Civic engagement and government spending: Lessons from global warming

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Abstract

This article examines the relationship between civic engagement and government spending. We define civic engagement along three dimensions of citizens' participation: in civil society associations; on e-government platforms; by voting at national elections. To exogenously vary the willingness to engage, we assume that reactions to global warming differ across countries due to preferences for collectivism, attitudes toward interacting behind a screen, and geo-climate features. We consistently estimate that civil and electronic participation increase government spending and welfare programs, compatibly with the hypothesis that more participative societies are associated with more redistributive policies. Instead, electoral participation decreases it, compatibly with a selection mechanism whereby the fraction of voters, moved by the environmental threat that global warming represents for the collectivity, distance themselves from political engagement through the traditional electoral channels.

Keywords: government spending; civic engagement; e-participation; voter turnout; global warming.

JEL Classification: H50, D78, Q56, Z18.

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1. Introduction

This article examines the relationship between civic engagement, a complex concept which can take multiple forms and encompass a variety of behaviors and actions related to both social and political aspects (Arvanitidis, 2017), and government spending. In a recent contribution, Besley (2020) argues that a strong "civic culture" increases the likelihood of spending on public goods. In a similar fashion, Lijphart (1997) advocates higher "democratic participation" to reduce income disparities, along patterns that Mueller and Stratmann (2003) find in aggregate data. Civic engagement should also improve the quality and accountability of public services and the allocation of public investment because it favors citizen control over public goods provision (Gaventa and Barrett, 2012; Livert et al., 2019).

In such a framework, more participative societies should be associated to larger governments' size, proxied by the amount of public spending. In this article, we test this statement bringing those insights into the data for a sample of democracies observed over the first decades of the XXI century. During the 2000-2019 period, environmental worries due to global warming have raised the degree of people involvement in civic and political life through traditional and novel forms of participation, providing an ideal setting for the analysis.

In Section 2, we first review the multidisciplinary literature on citizens' engagement to the civil and political life of their community and discuss the non-trivial issue of how to measure civic engagement at the country level (Gibson, 2000; Theocharis and Van Deth, 2018). Then, we describe our three measures of civic engagement and discuss how they could affect aggregate government spending and its main functions. In detail, we focus on c*ivil participation* to non-political and voluntary organizations that belong to the third sector (see, e.g., Putnam et al., 1994; Skocpol and Fiorina, 1999; Gherghina and Geissel, 2017). *Electronic participation* in policymaking by citizens who can interact and communicate with governments and public administrations directly, through ICTs, i.e. Information and Communications Technologies (McDonald, 2008; Khazaeli and Stockemer, 2013; Campante et al., 2018; Ceccarini, 2021). *Voter participation* at national elections, a measure often used to proxy civic engagement in economics and political sciences (see, e.g., Powell, 1986; Oliver, 1999; Costa and Kahn, 2003; Dalton, 2008; François and Gergaud, 2019).

In Section 3, we employ a two-stage least-square approach, to account for the possibility that civic engagement and government spending may not be random, if, e.g., citizens participation increased in times of more generous redistributive policies and expansionary fiscal policies. Based on the large literature that links environmental concerns to individual behavior, activism, and participation (Fransson and Garling, 1999; Dunlap and Jones, 2002; Knight and Messer, 2012; Brieger, 2018; Rhead et al., 2018), we build our identification strategy. To generate exogenous variation in participation, we use country-specific reactions to the environmental threat that global warming represents. Specifically, preferences for collectivism versus individualism (see also Bai and Li, 2021; Buonanno et al., 2023), attitudes for interacting behind a screen versus in presence (Anderson et al., 2017; Stavropoulos et al., 2021), and geo-climate features that affect the perceived private cost of global warming, will modulate country-specific reactions to global warming, while the latter will affect government spending directly.

Two-stage least-squares results in Section 4 indicate that the environmental threat, represented by global warming, increases civil and electronic participation, and through this channel, government spending, as predicted by the political economy models of redistribution and civic environmentalism (John, 1994; Knopman et al., 1999; Berry et al. 2019). Voter participation is, instead, lower in countries where stronger preferences for collectivism amplify reactions to environmental threats, and this perturbation to the willingness to turnout, in turn, reduces government spending and the welfare component.

The IV-type interpretation of the results in Section 5 suggests that this might be the case because of a selection mechanism whereby the fraction of the electorate moved by the threat that global warming represents for the collectivity distances themselves from political engagement through traditional electoral channels, as predicted by models of civic environmentalism, possibly bringing in more self-interested voters that ask for less redistribution (Dhami and al-Nowaihi, 2010). Several additional results are provided which support this interpretation. Finally, we focus on green attitudes of citizens that, although worried about climate change, seem not to express a demand for higher spending, in line with recent findings on social (dis)trust and individual expectations from others in contrast with their actual behavior (Daniele et al., 2023).

Our work relates to different strands of literature. We contribute to the empirical studies investigating whether more participative societies and democratic forms of government are associated with more redistributive policies (Fumagalli and Narciso, 2012; Besley, 2020; Theodossiou and Zangelidis, 2020).[1] By exploiting the heterogeneity of both public spending composition and civic engagement dimensions across countries, we challenge the classic view that greater civic engagement would necessarily lead to more government spending, at least in the case of voting at the national elections as expression of individuals' civic participation.

We also contribute to the long-standing literature analyzing the determinants of government size and scope over time due to demand factors and the extension of the voting franchise and suffrage allowing new groups (e.g., the poor and the most disadvantage) to participate actively in the political process and policy formation (Romer, 1975; Meltzer and Richard, 1981; Lijphart, 1997; Lott and Kenny, 1999; Aidt et al., 2006; Haelg et al., 2022). Beyond those traditional demand factors, we consider additional dimensions of civic engagement, such as the electronic participation (e.g., Roseman and Stephenson, 2005; Falck et al., 2014; Fujiwara, 2015), being able to shape government spending programs.

This article also contributes to the literature on civic environmentalism mentioned above, providing empirical evidence on whether and how different forms of civic engagement represent the channel through which environmental concerns affects government public spending.

2. Conceptual framework

2.1 How to define civic engagement: the literature review

Defining civic engagement proves to be a difficult task given that it can take many forms that range from individual voluntarism to electoral participation. Some scholars commonly describe it as the intensity to which citizens participate in the life of a community to improve conditions for others or to help shape the community's future (Schofer and Fourcade-Gourinchas, 2001). More generally, civic engagement includes a more nuanced and descriptive set of engagements such as political, social, and moral, and the adoption of various combinations of civic and political activities and participation have led to mixed results (Oliver, 1999; Costa and Kahn, 2003).

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[1] Consistently with those results, some scholars find that countries characterized by high levels of associational activity and norms of civic cooperation also show very low levels of income inequality (Knack and Keefer, 1997).

Based on Putnam (1995), civic engagement - together with networks, norms, and trust - enters the concept of social capital, defined as all the features of social life that enable individuals to act together more effectively to pursue shared objectives. Following this perspective, a further refinement is that proposed by Uphoff (1999), who proposes a distinction between *structural* and *cognitive* dimensions of social capital. Accordingly, civic engagement mostly pertains to the former, being referred to individuals' behaviours reflecting social participation (e.g., membership in organizations).[2] A similar approach is followed by Geraci et al. (2022) using, among their measures representing structural social capital, political and civic engagement indicating whether respondents are members of political parties, trade unions, professional associations, environmental groups, and other organizations. Active participation or membership in political parties, trade unions, or professional associations can be also classified as "Olson-type organizations" (see, Knack and Keefer, 1997 and Degli Antoni and Grimalda, 2016); the idea is that those organizations, even different in structure and scope, meet similar goals as they are groups with redistributive targets.

