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What are the Determinants of Public Support for Climate Policies? A Review of the Empirical Literature

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Abstract: Climate change is one of the most challenging problems of our times. To be effective, climate policies need to receive citizens' approval. The objective of this article is to examine both the extent of individuals' support for different climate policies and key determinants of policy support. To this end, an overview of the related empirical literature is provided. The article shows that the empirical literature on public climate policy support is very diverse in terms of concepts, measures of policy support and empirical approaches. Moreover, the bulk of the existing empirical literature has a strong U.S. focus. The article concludes that public support for climate policies is rather a matter of climate change beliefs and party identification, and not primarily a question of socio-demographic background. The article also offers suggestions for future research as well as policy recommendations.

Keywords: climate change, climate policy, policy support, public opinion, public good, literature survey

JEL Classification: Q54, Q58, H41

1 Introduction

More than in any comparable period in human history, humans have over the past decades rapidly and extensively intervened in the Earth's natural systems through pollution and resource extraction. Soil depletion, loss of biodiversity, marine plastic pollution, and climate change are only a few of the resulting environmental problems (IPCC 2007, Millennium Ecosystem Assessment 2005). Climate change in particular has the potential to lead to disastrous consequences for humans and the natural world (Hansen et al. 2013; IPCC 2018). In its 2018 special report, the Intergovernmental Panel on Climate Change (IPCC) warns that extensive climate

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policy measures are needed to mitigate climate change (IPCC 2018). These measures require the public's support to be effective. Against this background, this survey's objective is to provide an overview of the empirical literature concerning both the extent and determinants of individuals' support for different climate policies.

Climate change encompasses the characteristics of a public good: individuals polluting the air benefit from doing so without paying the full cost, thereby degrading the public good (Buchholz and Sandler 2021). Various scholars have pointed out that climate change can only be tackled by the collective action of various stakeholders, including governments and citizens (Buchholz and Sandler 2021; Jagers et al. 2020; Leiserowitz 2019; Ostrom 2009). By implementing national policies, governments play an especially important role in regulating greenhouse gas emissions (Buchholz and Sandler 2021; Leiserowitz 2019). At the Paris Climate Meeting in 2015, governments of countries worldwide pledged to keep global warming well below 2 °C above pre-industrial levels and try to limit the temperature rise to 1.5 °C (UNFCCC 2015). Nonetheless, given the current emission reduction plans of most countries, it is very likely that global warming will exceed 1.5 °C (IPCC 2018; Roelfsema et al. 2020; Rogelj et al. 2016). Hence, unless additional policy measures are taken to curb greenhouse gas emissions, risks to natural and human systems may be much higher than currently expected (IPCC 2018). However, without broad public support, policy efforts to reduce greenhouse gas emissions will likely be ineffective (Geels 2013; McGrath and Bernauer 2017; Wiseman et al. 2013).

The literature shows that the success of policies in general is affected by public opinion (Burstein 2003; Page and Shapiro 1983). Similarly, Nobel laureate Elinor Ostrom noted that for policies to be successfully implemented, they need citizens' support: "When citizens approve of a governmental policy, think they should comply, and this view is complemented by a sense that the governmental policy is effectively and fairly enforced, the costs of that enforcement are much lower than when citizens try to evade the policy" (Ostrom 2009). Related research has found that increasing public awareness of climate change positively affects climate policy outputs (Anderson et al. 2017; Tjernström and Tietenberg 2008).

This article provides an overview of the empirical literature on individuals' support for climate policies from different perspectives.[1] The first perspective is support for broad climate actions such as government actions to decrease greenhouse gas emissions. The second perspective is public support for specific climate

1 A similar study was performed by Drews and van den Bergh (2016), who summarize the literature on climate policy support according to three main categories of variables that explain climate policy support.

policy instruments. According to Hepburn (2006), there are two main types of policy instruments. The first type includes economic instruments, such as price-based instruments (e.g. taxes and subsidies) and quantity-based instruments (e.g. cap and trade systems). The second type of policy instrument involves regulations that aim to restrict an activity, a product, or a pollutant (e.g. setting air safety standards). The third perspective in the literature concerns individuals' support for new technologies with a special focus on renewable energy. The final perspective includes studies that combine different types of climate actions, such as broad actions and specific policy instruments, into an index measure of public policy support. This literature review concentrates on empirical studies that use polling or survey data as input; however, experimental studies are not considered.[2]

