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## The domestic politics of international climate commitments: which factors explain cross-country variation in NDC ambition?

To cite this article: Vegard Tørstad *et al* 2020 *Environ. Res. Lett.* **15** 024021

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## Environmental Research Letters



## LETTER

## The domestic politics of international climate commitments: which factors explain cross-country variation in NDC ambition?

## OPEN ACCESS

## RECEIVED

22 May 2019

## REVISED

28 November 2019

## ACCEPTED FOR PUBLICATION

19 December 2019

## PUBLISHED

11 February 2020

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**Keywords:** Paris agreement, climate policy, nationally determined contributions (NDCs), environmental policy, international environmental agreements

Supplementary material for this article is available [online](#)**Abstract**

Under the Paris Agreement, parties self-determine their mitigation ambition level by submitting Nationally Determined Contributions (NDCs). Extant assessments find that the collective ambition of current pledges is not line with the Agreement's goals and that individual ambition varies greatly across countries, but there have not been attempts at explaining this variation. This paper identifies several potential drivers of national climate ambition, and tests whether these can account for differences in the ambition level of countries' mitigation targets under the Paris Agreement. After outlining theorized relationships between a set of domestic political characteristics and climate policy ambition, regression analysis is used to assess the effects of different potential drivers across a dataset of 170 countries. We find that a country's level of democracy and vulnerability to climate change have positive effects on NDC ambition, while coal rent and GDP have negative effects. Our findings suggest that these objective factors are more important than subjective factors, while the most influential subjective factor is the cosmopolitanism-nativism value dimension.

**Introduction**

In December 2015, 195 states adopted the Paris Agreement under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC 2015). Under the new agreement, individual efforts are set through so-called Nationally Determined Contributions (NDCs) to be submitted every five years.

The Paris Agreement aims to limit the increase in the global average temperature to 'well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels' (UNFCCC 2015). To achieve these targets, dramatic strengthening of NDCs is needed already in 2020: countries must increase their NDC ambitions threefold to achieve the well below 2 °C goal and more than fivefold to achieve the 1.5 °C goal (UNEP 2019). Preliminary studies also highlight

substantial variation in ambition levels across countries: while most are currently far from fulfilling what analysts have found to be 'fair shares' of the necessary global mitigation effort, some are fulfilling or exceeding these expectations (Holz *et al* 2017, Robiou du Pont and Meinshausen 2018).

Yet, as the NDCs are of recent date, no study has so far empirically examined why ambition varies across a comprehensive set of NDCs<sup>5</sup>. On this basis, Klinsky *et al* (2017) call for work 'to document and understand what drives adequate climate action and inaction.' Documenting the drivers of climate action is both theoretically and empirically challenging, as a given country's climate policies result from a variety of interrelated factors. However, the bottom-up characteristics of the Paris Agreement, particularly its

<sup>5</sup> Although see Cunliffe *et al* (2019) for a comparison across four countries.

central feature of self-determination of goals through NDCs, render the relationship between domestic politics and climate policy ambition worthy of exploration. In this paper we therefore analyze which domestic politics factors drive and impede climate policy ambition.

The paper is structured as follows. First, we review the literature on domestic sources of international climate policy and divide this literature into objective and subjective factors. Thereafter, we propose six hypotheses about how these factors affect national climate policy ambition. The subsequent section outlines the methodology and data, before the results are presented and discussed. A concluding section summarizes the main findings and suggests avenues for future research.

## Literature review

### The domestic sources of international climate policy

The Paris Agreement marks a new phase in international climate politics, to a logic of domestically driven action (Falkner 2016). Whereas under the Kyoto Protocol, national mitigation targets were defined in the agreement, the Paris Agreement itself contains no such targets but instead requires parties to put forward self-determined targets through the NDCs.

Given the new logic, it is paramount to investigate which domestic variables drive international climate ambition. In the current analysis, we review literature on country variation in climate policy and distinguish between objective and subjective drivers of ambition (Inglehart 1995). Objective factors comprise country characteristics and contextual conditions—for example, a country's wealth level, fossil fuels resources, and vulnerability to climate change. Subjective factors are people's individual viewpoints and comprise public opinion factors such as citizens' political preferences, attitudes and values. We restrict our focus to factors for which the literature presents an expected relationship with climate policy ambition<sup>6</sup>.

### Objective factors and climate policy ambition

Objective variables feature in a wide range of studies on climate policy ambition. For example, Sprinz and Vaahoranta (1994) propose that the leaders and laggards in international climate policy can be crudely identified by comparing countries' abatement costs and ecological vulnerability. Bang *et al* (2015) explore the domestic sources of climate policy in seven countries and find ambition to reflect, *inter alia*, a country's energy resources and political institutions. Relatedly, Bailer (2012) suggests that interest groups, for example a strong petroleum lobby, and form of

governance affect countries' positions in the climate negotiations.

