

Supporting Material for

Michèle B. Bättig and Thomas Bernauer. National Institutions and Global Public Goods: Are democracies more cooperative in climate change policy? *International Organization* 63/2, 2009.

Additional caveats concerning the democracy-environment hypothesis

The main potential caveat relating to the supply side of the democracy-environment hypothesis is that governments in democratic systems operate with short time-horizons because they need to be elected or re-elected at rather short intervals. They may thus find it unattractive to make large investments for mitigating environmental problems whose biggest effects are felt only long after their term in office has ended. Autocrats, in contrast, do not require (re-) election. In principle, they are able to adopt more costly policies that have longer-term public benefits without having to fear quick punishment by myopic voters. Some authors have claimed, however, that autocratic leaders may in fact be more myopic because non-democracies are less stable, and because autocratic leaders tend to be more interested in accumulating personal wealth and face higher personal risks if they lose office (e.g., Congleton, 1992). We do not know of any studies that have systematically tested whether democratic political leaders are more or less myopic than non-democratic ones, in general and with respect to particular environmental problems. If we assume – in the absence of systematic empirical evidence – that autocratic leaders are equally myopic and green as democratic leaders, the preferences of constituencies and the institutional mechanisms for translating these preferences into policies and policy outcomes will probably matter most. Critics have remained silent on this issue. It thus remains open whether this line of criticism of the democracy-environment hypothesis is empirically relevant.

Other types of criticism of the democracy-environment hypothesis note that there is a strong interdependence between democracy and long term economic growth (e.g., Desai 1998). Assuming that economic growth contributes to environmental degradation, critics do not expect a positive effect of democracy on the environment. Similarly, Hardin (1968) and other authors have claimed that political freedom is closely associated with economic freedom, and that both freedoms also involve the freedom to pollute (Gleditsch and Sverdrup 2003). Heilbrunner (1974) notes that population growth is one of the major driving forces of environmental degradation, and that democracies may find it harder to constrain the “freedom to breed” than autocracies. This criticism is less important because the effects of economic conditions, population growth, etc. can be controlled for when studying democracy effects (we do so in our empirical models).

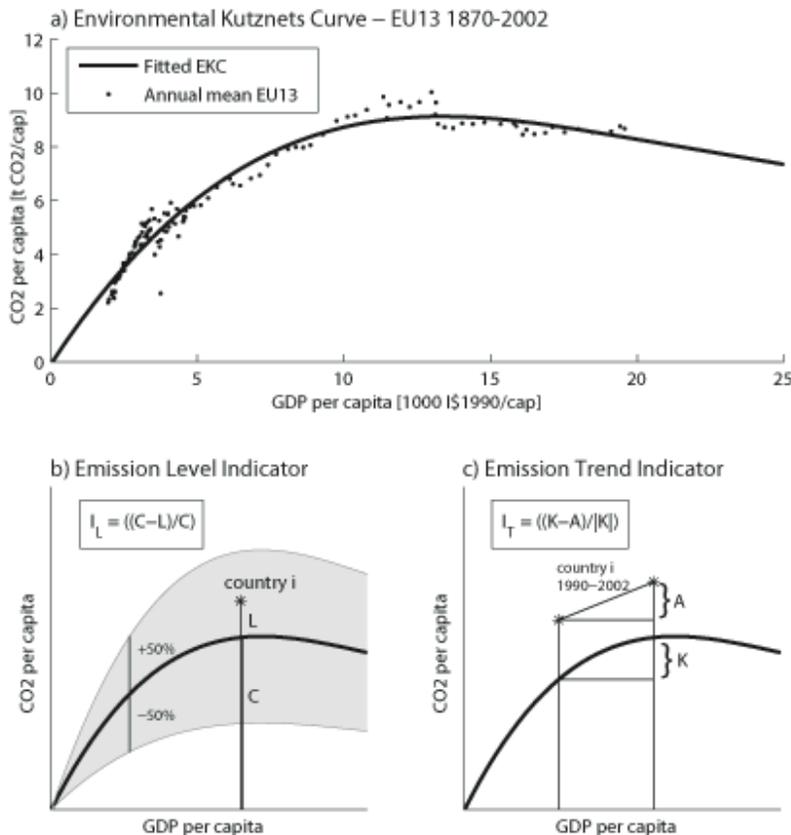
Empirical studies on the democracy-environment relationship

The empirical literature offers mixed evidence for the claim that democracy contributes to higher levels of environmental public goods provision at the local, national, or regional level. Congleton (1992) and Midlarsky (1998) find negative effects of democracy on environmental performance. Grossman and Krueger (1995) report that communist countries performed worse than non-communist countries in environmental terms. Torras and Boyce (1998) observe that democracy has a positive effect on air and water quality, particularly in low-income countries. Barrett and Graddy (2000) find that democracy reduces some types of pollution (e.g., some forms of air

pollution), but has no effect on some other pollutants (e.g., water quality). Harbaugh et al. (2000) report that democracies experience lower levels of SO₂ air pollution. Neumayer (2002) finds that democracies exhibit stronger international environmental commitment. Fredriksson and Gaston (2000) and Fredriksson et al. (2005) report that democracy promotes more stringent environmental policies. Farzin and Bond (2005) find that democracy lowers several local and global pollutants. Bernauer and Koubi (2008) find that democracy increases air quality (notably, by lowering SO₂ concentrations). Li and Reuveny (2006) observe that democracy reduces five types of anthropogenic environmental problems (CO₂ and NO_x emissions, deforestation, land degradation, organic water pollution). Ward (2008) finds that democracy has a positive effect on overall national environmental performance. Many authors have also studied the effects of particular aspects of democracy on environmental policy and its outcomes in advanced industrialized countries (e.g., Jaenicke (1992), Crepaz (1995), Jahn (1998, 2008), Scruggs (1998, 2001)).