As emerged so far, one relevant issue to be considered is the distinction between civic participation and political participation as the two concepts might be, in fact, in contrast (Theiss-Morse and Hibbing, 2005). This could be the case if the latter is motivated by the desire to affect public policy to pursue self-interest, instead of reflecting a nonremunerative, publicly spirited, collective action (Campbell, 2004). However, there is some evidence of a positive relationship between civic participation – as proxied by voluntary association membership – and political participation, according to which people who participate in voluntary associations are also likely to participate in politics (McFarland and Thomas, 2006; Howard and Gilbert, 2008). Overall, civic engagement can be seen as efforts to directly address public concerns, through individual work, collective action, or involvement in democratic institutions (Arvanitidis, 2017).

To provide a synthesis of the multifaced concept of civic engagement, we characterize such phenomenon in a cross-country and macroeconomic perspective, along three main dimensions: participation to voluntary organizations belonging to the civil society sphere; participation to

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[2] According to Uphoff (1999) approach, cognitive social capital derives from individuals' perceptions resulting in trust, values, and beliefs that promote pro-social behaviours.

policymaking process through new online tools; participation to national elections by voting action (empirical details on each dimension and its measurement are provided in Section 3). Even though those dimensions might account for a limited area of the broad spectrum of civic engagement, they allow us to focus on the crucial elements that relate to citizens' willingness and ability to affect government spending.

2.2 How different forms of civic engagement would affect government spending

Based on the framework described above, we provide some intuitions on how our measures of civic engagement would affect aggregate government spending and specific public functions taking advantage from the existing literature.

First, we consider participation to civil society organizations. As suggested in recent contribution by Besley (2020), who proposes a conceptual framework highlighting how civic culture can contribute to build an effective fiscal state, higher levels of *civicness* are associated with more people being intrinsically motivated to cooperate for the public good, leading to an expansion of the governments' fiscal capacity and activities, including higher provision of public goods. Additionally, many theoretical and empirical works emphasize the importance of civic engagement in the contest of the civic education theory (Galston, 2001). Through education, people accumulate human capital in the form of civic skills, which facilitate the participation to civil life. In this respect, there is some evidence on the fact that more educated individuals are more likely to engage in civic activities such as volunteering (Dee, 2004). Moreover, by interpreting civic engagement as a structural dimension of social capital, it emerges that countries with higher social capital spend a higher share of output on public education (as higher social capital causes greater voter knowledge at the individual level (Ponzetto and Troaino, 2018). Likewise, in economic theory the participation to civil society organizations is invoked to explain the link between education and democracy (Glaser et al., 2007). As a corollary, this could increase the health status of a democratic society and lead to more redistributive policies.

Second, we consider electronic participation. Growing evidence points to the rapid expansion of "e-participation", as defined by the United Nations (2020). A tool for engagement and strengthened collaboration between governments and citizens, for promoting participatory governance and helping individuals to accomplish civic duties, both for the empowerment of

individual citizens and the benefit of society (McDonald, 2008; Khazaeli and Stockemer, 2013; Campante et al., 2018; Ceccarini, 2021). Since the rise of Barak Obama's administration in the US, forms of e-participation that originates in the early 2000s found new ground for developing due to the affirmation of the "open government" model. Accordingly, open data, policy, and decision-making increased transparency and *e-platform* and services available to citizens.

The literature considering its relationship with government spending is less extensive, also given the novelty of that measure and its adoption across countries. Recently, Gavazza et al. (2019) empirically investigate the effects of online participation through internet diffusion on election outcomes as well as on government policies at the local level in UK. Differently from previous results, their empirical evidence indicates that broadband internet diffusion decreases political participation and, in turn, the size of government decreases. In terms of spending composition, they find that public expenditures addressed to less-educated voters (whose participation declines the most) such as expenditures on social housing and social services, decrease the most, whereas expenditures addressed to more-educated individuals (whose participation declines the least) such as expenditures on education, decrease the least. Evidence from China reveals that citizens' online participation leads governments to place greater attention on social welfare policies even in the absence of electoral accountability and to improve the quality of governance (Jiang et al., 2019).

Even though it is recognized that governments around the world are increasing internet-based platforms to facilitate public engagement with citizens (United Nation, 2020), an open question remains whether such online participation can effectively enable citizens to influence government policies. In this framework, the introduction of electronic voting technology in elections has been studied as a mechanism to promote a large *de facto* enfranchisement of mainly less educated citizens, especially in developing countries (Fujiwara, 2015). The main consequences are on government spending and its composition, with functions that are particularly beneficial to the poor. We also contribute to this debate with the subsequent empirical analysis.

Third, we consider the traditional participation in national elections by eligible voters. When civic engagement is seen as political participation, the voting action is considered an effective expression of it (Almond and Verba, 1963; Campbell, 2004; François and Gergaud, 2019). In this

regard, a higher voter turnout is found to be associated with more democratic policy outcomes, as more electoral participation should reduce democratic gaps (Mueller and Stratmann, 2003; Manor, 2004; Smith, 2009).[3] When turnout increases, people's support for more redistributive policies should be higher given that, before such increase, the poor and most disadvantaged groups are less likely to participate in the electoral process (Romer, 1975; Lijphart, 1997). Hence, by improving the political participation of less advantage citizenry, it would affect policy outcomes in a manner consistent with political economy theories of redistribution (e.g., Meltzer and Richard, 1981). In a similar fashion, higher political engagement of a specific group in the society, such as the young or the women, could target policy outcomes and, more precisely, government spending toward the type for which that group has the strongest preference (e.g., higher education expenditure for the young; higher welfare spending for the women) as recently highlighted by Bertocchi (2011) and Bertocchi et al. (2020). At the end, the outcome is higher government spending on those specific functions.

However, some single case-studies dispute the link between higher voter turnout and higher social expenditures such that by Hodler et al. (2015) based on Switzerland where an increased voter turnout, obtained after lower voting costs with the introduction of postal voting, calls for less government welfare expenditures that the authors basically ascribe to a decreased average level of education of the participants. A quite similar result is found by Lo Prete and Revelli (2021) for Italy, where higher voter turnout, due to concomitant elections, reduces the quality of public services at the municipal level, and by Hoffman et al. (2017) for Austria, where an increase in voter turnout, due to changes in compulsory voting laws, do not affect government spending patterns - neither in levels nor in composition.

2.3 Civic engagement at times of global warming
A large literature in behavioral economics, social science and psychology documents the impact of environmental concerns on individual behavior and activism (Fransson and Garling, 1999;

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[3] Intuitively, high electoral participation is desirable in a democracy because it increases the chance that the political system reflects the will of many individuals, and that the government enjoys a high degree of legitimacy.

Dunlap and Jones, 2002; Knight and Messer, 2012; Brieger, 2018; Rhead et al., 2018). Recent evidence on a large representative sample of US adults suggests that individual beliefs about social norms, preferences such as patience and altruism, as well as universal moral values positively predict environmental preferences, revealing that those effects are strongest for individuals who are skeptical about the existence and threat of global warming (Andre et al., 2021). Likewise, individuals who experienced earthquakes became more likely to participate in community meetings, volunteer activities, and the voting process, especially in developing countries, as documented by Bai and Li (2021).

