

A Service of

ZBW

Leibniz-Informationszentrum Wirtschaft Leibniz Information Centre for Economics

Al Doyaili-Wangler, Sarah

Working Paper Democracy, interest groups and compliance with the Kyoto Protocol

Jena Economic Research Papers, No. 2021-001

Provided in Cooperation with: Friedrich Schiller University Jena, Faculty of Economics and Business Administration

Suggested Citation: Al Doyaili-Wangler, Sarah (2021) : Democracy, interest groups and compliance with the Kyoto Protocol, Jena Economic Research Papers, No. 2021-001, Friedrich Schiller University Jena, Jena

This Version is available at: https://hdl.handle.net/10419/243072

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



WWW.ECONSTOR.EU



Democracy, Interest Groups and Compliance with the Kyoto Protocol

Sarah Al Doyaili-Wangler

JENA ECONOMIC RESEARCH PAPERS · # 2021-001

The JENA ECONOMIC RESEARCH PAPERS is a publication of the Friedrich Schiller University Jena, Germany (www.jenecon.de).

Democracy, Interest Groups and Compliance with the Kyoto Protocol

An Empirical Assessment

Sarah Al Doyaili-Wangler^{*}

21.1.2.2020

Abstract

This paper seeks to give insights into how domestic voters form their preferences pro or contra compliance with IEAs and therefore how public concern for the environment and interest group activity influence national compliance behaviour. Three hypotheses are developed. First, compliance behaviour is positively influenced by a high concern for climate change and second, by a high number of ENGOs. Third, a strong prevalence of industry interests is assumed to be connected with lower compliance. A panel data analysis on compliance with the Kyoto Protocol by Annex B countries is applied in order to test these hypotheses. The empirical findings give evidence for the first and the third one.

Keywords: Kyoto Protocol, interest groups, compliance, climate policy **JEL Classification:** F53, H87, Q54

1 Introduction

The consequences of climate change can now be clearly seen and felt. These include a rise in sea level, heat waves, severe storms and floods or the receding of ice surfaces in the polar seas and glaciers. The average global temperature

^{*}Friedrich-Schiller-University Jena, Germany

[†]I am grateful to Andreas Freytag and Leo Wangler for valuable comments.

has already risen by approx. 1°C and global greenhouse gas (GHG) emissions are higher than ever (NASA 2020). We are, therefore, on the verge of an irreversible turning point.

Climate change is the result of a global negative externality, international cooperation to overcome this problem is needed. However, multilateral policy cooperation faces serious problems at producing a meaningful and sustainable international agreement. The Kyoto Protocol, which was the main international agreement for a long time, is criticized for its ineffectiveness (e.g. Aichele and Felbermayr 2012, Rosen 2015, Falkner 2016). The future success of the Paris Agreement, even though celebrated as a big success of global climate policy at the beginning (e.g. Harvey 2015, Warrick and Mooney 2015), is now highly questioned as well. Various authors demonstrate that even with full national compliance with the nationally determined contributions by the parties, projected emission reductions are not sufficient to achieve the envisaged 2°C let alone 1.5°C target (e.g. Rogelj et al. 2016, den Elzen et al. 2016, Harmsen et al. 2019).

In order to create effective climate policy agreements it is highly relevant to understand how these agreements are formed, designed and which countries participate and comply and why. A fair amount of research has been conducted.¹ One central research area concerns various determinants of compliance with International Environmental Agreements (IEAs).² One theoretical argument focuses on the question whether democracies perform better than non-democratic states when it comes to compliance with IEAs. A common theory states that democracies are said to be better in upholding their international commitments. The main argument behind this theory stems from the fact that electoral institutions in a democracy function as an instrument of accountability. Competitive and regularly held elections are a prerequisite to distinguish a democracy from non-democratic states (Powell 2000, p. 47). Domestic constituents are enabled to punish their government for non-compliance through voting the incumbent out of office (Fearon 1994, McGillivray and

¹See Gilligan and Johns (2012), Wangler et al. (2013) or Al Doyaili-Wangler and Wangler (2017) for surveys on some of this research.

²See von Stein (2013) for a survey on International Law and International Relations literature for what drives compliance.

Smith 2000, 2005). This theory, also referred to as 'domestic audiences costs' (e.g. Fearon 1994, Tomz 2002, Mansfield et al. 2002), is supported by several studies on compliance with e.g. security alliances (e.g. Siverson and Emmons 1991, Gaubatz 1996, Smith 1996), human rights treaties (von Stein 2015), trade agreements (e.g. Mansfield et al. 2002), the Gold Standard (e.g. Broz 2002) or IEAs (e.g. Weiss and Jacobson 2000, Bättig and Bernauer 2009). Several other studies, however, do not support these results (e.g. Simmons 2000a,b, Busch and Reinhardt 2002, Gartzke and Gleditsch 2004). Böhmelt (2019) demonstrates that the regular turnover of leadship in democracies can negatively affect the ratification of IEAs. Consider, for example, the United States of America and their commitment to global climate agreements. First, the Kyoto Protocol which was signed by former President Bill Clinton never got ratified under his successor George W. Bush. Second, although the USA joined the Paris agreement by accession during the Barack Obama era, they withdrew at the instigation of successor Donald Trump.

The background for these ambiguous results is that the concept of 'domestic audiences costs' assumes unrealistically that voters will punish noncompliance either way. Firstly, this would mean that all constituents have a preference for compliant behaviour. However, compliance with the agreement will lead to a redistribution of wealth from which not all domestic actors will gain equally or gain at all (Dai 2006, p. 691). Actors bearing the costs of compliance have no interest in punishing the government. Secondly, in most cases international agreements are very complex and domestic constituents may not be able to fully understand the agreement and its consequences. Or they are simply ignorant towards the respective issue. Thirdly, voters might value other political issues higher and cast their vote for politicians closest to their preferences concerning these other issues (Tomz 2002, p. 2). Surveys in Germany, for example, show that environmental and climate protection is perceived as an important problem. Nevertheless, the problem regularly plays only a subordinate role behind changing other topics. While 53 percent of all respondents in 2016 perceived it as a very important problem, only 21 percent named it of their own accord as one of the country's two most important problems (BMUB and UBA 2017).

Overall it can be concluded that two opposing interests - pro and contra compliance - compete against each other and the compliance behaviour is conditional on which interest is stronger, better informed and organized and thus decisive (Tomz 2002, Dai 2005, 2006). As the consequences of climate change become more acute, discourse and conflicts between climate policy advocates and those who oppose necessary measures intensify. On the one hand, movements such as Fridays for Future (FFF) or the more radical Extinction Rebellion changed this discourse in a fundamental way. Instead of being consent with short-term measures, they demand a fundamental change of the current policies towards long-term solutions (von Zabern and Tulloch 2020). On the other hand, hard-line economic and political interests dominate the other side of the discourse. In Brazil, for example, under President Jair Bolsonaro, large areas of climate-relevant rainforest continue to be systematically destroyed in favour of mono-crop plantations or GHG-intensive cattle farming³ (de Area Leão Pereira et al. 2020). Or in the USA, where under the outgoing President Donald Trump, central climate and environmental protection laws of his predecessor were revoked to serve the interests of the oil industry. An industry that is constantly growing and has made the USA a leading exporter. The dependence on this fossil fuel remains high (Koduvayur 2020).

Based on this theory and the fact that young people are drivers of the Fridays for Future movement, there is serious hope, that the increased strength of advocates of climate policy will positively support structural change towards sustainability. In order to get more insights on this reasoning, we build on historical data in the context of the Kyoto-era. Even though the Kyoto Protocol is highly criticized it is worth taking a closer look on participating countries as two third overachieved the agreed targets⁴. Therefore, it is a highly relevant to get more insights on the determinants of the differences in GHG emission limitation. Within this paper we take a closer look at how voters form their preferences and how public concern for climate change and interest groups

³This is a problem for several reasons. First, deforestation of the rainforest destroys important habitat for diverse wildlife. Second, a functioning rainforest plays a central role in the preservation of the global climate. Third, cattle farming is a major source of global GHG emissions. Livestock farming causes approx. 18% of Brazil's GHG emissions (Bogaerts et al. 2017).

⁴See table 3 on p. 28 for information on Annex B countries, their targets and compliance status at the end of the first emission reduction phase.

influence domestic compliance behaviour.

The remainder of the paper is organized as follows. First, a short overview on relevant actors and related empirical literature is given and the main hypotheses derived. These are tested empirically through a panel data analysis on interest groups influencing compliance with the Kyoto Protocol in Annex B countries.

2 Compliance with IEAs and domestic actors in the compliance process

The paper follows Young (1979) in stating that

"compliance can be said to occur when the actual behavior of a given subject conforms to prescribed behavior, and non-compliance or violation occurs when actual behavior departs significantly from prescribed behavior" (p. 104, cited in Simmons 1998, p. 77).

Compliance means honouring the commitment (e.g. in the form of concrete goals) made by signing and ratifying the agreement. However, this paper is not only interested in the question if the respective goal was reached or not but rather how much each countries contributes to the provision of the public good (Dai 2005, 2006). We consider a level of compliance and the positive and negative deviation from said goal.

It is important to distinguish the concept of compliance from cooperation (process of treaty-making, participating in and committing to international agreements) as such and from treaty implementation (translation into national laws, regulations and norms) which is rather a prerequisite to reach the demanded change in behaviour. Laws or other instruments to implement the treaty have to be sufficiently designed to achieve the goal and the enforcement of the measures has to be guaranteed. Lastly it is crucial to note that a high level of compliance for an agreement does not mean that the agreement is effective in achieving its overall goal.

Elected politicians are the actors deciding on the level of compliance. As their main goal is to stay in office, incumbents - and other vote-seeking politicians for that matter - will choose the level of compliance the needed majority of voters prefer (Downs 1957). However, the question remains to which extent policy-makers will respond to voter preferences. International environmental policy is characterized by imperfect information, high complexity and a high level of uncertainty concerning the risks of climate change, costs and benefits of abatement policies as well as the behaviour of other states. Wealth redistributing regulations have to be implemented to stop climate change. Rentseeking behaviour of interest groups becomes highly relevant and in most cases vested interests are better in influencing government decisions than the general public (Page and Shapiro 1983, Downs 1957, Olson 1965).

The next subsections will give further insights on the role of voters and interest groups and how they influence national environmental policy-making and thus, the level of domestic compliance.⁵

Domestic citizens/voters

Domestic citizens are the focal point of this overview. Powell (2000) presents evidence that domestic voters are indeed able to punish policy-makers. His analysis considers 20 democratic countries and 153 elections. In 49 percent of the cases when reigning parties lost more than five percent of their votes a leadership-turnover followed. The real question, however, is if it is in the interest of a decisive number of voters to comply with the climate agreement. Page and Shapiro (1983) conclude with their empirical analysis that a change in public opinion towards a certain topic leads to a change in policy.

