Online Appendix

"Who Uses the Clean Development Mechanism? An Empirical Analysis of Projects in Chinese Provinces"

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1 Data Description

The following figures further illustrate distributions of our key variables. Figures A1 to A8 summarize the most important aspects of our data. All histograms are relative to province-years as unit of analysis.

- Figure A1 shows the number of CDM projects, 2004-2009.
- Figure A2 shows the number of renewable CDM projects, 2004-2009.
- Figure A3 shows the number of non-renewable CDM projects, 2004-2009.
- Figure A4 shows the distribution of electricity consumption in trillion kilowatt hours.
- Figure A5 shows the distribution of real per capita GDP in thousand US$ in constant 2005 prices.
- Figure A6 shows distribution of foreign direct investments (FDIs) in billion US$.
- Figure A7 shows population size in millions.
- Figure A8 shows the distribution of the economic growth variable.
- Figure A9 shows the distribution of the primary sector variable.

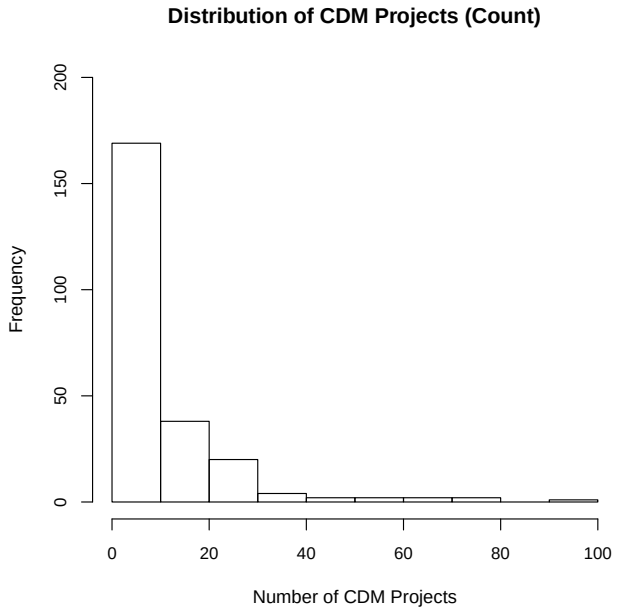

Figure A1: Histogram of the number of CDM projects.

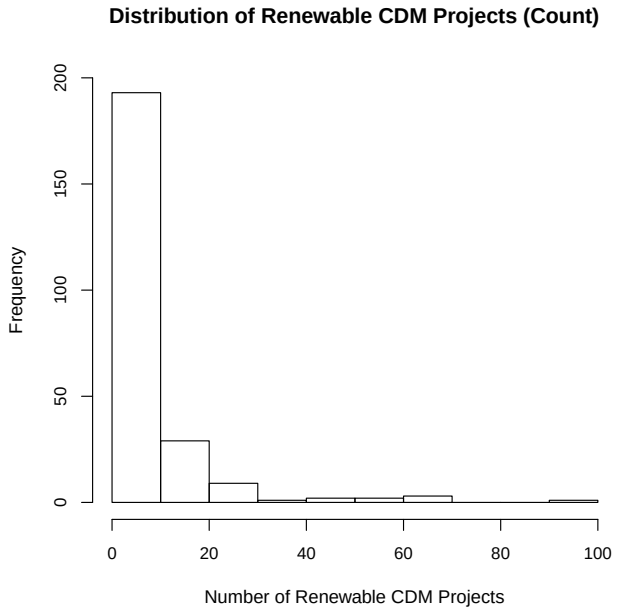

Figure A2: Histogram of the number of renewable CDM projects.