In political science, citizens participation is a key component of "civic environmentalism", defined and advocated as a social action that goes beyond voting to tackle environmental issues (John, 1994; Knopman et al., 1999; Berry et al. 2019). In these studies, civil participation should be higher in countries valuing social cohesion more, with respect to countries with a more individualistic culture (Andre et al., 2021). At the same time as citizens may not expect the government to solve social and environmental problems, thus making it an empirical question whether collective reactions to environmental threats translate in more or less participation through traditional electoral channels.

3. Main variables, estimation framework and identification strategy

3.1 Data on civic engagement and public spending

The first measure of civic engagement is the indicator of *civil participation* included in the IDEA's Global State of Democracy database. It accounts for the extent people participate in organizations belonging to the civil society sphere, including a wide array of groups: sport clubs, charities, independent non-political associations, and other social entities working in the community to form the third sector. The indicator ranges between 0 (not active) to 1 (most active).[4] To facilitate the interpretation of the results, we rescale it to range between 0 and 100.

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[4] In detail, the IDEA's *civil participation* indicator summarizes the values of its six sub-categories, namely: how much people are involved in civil society organizations ("CSO participatory environment"); how much independent are public deliberations on important policy reforms ("engaged society"); if major civil society organizations are routinely consulted on issues relevant to their members ("CSO consultation"); what share of the population is active in non-political associations, such as sports clubs, literary societies, charities, fraternal groups, or support groups ("engagement in independent non-political associations"); what share of the population is regularly active in independent political interest associations, such as environmental associations, animal rights groups, or LGBT rights

To measure *electronic participation,* we rely on the e-participation indicator developed by the United Nations (2020) through the E-Government Survey project. The indicator deals with three issues: enabling participation by providing citizens with public information and access to information without or upon demand (i.e. e-information); engaging citizens in contributions to, and deliberation on public policies and services (i.e. e-consultation); empowering citizens through co-design of policy option and co-production of service components and delivery modalities (i.e. e-decision-making). The index ranges between 0 and 1, with higher values indicating higher electronic participation. To facilitate the interpretation of the results, we rescale it to range between 0 and 100.[5]

Finally, we measure *voter participation*, the more political nuance of civic engagement, using data on voter turnout, defined as the percentage of eligible voters who cast a ballot at national election. The data we analyze are from the IDEA database on Voter Turnout and allow to compare results with findings from previous literature in a macroeconomic perspective (European Parliament, 2020; OECD, 2021).

The main dependent variable is *government spending*, measured by the ratio of *public expenditure* to GDP. Data on general government public expenditure are from the Government Finance Statistics (GFS) dataset by the IMF to proxy for government size, as adopted by all international organizations for cross-country comparability (e.g., IMF, United Nations, World Bank, OECD, Eurostat). We consider total government expenditure and the specific tasks for which the funds are used (Shelton 2007; Haelg et., 2022). Based on the Classification of the Functions of Government (COFOG), we define two groups of public expenditure which should reflect the two main governmental activities, namely: redistribution and allocation. As for the former function, we consider specific welfare spending items such as *Social protection, Health, Education*. We group them in a single variable named *Welfare,* and we include it and each component of this aggregate as dependent variable one at a time. As for the latter function, we

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groups ("engagement in independent political associations"); what share of the population is regularly active in independent trade unions ("engagement in independent trade unions").

[5] At the country level, the e-participation index reflects the e-participation mechanisms that are deployed by the government as compared to all other countries by offering insight into how different countries are using online tools in promoting interaction between the government and its people, as well as among the people, for the benefit of all (United Nations, 2020).

bring together spending functions that mostly refer to public services highly connected with the geographical area and jurisdictional territory where they are provided, such as public order and safety, public transports, housing and amenities. We group them in a single variable, named *Public goods*, used as dependent variable.

3.2 Estimation framework

We analyze patterns of civic engagement and government spending for the 2000-2019 period, across and within 27 countries classified as democracies since the 1990s.[6] To smooth out high-frequency and electoral cycles, and reduce measurement errors, if any, in government spending data, we analyze average values of annual data within four non-overlapping subperiods of 5 years each.[7] We observe substantial variation in government spending, which has increased by 13 percentage points on average over the sample period, and in the indicators of civic engagement, that are only mildly correlated between each other (see appendix tables A1 and A2).

To assess the relationship between civic engagement and government spending, we estimate the following equation:

$$GOV_{it} = CE_{it}^d + GW_t + X_{it} + u_i + z_t + \varepsilon_{it} , \qquad (1)$$

where the dependent variable, GOV, is public spending in country i and subperiod t; CE denotes civic engagement in one of its three dimensions (d = civil; electronic; voter); GW global warming in subperiod t. Following the United Nations, we define global warming as the long-term shifts in temperatures and weather patterns.[8] The NASA's index of *global warming* we use measures the annual change in land and ocean surface temperature with respect to the long-term average, using temperatures between 1951 and 1980 as a baseline. The increase in temperatures,

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[6] The quality of democracy is defined using the Freedom House indicator of political and civil liberties and including free and semi-free democracies (Fumagalli and Narciso, 2012).
The sample includes: Australia, Austria, Belgium, Bulgaria, Denmark, El Salvador, Finland, France, Germany, Greece, Hungary, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Singapore, South Africa, Spain, Sweden, Switzerland, United Kingdom.
[7] The division in four non-overlapping intervals of five years each (2000-04, 2005-09, 2010-14, 2015-19) is compatible with the statutory term of office, which lasts between two and five years in the sample of countries we analyze. On the political economy ground, our results do not challenge the political business cycle theories arguing that electorally motivated politicians increase social expenditures before elections - given that those expenditures are more visible to the voters than others – and they are also not likely to decrease them after elections (Haelg et al., 2022). Results are robust to computing averages over non-overlapping intervals of four years each.
[8] See "What Is Climate Change?" online definition by the United Nations (www.un.org/en/climatechange/what-is-climate-change).

recognized by many as a synonymous of climate change, can be due to natural phenomena (i.e. sun's activity, volcanic eruptions), and human activity - primarily related to the use of fossil fuels that generate greenhouse gas emissions, such as carbon dioxide and methane. The latter reflect much more the concept of policy variables themselves, besides capturing climate inequality across countries (Callahan and Mankin, 2022); one reason leading us to do not prefer them. Similarly, other indicators of the consequences of climate change, like the number of extreme whether events leading to natural disasters (flooding, droughts, severe fires, decline in biodiversity), are more likely associated to country-specific features and natural phenomena, from rainfall to earthquakes, that may determine electoral participation (Lind, 2014; Lo Prete and Revelli, 2021).

The X is a vector of time-varying country-specific characteristics controlling for the possibility that government spending is higher in wealthier, more open, populous, younger (under 15), older (over 65) economies. Country fixed effects (u_i) control for time invariant characteristics at the country level that might correlate with civic engagement, such as institutional factors. Period fixed effects (z_t) control for subperiod-specific shocks to government spending.

