Domestic and International Climate Policy: Complements or Substitutes?

Lauri Peterson
Department of Government

2019-02-04

Abstract

Climate change is a global crisis that will require countries to act in both domestic and international arenas. Country efforts, however, vary greatly in their ambition. While scholarly work has begun to assess the variation in climate policy ambition, only a few studies to date have tried to explain whether international climate policy serves as a complement or a subsitute for domestic climate policy. According to the standard view, countries that are more ambitious at home should also be expected to be more ambitious abroad. Many scholars, however, portray this relationship as substitutional where countries need to balance the conflicting demands of the domestic constituencies and international pressures, while preferring the former over the latter. The study uses quantitative methods and employs data from the OECD DAC dataset on climate finance in order to account for international climate aid policy ambition. Overall, the study makes two major contributions. First, it provides evidence that international climate finance commitments are complementary with domestic climate ambition. Second, the article identifies the interaction of domestic climate policy ambition and physical exposure to climate change.

1 Introduction

The United Nations Framework Convention on Climate Change (UNFCCC) obligates developed countries[1] to take on ambitious domestic actions in order to keep global temperature rise well under 2°C this century. Moreover, the Kyoto Protocol UNFCCC (2012) and the Paris Agreement (UNFCCC, 2015) require developed countries to contribute additionally a significant amount of international climate finance to assist developing countries prevent and cope with climate change as GHG emissions are growing the fastest in developing countries (Olivier et al., 2017). The relationship between domestic and international climate policy is a particularly timely issue, given that climate change is an urgent problem that is managed primarily within countries but which disregards political borders.

Since the 2000s, most developed countries have implemented some form of policies on the local

[1] In this case I refer to the Annex I countries as developed countries.

or national level in order to address such imminent issues like air pollution and the threat of coastal flooding. Climate change, however, is a global crisis that requires additional efforts on the international level (Sachs, 2015, 394). In response, developed countries promised at the 2009 Copenhagen climate summit to provide $100 billion of international climate finance per year by 2020 to help developing countries cope with the impacts of climate change and transition to lower carbon economies. This assistance is commonly referred to as international climate finance or climate aid (Gupta et al., 2014, 1238).

While funding for domestic climate policies is greater than for international policies UNFCCC (2016, 6), domestic and international climate policies demonstrate significant variation. Burck et al. (2018, 18), for instance, find it noteworthy that "many countries, including Canada, Germany, Argentina and South Africa, are performing relatively well on the international stage, yet seem to be failing to deliver on sufficiently implementing policy measures at the national level". Since a large part of the literature on environmental politics argues that countries are more likely to take on international action when domestic policies are impeded (Michaelowa and Michaelowa, 2007b), the question is whether the level of domestic ambition is truly complementary for international action or a substitution for it.

Research on the variation of climate policies is on the rise. This study investigates whether international climate ambition depends on domestic climate ambition or if it follows a different logic, due to the lower cost of reducing emissions abroad or levelling the playing field for local companies. Hence, this paper aims to add to the emerging literature on climate policy by contributing to the debates surrounding international climate financing (Lachapelle and Paterson, 2013; Madden, 2014; Tobin, 2017; Røttereng, 2018; Schmidt and Fleig, 2018). Previous studies have already investigated the effect of international support for domestic policies (Neuhoff, 2009), the patterns of national climate policies (Schmidt and Fleig, 2018) and the variation in the implementation of the UNFCCC (Dolšak, 2009). Scholars have focused on the effect of democracy on climate policy (Bättig and Bernauer, 2009) but also on the impact of domestic climate policies on sub- or non-state governance (Andonova and Tuta, 2014; Andonova et al., 2017; Roger et al., 2017). Very few papers simultaneously compare variation in international climate ambition by way of domestic climate ambition. Empirically, I am interested in finding out whether domestic and international climate policies are complementary, with more climate ambitious countries deciding to tackle both levels at the same time, or substitutes, as countries

prioritize one over the other. Beyond the effect of domestic climate ambition, I investigate which factors shape the relationship between domestic and international climate policies. More specifically, I determine whether the relationship is shaped by physical exposure to climate change, domestic industrial opposition, or the economic resources of developed countries.

The article is organized as follows. The first section introduces the theoretical framework, which is followed by sections describing the methods and the data. The third section presents the empirical results. The final section concludes with a discussion of the implications of the study.

2 Theoretical Framework

Tackling climate change domestically or globally is one of the central dilemmas of modern climate change policy (Platjouw, 2009, 244). The domestic/international divide is an important catalyst for the debates surrounding top-down and bottom-up debates on climate policy. International climate finance has been argued to provide the best solution for tackling climate change as greenhouse gas emissions would be reduced where reduction is the cheapest. While political science scholarship is beginning to engage with the variation in climate policies (Bättig and Bernauer, 2009; Bernauer, 2013; Harrison and Sundstrom, 2010; Lachapelle and Paterson, 2013), a lack of knowledge on the variation of domestic and international climate policy ambition still prevails. Similarly to VanDeveer and Steinberg (2013), I recognize the need for research that combines domestic politics and institutions with interactions in international environmental politics.

The studies that have engaged with both domestic and international climate efforts generally focus on the impact of domestic politics on international climate negotiations or *vice versa* (Bang et al., 2007; Bernstein, 2002; Cass, 2005; Dolšak, 2009; Sprinz and Weiß, 2001). Ingold and Pflieger (2016) identify actors' perspectives on both domestic and international Swiss climate policies. Platjouw (2009) measures the ratio between various types of international emissions trading schemes and domestic policies. Michaelowa and Michaelowa (2011) investigate the effect of international climate treaties on the share of renewable energy projects in bilateral aid.

I define domestic ambition as *complementary* for international climate financing when countries tackle both levels ambitiously. Nevertheless, when countries are more ambitious domestically and less internationally, I interpret it as *substitution*.