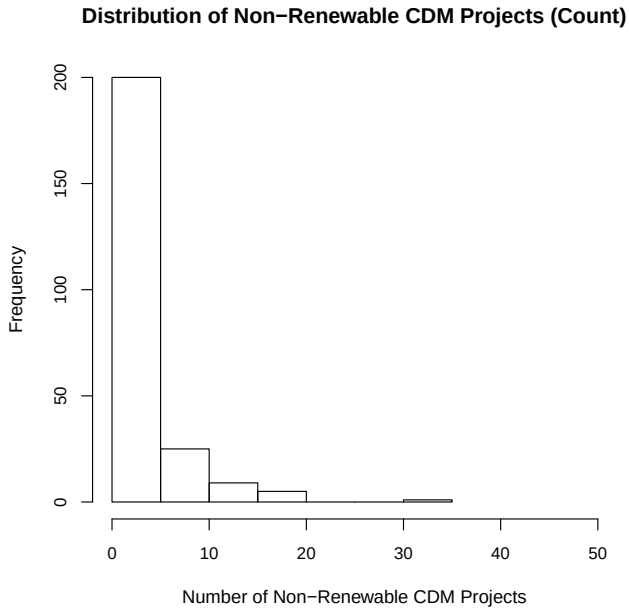

Figure A3: Histogram of the number of non-renewable CDM projects.

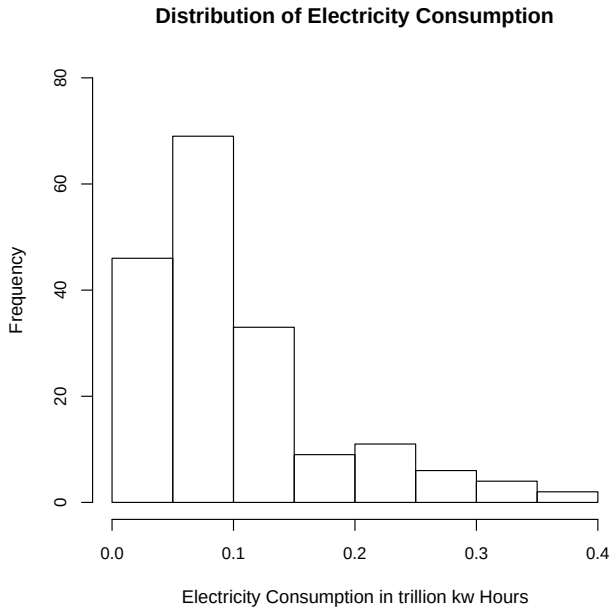

Figure A4: Histogram of electricity consumption.

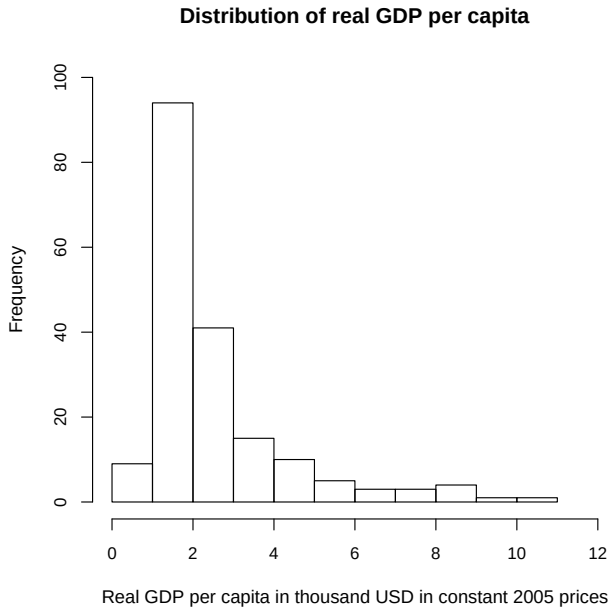

Figure A5: Histogram of real per capita GDP.

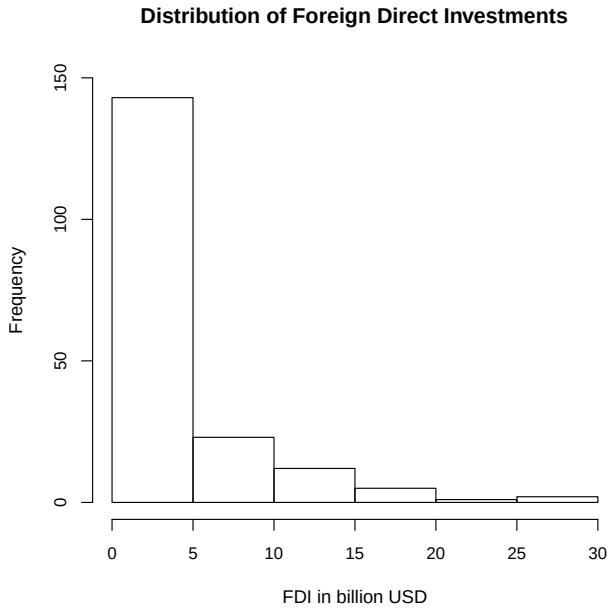

Figure A6: Histogram of foreign direct investments.