Construction of the policy outcome index (outcome)

This index, one of the four main dependent variables in the paper, assesses the level and trend of each country's per capita CO₂ emissions relative to per capita GDP. The basic idea is that per capita CO₂ emissions should be allowed to develop differently depending on the economic situation of a country. A developing country should have the possibility to increase its per capita emissions during economic growth. In contrast, a developed country should have the responsibility to invest in cleaner, more efficient technology and renewable energies, and thus stabilize and reduce its per capita emissions. To assess countries in this sense, per capita CO₂ emission levels and trends were evaluated with respect to an environmental Kuznets curve (EKC). The latter describes the relationship between economic development and emissions and is assumed to first increase and then decrease as a function of income. We estimated an EKC for 13 European Union (EU13) countries¹ (Figure a).



Each point depicts the EU13-average of one year between 1870 and 2002. The EKC-fit is a quadratic function, which is one of the standard functions in the EKC literature. We also estimated a cubic function. The two results are very similar (the correlation is 0.98) and choosing one or the other does not affect the results reported in the paper. The fit is reasonably good between the zero point and the last EU13-point (highest GDP per capita level). This EU13-EKC

¹ The 13 countries correspond to the EU-15 without Luxembourg and Ireland, as for these two countries no complete dataset exists. The remaining 13 EU countries are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom.

serves as a benchmark against which all countries' per capita CO2 emission levels and trends are assessed. The principal reason for using the EU-13 benchmark is that in this group of countries the EKC reaches its turning point earlier and at a lower level than in a larger group of countries (e.g., the OECD group). That is, we use a more demanding benchmark. We do not view the EU-13-curve as ideal, but regard it as a meaningful and probably realistic benchmark. The current economic development of two thirds of all countries worldwide lies within the boundaries set by the economic development of the EU-13 between 1870 and 2002 (from 1'965 to 19'572 USD1990 per capita). Thus, only one third of all countries needs to be covered by the extrapolation of the curve.

For the calculation of the Level Indicator (see Figure b above), the mean per capita CO2 emission level of 1990-1992 (L) was related to the corresponding level on the EKC (C). The equation to calculate the Level Indicator is $I_L = ((C - L) / C) + 0.5$, valid for the interval $I_L = [0;1]$. If $I_L > 0.5$, the country's level is below the EKC and the country is identified as behaving cooperatively. If $I_L < 0.5$, the country's level is above the EKC and it behaves less cooperatively. $I_L = 0.5$ denotes a level on the EKC equal to the EU-13. Countries were rated within the bandwidth of $\pm 50\%$ of the EKC. A level above the 50% band denotes 0 points, a level below the band denotes 1 point.

To calculate the Trend Indicator, the development of each country between 1990 and 2002 was compared to the corresponding development on the EKC. Mean GDP per capita and mean CO2 emissions per capita for the 1990-1992 and 2000-2002 periods were calculated for each country (see Figure c above). Change in CO2 emissions corresponds to the value A. K is the corresponding change in CO2 emissions on the EKC. The first approximation of the Trend Indicator I_t is $I_t = (K - A) / |K|$. If $I_t > 0$, the country's trend outdoes the EKC trend and the country behaves cooperatively in the sense of the UNFCCC. If $I_t < 0$, the country's trend is worse than the EKC trend, its behavior is less cooperative. $I_t = 0$ denote an equal trend of country and EKC. As I_t values are between $\pm\infty$, they were standardized to a scale from 0 through 1².

In calculating the policy outcome index (outcome), the Trend Indicator is weighted by a factor of two compared to the Level Indicator. The Trend Indicator is judged to be more important than the Level Indicator as it is a measure for the current climate policy of the country. Calculation with per capita emissions makes the emissions index independent of population growth, migration, etc. Note, however, that if a country is positively assessed according to the index no conclusion can be drawn concerning overall CO2 emissions. The emissions data is from the CAIT database of the World Resources Institute. The GDP data is from Maddison.³

² For the standardization the following equation is used $I_t = \frac{1}{2} \left[\left(\frac{2}{\pi} \right) \arctan(I_t) + 1 \right]$.

³ <http://cait.wri.org/>; <http://www.ggd.net/maddison/>. All countries are included in the CAIT data except Andorra, Liechtenstein, Marshall Island, Micronesia, Somalia, East Timor, Vatican City, and Tuvalu. Data for Andorra, Micronesia and Somalia are taken from Van Aardenne et al. (2001), those for Liechtenstein from Heldstab et al. (2006). The dataset does not cover each year and country. However, data for the EKC (EU-13 from 1870-2002) and the emission index calculations were available, except for Nauru, East Timor, Tuvalu, and Vatican City.