The current paper can be placed in the emerging scholarship in the field of comparative climate policies with an emphasis on international climate finance but differentiates itself from previous studies. First, this study aims to provide generalizable results. As such, I aim to provide a contribution to the underlying debate surrounding domestic and international climate ambition. Many policy-makers find it self-evident that domestic and international efforts of states are complementary, whereas much of the theoretical and empirical literature disagrees. Second, I aim to employ quantitative methods, which are still not common in this research area as Bernauer (2013, 434) notes that "[l]arge-N comparisons of many countries [...] are still rare" . The majority of peer-reviewed research exploring climate policy ambition relies on qualitative methods and case studies (Andonova, 2008; Atteridge et al., 2012; Christoff and Eckersley, 2011; Compston and Bailey, 2016; Harrison, 2007; Tobin, 2017). Third, whereas most studies on climate finance focus either on mitigation (Halimanjaya, 2016) or adaptation (Betzold and Weiler, 2017; Robinson and Dornan, 2016; Weiler et al., 2018), this study combines both, expecting that they are part of a similar aid agenda. Therefore, I assume that country ambition for climate change mitigation or adaptation is governed by the same mechanisms as prescribed by the Copenhagen Accord. This provides the study an opportunity to compare international climate policy with its domestic counterpart, which includes policies/investments in both climate change mitigation and adaptation.

Most studies have tackled this issue by comparing domestic climate action with the outcomes of UNFCCC negotiations. I find that international climate finance from public sources is a more appropriate stand-in for international climate policy ambition than treaty accession as climate treaties do not necessarily represent international climate policy ambition. This phenomenon is also known as the "words-deeds" gap in policy-making (Bättig and Bernauer, 2009): what countries agree upon at climate summits ("words") does not necessarily translate into policy ("deeds").

Conventional wisdom expects that highly ambitious countries excel in both domestic and international domains. This paper investigates whether domestic climate policy is complementary for international climate finance as literature on climate economics would predict, or substitutes per recent literature on comparative climate politics (Andonova and Carbonnier, 2014; Platjouw, 2009; Hicks et al., 2008). Essentially, I ask the following research question:

1. Does international climate policy complement or substitute domestic climate policy?

While domestic climate policies are to some extent required by international climate treaties (overall targets but usually not measures), the level of effort for international climate financing has been (up to now) largely voluntary by the member states of the UNFCCC. Hence, the paper aims to identify the factors that *govern* the variation in domestic and international climate policy. Consequently, I pose the second question:

2. Which factors affect the relationship between the level of ambition in domestic and international climate policies?

The policy-community overwhelmingly expects domestic climate policy to be complimentary for international climate policy. For instance, the OECD Secretary-General Angel Gurría (2017) hints that national climate policies and international climate finance create a powerful dynamic that is conducive to climate action. Eric Usher, Head of UNEP Finance Initiative, voiced similar opinions to the high-level representatives of the COP23 Finance for Climate Day in November 2017. Usher emphasized the two main gaps of the climate challenge: countries need to increase both the domestic ambition of their NDCs (Nationally Determined Contributions – domestic post-2020 climate goals) and bridge the gap in global climate investment (UNFCCC, 2017).

According to current literature, domestic climate policy may be complementary with international climate financing for three predominant reasons. First, climate change connects both domestic and foreign policies because it is a global issue where national borders bear very little meaning for true outcomes. Funding that is spent abroad has essentially the same effect as funds spent at home due to the global character of climate change. For example, greenhouse gas emissions add to global atmospheric concentrations regardless where they originate from. The most cost-effective climate change programs would be located in developing countries (Bosetti et al., 2009; Landis and Bernauer, 2012). Likewise, international investments in climate change adaptation are most needed in the Least Developed Countries, which are the most vulnerable countries (Huq et al., 2004; King and Harrington, 2018).

Second, high donor commitment for climate finance signals overall interest and engagement in environmental protection. Michaelowa and Michaelowa (2011) suggest that donor government's "green beliefs" tend to extend to the international environmental arena. So called "green" countries that are willing to spend larger sums on environmental issues may also be more eager to solve environmental problems beyond their borders (Klöck et al., 2018, 2). As such, developed

countries would be compelled to take climate action simultaneously both at home and abroad.

Third, countries may exploit climate financing as an extension of domestic climate policy-making. Falkner (2005, 587), argues that extensive support for international environmental financing signals donor commitment to "internationalize" domestic environmental policy. The United States, for example has sought to export environmental regulations to level the playing field for its domestic industry (Kelemen and Vogel, 2010). Neuhoff (2009) finds that by increasing financial support for international climate projects, especially related to renewable energy, donors can increase confidence in new climate technology and enable a more stable domestic investment environment. Castro (2010, 3) points out that developed countries with highly ambitious domestic climate policies may be urged to support the emission reductions in developing countries due to the danger of losing out on industrial competitiveness.

However, not all scholars agree with this conclusion. Ingold and Pflieger (2016) demonstrate, based on the example of Switzerland, that a country can maintain very different climate policy objectives domestically and internationally. Most notably, Putnam (1988, 434) describes domestic and foreign policy as a "two-level game", whereas national administrations need to balance domestic pressures on the domestic level, while the same time "[a]t the international level, national governments seek to maximize their own ability to satisfy domestic pressures, while minimizing the adverse consequences of foreign developments". While this does not necessarily refer to substitution, it does point towards an important cleavage between domestic and international policies. Emerging literature on voter behavior finds that the electorate prefers domestic spending to international climate policies since it provide the clearest local benefits (Neuhoff, 2009). The results of Buntaine and Prather's 2018 recent study indicate that voters consider domestic and international climate policy as substitutes.

More so, international climate spending may substitute domestic expenditure on climate change policies. Røttereng (2018, 70) claims that developed countries such as Canada and Japan engage more in international climate policies even when their own emission reduction targets are less ambitious. The author purports this may be due to the fact that countries do not want to be bound by domestic mitigation targets established by the international climate regime, but nevertheless acknowledge mitigation as an international norm that needs to be upheld. Michaelowa and Michaelowa (2007a) suggests that international climate finance is utilized as an alternative to domestic climate policies. They assert that poliycmakers in developed countries have real-

ized that domestic climate policies are bound to encounter considerable opposition from interest groups in the industrial sector. Thus, they substitute domestic efforts for international climate policy mainly because development assistance is not opposed by influential lobbies in the same way as domestic climate policies are opposed by the industry (Michaelowa and Michaelowa, 2007a, 18).

The first step of this study is to investigate whether domestic and international climate policies are on average complementary or substitutional. Hence, I introduce the overarching hypothesis on the complementarity or substitution:

Hypothesis 1: The more ambitious countries' domestic climate policies are, the more funding they will provide for international climate finance.