The remainder of this article is organized as follows. Section 2 reviews the empirical literature on public support for broad climate action. Sections 3 and 4 examine the extent and determinants of climate policy support for economic policy instruments and regulations, respectively. Section 5 considers renewable energy policy support. Section 6 covers the literature that uses index measures of climate policy support. The final section discusses the main findings, suggests opportunities for future research, and offers some policy recommendations derived from the literature.

2 Public Support for Broad Climate Action

Various polls and surveys that examine public attitudes toward climate change are now regularly conducted. A topic of many surveys has been measuring public support for broad climate action (e.g. whether the government should take steps against climate change).

Several studies have assessed individuals' preferences regarding broad climate actions in the United States. Here, political orientation and party identification tend to be key drivers of policy preferences. Analyzing data from the 1996 American National Election Studies (ANES), Daniels et al. (2012) find that Republicans and individuals with conservative worldviews are less likely to support climate action by the government. Using ANES data from 20 years later, this result is confirmed by Shao and Hao (2020). Moreover, research carried out by the 2018 Pew Research Center concludes that political orientation and party identification influence individuals' perceptions of climate protection measures taken by the government. However, environmental values and attention to national media appear to weaken the effect of political orientation on climate policy support. A

2 Readers interested in the latter type of studies may consult Drews and van den Bergh (2016).

possible explanation might be that those with higher environmental values or who pay more attention to media are more likely to agree that global warming is human caused (Shao and Hao 2020; Shwom et al. 2010). In a similar vein, Ziegler (2017) investigates the effects of political orientation, environmental values, and the interaction between these two variables on the support for broad climate action based on representative survey data from 2013. Importantly, the results suggest that environmental values drive public support for publicly financed climate policy in the United States. Moreover, environmental values weaken the differences in support for publicly financed climate policy between right-wing and left-wing oriented individuals (Ziegler 2017). In addition to political orientation and party identification, climate change beliefs emerge as an important determinant of individuals' policy preferences (Shao and Hao 2020). Similarly, using nationally representative survey data from 2008, Roser-Renouf et al. (2014) conclude that beliefs about climate change drive citizens' stances on climate action.

Socio-demographic variables that correlate with broad climate action in the United States appear to be age and religion. Older and more religious individuals are less likely to endorse increasing government action on climate change (Shao and Hao 2020). According to Ziegler (2017) older U.S. citizens have a lower willingness to support publicly financed climate policy. However, building on a review of research results and polling data, Egan and Mullin (2017) caution that socio-demographic factors are difficult to identify due to the fact that the impact of climate change is widely dispersed across individuals.

Research on public support for broad climate action from world regions other than the United States is scarce. One exception is Kim (2011), who compares climate policy support between Asian countries and other world regions including North and South America, Europe, and Africa on the basis of various cross-national surveys from 2006/07. The author finds that, relative to other world regions, Asian countries exhibit little support for broad climate action if it is costly. Besides the United States, Ziegler (2017) investigates individuals' support for broad climate action in Germany and China. Also in these two countries environmental values tend to be a major determinant of the support for publicly financed climate policy. Furthermore, the author identifies an interaction term between environmental values and political orientation in Germany implying that environmental values potentially attenuate the effects of individuals' political views on the support for publicly financed climate policy.

Apart from domestic climate action, climate change mitigation requires cooperative international efforts (Bernauer 2013; Buchholz and Sandler 2021). A review of survey and polling data by Nisbet and Myers (2007) suggests that U.S. citizens' support for global action is undermined by the implied domestic economic costs of international treaties such as the Kyoto protocol (Nisbet and Myers 2007).

McGrath and Bernauer (2017) observe similar links in various countries worldwide. Specifically, by drawing on data from different surveys, they find that personal cost considerations are a main driver of climate policy preferences. Moreover, the authors point out that individuals generally do not perceive climate change as a global public good. Instead, individuals appear to favor unilateral over internationally reciprocal climate policy (McGrath and Bernauer 2017).

