16.65135	.9736737	-17.102	0.000	-18.56342	-14.73929
count59	-15.00557	.9091531	-16.505	0.000	-16.79093	-13.22021
count60	-13.62238	.8822918	-15.440	0.000	-15.35498	-11.88977
count61	-16.49401	1.290926	-12.777	0.000	-19.02908	-13.95894
count62	-15.01294	.8919703	-16.831	0.000	-16.76456	-13.26133
count63	-13.9965	.8522818	-16.422	0.000	-15.67018	-12.32283
count64	-13.88045	.9446024	-14.694	0.000	-15.73542	-12.02548
count65	(dropped)					
count66	(dropped)					
count67	-12.75596	.8197256	-15.561	0.000	-14.36571	-11.14622
count68	-16.50258	1.491782	-11.062	0.000	-19.43208	-13.57308
count69	-15.94349	1.210746	-13.168	0.000	-18.3211	-13.56587
count70	-15.37794	.9764887	-15.748	0.000	-17.29553	-13.46035
count71	-17.49826	1.358629	-12.879	0.000	-20.16628	-14.83023

count72	-15.19938	1.084566	-14.014	0.000	-17.32921	-13.06955
count73	-15.89383	1.170385	-13.580	0.000	-18.19219	-13.59548
count74	-15.48905	1.01942	-15.194	0.000	-17.49095	-13.48715
count75	-12.7954	.7431896	-17.217	0.000	-14.25485	-11.33596
count76	-15.56579	.9014802	-17.267	0.000	-17.33609	-13.7955
count77	-15.89708	1.12064	-14.186	0.000	-18.09774	-13.69641
count78	-11.92629	.6792763	-17.557	0.000	-13.26022	-10.59235
count79	-14.71232	.9436907	-15.590	0.000	-16.56551	-12.85914
count80	-14.69615	1.109402	-13.247	0.000	-16.87475	-12.51755
count81	-11.27884	.6992059	-16.131	0.000	-12.65192	-9.905771
count82	-19.57468	1.306463	-14.983	0.000	-22.14026	-17.0091
count83	(dropped)					
count84	-17.92519	1.60218	-11.188	0.000	-21.07149	-14.77889
count85	-14.80291	.989434	-14.961	0.000	-16.74592	-12.8599
count86	-18.81488	1.557476	-12.080	0.000	-21.87339	-15.75637
count87	-17.6849	1.372531	-12.885	0.000	-20.38023	-14.98958
count88	-15.92673	1.224496	-13.007	0.000	-18.33135	-13.52212
count89	-15.27082	1.089797	-14.013	0.000	-17.41092	-13.13072
count90	-13.88873	.9522046	-14.586	0.000	-15.75863	-12.01882
count91	-16.62866	1.392157	-11.945	0.000	-19.36252	-13.8948
count92	-14.14504	.8803167	-16.068	0.000	-15.87377	-12.41631
count93	-15.80065	1.218776	-12.964	0.000	-18.19403	-13.40726
count94	-12.89805	.9005176	-14.323	0.000	-14.66645	-11.12965
count95	-15.4714	1.108881	-13.952	0.000	-17.64897	-13.29382
count96	-17.05689	1.180392	-14.450	0.000	-19.3749	-14.73888
count97	-18.56835	1.087045	-17.082	0.000	-20.70305	-16.43366
count98	-12.73163	.7976582	-15.961	0.000	-14.29804	-11.16522
count99	-17.30033	1.290329	-13.408	0.000	-19.83423	-14.76644
count100	-16.92984	1.234681	-13.712	0.000	-19.35446	-14.50523
count101	-11.22574	.7206687	-15.577	0.000	-12.64096	-9.810519
count102	-14.40151	1.057288	-13.621	0.000	-16.47777	-12.32525
count103	-12.9927	.8970116	-14.484	0.000	-14.75421	-11.23118
count104	-16.80582	1.09968	-15.282	0.000	-18.96533	-14.64631
count105	-15.21322	1.03812	-14.655	0.000	-17.25184	-13.1746
count106	-15.12613	1.121926	-13.482	0.000	-17.32933	-12.92294
count107	-17.14982	1.228245	-13.963	0.000	-19.5618	-14.73784
count108	-12.55602	.8836465	-14.209	0.000	-14.29129	-10.82075
count109	-15.9384	1.026938	-15.520	0.000	-17.95506	-13.92174
count110	-14.66384	1.076333	-13.624	0.000	-16.7775	-12.55018
count111	-14.29641	1.110363	-12.875	0.000	-16.4769	-12.11592
count112	-13.89417	1.080469	-12.859	0.000	-16.01596	-11.77239
count113	-12.97834	.7548348	-17.194	0.000	-14.46065	-11.49602
count114	-13.54657	1.130516	-11.983	0.000	-15.76663	-11.3265
count115	-14.07484	1.031026	-13.651	0.000	-16.09953	-12.05015
count116	-14.26908	1.019803	-13.992	0.000	-16.27173	-12.26643
count117	-16.02924	1.312476	-12.213	0.000	-18.60663	-13.45185
count118	-14.17227	1.156524	-12.254	0.000	-16.4434	-11.90113
count119	-15.76425	1.333292	-11.824	0.000	-18.38251	-13.14598
count120	-15.06616	1.083424	-13.906	0.000	-17.19374	-12.93857
count121	-14.35817	1.092176	-13.146	0.000	-16.50294	-12.2134
count122	-11.69455	.6365707	-18.371	0.000	-12.94462	-10.44448
count123	-13.72443	.961692	-14.271	0.000	-15.61297	-11.8359
count124	-16.48283	1.315768	-12.527	0.000	-19.06669	-13.89898
count125	-10.88637	.7109934	-15.311	0.000	-12.28259	-9.490147

count126	-12.49907	.673502	-18.558	0.000	-13.82167	-11.17648
count127	-14.8521	1.145089	-12.970	0.000	-17.10078	-12.60342
count128	-14.29097	.9992914	-14.301	0.000	-16.25334	-12.32861
count129	-14.69869	1.233864	-11.913	0.000	-17.12171	-12.27568
count130	-15.42298	1.085251	-14.211	0.000	-17.55415	-13.29181
count131	-13.66889	1.154413	-11.841	0.000	-15.93588	-11.4019
count132	-16.18512	1.253128	-12.916	0.000	-18.64596	-13.72427
count133	-14.71763	1.092856	-13.467	0.000	-16.86374	-12.57153
count134	-15.0615	1.060677	-14.200	0.000	-17.14442	-12.97859
count135	-16.43031	1.236592	-13.287	0.000	-18.85868	-14.00194
count136	-15.73553	1.325726	-11.869	0.000	-18.33893	-13.13212
count137	-16.35725	1.48522	-11.013	0.000	-19.27386	-13.44063
count138	-15.34335	1.178511	-13.019	0.000	-17.65766	-13.02904
count139	-14.64886	1.142176	-12.825	0.000	-16.89182	-12.40589
count140	-13.69741	.7295953	-18.774	0.000	-15.13017	-12.26466
count141	-14.1825	.9594887	-14.781	0.000	-16.0667	-12.29829
count142	-15.3607	.9095177	-16.889	0.000	-17.14677	-13.57462
count143	-13.0262	.6498543	-20.045	0.000	-14.30235	-11.75004
count144	(dropped)					
count145	-12.57545	.5998466	-20.964	0.000	-13.7534	-11.39749

168. predict pla5emis;
(237 missing values generated)

169. predict se_emis, stdf;
(237 missing values generated)

170. generate u = pla5emis-la5emis;
(259 missing values generated)

171. list coun year pla5emis la5emis u se_emis if counindx==88;

	coun	year	pla5emis	la5emis	u	se_emis
665.	CHINA	1992	6.55549	6.518021	.0374694	.3096723
666.	CHINA	1957	.	3.968974	.	.
667.	CHINA	1962	.	5.11556	.	.
668.	CHINA	1967	4.906567	4.844869	.0616984	.3094491
669.	CHINA	1982	5.948768	6.02307	-.0743022	.3091663
670.	CHINA	1987	6.217848	6.274206	-.0563579	.3090793
671.	CHINA	1972	5.353431	5.294098	.0593324	.3090165
672.	CHINA	1977	5.743172	5.733543	.0096288	.3088892

172. list coun year pla5emis la5emis u se_emis if counindx==90;

	coun	year	pla5emis	la5emis	u	se_emis
681.	INDIA	1992	5.037143	5.236049	-.1989059	.302413
682.	INDIA	1972	3.963014	3.99889	-.0358765	.3015801
683.	INDIA	1977	4.20428	4.255882	-.0516024	.3015495
684.	INDIA	1962	3.605689	3.510835	.0948539	.3018534
685.	INDIA	1987	4.723296	4.901045	-.1777492	.3021151
686.	INDIA	1967	3.831263	3.802467	.028796	.3015426
687.	INDIA	1982	4.485491	4.575284	-.0897932	.3018574
688.	INDIA	1957	3.389265	3.157894	.2313714	.3021568

173. list coun year pla5emis la5emis u se_emis if counindx==64;

	coun	year	pla5emis	la5emis	u	se_emis
481.	MEXICO	1992	4.532808	4.441646	.0911622	.3025931
482.	MEXICO	1957	2.329144	2.41135	-.082206	.3025465
483.	MEXICO	1982	4.132001	4.248595	-.1165938	.3018429
484.	MEXICO	1972	3.477162	3.374826	.1023359	.301436
485.	MEXICO	1987	4.45344	4.338542	.1148973	.3028533
486.	MEXICO	1962	2.726589	2.810968	-.084379	.3019243
487.	MEXICO	1967	3.031371	3.050069	-.0186977	.3015241
488.	MEXICO	1977	3.832966	3.748322	.0846434	.3016229

174. gen err = (pla5emis - la5emis);
(259 missing values generated)

175. gen p5emis = exp(pla5emis);
(237 missing values generated)

176. gen a5emis = exp(la5emis);
(62 missing values generated)

177. gen err2 = (p5emis - a5emis)/a5emis;
(259 missing values generated)

178. gen sqerr = (pla5emis - la5emis)*(pla5emis - la5emis);
(259 missing values generated)

```
179. gen sumsqerr = sum(sqerr);

180. list sumsqerr if time==43;
```

	sumsqerr
1.	.0012053
11.	.3468901
19.	1.233232
26.	1.487119
33.	1.688688
42.	2.237279
49.	2.740961
58.	4.596527
67.	5.349795
75.	5.839947
83.	6.33669
91.	6.441251
98.	7.129577
105.	7.161709
113.	7.279812
121.	8.099703
130.	9.771222
138.	9.973005
146.	10.0871
153.	10.21405
163.	10.28223
169.	11.20963
179.	12.00444
187.	13.15634
194.	13.55754
202.	13.79982
210.	15.72192
217.	16.62248
225.	17.04759
233.	18.11349
241.	19.14721
249.	20.64523
257.	23.20398
265.	23.48353
273.	24.00306
281.	24.65429
290.	26.98719
299.	27.89138
305.	28.39995
314.	28.85195
324.	29.60749
331.	30.10123
337.	30.10885
345.	30.23232
353.	30.32961
361.	32.61636
370.	34.154
377.	34.60648

387. 34.81491
393. 34.91583
401. 35.20115
409. 35.43367
417. 35.65219
427. 35.75419
433. 35.78027
441. 36.25616
449. 36.43952
457. 36.66405
465. 37.01297
473. 37.19978
481. 37.60057
489. 37.67616
497. 38.38582
506. 39.30725
514. 39.73872
522. 39.73872
529. 39.82877
537. 40.39038
545. 40.55664
553. 40.57814
561. 41.06859
569. 41.24812
577. 41.4917
585. 41.74598
593. 42.41944
601. 42.52719
609. 43.09188
619. 43.28036
625. 43.52679
633. 44.15595
641. 45.80237
649. 46.31804
663. 48.31559
665. 48.31699
674. 48.40865
681. 48.48225
690. 48.58972
697. 48.7408
705. 49.00237
713. 49.35212
721. 49.84043
729. 50.07187
737. 50.65472
751. 51.20007
755. 51.21701
761. 51.57999
770. 51.80278
781. 52.0906
785. 52.24614
793. 52.4806
804. 52.82243
811. 52.83042

```
 817.  53.33257
 825.  54.91003
 833.  55.21852
 841.  55.31392
 849.  55.62394
 857.   56.6628
 865.  56.67397
 873.  56.73887
 881.  57.07252
 890.  57.70897
 897.  57.77599
 907.  58.15586
 913.   58.2971
 921.  58.35171
 929.  59.26438
 940.  59.63475
 945.  59.64396
 953.   60.2332
 962.  61.04895
 969.  61.56054
 977.  62.39697
 985.  62.49502
 993.  63.16729
1001.  63.88355
1009.  64.12279
1017.  64.36044
1028.  64.55314
1033.  64.68517
1041.  65.12073
1049.  65.22507
1057.  65.59156
1065.  65.83762
1073.  65.89451
1081.  66.24825
1090.  66.52856
1099.  66.59852
1105.  66.67806
1114.  66.87704
1121.  67.10184
1129.  67.27441
1142.  68.19278
1150.  68.19278
1159.  68.19592

181. graph err2 if time==43, histogram bin(8) normal freq xlab(-2.0,-1.0,0,1.0,2.0
  > );

end of do-file
```

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Table 5. Crude Oil Refiner Acquisition Costs, 1968-1996
(Dollars per Barrel)

	Domestic		Imported		Composite	
Year	Nominal	Real	Nominal	Real	Nominal	Real
1968	3.21	11.59	2.9	10.47	3.17	11.44
1969	3.37	11.62	2.8	9.66	3.29	11.34
1970	3.46	11.31	2.96	9.67	3.4	11.11
1971	3.68	11.43	3.17	9.84	3.6	11.18
1972	3.67	10.96	3.22	9.61	3.58	10.69
1973	4.17	11.78	4.08	11.53	4.15	11.72
1974	7.18	18.65	12.52	32.52	9.07	23.56
1975	8.39	19.88	13.93	33.01	10.38	24.6
1976	8.84	19.82	13.48	30.22	10.89	24.42
1977	9.55	20.15	14.53	30.65	11.96	25.23
1978	10.61	20.8	14.57	28.57	12.46	24.43
1979	14.27	25.8	21.67	39.19	17.72	32.04
1980	24.23	40.12	33.89	56.11	28.07	46.47
1981	34.33	52.09	37.05	56.22	35.24	53.47
1982	31.22	44.54	33.55	47.86	31.87	45.46
1983	28.87	39.49	29.3	40.08	28.99	39.66
1984	28.53	37.59	28.88	38.05	28.63	37.72
1985	26.66	34.01	26.99	34.43	26.75	34.12
1986	14.82	18.39	14	17.37	14.55	18.05
1987	17.76	21.37	18.13	21.82	17.9	21.54
1988	14.74	17.12	14.56	16.91	14.67	17.04
1989	17.87	19.92	18.08	20.16	17.97	20.03
1990	22.59	24.13	21.76	23.25	22.22	23.74
1991	19.33	19.87	18.7	19.22	19.06	19.59
1992	18.63	18.63	18.2	18.2	18.43	18.43
1993	16.67	16.25	16.14	15.73	16.41	15.99
1994	15.67	R14.94	15.51	R14.79	15.59	R14.86
1995	17.33	R16.11	R17.14	15.93	17.23	R16.01
1996P	20.75	18.92	20.55	18.73	20.65	18.82

1 In chained (1992) dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
R=Revised data. P=Preliminary data.
Note: Refiner acquisition cost of crude oil for each category and for the composite is derived by dividing the sum of the total purchasing (acquisition) costs of all refiners by the total volume of all refiners' purchases.
Source · 1968-1973ÐEstimated. See Note 6 at end of section. · 1974 through January 1976ÐFederal Energy Administration (FEA), Form FEA-96, "Monthly Cost Allocation Report. · February 1976 through September 1977ÐFEA, Form FEA-P110-M-1, "Refiners' Monthly Cost Allocation Report."
· October 1977 through June 1978ÐEnergy Inf · July 1978 through December 1980ÐEIA, Form ERA-49, "Domestic · 1981 forwardÐEIA, Form EIA-14, "Refiners' Monthly Cost Report."

DATE	ALL COUNTRIES ALL LANDED PRICE $/barrel
7300	6.41
7400	12.32
7500	12.70
7600	13.32
7700	14.36
7800	14.35
7900	21.45
8000	33.67
8100	36.47
8200	33.18
8300	28.93
8400	28.54
8500	26.67
8600	13.49
8700	17.65
8800	14.08
8900	17.68
9000	21.13
9100	18.02
9200	17.75
9300	15.72
9400	15.18
9500	16.78
9600	20.31

nominal

Draft, CEA 11/7/97

Formula for per capita emissions:

$$\mathbf{(em/pop)_{2010} = constant + .9(em/pop)_{1990} + .08\ (gdp/pop)_{2010}}$$

where
$(em/pop)_{2010}$ is (the log of) per capita emissions forecast for 2010, and
$(gdp/pop)_{2010}$ is (the log of) per capita income in 2010.

The data (which were estimated on a 1970-1992 time series) also included a time trend, roughly 1 percent a year beyond what is explained by income growth. The time trend has been omitted above, as one step toward the goal of stabilizing/reducing emissions.

The other step toward stabilizing/reducing emissions is that the constant term could be set so that the formula predicts that the U.S. will emit its 1990 levels in 2010.

Proposal: When countries' per capita emissions exceed one ton of carbon per person, they are expected to take on the binding emission targets of a formula such as that above. China, India, Brazil, and other "Annex B" countries agree to that future commitment today.

Examples of the Formula

Formula set so U.S. emits 1990 carbon levels in 2010:

$$(em/pop)_{2010} = -.84 + .9(em/pop)_{1990} + .08\,(gdp/pop)_{2010}$$

Country	Emissions Allowance (MMTC)	Change Relative to 1990 Carbon Level (MMTC)
United States	1345.8	0
Australia	76.6	+4.1
France	97.2	+0.6
Germany	241.1	-23.2
Japan	288.5	-6.0
United Kingdom	144.1	-12.3
Annex I*	2834.2	-85.8
China	649.6	-10.6
India	221.1	+37.0
Brazil	71.4	+16.4
Mexico	103.4	+14.7
Korea	72.8	+7.0
Singapore	11.1	+0.8

*Note that Annex I excludes Belarus, the Czech Republic, Latvia, Lithuania, Russia, Slovakia, and Ukraine because of data limitations.

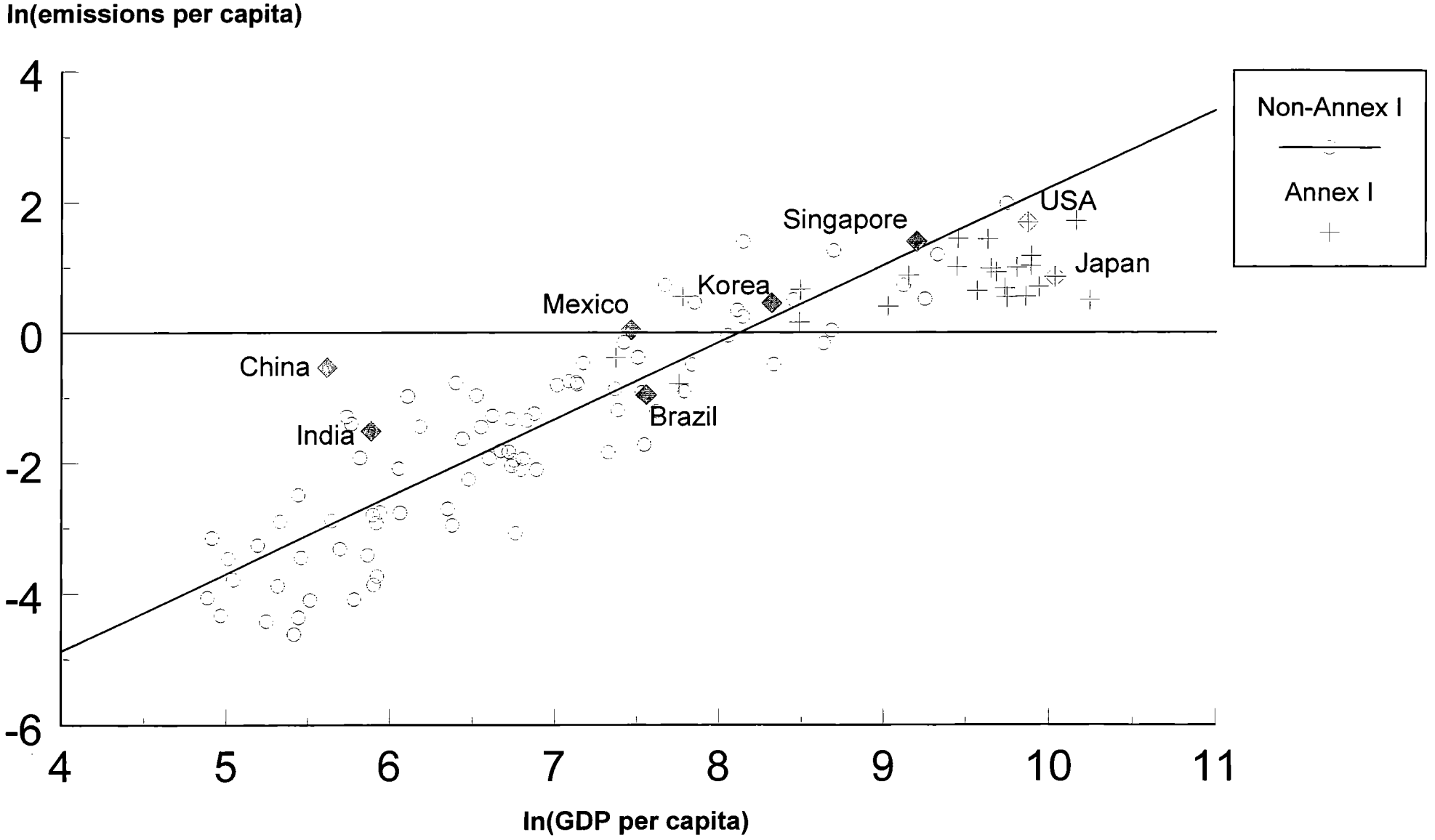
Formula set so Annex I emits 1990 carbon levels in 2010:

$$(em/pop)_{2010} = -.81 + .9(em/pop)_{1990} + .08\,(gdp/pop)_{2010}$$

Country	Emissions Allowance (MMTC)	Change Relative to 1990 Carbon Level (MMTC)
United States	1385.9	+40.1
Australia	78.9	+6.4
France	100.1	+3.5
Germany	248.3	-16.2
Japan	297.1	+2.6
United Kingdom	148.4	-8.1
Annex I*	2919.9	0
China	669.0	+8.8
India	227.7	+43.6
Brazil	73.5	+18.5
Mexico	106.4	+17.8
Korea	75.0	+9.1
Singapore	11.4	+1.2