As is the case with variation in policy-making, I agree with Christoff and Eckersley (2011, 444) and Tobin (2017) that finding a single or a small number of factors that influence policy ambition is a "near-futile exercise". Nevertheless, I find that it is meaningful to identify broad patterns in policy ambition, which give way for future research efforts. As such, I point out several factors in the next section that likely affect the relationship between domestic and international climate policy.

2.1 Climate Exposure

One of the most relevant international factors is physical exposure to climate change – the extent to which a country is exposed to the physical impacts of climate change (e.g. increased flooding, sea level rise and forest fires). According to current estimations by several organizations measuring climate exposure and vulnerability (Kaly et al., 2004; Chen et al., 2015), some developed countries are more exposed to climate change (i.e. Australia and South European countries), while others are estimated to be relatively less exposed (i.e. Finland and Sweden).

Christoff and Eckersley (2011, 445), however, contend that exposure and vulnerability may not be good predictors of domestic climate ambition: "vulnerability turns out to be a very poor predictor of strong climate performance". Countries that ought to be very vulnerable to the physical impacts of climate change (such as Australia) are actually climate laggards in domestic climate policies.

Nevertheless, as voters become more aware of climate change and the threat it poses, govern-

ments may prioritize their own self-preservation over the security of foreign countries. Sprinz and Vaahtoranta (1994) find that environmental efforts are conditional on countries' ecological vulnerability and the marginal cost of tackling climate change (abatement costs). A similar conclusion is reached by Heggelund (2007), who predicts that as vulnerability to climate change increases, it will in turn increase the importance of climate change in domestic policy-making. For instance, more exposed countries would be compelled to prioritize domestic adaptation activities in order to protect themselves from physical impacts such rising sea levels and droughts. Empirical results by Klöck et al. (2018, 2) show that donor countries, which are more exposed to climate change invest less funds abroad in terms of climate financing.

Previous studies have not tested whether countries that are more ambitious at home provide less climate finance if they are more exposed to climate change. I expect more vulnerable countries to prioritize domestic climate policies in order to safeguard against future climatic changes at home, such as more frequent forest fires, more intense tropical cyclones or longer periods of drought – depending on the country. Domestic climate policy may serve as a signalling mechanism to local voters that climate change is taken seriously by decision-makers. Moreover, domestic climate policies tackle local air pollution, that affects locals more than international transfers (Dolšak, 2009).

This does not necessarily mean that I expect countries to formulate very long-term plans due to climate change. Instead physically exposed countries likely tackle climate adaptation at home because many of them (i.e. Spain and Italy) are already enduring the impacts of climate change such as record-breaking heatwaves and wildfires. Europe has already endured a number of extreme heatwaves since 2000 such as in 2003 and 2010 (EEA, 2018). Consequently, I develop the following hypothesis regarding the threat of climate change and domestic climate policy:

Hypothesis 2: The more exposed a country is to climate change in relation to its level of domestic climate policy ambition, the less funding it provides for international climate finance.

2.2 Industry Opposition

The relationship between domestic politics and foreign policy has been a prominent motif in political science research since the publication of "Diplomacy and Domestic Politics: The Logic of Two-level Games" by Putnam (1988) that recognizes the division between domestic and

international pressures. Kincaid and Roberts (2013) in their study of President Obama's climate efforts found support for the existence of a "two-level game", in which the US administration needed to walk the tightrope of not antagonizing the industry with more stringent domestic climate regulation, while pleasing the requests of humanitarian, environmental and religious pressure groups for more climate aid. As a result, President Obama elevated climate finance within the US' budgetary agenda" (Kincaid and Roberts, 2013).

Higher ambition for international policies can be influenced by support and opposition from interest groups (Christoff and Eckersley, 2011; Madden, 2014). This description primarily includes groups that are negatively affected by climate policies, such as fossil fuel and energy-intensive industries, whose profits are dependent on actively resisting ambitious domestic climate policies. Steves and Teytelboym (2013) and Rafaty (2018) confirm this expectation by discovering that a strong carbon-intensive industry hinders the adoption of climate policies. Michaelowa and Michaelowa (2007b) note that policymakers may turn to international climate finance when more far-reaching domestic climate policies are strongly opposed by domestic industry interest groups. Ingold and Pflieger (2016, 32-33) conclude that domestic interest groups will oppose restrictive domestic climate measures but remain apathetic toward international climate policy that does not immediately affect them.

Hence, I expect that developed countries strong industrial interest groups will oppose domestic climate policy but accept international climate financing. Hence, the third hypothesis on the effect of the energy-intensive industry is the following:

Hypothesis 3: The larger a country's share of the energy-intensive industry is in relation to the level of its domestic climate policy ambition, the more funding it provides for international climate financing.

2.3 Resources

The third explanatory factor are the country's *resources*. A large part of the literature on environmental policy assumes that higher economic development and resources are conducive for environmental policy-making. Fordham (2011) indicates that the "capabilities-drive-intentions" is a persuasive explanation of the foreign policy ambition of states. According to this argument, "[o]nce the state becomes able to extract sufficient resources from society, it will use them to

pursue a more ambitious foreign policy" (Fordham, 2011, 589).

The empirical studies on the effect of economic development on domestic and international policies, however, have been inconclusive. Halimanjaya (2015) observe a negative relationship between GDP *per capita* and international climate financing, while Madden (2014) discovers that higher-income developed countries are less willing to adopt highly ambitious domestic climate policies. Hicks et al. (2008) find that wealthier donor countries tend to commit more funding to global environmental projects than poorer donor countries. Klöck et al. (2018) find that on average wealthier countries contribute more climate finance than poorer countries. I assume climate finance is a "luxury" that greener countries can afford given a surplus of resources.

Hypothesis 4: The higher is the GDP per capita of a country in relation to the level of its domestic climate ambition, the more funding it provides for international climate financing.

3 Methods

Bernauer (2013, 436) concludes that political science research has primarily emphasized the use of qualitative methods and case studies in order to study variation in climate change policies (Harrison and Sundstrom, 2010). This study attempts to provide further generalizability by employing quantitative methods. More specifically, this paper makes use of linear regression with year fixed effect in order to capture changes in the commitment of climate finance. The study is focused on rich developed countries that are members of the OECD. All of the countries are either included in the "Annex I" or the "Annex II" group, which according to the UNFCCC have a higher responsibility to reduce carbon emissions both at home and abroad. The overall sample is composed of 29 countries over the time period 2012-2016.

