

Domestic Climate Change Mitigation (or lack thereof), Variously Explained

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Climate change is real, and it is being caused by human activities.¹ It is also a collective action problem, and as such, must be addressed as a global effort. The Paris Agreement, an international accord meant to catalyze effective action on climate change to mitigate its worst effects, entered into force on November 6, 2016 by reaching the threshold for ratified parties. Since then, the action of setting climate change policy to meaningfully address the problem has shifted from the international down to the domestic frontier. It is now up to nation-states, at their own sovereign will, to establish nationally-determined contributions such that crisis is averted. Yet some countries are performing insufficiently, much worse or better than others. What can explain critical differences in climate change policy action on the domestic level? Under what conditions might the nation-state be more responsive to a collective action dilemma? This paper seeks to address a global quandary amid a greater urgency.

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Spring 2018*

¹ See NASA. 2017. "A blanket around the Earth." NASA. <https://climate.nasa.gov/causes/> (November 12, 2017).

Introduction

Climate change cannot be addressed unilaterally, not by any one sovereign state alone. Without respect to borders, it affects all people and countries of the world and therefore requires a global effort. After international institutions resolved to adopt the regime-altering Paris Agreement, the trajectory of setting emissions reductions to mitigate climate change has been redirected to individual states, that is, to be executed from the domestic rather than the international level. Yet the urgency of this anthropogenic crisis has not been enough to effect sufficient action, according to climate scientists and policy analysts. In fact, various organizations who dedicate resources to tracking emissions commitments and policy action commonly rate countries' individual progress as *critically insufficient* and *very poor* (Climate Action Tracker 2017; German Watch 2017). A domestic puzzle thus remains as to why some countries are more willing than others to commit and implement policy actions aimed at climate change mitigation sufficient to preserve the global commons in which the nation-state resides.

The existing literature often seeks to address the politics of climate change in multivariate studies (e.g., Harrison et al. 2010; LaChapelle 2013; Tubi et al. 2012; Dolsak 2001; Dolsak 2009; Bailer 2014; Zeynup 2016), although a variable of seemingly vast import in politics is often neglected in a systematic review—the citizens who form the nation. The role of public attitudes and beliefs in affecting action on climate change, specifically, has been insufficiently examined, even as comparative studies on climate change mitigation are budding (Dolsak 2009) and increasingly called upon, with a domestic reorientation, to address the mitigation problem (e.g., LaChapelle 2013; Purdon 2015; Falkner 2016; Duit et al. 2015). There is a shortage of political literature on public opinion, attitudes and beliefs on climate change in domestic policy action.

To expand the understanding of what may be inhibiting dire progress on climate change mitigation at the domestic level, this paper will build upon the literature surrounding climate change politics, which now transcends multilevel governance and spans the domestic, national, international, and transnational political spheres by incorporating public sentiment into the multitude of variables surrounding climate change mitigation. First, given the diverse and complex reality of climate change politics, the existing literature will be considered.

Institutions Matter

Concerning domestic commitments and action on climate change mitigation, international and state institutions have been explored to understand their structural and functional role in impacting state policy action.

Intergovernmental Organizations. Significantly, the United Nations Framework Convention on Climate Change (UNFCCC) on November 6, 2016, was emboldened when the Paris Agreement entered into force. This watershed affirmed the new global climate regime, later committing most nation-states of the world to setting “nationally determined contributions” (NDCs) to carbon emissions reductions and targeting climate change at its source. Set at the national level, NDCs are not legally binding, but Falkner (2016) explains the state parties to the Paris Agreement will regularly participate in submitting new pledges for emissions reductions every five years, including reporting policy implementation such that it is expected for countries to progressively increase their respective mitigation policy ambitions (if by nothing else, public pressure). The state may be relieving a modicum of sovereignty in cooperating with the self-reporting and regular re-submission component of the Paris Agreement. However, the Paris accord is also an acknowledgment of “the primacy of domestic politics in climate change” by allowing “countries to set their own level of ambition for climate change mitigation” (Purdon

2015, 1). Nonetheless, it is a stretch to otherwise imagine an achievement to this degree of cooperation among sovereign states over a collective action problem in a world without institutions of global governance such as the United Nations and UNFCCC. The Paris Agreement, therefore, makes international pressure and commitment to the global issue more possible. Other research considers regional intergovernmental organizations, such as the European Union, by way of contributors to the maintenance of members' domestic policy commitments and actions on climate change (Harrison and McIntosh 2010). All told, it is important to be cognizant of contexts beyond national borders when it comes to domestic climate change mitigation.

Bringing the State Back In...To Climate Change Politics. The preeminence of the state is no novel idea in comparative political literature, even as its emphasis is relatively new in climate change politics. Neither is the state declining in relevance (Duit, Feidnt, and Meadowcroft 2015). Political systems, with variable structures, levels of accountability and corruption, capacity, and functions, impact national policy input, argues Dolsak (2001) concerning the tradeoff between energy and environmental concerns. The notion of domestic political institutions affecting policy output is easily extrapolated to climate change mitigation given the direct role of the state in establishing NDCs under the Paris Agreement and seeing climate change mitigation policy through to implementation. But the domestic political system can have anywhere from a muffling to a facilitating effect on climate change commitment and mitigation (Harrison and McIntosh 2010). Giddens (2011) explains state authority in the policy realm of climate change is pivotal for implementation, where success relies on individual countries. Corruption has been found to negatively relate to actionable climate change mitigation. Conversely, as the state further varying in strength and capacity (Midgal 1988), each measure

has been found to positively relate to policy commitment and action on climate change (Dolsak 2001; Tubi 2012).

