Supplementary Information

Table S1. Cross-section dependence test [34].

Variable		AMG	P-value	CCEM	P-value
GHGs/GDP	**(no trend)**	-2.087	0.037	-2.575	0.023
	(trend)	-1.648	0.099	-2.281	0.000
Carbon Intensity	**(no trend)**	-1.835	0.067	-1.783	0.075
	(trend)	-2.497	0.013	-2.347	0.019
Energy Intensity	**(no trend)**	-1.111	0.267	-0.841	0.401
	(trend)	0.060	0.952	-0.999	0.318

H0: Cov(uit,ujt) = 0 for all t and i=j, the null hypothesis is that the cross-sections are independent.

Table S2. 2nd Generation Panel Unit Root test (CIPS)- [43].

		Level				Ist Difference				
		Constant		Trend		Constant		trend		
Variable	lags	Zt-bar	p. val	Zt-bar	p. val	Zt-bar	p. val	Zt-bar	p. val	Order of Int.
GHGs/GDP	0	-1.330	0.092	0.592	0.723	-9.429	0.000	-8.510	0.000	I(1)
	1	-2.497	0.006	0.421	0.663	-6.712	0.000	-5.609	0.000	I(0)
	2	-0.514	0.304	2.462	0.993	-2.900	0.002	-1.923	0.027	I(1)
CI	0	-2.724	0.003	-1.973	0.024	-11.206	0.000	10.573	0.000	I(0)
	1	-3.052	0.001	-1.102	0.135	-6.418	0.000	-5.522	0.000	I(0)
	2	-2.072	0.019	-0.470	0.319	-4.099	0.000	-2.453	0.007	I(1)
EI	0	-1.376	0.084	0.546	0.707	-8.001	0.000	-7.382	0.000	I(1)
	1	-2.431	0.008	-1.666	0.048	-5.026	0.000	-3.951	0.000	I(0)
	2	-2.549	0.005	-1.245	0.107	-3.991	0.000	-2.304	0.011	I(0)
GDPpc	0	0.118	0.547	-0.239	0.405	-6.917	0.000	-5.440	0.000	I(1)
	1	-1.445	0.074	-3.300	0.000	-5.031	0.000	-3.380	0.000	TS
	2	-0.777	0.219	-2.281	0.011	-4.433	0.000	-2.140	0.016	I(1)
GDPpcsq	0	0.164	0.565	-0.182	0.428	-6.917	0.000	-5.440	0.000	I(1)
	1	-1.402	0.080	-3.266	0.001	-5.031	0.000	-3.380	0.000	TS
	2	-0.705	0.241	-2.245	0.012	-4.433	0.000	-2.140	0.016	TS

Notes: The null hypothesis of the Pesaran (2007) test is the homogeneous nonstationary, and the maximum 2 lags are s used. Critical values at a 5% level of significance are -2.25 without trend and -2.76 for with trend. CIPS test assumes cross-section dependence is in form of a single unobserved common factor.

Table S3. 1st Generation Maddala and Wu (1999) [35] Panel Unit Root test (MW)

		Level				Ist Difference				
		Constant		Trend		Constant		trend		
Variable	lags	Zt-bar	p. val	Zt-bar	p. val	Zt-bar	p. val	Zt-bar	p. val	Order of Int.
GHGs/GDP	0	4.007	1.000	32.015	0.077	219.103	0.000	172.712	0.000	I(1)
	1	4.592	1.000	57.855	0.000	189.024	0.000	158.526	0.000	TS
	2	3.221	1.000	27.526	0.192	108.152	0.000	80.676	0.000	I(1)
CI	0	17.945	0.709	34.564	0.043	306.500	0.000	288.609	0.000	I(1)
	1	17.880	0.713	34.603	0.043	149.526	0.000	148.807	0.000	I(1)
	2	10.803	0.977	54.480	0.000	91.400	0.000	80.088	0.000	TS
EI	0	22.316	0.441	25.571	0.271	209.294	0.000	190.256	0.000	I(1)
	1	38.146	0.018	48.247	0.001	156.303	0.000	149.337	0.000	I(0)
	2	48.904	0.001	41.460	0.007	92.041	0.000	86.801	0.000	I(0)
GDPpc	0	45.577	0.002	5.615	1.000	128.644	0.000	125.135	0.000	I(0)
	1	30.455	0.108	7.223	0.999	79.418	0.000	83.568	0.000	I(1)
	2	33.275	0.058	4.896	1.000	36.344	0.028	38.115	0.018	I(1)
GDPpcsq	0	43.772	0.004	5.566	1.000	128.644	0.000	125.135	0.000	I(0)
	1	29.579	0.129	7.277	0.999	79.418	0.000	83.568	0.000	I(1)
	2	32.149	0.075	4.854	1.000	36.344	0.028	38.115	0.018	I(1)

Note: Int. means an order of integration, while TS refer series is trend stationary at level i.e, I(0) and I(1) refer to stationary at ist difference. While CI is carbon intensity, EI is energy Intensity, GDPpc is GDP per capita while GDPpcsq is GDP per capita square. Null for MW tests: series is I(1).MW test assumes cross-section independence. Critical values at a 5% level of significance are 33.92 without trend and 44.56 for with trend.

Table S4. PMG Short-run Provinces wise Results for Carbon Intensity Model (3).

VARIABLES	(1) NFL	(2) PEI	(3) NS	(4) NB	(5) Qc	(6) Ont	(7) Man	(8) Sask	(9) Alb	(10) BC	(11) AT
ECT	-0.606***	-0.471***	-0.474***	-0.319**	-0.406**	-0.514***	-0.406**	-0.116	-0.248**	-0.105	-0.530***
	(0.166)	(0.133)	(0.144)	(0.162)	(0.195)	(0.158)	(0.169)	(0.0755)	(0.109)	(0.117)	(0.153)
D.lgdpc	-3.420	41.84	68.82	8.111	-3.626	-54.84**	4.729	-29.30**	-4.060	14.03	-11.17
	(13.00)	(31.09)	(54.21)	(68.09)	(24.32)	(22.05)	(23.56)	(12.89)	(11.33)	(31.44)	(20.44)
D.lgdpcsq	0.161	-2.066	-3.300	-0.386	0.161	2.571**	-0.230	1.287**	0.165	-0.668	0.509
	(0.598)	(1.496)	(2.596)	(3.243)	(1.158)	(1.028)	(1.111)	(0.583)	(0.504)	(1.467)	(0.914)
Dummy2005	-0.0339	0.0461*	0.0796**	0.0651	-0.0265	0.0235	-0.0308	-0.0193	-0.0118	-0.0377**	0.111**
	(0.0476)	(0.0280)	(0.0377)	(0.0555)	(0.0208)	(0.0218)	(0.0192)	(0.0184)	(0.0135)	(0.0184)	(0.0540)
trend	-0.00118	-0.0168***	-0.0144***	-0.0127**	-0.00792*	-0.0151***	-0.00563*	-0.00109	-0.00157	-0.000490	-0.00834**
	(0.00300)	(0.00456)	(0.00437)	(0.00559)	(0.00408)	(0.00483)	(0.00291)	(0.00100)	(0.00141)	(0.00262)	(0.00349)
Constant	-49.85**	-38.49**	-38.67**	-25.96	-33.39*	-42.16**	-33.26*	-9.359	-20.09**	-8.598	-43.50**
	(21.69)	(16.17)	(18.28)	(16.66)	(18.80)	(19.78)	(18.27)	(6.927)	(9.604)	(10.00)	(17.16)
Observations	308	308	308	308	308	308	308	308	308	308	308

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.