3 Public Support for Economic Instruments

Economic instruments are judged important for reducing greenhouse gas emissions (Karp and Traeger 2018; Pizer 2002; Stiglitz 2019). They are usually implemented in the form of taxes or subsidies, including taxes on gasoline and electricity, tax incentives for renewable energy, or redirection of fossil fuel subsidies (Goulder and Parry 2008). Economic instruments are typically employed if (i) the solution to the problem varies across economic units mainly due to cost differences and (ii) governments lack sufficient information about the problem (Hepburn 2006). Additionally, it is possible to combine price and quantity instruments, resulting in so-called "hybrid instruments," for example a trading scheme with a price ceiling. However, hybrid instruments are disregarded here since public opinion polls rarely inquire about individuals' support for this type of instrument.

Several studies have examined public attitudes toward tax instruments that address climate change. Analyzing survey and polling data from various sources such as academic and news organizations, Nisbet and Myers (2007) show that U.S. citizens' approval of policies that lead to higher costs of living, for example taxes on electricity and gasoline, is lower compared with tax policies that target industries to increase energy efficiency. Individuals from other developed countries express similar attitudes. Comparing survey data from different world regions, Kim (2011) shows that people living in North America or Western Europe strongly favor tax incentives for alternative energy usage. By contrast, support for taxes on energy consumption is generally low in both developed and developing countries (Kim 2011).

Separate research has sought to identify factors that explain public support for economic climate policy instruments. Stoutenborough et al. (2014) examine U.S. citizens' opinions in the early 2000s with respect to the following policies: tax on industry, higher fossil fuel prices, and market incentives to encourage industries to reduce emissions. The authors point out that strong climate change concern is a key determinant of policy support. Similarly, individuals with strong ecological values are more likely to endorse economic climate policy instruments. Other relevant predictors of support for economic instruments are trust in experts and political identification: Republicans generally tend to oppose economic policy instruments.

The influence of socio-demographic variables is less clear-cut. Increased fossil fuel prices is the only policy variable that significantly correlates with socio-demographic factors including age, religion and income: older individuals, individuals with higher incomes, and those who are more religious are more likely to support increases in fossil fuel prices (Stoutenborough et al. 2014). Leiserowitz (2006) studies public attitudes towards several carbon tax proposals using a national, representative survey conducted in the United States in 2002 and 2003. He finds that, besides a person's feelings about climate change, cultural values are more important determinants of policy support than socio-demographic factors. In addition to the United States, Ziegler (2017) asks about individuals' (stated) willingness to pay a price premium for climate-friendly products in Germany and China based on 2013 representative survey data. In all three countries individuals who endorse a pro-ecological world view are more likely to support this measure. Furthermore, U.S. and German citizens with social and green party identifications would pay such a price premium. In China, members of the Communist party seem to be more accepting of higher prices. As regards socio-demographic factors, women and older individuals are less willing to pay a price premium for climate-friendly products in the United States, whereas in Germany and China this is true for less educated individuals.

Much of the economic climate policy support literature that has been discussed so far has concentrated on individual-level variables (e.g. ecological values or an individual's socio-demographic background). A study by Harring et al. (2019) investigates how a country's political culture (Scandinavian vs. Anglo-Saxon culture) and the economy's dependence on the fossil fuel industry modify the effect of individual-level variables on public support for different types of carbon taxes in four countries. To this end, representative surveys were carried out in Australia, New Zealand, Sweden, and Norway in 2005. Overall, their results imply that economic dependence on the fossil fuel industry reduces support for carbon taxes. Concerning the role of political culture, the authors discover that in Nordic countries, the prevailing political context reinforces the negative impact of right-wing ideology on climate policy endorsement. In addition, the study finds that carbon taxes directed toward industry and producers are more likely to be backed by the public than taxes targeting consumers. This is line with Nisbet and Myers (2007) and Kim (2011) mentioned above who find that individuals oppose policies that may possibly have a negative impact on themselves.