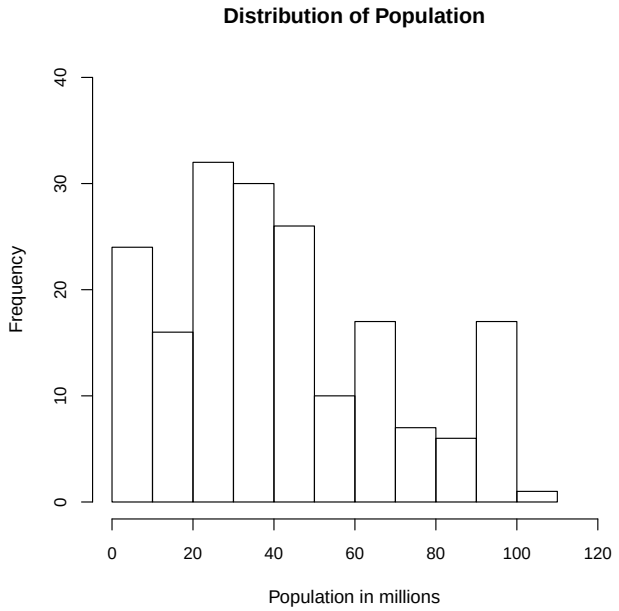

Figure A7: Histogram of population.

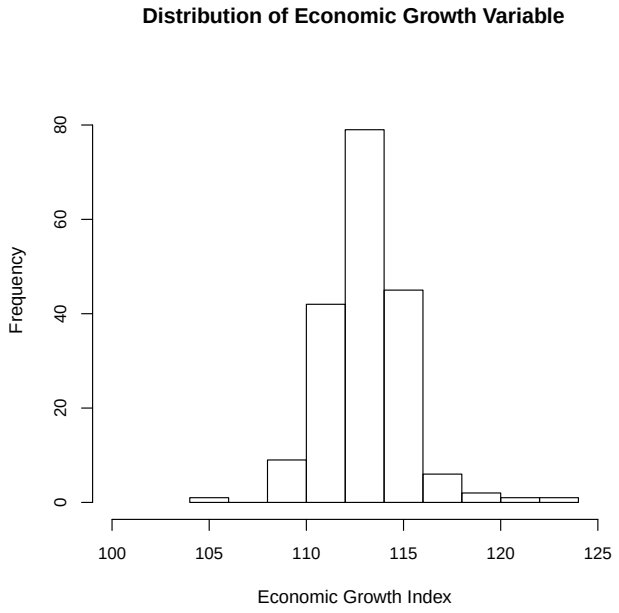

Figure A8: Histogram of economic growth variable.

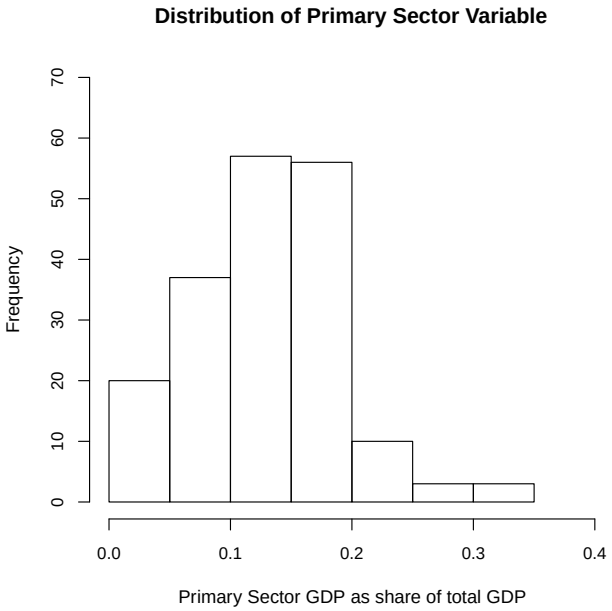

Figure A9: Histogram of primary sector variable.