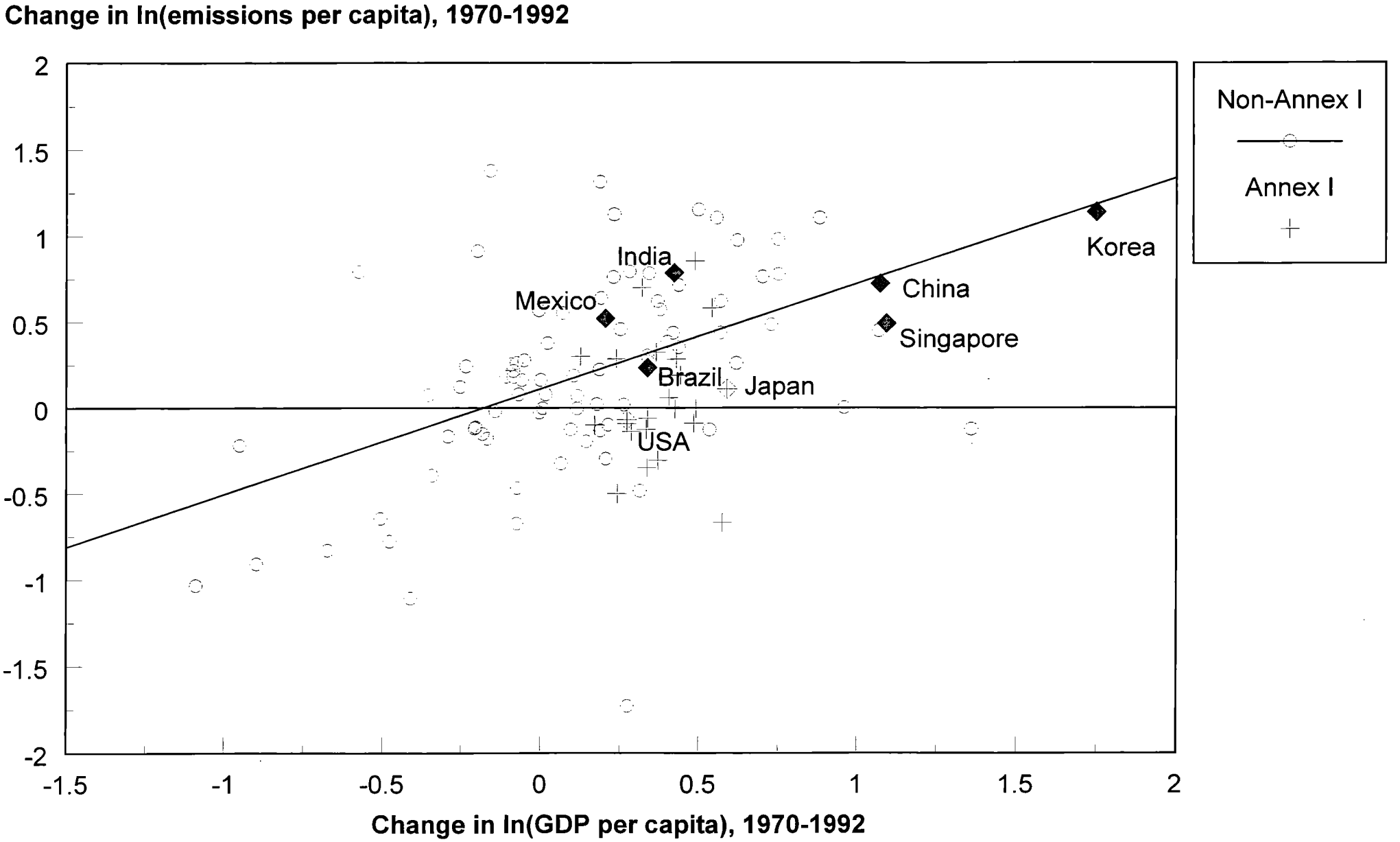
*Note that Annex I excludes Belarus, the Czech Republic, Latvia, Lithuania, Russia, Slovakia, and Ukraine because of data limitations.

Country Carbon Emissions vs. GDP, 1988-1992 Average



n = 110

Change in Country Carbon Emissions vs. GDP, 1970-1992



n = 110

Per Capita Carbon Emissions

The following chart presents the emissions of metric tons of carbon per capita, averaged over the 1988-1992 period, for 123 countries (including all of Annex I).[1] Forty-nine countries had per capita emissions greater than one over this period, including 34 Annex I countries. Turkey (0.68) and New Zealand (0.46) were the only two Annex I countries below this threshold. Of the 15 Non-Annex I countries with per capita emissions greater than one, several are members of OPEC (e.g., Kuwait, Qatar, Saudi Arabia, and Venezuela), several are Asian Tigers (e.g., Korea and Singapore), and several are upper middle income countries (e.g., Mexico and South Africa).

Based on UN population projections and Energy Information Administration carbon emissions projections, China will surpass this threshold in 2007. India's per capita emissions will increase to 0.39 by 2015.

[1] Please note that several countries have emissions per capita based only on 1992 data. Given the governing changes in the Former Soviet Union and Eastern Europe, 1992 data were only available for these countries.

Country	Per Capita Emissions, 88-92 average
Qatar	7.2486
Luxembourg	*5.5399*
United States	*5.4089*
Australia	*4.2230*
Canada	*4.1753*
Singapore	4.0345
Trinidad and Tobago	4.0339
*Russia**	*3.8740*
*Estonia**	*3.6442*
*Czech Republic**	*3.5910*
Saudi Arabia	3.5031
Kuwait	3.3058
Germany	*3.2850*
Norway	*3.2395*
*Ukraine**	*3.2299*
Denmark	*2.7956*
United Kingdom	*2.7406*
*Belarus**	*2.7253*
Finland	*2.7203*
Belgium	*2.6711*
Netherlands	*2.5269*
*Poland**	*2.4369*
Ireland	*2.4079*
Japan	*2.3523*
South Africa	2.0650
Israel	2.0630
Iceland	*2.0315*
Austria	*1.9774*
Greece	*1.9319*
*Slovakia**	*1.9057*
Italy	*1.9019*
Sweden	*1.7464*
Hungary	*1.7378*
France	*1.7266*
Bahamas	1.6701
*Bulgaria**	*1.6620*
Oman	1.6555
Switzerland	*1.6491*
*Lithuania**	*1.6146*
Venezuela	1.5831
Korea	1.5727
*Latvia**	*1.5281*
Spain	*1.4902*
*Romania**	*1.4403*
Gabon	1.4097
Suriname	1.2793
Portugal	*1.1751*
Mexico	1.0432
Malta	1.0314

Argentina	0.9538
Malaysia	0.8614
Barbados	0.8477
Chile	0.6842
Turkey	*0.6834*
Jamaica	0.6272
Seychelles	0.6133
Algeria	0.6108
China	0.5881
Colombia	0.4737
Tunisia	0.4647
Zimbabwe	0.4614
New Zealand	*0.4566*
Thailand	0.4532
Ecuador	0.4473
Botswana	0.4207
Uruguay	0.4053
Belize	0.4001
Brazil	0.3851
Egypt	0.3805
Mauritania	0.3768
Costa Rica	0.3039
Mauritius	0.3001
Congo	0.2888
Dominican Republic	0.2791
Guyana	0.2758
Peru	0.2700
Morocco	0.2668
Fiji	0.2595
Nigeria	0.2474
Indonesia	0.2374
Bolivia	0.2351
India	0.2214
Philippines	0.1961
Dominica	0.1789
Nicaragua	0.1630
Papua New Guinea	0.1605
St Vincent and The Grenadines	0.1595
Pakistan	0.1468
Cote d'Ivoire	0.1456
El Salvador	0.1445
Swaziland	0.1412
Guatemala	0.1297
Sao Tome and Principe	0.1245
Paraguay	0.1223
Honduras	0.1221
Senegal	0.1051
Zambia	0.0830
Kiribati	0.0669
Ghana	0.0635
Sri Lanka	0.0630

Kenya	0.0610
Gambia	0.0559
Guinea Bissau	0.0551
Togo	0.0541
Cape Verde	0.0521
Cameroon	0.0461
Sierra Leone	0.0429
Bangladesh	0.0384
Niger	0.0362
Benin	0.0329
Myanmar	0.0319
Haiti	0.0314
Comoros	0.0239
Tanzania	0.0226
Central African Republic	0.0209
Madagascar	0.0206
Malawi	0.0173
Rwanda	0.0168
Burkina Faso	0.0166
Nepal	0.0132
Mali	0.0127
Chad	0.0121
Burundi	0.0099
Bold: Emissions per capita > 1	
Italics: Annex 1 nation	
* Based on 1992 data only	
Data sources:	
emissions -- Carbon Dioxide Information Analysis Center, ORNL	
population -- Population Division, UN	

Agenda
November 7 Meeting on Climate Change
11:00 a.m.

I. Review of Key Substantive Points

- Target and timetable

  -- Reductions in second budget period
  -- Aspirational target
  -- Sinks

- Paper tons - early action for nations

- Joint Implementation - 0 probability now → may be decided in 2000 (end of pilot phase)
  JI + Brazil's Clean Development Fund as option
  -- Prospects for JI with credit in developing countries
  -- Two-step option

  2 ideas: 1) cap LDC @ BAU
  2) World Bank proposal
  (this is the one under consideration by US
  need to redesign JI/Brazil in prg.

- Developing Countries

  -- General strategic discussion
  -- Report on possible formula approach
  -- Mandate approach

  ⇒ David: Larry should speak w/ finance ministers

II. Process outcome

- Options for process deals
- How and when to pursue

Jeffrey A. Frankel
11/06/97 09:31:54 AM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc: Adele C. Morris/CEA/EOP
Subject: formula for LDC participation

Joe

Todd, and the others have a lot of potential interest now in what we and our econometrics might have to say about a formula for differentiation, and especially for LDCs. That's what the meeting with Gruber, Orszag at all is about this afternoon. Then they (and you) will report the results to Todd's group on Friday.

so our proposed formula will be something like
(e/cap)t+18 = const + .9(e/cap t) + (.1)(.8)(gdp/cap t+18).
where t and t+18 are averages over 5-year periods centered on
1972 and 1990, for the case of our data set on which we estimate,
or 1990 and 2010 for case of our prospective forward-looking formula.

[Our estimation has only been through 1992? We don't have any more recent data? This could be a problem.]

I have deliberately set the time trend to zero, even tho it clearly shows up in the estimation. This is the simplest possible way of proposing a target for everybody that reduces relative to the BAU path. But we should also have an idea of the extra trend (.01 per year?) that would be removed under this plan.

Please check if you think those parameters seem like a reasonable "central tendency" to our estimates. You might compose a table with some of our best estimates (Probably our most important run is the pure cross-section, with five-year averages for current and beginning-of-sample variables. drop ALL quadratics for these purposes -- they are already going to say the formula is too complicated as it is. And Concentrate mostly on the all--country data set.) In the last columns of the table, report what the implied LR coefficient (on gdp/cap) is, i.e., the SR coefficient times 1-coeff on lagged e/cap.

Also, as I said in preceding e-mail, can you do a plot that shows the middle-income countries and big emitters explicitly. We also want to know where the US, EU and other major countries are on this plot. (Ideally, we would also have a version of the plot that shows where we expect these countries to be in 15-20 years, e.g., based on World Bank predictions of growth rates. But I think that is asking too much for this week!)

I suppose we should have tried some runs with relative energy prices in. But we can't try to do that before this afternoon's meeting.

JF

Jeffrey A. Frankel
11/05/97 07:41:35 PM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: formula for LDC emissions

For Th. 4:00 mtg. (and Fri. mtg.), we need to decide what we think is our best formula to predict countries' emissions 15 or 20 years ahead. What do you think?

We should probably type up our favorite equation (with numbers rounded off).
Maybe also plot the curve of em/cap vs. GDP/cap, with some sample country data points (as of 1996) plotted around the regression curve. Including China India Brazil... Singapore Korea Mexico...

JF

CEA 11/6/97

Formula for per capita emissions:

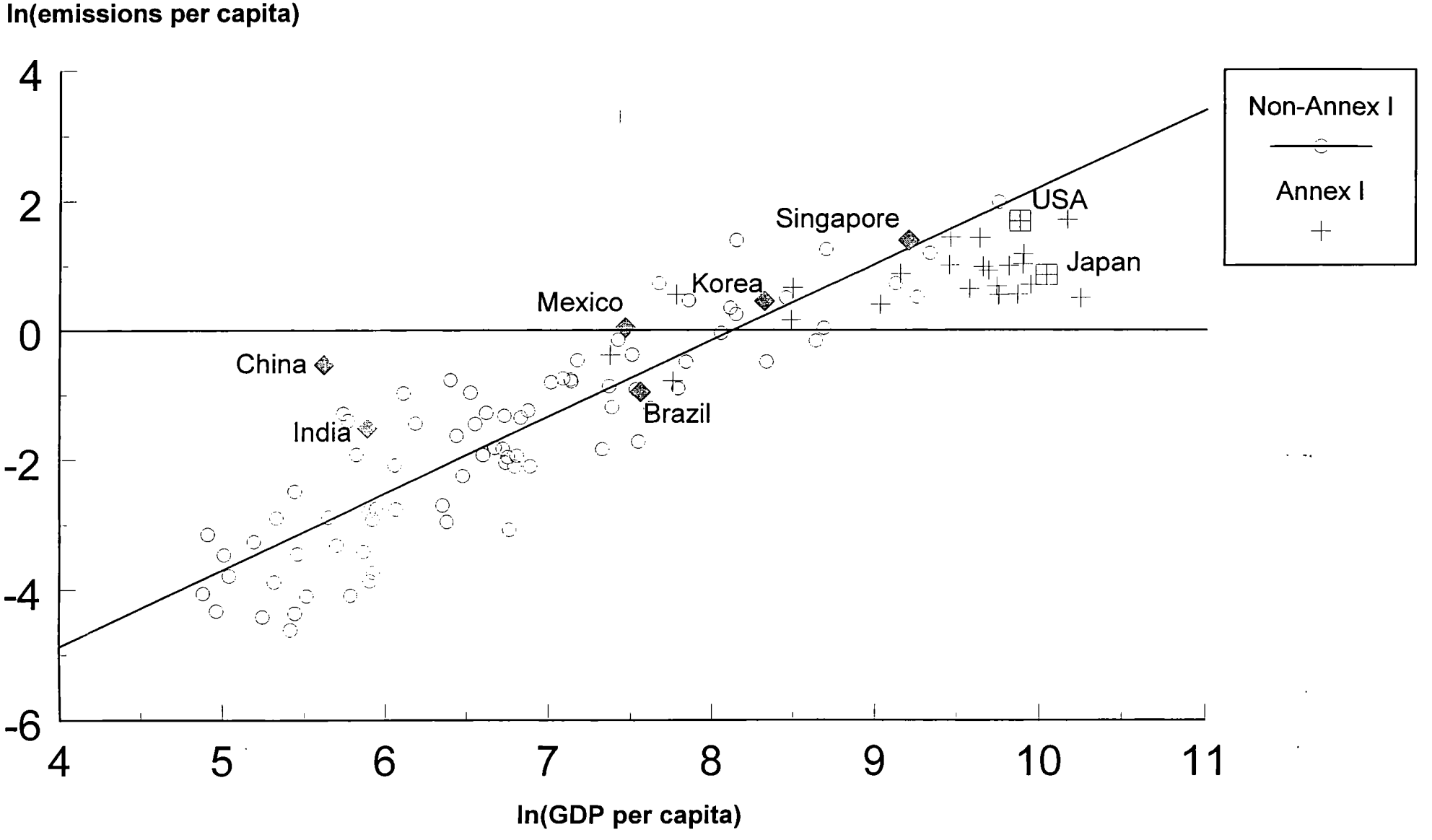
$$(e/pop)_{t+18} = \text{constant} + .9(e/pop)_{t} + (.1)(.8)(gdp/pop)_{t+18}.$$

where t and t+18 are averages over 5-year periods
centered on:
1972 and 1990, for the case of our data set on which we estimate,
or 1990 and 2010 for case of our prospective forward-looking formula.

The time series data also include a time trend, roughly 1 percent a year beyond what is explained by income growth. The time trend has been omitted above, as one step toward the goal of stabilizing/reducing emissions.

Proposal: When countries' per capita emissions exceed one ton of carbon per person, they take on the binding emission targets of a formula such as that above. (China, India, Brazil, and other "Annex B" countries agree to that future commitment today.)

Country Carbon Emissions vs. GDP, 1988-1992 Average



n = 110

Cross-Sectional

$\ln(emis/pop_{88\text{-}92}) = -21.5 + .9*\ln(GDP/pop_{88\text{-}92})$ $R^2 = .73$

$\ln(emis/pop_{88\text{-}92}) = -5.1 + .2*\ln(GDP/pop_{88\text{-}92}) + .7*\ln(emis/pop_{70\text{-}74})$ $R^2 = .92$

Panel

$\ln(emis/pop_i) = -19.2 + .6*\ln(GDP/pop_i) + .01*time$ $R^2 = .72$
[Fixed effects]

$\ln(emis/pop_i) = -3.1 + .1*\ln(GDP/pop_i) + .85*\ln(emis/pop_{70\text{-}74}) + .01*time$ $R^2 = .95$
[OLS]

Definitions

$emis/pop_{88\text{-}92}$ == average per capita emissions for country j, 1988-1992

$GDP/pop_{88\text{-}92}$ == average per capita GDP for country j, 1988-1992

$emis/pop_{70\text{-}74}$ == average per capita emissions for country j, 1970-1974

time == time trend, 1970 indexed to 1, increases by 1 each year

Annex 1	Country Constants	US Formula	Percapita Allowance	Emissions Allowance	1990 Delta
Australia	-0.89757	1.276458	3.583922	76.57766	4.099411
Austria	-0.85096	0.634948	1.886925	15.56902	0.130254
Belarus	ERR	ERR	ERR		
Belgium	-0.78446	0.890808	2.437098	25.18497	-1.5066
Bulgaria	-0.46775	0.532328	1.702892	14.03524	-6.3819
Canada	-0.86883	1.239578	3.454156	117.2548	3.040891
Czech Rep	ERR	ERR	ERR		
Denmark	-0.77188	0.918323	2.505085	12.9588	-0.94907
Estonia	-0.83375	-2.17245	0.113899	0.166406	-0.00147
Finland	-0.79843	0.919996	2.509282	13.33432	-0.60154
France	-0.84905	0.480072	1.61619	97.18152	0.628788
Germany	-0.75017	1.097405	2.996379	241.1066	-23.3374
Greece	-0.71398	0.495738	1.64171	17.169	-2.35579
Hungary	-0.58214	0.353127	1.423512	13.77675	-4.09824
Ireland	-0.79253	0.771032	2.161997	8.165863	-0.41889
Italy	-0.73965	0.55403	1.740251	97.42798	-10.5604
Japan	-0.82202	0.819419	2.269182	288.531	-5.98768
Latvia	ERR	ERR	ERR		
Lithuania	ERR	ERR	ERR		
Netherland	-0.82937	0.837175	2.309833	37.50938	-0.49796
New Zeala	-0.91421	0.540406	1.716705	6.925186	0.478878
Norway	-0.81224	1.111509	3.03894	13.84541	-0.4262
Poland	-0.64591	0.67111	1.956408	78.13501	-16.9798
Portugal	-0.75005	0.059877	1.061706	10.39517	-1.00754
Romania	-0.54152	0.346495	1.414102	31.55711	-11.0849
Russian Fe	ERR	ERR	ERR		
Slovak Rep	ERR	ERR	ERR		
Spain	-0.76399	0.301768	1.352247	53.4327	-4.36723
Sweden	-0.87144	0.439437	1.551834	14.37929	0.409461
Switzerland	-0.94577	0.514709	1.673152	12.91172	1.266191
Turkey	-1.00736	-0.51031	0.600307	46.75374	7.103595
Ukraine	ERR	ERR	ERR		
UK and Nor	-0.76034	0.877388	2.40461	144.0818	-12.3463
US	-0.84256	1.509378	4.523915	1345.802	0
				2834.168	-85.7514
Developing Countries					
China	-0.82637	-0.75952	0.467892	649.6562	-10.6038
India	-1.02565	-1.68242	0.185923	221.078	36.98805
Brazil	-1.10293	-1.02687	0.358125	71.38397	16.36397
Mexico	-0.99644	-0.12959	0.878453	103.3509	14.74089
Korea	-0.94331	0.360646	1.434256	72.80858	6.978578
Singapore	-0.92125	1.26145	3.530538	11.10001	0.840012

Annex 1	Country Constants	Annex 1 Formula	Percapita Allowance	Emissions Allowance	1990 Delta
Australia	-0.89757	1.305816	3.6907	78.85919	6.380936
Austria	-0.85096	0.664307	1.943143	16.03287	0.594111
Belgium	-0.78446	0.920167	2.509708	25.93533	-0.75625
Bulgaria	-0.46775	0.561687	1.753628	14.4534	-5.96374
Canada	-0.86883	1.268936	3.557067	120.7482	6.534333
Denmark	-0.77188	0.947681	2.57972	13.34489	-0.56298
Estonia	-0.83375	-2.14309	0.117292	0.171364	0.003486
Finland	-0.79843	0.949355	2.584042	13.7316	-0.20426
France	-0.84905	0.50943	1.664342	100.0769	3.524176
Germany	-0.75017	1.126763	3.085652	248.2901	-16.1539
Greece	-0.71398	0.525097	1.690623	17.68053	-1.84426
Hungary	-0.58214	0.382486	1.465924	14.18721	-3.68778
Ireland	-0.79253	0.800391	2.226411	8.409154	-0.1756
Italy	-0.73965	0.583388	1.7921	100.3307	-7.6577
Japan	-0.82202	0.848778	2.336789	297.1273	2.608698
Netherland	-0.82937	0.866534	2.378651	38.62692	0.619583
New Zeala	-0.91421	0.569765	1.767851	7.131512	0.685204
Norway	-0.81224	1.140867	3.129481	14.25791	-0.0137
Poland	-0.64591	0.700468	2.014696	80.46294	-14.6518
Portugal	-0.75005	0.089236	1.093338	10.70488	-0.69783
Romania	-0.54152	0.375853	1.456234	32.49731	-10.1447
Spain	-0.76399	0.331126	1.392536	55.02465	-2.77528
Sweden	-0.87144	0.468796	1.598069	14.8077	0.837872
Switzerland	-0.94577	0.544068	1.723001	13.2964	1.650878
Turkey	-1.00736	-0.48096	0.618193	48.1467	8.496557
UK and Nor	-0.76034	0.906746	2.476252	148.3745	-8.05361
US	-0.84256	1.538736	4.658699	1385.898	40.09627
				Sum-->	-1.31129
Annex 1	-0.8132	1.041616	2.833792	2919.919	2.2E-16
Developing Countries			1	0	0
China	-0.82637	-0.73016	0.481832	669.0118	8.751787
India	-1.02565	-1.65306	0.191463	227.6648	43.57476
Brazil	-1.10293	-0.99751	0.368795	73.51076	18.49076
Mexico	-0.99644	-0.10023	0.904625	106.4301	17.82009
Korea	-0.94331	0.390005	1.476988	74.97781	9.147808
Singapore	-0.92125	1.290809	3.635726	11.43072	1.170722

	delta GDP	delta emis
US	.272903	−.06917
Jap	.585892	.110112

C

	2000	2005	2010	2015
China	1031	1257	1523	1838
India	276	350	421	490
Mexico	123	146	163	180