I employ international climate finance as a dependent variable since I find it a reasonable expectation that international climate financing efforts are implemented temporally after domestic climate policy. International climate policy will be based on the OECD DAC country-level data on the "Rio Marker" *climate change*, which provides information on the amount of bilateral and multilateral climate finance (both mitigation and adaptation) OECD countries provided to developing countries during 2012-2016 (expressed in constant 2014 dollars).

The study utilizes commitment data, which consists of grant or loan agreements made between

donors and recipients, providing a more recent overview of donor decisions (Betzold and Weiler, 2017; Robertsen et al., 2015) that is available for more years. The level of international climate finance is presented as climate-related aid to developing countries *per capita* per donor and year as in other studies (Halimanjaya, 2015; Klöck et al., 2018). As the dependent variable is heavily skewed toward the lower values of the distribution among the higher values, I transform the variables using the natural logarithm.

In order to test the hypotheses, I employ the conceptually most rigorous measure for domestic climate policy ambition currently available – the Climate Change Performance Index (CCPI) – which is published by Germanwatch, CAN International and the NewClimate Institute. More specifically, I employ the CCPI's sub-indicator on national climate policy that is based on a questionnaire distributed among the climate change experts of local NGO-s (Burck et al., 2018, 19). The questionnaire covers issues on domestic climate policies such as the promotion of renewable energies, energy efficiency, efforts to reduce emissions from electricity production, manufacturing and transport sectors. Moreover, the sub-indicator also rates each country's deforestation, forest degradation and national peat land protection efforts (Burck et al., 2018). In effect, the sub-indicator largely measures countries' climate change policy ambition based on experts' evaluation of a country's domestic climate policies compared to its potential capability.

The study includes a logged GDP per capita term. I follow the standard practice of development aid literature as covered by Alesina and Dollar (2000) and Weiler et al. (2018) and use GDP *per capita* (GDP/capita in the model), which is collected by the World Bank (2018b). In order to account for resources I include a log transformed country CO_2 emission intensity (CO_2 emissions *per GDP*) (CDIAC, 2018). For physical exposure to climate change we incorporate the Notre Dame Global Adaptation Initiative's (ND-GAIN) climate exposure indicator (NDGAIN, 2018), defined as "[t]he extent to which human society and its supporting sectors are stressed by the future changing climate conditions (Chen et al., 2015, 3). Lower values of the indicator (Exposure in the model) represent lower exposure and higher values signify higher physical exposure to climate change. Similarly to Fredriksson et al. (2007) and Steves and Teytelboym (2013), the study employs an approximate proxy for industrial opposition as there is no comparative data available for the size or number of industry sector lobby groups across countries. Hence, I employ the size of the carbon-intensive industry relative to GDP (manufacturing, mining and utilities).

The study does not attempt to "re-invent the wheel" – rather it includes a number of control

variables that have proven fruitful as part of previous studies on development aid and climate finance (Alesina and Dollar, 2000; Berthélemy, 2006; Klöck et al., 2018; Weiler et al., 2018). First, I control for static CO_2 intensity as the variable domestic climate ambition does not account for actual emission levels. The variable is based on data collected by the Carbon Dioxide Information Analysis Center on CO_2 emissions (kg per PPP USD of GDP) World Bank (2017). Based on the *polluter pays principle* formalized by the Rio Declaration in 1992 (UN, 1992), I expect more carbon intensive countries to provide more international climate finance.

Second, following (Halimanjaya, 2015; Klöck et al., 2018), I control for each country's institutional capacity for effective administration. I decide to use the sum of the six sub-indicators of the Worldwide Governance Indicators (WGI) (Kaufmann et al., 2010), expecting that better governed countries are more likely to provide more international climate finance. Third, I control for the size of country population with data from the World Bank (2018a). I consider anticipate that larger countries take less action per capita due to the sheer volume of their aid efforts. Finally, I also take into account the total flows of Official Development Assistance, expecting that international climate financing is at least partly determined by the *path dependence* of overall aid-giving, which has found to be the case by previous research (Klöck et al., 2018, 16).

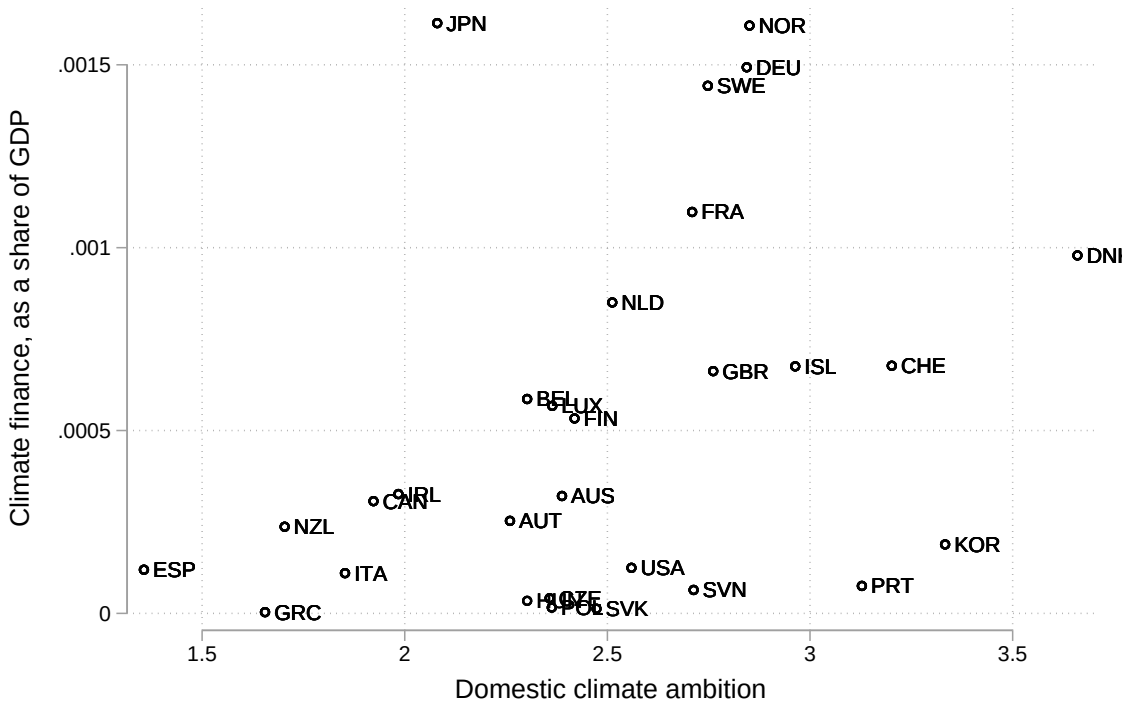
I employ an OLS model with interaction terms and robust standard errors. The interaction models aim to follow the principles of correct specification suggested by Brambor et al. (2006) by including all constitutive terms in the model specification and analyzing the marginal effects of substantively meaningful interaction terms. The first model in Table 1 shows the main effects without the inclusion of interaction terms. Models (2-4) show different interaction terms based on the aforementioned hypotheses. In order to improve comparability, all models include the same variables and the same number of observations (141).

