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Quantifying and qualifying "bullshit": A large-N analysis of country motives to not keep their climate promises

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Abstract. Amongst the many challenges, hampering the ability of the global regime to address climate change is the translation of international commitments to domestic policies. To facilitate the adoption of the Paris Agreement on the international stage and its successful implementation in the domestic arena, countries must harmonize their interests at various levels of governance. However, this complex task often results in a gap between what international negotiators promise and what domestic policymakers adopt. This paper presents the first large-N application of the novel Vertical Policy Harmonization Index (VPHI) that measures the difference between policy output at the international level, i.e., countries' commitments to climate change mitigation as communicated in their Nationally Determined Contributions (NDCs), and their domestic strategies, plans, or policies. To do so, this paper draws on well-studied hypotheses from the climate governance literature using regression analysis to study a representative sample of countries. The key research aim is to disentangle the effect of various macro-level characteristics on a country's degree of vertical policy harmonization. I expect that some macro-level factors (e.g., high vulnerability and low abatement costs) facilitate vertical policy harmonization, whereas others have a debilitating effect (e.g. high degree of decentralization in government).

Keywords. climate change mitigation policy, policy harmonization, policy output, qualitative comparative analysis

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1. Introduction

Amongst the many challenges hampering the ability of the global climate regime to address climate change is the translation of international commitments to domestic policies. The Paris Agreement relies on Nationally Determined Contributions (NDC), which are submitted all five years by each party to the UNFCCC secretariat. The NDCs contain a country's commitment to climate change mitigation and adaptation, i.e., specific reduction targets, as well as planned policies and measures. To facilitate the adoption of the Paris Agreement on the international stage and its successful implementation in the domestic arena, countries must harmonize their interests at various levels of governance. However, this is a complex task that often results in a gap between what international negotiators promise and what domestic policymakers adopt. This complexity is illustrated by Figure 1: Country delegations go into the international climate negotiations with a national initial position (I, figure 1), which stems from the beliefs and preferences of the relevant national government bodies and stakeholders. However, these positions are not set in stone, and delegations are equipped with a varying degree of discretion

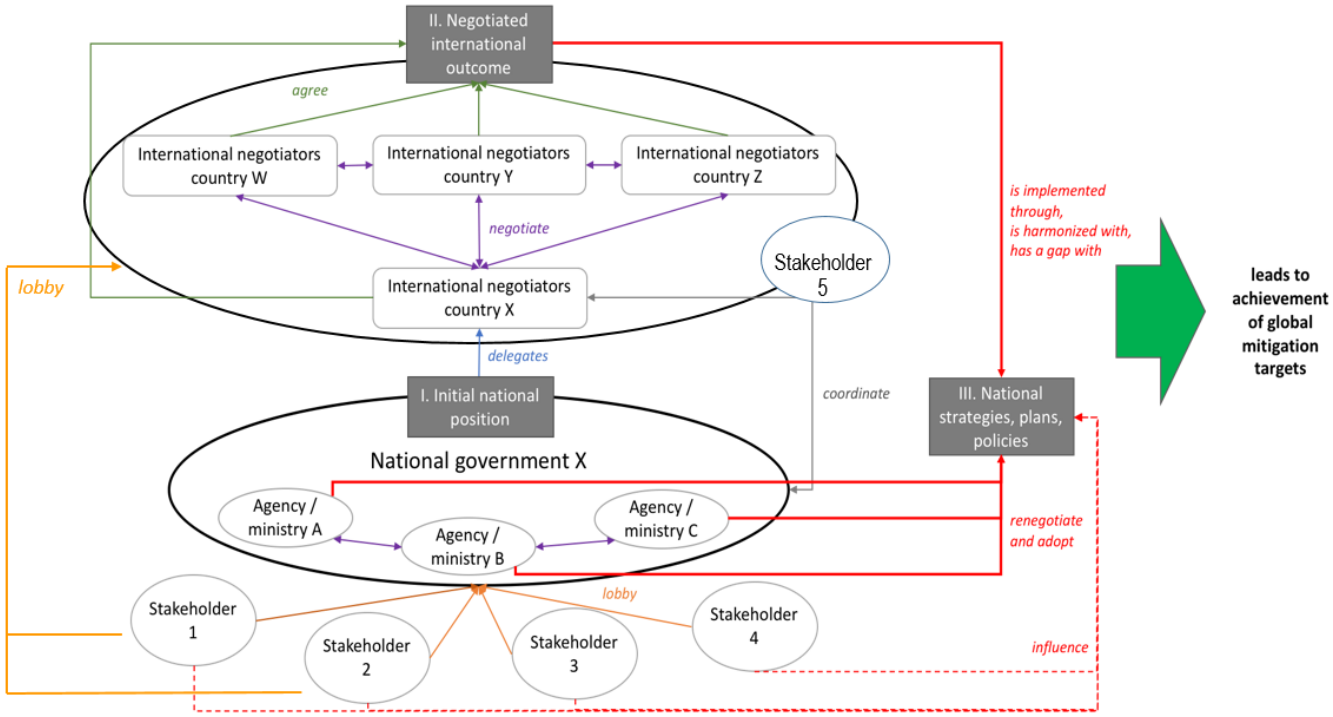

Figure 1: Climate policy in the multilevel game

(da Conceição-Heldt 2011; Lewis 2005; McKibben 2016; Odell 2009). Thus, during the negotiation

process, governments might update their positions, for example, due to the wish to improve their national reputation or to receive higher levels of international aid (Dash and Gim 2019).