Pop

	2001	2002	2003	2004	2005	2006	2007	2008
	1296	1307	1317	1327				
China	1285				1337	1347	1358	1368
India	1039				1107		1189	1264
Mexico	102				110			

Mex
95 emis : 97
95 pop : 94

	92 emis MMT	92 pop (1000s)
Belarus	27.8258	10210
Bulgaria	14.8252	8920
Czech Rep	36.984	10299
Estonia	5.6959	1563
Latvia	4.0312	2638
Lithuania	6.0016	3717
Poland	93.2433	38263
Romania	33.3008	23120
Slovakia	10.0906	5295
Ukraine	166.7296	51620

Office of Wetlands, Oceans, and Watersheds

Trading in Watersheds

- **Trading in Watersheds : EPA Office of Water, Office of Enforcement Compliance Assurance, and General Counsel Release**
  - Draft Framework for Watershed-Based Trading
  - Comments on Draft Framework for Watershed-Based Trading NEW
  - TMDL Case Study, Tar-Pamlico Basin, NC
  - Policy Statement
  - Draft Trading Updates -- December 1996

HTML

The Boulder Creek, Colorado trading project update
The Cherry Creek, Colorado trading project update
The Lake Dillon, Colorado trading program update
The Tar-Pamlico, North Carolina trading program update

WordPerfect 5.2

The Boulder Creek, Colorado trading project update
The Cherry Creek, Colorado trading project update
The Lake Dillon, Colorado trading program update
The Tar-Pamlico, North Carolina trading program update

OWOW's Watershed Management Program

OW-GENERAL@epamail.epa.gov
Revised *May 13, 1997*

http://www.epa.gov/OWOW/watershed/trading/index.html

Country	Country Code
Algeria	1
Argentina	2
Australia	3
Austria	4
Bahamas	5
Bangladesh	6
Barbados	7
Belgium	8
Belize	9
Benin	10
Bolivia	11
Botswana	12
Brazil	13
Burkina Faso	14
Burundi	15
Cameroon	16
Canada	17
Cape Verde	18
Central African Rep	19
Chad	20
Chile	21
China	22
Colombia	23
Comoros	24
Congo	25
Costa Rica	26
Cote d'Ivoire	27
Denmark	28
Dominica	29
Dominican Rep	30
Ecuador	31
Egypt	32
El Salvador	33
Fiji	34
Finland	35
France	36
Gabon	37
Gambia, The	38
Ghana	39
Greece	40
Guatemala	41
Guinea-Bissau	42
Guyana	43
Haiti	44
Honduras	45
Hungary	46
Iceland	47
India	48
Indonesia	49
Iraq	50

Ireland	51
Israel	52
Italy	53
Jamaica	54
Japan	55
Kenya	56
Kiribati	57
Korea, Rep	58
Kuwait	59
Liberia	60
Libya	61
Luxembourg	62
Madagascar	63
Malawi	64
Malaysia	65
Mali	66
Malta	67
Mauritania	68
Mauritius	69
Mexico	70
Morocco	71
Myanmar	72
Nepal	73
Netherlands	74
New Zealand	75
Nicaragua	76
Niger	77
Nigeria	78
Norway	79
Oman	80
Pakistan	81
Papua New Guinea	82
Paraguay	83
Peru	84
Philippines	85
Portugal	86
Qatar	87
Rwanda	88
Sao Tome and Principe	89
Saudi Arabia	90
Senegal	91
Seychelles	92
Sierra Leone	93
Singapore	94
Somalia	95
South Africa	96
Spain	97
Sri Lanka	98
St. Vincent and The Grenadine	99
Suriname	100
Swaziland	101

Sweden	102
Switzerland	103
Syrian Arab Rep	104
Tanzania	105
Thailand	106
Togo	107
Trinidad and Tobago	108
Tunisia	109
Turkey	110
United Kingdom	111
United States	112
Uruguay	113
Venezuela	114
Zaire	115
Zambia	116
Zimbabwe	117
Total	~~117~~
Germany	118

Poland, And Check Republic, the other two Annex I Countries are not included in Data Set for lack of Data.

	deltgdp	deltemis
Algeria	0.18695	0.222929
Argentina	-0.14187	-0.01912
Australia	0.240027	0.286166
Austria	0.426193	-0.00548
Bahamas	0.275419	-1.72867
Banglades	0.233657	1.126477
Barbados	0.252722	0.457708
Belgium	-0.37212	-0.3059
Belize	0.618772	0.260885
Benin	-0.00239	-0.02675
Bolivia	-0.10645	0.181689
Botswana	1.360368	-0.12235
Brazil	0.339301	0.234238
BurkinaFas	0.230667	0.761104
Burundi	0.281945	0.793562
Cameroon	0.437891	0.352356
Canada	-0.39293	-0.05962
CapeVerde	0.960343	0.003242
CentralAfric	-0.20373	-0.11292
Chad	0.002053	0.162784
Chile	0.214678	-0.09824
China	1.074042	0.724611
Colombia	0.340653	0.270282
Comoros	-0.20643	-0.11882
Congo	0.419429	0.436283
CostaRica	0.105689	0.187872
CotedIvoire	-0.25238	0.122848
Denmark	0.287672	-0.13708
Dominica	0.379112	0.571381
Dominican	0.263187	0.018551
Ecuador	0.344245	0.783011
Egypt	0.751374	0.778156
ElSalvador	-0.08426	0.180108
Fiji	0.189035	-0.1307
Finland	0.406234	0.058259
France	0.336639	-0.34812
Gabon	-0.35365	0.075073

Gambia	0.070982	0.552291
Ghana	-0.29049	-0.16576
Greece	0.320943	0.700426
Guatemala	0.007951	-0.00142
GuineaBiss	0.02316	0.377253
Guyana	-0.47638	-0.77681
Haiti	-0.07435	0.262074
Honduras	0.096062	-0.12521
Hungary	0.485162	-0.08897
Iceland	0.491387	-0.00213
India	0.422831	0.785943
Indonesia	0.750572	0.980885
Ireland	0.429948	0.284002
Israel	0.338071	0.303814
Italy	0.443864	0.189575
Jamaica	-0.34282	-0.39313
Japan	0.589892	0.110112
Kenya	0.207253	-0.29584
Kiribati	-0.67266	-0.82916
KoreaS	1.749305	1.138907
Kuwait	-0.89619	-0.90767
Luxembour	0.574893	-0.66739
Madagasca	-0.50516	-0.64417
Malawi	-0.07342	-0.4662
Malaysia	0.700666	0.763343
Mali	0.016955	0.079023
Malta	1.069383	0.451047
Mauritania	-0.1571	1.378522
Mauritius	0.728652	0.484908
Mexico	0.205863	0.520578
Morocco	0.370886	0.6201
Myanmar	0.145133	-0.19493
Nepal	0.191773	0.639776
Netherland	0.27397	-0.09114
NewZealan	0.126733	0.299934
Nicaragua	-0.94909	-0.21792
Niger	-0.57402	0.791988
Nigeria	-0.09026	0.254257

Norway	0.570667	0.62222
Oman	0.621741	0.975646
Pakistan	0.500127	1.152264
PapuaNew	-0.05002	0.277241
Paraguay	0.401813	0.384858
Philippines	0.178752	0.021553
Portugal	0.48925	0.854301
Qatar	-1.08891	-1.03216
Rwanda	0.187921	1.314797
SaoTomea	-0.19811	0.912502
SaudiArabi	-0.23419	0.242766
Senegal	-0.05717	0.162484
Seychelles	0.557501	1.105828
SierraLeon	-0.16718	-0.17781
Singapore	1.094406	0.492502
SouthAfrica	0.117192	0.069903
Spain	0.366388	0.323901
SriLanka	0.534882	-0.12607
StVincenta	0.568917	0.437644
Suriname	0.11633	-0.00347
Swaziland	0.314636	-0.48204
Sweden	0.243044	-0.49887
Switzerland	0.171974	-0.09876
Tanzania	-0.07428	-0.67401
Thailand	0.881209	1.105805
Togo	-0.08437	0.215371
Trinidadan	-0.00439	0.568729
Tunisia	0.437401	0.71326
Turkey	0.542469	0.581648
UnitedKing	0.334417	-0.12525
UnitedState	0.272903	-0.06917
Uruguay	0.066024	-0.32312
Venezuela	-0.18189	-0.15078
Zambia	-0.41083	-1.10628
Zimbabwe	-0.06787	0.078713

coun	ln(avgemis)	ln(avggdp)
Algeria	-0.49303	7.83816
Argentina	-0.04728	8.053626
Australia	1.440551	9.452587
Austria	0.68177	9.732024
Bahamas	0.512911	9.251085
Banglades	-3.25906	5.19357
Barbados	-0.16527	8.632928
Belgium	0.982487	9.649677
Belize	-0.91613	7.529262
Benin	-3.4138	5.864642
Bolivia	-1.44771	6.55137
Botswana	-0.86594	7.366752
Brazil	-0.95431	7.557479
BurkinaFas	-4.0978	5.515453
Burundi	-4.61738	5.416942
Cameroon	-3.07799	6.760702
Canada	1.429179	9.630336
CapeVerde	-2.95477	6.37634
CentralAfric	-3.86562	5.903364
Chad	-4.4176	5.246472
Chile	-0.37944	7.505455
China	-0.53079	5.618662
Colombia	-0.74724	7.085021
Comoros	-3.73456	5.922068
Congo	-1.24204	6.875669
CostaRica	-1.19096	7.383447
CotedIvoire	-1.92675	6.599967
Denmark	1.028045	9.889595
Dominica	-1.72095	7.54554
Dominican	-1.2763	6.619998
Ecuador	-0.80456	7.014406
Egypt	-0.96635	6.523071
ElSalvador	-1.93464	6.806189
Fiji	-1.34912	6.829868
Finland	1.000752	9.805321
France	0.546167	9.744741
Gabon	0.343383	8.109704

Gambia	-2.88437	5.646495
Ghana	-2.75628	5.941134
Greece	0.658521	8.492153
Guatemala	-2.04262	6.73711
GuineaBiss	-2.89932	5.330688
Guyana	-1.2881	5.737207
Haiti	-3.46121	5.012084
Honduras	-2.10329	6.793069
Hungary	0.552646	7.777208
Iceland	0.708769	9.937886
India	-1.50788	5.885078
Indonesia	-1.43786	6.181013
Ireland	0.878747	9.151084
Israel	0.724164	9.121185
Italy	0.642839	9.566742
Jamaica	-0.46654	7.172256
Japan	0.8554	10.03306
Kenya	-2.79687	5.896961
Kiribati	-2.70482	6.349432
KoreaS	0.45278	8.316743
Kuwait	1.195693	9.326922
Luxembour	1.711971	10.1611
Madagasca	-3.88062	5.316948
Malawi	-4.05854	4.885405
Malaysia	-0.14924	7.42005
Mali	-4.36352	5.44427
Malta	0.030942	8.681597
Mauritania	-0.97609	6.108422
Mauritius	-1.20372	7.618911
Mexico	0.042254	7.464022
Morocco	-1.32114	6.730203
Myanmar	-3.44663	5.45972
Nepal	-4.328	4.966862
Netherland	0.927005	9.680676
NewZealan	0.78395	7.755828
Nicaragua	-1.81415	6.670552
Niger	-3.31779	5.696867
Nigeria	-1.39658	5.766162

Norway	1.75414	9.893872
Oman	0.504079	8.44947
Pakistan	-1.91895	5.818383
PapuaNew	-1.8293	6.720311
Paraguay	-2.10121	6.888423
Peru	-1.3092	1.770957
Philippines	-1.62909	6.436398
Portugal	0.16139	8.482311
Qatar	1.980811	9.743834
Rwanda	-4.08646	5.78363
SaoTomea	-2.08378	6.054944
SaudiArabi	1.25365	8.693571
Senegal	-2.25303	6.476586
Seychelles	-0.48891	8.331279
SierraLeon	-3.14943	4.912588
Singapore	1.394887	9.199214
SouthAfrica	0.72514	7.669116
Spain	0.398898	9.027204
SriLanka	-2.76461	6.063249
StVincenta	-1.8356	7.325366
Suriname	0.246301	8.144156
Swaziland	-1.95771	6.75099
Sweden	0.557582	9.858795
Switzerland	0.500233	10.24265
Tanzania	-3.78845	5.042751
Thailand	-0.7914	7.136658
Togo	-2.91629	5.918271
Trinidadan	1.394741	8.144604
Tunisia	-0.76643	7.132041
Turkey	-0.38067	7.370984
UnitedKing	1.008167	9.444669
UnitedState	1.688045	9.87133
Uruguay	-0.90307	7.789989
Venezuela	0.459417	7.852796
Zambia	-2.48889	5.442403
Zimbabwe	-0.77358	6.399179

Jeffrey A. Frankel
11/05/97 09:02:26 AM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: emissions regressions

Joe,

Thanks for your latest results.

Looking over all the runs you have done for me (all of which were very useful; except we should ignore those with the squared term and no linear term), I think I should be able to draw general conclusions by now. But I am unsure exactly what they are. Let me try out the following on you. You might see if you agree on my reading of the results.

- the biggest determinant of a country's emissions are lagged emissions
- there is a tendency for em/cap to move toward a more common formula across countries, based on GDP/cap
- the relationship is somewhat less than proportionate. In the long run, a 1% increase in GDP per capita produces maybe a .6-1.0 % increase in em/cap.
- One might expect emissions in rich countries to begin to diminish. There may be a negative quadratic effect, but the evidence is weak
- There appears to be a positive time trend, which works to offset any tendency for em to rise less-than-proportionaly with income. -- To evaluate this, could you please print out a table or chart of emissions/GDP over time for the global total, and major groupings of countries (non-Annex, EEFSU, EU, US, other OECD)?

Annex I

Australia
Austria
Belarus[a/]
Belgium
Bulgaria[a/]
Canada
Czechoslovakia[a/] both Czech Rep + Slovakia
Denmark
European Economic Community
Estonia[a/]
Finland
France
Germany
Greece
Hungary[a/]
Iceland
Ireland
Italy
Japan
Latvia[a/]
Lithuania[a/]
Luxembourg
Netherlands
New Zealand
Norway
Poland[a/]
Portugal
Romania[a/]
Russian Federation[a/] – just Russia
Spain
Sweden
Switzerland
Turkey
Ukraine[a/]
United Kingdom of Great Britain and Northern Ireland
United States of America

[a/] Countries that are undergoing the process of transition to a market economy.

Annex II

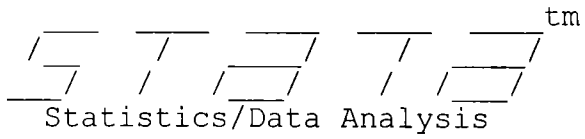
Australia
Austria
Belgium
Canada
Denmark
European Economic Community
Finland
France
Germany
Greece
Iceland
Ireland
Italy
Japan
Luxembourg
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
Turkey
United Kingdom of Great Britain and Northern Ireland
United States of America

CLIMATE CHANGE
BULLETIN

Issue 14, 2nd Quarter 19

Update on Ratification of the Convention - 13 May 1997

1. Mauritius	04/09/92	57. Paraguay	24/02/94	113. Saudi Arabia*	28/12/94
2. Seychelles	22/09/92	58. Austria	28/02/94	114. Solomon Islands	28/12/94
3. Marshall Islands	08/10/92	59. Brazil	28/02/94	115. Thailand	28/12/94
4. United S. of America	15/10/92	60. Argentina	11/03/94	116. Venezuela	28/12/94
5. Zimbabwe	03/11/92	61. Malta	17/03/94	117. Lao People's D.R.*	04/01/95
6. Maldives	09/11/92	62. Barbados	23/03/94	118. Jamaica	06/01/95
7. Monaco	24/11/92	63. France	25/03/94	119. Zaire	09/01/95
8. Canada	04/12/92	64. Bahamas	29/03/94	120. Kiribati	07/02/95
9. Australia	30/12/92	65. Ethiopia	05/04/94	121. Lesotho	07/02/95
10. China	05/01/93	66. Italy	15/04/94	122. Oman	08/02/95
11. Saint Kitts and Nevis	07/01/93	67. Bangladesh	15/04/94	123. Togo	08/03/95
12. Antigua and Barbuda	02/02/93	68. Ireland	20/04/94	124. Central African R.	10/03/95
13. Ecuador	23/02/93	69. Malawi	21/04/94	125. Colombia	22/03/95
14. Fiji	25/02/93	70. Nepal	02/05/94	126. Latvia	23/03/95
15. Mexico	11/03/93	71. Finland	03/05/94	127. Lithuania	24/03/95
16. Papua New Guinea	16/03/93	72. Luxembourg	09/05/94	128. Cape Verde	29/03/95
17. Vanuatu	25/03/93	73. Pakistan	01/06/94	129. Eritrea*	24/04/95
18. Cook Islands	20/04/93	74. Chad	07/06/94	130. Bulgaria	12/05/95
19. Guinea	07/05/93	75. Romania	08/06/94	131. Namibia	16/05/95
20. Armenia	14/05/93	76. Gambia	10/06/94	132. Azerbaijan	16/05/95
21. Japan	28/05/93	77. Liechtenstein	22/06/94	133. Kazakstan	17/05/95
22. Zambia	28/05/93	78. Trinidad and Tobago	24/06/94	134. Panama	23/05/95
23. Peru	07/06/93	79. Benin	30/06/94	135. Turkmenistan*	05/06/95
24. Algeria	09/06/93	80. Malaysia	13/07/94	136. Republic of Moldova	09/06/95
25. Saint Lucia	14/06/93	81. Estonia	27/07/94	137. Sierra Leone	22/06/95
26. Iceland	16/06/93	82. Poland	28/07/94	138. Niger	25/07/95
27. Uzbekistan*	20/06/93	83. Georgia *	29/07/94	139. Bhutan	25/08/95
28. Dominica*	21/06/93	84. Philippines	02/08/94	140. Mozambique	25/08/95
29. Sweden	23/06/93	85. Greece	04/08/94	141. Djibouti	27/08/95
30. Norway	09/07/93	86. Grenada	11/08/94	142. Ghana	06/09/95
31. Tunisia	15/07/93	87. Uruguay	18/08/94	143. Honduras	19/10/95
32. Burkina Faso	02/09/93	88. Indonesia	23/08/94	144. Guinea-Bissau	27/10/95
33. Uganda	08/09/93	89. Slovakia	25/08/94	145. Nicaragua	31/10/95
34. New Zealand	16/09/93	90. Costa Rica	26/08/94	146. Slovenia	01/12/95
35. Mongolia	30/09/93	91. Nigeria	29/08/94	147. El Salvador	04/12/95
36. Czech Republic	07/10/93	92. Guyana	29/08/94	148. Guatemala	15/12/95
37. Tuvalu	26/10/93	93. Kenya	30/08/94	149. Cambodia*	18/12/95
38. India	01/11/93	94. Bolivia	03/10/94	150. Morocco	28/12/95
39. Nauru	11/11/93	95. Albania*	03/10/94	151. United Arab Emirates*	29/12/95
40. Jordan	12/11/93	96. Senegal	17/10/94	152. Syrian Arab Rep.*	04/01/96
41. Micronesia	18/11/93	97. Cameroon	19/10/94	153. Belgium	16/01/96
42. Sudan	19/11/93	98. San Marino	28/10/94	154. Yemen	21/02/96
43. Sri Lanka	23/11/93	99. Belize	31/10/94	155. Niue*	28/02/96
44. United Kingdom	08/12/93	100. Comoros	31/10/94	156. Croatia	08/04/96
45. Germany	09/12/93	101. Viet Nam	16/11/94	157. Republic of Tanzania	17/04/96
46. Switzerland	10/12/93	102. Myanmar	25/11/94	158. Qatar*	18/04/96
47. Republic of Korea	14/12/93	103. Ivory Coast	29/11/94	159. Israel	04/06/96
48. Netherlands	20/12/93	104. Samoa	29/11/94	160. Iran	18/07/96
49. Denmark	21/12/93	105. D.P.R. of Korea	05/12/94	161. Haiti	25/09/96
50. Portugal	21/12/93	106. Egypt	05/12/94	162. Swaziland	07/10/96
51. Spain	21/12/93	107. Lebanon	15/12/94	163. Congo	14/10/96
52. E.E.C.	21/12/93	108. Chile	22/12/94	164. St. Vincent & Grenad.	02/12/96
53. Cuba	05/01/94	109. Bahrain	28/12/94	165. Burundi	06/01/97
54. Mauritania	20/01/94	110. Kuwait*	28/12/94	166. Ukraine	13/01/97
55. Botswana	27/01/94	111. Mali	28/12/94	*) = Accession	
56. Hungary	24/02/94	112. Russian Federation	28/12/94		




```
. generate emiscap = (emis/(pop*1000));
(23 missing values generated)

2. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(36 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. gen lgdpcaps = (ln(gdpcap)*ln(gdpcap));
(14 missing values generated)

6. regress lemiscap lgdpcap time;

  Source |       SS       df       MS                  Number of obs =    2664
---------+------------------------------               F(  2,  2661) = 3470.19
   Model |   6021.3068     2   3010.6534               Prob > F      =  0.0000
Residual |  2308.61798  2661  .867575339               R-squared     =  0.7229
---------+------------------------------               Adj R-squared =  0.7226
   Total |  8329.92477  2663  3.12802282               Root MSE      =  .93144

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .9492408   .0114084     83.206   0.000      .9268706     .971611
    time |   .0023204   .0027426      0.846   0.398     -.0030574    .0076982
   _cons |  -21.81703   .0888432   -245.568   0.000     -21.99124   -21.64282
------------------------------------------------------------------------------

7. xtreg lemiscap lgdpcap time, fe i(counindx);

                                              Fixed-effects (within) regression
sd(u_counindx)                =  1.056171     Number of obs =    2664
sd(e_counindx_t)              =  .3035692                 n =     117
sd(e_counindx_t + u_counindx)=  1.098932                T-bar = 22.7692

corr(u_counindx, Xb)          =    0.5433     R-sq within   =  0.1746
                                              Mean between  =  0.7451
                                              overall       =  0.7222

                                              F(  2,  2545) =  269.26
                                              Prob > F      =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .5865739   .0301464     19.457   0.000      .5274599     .645688
    time |   .0057999   .0009378      6.184   0.000      .0039609    .0076389
```

```
   _cons |  -19.25349   .2135128    -90.175   0.000      -19.67217   -18.83481
---------+--------------------------------------------------------------------
counindx |         F(116,2545) =    194.023   0.000          (117 categories)
```

```
8. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;

9. replace lgdpcap = . if annex1 == 0;
(2125 real changes made, 2125 to missing)

10. replace lemiscap = . if annex1 == 0;
(2127 real changes made, 2127 to missing)

11. regress lemiscap lgdpcap time;

  Source |       SS       df       MS                  Number of obs =     551
---------+------------------------------                F(  2,   548) =  297.29
   Model |  130.424183     2  65.2120915                Prob > F      =  0.0000
Residual |  120.205738   548  .219353537                R-squared     =  0.5204
---------+------------------------------                Adj R-squared =  0.5186
   Total |  250.629921   550  .455690766                Root MSE      =  .46835

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .6190961   .0254122     24.362   0.000       .5691788    .6690134
    time |  -.0096814   .0030582     -3.166   0.002      -.0156887   -.0036742
   _cons |  -18.64751   .2304981    -80.901   0.000      -19.10028   -18.19475
------------------------------------------------------------------------------

12. xtreg lemiscap lgdpcap time, fe i(counindx);

                                              Fixed-effects (within) regression
sd(u_counindx)                =  .4594014     Number of obs =     551
sd(e_counindx_t)              =  .1440041           n =      24
sd(e_counindx_t + u_counindx)=  .4814425           T-bar = 22.9583

corr(u_counindx, Xb)          =  -0.1200      R-sq within   =  0.1029
                                                    between  =  0.5417
                                                    overall  =  0.5204

                                              F(  2,   525) =   30.10
                                                   Prob > F =  0.0000
------------------------------------------------------------------------------
```

```
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+------------------------------------------------------------------
 lgdpcap |   .6876053    .103636      6.635   0.000       .4840131    .8911975
    time |  -.0107089   .0023646     -4.529   0.000      -.0153541   -.0060636
   _cons |  -19.26355   .9245386    -20.836   0.000       -21.0798    -17.4473
---------------------------------------------------------------------------
counindx |           F(23,525) =    229.201   0.000          (24 categories)
```