In this paper, we hypothesize that three objective factors are linked to mitigation ambition. First, we expect that vulnerability to climate change has a positive effect on a country's mitigation ambition level ( $H_1$ ) (Sprinz and Vaahoranta 1994, Heggelund 2007). Vulnerable countries have an interest in ambitious global climate policies in order to minimize damages caused by climate change. Illustratively, vulnerable country groups such as the Alliance of Small Island States and the Least Developed Countries have historically been among the strongest proponents of increased climate ambition in the UNFCCC negotiations, and successfully pushed for incorporating the 1.5 °C target in the Paris Agreement (Brun 2016). For vulnerable countries, high NDC ambition can help both with limiting the adverse effects of climate change and spur other countries to reciprocal contributions.

Political institutions are important for climate ambition because they determine the range of interests that will be represented in climate policy decisions (Congleton 1992). Form of governance is presumably the most fundamental characteristic of any political system (Bättig and Bernauer 2009). The literature is divided on the relationship between democracy and environmental policies. One argument, based on collective action theory, is that political leaders in democracies generally have stronger incentives to provide public goods, such as environmental protection, than leaders in non-democracies do (Bättig and Bernauer 2009). The reasoning is that the benefits are dispersed to the population while costs are more concentrated on elites, and elites are more influential relative to the general population in non-democracies than in democracies (Bättig and Bernauer 2009). On the other hand, democratic institutions have also been blamed for causing climate policy inertia by fostering short-sighted politicians that are susceptible to special interests (e.g. Jamieson 2014, Runciman 2018). Runciman (2018, p 93), for example, asserts that 'When it comes to climate change, democracy looks increasingly like the spell, not the cure.' The theory of 'authoritarian environmentalism' (Gilley 2012) suggests that authoritarian regimes can produce more ambitious environmental policies because of their centralized powers, strong control over the environmental policy-making process and disregard for individual liberties. The increasingly proactive position of China on climate change is often cited as a case in point (Engels 2018).

Yet, while the centralized powers of autocracies can allow swift action on climate change, such powers can also allow authoritarian rulers to shirk from enacting ambitious policies. If mitigating climate change is uniformly beneficial for the population of a country, the ruling elite in autocracies have little incentive to take on ambitious mitigation policies if the costs of

<sup>6</sup> The literature on cross-country variations in climate policy differs from the literature on cross-country variations in greenhouse gas emissions (Bernauer 2013).

such policies fall disproportionately on themselves (Congleton 1992, Bernauer *et al* 2010). Large-N studies that have previously tested the relationship between democracy and environmental policy ambition find unequivocally that democracies are more ambitious. Neumayer (2002) measures commitment among 159 countries to four international environmental agreements from the 1990s and early 2000s and finds strong evidence that democracies are more environmentally committed than non-democracies. Further, Bättig and Bernauer (2009) track how 185 countries perform on four climate policy indicators over the period 1990–2004 and find that democracy has a positive effect on political commitment to climate change mitigation. We therefore hypothesize that democracies are more ambitious on mitigation than non-democracies ( $H_2$ ).

Third, we expect that fossil fuels rent has a negative effect on a country's mitigation ambition level ( $H_3$ ). There are at least three mechanisms through which fossil fuels rent may impede climate ambition. First, from an economic perspective, it can be costly for countries that are endowed with fossil fuels to mitigate climate change if the fossil fuels industry constitutes a significant source of government revenue, as mitigation policies are likely to affect such revenues negatively. Similarly, ambitious climate policies can have negative effects on the number of jobs in such industries and therefore be politically costly. Finally, in countries endowed with fossil fuels resources, governmental action on climate change is prone to lobbying from fossil fuels companies. For example, Levy and Egan (2003) show how a fossil fuels industry coalition successfully impeded the ambition level of US' Kyoto Protocol commitments in the 1990s. In order to assess the effects of fossil fuels on mitigation ambition, we include data on countries' coal, oil and gas rent (World Bank 2015a, 2015b, 2015c) in the quantitative analysis below. We expect that the three different types of fossil fuels have the same detrimental effect on mitigation ambition.

Finally, we also include GDP per capita (World Bank 2016) in the analysis, but the theoretical relationship with ambition is more complex. Richer countries generally have higher abatement costs, but also greater capability to shoulder these costs. Capability is recognized as a relevant variable for distributing efforts across countries both in the UNFCCC (UN 1992) and in the Paris Agreement, and is incorporated in the ambition metric used in our analysis, as explained in the methodological section. Additionally, GDP per capita correlates with current and historical emissions, which are also incorporated in this ambition metric. Hence, the metric itself captures that developed countries are expected to do more according to the Convention and the PA, so we have no hypothesis on how GDP per capita affects scores on the metric. However, we include it as a control variable to avoid picking up

spurious effects of other explanatory variables that correlate with GDP.