2 Full Model Results

	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model	(7) Model	(8) Model	(9) Model
Electricity Consumption	7.824***	4.945*	5.652**	7.265***	5.336	7.726**	8.237***	5.259*	3.694
	(1.725)	(2.663)	(2.662)	(2.582)	(4.002)	(3.768)	(1.819)	(2.700)	(2.643)
Real GDP p.c.	-0.207***	-0.145*	-0.071	-0.222**	-0.183*	0.043	-0.186***	-0.114	-0.248**
	(0.068)	(0.075)	(0.094)	(0.097)	(0.106)	(0.126)	(0.067)	(0.076)	(0.096)
FDI	-0.061**	-0.059**	-0.059**	-0.057	-0.055	-0.062	-0.052*	-0.052*	-0.046*
	(0.028)	(0.029)	(0.028)	(0.042)	(0.043)	(0.040)	(0.029)	(0.029)	(0.028)
Population		0.012	0.012*		0.008	0.008		0.014*	0.013*
		(0.007)	(0.007)		(0.011)	(0.010)		(0.008)	(0.008)
Economic Growth		0.028	0.037		0.023	0.051		0.043	0.029
		(0.027)	(0.028)		(0.037)	(0.038)		(0.031)	(0.031)
Primary Sector (% of GDP)			3.385			9.957***			-6.022**
			(2.659)			(3.509)			(2.947)
Wind Potential	-0.192	-0.289	-0.319	-0.366	-0.417	-0.504	-0.039	-0.214	-0.143
	(0.481)	(0.470)	(0.461)	(0.714)	(0.712)	(0.650)	(0.452)	(0.451)	(0.400)
Solar Potential	0.668**	0.701**	0.560*	1.060**	1.073**	0.633	-0.621*	-0.619*	-0.366
	(0.312)	(0.312)	(0.327)	(0.431)	(0.433)	(0.435)	(0.345)	(0.350)	(0.348)
Hydroelectricity Potential	0.142	0.236	0.358*	0.259	0.311	0.714**	-0.100	0.041	-0.130
	(0.180)	(0.183)	(0.202)	(0.261)	(0.265)	(0.278)	(0.187)	(0.196)	(0.197)
Northern Region	0.844	0.846	0.789	0.601	0.597	0.428	1.136**	1.184**	1.258***
	(0.546)	(0.532)	(0.520)	(0.790)	(0.787)	(0.717)	(0.547)	(0.539)	(0.477)
Northeastern Region	1.244**	1.133*	0.941	1.509*	1.415	0.815	0.932	0.837	1.127**
	(0.630)	(0.614)	(0.622)	(0.916)	(0.914)	(0.875)	(0.627)	(0.613)	(0.572)
Eastern Region	0.805**	0.570	0.337	0.453	0.301	-0.375	0.967**	0.676*	1.059***
	(0.357)	(0.366)	(0.403)	(0.506)	(0.525)	(0.546)	(0.378)	(0.391)	(0.405)
South-Central Region	0.504	0.176	-0.194	0.450	0.236	-0.896	0.554	0.108	0.724
	(0.349)	(0.381)	(0.475)	(0.482)	(0.528)	(0.636)	(0.369)	(0.419)	(0.487)
Southwestern Region	0.836**	0.540	0.294	0.908*	0.722	0.025	0.213	-0.207	0.278
	(0.381)	(0.406)	(0.448)	(0.522)	(0.557)	(0.593)	(0.403)	(0.441)	(0.467)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	179	179	179	179	179	179	179	179	179

Standard errors in parentheses
Dependent Variable in Models (1) to (3): Number of CDM Projects.
Dependent Variable in Models (4) to (6): Number of Renewable CDM Projects.
Dependent Variable in Models (7) to (9): Number of Non-renewable Projects.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A1: Full results for main random effects model.