Voters will vote for the party closest to their own preferences. Therefore, it is important to take a look on how these are formed. Domestic constituents gain or loose to different extents from complying to the climate policy agreement (Dai 2006). In general, intergenerational and international aspects of climate policy highly influence how domestic constituents form their preferences towards certain policy measures. Consequences of climate change and benefits from stopping it will foremost affect future generations and, subsequently, voters mainly perceive the costs of complying with these commit-

⁵For a formal model on compliance, domestic democratic institutions and competing interests see Dai (2006).

ments (increasing energy prices, structural change in the energy sector and subsequent job losses). Thus, individual economic interests shape the opinion on compliance with the agreement (Dai 2006, Bechtel et al. 2014). Employment status, industry of employment and the overall income situation form this economic interest. Citizens working for companies in fossil fuel production or energy-intensive industries most likely have no economic interest in their country complying with the treaty. A family with a solar panel installed on their house's rooftop, on the other hand, most likely has. Bechtel et al. (2014) give empirical evidence on the relationship of an individual's economic well-being and their stance on international cooperation concerning climate change. Individuals grouped into the highest income quartile, show stronger support for cooperation than individuals in other quartiles. Furthermore, they are able to find that support decreases significantly for individuals working in sectors with high GHG emissions. Horbach (1992) shows that election results for the German Green Party were weaker in regions with relatively strong steel and chemical industries and with relatively high unemployment. Similar evidence is presented by Kahn and Kotchen (2010). The authors analyze the relationship of employment rates and the concern for the environment in three different analyses. First, they analyze how an increase of unemployment rates changes internet search behavior of US-Americans. The results show that with an increase in unemployment Google users search less for the keyword global warming and simultaneously more using the term unemployment. Secondly, national survey results for public opinion on climate change in the USA are used. These, too, confirm that an increase in unemployment rates is related to a decreasing concern for climate change as well as a reduction in support for policy measures to abate global warming. The third analysis uses monthly survey results for the US-American state of California and comes to the same results. There are a number of articles analyzing additional non-economic factors (e.g. level of education, age, political ideology, climate change exposure) influencing an individuals' concern for the environment (e.g. Inglehart 1995, Brechin 2003, Franzen and Meyer 2010, Kvaløy et al. 2012).

Furthermore, voters' preferences are also shaped by personal and social norms and values such as altruism and reciprocity (Bechtel et al. 2014, Ostrom

2000). These values are especially relevant considering the international and intergenerational aspects of climate policy. Overall, voters balance economic interests, personal and social values, and their level of concern for the environment and weigh it against other, in their opinion, more important policy issues such as unemployment, health, pensions and general economic policy. In addition to directly expressing their preferences by voting, domestic constituents mandate certain interest groups to influence the policy-making process in accordance with their preferences.

Interest groups and environmental NGOs

We assume that all stakeholders of the compliance process are organized as two competing groups - pro and contra compliance. In the case of climate treaties, stakeholder (above all owners, managers, employees) of fossil fuel and energy-intensive industries as well as other polluters (e.g. fossil fuel using transportation industry, car producer and owner) form pressure groups in favour of non-compliance as they are mainly affected by policy-measures aiming at reducing GHG emissions. Concerned constituents, environmental non-governmental organizations (ENGOs), producers of alternative energy sources and other benefiting actors are interested in reducing GHG emissions. These opposing groups take part in the policy-making process in order to influence subsequent wealth redistributions in their favour (Dai 2006, Böhmelt et al. 2015). They do so, directly, by supporting the government in the creation and implementation of environmental policy measures and indirectly by lobbying, campaigning and funding election campaigns (Böhmelt et al. 2015).

Interest groups exist in different shapes and sizes and are formed to further their members common interests and agendas. "Some seek to further the objectives of their members as factors of production or producers [...]" (e.g. labour unions, different business and industry association). "Others seek to influence public policy and public opinion with respect to particular public good-externality issues" (e.g. environmental or human rights groups) (Mueller 2003, p. 473). In the economic and political science literature, the term interest group is usually used uniformly for these groups despite their different target functions. Accordingly, business and industry associations, trade and labour unions, non-governmental organisations, but also associations in the leisure and cultural sector are subsumed under the term interest groups. Central to all these groups is that they are organised interests where there is some sort of membership system (Heinze and Voelzkow 2013). Therefore, we should bear in mind that although NGOs fall under the concept of interest groups, their incentive differs from that of business associations. While the latter primarily serve the economic self-interest of their members, NGOs represent public interests in the provision of public goods (e.g. environmental protection, health care, education).

Focal point of interest group activity is the acquisition, editing and distribution of information that is then provided for policy-makers as well as voters (Grossman and Helpman 2001). Especially when considering the complexity of and the uncertainty with environmental problems and IEAs as well as intergenerational aspects of costs and benefits of stopping climate change, providing information is a powerful tool in influencing policy-makers and voters (Böhmelt et al. 2015). Thus, the ability to acquire and distribute relevant information decides on the success of interest group activities. Small and financially well-endowed groups that represent rather homogeneous interests are in an advantageous position. According to Olson (1965) this proves to be mainly true for industry interests rather than heterogeneous public ones as it is inherently more difficult to mobilize the latter. In the case of climate policy, relevant organizations lobby for the provision of a public good and a large number of individuals is concerned. Thus, it is even harder to overcome free-rider problems. Bernauer and Caduff (2004) draw on this argument and explicate that ENGOs are aware of this problem. They behave rationally in lobbying and campaigning for interests that are of public concern and generate high participation in terms of membership and financial support. Big ENGOs are important domestic actors within the compliance process. Members and supporters of ENGOs are mainly politically interested, middle-income constituents (Raustiala 1997, p. 731). For more detailed information on relevant literature on the impact of ENGOs in international environmental policy see Böhmelt et al. (2015).

Roberts et al. (2004), Fredriksson et al. (2007) and Stein (2008) give evidence for interest group and ENGO influence on national IEA ratification behaviour. Roberts et al. (2004) analyse 192 countries and the ratification of 22 treaties with the result that "the number of NGOs in a nation appears virtually synonymous with its likelihood to participate in environmental treaties" (p. 39). According to Fredriksson et al. (2007) the higher the number of ENGOs the higher the probability that the Kyoto Protocol was ratified. However, they can give only limited proof for industry influence lowering the ratification probability. Stein (2008) studies both, the ratifications of the United Nations Framework Convention on Climate Change (UNFCCC) and of the Kyoto Protocol. She was able to derive following results. The UNFCCC was ratified substantially faster in countries with higher pressure through environmental NGOs. For the ratification of the Kyoto Protocol, however, there was no systematic impact found. Results for indicators used to proxy the influence through industry interests are mainly not significant. There is only a negative significant relationship between the ratification of the Kyoto Protocol and the share of coal and petroleum exports of total GDP in percentage. More detailed results for ENGO activity and ratification of 268 IEAs between 1973 and 2006 by 153 countries is given by Bernauer et al. (2013). The authors consider the time needed to ratify the IEAs. The fewer time needed the stronger the commitment to cooperation. Overall, they find a positive relationship as well. But when distinguishing between democratic and non-democratic countries, the positive relationship is mainly given for non-democratic states and decreases with increasing level of democracy. "[M]ore ENGO leverage may, in the extreme, slow down ratification in such states to some degree" (Bernauer et al. 2013, p. 101f.). According to the authors, the following explanation is possible to explain this paradox. Democracies with a high number of influential and demanding ENGOs are confronted with high pressure to commit to stricter goals and implement them more rapidly. Consequently, these countries will refrain from ratifying the agreement.

Evidence concerning interest groups influencing national environmental regulation is given by Fredriksson et al. (2005) for the lead content in gasoline and by Binder and Neumayer (2005) for air pollution. Both confirm the positive connection of the number of ENGOs and more strict regulations as well as industry lobby groups and higher level of lead and air pollution. Hagen et al. (2020) study the influence of industry and environmentalist groups on emission abatement measures of countries by modelling a sequential game. They confirm the results of previous work. Furthermore, their results allow for conclusions on the stability of IAEs. However, these results simply show that certain interest groups influence domestic environmental regulations. It does not allow to draw conclusions on the fulfilment of IEA commitments. Only a small number of studies give empirical evidence on this. Dai (2007) analyses domestic ENGO activity and compliance with the Long-Range Transboundary Air Pollution Convention from 1985 and finds a positive link between the two. Bernhagen (2008) presents similar results. The author studies the influence of environmental as well as business interest groups on IEA compliance in general and with the UNFCCC in particular.



Figure 1: Relevant actors for compliance decision in a democracy

Figure 1 summarizes these relevant actors and how they are intertwined. Domestic constituents and their preferences for or against compliance are the focus of our model on how the compliance process is influenced. They express their preferences through casting their vote for a certain party and their environmental policy. As the incumbent party seeks reelection, it will choose the level of compliance a threshold of voters demands. Voters' preferences are shaped by their individual economic interests, personal and social values and public concern for the environment. Apart from directly expressing their preferences through votes, constituents mandate interest groups (as founder, member and supporter) to influence the policy-making process (lobbying). Furthermore, interest groups provide relevant information for (indecisive) voters to influence their preferences and votes (campaigning). Interest group activity facilitates the influence of vested interests as well and can lead to the implementation of policy measures that are not in the interest of the majority of voters. The success of interest groups depends on their strength and financial and organizational endowment. Hence, homogenous vested interests have an advantage over heterogeneous public ones. We arrive at following hypotheses:

- H1: The higher the public concern for climate change, the higher the level of compliance with IEAs.
- H2: Countries with a high share of industry interests (representing stakeholders of fossil fuel and energy intensive industries) show a lower level of compliance with IEAs.
- H3: Countries with strong and influential environmental interests show a higher level of compliance with IEAs.

These hypotheses are tested empirically. Research design and results of this analysis are presented in the remainder of the paper.

3 Empirical Research Design

Based on our hypotheses, we want to test following relationship:

$$COMPLIANCE = f\left(\begin{smallmatrix} CONCERN, INDUSTRY, ENGO \\ + & - & + \end{smallmatrix} \right), \tag{1}$$

where compliance is a function of public concern with climate change, strength of industry and environmental interest groups. To test this relationship, we apply a panel data analysis on compliance with the Kyoto Protocol. The Kyoto Protocol was established in 1997 and entered into force in 2005 with the goal to reduce global GHG emissions by five percent in comparison to 1990. The protocol differentiates between two groups of countries - the so-called Annex B and non-Annex B countries. Annex B countries include the 38 most important industrialised countries. These countries committed to emission limitation targets (see table 3, appendix page 28). For Annex B countries, compliance is reached if GHG emissions are at least limited according to the defined target. After the agreement entered into force, the first official emission reduction phase took place from 2008 until 2012. At the end of 2012, the Kyoto Protocol parties agreed on a second reduction phase (2013-2020) with a reduction target of 18 percent in comparison to the 1990 level. This so-called Doha-Amendment never entered into force and became irrelevant with the creation of the Paris Agreement in 2015 (UNFCCC 2019). Approx. 75 percent of all Annex B countries complied with their goals.⁶

The compliance behaviour of these countries during the first reduction phase is especially suited to test our hypotheses. Firstly, almost all of them can be defined as democracies and secondly, the existing definition of concrete, numerical targets allows for a clear assessment of compliance within a completed period of time.