3.3 Identification strategy

To get consistent estimates, we need to address endogeneity issues. If, for instance, citizens participation increased due to more generous redistributive programs and/or expansionary fiscal policy, civic engagement and government spending would not be random. For this purpose, we use a two-stage least-squares approach, and estimate the first stage specification:

$$CE_{it}^d = RET_{it}^k + GW_t + X_{it} + u_i + z_t + \omega_{it}, \tag{2}$$

where each dimension of civic engagement is explained by variables that are included instruments in model (1) – i.e. global warming in subperiod t, the X vector of control variables, country and time fixed effects, – plus, a type-k source of variation in civic engagement that is orthogonal to the error term $\varepsilon_{i,t}$ in equation (1):

$$RET_{it}^k = GW_t \times k_i. \tag{3}$$

In this specification, the term RET_{it}^k, which means *reaction to environmental threats*, captures how different countries react to the environmental threat represented by global warming

differently due to time-invariant country-specific k features. Provided that civic engagement might be correlated to the error term $\varepsilon_{i,t}$, the aim of our identification strategy is to find instruments that shape civic engagement trajectories differently across countries and does not affect government expenditure directly.

The first component of our RET indicators is subperiod-specific global warming (GW_t). In Figure 2, we show annual mean values using the solid black line and the lowess smoothing, which helps see the rising trend in temperature and represents our variable,[9] using the dot grey line. The grey region represents the period we analyze: since 2000 temperatures were between a half and one Celsius degree (°C) warmer than the long-term average. Crucially to our identification strategy, we allow the main effect of global warming to affect government spending directly in Equation (1) and explore the explanatory power of its interactions with country-specific features that represent the shape of civic engagement reactions to global warming in Equation (2).

The other k_i components of our instruments in Equation (3) are time-invariant country-specific characteristics, which modulate reactions to the environmental threat that global warming represents. First, we consider preferences for *collectivism* versus individualism (see also Bai and Li, 2021; Buonanno et al., 2023). Based on Hofstede's model of national cultural dimensions, culture is a collective phenomenon, and each country can be positioned relative to other countries along six cultural dimensions that are statistically different from each other (Hofstede, 2011). These dimensions relate to social preferences over issues such as inequality, risk aversion, emotional roles attributed to genders, attachment to tradition values, hedonism, and, along the dimension we consider, collective needs and goals.[10] At the microlevel, some recent evidence suggests that the geographical proximity of an individual to others with different socioeconomic characteristics (mostly in terms of income and education) decreases their civic engagement (Andriani et al., 2023), highlighting that cultural diversity could favor fragmented communities

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[9] No significant difference is found using one indicator or the other.

[10] The cultural dimension index "individualism versus collectivism" in Hofstede (2011) ranges between 0 (low individualism) and 100 (high individualism). To ease the interpretation of our indicators and results, we rescale it to define a "collectivism" index. It belongs to a classification of cultural traits based on other five dimensions: *power distance*, related to inequality; *uncertainty avoidance*, related to risk aversion; *masculinity versus femininity*, related to emotional roles attributed to genders; *long term versus short term orientation*, related to attachment to tradition values; *indulgence versus restraint*, related to hedonism.

that are typically less prone to social activities, collective actions and civic participation, (Alesina and La Ferrara, 2000).

Back to the macro level, the Hotstede (2011) indicator ranks countries based on whether citizens self-image is defined in terms of "we" or "I" , and serves our purpose to capture the possibility that global environmental concerns may shape civic engagement trajectories differently across countries, depending on whether individuals in each society integrated into groups with a common purpose, as opposed to a society where self-interest and loose interpersonal ties prevail. Following the reasoning of Andre et al. (2021), the political divide on climate change and, more generally, environmental concerns, can be partially attributed to deeply entrenched human traits. Attitudes towards collectivism are heterogenous across countries, as Figure 3 shows – dark colors indicating more collectivism, pale ones more individualism.[11]

Second, we acknowledge that the three dimensions of participation we consider may differ between each other. To capture the specific role of ICTs in influencing the way people interact and engage through traditional and novel channels of participation (Fujiwara, 2015; Gavazza et al., 2019), we cannot use the number of internet users, which surely depends on public investments in infrastructures and education. Instead, we use data collected by the Eurostat on the percentage of internet users who purchased an online video game between 2011 and 2013,[12] as a proxy for "e-attitude", that is preferences for behind a screen (versus in presence) engagement and interact it with global warming. Online gaming involves the use of the internet, a (personal computer) monitor or other (e.g., mobile phone) screen, to play online alone or in a community: In the psychology literature (Anderson et al., 2017; Stavropoulos et al., 2021), along with the use of internet, it can be a way to avoid life stressors and, along this line, may be associated with lower civic engagement.[13]

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[11] Data on cultural dimensions were first collected in the 1980s, and updated to compute values for countries belonging to countries that ceased to exist, not included in the sample (e.g. URSS, Yugoslavia, Czechoslovakia), in more recent years.

[12] Given the limited number of years available, we consider their country average and assume the value constant.

[13] It is worth noting that gaming is a more complex phenomenon and we do not aim to analyze. A small percentage of gamers can suffer of compulsory gaming disorders. While the population represented by gamers, given its absolute size and the change in participation behavior after the Covid-19 pandemic, may represent an attractive group to target with new digital strategies by politicians and non-profit organizations (e.g., gamers vote), with the aim to activate them in traditional voting and participation to the democratic process.

We also acknowledge that the first instrument does not isolate the perceived private cost of global warming from collective worries. Thus, we consider a third instrument, built as the interaction between global warming and the geo-climate indicator of "cool water condition", which measures the prevalence of relatively cool temperatures combined with fresh water availability (Wezel, 2013); it is rescaled between 0 (cold and wet) and 100 (hot and dry).[14] The intuition behind our identification strategy is that what an individual perceives as a low-cost pro-environmental behavior is partially dependent on their personal circumstances, where the cost is not only defined in an economic sense but also in a broader psychological sense that includes, among other factors, the time and effort needed to undertake a particular behavior (Rhead et al., 2018). In doing so, we will derive some insights on implications related to the anonymity of the voting action in contrast with engagement in civil society organizations, which is visible (Ali and Benabou, 2020).

4. Civic engagement and government spending

4.1 Preferences for collectivism and reactions to global warming

Table 1 presents estimates from first-stage models, as described in Equation 2, using the reactions to environmental threats that we associate to preferences for collectivism, as an instrument for the three dimensions of civic engagement introduced in the previous sections.

When the k_i component is the preferences for *collectivism*, the instrument $RET^{collective}$ is a highly significant and strong determinant of civil, electronic, and voter participation as shown respectively in columns (1), (2) and (3). This result sounds familiar to the hypothesis that earthquake hazard, as considered a type of collective environmental concern, significantly contributed to the accumulation of civic capital at the municipal level as tested by Buonanno et al. (2023). This view is also in line with a more general strand of literature that has focused on how experiences of and attention to natural disasters promote the process of civic society and political participation (e.g., Fair et al., 2017; Bai and Li, 2021). In all models, the instrument is

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[14] Global warming changes and has changed climate conditions. The index of cool water conditions may slowly change, accordingly, violating the implicit assumption of time invariance. However, our estimates would be biased only if global warming changed the relative position of countries on a hotter and drier scale over the 2000-2019 considered. We will look for data supporting the goodness of the estimates.

valid, with a reasonable strength to provide information about the variation of the endogenous variables of civic engagement in the second-stage (Equation 1).[15]

In Tables from 2 to 4, we estimate and report the effect of civil, electronic, and voter participation on the level and composition of government spending. In each table, we follow this outline of presentation: the structural two-stage least-squares model based on the identification strategy described in Section 3; the reduced form model that considers how instruments relate to the dependent variables; the linear fixed-effect (FE) model, which provides consistent estimates if the endogeneity test rejected the hypothesis of endogeneity of civil engagement.