Democracies. Ergo the type, characteristics, and context in which political systems exist matters. Whereas democracies have been found to be more prone to stronger policy commitments to address climate change (Dolsak 2009), some with policy commitments have not necessarily resulted in better outcomes due in large part to institutional constraints (Tubi 2012; Bailer 2014; Ward, Cao, and Mukherjee 2014). For democracies, state capacity has been found to associate with higher environmental quality, as democratic incumbents tend to place more importance on social welfare than officials in non-democracies (Ward, Cao, and Mukherjee 2014). Democracy itself does not reveal a pattern, rather variation in democracy types seems to matter for climate change mitigation. LaChapelle (2013) argues for more research to be done on the variation in mitigation policy among types of democracies. Parliamentary and proportional representation (PR) compared to presidential systems differ in environmental policy output, as do federalist and unitary systems, parliamentary, PR, and unitary systems are associated with stronger environmental or climate change mitigation policies (Dolsak 2001; Harrison and McIntosh 2010; La Chapelle 2013). The expectation is that presidential and federal systems likely experience more veto points than parliamentary, proportional representation, and unitary systems of democracy.

Non-Democracies. On the other hand, non-democracies perform differently such that presidential systems are padded from popular mobilization (LaChapelle 2013). Hence, presidential systems in non-democracies tend to maneuver more easily in effecting policy, conditioned upon state capacity (Midgal 1988). The implication of popular mobilization in affecting policy output suggests there is space for public opinion, attitudes and beliefs in the domestic climate change

problem. Although non-democracies experience less political constraints, it is possible that state capacity can outpace environmental protection and worsening environmental outcomes, even as the system may be more readily capable of addressing the problem, if resources provide (Ward, Cao, and Mukherjee 2014).

Economy, Costs, Benefits, and Socioeconomics of Mitigation

In confronting the immense costs, both external and internal, economic factors surrounding climate change mitigation are abundant. More generally, the costs of inaction are enormous and so the benefits are inherent in preventing the worst effects, such as limiting the rise of global temperatures and sea levels. Nevertheless, economic factors are inclined to a preponderant effect over others in domestic climate change politics.

Costs and Benefits of Environmental Protection. The costs and benefits associated with climate change are complex, and salient in discourse. Much of the existing body of research has found a negative association with the costs of climate change mitigation (e.g., Tubi 2012; Harrison and McIntosh 2010). Governments calculate a cost-benefit analysis, Dolsak (2001) argues, where economic costs (e.g., higher fuel prices, declining profits, loss of domestic business overseas) and benefits (e.g., reduced air pollution) are weighed for states to make a rational choice. Harrison and McIntosh (2010), in examining the Kyoto Protocol (an earlier global climate regime), contend that greater economic costs come with more domestic resistance, which suggests a plurality of factors are affecting domestic climate change policy, including public sentiment.

Economic Structure and State Intervention. The structure of economies and state proclivities toward market intervention may also affect domestic climate change mitigation. LaChapelle (2013), for example, found liberal market economies tend to resist behavioral change more than

controlled market economies, with the former instead emphasizing R&D over market-adjusting policy. It is argued that market intervention is necessary to combat climate change (Giddens 2001). However, states acting as managers over the economy tend to hold economic development in higher accord than environmental protection (Duit, Feidnt, and Meadowcroft 2015). Neumayer (2013) further argues that pluralism in political institutions behaves like market failures, with interests dispersed rather than consolidated and thus slower-moving, if any, policy action on climate change mitigation as a result.

Economic Development. The economy factor is one of various layers in the complexity of national mitigation policy. For example, economic growth as a measurement of economic development has been found to significantly associate with carbon emissions growth (LaChapelle 2013; Tubi 2012). Given this relationship, it can be inferred that developing countries, which tend to reflect higher rates of economic growth, may also be inclined to higher carbon emissions growth. In fact, the Environmental Kuznets Curve (EKC) predicts with higher economic growth an adverse impact to the environment; and as a certain level of development is reached, the environmental costs are either reduced or reversed (Clulow 2016). While this may have held true in prior research (see Clulow 2016), it is difficult to reconcile the EKC with climate change deviants like the United States. The US has arguably reached peak levels of economic development yet has been rated *critically insufficient* and *poor* on measures of climate change performance (Climate Action Tracker 2017; German Watch 2017). This inconsistent application of the EKC suggests more work can be done, in a multilayered study, on domestic economic development and climate change policy.

Socioeconomic Conditions. Still other literature has given attention to the variability of socioeconomic characteristics, such as population density and per capita incomes, to analyze for

patterns in domestic climate change policy (LaChapelle 2013). In coping with the financial costs of mitigation by reducing carbon emissions, sometimes dramatically, it is quick to assume that the availability of greater economic resources would provide for easier maneuverability faced with the prospect drastic policy change. In other words, with more economic resources (e.g., for energy transition, renewable energy technologies, adaptation, etc.) presumably there is more readiness or willingness to act on climate change. Moreover, with greater population density and thus more opportunity for states to extract resources for public climate action through taxation, it is not hard to assume that these higher-density states will perform better in terms of climate change mitigation commitment and policy action. LaChapelle (2013) indeed found that population density is associated with stronger action and commitment to climate change mitigation; alternatively, the same research identified no significant patterns of differences in performance between the global North and South (typically characterized by the former as being richer and the latter as poorer countries). These findings implore further exploration into underlying factors driving national climate change policy, such as a multivariate study which brings public sentiment more prominently into the equation.