3.1 Dependent variable

For our dependent variable⁷ we calculated our own indicator (*COMPLIANCE*) on the basis of information on GHG emissions and targets provided by the UNFCCC. We assume that a change in behaviour is only restricted to the official emission limitation phase and calculate a linear limitation path for the years 2008-2012. Equations (2)-(4) depict our calculation (t = year). Starting

⁶Shishlov et al. (2016) analyse overall compliance in more detail and explain it by four factors - hot air, financial and economic crisis, non-participation of the USA and national climate policies.

⁷Table 5, appendix 30, gives an overview on the used variables and their sources.

with the real GHG emissions of the end of 2007 $(R_{2007})^8$, we calculate a yearly limitation rate (*g*) (equation (2)) by subtracting it from the overall emission goal for 2012 (*G*₂₀₁₂) which has been defined within the Kyoto Protocol:

$$\frac{G_{2012} - R_{2007}}{5} = g \tag{2}$$

The compliance goal for each year ($G_t witht = 2008, ..., 2012$) is calculated as follows:

$$G_t + g = G_{t+1} \tag{3}$$

We get a limitation goal for each year (G_t), which we compare to real GHG emissions of the same year (R_t) by calculating the yearly percentage deviation (D_t). The yearly deviation from the goal is used as an indicator for compliance and can be positive or negative.

$$\frac{G_t - R_t}{R_t} * 100 = D_t \tag{4}$$

Values ≥ 0 indicate that the emission limitation goal is achieved (= 0) or overachieved (> 0). Values < 0 indicate non-compliance (the calculations for yeach country and year can be seen in table 4 on 29). This indicator is superior to a dummy variable for the following reasons. First, it allows for variation within the variable and thus, it is possible to calculate an OLS regression using fixed effects. Furthermore, it allows for an expansion of the dataset from cross-section to panel data. Considering the fact that there are only 40 Annex B countries, from which certain countries have to be dropped for several reasons, the number of observations would be too low to allow for a credible analysis. Second, this indicator expands the concept of compliance from just considering if a goal is achieved or not to how strongly certain countries miss their targets or how strongly they contribute to the provision of the global

⁸The first official emission lreduction phase started on January 1st 2008 and, therefore, the level of GHG emissions at the end of 2007 are the starting point for our calculations.

public good. As far as we are aware, this indicator has not been used before.

3.2 Independent variables

To measure the strength of non-compliance interests, we use employment in industry as percentage of total employment (*INDUSTRY*). The data is reported by the World Development Indicators (WDI) and includes employment for the sectors of mining and quarrying, manufacturing, construction and public utilities. These sectors are mainly affected by environmental regulations aiming at reducing GHG emissions. Furthermore, it proxies individual economic interests of voters employed within these sectors. The higher *INDUSTRY*, the higher the importance of these sectors and the higher the pressure emanating from them.

As there is no indicator directly measuring the strength of pro-compliance interests, we use the number of ENGOs in a country as reported by the Environment Encyclopedia and Directory. The indicator is only reported for the years 2005 and 2010 and therefore we keep it constant for the other years. Fredriksson et al. (2005) propose to use the total number of ENGOs instead of per capita data. It can be assumed that necessary regulations are "determined by a central government influenced by all existing lobby groups" (p. 355). An advantage of using the total number of ENGOs is the fact that it indirectly controls for country size. For robustness checks we use an alternative indicator measuring ENGO strength - Greenpeace supporters per capita (*GRENNPEACE*)⁹.

To account for public concern for climate change in a country (*CONCERN*), we draw on trend data on internet search activity using the search engine *Google*. This tool is increasingly used for predictions on health issues and economic activity such as car and real estate sales (Kahn and Kotchen 2010, Choi and Varian 2009). As already mentioned in section 2 Kahn and Kotchen (2010) analyse Google search activity to get insights on the relationship between unemployment and concern for the environment. The tool *Google trends* allows for the analysis of used search terms for specific countries and years.¹⁰ We

⁹See Stein (2008) for information on advantages and disadvantages of this indicator.

¹⁰The tool is publicly accessible through https://www.google.com/trends/. For further in-

analyse worldwide yearly data for the search term CO_2 as this is universal for all languages. The tool does not report the total number of searches for each country but the search volume relative to other countries. The indicator is scaled from 0 to 1, with 1 for the countries with the highest volume.¹¹. The value CONCERN turns 0 if the search volume is to low to allow for a proper analysis. We drop countries for which the tool reports values of 0 for all years as we cannot be sure of the reason for that. Either the interest for our search term is low indeed or the overall Google search activity is too low to be analysed. Of course this indicator has its weaknesses. First, the use of the Google search engine is not equally common in all Annex B countries. Second, the term CO_2 is not only used in the context of climate change and thus, there might be another reason for using it. However, it is the main GHG connected with global warming and commonly known worldwide to be. Furthermore, the data availability is superior to that of survey results like the ones reported by the World Value Survey. These kinds of surveys are only conducted every five years for a limited circle of countries.

We include a one year time lag (t - 1) for these three variables by one year. The Kyoto Protocol entered into force in 2005. Since then governments and interest groups know that policy measures to limit GHG emissions had to be implemented. Thus, policy-making process and lobbying started prior to the actual compliance.

Additionally, we include a set of control variables - the log of GDP per capita (*lnGDPPC*) and the change of log of total GDP ($\delta lnGDP$) to account for income effects. We expect a negative relationship for the income variables as with increasing production, GHG emissions increase.¹² Furthermore, we include a dummy variable for countries in transition (*TRANSITION*). The former socialist countries face relatively low costs for complying. They are expected to use the international emission trading system of the Kyoto Protocol tp trade emission rights and gain emission credit that is ascribed to

formation on how to use the tool see Choi and Varian (2009).

 $^{^{11}}$ E.g.in 2010, most searches for the term CO_2 were made in Denmark. The values for all other countries are given in relation to Denmark. In Japan, for example, the term was searched only half as much and thus Japan's value is 0.5

¹²As the sample of Annex B countries is relatively homogenous concerning development and income status in comparison to a global sample, we do not expect a Kuznet curve effect.

their emission inventory. We expect the dummy to have a positive effect on *COMPLIANCE*.

3.3 Econometric Approach

We apply a panel data analysis with information over time (t = 1, ..., T) and across countries (i = 1, ..., N). We formalize the general panel model as follows:

$$y_{it} = \beta_0 + \beta X_{it} + c_i + u_{it},\tag{5}$$

with y_{it} as the dependent variable, β_0 as intercept, β as coefficient and X_{it} as independent variables. The idiosyncratic error component is denoted by u_{it} . The group specific unobserved error component c_i allows us to take country specific heterogeneity into account. A possibility to address heterogeneity is the application of a fixed effects model. (Wooldridge 2002, pp. 247 ff.). To test our hypothesis, we apply the following model:

$$COMPLIANCE = \beta_0 + \beta_{H1}(CONCERN) + \beta_z Z_{it} + c_i + u_{it}, \qquad (6)$$

$$COMPLIANCE = \beta_0 + \beta_{H1}(CONCERN) - \beta_{H2}(INDUSTRY)$$
(7)

$$+\beta_{z}Z_{it} + c_{i} + u_{it},$$

$$COMPLIANCE = \beta_{0} + \beta_{H1}(CONCERN) + \beta_{H3}(ENGO) \qquad (8)$$

$$+\beta_{z}Z_{it} + c_{i} + u_{it}.$$

with Z_{it} summarizing our controls.

3.4 Results

We differentiate between two baseline models. For the first we use *lnGDP* and for the second the change of *lnGDPPC lnGDP*. We decide to examine both variables separately in order to avoid severe multicollinearity. Furthermore, we include the change of *lnPOP* and *CONCERN* into our baseline models

	(1)	(2)	(3)	(4)
	compliance	compliance	compliance	compliance
$\Delta lnGDP$	-0.117	-0.632	-0.333	-0.692
	(-0.30)	(-1.65)	(-0.89)	(-1.84)
$\Delta lnPOP$	6.900	12.92**	7.919*	12.16**
	(1.88)	(3.34)	(2.25)	(3.21)
CONCERN	0.397***	0.264*	0.306**	0.223*
	(3.85)	(2.49)	(3.00)	(2.13)
INDUSTRY		-0.0450***		-0.0354**
		(-4.03)		(-3.04)
ENGO			-0.00539***	-0.00403*
			(-3.48)	(-2.40)
_cons	-0.0349	1.159***	0.170^{*}	1.058***
	(-0.84)	(3.87)	(2.40)	(3.58)
N	147	136	147	136
N_g	29	29	29	29
_r2_o	0.147	0.123	0.0280	0.103

Table 1: Estimation results with $\Delta lnGDP$

t statistics in parentheses * $p < 0.05, ^{\ast\ast} p < 0.01, ^{\ast\ast\ast} p < 0.001$

Table 2:	Estimation	results	with <i>l</i>	nGDPPC

	(1)	(2)	(3)	(4)
	compliance	compliance	compliance	compliance
lnGDPPC	-0.356	-0.0108	-0.648	-0.330
	(-0.91)	(-0.03)	(-1.71)	(-0.80)
$\Delta lnPOP$	7.336*	12.76**	8.921*	11.79**
	(2.01)	(3.26)	(2.55)	(3.06)
CONCERN	0.393***	0.311**	0.298**	0.270**
	(3.86)	(3.02)	(2.99)	(2.64)
INDUSTRY		-0.0400***		-0.0266*
		(-3.51)		(-2.13)
ENGO			-0.00572***	-0.00430*
			(-3.70)	(-2.39)
cons	3.659	1.125	6.910	4.249
_	(0.90)	(0.28)	(1.75)	(1.02)
N	147	136	147	136
N_g	29	29	29	29
r2_0	0.289	0.129	0.302	0.000689

t statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001

and add INDUSTRY and ENGO step by step. We use OLS with Fixed Effects for both models. Table 1 and 2 report the results for the two estimations. *InGDP* and *InGDPPC* are both insignificant. The results for *CONCERN* and INDUSTRY are significant and as expected. They confirm our hypotheses that there is a positive relationship between concern for climate change and compliance and a negative one for the strength of industry interests. Surprisingly, the results for ENGO show a negative significant relationship with COMPLIANCE. Possible explanations are that first, a high number of ENGOS in a country does not allow for a deduction on their actual strength. There might be a high number of small but ineffective ENGOs in one country and only a limited number of highly influential ENGOs in another one. Second, the estimations do not allow any conclusions to be drawn about causalities. ENGOS may be found especially in countries, that have not met their targets, to influence policy-makers in the future. Third, the chosen indicator includes all kind of NGOs active in the context of the environment, nature or animal life, e.g. Zoos or local NGOs with a special non-climate focus. Their interest in reducing GHG emissions might not be as high as for organizations such as Greenpeace. Thus, an indicator focusing on relevant ENGOs would be superior but is not available as far as we are aware.