3 Zero Inflated Negative Binomial

	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model	(7) Model	(8) Model	(9) Model
Stage 2: Estimation Model									
Electricity Consumption	8.106***	5.931***	6.720***	8.180***	8.553***	11.382***	7.932***	5.027**	2.725
	(1.482)	(2.199)	(2.291)	(2.128)	(3.200)	(3.253)	(1.502)	(2.357)	(2.337)
Real GDP p.c.	-0.237***	-0.187***	-0.130*	-0.305***	-0.271***	-0.050	-0.201***	-0.142**	-0.307***
	(0.052)	(0.056)	(0.074)	(0.082)	(0.091)	(0.112)	(0.055)	(0.061)	(0.077)
FDI	-0.062**	-0.061**	-0.063**	-0.078**	-0.093**	-0.096***	-0.043*	-0.039	-0.033
	(0.024)	(0.025)	(0.025)	(0.036)	(0.037)	(0.036)	(0.024)	(0.026)	(0.024)
Population		0.009*	0.009		0.002	0.000		0.012*	0.013**
		(0.005)	(0.005)		(0.008)	(0.008)		(0.006)	(0.006)
Economic Growth		0.036	0.046		0.064	0.111***		0.035	0.020
		(0.027)	(0.028)		(0.039)	(0.041)		(0.033)	(0.032)
Primary Sector (% of GDP)			2.571			9.617***			-7.736***
			(2.161)			(3.118)			(2.399)
Stage 1: Inflation Model									
Year	-2.014	-2.048	-2.110	-1.983	-1.945	-1.428	-3.556**	-3.565**	-3.313
	(1.572)	(1.401)	(1.437)	(1.794)	(1.519)	(1.370)	(1.565)	(1.520)	(2.248)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Renewable Potential Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	179	179	179	179	179	179	179	179	179
Vuong test statistic	0.34	0.42	0.41	0.21	0.25	0.30	0.55	0.64	0.34
p-value	0.365	0.337	0.305	0.417	0.401	0.381	0.290	0.261	0.366

Standard errors in parentheses
Dependent Variable in Models (1) to (3): Number of CDM Projects.
Dependent Variable in Models (4) to (6): Number of Renewable CDM Projects.
Dependent Variable in Models (7) to (9): Number of Non-renewable Projects.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Regression results for a zero inflated negative binomial model.

4 Robustness

Robustness: Political Control Model

Table A3 adds political control variables to our regressions. These variables are coded in the following fashion from a database compiled by the authors of the biographies of Chinese leaders. The information used to build this database are from China Vitae (`www.chinavitae.com`) and official Chinese news sources.

- Variable "Age of Governor" is the age of the #2 official in the provincial-level hierarchy. The data are principally from China Vitae (`www.chinavitae.com`) with missing values found from official Chinese news sources.

- Variable "Age of Party Secretary" is the age of the #1 official in the provincial-level hierarchy. The data are principally from China Vitae (`www.chinavitae.com`) with missing values found from official Chinese news sources.

- Variable "Turnover" is a dummy variable taking the value of 1 in all years when there is a change in at least one of the Governor or Party Secretary posts, and 0 in years with continuity in both of the top two posts in a province. The data are constructed from China Vitae with missing values found in official Chinese news sources.

- Variable "Retirement" is a dummy variable taking the value of 1 in all turnover years when the official leaving his top post is 65 or older. In all non-turnover years and years with turnover but when the officials leaving their posts are under the age of 65, retirement takes the value of 0. It has become a strong norm for officials to not be reappointed to high level positions after they turn 65 since the early 1980s. The data are constructed from the China Vitae-based biographical dataset.