4 Results

4.1 Descriptive Results

Figure 1 describes the relationship between average domestic climate policy ambition (CCPI national climate indicator) and average international climate finance (climate finance as a share of GDP) during 2012-2016. The relationship does not appear to be visually linear but instead

Figure 1: Average levels of domestic and international climate policy ambition (2012-2016)



conditional on other factors beyond domestic and international climate policy. At least two different country strategies can be determined. First, several of the countries fit the hypothesized results: countries that promote ambitious climate policies at home also spend more on the climate finance abroad (i.e. Norway, Germany, Sweden, France, Denmark and the Netherlands). Second, many countries stray from this pattern as they appear to be committed to climate policies at home, but are not engaged in international climate financing to the same degree (i.e. Portugal and South Korea). A third independent group can be identified as well, which can be described by relative inaction in both regards (i.e. Spain, New Zealand, Italy, Canada and Greece). Since it is not clear what the relationship is conditional on, it is fruitful to control for other factors. Thus, I turn my attention towards the results of the regression models.

4.2 Regression Results

The results of four quantitative models are presented in Table 1. The first models consists of all covariates but none of the interaction terms. The interaction terms are included in the following models (2-4). In general, the models fit the data well as the adjusted R^2 is higher than 70

percent in all cases.

As was hypothesized, model (1), which excludes interaction terms, demonstrates that a higher level of domestic climate ambition is positively associated with a higher commitment to international climate finance once other theoretically pertinent covariates are taken into account. This confirms hypothesis 1 that domestic climate policy is complimentary for international climate finance. Consequently countries that are more ambitious at home are also more likely to be ambitious internationally.

Table 1: Results of climate finance per capita, with various specifications

	(1)	(2)	(3)	(4)
Interaction effects				
Domestic ambition × Vulnerability		3.997**		
		[1.924]		
Domestic ambition × CO_2-int. industry			0.0000187	
			[0.0000307]	
Domestic ambition × GDP/capita (log)				-0.508*
				[0.282]
Covariates				
Domestic ambition	0.356***	-1.326*	0.268	5.744*
	[0.111]	[0.786]	[0.192]	[3.032]
CO_2-int. industry	0.000111***	0.000111***	0.0000638	0.0000981***
	[0.0000224]	[0.0000230]	[0.0000873]	[0.0000232]
Vulnerability	4.018***	-6.024	3.901***	3.398**
	[1.218]	[5.357]	[1.263]	[1.304]
GDP/capita (log)	-0.417	-0.475*	-0.423	0.943
	[0.277]	[0.276]	[0.277]	[0.740]
CO_2 intensity	-5.568***	-5.915***	-5.631***	-5.581***
	[0.724]	[0.752]	[0.711]	[0.782]
Governance	1.884***	1.969***	1.913***	1.765***
	[0.269]	[0.271]	[0.265]	[0.239]
Population (log)	-0.0442	-0.0651	-0.0495	-0.0220
	[0.0848]	[0.0841]	[0.0876]	[0.0899]
Total Aid	0.314***	0.323***	0.312***	0.313***
	[0.0592]	[0.0582]	[0.0604]	[0.0590]
Year Effects	Yes	Yes	Yes	Yes
Observations	141	141	141	141
Adjusted R^2	0.788	0.793	0.787	0.793

Standard errors in brackets

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The dependent variable is international climate finance per GDP (log).

Climate Exposure

Next I will turn to hypothesis 2. In model (1) without the interaction terms, I find that increased physical exposure to climate change, as measured by the ND-GAIN index, is associated with an overall higher commitment to international climate finance. This finding runs counter to Klöck et al. (2018), who do not discover a relationship between climate exposure and commitment to climate finance. The models in their paper, nevertheless, do not control for the level of domestic climate ambition. In model (2) I find that countries which are more threatened by climate change tend to provide more climate finance when they are domestically ambitious.

Figure 2 (plot 1a) shows that domestically ambitious countries with a higher than average exposure score of more than 0.4, such as Denmark, provide higher levels of international climate finance than countries with approximately the same level of domestic ambition but that score as less exposed, such as Slovenia. At lower levels of exposure (under 0.4) domestic ambition does not effectively make a difference on how much a country provides international climate finance. The results suggest the initially counterintuitive but more idealistic outcome that ambitious countries that are more exposed to climate change will aim to tackle climate change both at home and abroad. This result is in line with research on local governments: Zahran et al. (2008) find that more exposed local governments are also more likely to support climate protection commitments. Thus, I reject hypothesis 2.