In a third model, we included a transition dummy accounting for countries in transition from socialist to market economies. As of the time-invariance of the dummy variable we use a Random-effects GLS regression to estimate the results which are depicted in table 6 and 7, appendix 31. The introduction of the dummy has no ramification for the results of *CONCERN*, *INDUSTRY* and *ENGO*. *InGDPPC*, however, becomes significant. To check for robustness, we ran additional estimations with alternative indicator for ENGO strength (*GREENPEACE*) and controlled for country sizes by using total GDP (see appendix table 8 and 9 on page 32f.). The results support our findings .

4 Conclusion

This paper gives insights into how voters form their preferences pro or contra compliance with IEAs and how public concern for climate change and interest groups influence the domestic compliance behaviour. We developed the hypotheses that compliance behaviour is positively influenced by a high concern for climate change and number of ENGOs. A strong prevalence of industry interests is connected with lower compliance.

To test these hypotheses, we applied a panel data analysis for the compliance behaviour of Annex B countries with the Kyoto Protocol during the first emission reduction phase from 2008-2012. We are able to find evidence to support two of our three hypotheses. First, countries with relatively high public concern for climate change show a higher level of compliance than others. This finding allows for the conclusion that the better the public is informed on causes and consequences of climate change, the higher the level of compliance with the Kyoto Protocol. Thus, a possible strategy to facilitate compliance with IAEs could be to increase transparency, provide necessary information and raise the awareness for climate change. At this point, the Fridays for Future movement currently plays a decisive role and will probably continue to do so in the future. At the end of September 2019 during their climate strike week, they were able to mobilize more than six million people in 6000 events across 185 countries (Taylor et al. 2019, de Moor et al. 2020). With such events, the movement generates political pressure for action. They were able to move the issue of climate change and its consequences to the centre of the social discussion and to change the discourse in a sustainable way. Their actions prompted reactions by world leaders, leading UN personal and media outlets all over the world (Marris 2019, p. 472). The influence of this movement on the public perception of climate change can be seen in first studies. Koos and Naumann (2019), for example, examine whether Fridays for Future is able to induce sustainable social and political changes in Germany. Their results suggest, first that the movement was able to raise public awareness for the consequences of climate change and second, that there is social support for the climate movement. 50 percent of respondents were willing to participate in future climate protests. This could already be seen during the big global climate strike. While the original Friday For Future strikes started as school strikes by students, in September 2019 other social groups also followed the call to strike. These include for example scientists, entrepreneurs, labour unions and democratic parties (Schiermeier et al. 2019, Unternehmensgrün e.V. 2019, e.g.). Furthermore, the public's perception of climate change has changed in the last 2 years. It is increasingly perceived as a threat to Germany and the respondents personally. Furthermore, the movement has an impact on private lives. More than half of the respondents have changed their personal lifestyle to counteract climate change (Koos and Naumann 2019). Other studies confirm a general change in the perception among the adult population for other countries as well (Marris 2019).

In contrast to these results, we were not able to find evidence for a positive relationship between the number of domestic ENGOs and compliance. However, we should not ascribe too much meaning to this finding, especially when considering the weaknesses of the chosen indicator and the lack of a superior one. ENGOS, especially influential international ENGOS, can be crucial in providing transparency and information on the climate change and its consequences.

At last, we were able to find evidence to support the hypothesis that high employment in industry is associated with a lower compliance level. Thus, it could be concluded that the industry itself as well as individual economic interests of voters play a crucial role in inhibiting compliance. A possible strategy could be to create incentives to connect economic activity and sustainability goals (*green economy*), e.g. through innovation policy. Sustainable solutions to manage the structural change in the energy sector can combine individual economic interests and preferences for climate policy.

References

- Aichele, R. and Felbermayr, G.: 2012, Kyoto and the carbon footprint of nations, *Journal of Environmental Economics and Management* **63**(3), 336–354.
- Al Doyaili-Wangler, S. and Wangler, L.: 2017, What Drives Compliance with International Environmental Agreements? A Political Economy Analysis of International and National Determinants, *in* M. Ö. Kayallca, S. Çağatay and H. Mİhcİ (eds), *Economics of Interntional Environmental Agreements: A Critical Approach*, Routledge, London, pp. 15–34. Pages: 15-34 Publication Title: Economics of International Environmental Agreements.

Bättig, M. B. and Bernauer, T.: 2009, National institutions and global public

goods: Are democracies more cooperative in climate change policy?, *International Organization* **63**(2), 281–308.

- Bechtel, M. M., Genovese, F. and Scheve, K.: 2014, Interests, Norms, and Mass Support for Global Climate Cooperation.
- Bernauer, T., Böhmelt, T. and Koubi, V.: 2013, Is There a Democracy–Civil Society Paradox in Global Environmental Governance?, *Global Environmental Politics* **13**(1), 88–107.
- Bernauer, T. and Caduff, L.: 2004, In Whose Interest? Pressure Group Politics, Economic Competition and Environmental Regulation, *Journal of Public Policy* **24**(1), 99–126.
- Bernhagen, P.: 2008, Business and International Environmental Agreements: Domestic Sources of Participation and Compliance by Advanced Industrialized Democracies, *Global Environmental Politics* **8**(1), 78–110.
- Binder, S. and Neumayer, E.: 2005, Environmental pressure group strength and air pollution: An empirical analysis, *Ecological Economics* **55**(4), 527–538.
- BMUB and UBA: 2017, Umweltbewusstsein in Deutschland 2016 -Ergebnisse einer repräsentativen Bevölkerungsumfrage, Available at https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/umweltbewusstsein_deutschland_2016_bf.pdf, Berlin, Dessau-Roßlau.
- Bogaerts, M., Cirhigiri, L., Robinson, I., Rodkin, M., Hajjar, R., Costa Junior, C. and Newton, P.: 2017, Climate Change Mitigation Through Intensified Pasture Management: Estimating Greenhouse Gas Emissions on Cattle Farms in the Brazilian Amazon, *Journal of Cleaner Production* 162, 1539–1550.
- Böhmelt, T.: 2019, International Treaty Ratification and Leader Turnover, *Foreign Policy Analysis* **15**(2), 187–204.
- Böhmelt, T., Bernauer, T. and Koubi, V.: 2015, The Marginal Impact of ENGOs in Different Types of Democratic Systems, *European Political Science Review* 7(01), 93–118.
- Brechin, S. R.: 2003, Comparative Public Opinion and Knowledge on Global Climatic Change and the Kyoto Protocol: The Us Versus the World?, *International Journal of Sociology and Social Policy* **23**(10), 106–134.
- Broz, J.: 2002, The Political Economy of Commitment to Gold Standard, *Paper for Annual Meeting of the American Political Sciences Association*.
- Busch, M. L. and Reinhardt, E.: 2002, Testing International Trade Law: Empirical Studies of GATT/WTO Dispute Settlement, *in* D. M. Kennedy and J. D. Southwick (eds), *The Political Economy of International Trade Law: Essays in Honor of Robert Hudec*, Cambridge Univ. Press, New York and Cambridge.

Choi, H. and Varian, H. R.: 2009, Predicting the Present with Google Trends.

- Dai, X.: 2005, Why comply? the domestic constituency mechanism, *International Organization* **59**(2), 363–398.
- Dai, X.: 2006, The conditional nature of democratic compliance, *Journal of Conflict Resolution* **50**(5), 690–713.
- Dai, X.: 2007, International Institutions and National Policies, Cambridge University Press, Cambridge.
- de Area Leão Pereira, E. J., de Santana Ribeiro, L. C., da Silva Freitas, L. F. and de Barros Pereira, H. B.: 2020, Brazilian Policy and Agribusiness Damage the Amazon Rainforest, *Land Use Policy* **92**, 104491.
- de Moor, J., Uba, K., Wahlström, M., Wennerhag, M. and De Vydt, M.: 2020, Protest for a Future II: Composition, Mobilization and Motives of the Participants in Fridays for Future Climate Protests on 20-27 September, 2019, in 19 Cities Around the World, Available at https://protestinstitut.eu/wp-content/uploads/2020/02/Protest-for-a-Future-II-2020-02-24.pdf [Access: 08.12.2020].
- den Elzen, M., Admiraal, A., Roelfsema, M., van Soest, H., Hof, A. F. and Forsell, N.: 2016, Contribution of the G20 Economies to the Global Impact of the Paris Agreement Climate Proposals, *Climatic Change* **137**(3), 655–665.
- Downs, A.: 1957, An economic theory of democracy, Harper, New York.
- Falkner, R.: 2016, The Paris Agreement and the New Logic of International Climate Politics, *International Affairs* **92**(5), 1107–1125.
- Fearon, J. D.: 1994, Domestic political audiences and the escalation of international disputes., *American Political Science Review* **88**(3), 577–592.
- Franzen, A. and Meyer, R.: 2010, Environmental Attitudes in Cross-National Perspective: A Multilevel Analysis of the ISSP 1993 and 2000, *European Sociological Review* **26**(2), 219–234.
- Fredriksson, P. G., Neumayer, E., Damania, R. and Gates, S.: 2005, Environmentalism, democracy, and pollution control, *Journal of Environmental Economics and Management* 49(2), 343–365.
- Fredriksson, P. G., Neumayer, E. and Ujhelyi, G.: 2007, Kyoto Protocol Cooperation: Does Government Corruption Facilitate Environmental Lobbying?, *Public Choice* **133**(1-2), 231–251.
- Gartzke, E. and Gleditsch, K. S.: 2004, Why democracies may actually be less reliable allies, *American Journal of Political Science* **48**(4), 775–795.
- Gaubatz, K. T.: 1996, Democratic states and commitment in international relations, *International Organization* **50**(1), 109–139.
- Gilligan, M. J. and Johns, L.: 2012, Formal Models of International Institutions, *Annual Review of Political Science* **15**(1), 7.1–7.23.
- Grossman, G. M. and Helpman, E.: 2001, *Special Interest Politics*, MIT Press, Cambridge, Mass.