4 Public Support for Regulations

Regulations can be classified as non-market-based policies, which generally aim at controlling the amount of greenhouse gases released into the atmosphere. This

is mainly achieved by setting specific performance and technology standards or by restricting specific practices and products (Goulder and Parry 2008; Singhal 2018). Examples of regulations include fuel efficiency standards for vehicles, energy efficiency standards for buildings, or the requirement to apply a specific production method (Goulder and Parry 2008).

According to a review of survey and polling data, in the early 2000s, more than two-thirds of U.S. citizens already wanted the government to set stricter emission standards, especially for industry (Nisbet and Myers 2007). Similarly, a large national survey conducted in 2018 finds that more than half of U.S. citizens believe that regulations are needed to reduce greenhouse gas emissions. Furthermore, the survey suggests that most of the population is dissatisfied with the measures taken by the federal government to combat climate change and protect the environment (Funk et al. 2018).

Several studies indicate political divides over the number of regulations and government actions. Employing data from the 1996 ANES, Daniels et al. (2012) conclude that Republicans are less likely to support environmental regulation. The strong political divide seems to persist over time. In 2018, less than half of Republicans think the federal government should do more to protect the environment, whereas among Democrats this proportion increases to almost 90% (Funk et al. 2018). McCright et al. (2013) deliver a more nuanced picture of the influence of political orientation on policy support using U.S. Gallup survey data from 2012 by studying how the public perceives emission standards. While political orientation is shown to be an important predictor of climate policy support, it also influences policy support through other variables. Specifically, the authors find that Liberals and Democrats have more accurate views of climate change science than Republicans or individuals with conservative worldviews. Additional study findings are that global warming beliefs have important direct and indirect effects on policy approval. Global warming beliefs are captured by an index measure consisting of five different survey items, including individuals' concerns and views about the causes of climate change. Apart from being a key determinant of policy approval, global warming beliefs mediate the relationship between perceived scientific agreement and policy support as well as that between political orientation and policy support. It thus appears that liberalism and a democratic political orientation as well as agreement among scientists about climate change are associated with stronger global warming beliefs, which therefore raises acceptance of climate policies (McCright et al. 2013).

Likewise, research conducted by Bromley-Trujillo and Poe (2020) points to the importance of climate change beliefs for policy support. In this study, climate change beliefs are captured by public perceptions of the seriousness of the climate change problem. Using U.S. state-level data from 2004 to 2010, the authors find

that in states where climate change is considered a problem and attention to environmental issues is high, climate policies such as environmental standards for public buildings or vehicle emission standards are more likely to be enacted. However, in states that are controlled by Republicans the link between climate change awareness and policy adoption tends to be weaker (Bromley-Trujillo and Poe 2020).

5 Public Support for New Technologies

Energy transition plays a pivotal role if societies want to meet their climate targets (Edenhofer et al. 2006; Hainsch et al. 2020; Vollebergh and Kemfert 2005). This section attempts to summarize some key findings in the recent literature on individuals' support for new technologies with a special focus on renewable energy. A full treatment of this literature would go beyond the scope of this study.[3]

General patterns of public support for renewable energy over space and time have been studied. Using U.S. data from 12 nationally representative climate change opinion surveys conducted between 2008 and 2013, Howe et al. (2015) show that public support for renewable energy standards varies at the congressional district level. In separate research for specific U.S. regions, Hamilton et al. (2019) find an upward trend over the period 2011 to 2018 in the percentage of individuals who prioritize renewable energy over oil exploration.

Similar to the other perspectives on public support mentioned above, scholars have analyzed the role of partisanship for new technology support. According to a large representative survey among U.S. citizens in 2018, individuals largely agree that solar and wind power should be expanded. This is one of the rare cases where both Republicans and Democrats seem to agree on a climate policy issue (Funk et al. 2018). Although, regional data for Oregon and New Hampshire indicates that there are large gaps between Democrats and Republicans in terms of their beliefs that renewable energy is more important than oil exploration. And in a study for the United States as a whole, Stoutenborough et al. (2014) finds weak evidence that Democrats are less likely to support renewable energy.