In Table 2, two-stage least-squares estimates indicate that civil participation increases aggregate government spending (p-value=0.11) and welfare programs, whose effect is driven by the social protection component. Overall, this set of findings seems to provide support to the conventional view according to which more redistributive and social spending should be the result of societies characterized by more participation in civil society organizations, as discussed in Section 2. When we consider spending functions that mostly refer to public services locally provided, the results in column (6) indicate that they are not affected by the component of civil participation we are estimating in our structural models.

Estimates from the reduced form models in panel B of Table 2 indicate that the instrument, which could be a long-term policy variable its-self, is related to government spending in regressions where it works through endogenous civil participation. Moreover, in panel C, civil participation is a significant determinant of higher public spending on education (column 4), when linear fixed-effects estimates are consistent according to the endogeneity test reported at the bottom of panel A.

The second dimension of civic engagement, represented by novel forms of electronic participation, has positive effects on aggregate government spending (p-value=0.11), and leads to higher amount on the same functions that react to civil participation, as shown in Table 3. In detail, electronic participation spurs public spending on welfare and social protection, representing an additional determinant of redistributive outcomes and related spending programs. As for the

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[15] The F form of the Kleibergen-Paap rk Wald statistic we report, tests for weak identification with heteroskedastic robust standard errors and should be higher to the critical values (in the order of 10) computed by Stock and Yogo (2005) to foster confidence in the precision of the estimates from the second stage.

negative and statistically significant relationship between the increase in online participation and health spending in panel C, one possible interpretation being that computers may scare the elderly (see, e.g., Roseman and Stephenson, 2005), decreasing their participation on e-platforms, and in turn healthcare, the spending category more frequently devoted to them.

The third dimension of civic engagement is voter participation. In Table 4, it reduces aggregate government spending in column (1) with p-value=0.12, significantly so when we consider welfare, again driven by the social protection component. This very interesting finding somehow reverses common expectations that higher civic engagement – when proxied by voter turnout – increases redistributive policies. However, it is in line with some evidence provided for specific countries, such as in the Swiss (Hodler et al. (2015), the Austrian (Hoffman et al., 2017), and the Italian case (Lo Prete and Revelli, 2021). More in general, this result would suggest that, over the last two decades, the number of people voting at national elections became less representative of citizens' engagement, which may work along the other different documented dimensions. Additionally, and following this reasoning, a further interpretation suggest that voter turnout currently reflects political participation of those who are uninterested in politics and policymaking process, including how the public budget will be allocated and spent.[16]

To further investigate the channels of transmission from civic engagement to government spending, we study the effect of other shocks to the willingness of engaging, which account for specific features of each dimension of civic engagement.

4.2 Preferences for interacting behind a screen

In Table 5, we use our second instrument based on Equation (2), where the k_i component now captures preferences for interacting behind a screen versus in presence, namely the *e-attitude*. Accordingly, we test the hypothesis that in countries where citizens use more the internet to play video games, the reaction to environmental concerns, like other every-day life issues, may be lower through electronic participation (Anderson et al., 2017).

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[16] Consistently with this view, some macroeconomic studies do not focus on the direct association between the electoral participation and policy outcomes: voter turnout is not significantly associated with government spending per se, but only when instrumented by indicators of political institutions (Fumagalli and Narciso, 2012; Munley et al., 2023).

In the smaller sample for which information on purchases of online games by internet users is available,[17] countries where citizens use more the internet to play video games are less responsive to environmental concerns through electronic participation (column 1). Interestingly, if we consider attitudes towards collectivism of gamers, by including an interaction term between the instrument RET^{collective} and *e-attitude* (i.e., the k component of the instrument RET^{online}), the results in column (2) indicate that preferences for collectivism increase electronic participation among gamers (Stavropoulos et al., 2021). The strength of the instruments, however, is below standard levels.[18]

The second-stage results in columns from (3) to (8), from specifications using reactions to environmental threats modulated by *e-attitude* and collectivism to generate exogenous perturbations to voter participation, convey the same message of Table 3.

4.3 Traditional voting: collective versus private motivations

Using the third instrument described in Section 3, when the k_i component in Equation (2) reflects the perceived *private cost* of global warming (i.e. $RET^{private}$), we test whether reactions to environmental threats are stronger in countries more exposed to global warming because of relatively lower endowments of fresh water and warmer temperatures.

First-stage results, in column (1) of Table 6, indicate that private reactions to the environmental threat are a strong instrument, significantly associated to higher voter participation. Along the reasoning by Ali and Benabou (2020), we can figure the anonymity of the voting action to help people pursue their personal interests without being exposed to a social stigma. Instead, we do not observe any association with civil participation, for which the instrument is extremely weak (as shown in Table A3). This finding suggests that those moved by the $RET^{private}$ channel do not increase engagement in visible activities (maybe) to abide by societal norms. Even electronic participation could be more or less anonymous depending on the possibility to use an alias or accredited credentials, a feature of e-government platform we have no information about, which surely deserves to be investigated. However, the strength of the instrument does not allow to

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[17] The Eurostat database does not include information on video games' users for Australia, El Salvador, Singapore, South Africa, South Korea, Switzerland.
[18] The inclusion of e-attitudes in the set of instruments, reduces the value of the Kleibergen-Paap rk Wald F statistic below standard levels also in first stage models explaining civil and voter participation (see appendix table A3).

estimate second-stage coefficients precisely, as indicated by the low value of the Kleibergen-Paap rk Wald F statistic in Table A3.

Second-stage estimates in columns from (2) to (7) of Table 6, indicate that voter participation reduces government spending and its main components, confirming the findings in Table 4. Interestingly, reactions to environmental threats that relate to preferences for collectivism and to the private costs of global warming affect electoral participation in different directions, and through the former both decrease government spending.

5. Mechanisms: interpretation and additional evidence

5.1 Acting "green" through different dimensions of civic engagement

In our interpretation, second-stage estimates recover a local average treatment effects (i.e. LATE) among a sub-population of citizens whose treatment status is altered by country-specific reactions to climate change (Imbens and Angrist, 1994). The main results in Tables from 2 to 4 indicate that environmental sensitive citizens seem to look for alternative channels of engagement and participation to policymaking, with respect to the traditional voting act at national elections. Although we cannot rule out alternative mechanisms due to data limitations,[19] the combination of results in Tables 4 and 6 lends support to the identification of a channel through which environmental threats work: the electorate that emerges as collectivity-oriented people participate less in national elections, and as a larger share of people interested in the private costs of global warming turn out to vote, decreases redistribution.

5.2 Green attitudes: acting versus asking for environmental protection

In Table 7, we consider government spending on environmental protection, which accounts for between 0 and 1.6 percent of government spending. Interestingly, we do not find evidence of an increase in environmental protection spending, where it would be expected if people changed their

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[19] We have no data, for instance, on the number of civil society associations working to support specific sub-groups of the population, but only on the share of the population which is regularly active in independent political interest associations, such as environmental associations, animal rights groups, or LGBT rights groups, that may represent a mixed group from various segments of the society. Nor we can information on Fridays For Future strikes, which may also be a proxy, although imperfect, for testing whether the effects are driven by the young, as the movement was born at the end of the period we analyze.

attitudes towards environmental policy, asking for more environmental protection for collective or selfish motivations.[20]

With the aim to shed light on whether "green" attitudes change policies and politics, we use information on electoral outcomes and election programs from the Manifesto Project Dataset (Lehmann et al., 2023). Data are available for parties which have won at least one seat in national elections to the lower house and cover 25 countries among those under analysis in this paper. We start considering the share of seats won by green parties at the elections, in the first three columns of Table 8.