- Hagen, A., Altamirano-Cabrera, J.-C. and Weikard, H.-P.: 2020, National Political Pressure Groups and the Stability of International Environmental Agreements, *International Environmental Agreements: Politics, Law and Economics*.
- Harmsen, M., Fricko, O., Hilaire, J., van Vuuren, D. P., Drouet, L., Durand-Lasserve, O., Fujimori, S., Keramidas, K., Klimont, Z., Luderer, G., Aleluia Reis, L., Riahi, K., Sano, F. and Smith, S. J.: 2019, Taking Some Heat Off the NDCs? The Limited Potential of Additional Short-Lived Climate Forcers' Mitigation, *Climatic Change*.
- Harvey, F.: 2015, Paris Climate Change Agreement: The World's Greatest Diplomatic Success, *The Guardian*, 14.12.2015. https://www.theguardian.com/environment/2015/dec/13/paris-climatedeal-cop-diplomacy-developing-united-nations [Access: 13.02.2020].
- Heinze, R. G. and Voelzkow, H.: 2013, Interessengruppen, *in* U. Andersen and W. Woyke (eds), *Handwörterbuch des politischen Systems der Bundesrepublik Deutschland*, 7 edn, Springer VS, Heidelberg.
- Horbach, J.: 1992, Neue politische Ökonomie und Umweltpolitik, Fischer, Frankfurt.
- Inglehart, R.: 1995, Public Support for Environmental Protection: Objective Problems and Subjective Values in 43 Societies, *PS: Political Science and Politics* **28**(1), 57–72.
- Kahn, M. E. and Kotchen, M. J.: 2010, Environmental Concern and Business Cycle: The Chilling Effect of Recession, *NBER Working Paper Series*.
- Koduvayur, V.: 2020, The United States Is Still Too Reliant on Oil (opinion). URL: https://edition.cnn.com/2020/03/16/perspectives/us-oil-saudi-arabiarussia/index.html
- Koos, S. and Naumann, E.: 2019, Vom Klimastreik zur Klimapolitik. Die gesellschaftliche Unterstützung der "Fridays for Future"-Bewegung und ihrer Ziele, Forschungsbericht, Universität Konstanz, Konstanz. URL: http://nbn-resolving.de/urn:nbn:de:bsz:352-2-1jdetkrk6b9yl4
- Kvaløy, B., Finseraas, H. and Listhaug, O.: 2012, The publics' concern for global warming: A cross-national study of 47 countries, *Journal of Peace Research* **49**(1), 11–22.
- Mansfield, E. D., Milner, H. V. and Rosendorff, B. P.: 2002, Why democracies cooperate more: Electoral control and international trade agreements, *International Organization* **56**(3), 477–513.
- Marris, E.: 2019, Why young climate activists have captured the world's attention, *Nature* **573**(7775), 471–472.
- McGillivray, F. and Smith, A.: 2000, Trust and cooperation through agentspecific punishments, *International Organization* 54(4), 809–824.

- McGillivray, F. and Smith, A.: 2005, The impact of leadership turnover and domestic institutions on international cooperation, *The Journal of Conflict Resolution* **49**(5), 639–660.
- Mueller, D. C.: 2003, Public Choice III, Cambridge Univ. Press, Cambridge.
- NASA: 2020, Climate Change Evidence: How Do We Know?, Available at https://climate.nasa.gov/evidence [Access: 08.12.2020].
- Olson, M.: 1965, *The Logic of Collective Action: Public Goods and the Theory of Groups*, Havard University Press, Cambridge, Mass.
- Ostrom, E.: 2000, Collective action and the evolution of social norms, *The Journal of Economic Perspectives* **14**(3), 137–158.
- Page, B. I. and Shapiro, R. Y.: 1983, Effects of Public Opinion on Policy, *The American Political Science Review* 77(1), 175–190.
- Powell, G. B.: 2000, *Elections as instruments of democracy: majoritarian and proportional visions*, Yale Univ. Press, New Haven, Conn. [u.a.].
- Raustiala, K.: 1997, States, NGOs, and international environmental institutions, *International Studies Quarterly* **41**(4), 719–740.
- Roberts, J. T., Parks, B. C. and Vásquez, A. A.: 2004, Who ratifies environmental treaties and why? institutionalism, structuralism and participation by 192 nations in 22 treaties, *Global Environmental Politics* **4**(3), 22–64.
- Rogelj, J., den Elzen, M., Höhne, N., Fransen, T., Fekete, H., Winkler, H., Schaeffer, R., Sha, F., Riahi, K. and Meinshausen, M.: 2016, Paris Agreement Climate Proposals Need a Boost to Keep Warming Well Below 2 °c, *Nature* 534(7609), 631–639.
- Rosen, A. M.: 2015, The Wrong Solution at the Right Time: The Failure of the Kyoto Protocol on Climate Change, *Politics & Policy* **43**(1), 30–58.
- Schiermeier, Q., Atkinson, K., Mega, E. R., Padma, T. V., Stoye, E., Tollefson, J. and Witze, A.: 2019, Scientists worldwide join strikes for climate change, *Nature* 573(7775), 472–473.
- Shishlov, I., Morel, R. and Bellassen, V.: 2016, Compliance of the Parties to the Kyoto Protocol in the First Commitment Period, *Climate Policy* **16**(6), 768–782.
- Simmons, B. A.: 1998, Compliance with international agreements, *Annual Review of Political Science* **1**(1), 75–93.
- Simmons, B. A.: 2000a, International law and state behavior: Commitment and compliance in international monetary affairs, *The American Political Science Review* **94**(4), 819–835.
- Simmons, B. A.: 2000b, The legalization of international monetary affairs, *International Organization* **54**(3), 573–602.

- Siverson, R. M. and Emmons, J.: 1991, Birds of a feather: Democratic political systems and alliance choices in the twentieth century, *Journal of Conflict Resolution* **35**(2), 285–306.
- Smith, A.: 1996, To intervene or not to intervene: A biased decision, *The Journal* of *Conflict Resolution* **40**(1), 16–40.
- Stein, J. v.: 2008, The international law and politics of climate change: Ratification of the united nations framework convention and the kyoto protocol, *The Journal of Conflict Resolution* **52**(2), 243–268.
- Taylor, M., Watts, J. and Bartlett, J.: 2019, Climate Crisis: 6 Million People Join Latest Wave of Global Protests, *The Guardian*, 27.09.2019.
 URL: https://www.theguardian.com/environment/2019/sep/27/climate-crisis-6million-people-join-latest-wave-of-worldwide-protests [Accessed: 03.12.2020]
- Tomz, M.: 2002, Democratic Default: Domestic Audiences and Compliance with International Agreements, *Paper delivered at the 2002 Annual Meeting of the American Political Science Association, Boston, August.*
- UNFCCC: 2019, What is the kyoto Protocol?, Available at: https://unfccc.int/kyoto_protocol, [Access: 26.10.2020].
- Unternehmensgrün e.V.: 2019, Statement of Entrepreneurs For Future: Action for Climate Protection. URL: https://entrepreneurs4future.de/stellungnahme/statement-en/
- von Stein, J.: 2013, The Engines of compliance, *in* J. L. Dunoff and M. A. Pollack (eds), *Interdisciplinary perspectives on international law and international relations: The state of the art*, Cambridge Univ. Press, Cambridge [u.a.].
- von Stein, J.: 2015, Making Promises, Keeping Promises: Democracy, Ratification and Compliance in Unternational Human Rights Law, *British Journal of Political Science*.
- von Zabern, L. and Tulloch, C. D.: 2020, Rebel with a Cause: The Framing of Climate Change and Intergenerational Justice in the German Press Treatment of the Fridays for Future Protests, *Media*, *Culture & Society* **00**(0), 1–25.
- Wangler, L., Altamirano-Cabrera, J.-C. and Weikard, H.-p.: 2013, The political economy of international environmental agreements: A survey, *International Environmental Agreements: Politics, Law and Economics* **13**(3), 387.

Warrick, J. and Mooney, C.: 2015, 196 Countries Approve Historic Climate Agreement, *Washington Post*, 12.12.2015. URL: https://www.washingtonpost.com/news/energyenvironment/wp/2015/12/12/proposed-historic-climate-pact-nears-final-vote/ [Access: 13.02.2020]

- Weiss, E. B. and Jacobson, H. K.: 2000, *Engaging Countries: Strengthening Compliance with International Environmental Accords*, MIT Press.
- Wooldridge, J. M.: 2002, *Econometric Analysis of Cross Section and Panel Data*, MIT Press.

Young, O.: 1979, *Compliance and Public Authority: A Theory with International Applications*, JonHopkins Univ. Press, Baltimore.

Appendix

Country	Target ¹³	Actual change in %	Compliance
Australia	8	31	ŇO
Austria	-13	2.5	NO
Belarus	-8	-35.8	YES
Belgium	-7.5	-18.5	YES
Bulgaria	-8	-18.5	YES
Canada	-6	18.2	NO
Croatia	-5	-17.3	YES
Czech Republic	-8	-33	YES
Denmark	-21	-24.1	YES
Estonia	-8	-52.8	YES
Finland	0	-13.3	YES
France	0	-11.4	YES
Germany	-21	-24.8	YES
Greece	25	5.8	YES
Hungary	-6	-45.8	YES
Iceland	10	26.3	NO
Ireland	13	5.9	YES
Italy	-6.5	-11.4	YES
Japan	-6	8.8	NO
Latvia	-8	-58.1	YES
Liechtenstein	-8	-1.2	NO
Lithuania	-8	-55.6	YES
Luxembourg	-28	-8.2	NO
Monaco	-8	-14.7	YES
Netherlands	-6	-9.5	YES
New Zealand	0	25.4	NO
Norway	1	4.6	NO
Poland	-6	-29.9	YES
Portugal	27	13.1	YES
Romania	-8	-58.3	YES
Russian Federation	0	-31.8	YES
Slovak Republic	-8	-41.7	YES
Slovenia	-8	-6.4	NO
Spain	15	20.1	NO
Sweden	4	-20.8	YES
Switzerland	-8	-2.8	NO
Ukraine	0	-57.3	YES
United Kingdom	-12.5	-25.2	YES
United States	-7	4.3	NO

Table 3: Annex I countries, their targets and compliance behaviour

Table 4: Annex I countries, the deviation from the linear compliance path from 2008-2012 and compliance