Pairwise correlations

The correlation in the table below show that the four definitions of the dependent variable capture different aspects of public goods provision in climate change policy. The size and direction of correlation coefficients vary very much, suggesting that democracy effects are likely to differ as well across definitions of the dependent variable. When looking at differences between policy outcome and policy output we observe, for example, that Canada, the Netherlands, Finland, New Zealand, and the UK are among the countries where policy outcomes lag farthest behind policy output. Conversely, Afghanistan, Syria, Somalia, Turkey, and Chad are among the countries that are farthest ahead in policy outcome compared to policy output.

The following table shows the pairwise correlations of all variables used in the principal models. The variables are defined in the paper.

	<i>output</i>	<i>outcome</i>	<i>emisslevel</i>	<i>emisstrend</i>	<i>democracy</i>	<i>cci</i>	<i>income</i>
<i>output</i>	1.0000						
<i>outcome</i>	0.0798	1.0000					
<i>emisslevel</i>	-0.2380	0.5135	1.0000				
<i>emisstrend</i>	-0.0664	0.1009	-0.0596	1.0000			
<i>democracy</i>	0.4747	-0.1042	-0.3623	-0.0307	1.0000		
<i>cci</i>	-0.1090	0.0591	0.2109	-0.2349	0.0607	1.0000	
<i>income</i>	0.3629	-0.4382	-0.8642	-0.0368	0.5914	-0.1978	1.0000
<i>income^2</i>	0.3652	-0.4582	-0.8499	-0.0252	0.5969	-0.2096	0.9976
<i>GDPgrowth</i>	-0.1302	0.1287	0.0769	-0.3876	-0.1876	0.0061	-0.0310
<i>CO2cap1990</i>	0.0783	-0.5343	-0.7500	0.2152	0.1545	-0.2894	0.6287
<i>oilgascoal</i>	-0.2030	-0.3542	-0.3590	-0.0526	-0.2016	-0.0722	0.2159
<i>tradeopen</i>	-0.0033	-0.2984	-0.2678	0.0157	0.1062	0.0596	0.3007

	<i>income^2</i>	<i>GDPgrowth</i>	<i>CO2cap1990</i>	<i>oilgascoal</i>	<i>tradeopen</i>
<i>income^2</i>	1.0000				
<i>GDPgrowth</i>	-0.0336	1.0000			
<i>CO2cap1990</i>	0.6385	-0.1186	1.0000		
<i>oilgascoal</i>	0.2144	0.1108	0.6057	1.0000	
<i>tradeopen</i>	0.3086	0.0339	0.3240	0.2424	1.0000