Adaptive Capacity and Vulnerability. Whereas measures like per capita income and national GDP look to financial resource availability and level of economic development of the nation-state relating to climate change mitigation, adaptive capacity is employed to describe the ability for systems to adapt to a changing environment, often described as vulnerability (IPCC 2001). Economic losses and ecological susceptibility are often included in this measure. Existing literature has used adaptive capacity as an independent variable to identify patterns driving climate change policy, albeit with inconsistent results (e.g., Tubi 2012; Dolsak 2009; Bailer 2014; Purdon 2015). As some research finds vulnerability to positively associate with climate

change policy commitment and/or mitigation (Dolsak 2009; Bailer 2014), others suggest vulnerability is either insignificant (Purdon 2015; Rong 2010) or limited (Tubi 2012) in its role. Bailer (2014) contends that greater vulnerability associates with greater cooperation amid international climate regime negotiations, but the relationship is naught in terms of reducing carbon emissions. The policy implications of vulnerability, or lack thereof, may be due to the various contexts in climate policy action (e.g., public sentiment, political system, economic and socioeconomic conditions), which lends further support to a multilayered study.

Fossil Fuels: Economic Presence, Endowment, Exports and Reliance. With carbon emissions as a key driver of climate change, caused by human activities principally in the form of burning fossil fuels (IPCC 2001), the examination of the political economy of fossil fuels is obligatory for an understanding of drivers behind domestic climate change commitment and policy action. Extant literature thus shrewdly incorporates, in various ways, how the political economy of fossil fuels impacts climate change mitigation at the domestic level. A commonly exhibited relationship is the national presence of substantial fossil fuels exports, the net exporters of fossil fuels, which associates negatively with mitigation (LaChapelle 2013; Dolsak 2009; Dolsak 2001). Conversely are conclusions that economic structure is important in terms of reliance on fossil fuels, because carbon emissions vary among countries (Purdon 2015), as do the economic and social costs of emissions reductions in the more reliant countries (Dolsak 2009). Rather than mitigation policies, LaChapell (2013) finds that net exporters of fossil fuels tend to emphasize R&D to address climate change. Domestic fossil fuel energy supply also seems to play a role, with higher per capita energy endowments associating with less commitment to mitigation (Dolsak 2009). Fossil fuels, then, seem to both contribute to climate change and insufficient domestic policy action. Still, with exceptions among the OECD countries, like

Norway expressing high commitment to emissions reductions (albeit, to qualify, rated respectively *insufficient* and *poor* by Climate Action Tracker and German Watch performance measures, 2017; this finding echoes the strong commitment, lesser policy action narrative), it is apparent that the political economy of fossil fuels is not a singular causal factor in terms of mitigation.

People, Green Movements, Political Parties and Leadership

The incorporation of popular sentiment in the comparative study of climate change is less than robust, nevertheless available literature suggests that public opinion, social movements, political parties, and normative leadership should be considered. Granting the context of other factors, it is reasonable to infer a popular role in climate change mitigation as a condition for domestic commitment and subsequent policy action.

Public Opinion, Attitudes, Beliefs, and Social Movements. Popular sentiment surrounding the commons problem of climate change may influence domestic climate change politics variably, with some populations on average more inclined to environmental protection than others due to the lifestyle and economic costs of behavioral change (Bailer 2014; Dolsak 2001; Harrison and McIntosh 2010). For example, Harrison and McIntosh (2010) point to stronger domestic opposition to climate action in countries with higher costs for compliance with respective emissions reductions targets in the Kyoto Protocol. They also offer climate change is less salient than pocketbook issues like economic growth and low energy prices (Harrison and McIntosh 2010), while still others scholars argue it is citizens' value of non-material goods like environmental protection under conditions of greater economic wealth that contributes to popular support for actions (Dolsak 2009). The latter hypothesis echoes the EKC. Furthermore, public opinion may exert varying levels of influence over political leadership in political systems of

inconstant accountability to the populace (Dolsak 2001), as noted in the above discussion concerning political institutions. Domestic political pressure has been incorporated into some comparative research into climate change politics, however, it has not been systematically operationalized using surveys due to troubles with comparability of datasets (Dolsak 2001). In terms of popular mobilization, the role of green movements is seen as a leading driver of environmental politics (Giddens 2011), and some suggest they have obtained greater environmental demands through a broader left-wing agenda (Neumayer 2003). The societal role may be conditioned by institutional and economic contexts, where social movements can amplify this effect. It is a worthy undertaking to revisit these associations to climate change mitigation. As a preview of this research, Harrison and McIntosh (2010) found there was contentious public debate over climate change in non- and late-ratifying countries to the Kyoto Protocol, regardless of the overwhelming scientific consensus, which suggests there is indeed power, albeit conditionally, in a popular effect on the policy outcomes of climate change.

Green/Left-Libertarian Political Parties and the Traditional Left-Wing. The broader left-wing movement could very well be pinned to the political parties which often comprise politics in democratic states. Neumayer (2013) looks to the role of these political parties specifically in relation to environmental protections, finding that green/left-libertarian parties with an electoral or cabinet presence tend to positively impact environmental protections. With a tendency to correct market failures, the traditional left may be expected to likewise intervene in environmental failures (Neumayer 2013). To the contrary, traditional left-wing parties closer to the center of the left-right political spectrum are found to be less prone to the enactment of environmentally conscious policies, perhaps owing to economic costs like job loss and political pressure from union support (Neumayer 2013). Taken together with popular support for climate

change mitigation, that is, in democratic contexts, it could be expected that political party ideals, seeking to maximize chances for electoral survival, may be likely to reflect public sentiment, whether in favor or in opposition to effective policy actions.