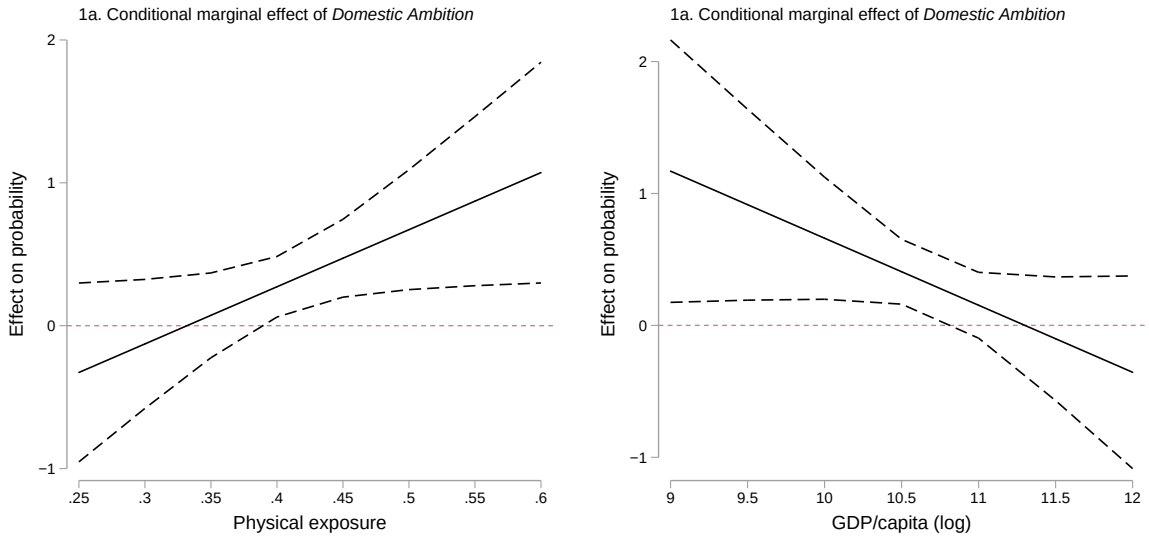


Figure 2: Marginal effects. The long dashed lines represent 95% confidence intervals. All plots are produced using plotplainblind (Bischof, 2017).

Industry Opposition

The importance of the carbon-intensive industry (percent of GDP) is included in models (1-2) and (4) as a separate covariate, and in model (3) as part of an interaction term with domestic climate ambition. The small positive but statistically significant results in models (1-2) and (4) suggest *ceteris paribus* that countries with a stronger carbon-intensive industry provide marginally more climate finance.

Buchner et al. (2017, 10) note that mitigation made up 93 percent of all climate finance between 2015 and 2016. The majority of investments were directed towards renewable energy generation. As countries with carbon intensive sectors such as steel and energy production are going through a transition, they welcome the opportunity to diversify their investments into renewable energy generation in developing countries. The effect of the industry in model (3), however, does not appear to be conditional on the particular level of domestic climate ambition in our sample. I reject hypothesis 3.

Resources

Resources have a negative but less clear conditional effect on international climate finance in model (4). The interaction term of domestic ambition and GDP per capita is significant only at the 90% confidence level. GDP per capita as an independent covariate is not a robust predictor of climate finance commitments. The effect becomes statistically insignificant during robustness testing when employing alternative specifications. Figure 2 shows that poorer countries (below the OECD average) provide more funding when domestic ambition is high. OECD countries with under average levels of GDP per capita, such as Ireland, provide more climate finance per each level increase of domestic ambition. The effect, however, decreases among wealthier countries and becomes eventually statistically insignificant at above average levels of wealth (Figure 2), approximately at the GDP per capita of the Netherlands. We can conclude that, even though the results are less stable and significant, wealthier country do not appear to provide more climate finance in relation to their level of domestic ambition. Hence, I also reject hypothesis 4.

Control Variables

I expected more carbon intensive countries to provide more climate finance. The result, however, is antithetical as the association turns out to be negative: higher intensity is associated with lower commitment to provide climate finance and *vice versa*, which is robust to different model specifications. Following previous studies by Halimanjaya and Papyrakis (2015) and Klöck et al. (2018), the model demonstrates a relationship between the allocation of climate finance and donor country governance. Third, the model also controls for overall ODA flows. In essence, OECD countries that provide large sums for development purposes also commit more aid to combat climate change. This is in line with the results of previous studies (Halimanjaya and Papyrakis, 2015; Klöck et al., 2018) that path dependence of development assistance has a significant effect on aid for climate-related projects. The size of the developed country population nor wealth does not demonstrate an association with international climate finance.

5 Conclusion

This paper aimed to provide generalizable results on whether domestic climate ambition is complementary or substitutional for international climate policy, using the case of international climate finance. In order to achieve this goal, I performed regression analysis with a continuous dependent variable. I reached the result that countries that have in place ambitious climate policies at home are generally also more ambitious abroad. This effect, however, is conditional on several factors. The paper used a combination of novel variables, such as domestic climate ambition, along with a number of variables that have been substantiated in previous literature. The study included funding for both climate change mitigation and adaptation and took into account developed country responsibilities as stated in the Kyoto Protocol and the Paris Agreement.

The paper underscored the effect of domestic climate policy on international climate policy, while accounting for other influential factors. Most interestingly, physically more exposed countries provide more climate finance depending on their level of domestic climate ambition. I show that when developed countries are physically vulnerable to the effects of climate change, they provide more climate finance if they already have ambitious climate policies in place on the domestic level. This finding contradicts the expectation that exposure to climate change does

affect domestic climate policy, rather the result shows that domestically ambitious countries will increase their international climate finance efforts, depending on their level of exposure to climate change.

The results do not support the argument that climate finance is a "luxury" that wealthier countries can afford due to surplus resources. On the contrary, I find that wealthier countries do not provide more climate finance. Lower-income countries of the OECD, such as Ireland and Slovenia that undertake relatively more ambitious policies domestically, also tend to provide more international climate finance. Domestic ambition does not seem to play such an important role for international transfers at higher levels of income. This may be due to the fact that non-materialist values exhort a stronger effect on international climate policy than purely the fact of having more material resources. This potential implication, however, requires further research. Even though the study does not discover a conditional effect of industry opposition, the variable plays a role on its own: the size of the carbon-intensive industry on itself increases the level of international climate finance.

The findings offer vital insight on the influence of notable structural factors. Furthermore, countries that are physically more exposed to climate change are also larger donors of international climate finance, no matter how ambitious are their domestic policies. This result adds to the findings of Zahran et al. (2008) who find that more vulnerable municipalities are more likely to support ambitious climate policies. Moreover, climate finance is found to be dependent on the level of governance in a developed country as better governed countries provide more of it. I also find clear evidence of path dependence as large donors of development assistance also provide more international climate finance. Future research could complement the present study, in particular by adopting a comparative framework for qualitative analysis and by encompassing a wider range of domestic political factors, including the role of national and transnational actors.

References

Alesina, A. and D. Dollar (2000). Who gives foreign aid to whom and why? *Journal of Economic Growth 5*(1), 33–63.

Andonova, L. B. (2008). VII Networks, Club Goods, and Partnerships for Sustainability: The Green Power Market Development Group.

Andonova, L. B. and G. Carbonnier (2014). Business–humanitarian partnerships: Processes of normative legitimation. *Globalizations 11*(3), 349–367.

Andonova, L. B., T. N. Hale, and C. B. Roger (2017). National Policy and Transnational Governance of Climate Change: Substitutes or Complements? *International Studies Quarterly 61*(2), 253–268.