### Subjective factors and climate policy ambition

In addition to the objective variables above, the literature has found that the subjective views of citizens affect climate policy in a number of different countries. In this study, we focus on people's subjective attitudes and values, and jointly refer to these as 'public opinion'.

Politicians tend to take the public's preferences into account when formulating policies (Wlezien and Soroka 2012). This dynamic is demand-driven: the public articulates and diffuses political opinions, which politicians formulate policies in response to. Climate policy literature has evaluated the effect of various public opinion variables on the emergence of policies. Much of this research has focused on the United States (Anderson *et al* 2017). Agnone (2007), for example, finds that pro-environmental attitudes has a positive effect on the enactment of federal environmental legislation in the United States over the period 1960–1988, and that the effect is amplified by protests. Similarly, Purdy (2010) traces the origins and prominence of various environmental values in the US and demonstrates through case studies how these values have affected environmental legislation in the country. On a global scale, Weaver (2008) establishes a direct link between support for environmental policies and the ambition level of environmental policies in an analysis of 64 countries. Finally, Anderson *et al* (2017) find that shifts in public attitudes toward pro-environmentalism lead to increases in renewable energy policies in Europe over the period 1974–2015.

The studies cited above assess the link between public opinion and climate policy in democracies. In democracies, voters are generally free to articulate their policy preferences through designated channels of public opinion such as the media, demonstrations, interest groups and debates, and politicians are incentivized to translate voters' preferences into policy in order to win elections. One model of the relationship between policy responsiveness and public opinion hence suggests that both office-holding and office-seeking politicians will try to appeal to the median voter's policy preferences (Downs 1957, Anderson *et al* 2017, Beiser-McGrath and Bernauer 2019). If so, we can expect that policymakers will strive to generate climate policy that is broadly in line with the general public opinion, as represented by the median voter, on climate change.

In non-democracies, the relationship between public opinion and climate policy is theoretically more ambiguous, as accountability mechanisms between the rulers and the ruled are weaker. Nevertheless, political leadership in authoritarian regimes also depend on support from their citizens. In China, for example, local environmental issues, such as air pollution, have

Table 1. Hypotheses.

Hypothesis	Factor type
H <sub>1</sub> : Vulnerability to climate change has a positive effect on a country's mitigation ambition level	Objective
H <sub>2</sub> : Democracy has a positive effect on a country's mitigation ambition level	Objective
H <sub>3</sub> : Fossil fuels rent has a negative effect on a country's mitigation ambition level	Objective
H <sub>4</sub> : Public support for taking on mitigation policies under the Paris agreement has a positive effect on a country's mitigation ambition level	Subjective
H <sub>5</sub> : Postmaterial values of citizens have a positive effect on a country's mitigation ambition level	Subjective
H <sub>6</sub> : Cosmopolitan values of citizens have a positive effect on a country's mitigation ambition level	Subjective

led to public demands for more ambitious climate- and environmental policies (Wiener 2008, Tang *et al* 2018). Notably, Tang *et al* (2018) find that public dissatisfaction with the state of the environment has led to an increase in policies implemented to address atmospheric pollution by Chinese provincial governments in the period 2011–2015.

In summary, there is reason to expect that public opinion can affect national climate policy ambition, both in democracies and non-democracies. Two ways of operationalizing public opinion emerge from the literature as particularly relevant for the current analysis: the first is a direct measure of the public's *attitudes* toward climate change policy; the second is a measure of a given population's *values*.

Recently, environmental politics literature has shown considerable interest in measuring the public's attitudes toward climate change across countries (e.g. Bernauer and Gampfer 2015, Brulle *et al* 2012, Kvaløy *et al* 2012, Scruggs and Benegal 2012). In the current analyses, we use data on specific attitudes to the Paris Agreement across 40 countries (Pew Research Center 2015). In the spring of 2015, survey respondents were asked whether they supported their own country taking on mitigation policies under the Paris Agreement, which was to be negotiated later that year. We expect that countries with populations that supported their own country taking on mitigation policies under the Paris Agreement, will have more ambitious NDCs (H<sub>4</sub>).