Apart from party identification, scholar have considered additional determinants of public support for renewable energy. Olson-Hazboun et al. (2018) demonstrate that support for renewable energy is lower in regions with extractive industries such as mining and natural gas production. Other factors that influence the support for renewable energy include education level, gender, ecological

3 For another review of the literature on public renewable energy support, the reader may refer to Devine-Wright (2008).

values as well as an understanding of the causes of climate change. Hamilton et al. (2019) point out that younger and more educated people in Oregon and New Hampshire give higher priority to renewable energy than to oil exploration. Similarly, Olson-Hazboun et al. (2018) find that women as well as better educated U.S. citizens are more likely to agree with renewable energy policies. In addition, individuals who believe that climate change is human-caused seem more supportive of renewable energy policies (Olson-Hazboun et al. 2018). Some of these findings are confirmed in Stoutenborough et al. (2014) whose results suggest that individuals with higher incomes and education are more accepting of renewable energy. Moreover, strong ecological values and climate change concern appear to enhance the support for increased spending on renewable energy policy among U.S. citizens (Stoutenborough et al. 2014).

Udalov (2019) studies renewable energy support among British citizens. His analysis shows that individuals who are worried about climate change and rising energy prices in the long-term more often prioritize renewable energy compared to individuals who mainly consider short-term prices. Moreover, Udalov (2019) finds that age and renewable energy support are negatively correlated.

6 Index Measures of Policy Support

Several studies employ index measures of climate policy support. Index measures typically combine the results of several survey questions concerning individuals' views on climate action. The questions span across all or a selection of the abovementioned perspectives on climate policy support. In effect, index measures treat different types of climate actions similarly. A common critique of index measures is that this approach potentially masks important differences in terms of support across policy instruments (Daniels et al. 2012; Stoutenborough et al. 2014). Moreover, each study typically employs its own set of climate policies, which renders comparisons across studies difficult.

Various cross-sectional studies have been performed using U.S. data. The studies are based on surveys among individuals from either selected states or the whole country. Taken together, the results suggest that climate change beliefs are a key determinant of policy support. This means individuals who believe climate change is happening and caused by humans are more likely to support a given set of climate policies (Ding et al. 2011; Goldberg et al. 2021; Hall et al. 2018; O'Connor et al. 2002). Moreover, agreement among scientists about climate change positively affects policy support. In addition to its direct effect, perceived scientific agreement appears to mediate the relationship between political party identification and climate policy support (Ding et al. 2011). Other variables that raise climate policy

support include worries about global warming (Goldberg et al. 2021; Leiserowitz 2006), risk perception (Goldberg et al. 2021; Zahran et al. 2006), altruistic values (Shwom et al. 2010) and environmental beliefs (Leiserowitz 2006; Shwom et al. 2010). Relevant socio-demographic variables that correlate with levels of support for climate policies are age and gender. Women (Goldberg et al. 2021; Zahran et al. 2006) and younger individuals (Goldberg et al. 2021) seem to endorse climate action more than men and older people, respectively. However, compared with variables such as values and beliefs, socio-demographic variables are weaker predictors of public climate policy support (Leiserowitz 2006).

Zahran et al. (2006) assess the influence of objective climate change risk. Proxy variables of objective climate change risk include temperature trends and sea-level rise. The authors find that objective climate change risk is less important for policy support than climate change's perceived threat to individuals' material well-being.

So far, all studies mentioned in this section are based on U.S. data. A study for Europe was recently conducted by Otto et al. (2020). The authors draw on data from the eighth round of the European Social Survey, which took place in 2016/2017 and included 23 countries. The authors merge measures of economic instruments (increasing taxes on fossil fuels and subsidies for renewable energy) as well as command-and-control instruments (ban the sale of the least energy efficient household appliances). They find that greater trust in public institutions is associated with higher levels of climate policy support. Other important correlates are education level and political ideology. Highly educated individuals and those with egalitarian views are more likely to support climate policies.

7 Discussion and Conclusion

In its 2018 report, the IPCC stresses that bold government action is required to limit global warming to 1.5 °C above pre-industrial levels. The report also describes various policies to decarbonize the economy, including new technology policies, carbon pricing, and removal of fossil fuel subsidies (IPCC 2018). Such policies need citizens' support for successful implementation. Thus, understanding the determinants behind public support for climate action is crucial and can guide policymakers in their policy choices. Against this background, this article reviewed the related empirical literature on climate policy support from four different perspectives, namely broad climate action, specific policy instruments, new technologies, and index measures of policy support. The literature used for this review focuses on the individual level and is based on polling or survey data; however, it is very diverse in terms of concepts, policy support measures, and empirical approaches. This is largely due to the fact that scholars from different

disciplines (e.g. economics, environmental psychology, and political science) have investigated the issue. Nevertheless, some general conclusions can be drawn.