However, in a context where high reputational costs from open international defection are matched with little transparency about details of policy adoption at home, delegates may formally accept an international agreement even if it is not intended to be fully adopted at the domestic level. As a result, national delegations may be pressured to make concessions or compromises that deviate from their initial position without being sure of how much deviation is domestically acceptable. Once a negotiated international outcome (II, figure 1) is reached, the national government seeks to adopt the strategies, plans, and policies (III, figure 1) necessary to fulfill the agreed-upon international commitment. This involves a process of re-negotiating the international commitment at home. The more the international agreement deviates from the initial national position, the greater the likelihood of a gap between the international commitments and national implementation (Fekete et al. 2019; Röser et al. 2020). Therefore, mitigating CC can be characterized as a multi-staged, multi-level, multi-actor process resembling the policy cycle heuristic (Howlett 2009; Underdal and Hanf 2000; Upadhyaya et al. 2018).

Considering this complex setting, this present study aims to contribute to an important, overarching research question: Why do domestic climate policies deviate from internationally communicated commitments? Generally, there are two different ways of deviating. First, countries commit to more at the international level, i.e., in their NDCs, as they can adopt nationally. I conceptualize this behaviour as “bullshitting” (Stevenson 2021, Frankfurt 2005). Frankfurt defines the bullshitter as someone who communicates “without any regard for how things really are” (Frankfurt, p.5). Thus, bullshitting is not lying, but disregarding facts or the truth when making a statement. In the climate context, countries are bullshitting when they make promises to the international arena, without considering of what their country is able or willing to do in reality. Second, countries commit to less at the international level, as they are actually doing. At first sight, this behaviour seems to be unproblematic for the overall goal to mitigate harmful climate change, as doing more to reduce greenhouse gas emissions than promised is a good thing. But often countries communicate very unambitious and insufficient targets in their NDCs, which means that doing “a little more” at home is still insufficient. Anyways the question of the motive of such behaviour is still unanswered. As describe above, one motive might be to seek for reputation. Other countries might be just cautious in what they promise to be able to

rather overperform than underperform. Either way, I call this behaviour "strategic overperformance".

To measure the gap between policy output at the international scale, i.e., countries' commitments to climate mitigation as communicated in their Nationally Determined Contributions (NDCs), and their domestic strategies, plans, or policies, I draw on the index of vertical policy harmonization (VPHI), that has been presented for the first time by Kammerer et al. (2021).

In this paper, I briefly present the construction of this index and show a first analysis that explain country motives to deviate on or the other direction. My results show that bullshitters rather more democratic, have higher pc emissions, and less political constraints.

2. Theory

This paper builds on research rooted in policy science and international relations studying countries performance and cooperation in international climate politics. One stream of this literature in the tradition of Putnam's "two-level" game (1988) studies how a country's involvement in the multiple layers of decision-making influence its cooperation in international negotiations the ratification of agreements (e.g., da Conceição-Heldt and Mello 2017) in general, and for climate change mitigation in particular (Karreth and Tir 2018; Upadhyaya et al. 2018; Urpelainen and Van de Graaf 2018; Hovi, Sprinz, and Bang 2012). Some scholars focus on the national constraints that affect delegates' discretion in international negotiations, applying a principal-agent model to the delegation of power from the national government (the principal) to the delegate (the agent) (Fisher and Davis 1999; da Conceição-Heldt 2011; McKibben 2016; Nicolaïdis 1999) or on the role of so-called "two-level" connectors that are able to mediate between the international and national level (e.g., Ingold and Pflieger 2016). Others focus on the characteristics of the negotiation process itself, its actors, and their bargaining strategies, and how all this affects the outcome (for a recent review, see Odell 2009).

In contrast, other scholars devote their attention to macro-level country characteristics to explain differences in countries climate policy performance and/ or cooperation, like vulnerability and abatement costs (Sprinz and Vaahtoranta 1994), the level of democracy (Bättig and Bernauer 2009; Bernauer and Böhmelt 2013) or more generally the variation of the institutional form of a country's governance regime or traditions of economic interventions (Lachapelle and Paterson

2013) or political restrictions (Tobin 2017), a country's embeddedness in intergovernmental organizations (IGOs) (Dolšak 2009; Tosun and Peters 2020; Knill, Shikano, and Tosun 2014) , general systemic differences like population density, carbon intensity and per capita income (Lachapelle and Paterson 2013). Some examples of applications in this vast literature include Kammerer & Namhata (2018) who study how country interactions affect the diffusion of climate policies, Brandi et al. (2019) and Jordaan et al. (2019) who study the gap between international commitments and (sub-) national policies in federal political systems, or Underdal and Hanf (2000) who investigate how the involvement in environmental agreements influences the likelihood of a country to adopt domestic policies. Similarly, Michaelowa & Michaelowa (2015; 2018) explore how different national characteristics (e.g. CO_2 emissions, energy security, poverty) among developing countries contribute to a fragmentation of international positions, different levels of implementation of climate policies, and a gap between international commitments and domestic policies. Furthermore, Michaelowa & Michaelowa (2017) show how decisions at the international level affect stakeholder incentives at the domestic level.