The results indicate that it does not depend on civic engagement. Since the parties identified as purely "green" in the dataset are a few, and won seats in 17% of the elections only, we complement this information with measures that allow to account for the possibility that green topics and issues are part of the political agenda of many parties, with different degrees of relevance in each manifesto and at the national level, depending on the share of seats won by each party. Accordingly, in columns from (4) to (6) of Table 8, we use information on the relevance of "green" politics, as it emerges from the analysis of the manifestos, weighted for the number of seats that each party won. The results indicate that civil participation decreases green discourse. The precision of the estimates is, however, below standard levels for civil (weak identification test=5.21) and voter participation (weak identification test=7.02). Interestingly, when we consider if the manifestos mentioned politics that opposed growth as a cause of environmental and societal harm, in columns from (7) to (9), we find that electronic participation increases this element of national politics debate, in regressions where fixed-effect estimators are consistent.

As suggested by recent works studying people's preferences about what policies should be implemented to tackle climate change, it is well possible that, even if the majority of citizens declares to be concerned about the environment (Eurobarometer Survey, 2020), they either do not know what to do in practice, i.e. what specific environmental protection policies to ask for, nor they want to ask for specific policy proposals, due to low political trust or to unwillingness to pay

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[20] When we use as dependent variable government spending minus this component, the results in column (1) of Tables 2-4 would not change significantly.

for, e.g., reductions in CO2 emissions (Fairbrother, 2022), following a free rider attitude in the case of a global public good such as the climate change issue (De Sario et., 2023).

In our framework, it is also possible that the disaffection towards politics and electoral participation decreases parties' incentives to tackle environmental issued in their programs. As the evidence presented in Table 8 suggests, where associations in the third sector are engaging citizens worried about the social consequences of global warming, the political discourse focuses less on environmental protection. It is interesting to notice that civic engagement through electronic participation channels protests, increasing opposition to environmentally arming growth policies, instead of raising attention to environmental protection issues.

6. Concluding remarks

Global warming became a source of serious concern in recent decades, as human activity increased disproportionally the natural greenhouse effect, leading to anomalous dynamics in the former. As it might represent a threat to human health and life, government and citizens are discussing possible remedies and policies to fight it. In this paper, we show that reactions to environmental threats related to global warming can be good predictors of perturbations to civic engagement, which we measure along three dimensions of participation: in civil society organization, through ICTs e-government platforms, and at national elections as voters.

We find that environmental sensitive citizens seem to look for alternative channels of engagement and participation to policymaking, with respect to the traditional voting act at national elections, suggesting a disaffection towards electoral participation. Additionally, spending for welfare and social protection functions are drained by the change in voter turnout. From a policy perspective, this result provides interesting implications concerning the lack of relevance citizens attribute to electoral participation as a form of engagement and, more importantly, as a tool for demanding specific spending programs, such as those usually addressed to the more fragile and vulnerable individuals in the society (e.g. the poor, minorities, women). The same individuals who are more likely supporting and asking for more redistributive policies (e.g., Meltzer and Richard, 1981; Aidt et al., 2006; Bertocchi, 2011). More generally, the findings on voter turnout could reflect a sort of "crisis of democracy" (Crozier et al., 1975) that some European countries

(e.g., Austria, Germany, Norway, the United Kingdom) try to challenge, for instance, by lowering the voting age from 18 to 16 as an effort to promote more active social and political engagement among the young nowadays (Bertocchi et al., 2020).

On the other hand, in societies more concerned about the collective implications of global warming, citizens actively work in voluntary, non-political groups, and independent associations belonging to the third sector, and they use ICTs to participate in a bottom-up process of democratic decision-making. These new channels of engaging in policy and politics spur aggregate government spending, mainly on welfare and social protection. In this perspective, our results corroborate the political science and political economy studies arguing that a solid civic culture is an essential tool for successful democratic politics and outcomes (Almond and Verba, 1963; Dalton, 2008; Besley and Persson, 2019). Our article extends this literature confirming that civic engagement is relevant not only for microeconomic frameworks and individuals' actions, but also for collective decision-making, and the implementation of public policies within a country.

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Figures

Figure 1 – Global warming
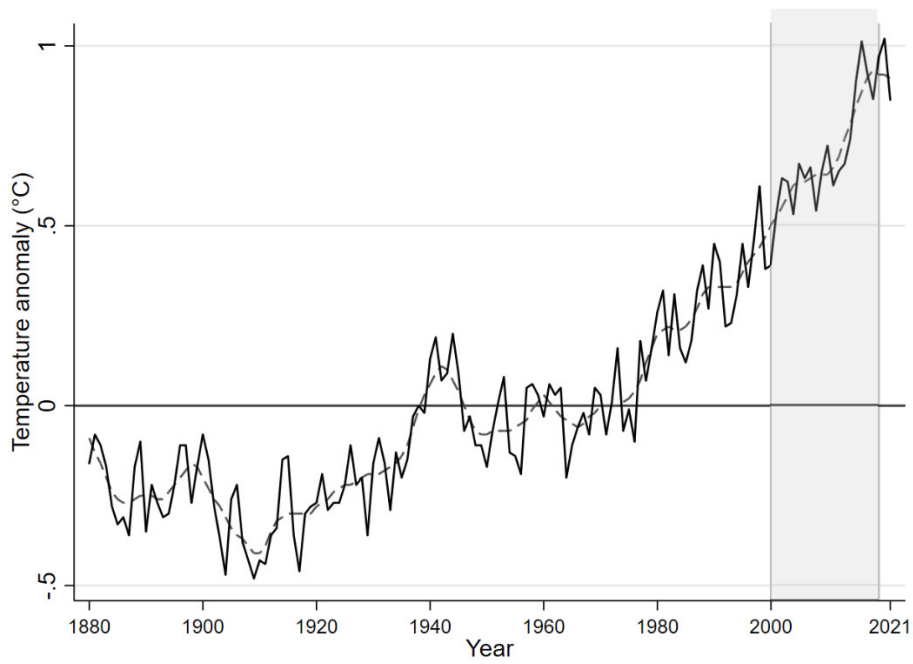
Note: NASA/GISS index of global land-ocean temperature, in Celsius degrees (°C), annual mean (black line) and lowess smoothing (dashed line).

Figure 2 – Collectivism around the world

Note: The map shows all available data of Hofstede's indicator of collectivism versus individualism. White areas indicate missing values.

Tables

Table 1 – Country-specific reactions to environmental threats ($RET^{collective}$)

	(1) Civil participation	(2) Electronic participation	(3) Voter participation
$RET^{collective}$	0.52***	1.99***	-0.59***
	(0.18)	(0.66)	(0.19)
Global warming	-15.63	50.47	-0.86
	(9.89)	(44.24)	(17.04)
GDP p.c.	-5.82	-18.88**	7.55
	(3.67)	(8.73)	(6.98)
Openness	0.00	0.41**	-0.11*
	(0.03)	(0.15)	(0.05)
Openness × OECD2020	0.03	-0.24	0.13**
	(0.03)	(0.17)	(0.06)
Population	0.37	5.64	1.21
	(1.18)	(3.47)	(2.01)
Population (square)	0.00	-0.05*	-0.01
	(0.01)	(0.03)	(0.02)
Under 15	0.06	1.19	-0.38
	(0.17)	(0.93)	(0.28)
Over 65	-0.14	-0.17	0.23
	(0.25)	(1.13)	(0.50)
Country effects	✓	✓	✓
Period effects	✓	✓	✓
Weak identification test	13.47	11.50	12.05
R squared	0.30	0.80	0.30
Observations	105	105	105

Note: The table reports first-stage estimates based on Equation 2. Robust standard errors are in parentheses. Significant at * 10 percent, ** 5 percent, *** 1 percent.