Global warming beliefs (i.e. climate change is happening and human caused) appear to be a key determinant of climate policy support across all four perspectives of climate policy support. Individuals who accept that climate change comes from greenhouse gases released into the atmosphere by human activity are more likely to support climate policies. Moreover, past empirical research points toward the highly politicized nature of climate policy support. Individuals with right-wing and conservative political views are less likely to support climate change policies, whereas individuals with egalitarian and democratic political orientations are more positively geared toward climate change policies. One explanation for this seems to be that conservative individuals are often skeptical of the idea that global warming is caused by humans (Capstick et al. 2015; Hornsey et al. 2016). Several studies that use economic policy instruments show that when respondents are confronted with the cost implications associated with climate policy, the public tends to favor taxes directed toward industry, whereas taxes targeted at households are typically opposed. It appears that the influence of socio-demographic variables on climate policy support is generally weaker compared with climate change beliefs and political orientation. Still, age, religion, education and gender can account for at least some variation in climate policy support.

This literature survey shows that public support for climate policies is rather a matter of climate change beliefs and party identification, and not so much a question of socio-demographic background. Thus, to increase acceptance of climate policies among individuals, the importance of climate policies should be promoted, along with information about the causes of climate change and how climate policies address these causes. As many climate policy measures are costly for citizens, policymakers should mention potential private benefits in the provision of public goods, for instance, better air quality due to reduced carbon emissions (Löschel et al. 2018). Moreover, because most individuals do not seem to perceive global warming as a collective action problem (McGrath and Bernauer 2017), greater emphasis should be placed on the public good nature of the climate change problem, which can only be solved by bold collective action (Buchholz and Sandler 2021; IPCC 2018).

The potential to draw general conclusions from the literature on public climate policy support is limited by the narrow geographical focus of the available studies and their limited time dimension. Most studies rely on cross-sectional data either for the United States or a few selected (typically highly industrialized) countries. An important shortcoming of cross-sectional data is that it is difficult to draw causal inferences from this type of data. Moreover, the strong bias toward studying

the United States and highly developed countries raises the question of how far the findings can be generalized, especially with respect to developing and emerging world regions with potentially fewer established climate policies. At the same time, poorer countries will likely suffer the most from climate change (Bathiany et al. 2018; Fankhauser and Dermott 2014).

Although the empirical literature on climate policy support has progressed significantly over the last decade, there are several gaps in the literature that should be targeted by future research. Over the past years, in the wake of international environmental and climate agreements, countries worldwide have implemented national climate policies to meet their nationally determined contributions (NDCs) (Roelfsema et al. 2020). Thus, research on public opinion regarding climate policies and government action should be extended to include countries worldwide and those at different levels of development.

Somewhat surprisingly, little research has been performed on the impact of climate change itself on public climate policy opinion. As extreme weather events such as droughts and heat waves are expected to intensify in the wake of climate change (Hansen et al. 2013; IPCC 2018), the effect of extreme weather events on climate policy preferences might rise in the future.

Another avenue for future research is using data with higher resolution. The problem of highly aggregated data is that it masks differences in public opinion across regions. One might expect that individuals from more vulnerable regions are more concerned with climate policies and demand more action from policymakers than those in less affected regions. Similarly, index measures hide differences in public opinion across different types of policy instruments. Thus, when building index measures, researchers should be guided by proposed climate policy mixes by established authorities like the IPCC (2018) or theory (see e.g. Pizer 2002; Fankhauser et al. 2010; Bertram et al. 2015). Such an approach could have more useful practical implications for policymakers.

Finally, there is growing awareness of the interlinkages between environmental protection and climate change (Pörtner et al. 2021; Warren et al. 2013). Thus, the literature on climate policy support should be complemented by research on public opinion regarding environmental protection.

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