Andonova, L. B. and I. A. Tuta (2014). Transnational networks and paths to EU environmental compliance: Evidence from new member states. *JCMS: Journal of Common Market Studies 52*(4), 775–793.

Atteridge, A., M. K. Shrivastava, N. Pahuja, and H. Upadhyay (2012). Climate policy in India: What shapes international, national and state policy? *Ambio 41*(1), 68–77.

Bang, G., C. B. Froyn, J. Hovi, and F. C. Menz (2007). The United States and international climate cooperation: International "pull" versus domestic "push". *Energy Policy 35*(2), 1282–1291.

Bättig, M. B. and T. Bernauer (2009). National institutions and global public goods: Are democracies more cooperative in climate change policy? *International organization 63*(2), 281–308.

Bernauer, T. (2013). Climate Change Politics. *Annual Review of Political Science 16*(1), 421–448.

Bernstein, S. (2002). International institutions and the framing of domestic policies: The Kyoto Protocol and Canada's response to climate change. *Policy Sciences 35*(2), 203–236.

Berthélemy, J.-C. (2006, May). Bilateral Donors' Interest vs. Recipients' Development Motives in Aid Allocation: Do All Donors Behave the Same? *Review of Development Economics 10*(2), 179–194.

Betzold, C. and F. Weiler (2017). Allocation of Aid for Adaptation to Climate Change: Do Vulnerable Countries Receive More Support? *International Environmental Agreements: Politics, Law and Economics 17*(1), 17–36.

Bischof, D. (2017). New Graphics Schemes for Stata: Plotplain & Plottig. *Stata Journal 17*(3), 748–759.

Bosetti, V., C. Carraro, E. Massetti, A. Sgobbi, and M. Tavoni (2009). Optimal energy investment and R&D strategies to stabilize atmospheric greenhouse gas concentrations. *Resource and Energy Economics 31*(2), 123–137.

Brambor, T., W. R. Clark, and M. Golder (2006). Understanding Interaction Models: Improving Empirical Analyses. *Political Analysis 14*, 63–82.

Buchner, B. K., P. Oliver, X. Wang, C. Carswell, C. Meattle, and F. Mazza (2017, October). Global Landscape of Climate Finance 2017. CPI Report.

Buntaine, M. T. and L. Prather (2018). Preferences for Domestic Action Over International Transfers in Global Climate Policy. *Journal of Experimental Political Science*, 1–15.

Burck, J., F. Marten, C. Bals, T. Uhlich, N. Höhne, S. Gonzales, and M. Moisio (2018). Climate change performance index: Background and methodology. *Germanwatch*.

Cass, L. (2005). Measuring the Domestic Salience of International Environmental Norms: Climate Change Norms in German, British, and American Climate Policy Debates. *International Studies Association, March 15*.

Castro, P. (2010). Climate change mitigation in advanced developing countries: Empirical analysis of the low-hanging fruit issue in the current CDM. *CIS Working Paper 54*.

CDIAC (2018). *Fossil-Fuel CO2 Emissions*.

Chen, C., I. Noble, J. Hellmann, J. Coffee, M. Murillo, and N. Chawla (2015, November). *University of Notre Dame Global Adaptation Index*.

Christoff, P. and R. Eckersley (2011, August). Comparing State Responses. In J. S. Dryzek, R. B. Norgaard, and D. Schlosberg (Eds.), *The Oxford Handbook of Climate Change and Society*, Oxford Handbooks. Oxford, New York: Oxford University Press.

Compston, H. and I. Bailey (2016). Climate policy strength compared: China, the US, the EU, India, Russia, and Japan. *Climate Policy 16*(2), 145–164.

Dolšak, N. (2009). Climate change policy implementation: A cross-sectional analysis. *Review of Policy Research 26*(5), 551–570.

EEA (2018). *Global and European Temperature*. European Environment Agency.

Falkner, R. (2005). American hegemony and the global environment. *International Studies Review 7*(4), 585–599.

Fordham, B. O. (2011). Who wants to be a major power? Explaining the expansion of foreign policy ambition. *Journal of Peace Research 48*(5), 587–603.

Fredriksson, P. G., E. Neumayer, and G. Ujhelyi (2007). Kyoto Protocol cooperation: Does government corruption facilitate environmental lobbying? *Public Choice 133*(1-2), 231–251.

Gupta, S., J. Harnisch, D. C. Barua, L. Chingambo, P. Frankel, R. Jorge, G. Vázquez, L. Gomez Echeverri, E. Haites, Y. Huang, and others (2014). Cross-cutting investment and finance issues.

Gurría, A. (2017). *Climate Action: Time for Implementation*. Munk School of Global Affairs, Toronto.

Halimanjaya, A. (2015). Climate Mitigation Finance across Developing Countries: What Are the Major Determinants? *Climate Policy 15*(2), 223–252.

Halimanjaya, A. (2016). Allocating Climate Mitigation Finance: A Comparative Analysis of Five Major Green Donors. *Journal of Sustainable Finance & Investment 6*(3), 161–185.

Halimanjaya, A. and E. Papyrakis (2015). Donor Characteristics and the Allocation of Aid to Climate Mitigation Finance. *Climate Change Economics 6*(3), 1550014.

Harrison, K. (2007). The road not taken: Climate change policy in Canada and the United States. *Global Environmental Politics 7*(4), 92–117.

Harrison, K. and L. M. Sundstrom (2010). *Global Commons, Domestic Decisions: The Comparative Politics of Climate Change*. MIT press.

Heggelund, G. (2007). China's climate change policy: Domestic and international developments. *Asian perspective*, 155–191.

Hicks, R. L., B. C. Parks, J. T. Roberts, and M. J. Tierney (2008). *Greening Aid?: Understanding the Environmental Impact of Development Assistance*. Oxford: Oxford University Press.

Huq, S., H. Reid, M. Konate, A. Rahman, Y. Sokona, and F. Crick (2004). Mainstreaming adaptation to climate change in least developed countries (LDCs). *Climate Policy 4*(1), 25–43.

Ingold, K. and G. Pflieger (2016). Two Levels, Two Strategies: Explaining the Gap Between Swiss National and International Responses Toward Climate Change. *European Policy Analysis 2*(1), 20–38.

Kaly, U. L., C. R. Pratt, and J. Mitchell (2004). The Environmental Vulnerability Index. Technical Report 384, SOPAC.