Electoral and Policy Incentives

Politicians are often self-interested such that they seek to ensure their own or their parties' political survival (even among authoritarian political systems, although more so in democratic systems; see Ward, Cao, and Mukherjee 2014). This discussion could go in hand with public opinion, as some of the existing literature on domestic climate change mitigation points to political survival—i.e. politicians flexing to public interests to ensure reelection—as a consideration for national commitments and policy action (Dolsak 2001). In other words, national governments seem to be more responsive to the climate change problem when public support is palpable, regardless of other interests (e.g., fossil fuels, labor unions) (Dolsak 2001). It is similarly argued that the normative commitments of politicians, in support of climate action, may be weak without the condition of electoral support (Harrison and McIntosh 2010). The existing literature has not systemically looked to popular sentiment concerning climate change before arriving at these conclusions. Given data constraints, especially in developing countries, GDP per capita and income levels have been used in place of cross-country surveys to operationalize popular feelings for environmental actions, citing economic factors as a reliable indicator of public support (Ward, Cao, and Mukherjee 2014; Dolsak 2001). Still, the economic-centric design for public support fails to account for variation in views, characteristic of pluralistic society, which may be better evaluated by a poll of public opinion, without which a closer measurement of public attitudes is left wanting.

Examining Public Opinion and Contextual Factors on Domestic Policy Outcomes

Taking into consideration the multitude of factors impacting climate change mitigation at the national level; in a nascent climate change regime characterized by a domestic reorientation of climate change politics from the international level; entangled with global contexts, there has been inadequate attention given to the popular role across countries and amid other contextual factors affecting domestic climate change mitigation. An examination of domestic political pressure operationalized by uniquely available Gallup public opinion surveys on climate change will serve to fill an extant scarcity in the comparative political literature on climate change.

This paper will use the emissions commitments and policy actions of countries as the dependent variable, operationalized by the Climate Change Performance Index. This index was developed by Germanwatch, a non-governmental organization which tracks emissions commitments and policy actions of countries at the domestic level. The scope of coverage spans approximately 57² countries responsible for “more than 90% of global energy-related emissions” (Germanwatch 2018). While this sample does not include all, nor the majority of countries, suffice it to say that it is difficult to come by comparable, robust data sets at the cross-country level including all or even most nation-states. Still, the level of coverage insofar as emissions ought to make up for this sampling pitfall, since climate change is a problem that displays uneven responsibility in terms of emissions contributions, and 90% emissions responsibility is indeed substantial coverage. The key independent variable of focus will be domestic political pressure, measured using a public opinion survey set courtesy of Gallup. Moreover, this multivariate analysis will incorporate measures for the type of political system, level of

² Specifically, for the years 2007, 2008, and 2010 that are examined, there are 56 countries total for the two former years, and 57 countries included in the latter, 2010.

economic development, fossil fuel industry presence, and the economic costs of ideal emissions reductions.

Public opinion is expected to inconsistently effect domestic climate change policy based on differing institutional and economic contexts. Overall, it is hypothesized that public opinion will positively relate to mitigation; that highly economically developed proportional representation or parliamentary political systems will be prime contexts for action; and costs for moving toward a green economy and fossil fuel industry presence will exhibit a negative association to mitigation. Any measurable relationship between public opinion and climate change is expected to be most dampened in countries where the costs of climate change mitigation are high, as the literature strongly hinges on the political economy of climate change. It may be that the United States is a primary example for which combination of forces can combine to thwart substantive progress on domestic mitigation, namely, a presidential, federalist democratic system, with high short-term social and economic costs for transformation, and a large fossil fuel industry presence, only with a highly developed economy.

Modelling Simply for Complex Phenomenon

From a review of the literature, it is obvious that climate change mitigation on the national level is multifaceted. The extent of action is dependent upon several variables rather than by a single causal factor. Overall, what is expected to be drawn from this paper is that domestic political pressure maintains a role in some contexts greater than others, among a crowd of factors influencing climate change policy. This paper resolves to identify the extent to which the popular views affect policy outcomes, specifically in combatting the collective action problem of anthropogenic climate change. In the following sections, I proffer testable hypotheses; conceptualize and operationalize the dependent variable and independent variables;

and discuss tools for analysis to test these hypotheses and illuminate the contextual factors affecting climate change mitigation.

Hypothesizing Different Contexts. National policy and actions on climate change mitigation are expected to have the clearest positive relation faced with domestic political pressure in (1) the setting of a democratic political institutional setting that is parliamentary or proportional representation, (2) in developed economic settings, and where each (3) the costs of mitigation and (4) fossil fuels industry presence are low. The expectation of a positive association between domestic political pressure and respective policy action is supported by the concept of political survival for those who hold political power (Dolsak 2001; Ward, Cao, and Mukherjee 2014). In other words, political leadership, especially so in democratic system, will tend to flex to popular demands to prolong political survival. In proportional representation, parliamentary, and unitary political systems—each of which characterized by less institutional constraints than their democratic counterparts, the tendency is more responsiveness of the state to popular as well as minority views (Dolsak 2001; LaChapelle 2013; Harrison and McIntosh Sundstrom 2010). Furthermore, proportional representation systems tend toward stricter environmental policies (LaChapelle 2013). It is important to note that within this framework, federalist and presidential systems can indeed be democratic systems; the distinction to be made is particularly the extent to which veto power can override or inhibit policy formation, and these systems have been found to exhibit this effect (e.g., LaChapelle 2013; Dolsak 2001; Harrison and McIntosh Sundstrom 2010; Tubi 2012; Bailer 2014; Ward, Cao, and Mukherjee 2014). In terms of economic development and climate change mitigation, the literature is less clear (LaChapelle 2013; Clulow 2016). But using the Environmental Kuznets Curve (EKC), which Clulow (2016) has found to predict a reduced or reversed effect of adverse environmental impacts in highly developed economies, the

assumption is made that greater economic development allows for greater extraction and capacity for states to execute policy outcomes. As for fossil fuel industry presence, seeing that the cause of climate change is known to be related to the use of fossil fuels (IPCC 2007), this paper follows prior studies that have found net exporters of fossil fuels (LaChapelle 2013; Dolsak 2009; Dolsak 2001), in addition to higher per capita fossil fuel endowments (Dolsak 2009), to negatively associate with ideal policy outcomes vis-à-vis climate change.