The second strand of literature on the relationship between public opinion and climate change addresses how the public's *values* can affect climate policy. A value can be understood as a fundamental and lasting human attribute, from the basis of which norms, attitudes, opinions and behavior can emanate (Rokeach 1968). The relationship between values and climate policy is more complex than the relationship between attitudes and policy, as a number of different values or value sets are potentially relevant (Feinberg and Willer 2012, Kvaløy *et al* 2012, Cherry *et al* 2017a, Cherry *et al* 2017b). In this analysis, we include two main value sets as explanatory variables: a materialist-postmaterialist dimension and a nativism-cosmopolitanism dimension. We measure the prevalence of these value sets in countries with data from the World Value Survey (2016).

First, the materialist-postmaterialist dimension is included because Ronald Inglehart's postmaterialism thesis is the principal theory for explaining pro-environmental attitudes in the literature on green values (Dunlap and York 2008, Kvaløy *et al* 2012, Franzen and Vogl 2013). Inglehart (1995) contends that people with postmaterialist values—such as self-expression and the quality of life—are more inclined to support protection of the environment than people with materialist values, i.e. people emphasizing economic and physical security. In the literature, postmaterialist values have been shown to spur the emergence of environmental movements, green parties, environmental concern, and green activism (Abramson and Inglehart 1995, Grob 1995, Booth 2017). Inglehart's value theory leads us to hypothesize that post-materialist values among citizens have a positive effect on countries' mitigation ambition level (H<sub>5</sub>).

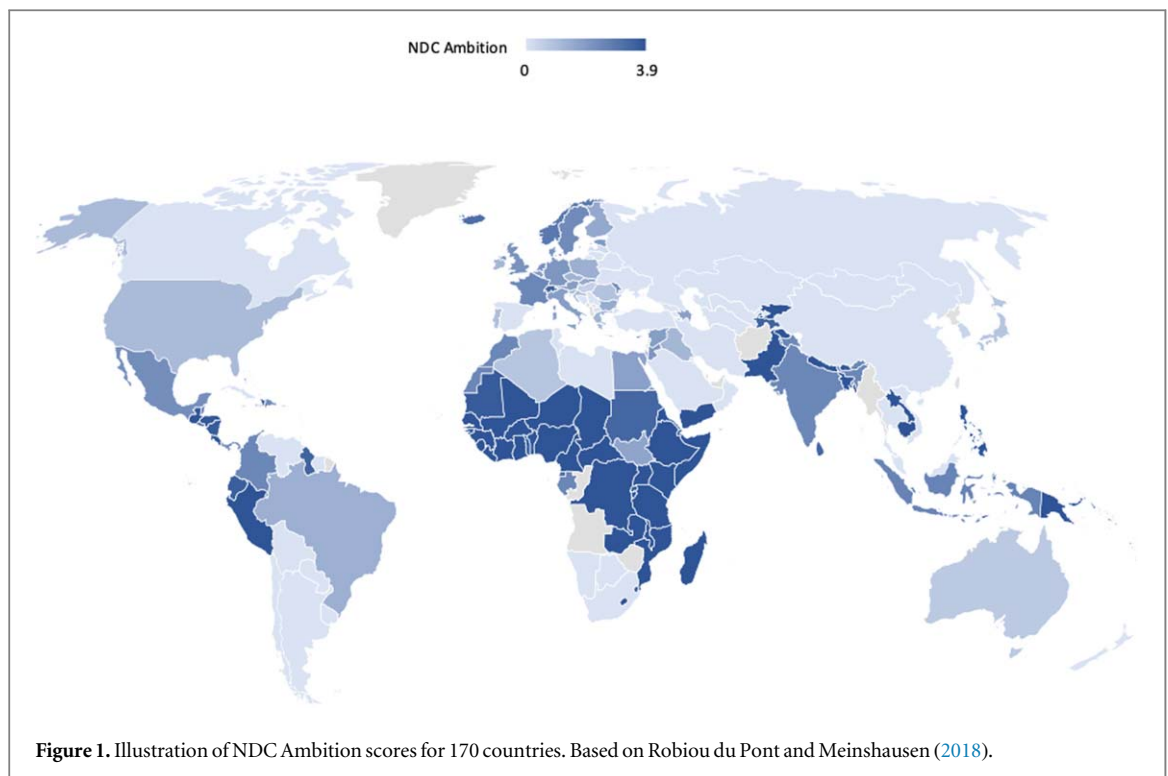
Second, studies have found a strong relationship between right-wing populist views and hostility to climate policies (Gemenis *et al* 2012, Lockwood 2018). A defining feature of right-wing populism is nativism (Mudde 2007), which favors national self-interest over international cooperation, and is the opposite of cosmopolitanism (Inglehart and Norris 2016). We hypothesize that cosmopolitan values have a positive effect on countries' mitigation ambition under the Paris Agreement (H<sub>6</sub>). Table 1 summarizes our hypotheses.