	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model	(7) Model	(8) Model	(9) Model
Electricity Consumption	7.537***	4.187	5.134*	7.266***	5.367	8.273**	7.689***	3.926	2.214
	(1.763)	(2.673)	(2.689)	(2.648)	(4.003)	(3.748)	(1.847)	(2.797)	(2.737)
Real GDP p.c.	-0.232***	-0.158**	-0.078	-0.236**	-0.186*	0.051	-0.198***	-0.119	-0.263***
	(0.069)	(0.077)	(0.095)	(0.099)	(0.109)	(0.129)	(0.067)	(0.077)	(0.096)
FDI	-0.051*	-0.050*	-0.051*	-0.054	-0.057	-0.066	-0.042	-0.037	-0.033
	(0.029)	(0.029)	(0.029)	(0.042)	(0.044)	(0.040)	(0.029)	(0.030)	(0.028)
Population		0.014*	0.014*		0.009	0.008		0.016*	0.016**
		(0.007)	(0.007)		(0.011)	(0.009)		(0.008)	(0.008)
Economic Growth		0.025	0.034		0.040	0.070*		0.020	0.003
		(0.029)	(0.030)		(0.040)	(0.040)		(0.035)	(0.034)
Primary Sector (% of GDP)			3.707			10.515***			-6.680**
			(2.666)			(3.512)			(3.003)
Age of Governor	-0.009	-0.007	-0.007	-0.005	0.000	-0.001	-0.017	-0.017	-0.021
	(0.013)	(0.014)	(0.013)	(0.018)	(0.019)	(0.018)	(0.015)	(0.016)	(0.016)
Age of Party Secretary	-0.011	-0.010	-0.010	-0.002	0.000	-0.002	-0.025	-0.023	-0.023
	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.016)
Turnover	-0.118	-0.093	-0.103	-0.029	0.004	-0.049	-0.084	-0.064	-0.058
	(0.089)	(0.091)	(0.092)	(0.122)	(0.124)	(0.127)	(0.107)	(0.112)	(0.110)
Retirement	0.404***	0.405***	0.411***	0.448**	0.461**	0.488***	0.156	0.173	0.143
	(0.150)	(0.147)	(0.145)	(0.189)	(0.187)	(0.179)	(0.201)	(0.199)	(0.195)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Renewable Potential Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	179	179	179	179	179	179	179	179	179

Standard errors in parentheses
Dependent Variable in Models (1) to (3): Number of CDM Projects.
Dependent Variable in Models (4) to (6): Number of Renewable CDM Projects.
Dependent Variable in Models (7) to (9): Number of Non-renewable Projects.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Full results for random effects model with political control variables.

Robustness: Main Models with CDM Service Center Control

Table A4 shows the results from adding a dummy variable that scores "1" for provinces that established CDM service centers and is coded "0" otherwise. The data is taken from China's Department of Climate Change, available from `http://cdm.ccchina.gov.cn/Web/ReferList.asp?ScrollAction=1`. This service center dummy turns out to be positive and highly statistically significant for the full sample and renewable CDM projects, while all our main results hold.

	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model	(7) Model	(8) Model	(9) Model
Electricity Consumption	6.645***	4.028	4.661*	5.757**	4.130	6.617*	8.278***	5.145*	3.510
	(1.702)	(2.495)	(2.532)	(2.564)	(3.826)	(3.644)	(1.866)	(2.732)	(2.671)
Real GDP p.c.	-0.151**	-0.083	-0.030	-0.162*	-0.112	0.085	-0.188***	-0.106	-0.239**
	(0.066)	(0.070)	(0.087)	(0.095)	(0.101)	(0.118)	(0.072)	(0.081)	(0.099)
FDI	-0.074***	-0.076***	-0.076***	-0.069*	-0.074*	-0.079**	-0.051*	-0.054*	-0.050*
	(0.028)	(0.028)	(0.028)	(0.041)	(0.042)	(0.040)	(0.030)	(0.030)	(0.029)
CDM Service Center	0.529**	0.591***	0.565***	0.615**	0.701**	0.618**	-0.024	0.066	0.095
	(0.218)	(0.208)	(0.208)	(0.311)	(0.305)	(0.286)	(0.249)	(0.249)	(0.225)
Population		0.011	0.011*		0.007	0.007		0.014*	0.014*
		(0.007)	(0.006)		(0.010)	(0.009)		(0.008)	(0.008)
Economic Growth		0.046*	0.052*		0.047	0.071*		0.044	0.031
		(0.028)	(0.028)		(0.039)	(0.039)		(0.032)	(0.031)
Primary Sector (% of GDP)			2.571			8.894***			-6.144**
			(2.464)			(3.282)			(2.966)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Renewable Potential Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	179	179	179	179	179	179	179	179	179

Standard errors in parentheses
Dependent Variable in Models (1) to (3): Number of CDM Projects.
Dependent Variable in Models (4) to (6): Number of Renewable CDM Projects.
Dependent Variable in Models (7) to (9): Number of Non-renewable Projects.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Regression results with a dummy variable for CDM Service Centers.