More generally, this paper expects there to be an overall positive association between domestic political pressure and climate change mitigation, despite variability in different domestic institutional and economic contexts. This paper holds that the complexity of domestic politics and policy formation cannot be explained by a single causal factor, rather a multitude of factors are present. These factors may be expressed in varying degrees, yet, according to the literature, none can explain domestic policy outcomes in isolation. As for domestic policy outcomes and global collective action problems, this paper resolves to elucidate pressures faced by states in following one policy pathway over another, not only in relation to climate change mitigation. What is expected to be a general takeaway is that state policy formulation is impacted by the type and variety of political institutions, the availability of economic resources (for both extraction and ultimately policy implementation), the costs of transformation to new policy regimes, and the degree of presence of affected industry interests. Where political institutions have structurally less constraints, where economies are abundant, where costs of change are lower, and where industry interests are absent, policy change is expected to be more easily achieved. To succeed in testing the ideas presented herein, it is important to aptly operationalize the underlying variables.

Conceptualizing Climate Change Mitigation. Climate change mitigation can be understood conceptually as a combination of policy actions and outcomes that curb carbon emissions, understood as the key driver of climate change (IPCC 2007). The United Nations Environment Program defines climate change mitigation as “efforts to reduce or prevent emission of greenhouse gases” (2017). Based on these criteria, climate change mitigation in this cross-country comparison will be measured using the Germanwatch Climate Change Performance Index (CCPI) indicator, which “evaluates and compares the climate protection performances of the 56³ countries that, together, are responsible for more than 90 percent of global energy-induced CO₂ emissions” (Burck, Hermwille, and Bals 2007). The broad responsible coverage of countries, though not all countries due to methodological limitations, is a valuable tool for comparing domestic climate change mitigation efforts. There are three parts that make the whole of the CCPI. Fifty percent of the index reflects per capita emissions trends, measured across energy, transport, residential, and industrial sectors. Thirty percent “shows the absolute, energy-related CO₂ emissions of a country taking its particular situation into account” (Germanwatch 2007, p. 8). The third component, accounting for 20% of the index, looks to each country’s domestic and international climate policies.⁴ Individual country scores are standardized for a final composite score, with a breadth of factors that make it beneficial and suitable as an indicator for country-level performance.

Popular Sentiment by means of Gallup Surveys. Popular sentiment can be inferred from public opinion using survey data, with some limitations. This primary independent variable refers to popular views on certain political or policy-related topics, in this case, climate change.

³56 total countries in 2007 and 2008, and 57 total countries in 2010.

⁴ The three parts to the index were consistent across each year, broadly, Emissions Trends by sector, Emissions Level, and Climate Policy; see Figure 1 in the Appendix.

Burstein (2003) contends that, while varying with issue salience, public opinion influences policy outcomes even when accounting for other pressures from elites and interest groups. Therefore, public opinion can also be viewed as a gauge for popular political pressure. Survey data will be used in this paper to measure popular political pressure conceptualized as public opinion on climate change as a threat and general awareness. With any cross-country comparison, it can at times be difficult to come by a comprehensive dataset, let alone far-reaching survey data. On climate change, Gallup (2009) has conducted a survey of public opinion across 128 countries, the “first comprehensive survey of global opinions about climate change.” This analysis is benefitted by the available of this survey and its observational coverage. The survey asked respondents aged 15 and older whether climate change was viewed as “a serious personal threat,” as well as how much the respondent knows about global warming climate change⁵ during 2007-8 and again in 2010 (Gallup 2009). Though some scholars acknowledge survey responses may be unstable (e.g., see Zaller and Feldman 1992), a limitation to which this paper will also cede, the Gallup (2009) survey is still arguably the best available indicator for popular sentiment concerning climate change for this cross-country comparative study.

In addition to survey data, another component to domestic political pressure by civil society stems from interest groups. While the model here will exclude domestic interest groups, it may be worthwhile for future consideration. It could be that greater presence of climate change or environmental groups among civil society yields greater political pressure for national

⁵ The survey specifically asked, “How serious of a threat is global warming to you and your family,” accounting for the percentage who view global warming as “very” or “somewhat” serious threat, and, “How much do you know about global warming or climate change,” expressed as the percent of respondents saying they know “something” or “a great deal” about it. See Gallup, 2009.

governments to act, for example. Likewise, greater domestic presence of climate change and environmental groups could result in greater public awareness, willingness and popular support to act on climate change mitigation.