CountryDeviationComplianceDeviation<	The Deviation Complexity -6.50 Ni -3.15 Ni 22.54 Ye 7.96 Ye		TO	24	LL	- N2	17
Australia-3.73NoAustria-3.73NoBelgium-5.12NoBelgium-1.83NoBulgaria-1.83NoBulgaria-1.83NoBulgaria-1.83NoCanada-1.183NoCanada-1.183NoCzech Republic9.58YesCzech Republic9.58YesDenmark-0.08NoEstonia28.46YesFinland9.00YesFrance1.43YesGermany-0.09NoGermany-0.09NoFrance1.43YesHungary1.95YesGermany-1.63NoIceland-1.63NoItaly-1.63NoItaly-1.63NoItaly-1.63NoItaly-1.63NoJapan-1.63NoItaly-1.63NoItaly-1.63NoJapan-1.63NoNew Zealand-1.63NoNew Zealand0.55YesPoland2.18YesRussian Federation1.077New Zealand-1.72Slovenia2.152YesSlovenia2.152YesSlovenia-5.71NoStwitzerland-7.97Switzerland-7.97Switzerland-7.97Switzerland-7.97	-6.50 Nu -3.15 Nu 22.54 Ye 7.96 Vo	iance Deviation (Compliance	Deviation	Compliance	Deviation	Compliance
Austria-5.12NoBelarus-5.12NoBelarus7.60YesBelgium-1.83NoBulgaria18.80YesCanada18.80YesCanada1.39YesCroatia1.39YesCroatia1.39YesCzech Republic9.58YesDenmark-0.08NoEstonia1.39YesEstonia1.43YesFrance1.43YesHungary1.95YesItaly-0.09NoCreece1.43YesItaly-0.19NoItaly-0.19NoItaly-1.63NoItaly-1.63NoNoItaly-0.19NoNANANANANANANoNANoNANo0.19Norway0.55NoYesPoland-5.22NoNoNorway0.55Poland-5.71NoSlovenia2.152YesSlovenia-5.71Slovenia-5.71Switzerland-5.71Switzerland-5.71Switzerland-5.71Switzerland-5.71Switzerland-5.71Switzerland-5.71Switzerland-5.71Switzerland-5.71Switzerland-5.71 <th>-3.15 No. 22.54 Ye 7.96 Ve</th> <th>9.88</th> <th>No</th> <th>-13.10</th> <th>No</th> <th>-16.69</th> <th>No</th>	-3.15 No. 22.54 Ye 7.96 Ve	9.88	No	-13.10	No	-16.69	No
Belarus7.60Yes2Belgium-1.83NioNioSelgium2.183NioBulgaria18.80Yes-1.83NioSelfSe	22.54 Ye 7 96 Ve	-9.16	No	-19.82	No	-23.65	No
Belgium-1.83NoBulgariaBulgaria1.39YesCanada-1.80NoYesCroatia1.39YesCzech Republic9.58YesDenmark9.00YesEstonia1.39YesEstonia1.39YesEstonia1.39YesEstonia1.39YesPinland9.00YesFrance1.43YesFrance1.43YesGermany1.95YesGreece1.43YesItaly-0.09NoItaly-1.63NoItaly-1.63NoItaly-1.63NoItaly-1.63NoItaly-1.63NoNew Zealand0.19NoNew Zealand0.55YesPoland23.66YesNorway0.55YesPoland2.18YesRussian Federation1.77Slovak Republic7.96Slovenia1.77Sheelen-5.71Switzerland-5.71Switzerland-5.73Switzerland-5.73Switzerland-5.73Switzerland-5.73Switzerland-5.73Switzerland-5.73Switzerland-5.73Switzerland-5.73Switzerland-5.73Switzerland-5.73Switzerland-5.73Sovenia <td< td=""><td>7 96 Ye</td><td>s 34.13</td><td>Yes</td><td>43.16</td><td>Yes</td><td>54.78</td><td>Yes</td></td<>	7 96 Ye	s 34.13	Yes	43.16	Yes	54.78	Yes
BulgariaBulgaria18.80Yes5Canada-4.18No-4.18NoCroatia1.39Yes-4.18NoCzech Republic9.58Yes-0.08NoDenmark-0.08No-0.08NoEstonia-1.39Yes-0.08NoFrance1.43Yes-0.09NoFrance1.43Yes-0.09NoFrance1.43Yes-0.09NoGermany-0.09NoYes1.95Greece1.43Yes-12.21NoItaly-12.21No-16.3NoItaly-1.63No-16.3NoItaly-1.63NoNo-16.3Italy-1.63NoNo-16.3Italy-1.63NoNo-16.3Italy-1.63NoNo-16.3Italy-1.63NoNoNew Zealand-0.19NoNew Zealand-0.19NoNew Zealand-0.19NoNew Zealand-0.19NoNew Zealand-0.19NoNew Zealand-1.52YesPolandNoNoNorway2.56YesPolandNoNoNorway2.18YesSlovenia1.0.77YesSlovenia1.72YesSlovenia1.72YesSwitzerland-5.71 <td></td> <td>s 7.70</td> <td>Yes</td> <td>1.34</td> <td>Yes</td> <td>13.32</td> <td>Yes</td>		s 7.70	Yes	1.34	Yes	13.32	Yes
Canada4.18NoCroatia1.39YesCroatia1.39YesCzech Republic9.58YesDenmark-0.08NoEstonia28.46YesFinland9.00YesFrance1.43YesGermany-0.09NoFrance1.43YesGermany-0.09NoFrance1.43YesGermany-0.09NoGreece1.43YesHungary15.07YesItaly-1.63NoItaly-1.63NoJapan1.1.63NoItaly-1.63NoJapan1.1.63NoItaly-1.63NoJapan1.1.63NoJapan1.1.63NoJapan1.1.63NoJapan1.1.63NoJapan1.1.63NoJapan23.66YesLutvina31.84YesVesNoNoNetherlands-1.2.21NoNew Zealand-5.52NoNorway0.55YesPortugal21.52YesPortugal21.52YesSlovenia10.77YesSlovenia1.1.72YesStorenia1.1.72YesStorenia2.18YesStorenia2.18YesStorenia1.177YesStorenia2.18 <td>56.49 Ye</td> <td>s 75.41</td> <td>Yes</td> <td>69.98</td> <td>Yes</td> <td>101.66</td> <td>Yes</td>	56.49 Ye	s 75.41	Yes	69.98	Yes	101.66	Yes
Croatia1.39YesCzech Republic9.58YesDenmark-0.08NoEstonia9.00YesFinland9.00YesFinland9.00YesFrance0.09NoGermany1.43YesGermany-0.09NoFrance1.43YesGermany-0.09NoGreece1.43YesHungary-1.63NoIceland-1.63NoItaly-1.63NoJapan-1.63NoLatvia31.84YesLatvia31.84YesLatvia31.84YesLatvia31.84YesLithuania-1.2.21NoNoNANANoNANANo0.19NoNew Zealand-5.52NoNorway0.55YesPortugal21.52YesRussian Federation10.77YesSlovenia21.52YesSlovenia21.52YesStorenia-5.71NoStorenia-5.71NoStorenia-5.71YesStorenia-5.71NoStorenia-5.71NoStorenia-5.71NoStorenia-5.71YesStorenia-5.73YesStorenia-5.73YesStorenia-5.73YesStorenia	-5.38 N	-13.64	No	-20.76	No	-27.38	No
Czech Republic9.58YesYesDenmark-0.08Finland-0.08NoEstoniaEstonia28.46YesNoFrance-0.09YesNoYesFrance1.43Yes-0.09NoGermany-0.09NoYes1Germany-1.63NoYes1Greece1.43Yes-1.63NoHungary1.5.07YesYes1Ireland-1.63NoNo-1.63Italy15.07YesYes3.18Japan-1.63NoNo-1.63Latvia3.18YesNo-1.63Latvia3.18YesNoNoLithuania23.66YesYesLuxembourgNANANANonacoNANANoNew Zealand0.55YesYesNorway0.55YesYesPoland2.18YesYesSlovenia1.77YesYesSlovenia2.152YesYesSlovenia1.797YesYesSwitzerland7.97YesYesLutonia1.797YesYesSwitzerland7.97YesYesLutonia1.777YesYesSwitzerland7.97YesYesLutonia2.153NoYesSwitzerland7.97YesYes<	6.32 Ye	s 6.10	Yes	5.33	Yes	11.56	Yes
Denmark-0.08NoEstoniaEstonia-0.08YesFinland9.00YesYesFrance1.43Yes1.43Germany-0.09NoYesGreece1.95YesYesHungary1.95Yes1.95Greece1.2.21NoYesItaly-1.63NoYosItaly-1.63NoYosJapan-1.63NoNoLutvia3.18YesYesLatvia3.18YesYesLithuania23.66YesYesLithuania23.66YesYesNorway0.55YesYesNorway0.55YesYesPoland0.55YesYesRussian Federation1.72YesYesSlovenia1.72YesYesSlovenia1.72YesYesSlovenia1.72YesYesSlovenia1.73YesYesSlovenia1.73YesYesSwitzerland2.153YesYesLutonia1.797YesYesSwitzerland2.153NoYesLutonia1.797YesYesSwitzerland2.153YesYesLutonia1.777YesYesSwitzerland2.153YesYesLutonia2.153YesYesSouria1.177	22.19 Ye	s 25.67	Yes	33.32	Yes	43.41	Yes
Estonia 28.46 Yes Estonia Finland 9.00 Yes 1.43 Yes 0.09 Yes 1.43 Yes 0.09 Yes 1.43 Yes 1.43 Yes 1.43 Yes 1.43 Yes 1.5.07 Yes 1.5.07 Yes 1.5.07 Yes 3.1.63 No 1.1.63 No No No No No No No No No No No No No	-0.78 No	-6.84	No	-4.62	No	-2.03	No
Finland9.00Yes1.43France1.43Yes0.09NoGermany-0.09NoGreece1.95YesGreece1.95Yes1.05Yes0.09Hungary1.15.07YesNo1.63NoIreland-1.63No-1.63No0.01Iraly-1.63NoNo-1.63NoJapan-1.63NoNo-1.63NoLatvia3.18YesNo-1.63NoLithuania3.18Yes-0.51NoLithuania23.66YesYesLuxembourgNANANANoway0.55YesNoNorway0.55YesYesPoland0.55YesYesRussian Federation10.77YesYesSlovenia1.72YesYesSlovenia1.72YesYesSwitzerland-4.53NoYesLutrovio0.55YesYesSoveden-4.53NoYesLutrovio2.152YesYesSwitzerland-4.53NoYesLutrovio-4.53NoYesSwitzerland-4.53NoYesLutrovio-4.53NoYesLutrovio-4.53NoYesLutrovio-4.53NoYesLutrovio-4.53NoYesLu	80.20 Ye	s 67.07	Yes	82.08	Yes	115.54	Yes