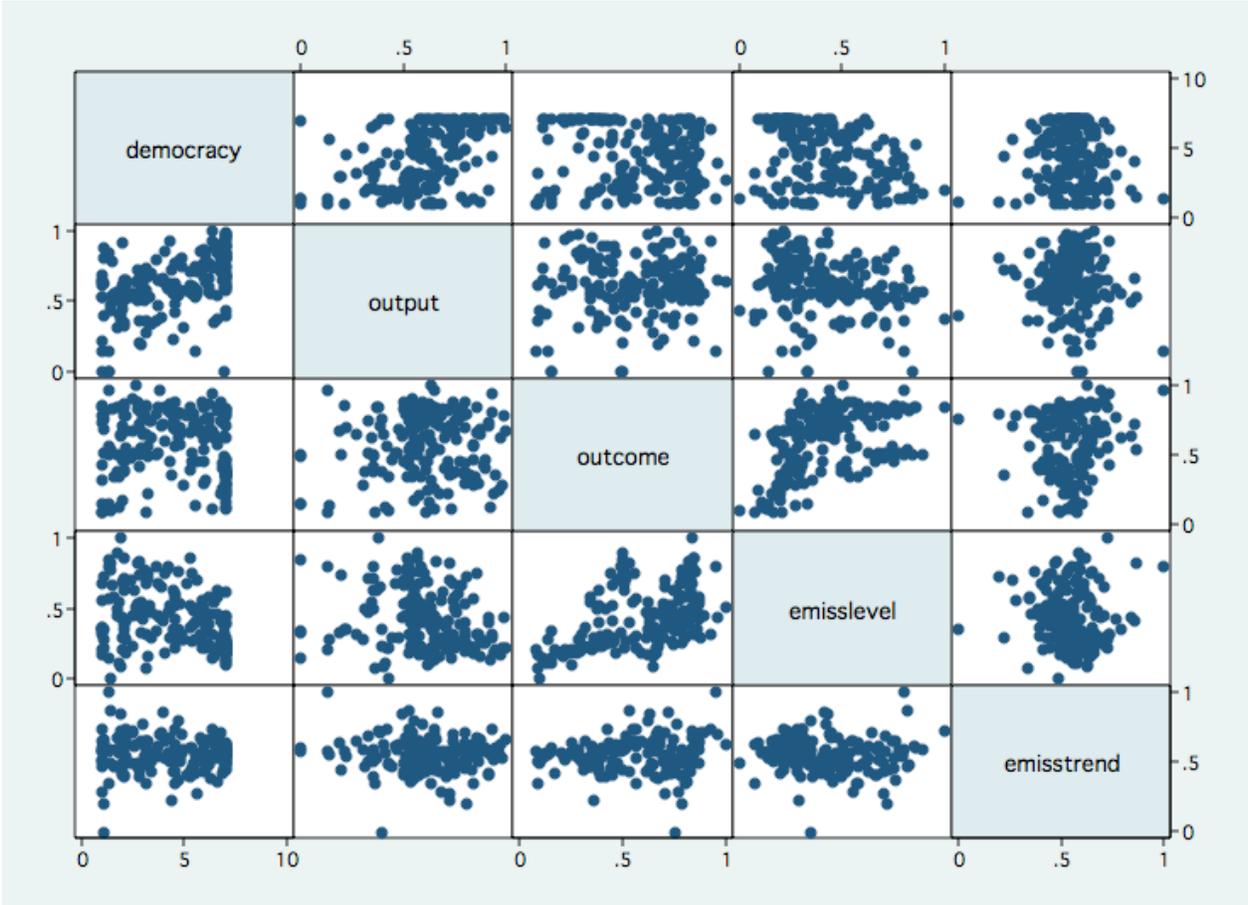
Descriptive statistics

The following table shows the descriptive statistics of all variables used in the principal models. The variables are defined in the paper.

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>output</i>	186	.6120536	.2028954	0	1
<i>outcome</i>	186	.5887657	.229541	.0841058	1
<i>emisslevel</i>	186	.4175984	.2082029	4.17e-07	1
<i>emisstrend</i>	178	.5468811	.1215112	0	1
<i>democracy</i>	185	4.464065	2.091912	1	7
<i>cci</i>	186	.4952555	.1399906	4.08e-08	.9999999
<i>income</i>	186	8.139162	1.105053	5.735131	10.2594
<i>income^2</i>	186	67.46054	18.00546	32.89173	105.2553
<i>GDPgrowth</i>	180	3.203966	2.939986	-4.306667	19.47472

CO2cap1990	179	4.450838	5.823156	0	31.1
oilgascoal	186	.0000454	.0001632	0	.0013915
tradeopen	183	.3339511	.415367	0	3.708472

Scatterplot matrix of democracy and the four main dependent variables



Effects of democracy in two samples

The following table shows the results for the full sample (models 1, 3, 5, 7 in Table 3 of the paper) and the results for the sample that excludes the richest 10% (models 2, 4, 6, 8).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	output	output	outcome	outcome	emisslevel	emisslevel	emisstrend	emisstrend
democracy	0.0312*** [0.0088]	0.0326*** [0.0092]	-0.0227*** [0.0087]	-0.0106 [0.0087]	0.0095** [0.0038]	0.0080** [0.0039]	0.0025 [0.0059]	0.0048 [0.0064]
cci	-0.1431 [0.0940]	-0.1294 [0.1038]	0.1192 [0.1157]	-0.0354 [0.1229]	-0.0063 [0.0401]	-0.0222 [0.0439]	-0.1774*** [0.0521]	-0.1833*** [0.0563]
income	0.0599*** [0.0191]	0.0487** [0.0209]			-0.7305*** [0.0848]	-0.6987*** [0.1066]	-0.1189 [0.1260]	-0.0958 [0.1588]
income^2					0.0368*** [0.0053]	0.0350*** [0.0068]	0.0053 [0.0075]	0.0035 [0.0098]
GDPgrowth	-0.0068 [0.0053]	-0.0059 [0.0056]			0.0040** [0.0018]	0.0034* [0.0019]	-0.0144* [0.0074]	-0.0138* [0.0075]
CO2cap1990	-0.0050* [0.0027]	-0.0027 [0.0032]			-0.0142*** [0.0021]	-0.0161*** [0.0025]	0.0072*** [0.0016]	0.0089*** [0.0023]
oilgascoal			-442.0084*** [111.0305]	-445.3356*** [103.2245]				
tradeopen	-0.0436** [0.0201]	-0.0688*** [0.0212]	-0.1115** [0.0524]	-0.0508 [0.0467]	0.0121 [0.0168]	0.0239 [0.0165]	0.0070 [0.0153]	-0.0050 [0.0246]
output			0.1378 [0.0883]	0.1792* [0.0908]	0.0483 [0.0417]	0.0602 [0.0428]	-0.0678 [0.0629]	-0.0842 [0.0676]
constant	0.1211 [0.1337]	0.1913 [0.1444]	0.6017*** [0.0888]	0.6066*** [0.0907]	3.8572*** [0.3437]	3.7294*** [0.4232]	1.2871** [0.5322]	1.2201* [0.6529]
observations	172	155	182	165	172	155	171	154
R-squared	0.325	0.271	0.207	0.179	0.881	0.867	0.288	0.299

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Models 2, 4, 6, 8 exclude the richest 10% of the countries in our full sample (income (not log) <17563.81).

Note: The effect on policy outcome is negative and significant in the full sample, but insignificant in the restricted sample. Inspection of the fitted EKC, which is used in the construction of the policy outcome index (see appendix A2), shows that this construction is rather unfavorable to the richest countries (they are positioned in the upper right of the graph, above the curve). This explains why the democracy effect becomes more strongly negative in the full sample. A more conservative interpretation is that democracy has no significant effect on policy outcome, as opposed to policy output. This interpretation is in line with the results for the emission trend variable: the effect of democracy on that variable is positive but insignificant. That is, the results shown in Table 3 support proposition 1, but offer only very limited support (in two out of six models) for proposition 2.