Table 2 – Civil participation and government spending

	(1) Government spending	(2) Welfare	(3) Social protection	(4) Health	(5) Education	(6) Public goods
A. Second-stage						
Civil participation	0.32	0.29***	0.37***	-0.06	-0.02	-0.11
	(0.20)	(0.11)	(0.11)	(0.05)	(0.04)	(0.07)
Global warming	18.71**	15.82***	12.07***	2.54	1.22	5.19**
	(7.96)	(5.03)	(3.65)	(1.69)	(0.99)	(2.14)
Covariates	✓	✓	✓	✓	✓	✓
Country effects	✓	✓	✓	✓	✓	✓
Period effects	✓	✓	✓	✓	✓	✓
Endogeneity test	2.02	1.63	7.77	1.24	1.76	3.55
	[0.15]	[0.20]	[0.01]	[0.27]	[0.18]	[0.06]
B. Reduced form						
RET^{collective}	0.17**	0.15**	0.19***	-0.03	-0.01	-0.06
	(0.08)	(0.07)	(0.05)	(0.03)	(0.03)	(0.04)
C. Linear model						
Civil participation	0.09	0.17**	0.14**	-0.01	0.04***	-0.01
	(0.07)	(0.06)	(0.05)	(0.03)	(0.01)	(0.05)

Note: The table reports 2SLS estimates using collective reactions to the environmental threat (*RET^{collective}*) as instrument in panel A, FE estimates for the reduced form model in panel B, FE estimates for the linear model in panel C. Robust standard errors are in parentheses. Significant at * 10 percent, ** 5 percent, *** 1 percent. Observations: 105.

Table 3 – Electronic participation and government spending

	(1) Government spending	(2) Welfare	(3) Social protection	(4) Health	(5) Education	(6) Public goods
A. Second-stage						
Electronic participation	0.08	0.08**	0.10***	-0.02	-0.00	-0.03
	(0.05)	(0.03)	(0.03)	(0.01)	(0.01)	(0.02)
Global warming	9.49	7.33	1.45	4.21**	1.66	8.50**
	(10.20)	(7.64)	(5.85)	(2.13)	(1.80)	(3.37)
Covariates	✓	✓	✓	✓	✓	✓
Country effects	✓	✓	✓	✓	✓	✓
Period effects	✓	✓	✓	✓	✓	✓
Endogeneity test	3.81	4.19	7.48	0.34	0.00	0.88
	[0.05]	[0.04]	[0.01]	[0.56]	[0.95]	[0.35]
B. Reduced form						
RET^{collective}	0.17**	0.15**	0.19***	-0.03	-0.01	-0.06
	(0.08)	(0.07)	(0.05)	(0.03)	(0.03)	(0.04)
C. Linear model						
Electronic participation	-0.00	0.01	0.03	-0.01**	-0.00	-0.01**
	(0.03)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)

Note: The table reports 2SLS estimates using collective reactions to the environmental threat ($RET^{collective}$) as instrument in panel A, FE estimates for the reduced form model in panel B, FE estimates for the linear model in panel C. Robust standard errors are in parentheses. Significant at * 10 percent, ** 5 percent, *** 1 percent. Observations: 105.

Table 4 – Voter participation and government spending

	(1) Government spending	(2) Welfare	(3) Social protection	(4) Health	(5) Education	(6) Public goods
A. Second-stage						
Voter participation	-0.28	-0.26*	-0.32***	0.05	0.01	0.10
	(0.18)	(0.13)	(0.12)	(0.04)	(0.04)	(0.07)
Global warming	13.47	10.99*	6.03	3.49*	1.47	7.07**
	(8.90)	(6.41)	(5.23)	(1.90)	(1.41)	(2.96)
Covariates	✓	✓	✓	✓	✓	✓
Country effects	✓	✓	✓	✓	✓	✓
Period effects	✓	✓	✓	✓	✓	✓
Endogeneity test	3.09	4.90	8.74	0.32	0.21	3.11
	[0.08]	[0.03]	[0.00]	[0.57]	[0.64]	[0.08]
B. Reduced form						
RET^{collective}	0.17**	0.15**	0.19***	-0.03	-0.01	-0.06
	(0.08)	(0.07)	(0.05)	(0.03)	(0.03)	(0.04)
C. Linear model						
Voter participation	0.01	-0.01	-0.04	0.03**	-0.00	-0.01
	(0.10)	(0.06)	(0.04)	(0.01)	(0.01)	(0.01)

Note: The table reports 2SLS estimates using collective reactions to the environmental threat ($RET^{collective}$) as instrument in panel A, FE estimates for the reduced form model in panel B, FE estimates for the linear model in panel C. Robust standard errors are in parentheses. Significant at * 10 percent, ** 5 percent, *** 1 percent. Observations: 105.

Table 5 – E-attitudes behind electronic participation

	(1) Electronic participation (first stage)	(2) Electronic participation (first stage)	(3) Government spending	(4) Welfare	(5) Social protection	(6) Health	(7) Education	(8) Public goods
A. Second-stage								
Electronic participation			0.04	0.05**	0.08***	-0.02**	-0.01	-0.02**
			(0.03)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
RET^{online}	-5.83**	-8.99***						
	(2.06)	(2.70)						
RET^{collective}		1.07						
		(1.07)						
RET^{collective} × e-attitude		0.22**						
		(0.09)						
Global warming	174.84***	79.04	21.46**	13.09**	5.22	4.28**	3.59**	6.35**
	(54.12)	(62.37)	(10.41)	(6.25)	(5.21)	(2.00)	(1.65)	(2.75)
Covariates	✓	✓	✓	✓	✓	✓	✓	✓
Country effects	✓	✓	✓	✓	✓	✓	✓	✓
Period effects	✓	✓	✓	✓	✓	✓	✓	✓
Endogeneity test			2.49	2.81	8.44	3.57	1.37	1.30
			[0.11]	[0.09]	[0.00]	[0.06]	[0.24]	[0.25]
Weak identification test	7.95	7.17						
R squared	0.80	0.84						
B. Reduced form								
RET^{online}			-0.20	-0.14	-0.54	0.34*	0.06	-0.00
			(0.75)	(0.49)	(0.37)	(0.18)	(0.13)	(0.21)
RET^{collective}			0.07	0.12	0.14	0.01	-0.03	-0.09
			(0.18)	(0.13)	(0.08)	(0.05)	(0.04)	(0.06)
RET^{collective} × e-attitude			-0.00	0.00	0.01	-0.01	0.00	-0.00
			(0.03)	(0.02)	(0.02)	(0.01)	(0.00)	(0.01)
C. Linear model								
Electronic participation			-0.00	0.01	0.03	-0.01**	-0.00	-0.01**
			(0.03)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)

Note: The table reports 2SLS estimates using RET^{onlinee}, *RET^{collective}* and its interaction with the indicator of e-attitudes as instruments in panel A, FE estimates for the reduced form model in panel B, FE estimates for the linear model in panel C. Robust standard errors are in parentheses. Significant at * 10 percent, ** 5 percent, *** 1 percent. Observations: 84.