Considering Different Contexts. Four additional independent variables used in this analysis based on the literature include the type of political system, fossil fuel industry presence, economic development, and the costs of climate change mitigation. The political system is conceptualized as the institutions by which each country is characterized and how they are structured. Since parliamentary political systems are thought to be most conducive to environmental protection, a dummy variable for parliaments based on the Database of Political Institutions ‘system’ classification data set is used.⁶ For fossil fuel industry presence, this paper infers industry presence from the aggregation of total proved domestic oil, natural gas, and coal reserves⁷ from the dataset underpinning the annual BP Statistical Review of World Energy (2018). For economic development, it is conceptually held that greater economic development generally yields higher socioeconomic indicators. Hence, to account for differing socioeconomic contexts of the countries used in this analysis, GDP per capita is used.⁸ Lastly, the costs of climate change mitigation is conceptually drawn from the extent to which a given country will need to adjust social and economic behavior to reduce the key driver of climate change: carbon emissions. This is achieved using the percentage of total domestic fossil fuel energy consumption.⁹ By including these four independent variables in addition to the survey data, the

⁶ The Database of Political Institutions 2015. Variable, SYSTEM (Parliamentary (2), Assembly-elected President (1), Presidential (0)). Data based on 2010 observations. The dummy variable for parliamentary system was created by collapsing the two DPI classifications coded as assembly-elected presidential system (1) or presidential system (0) into 0 and Parliamentary recoded as 1.

⁷ Countries not included in the BP dataset were coded as 0 for absence of proven fossil fuel reserves. Total Proved Oil (2007, 2008, 2010), Natural Gas (2007, 2008, 2010), and Coal Reserves (2016).

⁸ Sourced from World Bank national accounts data, and OECD National Accounts data files, 2007, 2008, and 2010.

⁹ From World Bank data, observations for the years 2007, 2008, and 2010 are used. See World Bank 2018.

goal of analyzing the results while considering different institutional and economic contexts can be reasonably fulfilled.

Multivariate Regression. The method of analysis used to test above-outlined hypotheses is six Ordinary Least Squares regression models composed of three different years of observations, 2007, 2008, and 2010, in combination with the two available different survey questions:

Six models total; two different survey questions on climate change, over a period of three years, 2007, 2008, and 2010.

Model No.	Dependent Variables		Independent Variables			
1	ccpi07	threat0708	parliament	fossilfuels07	consume07	lgdppc07
2	ccpi07	aware0708	parliament	fossilfuels07	consume07	lgdppc07
3	ccpi08	threat0708	parliament	fossilfuels07	consume08	lgdppc08
4	ccpi08	aware0708	parliament	fossilfuels08	consume08	lgdppc08
5	ccpi10	threat10	parliament	Fossilfuels10	consume10	lgdppc10
6	ccpi10	aware10	parliament	Fossilfuels10	consume10	lgdppc10

Variable Name		Description
DVs	ccpi07	Germanwatch Climate Change Performance Index 2007. 56 top CO2 emitting nations.
	ccpi08	Germanwatch Climate Change Performance Index 2008. 56 top CO2 emitting nations.
	ccpi10	Germanwatch Climate Change Performance Index 2010. 57 top CO2 emitting nations.
IVs	threat0708	Gallup survey 2007-8. <i>How serious of a threat is global warming to you and your family?</i> % who view global warming as "very" or "somewhat" serious threat.
	aware0708	Gallup survey 2007-8 <i>How much do you know about global warming or climate change?</i> % saying know "something" or "a great deal" about it.
	threat10	Gallup survey 2010. <i>How serious of a threat is global warming to you and your family?</i> % who view global warming as a "very" or "somewhat" serious threat.
	aware10	Gallup survey 2010 <i>How much do you know about global warming or climate change?</i> % saying know "something" or "a great deal" about it.
	parliament	The Database of Political Institutions 2015. SYSTEM. <i>type of political system.</i> Parliamentary = 1, Assembly-elected President/Presidential = 0. Data based on 2010 observations. [SYSTEM: Parliamentary (2), Assembly-elected President (1), Presidential (0)]
	consume07/08/10	Fossil fuel energy consumption (% of total). World Bank
	fossilfuels	BP Statistical Review of World Energy: Total Proved Oil (2007, 2008, 2010), Natural Gas (2007, 2008, 2010), and Coal Reserves (2016)
	gdppc07/08/10	GDP per capita, World Bank (2007, 2008, 2010).

As mentioned, the role of public opinion in influencing climate change politics is expected to vary, though remaining positive, in different domestic contexts. The five independent variables have been specified for the regression models as they reflect those considered important in the extant literature. By regressing the aggregate sample of countries in multivariate models, controls are therefore in place to assist in identifying the extent to which various factors impact domestic climate change mitigation.¹⁰

Results and Discussion

Tables 1 and 2 present results below, with some surprises and others confirming expectations.¹¹ The primary independent variable under consideration in this paper, popular sentiment vis-à-vis domestic climate change mitigation, did not reveal any significant results for the years under review. In fact, in only one year (2007, i.e., Model #1) did the climate change ‘threat’ survey begin to approach conventional significance. While other factors did produce significant results in the models, the effects of public opinion on climate change mitigation

¹⁰ Models range from 43 to 48 total observations, restricted by data availability and methodological limitations to data collection. Of course, it would strengthen this analysis to have available a greater number of observations, but the combination of available data, including observations represented by the Climate Change Performance Index, is what is presently available for the domestic climate change mitigation question. Most of the variables included have fairly normal distributions. GDP per capita was benefitted by a log transformation to correct for linearity assumptions. However, the ‘awareness’ climate change survey skewed much to the right, so this could be a potential source for biasing the coefficients and standard errors. The ‘threat’ climate change survey data, by contrast, had a mostly normal distribution, with some variance for 2007-8. Fossil fuel reserves might also introduce bias in the models, since many countries are technically ‘0’ or very low thus not registering a measurement, which potentially biases the slope coefficients; as noted above, these were coded 0 to ensure observations did not drop from when regressing. Fossil fuel energy consumption also skews to the right, though it is more normal than the fossil fuel reserves measurement. Standard diagnostics were conducted after each of the six models, finding the residuals are normal and there are no clear patterns that would raise flags.