Kaufmann, D., A. Kraay, and M. Mastruzzi (2010). *The Worldwide Governance Indicators: Methodology and Analytical Issues*. Number 5430 in Policy research working paper. Washington, DC: World Bank, Development Research Group, Macroeconomics and Growth Team.

Kelemen, R. D. and D. Vogel (2010). Trading places: The role of the United States and the European Union in international environmental politics. *Comparative Political Studies 43*(4), 427–456.

Kim, S. Y. and Y. Wolinsky-Nahmias (2014). Cross-national public opinion on climate change: The effects of affluence and vulnerability. *Global Environmental Politics 14*(1), 79–106.

Kincaid, G. and J. T. Roberts (2013). No Talk, Some Walk: Obama Administration First-Term Rhetoric on Climate Change and US International Climate Budget Commitments. *Global Environmental Politics 13*(4), 41–60.

King, A. D. and L. J. Harrington (2018). The Inequality of Climate Change from 1.5 $^{\circ}$C to 2 $^{\circ}$C of Global Warming. *Geophysical Research Letters*.

Klöck, C., N. Molenaers, and F. Weiler (2018). Responsibility, capacity, greenness or vulnerability? What explains the levels of climate aid provided by bilateral donors? *Environmental Politics Advance online publication*.

Lachapelle, E. and M. Paterson (2013). Drivers of National Climate Policy. *Climate policy 13*(5), 547–571.

Landis, F. and T. Bernauer (2012). Transfer payments in global climate policy. *Nature Climate Change 2*(8), 628.

Madden, N. J. (2014). Green means stop: Veto players and their impact on climate-change policy outputs. *Environmental Politics 23*(4), 570–589.

Michaelowa, A. and K. Michaelowa (2007a). Climate or Development: Is ODA Diverted from Its Original Purpose? *Climatic change 84*(1), 5–21.

Michaelowa, A. and K. Michaelowa (2007b, September). Does climate policy promote development? *Climatic Change 84*(1), 1–4.

Michaelowa, A. and K. Michaelowa (2011, September). Climate Business for Poverty Reduction? The Role of the World Bank. *The Review of International Organizations 6*(3-4), 259–286.

NDGAIN (2018). Rankings: Notre Dame Global Adaptation Initiative. https://gain.nd.edu/our-work/country-index/rankings/.

Neuhoff, K. (2009). *Understanding the Roles and Interactions of International Cooperation on Domestic Climate Policies*. Taylor & Francis.

Olivier, J., K. Schure, and J. Peters (2017). *Trends in Global CO2 and Total Greenhouse Gas Emissions* (2017 Report ed.). The Hague: PBL Netherlands Environmental Assessment Agency.

Platjouw, F. M. (2009). Reducing greenhouse gas emissions at home or abroad? The implications of Kyoto's supplementarity requirement for the present and future climate change regime. *Review of European, Comparative & International Environmental Law 18*(3), 244–256.

Putnam, R. D. (1988). Diplomacy and domestic politics: The logic of two-level games. *International organization 42*(3), 427–460.

Rafaty, R. (2018). Perceptions of Corruption, Political Distrust, and the Weakening of Climate Policy. *Global Environmental Politics 18*(3), 106–129.

Robertsen, J., N. Francken, and N. Molenaers (2015, November). Determinants of the Flow of Bilateral Adaptation-Related Climate Change Financing To Sub-Saharan African Countries. Discussion Paper 373/2015, KU Leuven.

Robinson, S.-a. and M. Dornan (2016, December). International Financing for Climate Change Adaptation in Small Island Developing States. *Regional Environmental Change*, 1–13.

Roger, C., T. Hale, and L. Andonova (2017). The comparative politics of transnational climate governance. *International Interactions 43*(1), 1–25.

Røttereng, J.-K. S. (2018). The Comparative Politics of Climate Change Mitigation Measures: Who Promotes Carbon Sinks and Why? *Global Environmental Politics* (Early Access), 52–76.

Sachs, J. D. (2015, March). *The Age of Sustainable Development*. Columbia University Press.

Schmidt, N. M. and A. Fleig (2018). Global patterns of national climate policies: Analyzing 171 country portfolios on climate policy integration. *Environmental Science & Policy 84*, 177–185.

Sprinz, D. F. and T. Vaahtoranta (1994). The interest-based explanation of international environmental policy. *International Organization 48*(1), 77–105.

Sprinz, D. F. and M. Weiß(2001). Domestic politics and global climate policy. *International relations and global climate change 67*, 94.

Steves, F. and A. Teytelboym (2013). Political economy of climate change policy.

Tobin, P. (2017). Leaders and Laggards: Climate Policy Ambition in Developed States. *Global Environmental Politics 17*(4), 28–47.

UN (1992). *Rio Declaration on Environment and Development*.

UNFCCC (2012, March). Decision 3/CP.17, Launching the Green Climate Fund. Report of the Conference of the Parties, COP 17, Durban, South Africa.

UNFCCC (2015, June). Methodological Guidance for Activities Relating to Reducing Emissions from Deforestation and Forest Degradation and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries. Agenda Item 4 FCCC/SBSTA/2015/L.5, SBSTA, Bonn, Germany.

UNFCCC (2016). 2016 Biennial Assessment and Overview of Climate Finance Flows Report. Technical report, UNFCCC Standing Committee on Finance, Bonn, Germany.

UNFCCC (2017). UN Climate Press Release: Bridging Climate Ambition and Finance Gaps. https://unfccc.int/news/bridging-climate-ambition-and-finance-gaps.

VanDeveer, S. D. and P. F. Steinberg (2013). Routledge handbook of global environmental politics. pp. 150–163. Routledge.

Weiler, F., C. Klöck, and M. Dornan (2018). Vulnerability, good governance, or donor interests? The allocation of aid for climate change adaptation. *World Development 104*, 65–77.

World Bank (2017). *CO2 Intensity (Kg per Kg of Oil Equivalent Energy Use) — Data*.

World Bank (2018a). *GDP per Capita (Constant 2010 US$)*.

World Bank (2018b). *Population in Millions*.

Zahran, S., S. D. Brody, A. Vedlitz, H. Grover, and C. Miller (2008). Vulnerability and capacity: Explaining local commitment to climate-change policy. *Environment and Planning C: Government and Policy 26*(3), 544–562.