France1.43YesGermany0.09NoGreece1.95YesHungary1.95YesIceland-1.63NoIreland-1.63NoIreland-1.63NoItaly-1.63NoJapan-1.63NoJapan-1.63NoJapan-1.63NoJapan-1.63NoJapan-1.63NoJapan-1.63NoJapan-1.63NoJapan-0.51NoJapan23.66YesLutenbourg-4.90NoMonacoNANANew Zealand-0.19NoNorway0.55YesPoland2.18YesRomania1.72YesSlovak Republic7.96YesSlovenia1.77YesSlovenia1.77YesSwitzerland-4.53NoLutonia-4.53No	12.79 Ye	s -2.62	No	5.37	Yes	12.29	Yes
Germany Greece-0.09 1.95No YesHungary Iceland1.95 1.63YesIreland Ireland-1.63 1.63No 1.63Iraly Japan-1.63 1.63No 1.63Italy Japan-1.63 3.18No YesLatvia Japan-1.63 3.18No YesLithuania Luxembourg-1.63 3.18No YesLithuania Luxembourg-1.63 	6.98 Ye	s 6.27	Yes	12.80	Yes	13.64	Yes
Greece1.95YesHungary15.07YesIceland-1.63NoIreland-1.63NoItaly-1.63NoJapan-1.63NoJapan-1.63NoJapan-1.63NoJapan-1.63NoJapan3.18YesLuctentensteinNANANANANANew Zealand-0.19Norway0.55Norway7.86YesPolandNorway2.18Poland2.18Slovak Republic7.96Slovenia1.77Switzerland-4.53Nu1.77Switzerland-4.53No1.79Switzerland-4.53No1.79Subash-4.53Sovacen-4.53Sovacen-5.71Sovacen-4.53Subash-4.53	7.59 Ye	s 4.06	Yes	6.35	Yes	5.49	Yes
Hungary 15.07 Yes 15.07 Iceland	6.72 Ye	s 11.63	Yes	13.94	Yes	17.01	Yes
Iceland -12.21 No Ireland -163 No Italy -0.51 No Japan -0.51 No Latvia 3.18 Yes 6 Lithuania 3.184 Yes 6 Lithuania 3.184 Yes 6 Luxembourg -4.90 No Monaco NA NA NA Netherlands -4.90 No Netherlands -4.90 No Norway 7.86 Yes 6 Ronania 2.18 Yes 6 Romania 2.1.8 Yes 3 Russian Federation 10.77 Yes 7 Slovenia -5.71 No Spain 7.97 Yes 10 Sweden -4.53 No No Kes 1.72 Yes 3 Slovenia -4.53 No No Spain -4.53 No No Spain 1.72 Yes 10 Sweden -4.53 No No No No No No No No No No No No No N	38.43 Ye	s 49.40	Yes	65.66	Yes	89.94	Yes
Ireland -1.63 No Italy -0.51 No Japan -1.63 No Latvia 3.18 Yes NA Litechtenstein NA Yes NA Litechtenstein NA NA NA Lithuania 23.66 Yes 6 Norway -4.90 No Netherlands -0.19 No Norway 0.55 Yes 8 Poland -6.52 No Norway 7.86 Yes 3 Russian Federation 10.77 Yes 7 Slovenia 21.52 Yes 8 Russian Federation 10.77 Yes 8 Slovenia -4.53 No Spain 7.97 Yes 10 Sweden -4.53 No No Sweden -4.53 No No Sweden -4.53 No No Sweden -4.53 No Luterion 10.77 Yes 8 Spain -4.53 No Luterion 10.77 Yes 8 Spain -4.53 No Luterion 10.77 Yes 8 Spain -4.53 No	-11.59 No	-13.00	No	-13.11	No	-17.73	No
Italy-0.51NoJapanJapan-0.51NoJapanLatvia1.84YesLatvia3.1.84YesLitchtensteinNANALitthuania3.1.84YesLuxembourgNANANetherlands-4.90NoMonacoNANANew Zealand-6.52NoNorway0.19NoNorway0.55YesPoland-6.52NoNorway0.55YesPoland2.18YesRomania21.52YesSlovenia10.77YesSlovenia1.72YesSweden-4.53NoTherino20.80No	4.99 Ye	s 3.28	Yes	8.10	Yes	4.11	Yes
Japan 3.18 Yes Latvia 3.18 Latvia 3.18 Letvia 1.1echtenstein NA Lischtenstein NA NA NA NA Lithuania 2.3.66 Yes No No No NA NA NA NA NA NA NA NA NA NA NA NA NA	6.16 Ye	s 0.69	Yes	-0.28	No	1.66	Yes
Latvia31.84Yes6LiechtensteinNANANALithuania23.66Yes7Luxembourg-4.90NoNoMonacoNANANANetherlands-0.19NoNew Zealand-6.52NoNorway0.55YesPoland-6.52NoNorway0.55YesPoland2.18YesPortugal2.13YesRussian Federation10.77YesSlovenia-5.71NoSpain-4.53NoSwitzerland-4.53NoTurneino20.80No	5.99 Ye	s -1.73	No	-8.87	No	-14.60	No
Liechtenstein NA NA NA Lithuania 23.66 Yes Ves Luxembourg -4.90 No Monaco NA NA NA NA NA NA Netherlands -4.90 No Netherlands -0.19 No New Zealand -6.52 No Norway 0.55 Yes Yes Poland 7.86 Yes Yes 66 Romania 2.18 Yes 93 Russian Federation 10.77 Yes 23 Slovenia -5.71 No Slovenia -4.53 No Spain -4.53 No Ultraino 20.80 Ves 8	67.50 Ye	s 76.76	Yes	117.31	Yes	147.99	Yes
Lithuania 23.66 Yes Luxembourg -4.90 No Monaco NA NA NA Netherlands -4.90 No New Zealand -6.52 No Norway 0.55 Yes No Poland 7.86 Yes 6 Romania 21.52 Yes 6 Russian Federation 10.77 Yes 3 Slovak Republic 7.96 Yes 2 Slovenia -5.71 No Spain 1.72 Yes 1 Sweden -4.53 No 1.172 Yes 1 Sweden -4.53 No	NA N/	A NA	NA	NA	NA	NA	NA
Luxembourg -4.90 No Monaco NA NA NA Netherlands -0.19 No New Zealand -6.52 No Norway 0.55 Yes 86 Portugal 2.18 Yes 3 Russian Federation 10.77 Yes 3 Slovak Republic 7.96 Yes 2 Slovenia -5.71 No Spain 1.72 Yes 1 Sweden -4.53 No 1.172 Yes 1 Sweden -4.53 No	73.78 Ye	s 90.26	Yes	106.89	Yes	129.06	Yes
MonacoNANANetherlands-0.19NoNew Zealand-6.52NoNorway-6.52NoNorway0.55YesPoland0.55YesPortugal2.18YesPortugal2.13YesRomania2.152YesRussian Federation10.77YesSlovak Republic7.96YesSlovenia-5.71NoSpain1.72YesSweden-4.53NoTurneino20.80VacTurneino20.80Vac	-7.36 No	-17.90	No	-23.39	No	-28.03	No
Netherlands -0.19 No New Zealand -6.52 No Norway -6.52 No Poland -6.52 Yes -6.52 Yes Portugal 2.18 Yes -2 Romania 21.52 Yes -3 Russian Federation 10.77 Yes -3 Slovak Republic 7.96 Yes -3 Slovenia -5.71 No Spain 1.72 Yes -2 Sweden -4.53 No Tutraind -4.53 No	NA N/	A NA	NA	NA	NA	NA	NA
New Zealand-6.52NoNorway0.55YesPoland0.55YesPortugal7.86YesPortugal2.18YesRomania2.1.52YesRussian Federation10.77YesSlovak Republic7.96YesSlovenia1.72YesSpain1.72YesSweden7.97YesSwitzerland-4.53NoTurneino20.80Vac	1.96 Ye	s -4.24	No	2.09	Yes	3.24	Yes
Norway0.55Yes3Poland7.86Yes2Portugal7.86Yes2Romania2.1.52Yes6Russian Federation10.77Yes3Slovak Republic7.96Yes3Slovenia1.72Yes2Spain1.72Yes2Sweden7.97Yes1Luraind-4.53No20.80Turraind20.80Vac8	-8.17 No	-13.68	No	-19.69	No	-26.29	No
Poland7.86Yes2Portugal2.18Yes6Romania2.1.52Yes6Russian Federation10.77Yes3Slovak Republic7.96Yes3Slovenia-5.71No2Spain1.72Yes1Sweden7.97Yes1Switzerland-4.53No1Turneino20.80Ves8	3.15 Ye	s -4.04	No	-4.56	No	-5.98	No
Portugal2.18Yes8Romania2.1.52Yes6Russian Federation21.52Yes6Slovak Republic7.96Yes3Slovenia-5.71NoNoSpain1.72Yes1Sweden7.97Yes1Switzerland-4.53No1Turneino20.80Voc8	20.75 Ye	s 22.28	Yes	30.23	Yes	39.89	Yes
Romania21.52Yes6Russian Federation10.77Yes3Slovak Republic7.96Yes2Slovenia-5.71No2Spain1.72Yes1Sweden7.97Yes1Switzerland-4.53No2Turneino20.80Ves8	5.49 Ye	s 10.69	Yes	11.68	Yes	11.47	Yes
Russian Federation10.77Yes3Slovak Republic7.96Yes2Slovenia-5.71No2Spain1.72Yes1Sweden7.97Yes1Switzerland-4.53No20.80Turneino20.80Ves8	64.30 Ye	s 93.58	Yes	106.81	Yes	134.44	Yes
Slovak Republic7.96Yes2Slovenia-5.71No	30.30 Ye	s 37.93	Yes	46.74	Yes	58.60	Yes
Slovenia-5.71NoSpain1.72YesSweden7.97YesSwitzerland-4.53NoTurneino20.80Vac	28.17 Ye	s 35.87	Yes	47.75	Yes	64.88	Yes
Spain1.72Yes1Sweden7.97Yes1Switzerland-4.53No-Turneino20.80Vac8	1.37 Ye	s -1.54	No	-4.50	No	-4.49	No
Sweden 7.97 Yes 1 Switzerland -4.53 No -	5.27 Ye	s 1.36	Yes	-5.98	No	-12.41	No
Switzerland -4.53 No - Illusing 30.80 Vec 8	19.42 Ye	s 12.36	Yes	24.52	Yes	35.74	Yes
Illusina 30.80 Vac 8	-3.76 No	-8.35	No	-2.44	No	-6.81	No
	85.22 Ye	s 109.15	Yes	127.67	Yes	162.65	Yes
United Kingdom 0.49 Yes 1	10.77 Ye	s 8.91	Yes	18.47	Yes	16.15	Yes
United States -3.34 No -	-2.42 No	o -10.87	No	-14.58	No	-17.30	No