Aware of these differences, researchers have developed typologies of climate policy performance like the differentiation in pusher, pioneers, symbolic leaders, laggards (Wurzel, Liefferink, and Torney 2019), or the categorization in bystanders, pushers, draggers, and intermediates (Sprinz et al. 2018). In a similar vein, several indices measure climate (policy) performance and have developed a "traffic light" system for a country's performance. The most prominent indices are the Climate Change Performance Index (CCPI) by (Burck et al. 2018), the Climate Change Cooperation Index (C3-I) from Bernauer and Böhmelt (2013) and the Climate Action Tracker [1](CAT) developed by Climate Analytics & the New Climate Institute (2021). The CCPI and the C3-I assess climate performance based on countries' political commitment to climate mitigation and emissions reductions. Along the same lines, the CAT evaluates countries' mitigation pledges but also rates whether a country is contributing its "fair share" pursuant to the 1.5˚C goal of the Paris Agreement. Despite the considerable contributions of these indices in the climate (policy) performance literature, they offer only a possibility of *inter*-comparisons. That is, with these indices one can only make statements of countries' performance in relation to one another and not much can be confidently said for the alignment between a country's international commitments and its own domestic policies.

[1] https://climateactiontracker.org/

In contrast, the vertical policy harmonization index (Kammerer et al. 2021) measures the degree of policy alignment between international promises and national policies. Policy harmonization, diffusion, alignment, or convergence are different aspects of the same phenomenon, as they all describe how policy choices in one political entity influence decisions in other entities (Bennett 1991; Plümper and Schneider 2009). There is a wide literature investigating such processes (e.g., Braun and Gilardi 2006; Meseguer and Gilardi 2009; Gilardi 2005) by focusing on how political practice disperses, disseminates or assimilates across boundaries of political entities, like states, countries, provinces or municipalities (e.g., Elkins and Simmons 2005). Following the "unified model of government innovation" by Berry and Berry (1990; 2014, 325), the adoption of political practices, like policies, strategies, plans, or concrete targets and instruments, can be understood as a function of internal and external factors (Berry and Berry 2007). Internal factors include social, political, or economic country-specific characteristics driving a country's decision (Canon and Baum 1981; Gray 1973). External factors include the behavior of other countries (Graham, Woodfield, and Harrison 2013), for example of political entities being geographically close (Berry & Berry 1990) or of frequent interaction partners (Kammerer and Namhata 2018).

Kammerer et al. (2021) conceptualize the gap between internationally communicated commitments and domestic climate policy as the degree of vertical policy harmonization in climate change mitigation. They define the process of vertical policy harmonization as "the making of a country's (…) national climate mitigation policies (…) identical or at least more similar" to what delegates of a country committed internationally (Majone 2014, 4). Thus, unlike studies that examine factors that drive harmonization of climate policies between countries, they study factors that influence the level of policy harmonization between a country's commitment at the international level (Square II, figure 1), and its domestically adopted climate policy (Square III, figure 1) at the level of national or federal policies.

To study the countries' motives to deviate, I test several well-known hypotheses drawn from the environmental performance literature.

From an *interest-based* perspective, the national position is a function of climate-related variables (e.g., per capita emissions, GDP, climate vulnerability) reflecting a country's economic interests and its structural power position in the negotiations (Castro et al. 2014; Bailer & Weiler

2015, Weiler 2012). An interest-based explanation of international environmental politics classifies countries into bystanders, pushers, draggers, or intermediates, based on their vulnerability and abatement costs (Sprinz & Vaahtoranta 1994). Similarly, I expect that certain combinations of such characteristics affect the capability and willingness of countries to update national positions in response to pressure from other countries or stakeholders, but also to adopt internationally agreed commitments domestically. For example, wI expect countries with lower mitigation costs and higher vulnerability to show higher levels of policy harmonization **(hypotheses (H) 1a-b)**. However, the available resources (e.g., finances, personnel, capable institutions) are also relevant for countries' bargaining power and ability to adopt climate policies (**H 1c**). At the same time, we expect major emitters to show higher levels of harmonization, as they are in a better position to defend their national position internationally given their vital role for CC (**H 1d**).

From an *institutional* perspective, I also expect that the characteristics of political systems are relevant. For example, countries with a higher number of veto players and higher levels of political inclusion (i.e., a larger number of actors and levels of decision-making) might show less vertical policy harmonization (**H 1e**, Lachapelle and Patterson 2013). Also, the more general regime type (autocracy vs. democracy, parliamentary vs presidential) might influence the degree of vertical policy harmonization (**H 1f**). While existing research has established that more democratic countries tend to display higher levels of commitment to climate change mitigation (Bättig & Bernauer 2009), the effect of democracy on actual policy adoption and emissions trends or levels is more contested or inconclusive (Bättig & Bernauer 2009; Bernauer & Böhmelt 2013; Lachapelle & Patterson 2013). Bättig & Bernauer (2013: 303-4) describe democracies as having a larger implementation or "words-deeds gap" in CC policy, which would also imply lower policy harmonization. Michaelowa and Michaelowa (2011) show that despite their stronger preferences for CC mitigation, this "words-deed gap" is even larger for countries with strong green parties, as long as actual implementation is difficult to monitor.

3. Research design

3.1 Dependent variable: Vertical Harmonization Index (VPHI)

The vertical climate policy harmonization Index (VPHI is based on three indicators (see Figure 1) that assess the gap between countries' international commitments and their domestic mitigation efforts as outlined in their NDCs and national strategies, plans, and policies[2]: scope, compliance emissions, and policy output. *Scope* refers to the economic sectors that are covered by the NDC and the national policies, weighted by the distribution of greenhouse gas (GHG) emissions across those sectors. *Compliance emissions* refer to the amount of GHGs that will be emitted in the given target year if that country complies (i.e., meets) the target stipulated in its NDC or national policies. This indicator therefore aims at measuring the extent to which the mitigation targets in the NDC and the national policies are equivalent. The third indicator, *policy output*, is a function of density and intensity, where density is the number of relevant policies or instruments identified, and intensity can be generally thought of as the quality of a given policy or policy instrument (Schaffrin, Sewerin, and Seubert 2015). While the scope and compliance emission indicator can be compared directly, this is not possible for the policy output. NDCs often present policy output, but they don't to it systematically and to a very varying degree. So, the comparison would be unfair. Kammerer et al. 2021, use the national policy output indicator to qualify how realistic the national promises are with regards to their policy output.