13. regress lemiscap lgdpcap lgdpcaps time;

```
  Source |       SS       df       MS                  Number of obs =     551
---------+------------------------------               F(  3,   547) =  204.41
   Model |  132.468602     3  44.1562007               Prob > F      =  0.0000
Residual |  118.161319   547  .216017037               R-squared     =  0.5285
---------+------------------------------               Adj R-squared =  0.5260
   Total |  250.629921   550  .455690766               Root MSE      =  .46478

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   2.298873   .5466048      4.206   0.000       1.225172    3.372575
lgdpcaps |   -.096867   .0314873     -3.076   0.002      -.1587177   -.0350162
    time |  -.0078202   .0030946     -2.527   0.012      -.0138989   -.0017415
   _cons |  -25.86624   2.357616    -10.971   0.000      -30.49733   -21.23515
------------------------------------------------------------------------------
```

xtreg lemiscap lgdpcap lgdpcaps time, fe i(counindx);

```
                                        Fixed-effects (within) regression
sd(u_counindx)                =  .4780541   Number of obs =       551
sd(e_counindx_t)              =  .1303847         n =        24
sd(e_counindx_t + u_counindx)=  .4955158         T-bar = 22.9583

corr(u_counindx, Xb)          =   -0.2765   R-sq within   =  0.2659
                                            between  =  0.5349
                                            overall  =  0.5222

                                        F(  3,   524) =    63.28
                                             Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   4.709979   .3844418     12.251   0.000       3.954742    5.465216
lgdpcaps |  -.2276058   .0210957    -10.789   0.000      -.2690483   -.1861633
    time |  -.0078581   .0021572     -3.643   0.000       -.012096   -.0036203
   _cons |  -36.89891   1.836422    -20.093   0.000      -40.50657   -33.29126
------------------------------------------------------------------------------
counindx |           F(23,524) =    279.417   0.000          (24 categories)
```

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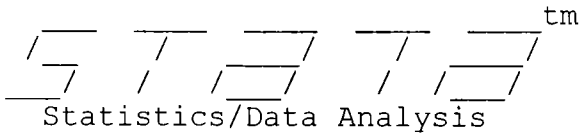


```
. generate emiscp88 = (emis88/(pop88*1000));

2. generate emiscp89 = (emis89/(pop89*1000));

3. generate emiscp90 = (emis90/(pop90*1000));

4. generate emiscp91 = (emis91/(pop91*1000));

5. generate emiscp92 = (emis92/(pop92*1000));

6. generate emiscp70 = (emis70/(pop70*1000));

7. generate emiscp71 = (emis71/(pop71*1000));

8. generate emiscp72 = (emis72/(pop72*1000));

9. generate emiscp73 = (emis73/(pop73*1000));

10. generate emiscp74 = (emis74/(pop74*1000));

11. gen gdpcap88 = (gdp88/(pop88*1000));
(1 missing value generated)

12. gen gdpcap89 = (gdp89/(pop89*1000));
 missing value generated)

13. gen gdpcap90 = (gdp90/(pop90*1000));
(2 missing values generated)

14. gen gdpcap91 = (gdp91/(pop91*1000));
(4 missing values generated)

15. gen gdpcap92 = (gdp92/(pop92*1000));
(7 missing values generated)

16. generate emisavg = (emiscp88 + emiscp89 + emiscp90 +emiscp91 + emiscp92)/5;

17. generate gdpavg = (gdpcap88 + gdpcap89 + gdpcap90 +gdpcap91 + gdpcap92)/5;
(7 missing values generated)

18. gen lemisavg = ln(emisavg);

19. gen lgdpavg = ln(gdpavg);
(7 missing values generated)

20. gen emis70s = (emiscp70 + emiscp71 + emiscp72 + emiscp73 +emiscp74)/5;

    gen lemis70s = ln(emis70s);

22. gen lgdpquad = lgdpavg*lgdpavg;
(7 missing values generated)
```

```
. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
  counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
> 2|
> counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
> == 112|
> counindx == 118;
```

24. regress lemisavg lgdpavg lemis70s;

```
  Source |       SS       df       MS                  Number of obs =     111
---------+------------------------------                F(  2,   108) =  675.39
   Model |  300.283779     2   150.14189                Prob > F      =  0.0000
Residual |  24.0086769   108   .222302564               R-squared     =  0.9260
---------+------------------------------                Adj R-squared =  0.9246
   Total |  324.292456   110  2.94811324                Root MSE      =  .47149

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpavg |    .201598   .0505458      3.988   0.000        .101408    .3017889
lemis70s |   .7436992    .044404     16.748   0.000       .6556827    .8317157
   _cons |  -5.157321   .9988239     -5.163   0.000      -7.137163   -3.177479
------------------------------------------------------------------------------
```

25. regress lemisavg lgdpavg;

```
  Source |       SS       df       MS                  Number of obs =     111
---------+------------------------------                F(  1,   109) =  300.28
   Model |  237.925461     1  237.925461                Prob > F      =  0.0000
Residual |  86.3669948   109  .792357751               R-squared     =  0.7337
---------+------------------------------                Adj R-squared =  0.7312
   Total |  324.292456   110  2.94811324                Root MSE      =  .89014

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpavg |   .908837   .0524477     17.328   0.000        .8048874    1.012787
   _cons |  -21.52082   .391903    -54.914   0.000       -22.29756   -20.74409
------------------------------------------------------------------------------
```

```
. replace lgdpavg = . if annex1 == 1;
(24 real changes made, 24 to missing)

. replace lemis70s = . if annex1 == 1;
(25 real changes made, 25 to missing)

. regress lemisavg lgdpavg lgdpquad lemis70s;
```

Source	SS	df	MS		
Model	191.845585	3	63.9485283	Number of obs =	87
Residual	21.3048022	83	.256684364	F(3, 83) =	249.13
Total	213.150387	86	2.47849287	Prob > F =	0.0000
				R-squared =	0.9000
				Adj R-squared =	0.8964
				Root MSE =	.50664

lemisavg	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpavg	.1224454	.2635569	0.465	0.643	-.4017587	.6466495
lgdpquad	.0099215	.0218274	0.455	0.651	-.0334922	.0533352
lemis70s	.7271184	.0591444	12.294	0.000	.6094825	.8447542
_cons	-5.343714	1.146597	-4.660	0.000	-7.62425	-3.063178

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```
. generate emiscap = (emis/(pop*1000));
(23 missing values generated)

2. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(36 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. gen emisavg = (emiscap +emiscap[_n-1] + emiscap[_n-2] + emiscap[_n-3] + emisc
 > ap[_n-4])/5
 >  if time == 5;
(2597 missing values generated)

6. replace emisavg = emisavg[_n+1] if time == 4;
(117 real changes made)

7. replace emisavg = emisavg[_n+2] if time == 3;
(117 real changes made)

8. replace emisavg = emisavg[_n+3] if time == 2;
(117 real changes made)

9. replace emisavg = emisavg[_n+4] if time == 1;
(117 real changes made)

10. replace emisavg = emisavg[_n-1] if time == 6;
(117 real changes made)

11. replace emisavg = emisavg[_n-2] if time == 7;
(117 real changes made)

12. replace emisavg = emisavg[_n-3] if time == 8;
(117 real changes made)

13. replace emisavg = emisavg[_n-4] if time == 9;
(117 real changes made)

14. replace emisavg = emisavg[_n-5] if time == 10;
(117 real changes made)

15. replace emisavg = emisavg[_n-6] if time == 11;
(117 real changes made)

16. replace emisavg = emisavg[_n-7] if time == 12;
(117 real changes made)

17. replace emisavg = emisavg[_n-8] if time == 13;
```

(117 real changes made)

. replace emisavg = emisavg[_n-9] if time == 14;
(117 real changes made)

19. replace emisavg = emisavg[_n-10] if time == 15;
(117 real changes made)

20. replace emisavg = emisavg[_n-11] if time == 16;
(117 real changes made)

21. replace emisavg = emisavg[_n-12] if time == 17;
(117 real changes made)

22. replace emisavg = emisavg[_n-13] if time == 18;
(117 real changes made)

23. replace emisavg = emisavg[_n-14] if time == 19;
(117 real changes made)

24. replace emisavg = emisavg[_n-15] if time == 20;
(117 real changes made)

25. replace emisavg = emisavg[_n-16] if time == 21;
(117 real changes made)

. replace emisavg = emisavg[_n-17] if time == 22;
(117 real changes made)

27. replace emisavg = emisavg[_n-18] if time == 23;
(117 real changes made)

28. gen lemisavg = ln(emisavg);
(23 missing values generated)

29. gen lgdpcaps = (ln(gdpcap)*ln(gdpcap));
(14 missing values generated)

30. regress lemiscap lgdpcap lemisavg time;

Source	SS	df	MS	Number of obs =	2664
Model	7882.85843	3	2627.61948	F(3, 2660) =	15634.07
Residual	447.06634	2660	.168070052	Prob > F =	0.0000
Total	8329.92477	2663	3.12802282	R-squared =	0.9463
				Adj R-squared =	0.9463
				Root MSE =	.40996

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gdpcap	.1179106	.00936	12.597	0.000	.099557	.1362643
emisavg	.8519272	.0080949	105.243	0.000	.8360543	.8678001
time	.0103505	.0012095	8.557	0.000	.0079787	.0127222

```
   _cons |  -3.093988   .1821501    -16.986   0.000      -3.451158   -2.736818
------------------------------------------------------------------------------
```

31. xtreg lemiscap lgdpcap lemisavg time, fe i(counindx);

```
                                              Fixed-effects (within) regression
sd(u_counindx)                 =  1.056171    Number of obs      =      2664
sd(e_counindx_t)               =  .3035692    n                  =       117
sd(e_counindx_t + u_counindx)= 1.098932       T-bar              =   22.7692

corr(u_counindx, Xb)           =    0.5433    R-sq within        =    0.1746
                                              between            =    0.7451
                                              overall            =    0.7222

                                              F(  2,  2545)      =    269.26
                                              Prob > F           =    0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .5865739   .0301464     19.457   0.000       .5274599     .645688
lemisavg |  (dropped)
    time |   .0057999   .0009378      6.184   0.000       .0039609    .0076389
   _cons |  -19.25349   .2135128    -90.175   0.000      -19.67217   -18.83481
---------+--------------------------------------------------------------------
counindx |         F(116,2545) =     19.882   0.000          (117 categories)
```

32. regress lemiscap lgdpcap lgdpcaps lemisavg time;

```
  Source |       SS       df       MS                  Number of obs =    2664
---------+------------------------------               F(  4,  2659) =11762.82
   Model |  7884.35744     4  1971.08936               Prob > F      =  0.0000
Residual |  445.567329  2659  .167569511               R-squared     =  0.9465
---------+------------------------------               Adj R-squared =  0.9464
   Total |  8329.92477  2663  3.12802282               Root MSE      =  .40935

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .2198465     .03534      6.221   0.000       .1505498    .2891431
lgdpcaps |  -.0076419    .002555     -2.991   0.003      -.012652    -.0026318
lemisavg |   .8606496   .0085928    100.159   0.000       .8438003    .8774989
    time |   .0104892   .0012086      8.679   0.000       .0081193    .0128592
   _cons |  -3.28287    .1925306    -17.051   0.000      -3.660395   -2.905346
------------------------------------------------------------------------------
```

33. xtreg lemiscap lgdpcap lgdpcaps lemisavg time, fe i(counindx);

```
                                              Fixed-effects (within) regression
sd(u_counindx)                 =  1.124143    Number of obs      =      2664
sd(e_counindx_t)               =  .3002718    n                  =       117
sd(e_counindx_t + u_counindx)= 1.163555       T-bar              =   22.7692
```

```
corr(u_counindx, Xb)         =    0.3487              R-sq within   =  0.1928
                                                          between   =  0.6376
                                                          overall   =  0.6198

                                                     F(  3,  2544) =  202.54
                                                          Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   1.692139   .1491867     11.342   0.000         1.3996    1.984679
lgdpcaps |  -.0747524   .0098836     -7.563   0.000      -.0941332   -.0553715
lemisavg |  (dropped)
    time |   .0061792   .000929      6.651   0.000       .0043575    .0080009
   _cons |  -23.15504   .5574155    -41.540   0.000      -24.24808   -22.06201
---------+--------------------------------------------------------------------
counindx |         F(116,2544) =     20.671   0.000          (117 categories)
```

```
34. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;

35. replace lgdpcap = . if annex1 == 1;
(575 real changes made, 575 to missing)

36. replace lemiscap = . if annex1 == 1;
(551 real changes made, 551 to missing)

37. regress lemiscap lgdpcap lemisavg time;

  Source |       SS       df       MS                  Number of obs =    2113
---------+------------------------------               F(  3,  2109) = 8766.77
   Model |  5192.17538     3  1730.72513               Prob > F      =  0.0000
Residual |  416.356417  2109   .19741888               R-squared     =  0.9258
---------+------------------------------               Adj R-squared =  0.9257
   Total |  5608.53179  2112  2.65555483               Root MSE      =  .44432

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .1418194   .0116836     12.138   0.000       .1189069    .1647319
lemisavg |   .8468986   .0090732     93.341   0.000       .8291053    .8646918
    time |   .0126089   .0014718      8.567   0.000       .0097226    .0154952
   _cons |  -3.355376   .2076945    -16.155   0.000      -3.762683   -2.948068
------------------------------------------------------------------------------
```

38. xtreg lemiscap lgdpcap lemisavg time, fe i(counindx);

```
                                                Fixed-effects (within) regression
sd(u_counindx)                =  1.057425       Number of obs =      2113
sd(e_counindx_t)              =  .3279552                 n =        93
sd(e_counindx_t + u_counindx)=  1.107115                T-bar = 22.7204

corr(u_counindx, Xb)          =    0.4241       R-sq within   =  0.2021
                                                     between  =  0.6454
                                                     overall  =  0.6182

                                                F(  2,  2018) =  255.59
                                                     Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .6380502   .0335849     18.998   0.000       .5721855    .7039149
lemisavg |  (dropped)
    time |   .0092905    .001107      8.393   0.000       .0071195    .0114614
   _cons |  -19.82543   .2217861    -89.390   0.000      -20.26038   -19.39047
---------+--------------------------------------------------------------------
counindx |          F(92,2018) =     20.143   0.000           (93 categories)
```

39. regress lemiscap lgdpcap lgdpcaps lemisavg time;

```
      Source |       SS       df       MS                  Number of obs =    2113
-------------+------------------------------                F(  4,  2108) = 6580.01
       Model |   5192.6473     4  1298.16182                Prob > F      =  0.0000
    Residual |  415.884495  2108   .19728866                R-squared     =  0.9258
-------------+------------------------------                Adj R-squared =  0.9257
       Total |  5608.53179  2112  2.65555483                Root MSE      =  .44417

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .0744476   .0450993      1.651   0.099      -.0139961    .1628913
lgdpcaps |   .0055686   .0036005      1.547   0.122      -.0014923    .0126295
lemisavg |   .8394203   .0102785     81.668   0.000       .8192633    .8595774
    time |   .0126008   .0014713      8.564   0.000       .0097154    .0154861
   _cons |  -3.279621   .2133253    -15.374   0.000      -3.697971   -2.861271
------------------------------------------------------------------------------
```

40. xtreg lemiscap lgdpcap lgdpcaps lemisavg time, fe i(counindx);

```
                                                Fixed-effects (within) regression
sd(u_counindx)                =  1.094035       Number of obs =      2113
sd(e_counindx_t)              =  .3271232                 n =        93
sd(e_counindx_t + u_counindx)=  1.141894                T-bar = 22.7204

corr(u_counindx, Xb)          =    0.2841       R-sq within   =  0.2065
                                                     between  =  0.5722
                                                     overall  =  0.5499
```

F(3, 2017) = 175.02
Prob > F = 0.0000

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	1.231508	.1798674	6.847	0.000	.8787626	1.584253
lgdpcaps	-.0409889	.0122057	-3.358	0.001	-.064926	-.0170518
lemisavg	(dropped)					
time	.0088402	.0011123	7.948	0.000	.0066588	.0110215
_cons	-21.8852	.6520356	-33.564	0.000	-23.16393	-20.60646
counindx	F(92,2017) =		20.320	0.000	(93 categories)	

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```
. generate emiscp88 = (emis88/(pop88*1000));

2. generate emiscp89 = (emis89/(pop89*1000));

3. generate emiscp90 = (emis90/(pop90*1000));

4. generate emiscp91 = (emis91/(pop91*1000));

5. generate emiscp92 = (emis92/(pop92*1000));

6. generate emiscp70 = (emis70/(pop70*1000));

7. generate emiscp71 = (emis71/(pop71*1000));

8. generate emiscp72 = (emis72/(pop72*1000));

9. generate emiscp73 = (emis73/(pop73*1000));

10. generate emiscp74 = (emis74/(pop74*1000));

11. gen gdpcap88 = (gdp88/(pop88*1000));
(1 missing value generated)

12. gen gdpcap89 = (gdp89/(pop89*1000));
 missing value generated)

13. gen gdpcap90 = (gdp90/(pop90*1000));
(2 missing values generated)

14. gen gdpcap91 = (gdp91/(pop91*1000));
(4 missing values generated)

15. gen gdpcap92 = (gdp92/(pop92*1000));
(7 missing values generated)

16. generate emisavg = (emiscp88 + emiscp89 + emiscp90 +emiscp91 + emiscp92)/5;

17. generate gdpavg = (gdpcap88 + gdpcap89 + gdpcap90 +gdpcap91 + gdpcap92)/5;
(7 missing values generated)

18. gen lemisavg = ln(emisavg);

19. gen lgdpavg = ln(gdpavg);
(7 missing values generated)

20. gen emis70s = (emiscp70 + emiscp71 + emiscp72 + emiscp73 +emiscp74)/5;

21. gen lemis70s = ln(emis70s);

22. gen lgdpquad = lgdpavg*lgdpavg;
(7 missing values generated)
```

```
. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
> counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
> 2|
> counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
> == 112|
> counindx == 118;
```

```
24. regress lemisavg lgdpavg lgdpquad lemis70s;

  Source |       SS       df       MS                  Number of obs =     111
---------+------------------------------                F(  3,   107) =  450.90
   Model |  300.521168     3  100.173723                Prob > F      =  0.0000
Residual |  23.7712883   107  .222161573                R-squared     =  0.9267
---------+------------------------------                Adj R-squared =  0.9246
   Total |  324.292456   110  2.94811324                Root MSE      =  .47134

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpavg |   .3899751   .1891106      2.062   0.042       .0150854    .7648648
lgdpquad |  -.0141026   .0136428     -1.034   0.304      -.0411478    .0129426
lemis70s |   .7614509    .047596     15.998   0.000       .6670974    .8558044
   _cons |  -5.476996   1.045301     -5.240   0.000      -7.549182   -3.404809
------------------------------------------------------------------------------
```

```
25. replace lgdpavg = . if annex1 == 1;
(24 real changes made, 24 to missing)

26. replace lemis70s = . if annex1 == 1;
(25 real changes made, 25 to missing)

27. regress lemisavg lgdpavg lgdpquad lemis70s;

  Source |       SS       df       MS                  Number of obs =      87
---------+------------------------------                F(  3,    83) =  249.13
   Model |  191.845585     3  63.9485283                Prob > F      =  0.0000
Residual |  21.3048022    83  .256684364                R-squared     =  0.9000
---------+------------------------------                Adj R-squared =  0.8964
   Total |  213.150387    86  2.47849287                Root MSE      =  .50664

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpavg |   .1224454   .2635569      0.465   0.643      -.4017587    .6466495
lgdpquad |   .0099215   .0218274      0.455   0.651      -.0334922    .0533352
lemis70s |   .7271184   .0591444     12.294   0.000       .6094825    .8447542
   _cons |  -5.343714   1.146597     -4.660   0.000       -7.62425   -3.063178
------------------------------------------------------------------------------
```

end of do-file

.