Table 5: Variable description

Variable	Definition	Source
COMPLIANCE	Yearly percentage deviation from assumed linear emissions limitation path for the years 2008-2012	UNFCCC and own calculation
lnGDP	In of GDP, 2008-2012	WDI
ΔlnGDPPC	Change of ln of per capita GDP (PPP, 2010 constant international US Dollar), 2008-2012	WDI
$\Delta lnPOP$	Population, years 2008-2012	WDI
INDUSTRY	Employment in industry as percentage of total employment, 2007-2012	WDI
CONCERN	Trend in search for the term CO_2 , 2007-2012	Google Trends
ENGO	Number of environmental NGOs, 2005 and 2010	The Environment Encyclopedia and Directory
TRANSITION	Dummy variable, value=1 for country in transi- tion, value=0 otherwise	UNFCCC

	(1)	(2)	(3)	(4)
	compliance	compliance	compliance	compliance
$\Delta lnGDP$	-0.310	-0.640	-0.336	-0.653
	(-0.80)	(-1.69)	(-0.89)	(-1.75)
$\Delta lnPOP$	2.499	4.679	3.634	5.669
	(0.74)	(1.42)	(1.09)	(1.73)
CONCERN	0.276**	0.238**	0.266**	0.226*
	(2.99)	(2.68)	(2.89)	(2.54)
TRANSITION	0.500***	0.690***	0.503***	0.694***
	(5.54)	(6.64)	(5.40)	(6.58)
INDUSTRY		-0.0258***		-0.0259***
		(-3.68)		(-3.67)
ENGO			-0.00202*	-0.00166
			(-2.15)	(-1.88)
_cons	-0.132*	0.480**	-0.0667	0.539**
	(-2.03)	(2.76)	(-0.90)	(3.04)
N	147	136	147	136
N_g	29	29	29	29
r2_o	0.336	0.354	0.312	0.338

Table 6: Random-effects GLS regression with transition dummy ($\Delta lnGDP$)

t statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001

	(1)	(2)	(3)	(4)
	compliance	compliance	compliance	compliance
lnGDPPC	-0.639***	-0.559***	-0.638***	-0.555***
	(-5.53)	(-4.84)	(-5.31)	(-4.71)
$\Delta lnPOP$	5.858	6.244*	6.626*	6.993*
	(1.82)	(1.99)	(2.06)	(2.22)
CONCERN	0.352***	0.338***	0.344***	0.329***
	(4.11)	(4.01)	(4.02)	(3.90)
TRANSITION	0.120	0.264*	0.122	0.274^{*}
	(1.26)	(2.29)	(1.22)	(2.32)
INDUSTRY		-0.0148*		-0.0154*
		(-2.42)		(-2.48)
ENGO			-0.00145	-0.00124
			(-1.89)	(-1.68)
_cons	6.579***	6.095***	6.618***	6.110***
	(5.43)	(5.15)	(5.25)	(5.05)
N	147	136	147	136
N_g	29	29	29	29
r2_0	0.580	0.558	0.567	0.549

Table 7: Random-effects GLS regression with transition dummy (lnGDPPC)

t statistics in parentheses * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Table 8: Estima	ation results wit	h alternative in	ndicator for	ENGOs
-----------------	-------------------	------------------	--------------	--------------

	(1)	(2)	(3)	(4)
	compliance	compliance	compliance	compliance
D.ln_gdp	-0.679	-0.632	-0.679	-0.679
	(-1.95)	(-1.65)	(-1.95)	(-1.95)
51				
D.In_pop	9.829**	12.92**	9.829**	9.829**
	(3.12)	(3.34)	(3.12)	(3.12)
L.concern	0 286**	0 264*	0 286**	0 286**
Liconcern	(3.29)	(2.49)	(3.29)	(3.29)
	(0.12))	(=:=>)	(0.22)	(0.2))
L.greenpeacepop	-5.371		-5.371	-5.371
	(-0.75)		(-0.75)	(-0.75)
Lindustry	-0.0321**	-0.0450***	-0.0321**	-0.0321**
Lintadotry	(-3.36)	(-4.03)	(-3.36)	(-3.36)
	(0.00)	(1.00)	(0.00)	(0.00)
_cons	0.833**	1.159***	0.833**	0.833**
	(3.33)	(3.87)	(3.33)	(3.33)
Ν	128	136	128	128
N_g	28	29	28	28
r2_0	0.170	0.123	0.170	0.170

t statistics in parentheses * $p < 0.05, ^{\ast\ast} p < 0.01, ^{\ast\ast\ast} p < 0.001$

$\begin{array}{c c c c c c c c } & (2) & (3) & (4) \\ compliance & compliance & compliance & compliance \\ compliance & compliance & compliance \\ compliance & compliance & compliance \\ lnGDP & -0.604 & -0.351 & -0.957^{**} & -0.652 \\ (-1.64) & (-0.93) & (-2.68) & (-1.70) \\ \hline \Delta lnPOP & 7.571^* & 12.83^{**} & 9.327^{**} & 11.97^{**} \\ (2.09) & (3.29) & (2.71) & (3.15) \\ \hline CONCERN & 0.394^{***} & 0.308^{**} & 0.295^{**} & 0.263^* \\ (3.92) & (3.00) & (3.03) & (2.60) \\ \hline INDUSTRY & -0.0382^{***} \\ (-3.46) & & -0.0248^* \\ (-2.09) \\ \hline ENGO & & & & & & & & & \\ \hline LNGO & & & & & & & & & & \\ \hline LNGO & & & & & & & & & & & & & \\ \hline LNGO & & & & & & & & & & & & & & \\ \hline LNGO & & & & & & & & & & & & & & & & \\ \hline LNGO & & & & & & & & & & & & & & & & & & &$					
$\begin{array}{ c c c c c } \hline compliance &$		(1)	(2)	(3)	(4)
$\begin{array}{c cccccc} lnGDP & -0.604 & -0.351 & -0.957^{**} & -0.652 \\ (-1.64) & (-0.93) & (-2.68) & (-1.70) \\ \hline \Delta lnPOP & 7.571^{*} & 12.83^{**} & 9.327^{**} & 11.97^{**} \\ (2.09) & (3.29) & (2.71) & (3.15) \\ \hline CONCERN & 0.394^{***} & 0.308^{**} & 0.295^{**} & 0.263^{*} \\ (3.92) & (3.00) & (3.03) & (2.60) \\ \hline INDUSTRY & -0.0382^{***} & -0.0248^{*} \\ (-3.46) & (-2.09) \\ \hline ENGO & & -0.00617^{***} & -0.00471^{**} \\ (-4.03) & (-2.67) \\ \hline _cons & 16.24 & 10.41 & 26.01^{**} & 18.34 \\ (1.64) & (1.03) & (2.70) & (1.79) \\ \hline N & 147 & 136 & 147 & 136 \\ \hline N_g & 29 & 29 & 29 & 29 \\ r2 & 0 & 0.000198 & 0.0255 & 0.00237 & 0.000128 \\ \hline \end{array}$		compliance	compliance	compliance	compliance
$ \begin{array}{c cccc} (-1.64) & (-0.93) & (-2.68) & (-1.70) \\ \hline \Delta lnPOP & 7.571^* & 12.83^{**} & 9.327^{**} & 11.97^{**} \\ (2.09) & (3.29) & (2.71) & (3.15) \\ \hline CONCERN & 0.394^{***} & 0.308^{**} & 0.295^{**} & 0.263^{*} \\ (3.92) & (3.00) & (3.03) & (2.60) \\ \hline INDUSTRY & -0.0382^{***} & -0.0248^{*} \\ (-3.46) & & -0.0248^{*} \\ (-2.09) \\ \hline ENGO & & -0.00617^{***} & -0.00471^{**} \\ (-4.03) & (-2.67) \\ \hline _cons & 16.24 & 10.41 & 26.01^{**} & 18.34 \\ (1.64) & (1.03) & (2.70) & (1.79) \\ \hline N & 147 & 136 & 147 & 136 \\ \hline N_g & 29 & 29 & 29 & 29 \\ r2 & 0 & 0.000198 & 0.0255 & 0.00237 & 0.000128 \\ \hline \end{array} $	lnGDP	-0.604	-0.351	-0.957**	-0.652
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		(-1.64)	(-0.93)	(-2.68)	(-1.70)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\Delta lnPOP$	7.571*	12.83**	9.327**	11.97**
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		(2.09)	(3.29)	(2.71)	(3.15)
$\begin{array}{cccc} CONCERN & 0.394 & 0.308 & 0.295 & 0.285 \\ (3.92) & (3.00) & (3.03) & (2.60) \\ \hline INDUSTRY & -0.0382^{***} & -0.0248^{*} \\ (-3.46) & (-2.09) \\ \hline ENGO & & -0.00617^{***} & -0.00471^{**} \\ (-4.03) & (-2.67) \\ \hline _cons & 16.24 & 10.41 & 26.01^{**} & 18.34 \\ (1.64) & (1.03) & (2.70) & (1.79) \\ \hline N & 147 & 136 & 147 & 136 \\ \hline N_g & 29 & 29 & 29 & 29 \\ r2 & 0 & 0.000198 & 0.0255 & 0.00237 & 0.000128 \\ \hline \end{array}$	CONCERN	0.204***	0 200**	0.205**	0 262*
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	CONCERN	0.394	0.508	0.295	0.265
$\begin{array}{cccc} INDUSTRY & -0.0382^{***} & -0.0248^{*} \\ (-3.46) & & (-2.09) \end{array} \\ ENGO & & & & & & & & & & & & & & & & & & &$		(3.92)	(3.00)	(3.03)	(2.60)
$\begin{array}{cccc} ENGO & & & & & & & & & & & & & & & & & & &$	INDUSTRY		-0.0382***		-0.0248*
$ENGO \qquad \begin{array}{c} -0.00617^{***} & -0.00471^{**} \\ (-4.03) & (-2.67) \end{array}$ $_cons \qquad 16.24 \qquad 10.41 \qquad 26.01^{**} \qquad 18.34 \\ (1.64) & (1.03) \qquad (2.70) \qquad (1.79) \end{array}$ $\boxed{N \qquad 147 \qquad 136 \qquad 147 \qquad 136} \\ \boxed{N_g} \qquad 29 \qquad 29 \qquad 29 \qquad 29 \\ r2 o \qquad 0.000198 \qquad 0.0255 \qquad 0.00237 \qquad 0.000128 \end{array}$	1110 001101		(2.46)		(2.02)
$ \begin{array}{c} ENGO \\ \hline \\ \ \ \ \ \ \ \ \ \ \ \ \ \$			(-3.40)		(-2.09)
$\begin{array}{c cccc} (-4.03) & (-2.67) \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	ENGO			-0.00617***	-0.00471**
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				(-4.03)	(-2.67)
$\begin{array}{c ccccc} -\cos & 16.24 & 10.41 & 26.01^{**} & 18.34 \\ \hline & (1.64) & (1.03) & (2.70) & (1.79) \\ \hline N & 147 & 136 & 147 & 136 \\ \hline N_{-g} & 29 & 29 & 29 & 29 \\ r2 & 0 & 0.000198 & 0.0255 & 0.00237 & 0.000128 \\ \end{array}$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	_cons	16.24	10.41	26.01**	18.34
N 147 136 147 136 N_g 29 29 29 29 r2 o 0.000198 0.0255 0.00237 0.000128		(1.64)	(1.03)	(2.70)	(1.79)
N_g 29 29 29 29 r2 o 0.000198 0.0255 0.00237 0.000128	N	147	136	147	136
r2 o 0.000198 0.0255 0.00237 0.000128	N_g	29	29	29	29
	r2_o	0.000198	0.0255	0.00237	0.000128

Table 9: Estimation results integrating country size (*lnGDP*)

t statistics in parentheses * $p < 0.05, ** \ p < 0.01, *** \ p < 0.001$

IMPRESSUM Jena Economic Research Papers ISSN 1864-7057 Friedrich Schiller University Jena Faculty of Economics and Business Administration Carl-Zeiss-Str. 3 D-07743 Jena, Germany

Email: office.jerp@uni-jena.de Editor: Silke Übelmesser Website: www.wiwi.uni-jena.de/en/jerp

© by the author