Robustness checks

We report most robustness checks only in general terms in the paper. Here are more details. The above findings remain robust to replacing the Freedom House index of political rights by six alternative indices for democracy: winning coalition size relative to selectorate size; an index of democratization developed by Vanhanen (2006); the revised combined Polity IV score; binary values for the Freedom House political rights index (0=values below the median; 1= values equal to or above the median); the civil liberties index of Freedom House; and the World Bank's voice and accountability index. We also experimented with various lag-structures of the democracy effect (e.g., using democracy scores for the years 1990-1995), but the main results did not change.

	(1) output	(2) output	(3) outcome	(4) outcome	(5) emisslevel	(6) emisslevel	(7) emisstrend	(8) emisstrend
w_s	0.2292*** [0.0679]	0.2363*** [0.0702]	-0.2091*** [0.0757]	-0.1029 [0.0757]	0.0284 [0.0355]	0.0139 [0.0356]	0.0076 [0.0439]	0.0272 [0.0461]
van	0.0043*** [0.0016]	0.0046*** [0.0018]	-0.0058*** [0.0015]	-0.0035** [0.0017]	0.0004 [0.0007]	0.0003 [0.0008]	0.0018 [0.0011]	0.0025** [0.0012]
poliv	0.0103*** [0.0028]	0.0105*** [0.0029]	-0.0060* [0.0031]	-0.0023 [0.0031]	0.0024* [0.0013]	0.0022 [0.0013]	0.0025 [0.0021]	0.0032 [0.0022]
democbin	0.1003*** [0.0299]	0.1034*** [0.0308]	-0.1045*** [0.0320]	-0.0696** [0.0312]	0.0068 [0.0141]	0.0019 [0.0144]	-0.0045 [0.0205]	0.0006 [0.0218]
civlib	0.0375*** [0.0110]	0.0402*** [0.0119]	-0.0293*** [0.0105]	-0.0133 [0.0109]	0.0118** [0.0046]	0.0099** [0.0048]	0.0005 [0.0068]	0.0039 [0.0076]
wbgi_vae	0.0785*** [0.0190]	0.0805*** [0.0200]	-0.0588*** [0.0181]	-0.0286 [0.0187]	0.0176* [0.0091]	0.0142 [0.0093]	0.0066 [0.0134]	0.0120 [0.0145]

Note: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Models 2, 4, 6, 8 exclude the richest 10% of the countries in our full sample (income (not log) <17563.81). We report only the coefficients for the democracy variable. The specification of the models remains exactly the same as shown in Table 3 of the paper. w_s = Size of winning coalition relative to size of selectorate, 1990-99 average, Bueno de Mesquita et al. 2003, <http://www.nyu.edu/gsas/dept/politics/data/bdm2s2/Logic.htm>. Van = Index measuring competition and participation in political systems, scale: 0-100, 1990-2004 averages, Vanhanen, <http://www.fsd.uta.fi/english/>. Poliv = Revised combined Polity IV score, 1990-2003 averages, scale: -10...+10, <http://www.cidcm.umd.edu/polity/data>. Democbin = based on political rights index of Freedom House, 1 if democracy>5, otherwise 0, Freedom House 2006, <http://www.freedomhouse.org>. Civlib = rating of civil liberties by Freedom House, 1990-2005 averages, scale of original data inverted (1...7), Freedom House 2006, <http://www.freedomhouse.org>. wbgi_vae = Voice and accountability estimate, based on several indicators for political process, civil liberties, and political rights, 1996-2005 averages, scale approx: -2.5...+2.5, mean of zero, World Bank, <http://web.worldbank.org/>

The results reported in Table 3 of the paper are robust to estimating separately models for the four components of the policy output index (participation in the UN FCCC and the Kyoto Protocol, compliance with reporting and financial commitments).

	(1) Unfcc	(2) Unfcc	(3) Kyoto	(4) Kyoto	(5) Finance	(6) Finance	(7) Reporting	(8) Reporting
democracy	0.0185*** [0.0071]	0.0158** [0.0074]	0.0347** [0.0163]	0.0352** [0.0162]	0.0381** [0.0151]	0.0390** [0.0157]	0.0231* [0.0124]	0.0298** [0.0118]
cci	-0.0766 [0.0694]	-0.0618 [0.0792]	0.0023 [0.1650]	-0.0424 [0.1829]	-0.2384 [0.1638]	-0.1900 [0.1861]	-0.2128* [0.1234]	-0.1817 [0.1240]
income	0.0243 [0.0150]	0.0226 [0.0171]	0.0526 [0.0362]	0.0599 [0.0396]	0.0842*** [0.0322]	0.0689* [0.0352]	0.0592** [0.0292]	0.0276 [0.0286]
GDPgrowth	-0.0021 [0.0047]	-0.0022 [0.0048]	-0.0059 [0.0095]	-0.0045 [0.0100]	0.0074 [0.0076]	0.0072 [0.0076]	-0.0243*** [0.0058]	-0.0221*** [0.0058]
CO2cap1990	-0.0018 [0.0023]	-0.0033 [0.0030]	-0.0113* [0.0067]	-0.0092 [0.0072]	0.0065 [0.0050]	0.0075 [0.0058]	-0.0118** [0.0060]	-0.0050 [0.0059]
tradeopen	-0.0611*** [0.0149]	-0.0482** [0.0188]	-0.0272 [0.0646]	-0.0065 [0.0547]	-0.0148 [0.0484]	-0.0539 [0.0335]	-0.0567 [0.0706]	-0.1435*** [0.0291]
Constant	0.5619*** [0.1131]	0.5778*** [0.1241]	0.0794 [0.2521]	0.0314 [0.2687]	-0.4160* [0.2298]	-0.3214 [0.2465]	0.2173 [0.1975]	0.4127** [0.1908]
Observations	172	155	172	155	172	155	172	155
R-squared	0.151	0.098	0.120	0.120	0.269	0.184	0.200	0.218

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Models 2, 4, 6, 8 exclude the richest 10% of the countries in our full sample (income (not log) <17563.81).