[2] For the sake of brevity, national policies while be used henceforth in reference to national strategies, plans and policies.

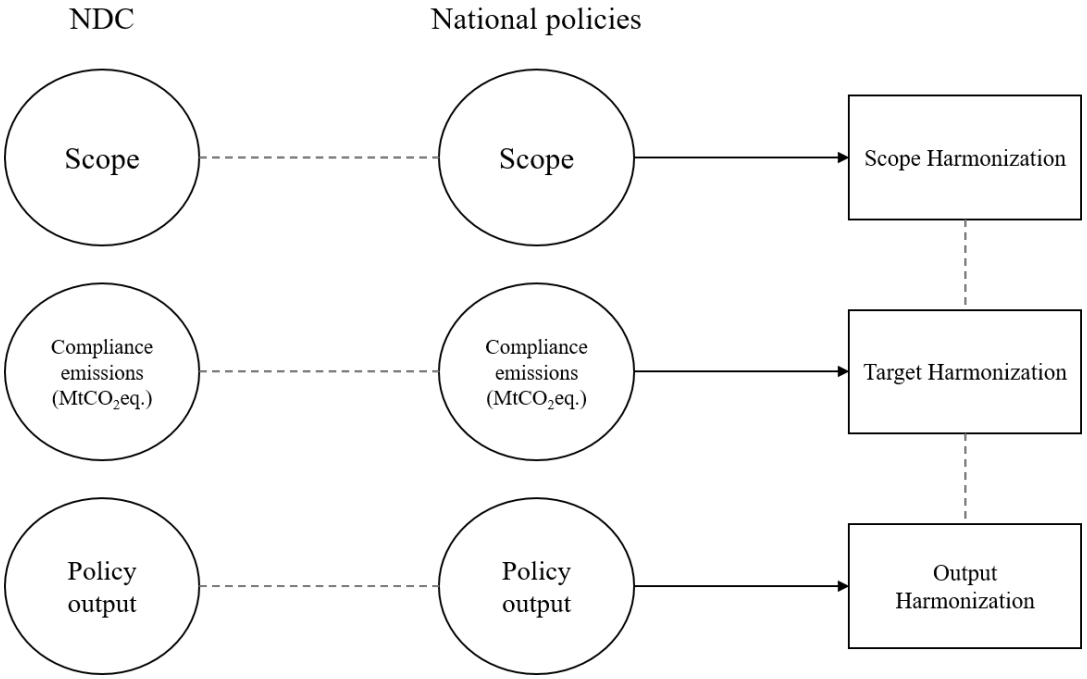

Figure 2: Illustration of the Vertical Policy Index, adapted from Kammerer et al. 2021

The **scope indicator** accounts for the economic sectors and the proportion of a country's total GHG emissions that are covered by a NDC or national policy. Kammerer et al. (2021) follow the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories to categorize the different economic sectors; these include the Energy, Industrial Processes and Product Use (IPPU), Agriculture, Land Use, Land Use Change and Forestry (LULUCF), Waste, and Other[3] sectors (Sánchez, Bhattacharya, and Marecoka 2006). Scope is quantified as the sum of a NDC's or policy's weighted sectoral coverage. Concretely, the scope score is found by assigning 1's to sectors that are mentioned in the NDC or the national policy and a 0's to those that are not. This binary sectoral coverage is then multiplied by the sector's share of the country's total GHG emissions, taken from the latest GHG inventory report available. The scope indicator is calculated as follows (Kammerer et al. 2021)

$$VPH_{scope} = (Scope_{NAT} - Scope_{NDC})$$

[3] The "Other" Sector refers to "Indirect N_2O Emissions fro the Atmospheric Deposition of Nitrogen in NO_x and NH_3" (Sánchez, Bhattacharya, and Marecoka 2006). Emissions from this sector tend to contribute marginal amounts to a country's total emissions; in most cases, no emissions from this sectore are accounted for.

Compliance emissions refer to the GHGs that are supposed to be emitted in the target year if a country meets its reduction target as laid out in its NDC or national policy. Kammerer et al. (2021) use this measure to normalize the various types of targets proposed in NDCs or its national policy by simply translating those targets (e.g., in form of percentage reduction compared to a base year, or percentage reduction compared to future projected emissions, or percentage reduction in emissions intensity) into a common measure. Calculations follow the methodology of (Ross, Rich, and Ge 2016). The **compliance emission indicator** is calculated simply as (see Kammerer et al. 2021):

$$VPH_{comp} = \left({Comp_{NDC}}/{Comp_{NAT}}\right) - 1$$

To measure policy output at the national level both the number of relevant climate policies and instruments in place in a country (density), as well as their quality (intensity) are used (see as well Schaffrin et al., 2015). To calculate policy or instrument density, Kammerer et al. (2021) simply count the number of relevant climate policies and instruments in a country. The assessment of the intensity of all policies and instruments is based on six indicators per policy or instruments (see table 1, and Kammerer et al. 2021) for more details. Policy or instrument assessment is the average across all six indicators. Intensity at the sector level is the average of all sector policies.