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```
. generate emiscp88 = (emis88/(pop88*1000));

2. generate emiscp89 = (emis89/(pop89*1000));

3. generate emiscp90 = (emis90/(pop90*1000));

4. generate emiscp91 = (emis91/(pop91*1000));

5. generate emiscp92 = (emis92/(pop92*1000));

6. generate emiscp70 = (emis70/(pop70*1000));

7. generate emiscp71 = (emis71/(pop71*1000));

8. generate emiscp72 = (emis72/(pop72*1000));

9. generate emiscp73 = (emis73/(pop73*1000));

10. generate emiscp74 = (emis74/(pop74*1000));

11. gen gdpcap88 = (gdp88/(pop88*1000));
(1 missing value generated)

12. gen gdpcap89 = (gdp89/(pop89*1000));
(1 missing value generated)

13. gen gdpcap90 = (gdp90/(pop90*1000));
(2 missing values generated)

14. gen gdpcap91 = (gdp91/(pop91*1000));
(4 missing values generated)

15. gen gdpcap92 = (gdp92/(pop92*1000));
(7 missing values generated)

16. generate emisavg = (emiscp88 + emiscp89 + emiscp90 +emiscp91 + emiscp92)/5;

17. generate gdpavg = (gdpcap88 + gdpcap89 + gdpcap90 +gdpcap91 + gdpcap92)/5;
(7 missing values generated)

18. gen lemisavg = ln(emisavg);

19. gen lgdpavg = ln(gdpavg);
(7 missing values generated)

20. gen emis70s = (emiscp70 + emiscp71 + emiscp72 + emiscp73 +emiscp74)/5;

21. gen lemis70s = ln(emis70s);

22. gen lgdpquad = lgdpavg*lgdpavg;
(7 missing values generated)
```

```
. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
> counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
> 2|
> counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
> == 112|
> counindx == 118;
```

24. regress lemisavg lgdpavg lemis70s;

```
  Source |       SS       df       MS                  Number of obs =     111
---------+------------------------------                F(  2,   108) =  675.39
   Model |  300.283779     2   150.14189                Prob > F      =  0.0000
Residual |  24.0086769   108  .222302564                R-squared     =  0.9260
---------+------------------------------                Adj R-squared =  0.9246
   Total |  324.292456   110  2.94811324                Root MSE      =  .47149

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpavg |   .2015985   .0505458      3.988   0.000        .101408    .3017889
 lemis70s |   .7436992    .044404     16.748   0.000       .6556827    .8317157
   _cons |  -5.157321   .9988239     -5.163   0.000      -7.137163   -3.177479
------------------------------------------------------------------------------
```

25. regress lemisavg lgdpavg;

```
  Source |       SS       df       MS                  Number of obs =     111
---------+------------------------------                F(  1,   109) =  300.28
   Model |  237.925461     1  237.925461                Prob > F      =  0.0000
Residual |  86.3669948   109  .792357751                R-squared     =  0.7337
---------+------------------------------                Adj R-squared =  0.7312
   Total |  324.292456   110  2.94811324                Root MSE      =  .89014

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpavg |    .908837   .0524477     17.328   0.000       .8048874    1.012787
   _cons |  -21.52082    .391903    -54.914   0.000      -22.29756   -20.74409
------------------------------------------------------------------------------
```

26. replace lgdpavg = . if annex1 == 1;
(24 real changes made, 24 to missing)

27. replace lemis70s = . if annex1 == 1;
(25 real changes made, 25 to missing)

28. regress lemisavg lgdpavg lgdpquad lemis70s;

Source	SS	df	MS		
Model	191.845585	3	63.9485283	Number of obs =	87
Residual	21.3048022	83	.256684364	F(3, 83) =	249.13
Total	213.150387	86	2.47849287	Prob > F =	0.0000
				R-squared =	0.9000
				Adj R-squared =	0.8964
				Root MSE =	.50664

lemisavg	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpavg	.1224454	.2635569	0.465	0.643	-.4017587	.6466495
lgdpquad	.0099215	.0218274	0.455	0.651	-.0334922	.0533352
lemis70s	.7271184	.0591444	12.294	0.000	.6094825	.8447542
_cons	-5.343714	1.146597	-4.660	0.000	-7.62425	-3.063178

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end of do-file

.

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Statistics/Data Analysis

```
1. generate emiscp88 = (emis88/(pop88*1000));

2. generate emiscp89 = (emis89/(pop89*1000));

3. generate emiscp90 = (emis90/(pop90*1000));

4. generate emiscp91 = (emis91/(pop91*1000));

5. generate emiscp92 = (emis92/(pop92*1000));

6. generate emiscp70 = (emis70/(pop70*1000));

7. generate emiscp71 = (emis71/(pop71*1000));

8. generate emiscp72 = (emis72/(pop72*1000));

9. generate emiscp73 = (emis73/(pop73*1000));

10. generate emiscp74 = (emis74/(pop74*1000));

11. gen gdpcap88 = (gdp88/(pop88*1000));
(1 missing value generated)

12. gen gdpcap89 = (gdp89/(pop89*1000));
(1 missing value generated)

13. gen gdpcap90 = (gdp90/(pop90*1000));
(2 missing values generated)

14. gen gdpcap91 = (gdp91/(pop91*1000));
(4 missing values generated)

15. gen gdpcap92 = (gdp92/(pop92*1000));
(6 missing values generated)

16. generate emisavg = (emiscp88 + emiscp89 + emiscp90 +emiscp91 + emiscp92)/5;

17. generate gdpavg = (gdpcap88 + gdpcap89 + gdpcap90 +gdpcap91 + gdpcap92)/5;
(6 missing values generated)

18. gen lemisavg = ln(emisavg);

19. gen lgdpavg = ln(gdpavg);
(6 missing values generated)

20. gen emis70s = (emiscp70 + emiscp71 + emiscp72 + emiscp73 +emiscp74)/5;

21. gen lemis70s = ln(emis70s);

22. gen lgdpquad = lgdpavg*lgdpavg;
(6 missing values generated)
```

```
. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
> counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
> 2|
> counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
> == 112|
> counindx == 118;
```

24. regress lemisavg lgdpavg lgdpquad lemis70s;

```
  Source |       SS       df       MS                  Number of obs =     112
---------+------------------------------                F(  3,   108) =  566.10
   Model |  407.058383     3  135.686128                Prob > F      =  0.0000
Residual |  25.8861832   108  .239686882                R-squared     =  0.9402
---------+------------------------------                Adj R-squared =  0.9385
   Total |  432.944566   111   3.9004015                Root MSE      =  .48958

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpavg |   .4067562   .1963468      2.072   0.041       .0175627    .7959496
 lgdpquad |   -.020549   .0140035     -1.467   0.145      -.0483063    .0072084
 lemis70s |   .8525945   .0387635     21.995   0.000       .7757585    .9294306
   _cons |  -3.856445   .9387304     -4.108   0.000      -5.717171   -1.995718
------------------------------------------------------------------------------
```

25. replace lgdpavg = . if annex1 == 1;
(25 real changes made, 25 to missing)

26. replace lemis70s = . if annex1 == 1;
(25 real changes made, 25 to missing)

27. regress lemisavg lgdpavg lgdpquad lemis70s;

```
  Source |       SS       df       MS                  Number of obs =      87
---------+------------------------------                F(  3,    83) =  249.13
   Model |  191.845585     3  63.9485283                Prob > F      =  0.0000
Residual |  21.3048022    83  .256684364                R-squared     =  0.9000
---------+------------------------------                Adj R-squared =  0.8964
   Total |  213.150387    86  2.47849287                Root MSE      =  .50664

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpavg |   .1224454   .2635569      0.465   0.643      -.4017587    .6466495
 lgdpquad |   .0099215   .0218274      0.455   0.651      -.0334922    .0533352
 lemis70s |   .7271184   .0591444     12.294   0.000       .6094825    .8447542
   _cons |  -5.343714   1.146597     -4.660   0.000       -7.62425   -3.063178
------------------------------------------------------------------------------
```

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.

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```
generate emiscap = (emis/(pop*1000));

2. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(13 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. gen emisavg = (emiscap +emiscap[_n-1] + emiscap[_n-2] + emiscap[_n-3] + emisc
 > ap[_n-4])/5
 >  if time == 5;
(2596 missing values generated)

6. replace emisavg = emisavg[_n+1] if time == 4;
(118 real changes made)

7. replace emisavg = emisavg[_n+2] if time == 3;
(118 real changes made)

8. replace emisavg = emisavg[_n+3] if time == 2;
(118 real changes made)

9. replace emisavg = emisavg[_n+4] if time == 1;
(118 real changes made)

10. replace emisavg = emisavg[_n-1] if time == 6;
(118 real changes made)

11. replace emisavg = emisavg[_n-2] if time == 7;
(118 real changes made)

12. replace emisavg = emisavg[_n-3] if time == 8;
(118 real changes made)

13. replace emisavg = emisavg[_n-4] if time == 9;
(118 real changes made)

14. replace emisavg = emisavg[_n-5] if time == 10;
(118 real changes made)

15. replace emisavg = emisavg[_n-6] if time == 11;
(118 real changes made)

16. replace emisavg = emisavg[_n-7] if time == 12;
(118 real changes made)

17. replace emisavg = emisavg[_n-8] if time == 13;
(118 real changes made)
```

. replace emisavg = emisavg[_n-9] if time == 14;
(118 real changes made)

19. replace emisavg = emisavg[_n-10] if time == 15;
(118 real changes made)

20. replace emisavg = emisavg[_n-11] if time == 16;
(118 real changes made)

21. replace emisavg = emisavg[_n-12] if time == 17;
(118 real changes made)

22. replace emisavg = emisavg[_n-13] if time == 18;
(118 real changes made)

23. replace emisavg = emisavg[_n-14] if time == 19;
(118 real changes made)

24. replace emisavg = emisavg[_n-15] if time == 20;
(118 real changes made)

25. replace emisavg = emisavg[_n-16] if time == 21;
(118 real changes made)

. replace emisavg = emisavg[_n-17] if time == 22;
(118 real changes made)

27. replace emisavg = emisavg[_n-18] if time == 23;
(118 real changes made)

28. gen lemisavg = ln(emisavg);

29. gen lgdpcaps = (ln(gdpcap)*ln(gdpcap));
(14 missing values generated)

30. regress lemiscap lgdpcap lemisavg time;

Source	SS	df	MS		
Model	10433.1596	3	3477.71988	Number of obs	= 2687
Residual	466.582945	2683	.173903446	F(3, 2683)	=19997.99
Total	10899.7426	2686	4.05798309	Prob > F	= 0.0000
				R-squared	= 0.9572
				Adj R-squared	= 0.9571
				Root MSE	= .41702

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	.0712566	.0084267	8.456	0.000	.0547332	.08778
lemisavg	.9055841	.0064631	140.116	0.000	.8929109	.9182573
time	.010668	.0012243	8.714	0.000	.0082673	.0130686
_cons	-1.947395	.1499393	-12.988	0.000	-2.241404	-1.653387

xtreg lemiscap lgdpcap lemisavg time, fe i(counindx);

```
                                                Fixed-effects (within) regression
sd(u_counindx)                 =  1.355237      Number of obs      =      2687
sd(e_counindx_t)               =  .3026815      n                  =       118
sd(e_counindx_t + u_counindx)= 1.388627         T-bar              = 22.7712

corr(u_counindx, Xb)           =    0.5069      R-sq within        =  0.1725
                                                     between      =  0.6601
                                                     overall      =  0.6432

                                                F(  2,  2567)      =  267.61
                                                     Prob > F     =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .5828345   .0300226     19.413   0.000       .5239636    .6417054
lemisavg |  (dropped)
    time |   .0056231   .0009325      6.030   0.000       .0037947    .0074516
   _cons |  -19.14542   .2131924    -89.803   0.000      -19.56347   -18.72737
---------+--------------------------------------------------------------------
counindx |         F(117,2567) =     21.588   0.000          (118 categories)
```

regress lemiscap lgdpcap lgdpcaps lemisavg time;

```
  Source |       SS       df       MS                  Number of obs =    2687
---------+------------------------------               F(  4,  2682) =15115.26
   Model |  10436.7761     4  2609.19402                Prob > F      =  0.0000
Residual |  462.966485  2682  .172619867                R-squared     =  0.9575
---------+------------------------------               Adj R-squared =  0.9575
   Total |  10899.7426  2686  4.05798309               Root MSE      =  .41548

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .2307698   .0358468      6.438   0.000       .1604797    .3010599
lgdpcaps |  -.0117226   .0025611     -4.577   0.000      -.0167445   -.0067007
lemisavg |   .9153483   .0067834    134.940   0.000       .9020472    .9286495
    time |   .0108613   .0012205      8.899   0.000       .0084681    .0132545
   _cons |  -2.314432   .1695467    -13.651   0.000      -2.646888   -1.981977
------------------------------------------------------------------------------
```

33. xtreg lemiscap lgdpcap lgdpcaps lemisavg time, fe i(counindx);

```
                                                Fixed-effects (within) regression
sd(u_counindx)                 =  1.418067      Number of obs      =      2687
sd(e_counindx_t)               =  .2991913      n                  =       118
sd(e_counindx_t + u_counindx)= 1.449286         T-bar              = 22.7712

corr(u_counindx, Xb)           =    0.3395      R-sq within        =  0.1918
                                                     between      =  0.5546
```

```
                                                      overall  =  0.5419

                                                F(  3,  2566) =  203.00
                                                     Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   1.717447   .1479939     11.605   0.000       1.427248    2.007647
lgdpcaps |  -.0766359    .009793     -7.826   0.000      -.0958389   -.0574329
lemisavg |  (dropped)
    time |   .0060664   .0009234      6.569   0.000       .0042556    .0078772
   _cons |  -23.15315   .5537947    -41.808   0.000      -24.23908   -22.06722
------------------------------------------------------------------------------
counindx |         F(117,2566) =     22.273   0.000          (118 categories)
```

34. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
> counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
> 2|
> counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
> == 112|
counindx == 118;

35. replace lgdpcap = . if annex1 == 1;
(575 real changes made, 575 to missing)

36. replace lemiscap = . if annex1 == 1;
(574 real changes made, 574 to missing)

37. regress lemiscap lgdpcap lemisavg time;

```
  Source |       SS       df       MS                  Number of obs =    2113
---------+------------------------------               F(  3,  2109) = 8766.77
   Model |  5192.17538     3  1730.72513                Prob > F      =  0.0000
Residual |  416.356417  2109   .19741888                R-squared     =  0.9258
---------+------------------------------               Adj R-squared =  0.9257
   Total |  5608.53179  2112  2.65555483                Root MSE      =  .44432

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .1418194   .0116836     12.138   0.000       .1189069    .1647319
lemisavg |   .8468986   .0090732     93.341   0.000       .8291053    .8646918
    time |   .0126089   .0014718      8.567   0.000       .0097226    .0154952
   _cons |  -3.355376   .2076945    -16.155   0.000      -3.762683   -2.948068
------------------------------------------------------------------------------
```

38. xtreg lemiscap lgdpcap lemisavg time, fe i(counindx);

```
                                                Fixed-effects (within) regression
[redacted]u_counindx)                 =  1.057425          Number of obs =      2113
[redacted]e_counindx_t)               =  .3279552                n =        93
sd(e_counindx_t + u_counindx)=  1.107115                T-bar = 22.7204

corr(u_counindx, Xb)          =    0.4241          R-sq within   =  0.2021
                                                       between  =  0.6454
                                                       overall  =  0.6182

                                                F(  2,  2018) =  255.59
                                                     Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .6380502   .0335849     18.998   0.000       .5721855    .7039149
lemisavg |  (dropped)
    time |   .0092905    .001107      8.393   0.000       .0071195    .0114614
   _cons |  -19.82543   .2217861    -89.390   0.000      -20.26038   -19.39047
---------+--------------------------------------------------------------------
counindx |          F(92,2018) =     20.143   0.000           (93 categories)
```

39. regress lemiscap lgdpcap lgdpcaps lemisavg time;

```
  Source |       SS       df       MS                  Number of obs =    2113
---------+------------------------------               F(  4,  2108) = 6580.01
[redacted]Model |  5192.6473     4  1298.16182           Prob > F      =  0.0000
[redacted]esidual |  415.884495  2108   .19728866        R-squared     =  0.9258
---------+------------------------------               Adj R-squared =  0.9257
   Total |  5608.53179  2112  2.65555483                Root MSE      =  .44417

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .0744476   .0450993      1.651   0.099      -.0139961    .1628913
lgdpcaps |   .0055686   .0036005      1.547   0.122      -.0014923    .0126295
lemisavg |   .8394203   .0102785     81.668   0.000       .8192633    .8595774
    time |   .0126008   .0014713      8.564   0.000       .0097154    .0154861
   _cons |  -3.279621   .2133253    -15.374   0.000      -3.697971   -2.861271
------------------------------------------------------------------------------
```

40. xtreg lemiscap lgdpcap lgdpcaps lemisavg time, fe i(counindx);

```
                                                Fixed-effects (within) regression
sd(u_counindx)                =  1.094035          Number of obs =      2113
sd(e_counindx_t)              =  .3271232                n =        93
sd(e_counindx_t + u_counindx)=  1.141894                T-bar = 22.7204

corr(u_counindx, Xb)          =    0.2841          R-sq within   =  0.2065
[redacted]                                             between  =  0.5722
                                                       overall  =  0.5499

                                                F(  3,  2017) =  175.02
```

Prob > F = 0.0000

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	1.231508	.1798674	6.847	0.000	.8787626	1.584253
lgdpcaps	-.0409889	.0122057	-3.358	0.001	-.064926	-.0170518
lemisavg	(dropped)					
time	.0088402	.0011123	7.948	0.000	.0066588	.0110215
_cons	-21.8852	.6520356	-33.564	0.000	-23.16393	-20.60646
counindx	F(92,2017) =		20.320	0.000	(93 categories)	

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end of do-file

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Statistics/Data Analysis

```
. generate emiscap = (emis/(pop*1000));

. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

. gen lemiscap = ln(emiscap);
(13 missing values generated)

. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

. gen lgdpcaps = (ln(gdpcap)*ln(gdpcap));
(14 missing values generated)

. regress lemiscap lgdpcap time;

      Source |       SS       df       MS              Number of obs =    2687
-------------+------------------------------           F(  2,  2684) = 2427.25
       Model |  7019.01125     2  3509.50562           Prob > F      =  0.0000
    Residual |  3880.73133  2684  1.44587606           R-squared     =  0.6440
-------------+------------------------------           Adj R-squared =  0.6437
       Total |  10899.7426  2686  4.05798309           Root MSE      =  1.2024

------------------------------------------------------------------------------
    lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lgdpcap |    1.015421   .0145897    69.598   0.000      .9868128    1.044029
        time |    .0015875   .0035252     0.450   0.653     -.0053249    .0084999
       _cons |   -22.21328   .1139605  -194.921   0.000     -22.43674   -21.98982
------------------------------------------------------------------------------

. xtreg lemiscap lgdpcap time, fe i(counindx);

                                        Fixed-effects (within) regression
sd(u_counindx)                =  1.355237   Number of obs =      2687
sd(e_counindx_t)              =  .3026815   n =          118
sd(e_counindx_t + u_counindx)=  1.388627   T-bar = 22.7712

corr(u_counindx, Xb)          =    0.5069   R-sq within  =  0.1725
                                            between  =  0.6601
                                            overall  =  0.6432

                                        F(  2,  2567) =  267.61
                                        Prob > F      =  0.0000

------------------------------------------------------------------------------
    lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lgdpcap |    .5828345   .0300226    19.413   0.000      .5239636    .6417054
        time |    .0056231   .0009325     6.030   0.000      .0037947    .0074516
       _cons |   -19.14542   .2131924   -89.803   0.000     -19.56347   -18.72737
```

```
-------------------------------------------------------------------------------
nindx |         F(117,2567) =    340.099   0.000          (118 categories)
```

8. regress lemiscap lgdpcap lgdpcaps time;

```
  Source |       SS       df       MS                  Number of obs =    2687
---------+------------------------------               F(  3,  2683) = 1808.82
   Model |  7293.58323     3  2431.19441               Prob > F      =  0.0000
Residual |  3606.15935  2683  1.34407728               R-squared     =  0.6692
---------+------------------------------               Adj R-squared =  0.6688
   Total |  10899.7426  2686  4.05798309               Root MSE      =  1.1593

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |  -.3881612   .0992047     -3.913   0.000      -.5826866   -.1936358
lgdpcaps |   .0969609   .0067839     14.293   0.000       .0836587    .1102632
    time |    .000798   .0033993      0.235   0.814      -.0058676    .0074635
   _cons |  -17.37004   .3562284    -48.761   0.000      -18.06855   -16.67153
------------------------------------------------------------------------------
```

9. xtreg lemiscap lgdpcap lgdpcaps time, fe i(counindx);

```
                                              Fixed-effects (within) regression
sd(u_counindx)                =  1.418067     Number of obs =    2687
(e_counindx_t)                =  .2991913               n =     118
(e_counindx_t + u_counindx)   =  1.449286          T-bar = 22.7712

corr(u_counindx, Xb)          =    0.3395     R-sq within   =  0.1918
                                              between       =  0.5546
                                              overall       =  0.5419

                                              F(  3,  2566) =  203.00
                                              Prob > F      =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   1.717447   .1479939     11.605   0.000       1.427248    2.007647
lgdpcaps |  -.0766359    .009793     -7.826   0.000      -.0958389   -.0574329
    time |   .0060664   .0009234      6.569   0.000       .0042556    .0078772
   _cons |  -23.15315   .5537947    -41.808   0.000      -24.23908   -22.06722
------------------------------------------------------------------------------
counindx |         F(117,2566) =    322.388   0.000          (118 categories)
```

10. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
> counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
2|
counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx

```
== 112|
counindx == 118;

11. replace lgdpcap = . if annex1 == 1;
(575 real changes made, 575 to missing)

12. replace lemiscap = . if annex1 == 1;
(574 real changes made, 574 to missing)

13. regress lemiscap lgdpcap time;

  Source |       SS       df       MS                  Number of obs =    2113
---------+------------------------------               F(  2,  2110) = 1714.64
   Model |  3472.15584     2  1736.07792               Prob > F      =  0.0000
Residual |  2136.37595  2110  1.01250045               R-squared     =  0.6191
---------+------------------------------               Adj R-squared =  0.6187
   Total |  5608.53179  2112  2.65555483               Root MSE      =  1.0062

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .9834178   .0168273     58.442   0.000        .950418    1.016418
    time |   .0071194   .0033304      2.138   0.033       .0005882    .0136506
   _cons |   -22.1012   .1199121   -184.312   0.000      -22.33636   -21.86604
------------------------------------------------------------------------------

xtreg lemiscap lgdpcap time, fe i(counindx);

                                        Fixed-effects (within) regression
sd(u_counindx)                 =  1.057425          Number of obs =    2113
sd(e_counindx_t)               =  .3279552                n =      93
sd(e_counindx_t + u_counindx)= 1.107115           T-bar = 22.7204

corr(u_counindx, Xb)           =    0.4241       R-sq within   =  0.2021
                                                      between  =  0.6454
                                                      overall  =  0.6182

                                                 F(  2,  2018) =  255.59
                                                      Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .6380502   .0335849     18.998   0.000        .5721855    .7039149
    time |   .0092905    .001107      8.393   0.000        .0071195    .0114614
   _cons |  -19.82543   .2217861    -89.390   0.000       -20.26038   -19.39047
------------------------------------------------------------------------------
counindx |          F(92,2018) =    193.969   0.000           (93 categories)

regress lemiscap lgdpcap lgdpcaps time;

  Source |       SS       df       MS                  Number of obs =    2113
---------+------------------------------               F(  3,  2109) = 1573.81
```

```
      Model |  3876.81018     3  1292.27006           Prob > F      =  0.0000
   Residual |  1731.72161  2109  .821110294           R-squared     =  0.6912
-------------+------------------------------           Adj R-squared =  0.6908
      Total |  5608.53179  2112  2.65555483           Root MSE      =  .90615

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |  -.9495023   .0883796    -10.743   0.000      -1.122823   -.7761819
lgdpcaps |   .1438931   .0064818     22.199   0.000       .1311816    .1566046
    time |   .0081621   .0029995      2.721   0.007       .0022797    .0140445
   _cons |  -15.86642   .3008979    -52.730   0.000      -16.45651   -15.27634
------------------------------------------------------------------------------
```

16. xtreg lemiscap lgdpcap lgdpcaps time, fe i(counindx);

```
                                              Fixed-effects (within) regression
sd(u_counindx)                 =  1.094035    Number of obs      =      2113
sd(e_counindx_t)               =  .3271232                 n     =        93
sd(e_counindx_t + u_counindx)= 1.141894                    T-bar =   22.7204

corr(u_counindx, Xb)           =    0.2841    R-sq within  =  0.2065
                                              between      =  0.5722
                                              overall      =  0.5499

                                              F(  3,  2017) =  175.02
                                                   Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   1.231508   .1798674      6.847   0.000       .8787626    1.584253
lgdpcaps |  -.0409889   .0122057     -3.358   0.001       -.064926   -.0170518
    time |   .0088402   .0011123      7.948   0.000       .0066588    .0110215
   _cons |   -21.8852   .6520356    -33.564   0.000      -23.16393   -20.60646
------------------------------------------------------------------------------
counindx |          F(92,2017) =    153.977   0.000           (93 categories)

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.

Stata Corporation
702 University Drive East
College Station, Texas 77840
409-696-4600, fax 409-696-4601

.
```

Statistics/Data Analysis

```
1. generate emiscap = (emis/(pop*1000));

2. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(13 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. gen lgdpcaps = (ln(gdpcap)*ln(gdpcap));
(14 missing values generated)

6. regress lemiscap lgdpcap time;

  Source |       SS       df       MS              Number of obs =    2687
---------+------------------------------           F(  2,  2684) = 2427.25
   Model |  7019.01125     2  3509.50562           Prob > F      =  0.0000
Residual |  3880.73133  2684  1.44587606           R-squared     =  0.6440
---------+------------------------------           Adj R-squared =  0.6437
   Total |  10899.7426  2686  4.05798309           Root MSE      =  1.2024

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |    1.015421   .0145897    69.598   0.000      .9868128    1.044029
    time |    .0015875   .0035252     0.450   0.653     -.0053249    .0084999
   _cons |   -22.21328   .1139605  -194.921   0.000     -22.43674   -21.98982
------------------------------------------------------------------------------

7. xtreg lemiscap lgdpcap time, fe i(counindx);

                                        Fixed-effects (within) regression
sd(u_counindx)                =  1.355237   Number of obs =      2687
sd(e_counindx_t)              =  .3026815             n =       118
sd(e_counindx_t + u_counindx)=  1.388627        T-bar = 22.7712

corr(u_counindx, Xb)          =    0.5069   R-sq within   =    0.1725
                                            between  =    0.6601
                                            overall  =    0.6432

                                        F(  2,  2567) =    267.61
                                             Prob > F =    0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |    .5828345   .0300226    19.413   0.000      .5239636    .6417054
    time |    .0056231   .0009325     6.030   0.000      .0037947    .0074516
   _cons |   -19.14542   .2131924   -89.803   0.000     -19.56347   -18.72737
```

```
-------------------------------------------------------------------------------
counindx |          F(117,2567) =    340.099   0.000          (118 categories)

8. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;

9. replace lgdpcap = . if annex1 == 0;
(2125 real changes made, 2125 to missing)

10. replace lemiscap = . if annex1 == 0;
(2127 real changes made, 2127 to missing)

11. regress lemiscap lgdpcap time;

  Source |       SS       df       MS                  Number of obs =     574
---------+------------------------------                F(  2,   571) =   38.66
   Model |  230.588216     2  115.294108                Prob > F      =  0.0000
Residual |  1702.67819   571  2.98192327                R-squared     =  0.1193
---------+------------------------------                Adj R-squared =  0.1162
   Total |   1933.2664   573  3.37393787                Root MSE      =  1.7268

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .8199075    .093283      8.789   0.000       .6366877    1.003127
    time |  -.0141017   .0110544     -1.276   0.203      -.0358139    .0076105
   _cons |  -20.09859   .8468806    -23.732   0.000      -21.76197   -18.43521
------------------------------------------------------------------------------

12. xtreg lemiscap lgdpcap time, fe i(counindx);

                                              Fixed-effects (within) regression
sd(u_counindx)                =  1.755306     Number of obs =     574
sd(e_counindx_t)              =  .1420899           n =      25
sd(e_counindx_t + u_counindx)=  1.761048      T-bar =   22.96

corr(u_counindx, Xb)          =    0.0720     R-sq within   =  0.0939
                                              between  =  0.1198
                                              overall  =  0.1193

                                              F(  2,   547) =   28.35
                                              Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
```

```
------+------------------------------------------------------------------------
lgdpcap |    .659232   .1013007      6.508   0.000        .460246    .8582179
   time |  -.0105244   .0023186     -4.539   0.000       -.0150789     -.00597
  _cons |  -18.66542   .9050468    -20.624   0.000       -20.44321   -16.88763
------------------------------------------------------------------------------
counindx |          F(24,547) =   3491.152   0.000          (25 categories)
```

13. regress lemiscap lgdpcap lgdpcaps time;

```
  Source |       SS       df       MS                  Number of obs =     574
---------+------------------------------               F(  3,   570) =   26.72
   Model |  238.334358     3  79.4447861               Prob > F      =  0.0000
Residual |  1694.93204   570  2.97356499               R-squared     =  0.1233
---------+------------------------------               Adj R-squared =  0.1187
   Total |   1933.2664   573  3.37393787               Root MSE      =  1.7244

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   4.082181   2.023378      2.018   0.044        .1079941    8.056368
lgdpcaps |  -.1881469   .1165717     -1.614   0.107       -.4171093    .0408155
    time |  -.0103029    .011287     -0.913   0.362        -.032472    .0118663
   _cons |  -34.11905   8.727837     -3.909   0.000       -51.26169    -16.9764
------------------------------------------------------------------------------
```

xtreg lemiscap lgdpcap lgdpcaps time, fe i(counindx);

```
                                              Fixed-effects (within) regression
sd(u_counindx)                 =  1.748911    Number of obs =     574
sd(e_counindx_t)               =  .1281364              n =      25
sd(e_counindx_t + u_counindx)= 1.753598         T-bar =   22.96

corr(u_counindx, Xb)           =    0.0265    R-sq within   =  0.2645
                                                  between  =  0.1222
                                                  overall  =  0.1228

                                              F(  3,   546) =   65.45
                                                   Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   4.764622   .3761053     12.668   0.000        4.025832    5.503412
lgdpcaps |   -.231501   .0205733    -11.253   0.000       -.2719135   -.1910885
    time |  -.0077195   .0021057     -3.666   0.000       -.0118558   -.0035832
   _cons |  -36.73382   1.801243    -20.394   0.000       -40.27204   -33.19561
------------------------------------------------------------------------------
counindx |          F(24,546) =   4278.515   0.000          (25 categories)
```

end of do-file

.

Data Corporation
702 University Drive East
College Station, Texas 77840
409-696-4600, fax 409-696-4601

Jeffrey A. Frankel
11/03/97 08:34:02 AM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: more emissions regressions

Joe,

Could you please try two more variations:

(1) • Em/cap = A + B (GDP/cap) with trend but WITHOUT lagged Em.

(2) • An equation that is quadratic in (GDP/cap), to allow the possibility of an inverted U shape.

Thanks (Deadline is before the 2:00 meeting, on any given day.)

JF

Jeffrey A. Frankel
10/31/97 02:09:29 PM

Record Type: Record

To: Joseph E. Aldy/CEA/EOP

cc:
Subject: emission regressions

Joe,

I have been thinking more about your question (why/how population and GDP should matter), and have decided that the answer I gave was inadequate. It is hard to think of a reason, in theory, why the relationship should be more complicated that emissions per capita depending on GDP per capita. What I said was merely an argument why that coefficient should be less than 1.0, not a reason why one should want unconstrained coefficients on GDP and population. Thus theory implies that the sum of the coefficients on GDP and population should equal one minus the coefficient on initial emissions (i.e., that the three should sum to one, the property of homogeneity). This constraint seems roughly to hold in most of the regressions. Perhaps we should report a t-statistic for this constraint. But I now think we should estimate the equation subject to the constraint. The most straightforward way to do this seems to me to regress emissions per capita against income per capita and initial emissions per capita. Assuming the constraint is true, this should give slightly sharper estimates.

After getting the answer, one probably should report predicted emission levels (not just per capita) alongside actual emissions, to get a feel for where the U.S. and other countries are in 1990s relative to where they "should" be.

JF

Statistics/Data Analysis

1. generate emiscap = (emis/(pop*1000));

2. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(13 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. gen lgdpcaps = (ln(gdpcap)*ln(gdpcap));
(14 missing values generated)

6. regress lemiscap lgdpcap time; all countries

Source	SS	df	MS		
Model	7019.01125	2	3509.50562	Number of obs =	2687
Residual	3880.73133	2684	1.44587606	F(2, 2684) =	2427.25
Total	10899.7426	2686	4.05798309	Prob > F =	0.0000
				R-squared =	0.6440
				Adj R-squared =	0.6437
				Root MSE =	1.2024

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	1.015421	.0145897	69.598	0.000	.9868128	1.044029
time	.0015875	.0035252	0.450	0.653	-.0053249	.0084999
_cons	-22.21328	.1139605	-194.921	0.000	-22.43674	-21.98982

7. xtreg lemiscap lgdpcap time, fe i(counindx); all countries

Fixed-effects (within) regression

sd(u_counindx)	= 1.355237	Number of obs =	2687
sd(e_counindx_t)	= .3026815	n =	118
sd(e_counindx_t + u_counindx)	= 1.388627	T-bar =	22.7712
corr(u_counindx, Xb)	= 0.5069	R-sq within =	0.1725
		between =	0.6601
		overall =	0.6432
		F(2, 2567) =	267.61
		Prob > F =	0.0000

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	.5828345	.0300226	19.413	0.000	.5239636	.6417054
time	.0056231	.0009325	6.030	0.000	.0037947	.0074516
_cons	-19.14542	.2131924	-89.803	0.000	-19.56347	-18.72737

```
-------------------------------------------------------------------------------
counindx |         F(117,2567) =    340.099   0.000          (118 categories)
```

8. regress lemiscap lgdpcaps time; all countries

```
  Source |       SS       df       MS                  Number of obs =    2687
---------+------------------------------               F(  2,  2684) = 2691.23
   Model |  7273.00615     2  3636.50307               Prob > F      =  0.0000
Residual |  3626.73644  2684  1.35124308               R-squared     =  0.6673
---------+------------------------------               Adj R-squared =  0.6670
   Total |  10899.7426  2686  4.05798309               Root MSE      =  1.1624

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
lgdpcaps |   .0706855   .0009645     73.288   0.000      .0687943    .0725767
    time |   .0009362   .0034082      0.275   0.784     -.0057468    .0076191
   _cons |  -18.73782   .0687223   -272.660   0.000     -18.87257   -18.60307
------------------------------------------------------------------------------
```

9. xtreg lemiscap lgdpcaps time, fe i(counindx); all countries

```
                                              Fixed-effects (within) regression
sd(u_counindx)                =  1.402893     Number of obs =      2687
sd(e_counindx_t)              =  .3068824                 n =       118
sd(e_counindx_t + u_counindx) =  1.436066           T-bar = 22.7712

corr(u_counindx, Xb)          =    0.5952     R-sq within   =  0.1494
                                                     between  =  0.6856
                                                     overall  =  0.6659

                                              F(  2,  2567) =  225.43
                                                   Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
lgdpcaps |   .0347023   .0020142     17.229   0.000      .0307526    .0386519
    time |   .0060796   .0009472      6.419   0.000      .0042222    .0079369
   _cons |  -16.84103   .1067898   -157.703   0.000     -17.05044   -16.63163
------------------------------------------------------------------------------
counindx |         F(117,2567) =    307.204   0.000          (118 categories)
```

```
10. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;
```

. replace lgdpcap = . if annex1 == 1;
(575 real changes made, 575 to missing)

12. replace lemiscap = . if annex1 == 1;
(574 real changes made, 574 to missing)

13. regress lemiscap lgdpcap time; Non-Annex I

Source	SS	df	MS		
Model	3472.15584	2	1736.07792	Number of obs =	2113
Residual	2136.37595	2110	1.01250045	F(2, 2110) =	1714.64
Total	5608.53179	2112	2.65555483	Prob > F =	0.0000
				R-squared =	0.6191
				Adj R-squared =	0.6187
				Root MSE =	1.0062

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	.9834178	.0168273	58.442	0.000	.950418	1.016418
time	.0071194	.0033304	2.138	0.033	.0005882	.0136506
_cons	-22.1012	.1199121	-184.312	0.000	-22.33636	-21.86604

14. xtreg lemiscap lgdpcap time, fe i(counindx); Non-Annex I

Fixed-effects (within) regression

sd(u_counindx)	= 1.057425	Number of obs =	2113
sd(e_counindx_t)	= .3279552	n =	93
sd(e_counindx_t + u_counindx)	= 1.107115	T-bar =	22.7204
corr(u_counindx, Xb)	= 0.4241	R-sq within =	0.2021
		between =	0.6454
		overall =	0.6182
		F(2, 2018) =	255.59
		Prob > F =	0.0000

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	.6380502	.0335849	18.998	0.000	.5721855	.7039149
time	.0092905	.001107	8.393	0.000	.0071195	.0114614
_cons	-19.82543	.2217861	-89.390	0.000	-20.26038	-19.39047
counindx	F(92,2018) =	193.969	0.000		(93 categories)	

15. regress lemiscap lgdpcaps time; Non-Annex I

Source	SS	df	MS		
Model	3782.03618	2	1891.01809	Number of obs =	2113
Residual	1826.49562	2110	.865637733	F(2, 2110) =	2184.54
				Prob > F =	0.0000
				R-squared =	0.6743

```
------+------------------------------                Adj R-squared =  0.6740
Total |  5608.53179  2112  2.65555483                Root MSE      =   .9304

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
lgdpcaps |    .075287   .0011411     65.976   0.000        .0730491    .0775248
    time |   .0075155   .0030792      2.441   0.015         .001477     .013554
   _cons |  -19.02332   .0665034   -286.051   0.000       -19.15374   -18.8929
------------------------------------------------------------------------------
```

16. xtreg lemiscap lgdpcaps time, fe i(counindx); Non-Annex I

```
                                              Fixed-effects (within) regression
sd(u_counindx)                 =  1.065691    Number of obs      =      2113
sd(e_counindx_t)               =  .3308208    n                  =        93
sd(e_counindx_t + u_counindx)= 1.115858       T-bar              =   22.7204

corr(u_counindx, Xb)           =    0.5670    R-sq within        =    0.1881
                                              between            =    0.7057
                                              overall            =    0.6725

                                              F(  2,  2018)      =    233.77
                                              Prob > F           =    0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
lgdpcaps |   .0411184    .002299     17.886   0.000        .0366098     .045627
    time |   .0100118   .0011115      9.008   0.000        .0078321    .0121915
   _cons |  -17.47767    .104856   -166.683   0.000       -17.68331   -17.27204
------------------------------------------------------------------------------
counindx |          F(92,2018) =    159.468   0.000          (93 categories)

.
end of do-file

.

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```

Statistics/Data Analysis

1. generate emiscap = (emis/(pop*1000));

2. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(13 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. gen lgdpcaps = (ln(gdpcap)*ln(gdpcap));
(14 missing values generated)

6. regress lemiscap lgdpcap time; all countries

Source	SS	df	MS		
Model	7019.01125	2	3509.50562	Number of obs =	2687
Residual	3880.73133	2684	1.44587606	F(2, 2684) =	2427.25
Total	10899.7426	2686	4.05798309	Prob > F =	0.0000
				R-squared =	0.6440
				Adj R-squared =	0.6437
				Root MSE =	1.2024

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	1.015421	.0145897	69.598	0.000	.9868128	1.044029
time	.0015875	.0035252	0.450	0.653	-.0053249	.0084999
_cons	-22.21328	.1139605	-194.921	0.000	-22.43674	-21.98982

7. xtreg lemiscap lgdpcap time, fe i(counindx); all countries

Fixed-effects (within) regression

sd(u_counindx)	= 1.355237	Number of obs =	2687
sd(e_counindx_t)	= .3026815	n =	118
sd(e_counindx_t + u_counindx)	= 1.388627	T-bar =	22.7712
corr(u_counindx, Xb)	= 0.5069	R-sq within =	0.1725
		between =	0.6601
		overall =	0.6432
		F(2, 2567) =	267.61
		Prob > F =	0.0000

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	.5828345	.0300226	19.413	0.000	.5239636	.6417054
time	.0056231	.0009325	6.030	0.000	.0037947	.0074516
_cons	-19.14542	.2131924	-89.803	0.000	-19.56347	-18.72737

```
-------------------------------------------------------------------------------
unindx |          F(117,2567) =    340.099   0.000          (118 categories)
```

```
8. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;

9. replace lgdpcap = . if annex1 == 0;
(2125 real changes made, 2125 to missing)

10. replace lemiscap = . if annex1 == 0;
(2127 real changes made, 2127 to missing)

11. regress lemiscap lgdpcap time;   Annex I

  Source |       SS       df       MS              Number of obs =     574
---------+------------------------------           F(  2,   571) =   38.66
   Model |  230.588216     2  115.294108           Prob > F      =  0.0000
sidual |  1702.67819   571  2.98192327           R-squared     =  0.1193
-------+------------------------------           Adj R-squared =  0.1162
   Total |   1933.2664   573  3.37393787           Root MSE      =  1.7268

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .8199075    .093283      8.789   0.000       .6366877    1.003127
    time |  -.0141017   .0110544     -1.276   0.203      -.0358139    .0076105
   _cons |  -20.09859   .8468806    -23.732   0.000      -21.76197   -18.43521
------------------------------------------------------------------------------

12. xtreg lemiscap lgdpcap time, fe i(counindx);   Annex I

                                        Fixed-effects (within) regression
sd(u_counindx)                =  1.755306          Number of obs =     574
sd(e_counindx_t)              =  .1420899                n =      25
sd(e_counindx_t + u_counindx)=  1.761048           T-bar =   22.96

corr(u_counindx, Xb)          =    0.0720          R-sq within   =  0.0939
                                                       between  =  0.1198
                                                       overall  =  0.1193

                                                 F(  2,   547) =   28.35
                                                      Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
```

```
------------+----------------------------------------------------------------
     gdpcap |    .659232   .1013007      6.508   0.000        .460246    .8582179
       time |  -.0105244   .0023186     -4.539   0.000       -.0150789     -.00597
      _cons |  -18.66542   .9050468    -20.624   0.000       -20.44321   -16.88763
------------------------------------------------------------------------------
   counindx |          F(24,547) =   3491.152   0.000          (25 categories)
```

— $(\ln(GDP/pop))^2$

13. regress lemiscap lgdpcaps time; Annex I

```
      Source |       SS       df       MS              Number of obs =     574
-------------+------------------------------           F(  2,   571) =   37.84
       Model |  226.230947     2  113.115473            Prob > F      =  0.0000
    Residual |  1707.03546   571  2.98955421            R-squared     =  0.1170
-------------+------------------------------           Adj R-squared =  0.1139
       Total |   1933.2664   573  3.37393787            Root MSE      =   1.729

------------------------------------------------------------------------------
    lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    lgdpcaps |    .046788   .0053811     8.695   0.000      .0362187    .0573572
        time |  -.0148663   .0110877    -1.341   0.181       -.036644    .0069114
       _cons |  -16.53469   .4578417   -36.114   0.000      -17.43395   -15.63543
------------------------------------------------------------------------------
```

— $(\ln(GDP/pop))^2$

14. xtreg lemiscap lgdpcaps time, fe i(counindx); Annex I

```
                                        Fixed-effects (within) regression
sd(u_counindx)                 =  1.787084   Number of obs =       574
sd(e_counindx_t)               =  .1456232         n =        25
sd(e_counindx_t + u_counindx)= 1.793007        T-bar =     22.96

corr(u_counindx, Xb)           =    0.1943   R-sq within   =  0.0483
                                             between  =  0.1180
                                             overall  =  0.1168