We replaced the climate risk, income, mitigation cost, and trade indicators with alternative indicators. These indicators are listed in the table below. For climate risk we used estimated losses of GDP through global warming, the low coast area of countries affected by a one meter sea level rise, and the percent of a country's territory under severe water stress. For income, we used child mortality rates, an educational achievement index, and the human development index. As proxies for mitigation costs, we used the annex one status of countries in the Kyoto Protocol (countries that have formal emission targets), deviation of a country from Kyoto Protocol targets (in 1997), OPEC membership, and the share of oil and coal exports in GDP. In lieu of the trade openness indicator, we used a broader index for economic, political, and social openness of countries, and indices for trade and financial openness of countries defined in regulatory terms. The results did not change in substantive ways.

Alternative indicators for climate change

<i>Variable</i>	<i>Definition</i>	<i>Source</i>
imprnb	Impacts of 2.5° warming above 1990 in % of GDP	Nordhaus and Boyer 2000; Nordhaus and Yang 1996
impwia	Climate change impacts BAU in 2050, % of GDP	Kempfert 2002
lnlowcoast	Low coast (in km) that is susceptible to a sea level rise of 1 m (log value)	IPCC 1990
watstr	Percentage of country's territory under severe water stress	ESI 2001

Alternative indicators for costs of public goods provision

<i>Variable</i>	<i>Definition</i>	<i>Source</i>
annexone	Annex one country (country with formal emission target under the Kyoto Protocol)	FCCC, http://unfccc.int
devifrkyoto	Deviation (in 1997) from Kyoto Protocol target (for 2010) in %. Only the 38 countries that have Kyoto	Own calculation based on CAIT, http://cait.wri.org/ and FCCC, http://unfccc.int

	emission targets were assigned a positive or negative percentage value, all others countries are assigned zero.	
opec	Opec membership	http://www.opec.org
petrolcoalexpgdp	Share of oil and coal exports in GDP	BP, see above; von Stein 2006

Alternative indicators for income

<i>Variable</i>	<i>Definition</i>	<i>Source</i>
cmr_unicef, cmrunicsquare	Child mortality rate	Ross 2006
educindex, educinsquare	Educational index, component of HDI	UNDP Human Development Report; http://hdr.undp.org/
hdi, hdisquare	Human Development Index,	UNDP Human Development Report; http://hdr.undp.org/

Alternative indicators for economic openness

econglob	Economic openness index	KOF, http://globalization.kof.ethz.ch/
trade	Trade openness index	Martin 2005
capital	Capital account openness index	Martin 2005

We added a wide range of additional control variables one-by-one to the models reported in Table 3 of the paper. These variables are listed in the table below. They include socio-economic factors (e.g., economic size of a country, population, population density, manufacturing output as a share of GDP, income distribution, extent of scientific activity, urbanization), environmental performance of a country more broadly defined, government quality (e.g., corruption, government effectiveness, veto players), armed conflict, international network variables, country group effects (e.g., EU membership, very small vs. very big countries), and geophysical variables (temperature, precipitation). Again, the results did not change in substantive ways.

	<i>Definition</i>	<i>Source</i>
ansipm10	Adjusted net savings, including PM damage	World Bank, http://web.worldbank.org
artpop	Scientific and technical articles per million population	ESI 2001
centrality	Centrality score for countries' affiliation network generated by common membership in 2000 of 396 active IGOs	Ward 2006
cumratnokoyoto	Cumulated number of ratified global environmental agreements (without climate agreements), 1990-2005	Own coding, building on http://sedac.ciesin.org/entri/ and http://iea.uoregon.edu/
esimis	Percent of ESI variables missing from public global data sets	ESI 2001
eu15	EU members before recent expansion	Own coding
eu25	EU members as of 2006	Own coding
gdpppp2000	GDP, PPP (constant 2000 international \$)	World Bank, http://devdata.worldbank.org
geooutco2w, geooutgdpw, geooutpopw	Average scores on four DVs for 11 geographically defined country groups; contributions of countries to regional average are weighed by	Own coding 1 Western Europe 2 USA, Canada, Australia, New Zealand