Table 1: Operationalization of policy and instrument intensity indicators

Policy Level		
Application Period	*The period to which the policy applies.*	
	0.00	if application period of policy has ended in the past;
	0.50	if application period of policy ends before 2030;
	1.00	if application period of policy lasts until 2030 or beyond;
Objective	*Specifies the integration of mitigation-related targets.*	
	0.00	if no mitigation-related targets mentioned;
	1.00	mitigation-related targets mentioned;
Status	*Indicates if the policy is in force, planned, proposed, or repealed.*	
	0.00	if the policy is not in force, the status unknown, repealed / stayed;
	0.25	if the policy is proposed / under review;
	0.50	if planned or in draft;
	1.00	in force;
Type	*Specifies the liability of a policy.*	
	0.25	strategies, plans & programs that formulate rather vague declarations of intent without any concrete targets (e.g., increase of energy produced by renewable sources);
	0.50 =	strategies, plans & programs that incorporate specific targets (e.g., increase share of renewable by 50% until 2030);
	0.75 =	executive decrees, orders or regulation;
	1.00 =	legislation
Integration	*Specifies the degree to which a policy refers to other policies.*	

	0.00	the policy does not refer to other policies in the same or other sectors;
	0.50	it refers to other policies in the same sector;
	0.75	it refers to other policies in different sectors;
	1.00	the policy is a framework policy covering several sectors.
Budget	*Indicate if the policy is attributed a budget.*	
	0.00	no budget mentioned
	0.50	the policy mentions a budget and / or a funding source
	1.00	the policy mentions a budget that is earmarked for its purposes (i.e., a budget is set up exclusively for this policy or the policy generates its own funding through taxes or similar)
Instrument Level		
Instrument type	*Specifies the instrument type. Typology distinguishes instruments based on their level of coerciveness.*	
	0.10	procedural measures (e.g., a climate change committee is established);
	0.25	voluntary measures, information, persuasion (e.g., training, labelling, funding programs for research projects);
	0.50	economic incentives (e.g., tax, carbon market, subsidies);
	0.75	a planned government investment (e.g., budgeted plan for a new hydro power plant);
	1.00	regulatory approaches (e.g., performance or technology standard)
Implementation	*Indicates if any implementation tools are attributed to the given policy instrument.*	
	0.00	no statement on implementation is found;
	+0.25	an implementation agency is established;
	+0.25	there is sanctioning for non-compliance;
	+0.25	there is a monitoring procedure;
	+0.25 =	the instrument is strictly applied (i.e., there are no exemptions)

Based on these indicators, Kammerer et al. (2021) have developed two aggregated indices. The first index juxtaposes only the scope and compliance indicators and calculated simply as follows:

$$VPH_{simple} = {}^{(VPH_{scope} + \ VPH_{comp})}/_{2}$$

A second aggregation also includes the national policy output as a weighing factor for how realistic the national promises are in the context of national policies and is calculated as follows.

$$VPH_{weighted} = {}^{(VPH_{scope} + \ VPH_{comp})}/_{2} \ * (1 + (OUT_{NDC}))$$

So far, Kammerer et al (2021) present the simple index for 60 and the complex index for 21 countries, with more data coding going on at this moment. See figures 3 and 4 for an illustration of the current dataset.