                                        F(  2,   547) =     13.88
                                             Prob > F =  0.0000

------------------------------------------------------------------------------
    lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    lgdpcaps |    .021323    .005679     3.755   0.000      .0101676    .0324784
        time |  -.0048483   .0023792    -2.038   0.042      -.0095217   -.0001748
       _cons |  -14.49004   .4566239   -31.733   0.000      -15.38699   -13.59309
------------------------------------------------------------------------------
   counindx |          F(24,547) =   3331.262   0.000          (25 categories)

.
end of do-file
```

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Statistics/Data Analysis

```
1. generate emiscap = (emis/(pop*1000));

2. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(13 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. regress lemiscap lgdpcap time;

  Source |       SS       df       MS                  Number of obs =    2687
---------+------------------------------               F(  2,  2684) = 2427.25
   Model |  7019.01125     2  3509.50562               Prob > F      =  0.0000
Residual |  3880.73133  2684  1.44587606               R-squared     =  0.6440
---------+------------------------------               Adj R-squared =  0.6437
   Total |  10899.7426  2686  4.05798309               Root MSE      =  1.2024

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |    1.015421   .0145897     69.598   0.000        .9868128    1.044029
    time |    .0015875   .0035252      0.450   0.653       -.0053249    .0084999
   _cons |   -22.21328   .1139605   -194.921   0.000       -22.43674   -21.98982
------------------------------------------------------------------------------

6. xtreg lemiscap lgdpcap time, fe i(counindx);

                                        Fixed-effects (within) regression
sd(u_counindx)                =  1.355237   Number of obs =    2687
sd(e_counindx_t)              =  .3026815             n =     118
sd(e_counindx_t + u_counindx)=  1.388627        T-bar = 22.7712

corr(u_counindx, Xb)          =    0.5069   R-sq within   =  0.1725
                                            between  =  0.6601
                                            overall  =  0.6432

                                        F(  2,  2567) =  267.61
                                             Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |    .5828345   .0300226     19.413   0.000        .5239636    .6417054
    time |    .0056231   .0009325      6.030   0.000        .0037947    .0074516
   _cons |   -19.14542   .2131924    -89.803   0.000      -19.56347   -18.72737
---------+--------------------------------------------------------------------
counindx |         F(117,2567) =    340.099   0.000          (118 categories)
```

```
. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
> counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
> 2|
> counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
> == 112|
> counindx == 118;

. replace lgdpcap = . if annex1 == 1;
(575 real changes made, 575 to missing)

. replace lemiscap = . if annex1 == 1;
(574 real changes made, 574 to missing)

. regress lemiscap lgdpcap time;

  Source |       SS       df       MS              Number of obs =    2113
---------+------------------------------           F(  2,  2110) = 1714.64
   Model |  3472.15584     2  1736.07792           Prob > F      =  0.0000
Residual |  2136.37595  2110  1.01250045           R-squared     =  0.6191
---------+------------------------------           Adj R-squared =  0.6187
   Total |  5608.53179  2112  2.65555483           Root MSE      =  1.0062

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .9834178   .0168273    58.442  0.000      .950418    1.016418
    time |   .0071194   .0033304     2.138  0.033     .0005882    .0136506
   _cons |   -22.1012   .1199121  -184.312  0.000    -22.33636   -21.86604
------------------------------------------------------------------------------

. xtreg lemiscap lgdpcap time, fe i(counindx);

                                        Fixed-effects (within) regression
sd(u_counindx)                =  1.057425   Number of obs =    2113
sd(e_counindx_t)              =  .3279552             n =      93
sd(e_counindx_t + u_counindx)=  1.107115        T-bar = 22.7204

corr(u_counindx, Xb)          =    0.4241   R-sq within   =  0.2021
                                            between  =  0.6454
                                            overall  =  0.6182

                                        F(  2,  2018) =  255.59
                                             Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .6380502   .0335849    18.998  0.000      .5721855    .7039149
    time |   .0092905    .001107     8.393  0.000      .0071195    .0114614
```

```
       _cons |  -19.82543   .2217861    -89.390   0.000      -20.26038   -19.39047
-------------+----------------------------------------------------------------
   counindx |          F(92,2018) =    193.969   0.000           (93 categories)

.
end of do-file

.
```

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Statistics/Data Analysis

```
1. generate emiscap = (emis/(pop*1000));

2. gen gdpcap = (gdp/(pop*1000));
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(13 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. regress lemiscap lgdpcap time;

  Source |       SS       df       MS                  Number of obs =    2687
---------+------------------------------               F(  2,  2684) = 2427.25
   Model |  7019.01125     2  3509.50562               Prob > F      =  0.0000
Residual |  3880.73133  2684  1.44587606               R-squared     =  0.6440
---------+------------------------------               Adj R-squared =  0.6437
   Total |  10899.7426  2686  4.05798309               Root MSE      =  1.2024

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |    1.015421   .0145897     69.598   0.000       .9868128    1.044029
    time |    .0015875   .0035252      0.450   0.653      -.0053249    .0084999
   _cons |   -22.21328   .1139605   -194.921   0.000      -22.43674   -21.98982
------------------------------------------------------------------------------

6. xtreg lemiscap lgdpcap time, fe i(counindx);

                                              Fixed-effects (within) regression
sd(u_counindx)                 =  1.355237    Number of obs =    2687
sd(e_counindx_t)               =  .3026815              n =     118
sd(e_counindx_t + u_counindx)= 1.388627         T-bar = 22.7712

corr(u_counindx, Xb)           =    0.5069    R-sq within   =  0.1725
                                                  between  =  0.6601
                                                  overall  =  0.6432

                                              F(  2,  2567) =  267.61
                                                   Prob > F =  0.0000

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |    .5828345   .0300226     19.413   0.000       .5239636    .6417054
    time |    .0056231   .0009325      6.030   0.000       .0037947    .0074516
   _cons |   -19.14542   .2131924    -89.803   0.000      -19.56347   -18.72737
---------+--------------------------------------------------------------------
counindx |         F(117,2567) =    340.099   0.000          (118 categories)
```

```
. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
> counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
> 2|
> counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
> == 112|
> counindx == 118;

. replace lgdpcap = . if annex1 == 0;
(2125 real changes made, 2125 to missing)

. replace lemiscap = . if annex1 == 0;
(2127 real changes made, 2127 to missing)

. regress lemiscap lgdpcap time;

  Source |       SS       df       MS              Number of obs =     574
---------+------------------------------           F(  2,   571) =   38.66
   Model |  230.588216     2  115.294108           Prob > F      =  0.0000
Residual |  1702.67819   571  2.98192327           R-squared     =  0.1193
---------+------------------------------           Adj R-squared =  0.1162
   Total |   1933.2664   573  3.37393787           Root MSE      =  1.7268

------------------------------------------------------------------------------
lemiscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lgdpcap |   .8199075    .093283     8.789   0.000      .6366877    1.003127
    time |  -.0141017   .0110544    -1.276   0.203     -.0358139    .0076105
   _cons |  -20.09859   .8468806   -23.732   0.000     -21.76197   -18.43521
------------------------------------------------------------------------------

. xtreg lemiscap lgdpcap time, fe i(counindx);

                                        Fixed-effects (within) regression
sd(u_counindx)                =  1.755306   Number of obs =     574
sd(e_counindx_t)              =  .1420899         n =      25
sd(e_counindx_t + u_counindx)=  1.761048         T-bar =   22.96

corr(u_counindx, Xb)          =    0.0720   R-sq within   =  0.0939
                                            between  =  0.1198
                                            overall  =  0.1193

                                        F(  2,   547) =   28.35
                                             Prob > F =  0.0000

------------------------------------------------------------------------------
miscap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------+--------------------------------------------------------------------
 lgdpcap |    .659232   .1013007     6.508   0.000       .460246    .8582179
    time |  -.0105244   .0023186    -4.539   0.000     -.0150789     -.00597
```

```
       _cons |  -18.66542   .9050468    -20.624   0.000      -20.44321   -16.88763
-------------+----------------------------------------------------------------
   counindx |            F(24,547) =   3491.152   0.000            (25 categories)

.
end of do-file

.
```

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Statistics/Data Analysis

1. generate emiscap = (emis/pop);

2. gen gdpcap = (gdp/pop);
(14 missing values generated)

3. gen lemiscap = ln(emiscap);
(13 missing values generated)

4. gen lgdpcap = ln(gdpcap);
(14 missing values generated)

5. regress emiscap gdpcap time;

Source	SS	df	MS		
Model	75.7529688	2	37.8764844	Number of obs =	2700
Residual	3697.32819	2697	1.37090404	F(2, 2697) =	27.63
Total	3773.08116	2699	1.39795523	Prob > F =	0.0000
				R-squared =	0.0201
				Adj R-squared =	0.0194
				Root MSE =	1.1709

emiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gdpcap	2.58e-08	3.48e-09	7.433	0.000	1.90e-08	3.26e-08
time	-.0014089	.0034113	-0.413	0.680	-.0080978	.0052801
_cons	.0194836	.0482819	0.404	0.687	-.0751895	.1141568

6. regress lemiscap lgdpcap time;

Source	SS	df	MS		
Model	7019.0112	2	3509.5056	Number of obs =	2687
Residual	3880.73126	2684	1.44587603	F(2, 2684) =	2427.25
Total	10899.7425	2686	4.05798305	Prob > F =	0.0000
				R-squared =	0.6440
				Adj R-squared =	0.6437
				Root MSE =	1.2024

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	1.015421	.0145897	69.598	0.000	.9868128	1.044029
time	.0015875	.0035252	0.450	0.653	-.0053249	.0084999
_cons	-22.3198	.2097293	-106.422	0.000	-22.73105	-21.90856

7. xtreg emiscap gdpcap time, fe i(counindx);

Fixed-effects (within) regression

sd(u_counindx)	=	1.184954	Number of obs = 2700
sd(e_counindx_t)	=	.0564169	n = 118
sd(e_counindx_t + u_counindx)	=	1.186296	T-bar = 22.8814

rr(u_counindx, Xb) = -0.1498

R-sq within = 0.0084
between = 0.0220
overall = 0.0189

F(2, 2580) = 10.99
Prob > F = 0.0000

emiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gdpcap	-2.20e-09	6.13e-10	-3.583	0.000	-3.40e-09	-9.95e-10
time	-.0004117	.0001661	-2.479	0.013	-.0007374	-.0000861
_cons	.124639	.0031978	38.977	0.000	.1183685	.1309095
counindx	F(117,2580) =	9906.448	0.000		(118 categories)	

8. xtreg lemiscap lgdpcap time, fe i(counindx);

Fixed-effects (within) regression

sd(u_counindx) = 1.355237
sd(e_counindx_t) = .3026815
sd(e_counindx_t + u_counindx)= 1.388627

Number of obs = 2687
n = 118
T-bar = 22.7712

corr(u_counindx, Xb) = 0.5069

R-sq within = 0.1725
between = 0.6601
overall = 0.6432

F(2, 2567) = 267.61
Prob > F = 0.0000

lemiscap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdpcap	.5828345	.0300226	19.413	0.000	.5239636	.6417054
time	.0056231	.0009325	6.030	0.000	.0037947	.0074516
_cons	-16.26374	.4204123	-38.685	0.000	-17.08812	-15.43936
counindx	F(117,2567) =	340.099	0.000		(118 categories)	

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end of do-file

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Statistics/Data Analysis

```
1. generate emisavg = (emis88 + emis89 + emis90 +emis91 + emis92)/5;

2. generate gdpavg = (gdp88 + gdp89 + gdp90 +gdp91 + gdp92)/5;
(6 missing values generated)

3. generate popavg = (pop88 + pop89 + pop90 +pop91 + pop92)/5;

4. gen lemisavg = ln(emisavg);

5. gen lgdpavg = ln(gdpavg);
(6 missing values generated)

6. gen lpopavg = ln(popavg);

7. gen lemis87 = ln(emis87);

8. gen emis70s = (emis70 + emis71 + emis72 + emis73 +emis74 +emis75 +emis76 + em
 > is77
 > + emis78 + emis79)/10;

9. gen lemis70s = ln(emis70s);

10. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;

11. regress lemisavg lpopavg lgdpavg lemis70s annex1;
```

OLS - all countries

Source	SS	df	MS		
Model	929.216766	4	232.304192	Number of obs =	112
Residual	18.240859	107	.170475317	F(4, 107) =	1362.69
Total	947.457625	111	8.53565428	Prob > F =	0.0000
				R-squared =	0.9807
				Adj R-squared =	0.9800
				Root MSE =	.41289

lemisavg	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpopavg	.086245	.0347577	2.481	0.015	.0173419	.1551481
lgdpavg	.1454925	.0475215	3.062	0.003	.0512866	.2396984
lemis70s	.8490484	.0316984	26.785	0.000	.78621	.9118868
annex1	-.356023	.1359657	-2.618	0.010	-.6255592	-.0864868
_cons	-3.550292	.9398171	-3.778	0.000	-5.413369	-1.687214

12. replace lpopavg = . if annex1 == 1;
(25 real changes made, 25 to missing)

13. replace lgdpavg = . if annex1 == 1;
(25 real changes made, 25 to missing)

14. replace lemis70s = . if annex1 == 1;
(25 real changes made, 25 to missing)

15. regress lemisavg lpopavg lgdpavg lemis70s; OLS - Non-Annex I

Source	SS	df	MS		
Model	516.698484	3	172.232828	Number of obs	= 87
Residual	14.2217901	83	.171346869	F(3, 83)	= 1005.17
Total	530.920274	86	6.17349155	Prob > F	= 0.0000
				R-squared	= 0.9732
				Adj R-squared	= 0.9722
				Root MSE	= .41394

lemisavg	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpopavg	.0712831	.0366461	1.945	0.055	-.0016044	.1441707
lgdpavg	.2480768	.0564205	4.397	0.000	.1358588	.3602948
lemis70s	.7735871	.0420333	18.404	0.000	.6899846	.8571896
_cons	-5.730936	1.155129	-4.961	0.000	-8.02844	-3.433432

16. replace lpopavg = . if counindx == 48;
(1 real change made, 1 to missing)

17. replace lgdpavg = . if counindx == 48;
(1 real change made, 1 to missing)

18. replace lemis70s = . if counindx == 48;
(1 real change made, 1 to missing)

19. replace lpopavg = . if counindx == 22;
(1 real change made, 1 to missing)

20. replace lgdpavg = . if counindx == 22;
(1 real change made, 1 to missing)

21. replace lemis70s = . if counindx == 22;
(1 real change made, 1 to missing)

22. regress lemisavg lpopavg lgdpavg lemis70s; OLS - Non-Annex I no India, China

Source	SS	df	MS		
Model	448.12222	3	149.374073	Number of obs	= 85
Residual	14.1146887	81	.174255417	F(3, 81)	= 857.21
				Prob > F	= 0.0000
				R-squared	= 0.9695
				Adj R-squared	= 0.9683

```
   Total |  462.236909    84  5.50282035                Root MSE      =   .41744
------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lpopavg |   .0642408   .0380681      1.688   0.095      -.0115027    .1399843
 lgdpavg |   .2528322   .0573373      4.410   0.000       .1387491    .3669154
lemis70s |   .7688554   .0429266     17.911   0.000       .6834449    .8542659
   _cons |  -5.783542   1.170712     -4.940   0.000      -8.112891   -3.454193
------------------------------------------------------------------------------

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Developing Countries only

Statistics/Data Analysis

```
. sort counindx year;

2. generate lemis = ln(emis);
(13 missing values generated)

3. gen gdp_5 = gdp[_n-5];
(19 missing values generated)

4. gen pop_5 = pop[_n-5];
(5 missing values generated)

5. gen emis_5 = emis[_n-5];
(5 missing values generated)

6. replace gdp_5 = . if year <= 74;
(571 real changes made, 571 to missing)

7. replace pop_5 = . if year <= 74;
(585 real changes made, 585 to missing)

8. replace emis_5 = . if year <= 74;
(585 real changes made, 585 to missing)

9. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
> counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
> 6|
> counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
> 2|
> counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
> 7|
> counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
> == 112|
> counindx == 118;

10. replace gdp_5 = . if annex1 == 1;
(450 real changes made, 450 to missing)

11. replace pop_5 = . if annex1 == 1;
(450 real changes made, 450 to missing)

12. replace emis_5 = . if annex1 == 1;
(450 real changes made, 450 to missing)

13. gen lgdp_5 = ln(gdp_5);
(1040 missing values generated)

14. gen lpop_5 = ln(pop_5);
(1040 missing values generated)

. gen lemis_5 = ln(emis_5);
(1041 missing values generated)
```

16. regress lemis lpop_5 lgdp_5 lemis_5 time; OLS

Source	SS	df	MS		
Model	9275.24135	4	2318.81034	Number of obs =	1661
Residual	272.971649	1656	.164837952	F(4, 1656) =	14067.21
Total	9548.213	1660	5.75193554	Prob > F =	0.0000
				R-squared =	0.9714
				Adj R-squared =	0.9713
				Root MSE =	.406

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.0299348	.0081551	3.671	0.000	.0139393	.0459303
lgdp_5	.1357998	.0132253	10.268	0.000	.1098598	.1617398
lemis_5	.8680547	.0100158	86.668	0.000	.8484097	.8876997
time	-.0129227	.0019409	-6.658	0.000	-.0167296	-.0091157
_cons	-2.876177	.2738106	-10.504	0.000	-3.413229	-2.339126

17. xtreg lemis lpop_5 lgdp_5 lemis_5 time, fe i(counindx);

Fixed-effects (within) regression

sd(u_counindx)	= 1.316069	Number of obs =	1661
sd(e_counindx_t)	= .2735134	n =	93
sd(e_counindx_t + u_counindx)	= 1.34419	T-bar =	17.8602
rr(u_counindx, Xb)	= 0.8338	R-sq within =	0.2934
		between =	0.9131
		overall =	0.8973
		F(4, 1564) =	162.32
		Prob > F =	0.0000

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.1590084	.1194312	1.331	0.183	-.0752538	.3932705
lgdp_5	.2935603	.0423547	6.931	0.000	.2104823	.3766383
lemis_5	.1518739	.0207449	7.321	0.000	.1111832	.1925646
time	.0085241	.00354	2.408	0.016	.0015805	.0154677
_cons	-7.870794	1.34712	-5.843	0.000	-10.51315	-5.228442
counindx	F(92,1564) =	22.662	0.000	(93 categories)		

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Statistics/Data Analysis

```
1. sort counindx year;

2. generate lemis = ln(emis);
(13 missing values generated)

3. gen gdp_5 = gdp[_n-5];
(19 missing values generated)

4. gen pop_5 = pop[_n-5];
(5 missing values generated)

5. gen emis_5 = emis[_n-5];
(5 missing values generated)

6. replace gdp_5 = . if year <= 74;
(571 real changes made, 571 to missing)

7. replace pop_5 = . if year <= 74;
(585 real changes made, 585 to missing)

8. replace emis_5 = . if year <= 74;
(585 real changes made, 585 to missing)

9. gen lgdp_5 = ln(gdp_5);
(590 missing values generated)

10. gen lpop_5 = ln(pop_5);
(590 missing values generated)

11. gen lemis_5 = ln(emis_5);
(591 missing values generated)

12. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;

13. regress lemis lpop_5 lgdp_5 lemis_5 annex1 time;

  Source |       SS       df       MS              Number of obs =    2110
---------+------------------------------           F(  5,  2104) =24327.95
   Model |  17033.3781     5  3406.67562           Prob > F      =  0.0000
Residual |  294.625913  2104  .140031328           R-squared     =  0.9830
---------+------------------------------           Adj R-squared =  0.9830
   Total |   17328.004  2109  8.21621813           Root MSE      =  .37421
```

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.0320932	.0071763	4.472	0.000	.0180199	.0461665
lgdp_5	.0731338	.0100699	7.263	0.000	.0533859	.0928817
lemis_5	.9201625	.0068993	133.370	0.000	.9066323	.9336927
annex1	-.1306391	.0279427	-4.675	0.000	-.1854373	-.0758409
time	-.0110584	.0015853	-6.975	0.000	-.0141674	-.0079494
_cons	-1.535937	.200838	-7.648	0.000	-1.929799	-1.142075

14. xtreg lemis lpop_5 lgdp_5 lemis_5 time annex1, fe i(counindx);

Fixed-effects (within) regression

sd(u_counindx) = 1.325019
sd(e_counindx_t) = .248571
sd(e_counindx_t + u_counindx)= 1.348133

corr(u_counindx, Xb) = 0.5892

Number of obs = 2110
n = 118
T-bar = 17.8814

R-sq within = 0.2914
between = 0.8612
overall = 0.8545

F(4, 1988) = 204.34
Prob > F = 0.0000

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.4348262	.0847408	5.131	0.000	.268636	.6010164
lgdp_5	.2893272	.037863	7.641	0.000	.2150719	.3635826
lemis_5	.1699364	.0184928	9.189	0.000	.1336692	.2062036
time	-.0004994	.0022956	-0.218	0.828	-.0050015	.0040026
annex1	(dropped)					
_cons	-9.630488	1.102549	-8.735	0.000	-11.79276	-7.468215
counindx	F(117,1988) =		23.764	0.000	(118 categories)	

15. replace gdp_5 = . if annex1 == 1;
(450 real changes made, 450 to missing)

16. replace pop_5 = . if annex1 == 1;
(450 real changes made, 450 to missing)

17. replace emis_5 = . if annex1 == 1;
(450 real changes made, 450 to missing)

18. regress lemis lpop_5 lgdp_5 lemis_5 time;

Source	SS	df	MS		
Model	17030.3173	4	4257.57933	Number of obs =	2110
Residual	297.686715	2105	.141418867	F(4, 2105) =	30106.16
				Prob > F =	0.0000
				R-squared =	0.9828

```
-------+------------------------------                Adj R-squared =  0.9828
Total |   17328.004  2109  8.21621813                Root MSE      =  .37606
```

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.0466962	.0064928	7.192	0.000	.0339632	.0594291
lgdp_5	.050601	.0088853	5.695	0.000	.0331762	.0680258
lemis_5	.9201761	.0069334	132.716	0.000	.906579	.9337732
time	-.0106487	.0015907	-6.694	0.000	-.0137683	-.0075291
_cons	-1.183965	.1871143	-6.327	0.000	-1.550913	-.8170168