Table 6 – Private motives behind the voting action

	(1) Voter participation (first stage)	(2) Government spending	(3) Welfare	(4) Social protection	(5) Health	(6) Education	(7) Public goods
A. Second-stage							
Voter participation		-0.33** (0.16)	-0.19** (0.09)	-0.21*** (0.08)	0.04 (0.03)	-0.02 (0.03)	-0.01 (0.04)
$RET^{priivate}$	0.92*** (0.29)						
Global warming	-75.56*** (20.64)	11.85 (9.37)	12.57** (5.78)	8.90** (4.14)	3.10* (1.82)	0.57 (1.22)	4.38* (2.45)
Covariates	✓	✓	✓	✓	✓	✓	✓
Country effects	✓	✓	✓	✓	✓	✓	✓
Period effects	✓	✓	✓	✓	✓	✓	✓
Endogeneity test		4.46 0.03	5.64 0.02	7.75 0.01	0.04 0.85	0.57 0.45	0.01 0.92
Weak identification test	12.82						
R squared	0.34						
B. Reduced form							
$RET^{priivate}$		-0.30*** (0.09)	-0.18*** (0.05)	-0.19*** (0.07)	0.04 (0.04)	-0.02 (0.03)	-0.01 (0.05)
C. Linear model							
Voter participation		0.01 (0.10)	-0.01 (0.06)	-0.04 (0.04)	0.03** (0.01)	-0.00 (0.01)	-0.01 (0.01)

Note: The table reports 2SLS estimates using private reactions to the environmental threat ($RET^{private}$) as instrument in panel A, FE estimates for the reduced form model in panel B, FE estimates for the linear model in panel C. Robust standard errors are in parentheses. Significant at * 10 percent, ** 5 percent, *** 1 percent. Observations: 101.

Table 7 – Environmental protection

	(1) Environmental protection	(2) Environmental protection	(3) Environmental protection
A. Second-stage			
Civil participation	0.01		
	(0.02)		
Electronic participation		0.00	
		(0.00)	
Voter participation			-0.01
			(0.01)
Global warming	2.06***	1.65***	1.83***
	(0.43)	(0.61)	(0.49)
Covariates	✓	✓	✓
Country effects	✓	✓	✓
Period effects	✓	✓	✓
Endogeneity test	2.19	0.54	0.17
	[0.14]	[0.46]	[0.68]
B. Reduced form			
RET^{collective}	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)
C. Linear model			
Civil participation	-0.00	0.00	-0.01
	(0.01)	(0.00)	(0.00)

Note: The table reports 2SLS estimates using collective reactions to the environmental threat (RET^{collective}) as instrument in panel A, FE estimates for the reduced form model in panel B, FE estimates for the linear model in panel C. Robust standard errors are in parentheses. Significant at * 10 percent, ** 5 percent, *** 1 percent. Observations: 105.

Table 8 – Green politics

	(1) Green parties share of seats	(2) Green parties share of seats	(3) Green parties share of seats	(4) Green content of manifestos	(5) Green content of manifestos	(6) Green content of manifestos	(7) Opposing-growth content of manifestos	(8) Opposing-growth content of manifestos	(9) Opposing-growth content of manifestos
A. Second-stage									
Civil participation	5.22 (15.72)			-0.35* (0.21)			0.19 (0.21)		
Electronic participation		0.67 (1.98)			-0.04 (0.03)			0.02 (0.02)	
Voter participation			-3.39 (9.75)			0.23 (0.19)			-0.13 (0.13)
Global warming	-10.51 (8.77)	-11.05 (9.05)	-10.60 (8.84)	-6.66 (4.55)	-3.03 (6.93)	-6.03 (6.56)	12.26*** (4.13)	10.23** (4.50)	11.91*** (3.64)
Covariates	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Period effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Endogeneity test	0.14 [0.71]	0.47 [0.52]	0.43 [0.51]	0.96 [0.33]	2.79 [0.09]	2.82 [0.09]	1.05 [0.31]	0.02 [0.87]	0.66 [0.42]
B. Reduced form									
RET^{collective}	0.02 (0.05)	0.02 (0.05)	0.02 (0.05)	-0.14 (0.10)	-0.14 (0.10)	-0.14 (0.10)	0.08 (0.09)	0.08 (0.09)	0.08 (0.09)
C. Linear model									
Civil participation	-0.01 (0.08)			-0.19 (0.12)			-0.00 (0.06)		
Electronic participation		0.02 (0.02)			0.02 (0.03)			0.03* (0.01)	
Voter participation			-0.10 (0.08)			-0.06 (0.06)			-0.03 (0.03)

Note: The table reports 2SLS estimates using collective reactions to the environmental threat (RET^{collective}) as instrument in panel A, FE estimates for the linear model in panel B. Robust standard errors are in parentheses. Significant at * 10 percent, ** 5 percent, *** 1 percent. Observations: 90.

Data Appendix

Table A1 - Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Civil participation	105	71.75	12.34	45.05	100
Electronic participation	105	53.03	26.11	8.4	100
Voter participation	105	70.97	15.13	37.79	94.76
Global warming	105	0.69	0.14	0.54	0.93
Collectivism (vs individualism)	105	40.6	20.7	10	82
RET^{collective}	105	28.15	15.7	5.4	75.33
E-attitude (video gaming)	84	8.97	5.9	0.86	19.91
RET^{Online}	84	6.23	4.38	0.46	18.51
Geo-climate (warm and dry)	101	49.25	15.2	14.81	71.95
RET^{private}	101	34.18	12.95	8	66.92
Government spending	105	42.58	9.53	14.02	56.94
Welfare	105	25.75	7.9	5.18	40.06
Social protection	105	14.95	5.86	0.98	24.72
Health	105	5.75	1.94	0.36	8.55
Education	105	5.05	1.11	2.75	7.63
Public goods	105	4.86	1.1	2.72	8.47
GDP per capita	105	40,056	18,339	2,664	87,868
Openness	105	106.83	76.08	40.81	407.12
Population (millions)	105	22.59	23.51	0.29	82.66
Under 15	105	26.59	7.34	16.04	61.77
Over 65	105	23.35	6.43	7.21	35.11
Environmental protection	105	0.66	0.33	0	1.61
Green parties' share of seats	90	0.96	2.68	0	12.42
Green content of manifestos	90	4.35	2.29	0.17	11.57
Opposing-growth content of manifestos	90	1.33	1.45	0	5.50

Notes: The table reports information on the variables not transformed.

Table A2 – Correlations between measures of civic engagement

	Civil participation	Voter participation
Voter participation	0.26	
Electronic participation	0.10	0.13

Table A3 – Reactions to environmental threats, weak identification test

Instruments' set:	(1) Civil participation	(2) Electronic participation	(3) Voter participation
RET^{private}	3.26	6.49	12.82
RET^{online}	0.90	7.95	9.00
RET^{online}, RET^{collective}, RET^{collective} × e-attitude	4.89	7.17	8.29

Notes: The table reports the value of the Kleibergen-Paap rk Wald F statistic for first-stage models based on Equation 2, which include the control variables reported in Table 1.