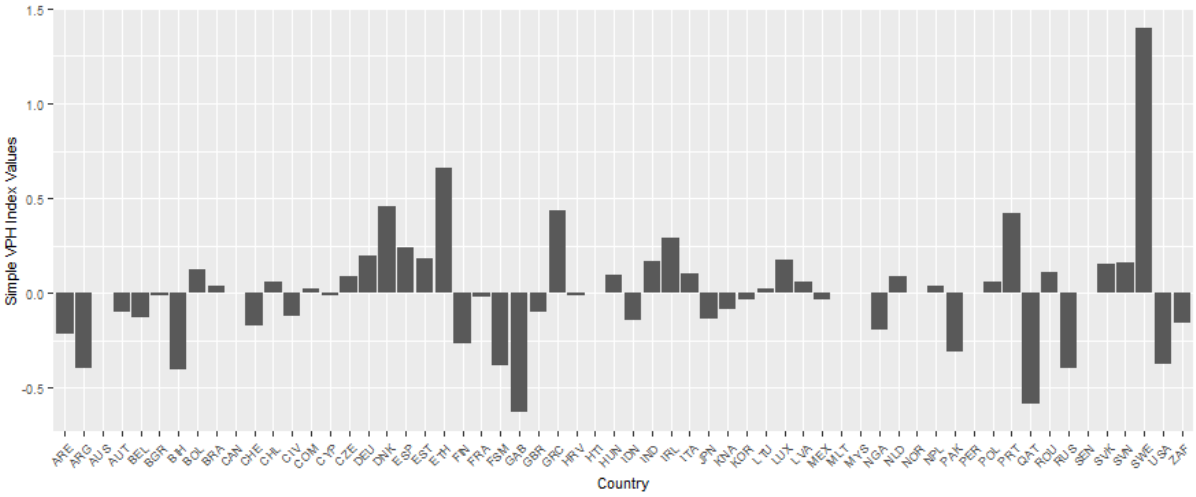

Figure 3: Simple Vertical Policy Harmonization index

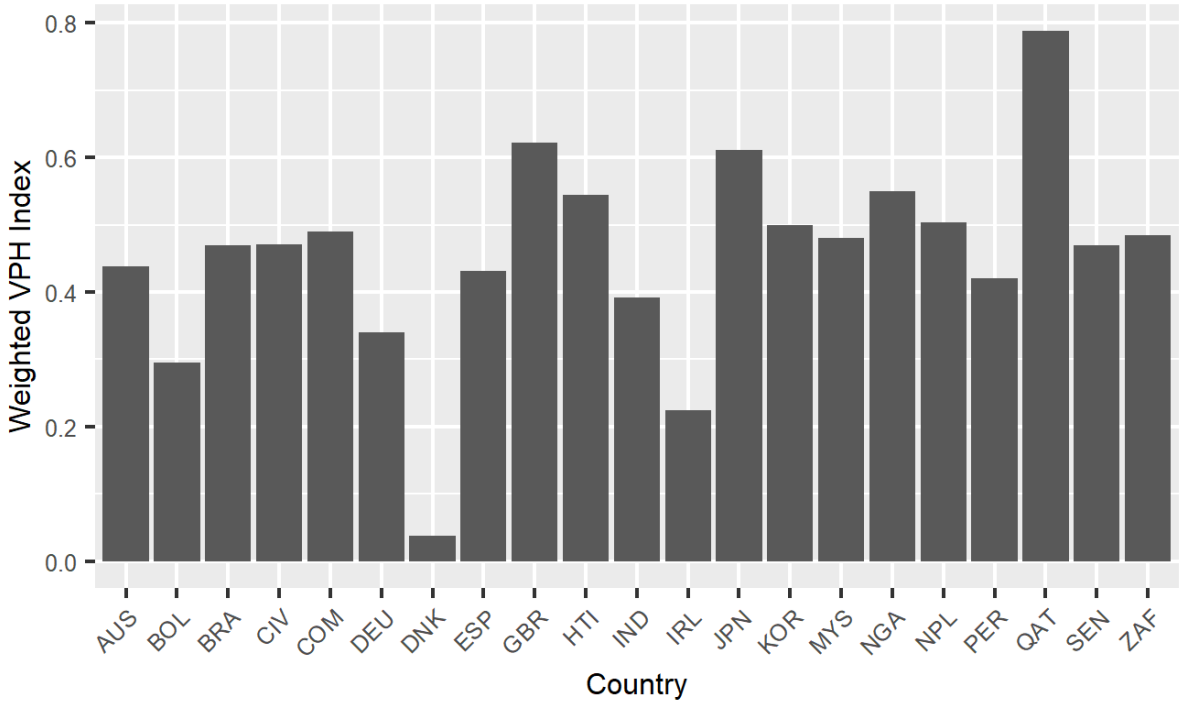

Figure 4: Weighted Vertical Policy Harmonization index

3.2 Independent variables

The operationalization of the set of independent variables and their data sources is presented in table 2.

Table 2. Operationalization of independent variables

Variable name	Explanation	Source	Hypotheses
Interest-based variables			
ND Gain Index	Measure for a country's vulnerability in combination with its readiness to improve resilience.	https://gain.nd.edu/our-work/country-index/	H1a
Fossil fuel dependency	Level of a country's dependency on fossil fuels, such as oil and gas. Used as proxy for a country's cost to mitigate CO2 emissions.	World Development Indicators, Quality of Government Dataset, 2022	H1b
GDP pc (logged)	Gross Domestic Product Per Capita purchasing power parity is used as a proxy to measure a country's resources.	World Development Indicators, Quality of Government Dataset, 2022	H1c
CO2 emissions pc	Per capita CO2 emissions are used as a measure for the emission levels in a country.	World Development Indicators, Quality of Government Dataset, 2022	H1d
Institutional variables			
Political constraints	Higher scores indicate more political constraints and thus less feasibility of policy change. The variable combines (1) the number of independent branches of government (counting the executive and the presence of an effective lower and upper house in the legislature (more branches leading to more constraint); (2) the extent of party alignment across branches of government,	Henisz, W. J. (2017).	H2a

	measured as the extent to which the same party or coalition of parties control each branch (decreasing the level of constraint); (3) and the extent of preference heterogeneity within each legislative branch, measured as legislative fractionalization in the relevant house (increasing constraint for aligned executives, decreasing it for opposed executives); (4) judiciary, (5) sub-federal entities		
Democracy	Average level of democracy, as measured by the Polity2 score. The scale ranges from +10 (strongly democratic) to -10 (strongly autocratic).	Freedom House, Quality of Government Dataset, 2022	H2b

6. Results

To test the hypotheses on vertical climate policy harmonization, I ran several ordinary least square (OLS) regressions (see Appendix for distribution of dependent variable). Table 3 and figure 5 show the different models. Models 1 shows the results for the regression with the simple index. It shows that my first hypotheses on vulnerability (H1a) is not confirmed. The parameter estimate is close to zero and also insignificant. This implies that the affectedness of a country is not linked to a country's motive to deviate from international promises. Similarly, I do not observe a significant relationship between GDP per Capita (H1c) or fossil fuel dependency (H1b) and vertical policy harmonization. These finding is interesting, as the "usual suspects" often used interest-based explanations of environmental or climate performance, i.e., affectedness and abatement costs, seem not to be decisive for whether country's keep up with their promises.

Table 3. Regression results OLS model

	Model 1	Model 2
(Intercept)	0.02	-1.11 **
	(0.03)	(0.37)
fh_ipolity2	-0.09 *	0.96 *
	(0.04)	(0.41)
nd_gain_gdp_adj_log	-0.02	0.27
	(0.04)	(0.39)
GDP_pc_log	0.18	-0.21
	(0.11)	(1.00)
co2_cap_log	-0.20 *	0.47
	(0.09)	(0.85)
fossil_rents_log	0.06	-0.39
	(0.05)	(0.53)
pol_constraints5_log	0.11 *	-0.83 *
	(0.04)	(0.39)
N	57	57
R2	0.33	
AIC	15.33	69.65
BIC	31.68	83.95
Pseudo R2		0.31

All continuous predictors are mean-centered and scaled by 1 standard deviation. *** p < 0.001; ** p < 0.01; * p < 0.05.