## Methodology

To assess whether the objective and subjective climate policy factors are related to the ambition level of NDCs, we conduct a statistical analysis on a sample of 170 countries<sup>7</sup> that have submitted NDCs. To measure these countries' climate ambition, we use data from Robiou du Pont and Meinshausen (2018), who apply a hybrid allocation approach to estimate the global

<sup>7</sup> Our analysis includes 170 countries because this is the number of countries that are included in the dataset provided by Robiou du Pont and Meinshausen (2018). Countries for which NDC ambition data are unavailable are colored gray in figure 1. The 170 countries are listed in supplementary text 4 is available online at [stacks.iop.org/ERL/15/024021/mmedia](https://stacks.iop.org/ERL/15/024021/mmedia). Note that the EU submitted one NDC with EU-wide targets, and Robiou du Pont and Meinshausen (2018)'s data on NDC ambition are based on that NDC. This means that the NDC ambition variable does not take into account differentiated targets that have since been negotiated within the EU.





temperature impact consistent with each given country's NDC, assuming that efforts were distributed based on the effort-sharing principle most lenient for the given country. The principles included are capability to pay (GDP per capita), historical responsibility (convergence to equal cumulative per capita emissions), and equality (convergence to equal per capita emissions). The data includes high, low and average scores for each country; we mainly use the average scores. These scores range from 1.2 °C warming (most ambitious) to over 5.1 °C (least ambitious). We invert the scale to facilitate interpretation, so that higher scores mean higher ambition, with a range from 0 to 3.9. Scores are displayed in figure 1, which shows that the bulk of the most ambitious countries are African. Additionally, a few Asian and South American countries—such as Pakistan and Peru—have NDC targets that are rated as 1.2 °C consistent. Switzerland is rated the most ambitious developed country, being 1.6 °C consistent. The NDCs of major emitters such as China, Russia, Saudi Arabia and South Africa are rated as the least ambitious—i.e. consistent with more than 5.1 °C warming.

We use this assessment as our dependent variable because it has global coverage, minimizes the normative choices made, and avoids making counterfactual assumptions about business-as-usual emissions. However, there is no agreement between countries on what constitutes a fair differentiation of efforts, and some scholars disagree with some of the normative choices necessary to Robiou du Pont and Meinshausen's (2018) analysis. Their selection of principles is based on a categorization from the IPCC, but this is not universally accepted as an authoritative and

ethically robust taxonomy (Kartha *et al* 2018). Normative choices are also needed to operationalize the principles. For example, historical emissions are counted from 1990; an earlier start date would redistribute effort from developing to developed countries. Furthermore, the two other principles include a transition period until 2040, meaning that a large share of remaining emissions are allocated proportionally to current emissions (Kartha *et al* 2018). Due to this lack of consensus, we perform sensitivity analyses using alternative NDC assessments from Germanwatch (Burck *et al* 2018) and Climate Action Tracker (2019). Our main results are robust to these alternative specifications.

The independent variables in our analysis are the four objective factors and three subjective factors identified in the literature review above. We collect data for these variables from a range of different data sources (ND-GAIN 2015; Pew Research Center 2015; World Bank 2015a, 2015b, 2015c, 2016; World Value Survey 2016; Coppedge *et al* 2017). Data is more widely available for the objective than the subjective factors, limiting the statistical power of the analyses of the latter. Nevertheless, our data on subjective factors cover a representative sample of countries from all regions of the world, listed in supplementary text 4. Table S1 in supplementary text 1 lists key information about all variables used for the quantitative analysis. Ordinary least square regression models are used to fit the data. Supplementary text 3 contains additional regression models that include different configurations of independent variables than the models discussed here; additional independent variables; and additional dependent variables that take into account

**Table 2.** Ordinary least squares regressions explaining NDC ambition as a function of objective and subjective domestic factors.

	<i>Dependent variable:</i>			
	NDC ambition			
	(1)	(2)	(3)	(4)
Constant	7.102*** (2.431)	12.388 (8.775)	−3.109 (2.186)	3.342 (4.499)
GDP/Capita (log)	−0.803*** (0.178)	−0.991* (0.545)		−0.873*** (0.313)
Democracy index	1.574*** (0.417)	2.856*** (0.817)		1.128 (0.730)
Coal rent	−0.963** (0.370)	−1.988*** (0.719)		−1.252* (0.677)
Natural gas rent	−0.068 (0.054)	−0.126 (0.557)		−0.218* (0.126)
Oil rent	0.022 (0.021)	0.129 (0.259)		0.020 (0.034)
Vulnerability index	4.169* (2.111)	4.912 (6.148)		5.552 (4.245)
Paris agreement support		−1.626 (1.282)		
Postmaterialism			−0.267 (0.521)	0.692 (0.580)
Cosmopolitanism			1.815*** (0.596)	0.575 (0.588)
Observations	149	38	53	51
$R^2$	0.532	0.682	0.158	0.517
Adjusted $R^2$	0.512	0.608	0.124	0.425
$F$ statistic	26.887*** (df = 6; 142)	9.193*** (df = 7; 30)	4.681** (df = 2; 50)	5.616*** (df = 8; 42)

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

the conditionality of NDCs. All results presented below are robust to these alternative model specifications. The data used for the analysis and instructions to reproduce the results are available online (Tørstad *et al* 2019).