19. xtreg lemis lpop_5 lgdp_5 lemis_5 time, fe i(counindx);

```
                                              Fixed-effects (within) regression
sd(u_counindx)                 =  1.325019    Number of obs =      2110
sd(e_counindx_t)               =   .248571                n =       118
sd(e_counindx_t + u_counindx)= 1.348133                T-bar = 17.8814

corr(u_counindx, Xb)           =    0.5892    R-sq within   =  0.2914
                                              R-sq between  =  0.8612
                                              R-sq overall  =  0.8545

                                              F(  4,  1988) =  204.34
                                              Prob > F      =  0.0000
```

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.4348262	.0847408	5.131	0.000	.268636	.6010164
lgdp_5	.2893272	.037863	7.641	0.000	.2150719	.3635826
lemis_5	.1699364	.0184928	9.189	0.000	.1336692	.2062036
time	-.0004994	.0022956	-0.218	0.828	-.0050015	.0040026
_cons	-9.630488	1.102549	-8.735	0.000	-11.79276	-7.468215
counindx	F(117,1988) =	24.187	0.000	(118 categories)		

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```

X section
5 year avg (88-92)

Statistics/Data Analysis

```
1. generate emisavg = (emis88 + emis89 + emis90 +emis91 + emis92)/5;

2. generate gdpavg = (gdp88 + gdp89 + gdp90 +gdp91 + gdp92)/5;
(6 missing values generated)

3. generate popavg = (pop88 + pop89 + pop90 +pop91 + pop92)/5;

4. gen lemisavg = ln(emisavg);

5. gen lgdpavg = ln(gdpavg);
(6 missing values generated)

6. gen lpopavg = ln(popavg);

7. gen lemis87 = ln(emis87);

8. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 == 112|
 > counindx == 118;

9. regress lemisavg lpopavg lgdpavg lemis87 annex1;

  Source |       SS       df       MS                  Number of obs =     112
---------+------------------------------               F(  4,   107) =13089.46
   Model |  945.525322     4  236.381331               Prob > F      =  0.0000
Residual |  1.93230329   107  .018058909               R-squared     =  0.9980
---------+------------------------------               Adj R-squared =  0.9979
   Total |  947.457625   111  8.53565428               Root MSE      =  .13438

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lpopavg |   .0067567      .0114      0.593   0.555      -.0158425    .0293559
 lgdpavg |   .0532499   .0157492      3.381   0.001       .0220289    .0844709
 lemis87 |   .9774163   .0111563     87.611   0.000       .9553003    .9995323
  annex1 |  -.1563208   .0441997     -3.537   0.001      -.2439415   -.0687001
   _cons |  -1.157446   .3159164     -3.664   0.000      -1.783713   -.5311784
------------------------------------------------------------------------------

end of do-file

.
```

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all countries
log 5 years

Statistics/Data Analysis

```
1. sort counindx year;

2. generate lemis = ln(emis);
(13 missing values generated)

3. gen gdp_5 = gdp[_n-5];
(19 missing values generated)

4. gen pop_5 = pop[_n-5];
(5 missing values generated)

5. gen emis_5 = emis[_n-5];
(5 missing values generated)

6. replace gdp_5 = . if year <= 74;
(571 real changes made, 571 to missing)

7. replace pop_5 = . if year <= 74;
(585 real changes made, 585 to missing)

8. replace emis_5 = . if year <= 74;
(585 real changes made, 585 to missing)

9. gen lgdp_5 = ln(gdp_5);
(590 missing values generated)

10. gen lpop_5 = ln(pop_5);
(590 missing values generated)

11. gen lemis_5 = ln(emis_5);
(591 missing values generated)

12. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;

13. regress lemis lpop_5 lgdp_5 lemis_5 annex1 time;
```

OLS

Source	SS	df	MS	
Model	17033.3781	5	3406.67562	Number of obs = 2110
Residual	294.625913	2104	.140031328	F(5, 2104) =24327.95
				Prob > F = 0.0000
				R-squared = 0.9830
				Adj R-squared = 0.9830
Total	17328.004	2109	8.21621813	Root MSE = .37421

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.0320932	.0071763	4.472	0.000	.0180199	.0461665
lgdp_5	.0731338	.0100699	7.263	0.000	.0533859	.0928817
lemis_5	.9201625	.0068993	133.370	0.000	.9066323	.9336927
annex1	-.1306391	.0279427	-4.675	0.000	-.1854373	-.0758409
time	-.0110584	.0015853	-6.975	0.000	-.0141674	-.0079494
_cons	-1.535937	.200838	-7.648	0.000	-1.929799	-1.142075

14. xtreg lemis lpop_5 lgdp_5 lemis_5 annex1 time, i(counindx);

Random-effects GLS regression

sd(u_counindx) = .1572776
sd(e_counindx_t) = .248571
sd(e_counindx_t + u_counindx)= .2941493

Number of obs = 2110
n = 118
T-bar = 17.8741

corr(u_counindx, X) = 0 (assumed)

R-sq within = 0.2091
between = 0.9862
overall = 0.9755

theta

min	5%	median	95%	max
0.6325	0.6421	0.6509	0.6509	0.6509

chi2(5) =20540.74
Prob > chi2 = 0.0000

lemis	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lpop_5	.0859333	.0166292	5.168	0.000	.0533407	.1185258
lgdp_5	.2666246	.0211493	12.607	0.000	.2251727	.3080766
lemis_5	.6958347	.0138274	50.323	0.000	.6687334	.7229359
annex1	-.0203899	.0659798	-0.309	0.757	-.149708	.1089282
time	-.0106023	.0013813	-7.676	0.000	-.0133096	-.007895
_cons	-6.283472	.4128191	-15.221	0.000	-7.092582	-5.474361

15. xthaus;

Hausman specification test

lemis	Coefficients: Fixed Effects	Coefficients: Random Effects	Difference
lpop_5	.4348262	.0859333	.3488929
lgdp_5	.2893272	.2666246	.0227026
lemis_5	.1699364	.6958347	-.5258982
time	-.0004994	-.0106023	.0101029

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[S^(-1)](b-B), S = (S_fe - S_re)

= 1970.89
Prob>chi2 = 0.0000

reject random effects

16. xtreg lemis lpop_5 lgdp_5 lemis_5 time, fe i(counindx);

Fixed-effects (within) regression

sd(u_counindx)	= 1.325019	Number of obs	= 2110
sd(e_counindx_t)	= .248571	n	= 118
sd(e_counindx_t + u_counindx)	= 1.348133	T-bar	= 17.8814
corr(u_counindx, Xb)	= 0.5892	R-sq within	= 0.2914
		between	= 0.8612
		overall	= 0.8545
		F(4, 1988)	= 204.34
		Prob > F	= 0.0000

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.4348262	.0847408	5.131	0.000	.268636	.6010164
lgdp_5	.2893272	.037863	7.641	0.000	.2150719	.3635826
lemis_5	.1699364	.0184928	9.189	0.000	.1336692	.2062036
time	-.0004994	.0022956	-0.218	0.828	-.0050015	.0040026
_cons	-9.630488	1.102549	-8.735	0.000	-11.79276	-7.468215
counindx	F(117,1988) =	24.187	0.000	(118 categories)		

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$$\frac{\hat{e}}{e_{-5}} = f(\underset{-5}{\gamma}, \underset{-5}{\text{pop}})$$

$$|emic - |emis_{-5} =$$

Statistics/Data Analysis

```
1. sort counindx year;

2. generate lemis = ln(emis);
(13 missing values generated)

3. gen gdp_5 = gdp[_n-5];
(19 missing values generated)

4. gen pop_5 = pop[_n-5];
(5 missing values generated)

5. gen emis_5 = emis[_n-5];
(5 missing values generated)

6. replace gdp_5 = . if year <= 74;
(571 real changes made, 571 to missing)

7. replace pop_5 = . if year <= 74;
(585 real changes made, 585 to missing)

8. replace emis_5 = . if year <= 74;
(585 real changes made, 585 to missing)

9. gen lgdp_5 = ln(gdp_5);
(590 missing values generated)

10. gen lpop_5 = ln(pop_5);
(590 missing values generated)

11. gen lemis_5 = ln(emis_5);
(591 missing values generated)

12. gen annex1 = counindx == 3| counindx == 4| counindx == 8| counindx == 17|
 > counindx == 28| counindx == 35| counindx == 36| counindx == 40| counindx == 4
 > 6|
 > counindx == 47| counindx == 51| counindx == 53| counindx == 55| counindx == 6
 > 2|
 > counindx == 74| counindx == 75| counindx == 79| counindx == 86| counindx == 9
 > 7|
 > counindx == 102| counindx == 103| counindx == 110| counindx == 111| counindx
 > == 112|
 > counindx == 118;

13. regress lemis lpop_5 lgdp_5 lemis_5 annex1 time;

      Source |       SS       df       MS              Number of obs =    2110
-------------+------------------------------           F(  5,  2104) =24327.95
       Model |  17033.3781     5  3406.67562            Prob > F      =  0.0000
    Residual |  294.625913  2104  .140031328            R-squared     =  0.9830
-------------+------------------------------           Adj R-squared =  0.9830
       Total |   17328.004  2109  8.21621813           Root MSE      =  .37421
```

lemis	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpop_5	.0320932	.0071763	4.472	0.000	.0180199	.0461665
lgdp_5	.0731338	.0100699	7.263	0.000	.0533859	.0928817
lemis_5	.9201625	.0068993	133.370	0.000	.9066323	.9336927
annex1	-.1306391	.0279427	-4.675	0.000	-.1854373	-.0758409
time	-.0110584	.0015853	-6.975	0.000	-.0141674	-.0079494
_cons	-1.535937	.200838	-7.648	0.000	-1.929799	-1.142075

14. xtreg lemis lpop_5 lgdp_5 lemis_5 annex1 time, i(counindx);

Random-effects GLS regression

sd(u_counindx) = .1572776 Number of obs = 2110
sd(e_counindx_t) = .248571 n = 118
sd(e_counindx_t + u_counindx)= .2941493 T-bar = 17.8741

corr(u_counindx, X) = 0 (assumed) R-sq within = 0.2091
between = 0.9862
overall = 0.9755

theta

min	5%	median	95%	max
0.6325	0.6421	0.6509	0.6509	0.6509

chi2(5) =20540.74
Prob > chi2 = 0.0000

lemis	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lpop_5	.0859333	.0166292	5.168	0.000	.0533407	.1185258
lgdp_5	.2666246	.0211493	12.607	0.000	.2251727	.3080766
lemis_5	.6958347	.0138274	50.323	0.000	.6687334	.7229359
annex1	-.0203899	.0659798	-0.309	0.757	-.149708	.1089282
time	-.0106023	.0013813	-7.676	0.000	-.0133096	-.007895
_cons	-6.283472	.4128191	-15.221	0.000	-7.092582	-5.474361

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Statistics/Data Analysis

```
1. generate emisavg = (emis88 + emis89 + emis90 +emis91 + emis92)/5;

2. generate gdpavg = (gdp88 + gdp89 + gdp90 +gdp91 + gdp92)/5;
(6 missing values generated)

3. generate popavg = (pop88 + pop89 + pop90 +pop91 + pop92)/5;

4. gen lemisavg = ln(emisavg);

5. gen lgdpavg = ln(gdpavg);
(6 missing values generated)

6. gen lpopavg = ln(popavg);

7. gen lemis87 = ln(emis87);

8. regress lemisavg lpopavg lgdpavg lemis87;

  Source |       SS       df       MS                  Number of obs =     111
---------+------------------------------                F(  3,   107) =12872.50
   Model |  778.771982     3  259.590661                Prob > F      =  0.0000
Residual |  2.15779322   107  .020166292                R-squared     =  0.9972
---------+------------------------------                Adj R-squared =  0.9972
   Total |  780.929775   110  7.09936159                Root MSE      =  .14201

------------------------------------------------------------------------------
lemisavg |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
 lpopavg |   .0264057   .0106607      2.477   0.015        .005272    .0475393
 lgdpavg |   .0237347   .0166288      1.427   0.156      -.0092299    .0566993
 lemis87 |   .9790539   .0156337     62.625   0.000        .948062    1.010046
   _cons |  -.6866396   .3688143     -1.862   0.065      -1.417771    .0444917
------------------------------------------------------------------------------

 .
end of do-file

 .
```

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Statistics/Data Analysis

```
1. sort counindx year;

2. generate lemis = ln(emis);
(13 missing values generated)

3. gen gdp_5 = gdp[_n-5];
(19 missing values generated)

4. gen pop_5 = pop[_n-5];
(5 missing values generated)

5. gen emis_5 = emis[_n-5];
(5 missing values generated)

6. replace gdp_5 = . if year <= 1974;
(566 real changes made, 566 to missing)

7. replace pop_5 = . if year <= 1974;
(580 real changes made, 580 to missing)

8. replace emis_5 = . if year <= 1974;
(580 real changes made, 580 to missing)

9. gen lgdp_5 = ln(gdp_5);
(585 missing values generated)

10. gen lpop_5 = ln(pop_5);
(585 missing values generated)

11. gen lemis_5 = ln(emis_5);
(586 missing values generated)

12. regress lemis lpop_5 lgdp_5 lemis_5 time;

  Source |       SS       df       MS              Number of obs =    2092
---------+------------------------------           F(  4,  2087) =25098.82
   Model |  13951.1005     4  3487.77513            Prob > F      =  0.0000
Residual |  290.013053  2087  .138961693           R-squared     =  0.9796
---------+------------------------------           Adj R-squared =  0.9796
   Total |  14241.1136  2091  6.81067124           Root MSE      =  .37278

------------------------------------------------------------------------------
   lemis |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
  lpop_5 |    .052716   .0064872      8.126   0.000        .039994     .065438
  lgdp_5 |   .0855088   .0099906      8.559   0.000       .0659163    .1051014
 lemis_5 |   .8796265   .0087878    100.096   0.000       .8623927    .8968603
    time |  -.0105241   .0015838     -6.645   0.000      -.0136302    -.007418
   _cons |  -2.012293   .2166752     -9.287   0.000      -2.437215   -1.587371
------------------------------------------------------------------------------
```

. **xtreg lemis lpop_5 lgdp_5 lemis_5 time, i(counindx);**

```
                                                Random-effects GLS regression
sd(u_counindx)                 =  .1622179      Number of obs      =      2092
sd(e_counindx_t)               =  .2495554      n                  =       117
sd(e_counindx_t + u_counindx)=    .297645       T-bar              =   17.8731

corr(u_counindx, X)            =  0 (assumed)   R-sq within       =    0.2277
                                                      between      =    0.9806
                                                      overall      =    0.9691
------------------- theta --------------------
  min      5%       median        95%       max          chi2(  4)     =17564.72
0.6410   0.6504     0.6591      0.6591    0.6591          Prob > chi2 =    0.0000

------------------------------------------------------------------------------
   lemis |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
  lpop_5 |   .1097276   .0150394      7.296   0.000        .0802509    .1392043
  lgdp_5 |   .3529552   .0190857     18.493   0.000         .315548    .3903624
 lemis_5 |   .5799643    .015684     36.978   0.000        .5492242    .6107045
    time |  -.0098353   .0013201     -7.451   0.000       -.0124226    -.007248
   _cons |  -8.420899   .4010889    -20.995   0.000       -9.207019   -7.634779
------------------------------------------------------------------------------
```

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.

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emis units: mmTC

Statistics/Data Analysis

```
1. generate lemis = ln(emis);
(13 missing values generated)

2. gen lgdp = ln(gdp);
(14 missing values generated)

3. gen lpop = ln(pop);

4. gen llagem70 = ln(lagem70);

5. gen llagem90 = ln(lagem90);

6. regress lemis lpop lgdp llagem70 time;

  Source |       SS       df       MS                  Number of obs =    2664
---------+------------------------------               F(  4,  2659) =13073.65
   Model |  17603.7027     4  4400.92567               Prob > F      =  0.0000
Residual |  895.087617  2659  .336625655               R-squared     =  0.9516
---------+------------------------------               Adj R-squared =  0.9515
   Total |  18498.7903  2663  6.94659793               Root MSE      =  .58019

------------------------------------------------------------------------------
   lemis |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
    lpop |   .1174362   .0087843    13.369   0.000     .1002113    .134661
    lgdp |   .3048029   .0126606    24.075   0.000     .2799772   .3296286
llagem70 |   .6359045   .0101276    62.789   0.000     .6160458   .6557632
    time |   .0206546   .0017473    11.821   0.000     .0172284   .0240809
   _cons |  -7.665106   .2629712   -29.148   0.000    -8.180755  -7.149457
------------------------------------------------------------------------------

7. regress lemis lpop lgdp llagem90 time;

  Source |       SS       df       MS                  Number of obs =    2664
---------+------------------------------               F(  4,  2659) =23380.27
   Model |  17987.3717     4  4496.84292               Prob > F      =  0.0000
Residual |  511.418604  2659   .19233494               R-squared     =  0.9724
---------+------------------------------               Adj R-squared =  0.9723
   Total |  18498.7903  2663  6.94659793               Root MSE      =  .43856

------------------------------------------------------------------------------
   lemis |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
    lpop |  -.0356557   .0068749    -5.186   0.000    -.0491364   -.022175
    lgdp |   .1293387   .0103411    12.507   0.000     .1090612   .1496162
llagem90 |   .9095671   .0096441    94.313   0.000     .8906564   .9284777
    time |   .0289192   .0013329    21.696   0.000     .0263055   .0315329
   _cons |  -3.156963   .2228836   -14.164   0.000    -3.594005  -2.71992
------------------------------------------------------------------------------

8. xtreg lemis lpop lgdp llagem90 time, i(counindx);
```

```
                                                Random-effects GLS regression
sd(u_counindx)                 =  .2948932      Number of obs =      2664
sd(e_counindx_t)               =   .299599            n =       117
sd(e_counindx_t + u_counindx)=  .4203826        T-bar = 22.7454

corr(u_counindx, X)            =  0 (assumed)   R-sq within  =  0.3891
                                                     between =  0.9754
                                                     overall =  0.9627
------------------- theta --------------------
  min      5%       median        95%       max          chi2(  4)      = 9100.11
0.7671   0.7883     0.7928      0.7928    0.7928          Prob > chi2 =  0.0000

------------------------------------------------------------------------------
   lemis |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    lpop |   .0258219   .0227329      1.136   0.256      -.0187338    .0703776
    lgdp |   .4156815   .0252373     16.471   0.000       .3662172    .4651457
llagem90 |    .629809   .0264164     23.842   0.000       .5780338    .6815841
    time |   .0192119   .0012766     15.049   0.000       .0167098     .021714
   _cons |  -9.845433   .5571964    -17.670   0.000      -10.93752   -8.753348
------------------------------------------------------------------------------
```

```
. xtreg lemis lpop lgdp llagem70 time, i(counindx);
```

```
                                                Random-effects GLS regression
sd(u_counindx)                 =  .4955413      Number of obs =      2664
sd(e_counindx_t)               =   .299599            n =       117
sd(e_counindx_t + u_counindx)=  .5790689        T-bar = 22.7454

corr(u_counindx, X)            =  0 (assumed)   R-sq within  =  0.4152
                                                     between =  0.9502
                                                     overall =  0.9380
------------------- theta --------------------
  min      5%       median        95%       max          chi2(  4)      = 4608.94
0.8589   0.8722     0.8749      0.8749    0.8749          Prob > chi2 =  0.0000

------------------------------------------------------------------------------
   lemis |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    lpop |   .2080368   .0316753      6.568   0.000       .1459544    .2701191
    lgdp |   .5600644   .0284464     19.688   0.000       .5043105    .6158183
llagem70 |   .3885727   .0301753     12.877   0.000       .3294303    .4477152
    time |   .0109546   .0013377      8.189   0.000       .0083327    .0135765
   _cons |  -14.11122   .6344095    -22.243   0.000      -15.35464   -12.8678
------------------------------------------------------------------------------
```

end of do-file

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coun	year	emis	pop	gdp	lagem	lagem90	time	counindx

c:\work\
wdata4.csv

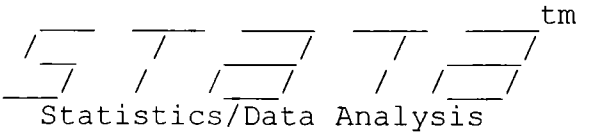
lhs: log(emis)

rhs: log(pop)
log(gdp)
log((lagem90)
time

fixed
random
group: counindx

97 US pop: 268,399,624

90 251,133,000



[redacted]e C:\WORK\ALDY\CLIMATE\gcc1.dta
[redacted]ile C:\WORK\ALDY\CLIMATE\gcc1.dta saved

1. des

```
Contains data from C:\WORK\ALDY\CLIMATE\gcc1.dta
  Obs:  2691 (max= 14758)
 Vars:     9 (max=    99)                     29 Oct 1997 12:06
Width:    44 (max=   200)
  1. coun          str20  %20s
  2. year          int    %9.0g
  3. emis          float  %9.0g
  4. pop           float  %9.0g
  5. gdp           float  %9.0g
  6. lagem70       float  %9.0g
  7. lagem90       float  %9.0g
  8. time          byte   %9.0g
  9. counindx      byte   %9.0g
Sorted by:
```

.

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SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.974946814					
R Square	0.950521291					
Adjusted R Square	0.950443433					
Standard Error	0.254258031					
Observations	2547					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	4	3156.955009	789.2387521	12208.40821	0	
Residual	2542	164.333046	0.064647146			
Total	2546	3321.288055				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-2.10535166	0.086422943	-24.3610271	5.4867E-118	-2.274818224	-1.935885095
LOG POP	0.122473393	0.009062771	13.51390145	3.06892E-40	0.104702225	0.140244562
LOG GDP	0.318581393	0.013070004	24.37500307	4.1611E-118	0.29295245	0.344210337
LOG Emissions 1970	0.619510226	0.010453265	59.26476025	0	0.599012441	0.64000801
Time Trend (1=1971)	0.008050511	0.000816988	9.853890101	1.65953E-22	0.006448481	0.009652542

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.974202591					
R Square	0.949070689					
Adjusted R Square	0.94901325					
Standard Error	0.258463294					
Observations	2664					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	3	3311.388566	1103.796189	16523.08516	0	
Residual	2660	177.6967094	0.066803274			
Total	2663	3489.085276				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-2.124530072	0.085307338	-24.90442344	3.092E-123	-2.291805557	-1.957254586
LOG POP	0.120208607	0.009007323	13.34565351	2.25246E-39	0.102546536	0.137870679
LOG GDP	0.332314672	0.012765346	26.03256378	2.7776E-133	0.307283655	0.357345688
LOG Emissions 1970	0.613160782	0.010199191	60.11857107	0	0.593161628	0.633159936