However, Model 1 shows a negative and significant parameter estimated associated with the CO2 per capita variable. This means that countries with higher per capita emissions, that the major emitters, tend to show negative values of the vertical policy harmonization index, i.e., they

promise more than they do. Or put differently, major emitter are more likely bullshitters. I can therefore confirm hypothesis (H1d).

Interestingly, both institutional variables are significant in Model 1, but in the opposite direction as I have expected in my hypotheses 2a and 2b. Democracies tend to bullshit more than autocracies or less democratic countries. Certainly, this finding is also linked to the fact that many democracies belong the group of major emitters and have high per capita emissions, but another explanation for this fining might lie in the difficulty of adopting policies in democratic systems, or the tendency of many democracies to engage in symbol politics (Wurzel et al. 2019). Also, the political constraints variable shows a significant effect, but this time positive. This means that more constraints are actually linked with harmony or overperformance, i.e., positive values of the vertical policy harmonization index. Thus, more veto players complicate the policy process but at the same time seem to make sure that international commitments and national policies are balanced out to a larger degree.

Model 2 show the results for a dummy variable that indicates if a country is bullshitting (underperforming) or not. The results point into the same direction: Bullshitters rather more democratic, have higher pc emissions, and less political constraints.

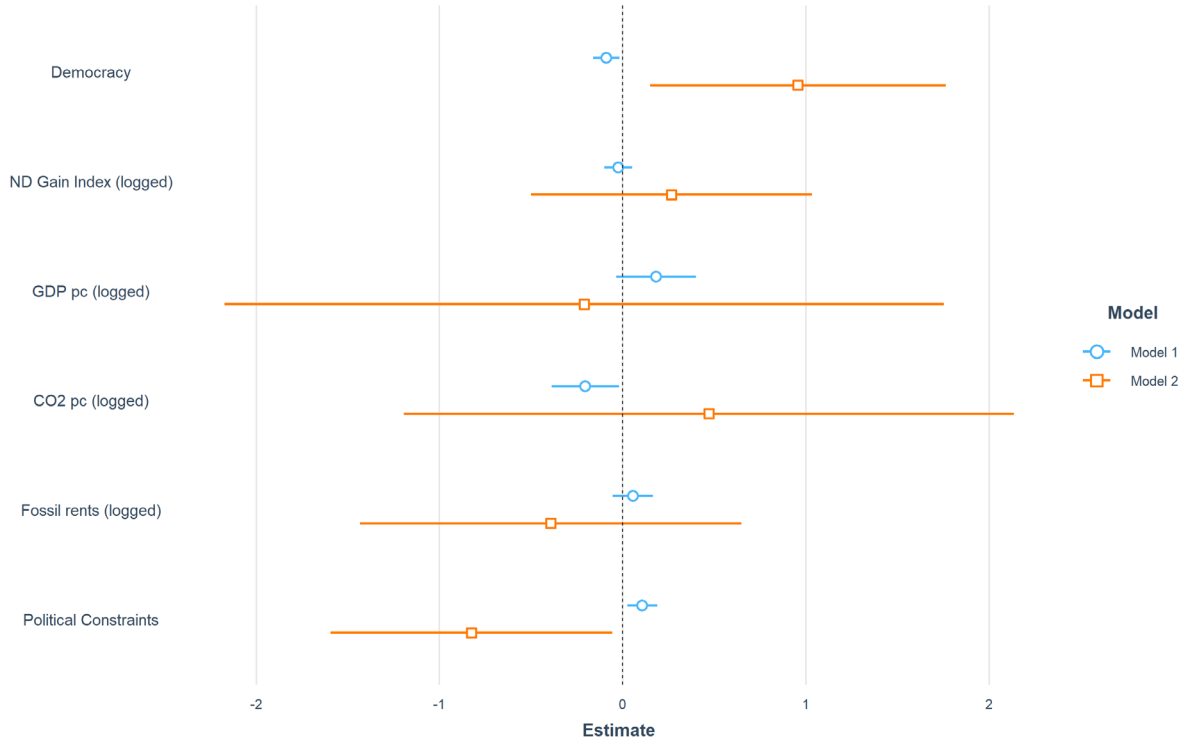

Figure 5: Coefficient plot for both models

6. Conclusions

In this paper, I presented a first and drafty explanation of a complex problem, i.e., the harmonization of international commitments to climate change and their translation into respective national measures. I drew in the vertical policy harmonization index (VPHI), developed by Kammerer et al. (2021). To be best of my knowledge, this the first systematic attempt to measure the gap between international climate commitments, as prepared by all countries in their NDCs and their national polices.

My results have shown that bullshitters, i.e., countries that do not keep up with their promises are more often democracies, major emitters, and face less political constraints in their political institutions.

This analysis has a clear limitation due to the small sample size. So far, the index comprises 60 countries for the simple index and 21 countries for the weighted index. Further analyses will be done once the sample size has increased to at least 30 for the weighted index, and 80 for the simple index, which is expected for end of this year. Also, further institutional variables could be explored, such as the political stability in a country, the degree of pluralism etc.