¹¹ Some of the coefficients and standard errors may be biased, due to collinearity between the survey sets and GDP per capita.

Multivariate Regression (OLS)	<i>Model #1</i>	<i>Model #3</i>	<i>Model #5</i>
Variable	2007	2008	2010
climate change “very” or “somewhat” serious threat	0.01+ (0.00)	0.01 (0.01)	0.01 (0.01)
Parliamentary System ¹²	0.12 (0.15)	0.56+ (0.03)	0.21 (0.31)
Proven Fossil Fuel Reserves (oil, natural gas, coal) ¹³	-0.03** (0.01)	-0.06+ (0.03)	-0.05+ (0.03)
GDP per capita ¹⁴	-0.13+ (0.08)	-0.64*** (0.18)	-0.45*** (0.16)
Fossil Fuel Energy Consumption (% of total)	-0.01*** (0.00)	-0.03**** (0.01)	-0.03*** (0.01)
Constant	1.65	7.85	6.34
N	44	44	49
R-squared	0.27	0.41	0.30

Robust standard errors in parentheses. +: p<0.15; *: p<0.10; **: p<0.05; ***: p<0.01; ****: p<0.001

Multivariate Regression (OLS)	<i>Model #2</i>	<i>Model #4</i>	<i>Model #6</i>
Variable	2007	2008	2010
know “somewhat” or “great deal” about climate change	0.01 (0.00)	0.01 (0.01)	0.02 (0.01)
Parliamentary System ¹⁵	0.14 (0.15)	0.59* (0.31)	0.14 (0.29)
Proven Fossil Fuel Reserves (oil, natural gas, coal) ¹⁶	-0.03** (0.01)	-0.06* (0.03)	-0.05* (0.03)
GDP per capita ¹⁷	-0.16 (0.11)	-0.75*** (0.27)	-0.60** (0.23)
Fossil Fuel Energy Consumption (% of total)	-0.01** (0.00)	-0.03*** (0.01)	-0.03** (0.01)
Constant	1.71	8.23	6.63
N	43	43	48
R-squared	0.23	0.40	0.31

Robust standard errors in parentheses. +: p<0.15; *: p<0.10; **: p<0.05; ***: p<0.01; ****: p<0.001

¹² Parliament dummy variable (Parliamentary = 1, Assembly-elected President/Presidential = 0).

¹³ Log transformation to correct for linearity.

¹⁴ Log transformation to correct for linearity.

¹⁵ Parliament dummy variable (Parliamentary = 1, Assembly-elected President/Presidential = 0).

¹⁶ Log transformation to correct for linearity.

¹⁷ Log transformation to correct for linearity.

can be understood twofold. First, assuming different contexts, as this paper and extant literature both consider to be important, public opinion may actually play a substantive role, but not such that it registers as a consistent and significant effect on domestic climate change mitigation in a cross-country sample for regression analysis. In other words, public opinion could still present a palpable political force with which officials and political leaders reckon in terms of policymaking and effecting political change; however, the significance of this effect might prove to be difficult to find domestically amid variation, that is, when comparing a sample of countries and each vary considerably in several dimensions. Popular sentiment as measured by public opinion may not have the same impact on climate change mitigation in one country over another. The second possible explanation, as Harrison and McIntosh (2010) suggest, is that climate change is just not as important as pocketbook issues, which people face tangibly and directly being consumers.

The contextual variation of countries included in the sample—possible cause for null results with the survey sets—carries this discussion next to parliamentary systems, which also failed to display conventional levels of significance by association with climate change mitigation. Like the two Gallup survey sets, the parliamentary systems dummy variable does approach significance, though without ever getting there by conventional standards. The parliamentary system dummy variable, still, is among the results of the six models with larger slope coefficients as shown in Tables 1 and 2. The coefficients are also positive, which agrees with extant literature and the above hypothesis. In total, the sample size and other potential introductions to biases could have implicated the significance of the parliamentary systems dummy variable.

Fossil fuel energy consumption, the proxy measure for costs associated with climate change mitigation, reveals consistently significant results by conventional standards. These findings, with reliably negative coefficients, tend to agree with above hypotheses and the literature, which suggests lifestyle costs of climate change mitigation are clear inhibitors to an adequate domestic policy response. In contrast, the political economy of fossil fuels industry presence, measured by proxy as aggregate proven domestic fossil fuels reserves, shows mixed results, with reliably negative coefficients but inconsistent significance by conventional standards across the six models. The former, measuring costs of climate change mitigation by way of domestic fossil fuel energy consumption, provides the highest significance among the findings of the six models.¹⁸ Unsurprisingly, then, it is both the interests of fossil fuels industries and the aversion to costs of transformation and lifestyles changes that are shown to be implicated, harmfully, in effecting domestic actions for mitigation.