## Empirical analysis

### Regression results

To test the six hypotheses outlined in the literature review, we fit four regression models with NDC ambition as the dependent variable and the objective and subjective factors as independent variables. The results are presented in table 2 above. Model 1 includes the objective factors; model 2 includes the objective factors and citizens' support for taking on mitigation policies under the Paris Agreement; model 3 contains only the values, while model 4 adds the objective factors as controls. Selected bivariate relationships are plotted in supplementary text 2.

### Objective factors and ambition

First, GDP per capita has a strong negative association with ambition. The bivariate correlation is strongly negative (Pearson's  $r = -0.65$ ,  $p < 0.01$ , see supplementary figure S2), and the effect is also significant in a regression controlling for other objective factors, as shown in model 1 in table 2. Thus, poorer countries are more ambitious than richer ones, also when holding other factors constant. The model predicts that a 1% increase in GDP/Capita corresponds to a 0.38% reduction in NDC ambition (evaluated at the variables' means across these 149 countries). The negative effect of GDP per capita also holds across two alternative NDC ambition metrics (see table 3). However, as noted earlier, we do not posit that there is a causal effect of GDP, because richer countries are held

to higher standards than poorer countries in the three assessments we rely on.

Second, the bivariate relationship between Vulnerability and NDC ambition is strongly positive (Pearson's  $r = 0.63$ ,  $p = 0$ ), as hypothesized. In the regression model above model 1 in table 2, Vulnerability has a positive effect on ambition significant at 10% level. The effect is relatively large: a 1% increase on the Vulnerability index corresponds to 0.87% increase in NDC ambition.

The two other statistically significant effects in model 1 are from Democracy and Coal rent. The hypothesis that democratic countries have more ambitious climate policies than non-democracies finds support in the regression model. The model shows that democracy has indeed a positive and statistically significant effect on NDC ambition. However, the effect is smaller than for Vulnerability: a 1% increase in the Democracy index corresponds to 0.29% increase in ambition. Further, the effect of Democracy is conditional on controlling for the effects of the other objective variables, as the bivariate correlation with ambition is weak and insignificant (Pearson's  $r = -0.12$ ,  $p = 0.13$ ; see figure S2 in supplementary text 2).

Fourth, we hypothesized that fossil fuels rent would have a negative effect on NDC ambition. Our regression model finds that there is a relationship between fossil fuels endowments and ambition, but that the type of fossil fuels matters: while the effects of oil and gas are negligible, coal rent has a negative effect on ambition in our sample. The raw coefficient implies that an increase in coal rent of 1% of GDP corresponds to decreased ambition by roughly 1 °C. However, mean coal rent is only 0.07% of GDP, translating into a low elasticity of  $-0.03$ .

**Table 3.** Objective factors and two alternative NDC ambition metrics.

	Dependent variable:	
	CCPI 2019 (1)	CAT 2019 (2)
Constant	230.778*** (64.415)	10.199* (5.328)
GDP/ Capita (log)	−16.360*** (5.186)	−0.795** (0.376)
Democracy index	18.786** (7.979)	0.934 (0.783)
Coal rents	−14.785** (7.195)	−0.852 (0.642)
Natural gas rents	0.831 (2.739)	−0.225 (0.319)
Oil rents	−1.113* (0.606)	−0.001 (0.055)
Vulnerability index	−60.645 (52.912)	0.184 (5.096)
Observations	53	28
R <sup>2</sup>	0.438	0.464
Adjusted R <sup>2</sup>	0.365	0.311
F statistic	5.973*** (df = 6; 46)	3.033** (df = 6; 21)

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

### Public attitudes and ambition

We now proceed to the effects of subjective factors on NDC ambition and discuss hypotheses 5–8. First, we expected that public support for taking on mitigation policies under the Paris Agreement would lead to higher NDC ambition. However, our data indicate little support for such a relationship. Figure S3 in supplementary text 2 displays the bivariate relationship between average public support for the Paris Agreement and countries' NDC ambition level. The two variables are not significantly correlated (Pearson's  $r = 0.16$ ,  $p = 0.32$ ). It should be noted, however, that statistical power is limited by the lower number of countries for which data on attitudes is available (39 in the bivariate analysis and 38 in the regressions)<sup>8</sup>. Additionally, there is very low variation in this explanatory variable, which limits its ability to explain variation in the outcome variable, reflecting the publics in all these countries strongly supported their own country taking on mitigation policies under the Agreement.