	population, gdp, total CO2 emissions in 1990-2002	3 Central and Eastern Europe, including Turkey, excluding former USSR 4 Central and Latin America, including Mexico and Caribbean 5 South Asia and Pacific, excluding Australia and New Zealand 6 Balkan 7 Former USSR, CIS 8 Africa, subsahara 9 Africa, non subsahara (Northern Africa) 10 Middle East 11 North Asia
inci	Incidence of intrastate conflict, 1990-2005 averages	http://new.prio.no
industpgdp	Industry, value added (% of GDP), 1990-2004 averages	World Bank, http://devdata.worldbank.org
inflation	Inflation rate	World Bank, http://devdata.worldbank.org
popdensity	Total population, 1990-2005 average, divided by surface of country (in km ²)	Based on World Bank, http://devdata.worldbank.org
popsmall	poptot<1000000	Based on poptot
poptot	Population, 1990-2005 averages	World Bank, http://devdata.worldbank.org , CIA 2006, Maddison 2007
precip	Precipitation (mm), 1961-1990 averages	See Tmean
rdexp	Expenditure for research & development as a percentage of GNP	ESI 2001
Tmean	Precipitation (mm), 1961-1990 averages	Mitchell et al. 2003, http://www.cru.uea.ac.uk
top10gdp	Ten biggest (in terms of gdp2000) countries	Based on gdp2000, see above
top10pop	Ten biggest (in terms of poptot) countries	Based on poptot
usaandchina	USA, China = 1, other countries = 0	Own coding
uw_gini	Gini index, 1990-2003 averages	UNU-WIDER, World Income Inequality Database, http://www.wider.unu.edu/research/Database/
van_urban	Urban population in %, 1990-99 averages	Vanhanen; http://www.fsd.uta.fi/english/
warinci	Incidence of intrastate war, 1990-2005 averages	http://new.prio.no
wbgi_gee	Government effectiveness estimate	World Bank, http://www.worldbank.org/wbi/governance/govdatasets/

Models for comprehensive indices of climate policy performance

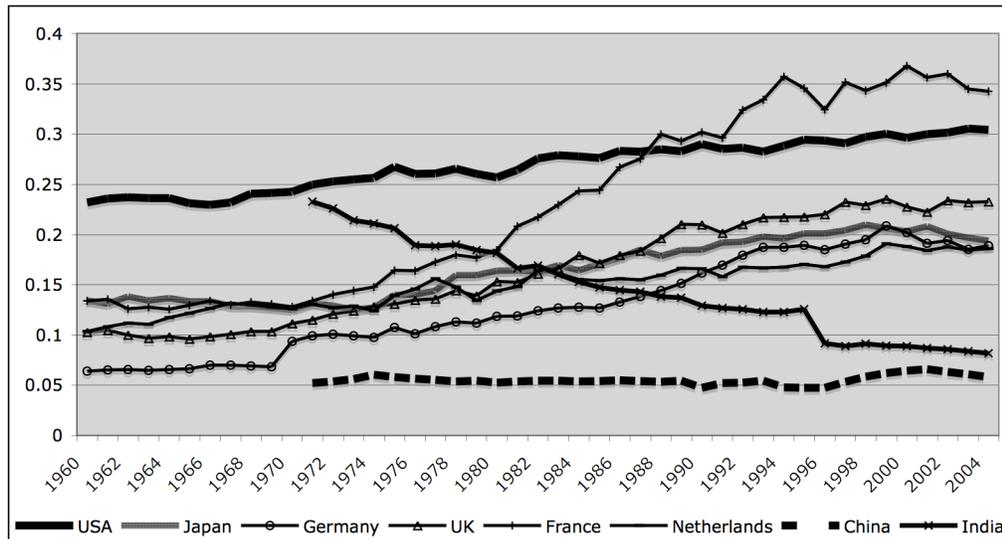
As an additional robustness check we presented two models that use comprehensive indices of climate change policy performance as dependent variables. The following table provides additional details. It shows the results for the full sample and the sample that excludes the richest 10%.

	(1) GWscore	(2) GWscore	(3) CPperform	(4) CPperform
democracy	0.0520*** [0.0171]	0.0659*** [0.0200]	0.0154*** [0.0055]	0.0170*** [0.0058]
cci	-0.3445* [0.1766]	-0.0431 [0.2092]	-0.1883*** [0.0557]	-0.1999*** [0.0610]
income	-0.8427 [0.6667]	0.8382 [0.8182]	-0.5024*** [0.1146]	-0.4659*** [0.1455]
Income^2	0.0421 [0.0373]	-0.0575 [0.0472]	0.0264*** [0.0069]	0.0237*** [0.0091]
GDPgrowth	-0.0285** [0.0133]	-0.0138 [0.0142]	-0.0121** [0.0056]	-0.0116** [0.0057]
CO2cap1990	-0.0289*** [0.0064]	-0.0220*** [0.0071]	-0.0028* [0.0017]	-0.0016 [0.0022]
tradeopen	0.1436** [0.0564]	0.0554 [0.1226]	-0.0030 [0.0180]	-0.0128 [0.0268]
constant	4.8564 [2.9606]	-2.4608 [3.5741]	2.9467*** [0.4688]	2.8240*** [0.5802]
observations	55	39	171	154
R-squared	0.583	0.582	0.452	0.458

Robust standard errors in brackets, * significant at 10%; ** significant at 5%; *** significant at 1%. Models 2, 4, 6, 8 exclude the richest 10% of the countries in our full sample (income (not log) <17563.81).

Emissions from transportation

The following figure illustrates the importance of transportation related emissions. It shows that the share of CO₂ emissions from transportation in total CO₂ emissions has strongly increased in large industrialized countries, but has remained stable or even decreased in the two largest developing countries (China, India).



The following table adds more details to Table 5 of the paper. It shows the results both for the full sample and the sample that excludes the richest 10%.