The economy factor of climate change is proving to be formidable. As a further matter, GDP per capita is shown to be consistently significant under conventional levels while maintaining negative coefficients, with two qualifying exceptions; one in Model #1, where it is approaching significance, and Model #2, where there is no significance. Looking back to the Environmental Kuznet's Curve in the above discussion, which follows that high levels of economic development can be conducive to reversal or reduction in environmental degradation only after overcoming a threshold or curve, the findings of this paper exhibit mostly only the front half of the curve. In other words, there is no consistent pattern of GDP per capita having any positive association regarding climate change mitigation. Echoing the lifestyle-change costs

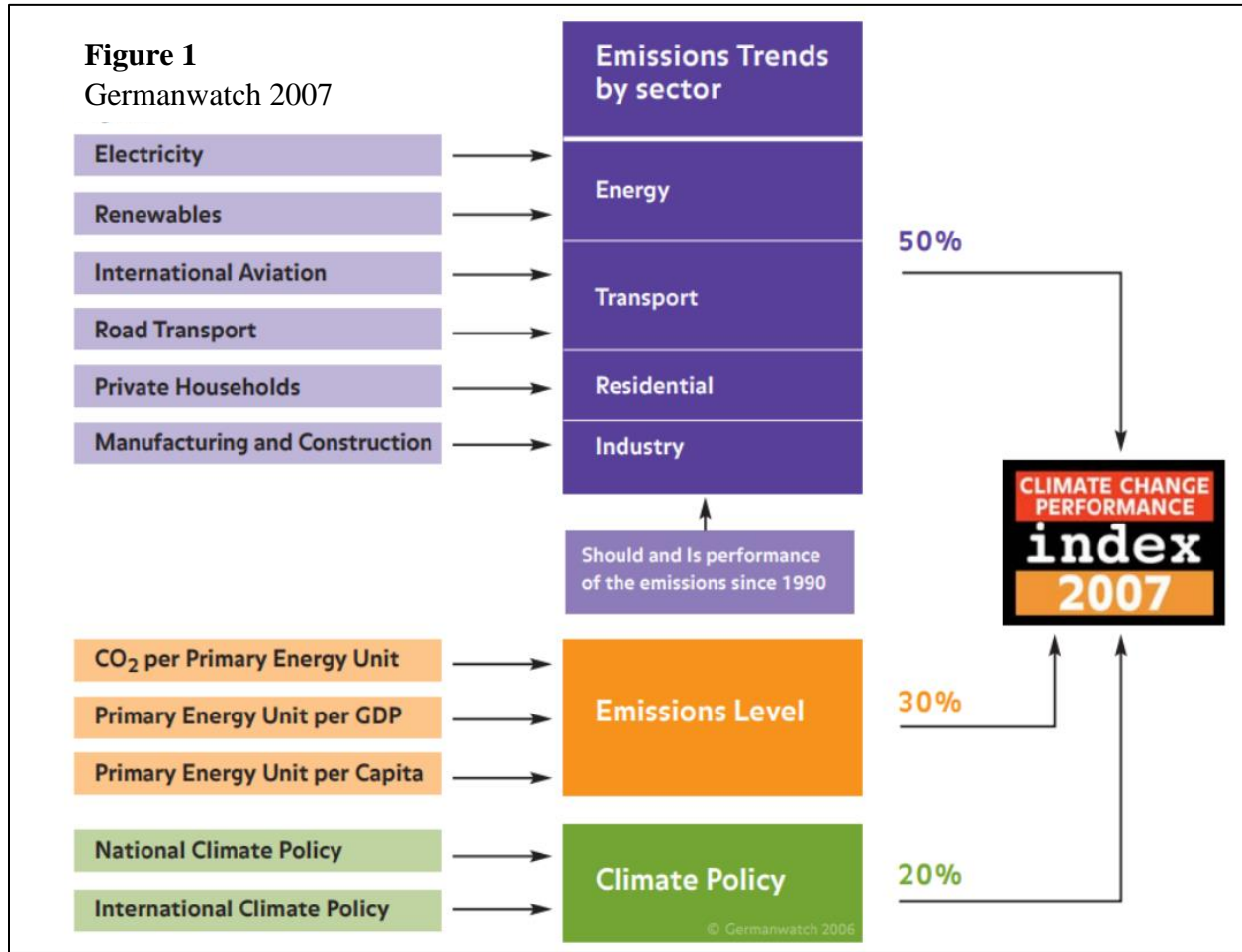
¹⁸ It is important to note the relatively low coefficients for both fossil fuels independent variables, consumption and industry presence. Because the distributions for both data sets exhibited skewness from a perfectly normal distribution, the coefficients and intercepts may be biased.

of effective mitigation, it seems that wealthier countries are not so prepared for collective transformation and its tangible costs.

Taken together, the models provide a reasonable fit for all their parsimony and given data constraints in analyzing the domestic climate change mitigation in a cross-country comparative study. Through validation of extant ideas explaining the trouble of present deficiencies in domestic policy action to combat climate change, this paper adds more clarity to a budding research area. The addition of the multivariate models provided here serve to illuminate the importance of various factors adjacent to the domestic politics of climate change, which is a policy arena increasingly pivotal for adequately addressing this collective action dilemma. Further research will benefit if quantitative literature of this ilk is supplemented by case analyses and qualitative work, perhaps in that way capturing the uniqueness of context in effecting state policy actions to confront climate change.

With a reorientation of climate change politics from the international to the domestic policy level made formal by the landmark Paris Agreement, the interchange of public support, industry interests, lifestyle adjustment, and domestic institutions enter the limelight. It becomes more important now than ever, in a globalized world, that domestic politics are driven by a collective understanding of the necessity to address global problems by a global effort.

Appendix



Countries Included in the Models

Algeria	Cyprus	Ireland	Netherlands	South Africa
Argentina	Czech Rep.	Italy	New Zealand	South Korea
Australia	Denmark	Japan	Poland	Spain
Austria	Finland	Kazakhstan	Portugal	Sweden
Belarus	France	Lithuania	Romania	Taiwan
Belgium	Germany	Luxembourg	Russia	Thailand
Brazil	Greece	Malaysia	Saudi Arabia	Turkey
Bulgaria	Hungary	Malta	Singapore	Ukraine
Canada	India	Mexico	Slovakia	United Kingdom
China	Indonesia	Morocco	Slovenia	US

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