Finally, the analysis of vertical policy harmonization is relevant in an ethical and practical context. For example, an ethical perspective discussing the different factors contributing to smaller or lager gaps between a country's national country's national climate policy and its international commitment along several dimensions of the legitimacy of (democratic) decision-making and (climate) justice (Roser and Seidel 2016). With respect to practical implications, our results provide a basis for a more realistic—and probably more sober—prediction of actual global emission reductions to be expected from the sum of the current efforts. This is especially relevant in the context of the "ratcheting up" process of NDCs over time that is seen as a cornerstone of the Paris Agreement's approach to achieve its long-term ambition. If it becomes clear that a number of specific countries systematically fails in reaching the first NDC targets, the "ratcheting up" of the subsequent NDCs is unlikely to work as expected.

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Appendix

Appendix A. GHG Reduction Target Types and Calculating Compliance Emissionss

Target type	Description*	Calculation Compliance Emissions
Base year	A GHG reduction target that reduces or controls the increase of emissions by a specified quantity relative to base year.	**Emissions in the target year (MtCO2eq) =** Base year emissions (MtCO2eq) – [Base year emissions (MtCO2eq) x Percent reduction]
Intensity	A GHG reduction target that reduces the emissions relative to the unit of another variable (typically GDP) by specified quantity relative to a base year.	Emissions intensity in the target year (MtCO2eq / level of output) = Base year emissions intensity (MtCO2eq / level of output) – [Base year emissions intensity (MtCO2eq / level of output) x Precent reduction] **Emissions in the target year (MtCO2eq) =** Emissions intensity in the target year (MtCO2eq / level of output) x Level of output in the target year
Business-as-usual (BAU)	A GHG reduction target that reduces emissions by a specified quantity relative to a (future) projected emissions baseline scenario.	**Emissions in the target year (MtCO2eq) =** Projected baseline scenario emissions in the target year (MtCO2eq) – [Projected baseline scenario emissions in the target year (MtCO2eq) * Precent reduction]
Trajectory	A GHG reduction target that specifies an emissions level or range in the future.	No calculation is required; already expressed in absolute terms

*source: (Ross et al., 2016, p.5)

Appendix B. Coding Policy Output

Variable	Value	Description
NDCs *Does the NDC mention specific policies, measures or even concrete laws or regulations and/or policy instruments?*		
Sector	*specify which IPCC sector(s) the measure or instrument mentions.*	
Measure type	0.25 =	a measure that is not much more than a declaration of intent (e.g. increase share of renewable energies);
	0.5 =	a measure that specifies targets (e.g. increase share of renewable energies by 50%);
	0.75 =	a measure that refers to a specific national plan, program or strategy (identifiable as such through its name);
	1 =	a measure is a specific law or regulation (with a legally binding text, identifiable as such through its name).
Instrument Type	0 =	no policy instrument(s) mentioned
	0.1 =	procedural measures (e.g., a climate change committee is established);
	0.25 =	voluntary measures, information, persuasion (e.g., training, labelling, funding programs for research projects);
	0.5 =	economic incentives (e.g., tax, carbon market, subsidies);
	0.75 =	a planned government investment (e.g., budgeted plan for a new hydro power plant);
	1 =	regulatory approaches (e.g., performance or technology standard)
National Strategies, Plans or Policies – *Policy Level*		
Application Period	*the period to which the policy applies*	
	0 =	if application period of policy has ended in the past;
	0.5 =	if application period of policy ends before 2030;
	1 =	if application period of policy lasts until 2030 or beyond
Objective	*does this policy specify any mitigation-related targets (e.g., GHG reduction, renewable energy, energy efficiency, energy consumption, etc.)?*	
	0 =	No mitigation-related targets mentioned
	1 =	Mitigation-related targets mentioned
Status	*indicate if the policy is in force*	
	0 =	if the policy is not in force, the status unknown, repealed / stayed;
	0.25 =	if the policy is proposed / under review;
	0.5 =	if planned or in draft;
	1 =	in force
Type	0.25 =	strategies, plans & programs that formulate rather vague declarations of intent without any concrete targets (e.g. increase of energy produced by renewable sources);
	0.5 =	strategies, plans & programs that incorporate specific targets (e.g. increase share of renewable by 50% until 2030);
	0.75 =	executive decrees, orders or regulation;
	1 =	legislation
Integration	*specify if the policy refers to other policies*	
	0 =	the policy does not refer to other policies in the same or other sectors;
	0.5 =	it refers to other policies in the same sector;
	0.75 =	it refers to other policies in different sectors;
	1 =	the policy is a framework policy covering several sectors.
Budget	*indicate whether the policy is attributed a budget.*	
	0 =	no budget mentioned
	0.5 =	the policy mentions a budget and / or a funding source
	1 =	the policy mentions a budget that is earmarked for its purposes (i.e. a budget is set up exclusively for this policy or the policy generates its own funding through taxes or similar)
Sector	*specify which IPCC sector(s) the policy mentions.*	
National Strategies, Plans or Policies – *Policy Instrument Level*		
Sector	*specify which IPCC sector(s) the policy instrument mentions.*	
Type	0 =	no policy instrument(s) mentioned
	0.1 =	procedural measures (e.g., a climate change committee is established);
	0.25 =	voluntary measures, information, persuasion (e.g., training, labelling, funding programs for research projects);
	0.5 =	economic incentives (e.g., tax, carbon market, subsidies);

	0.75 =	a planned government investment (e.g., budgeted plan for a new hydro power plant);
	1 =	regulatory approaches (e.g., performance or technology standard)
Implementation	*indicate whether any implementation tools are attributed to the given policy instrument*	
	0 =	no statement on implementation is found;
	+0 .25 =	an implementation agency is established;
	+0 .25 =	there is sanctioning for non-compliance;
	+0 .25 =	there is a monitoring procedure;
	+0 .25 =	the instrument is strictly applied (i.e., there are no exemptions)