5 Technology Transfer in Chinese Provinces

#	Province	Cumulative Number of Projects		Share
		Project Totals	with Tech Transfer	
	Northern Provinces			
1	Beijing	11	6	0.545
2	Hebei	89	16	0.180
3	Inner Mongolia	157	41	0.261
4	Shanxi	88	22	0.250
5	Tianjin	4	1	0.250
	Northeastern Provinces			
6	Heilongjiang	68	15	0.221
7	Jilin	56	13	0.232
8	Liaoning	58	21	0.362
	Eastern Provinces			
9	Anhui	39	21	0.538
10	Fujian	64	10	0.156
11	Jiangsu	67	22	0.328
12	Jiangxi	45	4	0.089
13	Shandong	98	26	0.265
14	Shanghai	14	7	0.500
15	Zhejiang	58	14	0.241
	South-Central Provinces			
16	Hainan	15	1	0.067
17	Henan	76	12	0.158
18	Hubei	72	14	0.194
19	Hunan	123	10	0.081
20	Guangdong	53	20	0.377
21	Guangxi	74	8	0.108
	Southwestern Provinces			
22	Chongqing	36	2	0.056
23	Guizhou	65	0	0.000
24	Sichuan	189	11	0.058
25	Tibet	na	na	na
26	Yunnan	243	12	0.049
	Northwestern Provinces			
27	Gansu	111	6	0.054
28	Qinghai	18	1	0.056
29	Ningxia	22	2	0.091
30	Shaanxi	44	5	0.114
31	Xinjiang	40	6	0.150
	Total	2,097	349	0.166
	Correlation			-0.318

Table A5: Cumulative number of projects with and without technology transfer. Data for technology transfer coding is taken from UNFCCC (2010).

6 Project Counts and Project Size

#	Province	Number of Projects	Expected CERs in Mt CO2e until 2012	Expected CERs in Mt CO2e until 2020
	Northern Provinces			
1	Beijing	11	15.07	42.29
2	Hebei	89	43.30	140.20
3	Inner Mongolia	157	84.71	287.40
4	Shanxi	88	109.44	322.08
5	Tianjin	4	1.06	3.20
	Northeastern Provinces			
6	Heilongjiang	68	31.96	117.69
7	Jilin	56	28.05	90.60
8	Liaoning	58	84.31	241.19
	Eastern Provinces			
9	Anhui	39	23.89	72.63
10	Fujian	64	38.63	119.67
11	Jiangsu	67	179.56	458.58
12	Jiangxi	45	11.56	38.20
13	Shandong	98	129.25	340.01
14	Shanghai	14	21.71	68.69
15	Zhejiang	58	170.68	441.77
	South-Central Provinces			
16	Hainan	15	2.22	7.73
17	Henan	76	55.35	165.89
18	Hubei	72	26.56	93.24
19	Hunan	123	42.11	136.78
20	Guangdong	53	39.91	134.30
21	Guangxi	74	26.48	96.63
	Southwestern Provinces			
22	Chongqing	36	18.95	64.82
23	Guizhou	65	22.97	62.67
24	Sichuan	189	101.35	341.70
25	Tibet	na	na	na
26	Yunnan	243	78.76	276.64
	Northwestern Provinces			
27	Gansu	111	47.39	162.67
28	Qinghai	18	6.96	20.90
29	Ningxia	22	10.07	30.96
30	Shaanxi	44	15.94	66.87
31	Xinjiang	40	19.99	80.78
	Total	2,097	1,488.32	4,527.04
	Correlation		+0.479	+0.598

Table A6: Cumulative number of projects and expected CERs by 2012 and 2020.

Supplementary Appendix: References

UNFCCC. 2010. "The Contribution of the Clean Development Mechanism under the Kyoto Protocol." United Nations Framework Convention on Climate Change.