	(1) CO ₂ electr&heat	(2) CO ₂ electr&heat	(3) CO ₂ transport	(4) CO ₂ transport
democracy	0.0045 [0.0082]	0.0046 [0.0086]	-0.0238* [0.0120]	-0.0183 [0.0126]
climrisk	-0.1273 [0.1196]	-0.1175 [0.1214]	-0.0143 [0.0734]	0.0440 [0.0745]
income	-0.4769** [0.1849]	-0.6465** [0.2464]	-0.1192 [0.2140]	-0.0373 [0.2695]
income ²	0.0275** [0.0109]	0.0386** [0.0152]	0.0102 [0.0132]	0.0037 [0.0169]
GDPgrowth	-0.0034 [0.0067]	-0.0026 [0.0065]	-0.0122 [0.0117]	-0.0106 [0.0111]
CO ₂ electr&heat1990	0.0122*** [0.0043]	0.0180*** [0.0062]		
CO ₂ transport1990			0.0015 [0.0168]	0.0490** [0.0214]
output	-0.0214 [0.0570]	-0.0353 [0.0634]	-0.1552* [0.0813]	-0.1925** [0.0901]
tradeopen	-0.0147 [0.0292]	-0.0859* [0.0507]	-0.0112 [0.0305]	-0.0960 [0.0606]
constant	2.6192*** [0.7615]	3.2707*** [0.9887]	1.0396 [0.8586]	0.7613 [1.0710]
observations	103	88	107	91
R-squared	0.177	0.193	0.170	0.202

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Models 2, 4 exclude the richest 10% of the countries in our full sample (income (not log) <17563.81).

Democracy effects on climate risk perception

This and the following tables show some regression results to back up arguments made in the concluding section of the paper.

	(1) PIPA2006	(2) PIPA2003
democracy	3.8808** [1.8449]	5.2316* [2.5924]
income	-1.4360 [3.7366]	-7.2580 [6.0684]
constant	56.6140** [27.1909]	85.2230* [43.7187]
observations	30	16
R-squared	0.189	0.169

Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

The survey data was taken from

PIPA. Program on International Policy Attitudes.

<http://www.pipa.org/> (last accessed on May 30, 2008).

Democracy effects on Greenpeace membership

	greenpeace
democracy	0.0208** [0.0086]
income	0.1172*** [0.0387]
constant	-0.9494*** [0.3100]
observations	178
R-squared	0.129

Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

The data on Greenpeace membership was provided by Jana von Stein.

Greenpeace membership per population added to models as shown in Table 3 of the paper

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	output	output	outcome	outcome	emisslevel	emisslevel	emisstrend	emisstrend
democracy	0.0295***	0.0317***	-0.0158*	-0.0040	0.0095**	0.0079**	0.0025	0.0048
	[0.0089]	[0.0092]	[0.0094]	[0.0092]	[0.0038]	[0.0039]	[0.0059]	[0.0065]
cci	-0.1306	-0.1187	0.0520	-0.0887	-0.0063	-0.0235	-0.1774***	-0.1831***
	[0.0943]	[0.1046]	[0.1171]	[0.1226]	[0.0402]	[0.0438]	[0.0522]	[0.0564]
income	0.0568***	0.0454**			-0.7294***	-0.7153***	-0.1220	-0.0935
	[0.0193]	[0.0210]			[0.0856]	[0.1102]	[0.1295]	[0.1623]
income^2					0.0367***	0.0361***	0.0055	0.0033
					[0.0054]	[0.0070]	[0.0078]	[0.0101]
GDPgrowth	-0.0067	-0.0058			0.0040**	0.0033*	-0.0144*	-0.0138*
	[0.0053]	[0.0056]			[0.0018]	[0.0019]	[0.0075]	[0.0075]
CO2cap1990	-0.0054*	-0.0026			-0.0142***	-0.0162***	0.0072***	0.0089***
	[0.0029]	[0.0033]			[0.0021]	[0.0025]	[0.0016]	[0.0023]
oilgascoalpcap			-443.733***	-431.087***				
			[107.6136]	[104.8763]				
tradeopengl	-0.0494**	-0.0688***	-0.0928*	-0.0576	0.0120	0.0239	0.0071	-0.0050
	[0.0208]	[0.0211]	[0.0517]	[0.0499]	[0.0170]	[0.0167]	[0.0153]	[0.0246]
output			0.1617	0.1868*	0.0481	0.0629	-0.0673	-0.0845
			[0.0990]	[0.1016]	[0.0425]	[0.0431]	[0.0637]	[0.0683]
greenpeace	0.0518***	0.1723***	-0.1255***	-0.3852***	0.0006	-0.0377**	-0.0018	0.0051
	[0.0136]	[0.0305]	[0.0361]	[0.0992]	[0.0094]	[0.0151]	[0.0079]	[0.0206]
constant	0.1463	0.2129	0.5978***	0.6120***	3.8531***	3.7897***	1.2987**	1.2121*
	[0.1351]	[0.1450]	[0.0925]	[0.0950]	[0.3461]	[0.4359]	[0.5433]	[0.6642]
observations	172	155	177	160	172	155	171	154
R-squared	0.337	0.281	0.255	0.218	0.881	0.867	0.288	0.299

Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

The data on Greenpeace membership was provided by Jana von Stein.

Democracy effects on environmental monitoring and data reporting

	esimis
democracy	0.1629***
	[0.0492]
income	0.4017***
	[0.0700]
constant	-4.0883***
	[0.4161]
observations	122
R-squared	0.467

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

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