The relationship between public support for mitigation policies under the Paris Agreement and a country's NDC ambition level is not strengthened by controlling for the effects of other variables. Regression model 2 includes the Paris Agreement support variable along with the objective factors from the previous model. The model does not corroborate H<sub>5</sub>, which proposed that public support for taking on mitigation policies under the Paris Agreement would lead to higher NDC ambition. On the contrary, the model suggests that the effect of Paris Agreement support on NDC ambition is negligible when controlled

<sup>8</sup> These countries are listed in supplementary text 4.

for the objective factors. As in model 1, GDP, Democracy and Coal rent are statistically significant factors.

### Public values and climate ambition

We now turn to the second part of the analysis of subjective factors, which asks whether citizens' values affect the ambition level of climate policy. We test two hypotheses: that postmaterialist (H<sub>5</sub>) and cosmopolitan (H<sub>6</sub>) values among citizens should lead to more ambitious climate policy for a given country.

Simple correlation analysis indicates that cosmopolitanism is more closely related to NDC ambition than postmaterialism. While postmaterialism and NDC ambition are unconnected (Pearson's  $r = 0.02$ ,  $p = 0.9$ ) in our sample, cosmopolitanism and NDC ambition are moderately positively correlated (Pearson's  $r = 0.38$ ,  $p = 0.005$ ). Also here, the number of observations (53) limits statistical power (see footnote 8).

The same relationships still hold when regressing NDC ambition on the two values without including other control variables (model 3)<sup>9</sup>. However, when the objective factors are included as controls (model 4), the significance of cosmopolitanism vanishes. Instead, GDP and fossil fuels rent are again the strongest predictors, with detrimental effects on ambition.

### Sensitivity to NDC ambition metric

We test whether the findings on objective factors hold for two different operationalizations of NDC ambition. Model 1 below uses Burck *et al's* (2018) Climate Change Performance Index (CCPI) as dependent variable. Model 2 below uses Climate Action Tracker (CAT)'s (2019) rating of 28 countries' NDCs as dependent variable. Compared with the main results, all coefficients have the same signs, except for Vulnerability based on CCPI, but this may be due to a lack of highly vulnerable countries in the CCPI dataset. With much lower number of observations, especially in CAT, fewer effects are significant; but the negative effect of GDP/Capita is significant across the two models. Based on CAT, oil rents have a negative effect significant at the 10% level. Note that unlike Robiou du Pont and Meinshausen (2018), these two alternatives include implementation of NDCs when assessing ambition.

### Sensitivity to conditionality in NDCs

Our analysis finds that low GDP/capita and high vulnerability are associated with high ambition. However, the fractions of NDCs where the mitigation component is conditional on financial support from developed countries is larger among low-income countries and small-island developing states

<sup>9</sup> In supplementary text 2, we also show that the relationship between Cosmopolitanism and NDC ambition is robust to a different operationalization of the Cosmopolitanism-Nativism scale.



**Table 4.** Summary of findings.

Hypothesis	Result	Finding
H <sub>1</sub> : Vulnerability to climate change has a positive effect on a country's mitigation ambition level	Supported	Vulnerability has a positive effect on NDC ambition
H <sub>2</sub> : Democracy has a positive effect on a country's mitigation ambition level	Supported	Democracy has a positive effect on NDC ambition
H <sub>3</sub> : Fossil fuels rent has a negative effect on a country's mitigation ambition level	Partially supported	Only coal rent, not oil and gas, has a negative effect on NDC ambition
H <sub>4</sub> : Public support for taking on mitigation policies under the Paris Agreement has a positive effect on a country's mitigation ambition level	Not supported	We find no evidence of a relationship between the two variables
H <sub>5</sub> : Postmaterial values of citizens have a positive effect on a country's mitigation ambition level	Not supported	We find no evidence of a relationship between the two variables
H <sub>6</sub> : Cosmopolitan values of citizens have a positive effect on a country's mitigation ambition level	Mixed evidence	Moderately strong bivariate relationship, but no statistically significant effect when control variables are included

(including some with relatively high income) than among other countries. It could therefore be that these countries appear more ambitious than others because they have included conditional contributions. Adjusting for conditionality could in principle also affect other results obtained. We therefore perform three tests on whether the results are sensitive to such conditions, reported in supplementary tables S7–S9 and accompanying discussion. In summary, our results appear robust to how we handle conditionality of NDCs.

## Discussion and conclusions

Responding to a call from the literature about the need for delineating the empirical drivers of climate ambition, this paper has theoretically outlined, and empirically tested, the relationship between various domestic politics variables and countries' pledged NDC ambition under the Paris Agreement.

By regressing the ambition level of 170 countries' NDCs on nine potential explanatory factors, we find four objective factors to be robust predictors of climate policy ambition. Table 4 summarizes our findings. Democracy and Vulnerability to climate change have positive effects on NDC ambition, while Coal rent has a negative effect. These findings, which are consistent with self-interested state behavior, affirm three of our hypotheses about the drivers of climate policy. Further, GDP has a negative coefficient across all models, illustrating that poorer countries have on average pledged more ambitious climate policies than wealthier ones, according to the assessment on which this analysis is based (Robiou du Pont and Meinshausen 2018).

The effects of Democracy and Coal rent offer policy implications. Democratic institutions have been blamed for causing climate policy inertia by fostering short-sighted politicians that are susceptible to special interests (e.g. Jamieson 2014, Runciman 2018). However, our results highlight the importance of

distinguishing the effects of form of governance from the influence of special interests: democracy is associated with higher climate ambition, while Coal rents have a robust negative effect across the models. These findings suggest that ensuring strong accountability between political leaders and citizens and reducing coal dependence are two political strategies that likely will affect NDC ambition positively. Notably, measures to reduce coal dependence could have a double and self-reinforcing effect on emissions. In addition to reducing emissions directly, they make it politically easier to raise policy ambition. In this light, the recent coinciding trends of increased autocratization (Lührmann *et al* 2018) and rebound in coal production in large countries such as China, India, Indonesia and Russia (Enerdata 2018) reduce the likelihood of countries increasing ambition when updating or revising NDCs in 2020.

Of subjective factors, we find no evidence of a relationship between citizens' support for taking on mitigation policies under the Paris Agreement and countries' NDC ambition, nor between postmaterial values and ambition. However, a moderately strong bivariate relationship between cosmopolitanism and NDC ambition suggests that the effects of this value are worth investigating further in future research. This variable is of great political interest, because it measures a defining feature of right-wing populism, which extant research has shown to indicate increasing political polarization on climate politics (Fraune and Knodt 2018). It would be interesting to explore and explain the relationship between cosmopolitanism and support for climate policies, using individual-level data. To the extent there is a negative relationship between right-wing populism and NDC ambition, it further decreases the likelihood of increased NDC ambition in 2020, as there has been a rise of right-wing populist parties and politicians globally (Rooduijn 2019), particularly after current NDCs were formulated. This trend calls for research on the effects on climate policy when right-wing populist parties gain political power.

The weak effects of subjective factors on climate policy ambition is not sufficient evidence for rejecting that these factors matter. The primary caveat to this analysis is the lack of data on relevant subjective factors covering a large number of countries. In the analysis of subjective factors, the sample size is reduced by some 100 countries compared with the analysis of objective factors only, resulting in reduced statistical power. Additionally, in the case of the Paris Agreement support variable, most populations expressed strong support for taking on mitigation policies under the Agreement. The low cross-country variation on the variable precluded strong effects in the regressions. However, the lack of variation on this variable may be good news for the compliance prospects of the Paris Agreement, as the high scores across the sample indicate that most countries have a strong mandate in domestic electorates for implementing mitigation policies under the Agreement. Hence, even though the objective factors come out as more important than the subjective factors in the current analysis, the effect of subjective factors should be further tested on a larger sample of countries when more data become available. Future research should therefore survey climate change attitudes and related values in more countries. Further, comparative case studies that explore the relative effects of subjective and objective factors on climate ambition in countries that have extreme values on the ambition variable could be useful.

Finally, this paper has analyzed climate policy commitments, but not the degree to which these are actually put into effect. While our findings largely hold for two alternative NDC ambition metrics that incorporate both ambition and implementation, future research should further explore whether the effects identified here also apply for the implementation stage of NDCs when more such data become available.

## Acknowledgments

The authors would like to thank Hanspeter Kriesi, Øyvind Stiansen, Vegard Wiborg, CICEP board members, participants at the ‘Sharing the Burden?’ workshop at the Institute for Future Studies—Stockholm 21–22 February 2019, and two anonymous reviewers for helpful comments and suggestions. Any remaining errors or omissions are the sole responsibility of the authors.

## Data availability statement

The data that support the findings of this study are openly available at <https://doi.org/10.7910/DVN/ZPDOYT>.

## Funding

This work was supported by Research Council of Norway, projects no. 261491 and 209701.

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