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Understanding how economic conditions and natural disasters shape environmental attitudes

A cross-country comparison to inform policy making

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This cancel and replace version of the document is being issued to correct the title of the paper and the note for Figure 1.2.

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Abstract

Understanding adults' attitudes towards the environment is necessary to gauge the opportunities and challenges of creating effective and politically-feasible climate policies. Using data from the Wellcome Global Monitor 2020, the European Social Survey (Round 8), World Values Survey and EM-DAT, this paper examines how adults' environmental attitudes vary within and across countries and details how environmental attitudes are associated with adults' engagement in pro-environmental behaviours and support for environmentally-friendly policies. The paper explores whether the extent to which individuals prioritise the environment over the state of the economy or vice versa depends on individuals' exposure to natural disasters or negative labour market conditions. Results indicate that people's economic vulnerability and the sectors they work in impact their attitudes towards their environment and support for public policy. Furthermore, the findings suggest that increases in unemployment and exposure to natural disasters influence the extent to which individuals prioritise the environment.

Synthèse

Appréhender l'attitude des adultes vis-à-vis de l'environnement est une nécessité pour apprécier les possibilités et les enjeux associés à la définition de mesures climatiques efficaces et politiquement applicables. À partir de données issues du *Wellcome Global Monitor 2020*, de l'Enquête sociale européenne (8e édition), de l'enquête *World Values Survey* et de la base EM-DAT, nous verrons dans le présent document comment l'attitude des adultes à l'égard de l'environnement varie selon les pays et nous étudierons de plus près le lien que cette attitude entretient avec l'adoption d'un comportement écofavorable et avec le soutien apporté aux mesures en faveur de l'environnement. Nous avons cherché à déterminer dans quelle mesure les individus font primer l'environnement sur l'économie, ou inversement, en fonction de leur exposition aux catastrophes naturelles ou des difficultés qu'ils rencontrent sur le marché du travail. Il apparaît que le degré de vulnérabilité économique et le secteur d'activité ont tous deux une incidence sur l'attitude adoptée vis-à-vis de l'environnement et le soutien apporté à l'action publique. Il semble de plus que la hausse du chômage et l'exposition aux catastrophes naturelles influencent le degré de priorité accordé à la protection de l'environnement.

Executive Summary

Ambitious climate change regulations are required for countries to tackle climate change and transition to low-carbon economies. However, these policies will inevitably impact the labour market, with effects on the supply side of the economy due to changes in production as well as on the demand side resulting from changes in consumer behaviour (Martinez-Fernandez, Hinojosa and Miranda, 2010[1]). Climate change mitigation policies are therefore expected to have a profound impact on the distribution of industries, occupations and jobs, and ultimately the demand for skills (Vona et al., 2018[2]).

For governments to manage the transition to net zero economies, they need to take into account these labour market changes, address people's anxieties about the impact of green policies on jobs, and obtain citizen buy-in for the policies. Successfully implementing climate change mitigation policies therefore requires an understanding of adults' attitudes towards climate change and different policy instruments. Knowing how adults perceive climate change is key because attitudes can be used to anticipate environmental behaviour and policy support. Similarly, knowing how attitudes are shaped and how they can be influenced by external factors such as economic hardship or natural disasters provides insight into which moments should be seized to put forth climate change mitigating policies. It also provides awareness regarding where adults' thresholds for green regulation and ensuing labour market changes lie.

This paper examines how adults' attitudes towards climate change vary within and across countries and considers if environmental attitudes are associated with adults' engagement in pro-environmental behaviours and support for environmentally-friendly policies. In addition, the review explores whether the extent to which individuals prioritise the environment over the state of the economy or vice versa depends on individuals' exposure to natural disasters or negative labour market conditions.

Using information about adults' attitudes towards climate change and their support for policy action, the paper aims to inform the discussion on the opportunities and challenges of creating effective and politically-feasible climate policies. Furthermore, the paper aims to provide some insight into factors that may contribute to political divisions over the environment and climate change policy making.

The analysis relies on a wide range of data containing information on attitudes towards the environment: the Wellcome Global Monitor 2020, the European Social Survey (Round 8), and multiple waves of the World Values Survey. The paper also uses data on natural disasters which come from the Emergency Events Database (EM-DAT) as well as unemployment data, used to characterise labour market conditions, which come from OECD.Stat. Finally, the data on industry-level CO_2 emissions come from the CO_2 emissions multiplier developed by International Monetary Fund.

Key findings are:

- On average, 85% of adults across OECD countries report that they understand climate change "fairly well" or "very well" and 67% of adults report that they perceive climate change to be a major threat.
- Men are, on average, 3 percentage points more likely to report understanding climate change than women. However, women are 8 percentage points more likely to consider climate change to be a major threat.

- Different age groups have similar self-reported understanding of climate change as well as similar perceptions about the threat posed by climate change.
- There is a positive correlation between educational attainment and individuals' self-reported understanding of climate change: 90% of individuals who completed a tertiary degree report that they understand climate change "fairly well" or "very well", while 75% of those who did not complete a secondary school degree report the same understanding. Educational attainment is also positively correlated with increased threat perception. Across OECD countries, 71% of individuals with a tertiary qualification, 65% of individuals with a secondary qualification and 62% of those without secondary qualifications report perceiving climate change as a major threat.
- In many countries individuals who work in industries that are among the 25% heaviest emitters of greenhouse gases are less likely to report believing in climate change than individuals who work in industries that are among the 25% lowest emitters of greenhouse gases. Similarly, individuals who work in the most CO_2-emitting sectors tend to be less worried about climate change than those working in the least CO_2-emitting sectors. On average, 31% of individuals working in the least CO_2-emitting industries reported being very or extremely worried about climate change in the sectors, in contrast to 27% in the most CO_2-emitting industries.
- Climate change beliefs are significantly associated with self-reported engagement in climate-friendly behaviour and support for pro-environmental policies. Whereas, working in a more CO_2-intensive sector and having lower climate change understanding and threat perception is associated with being less environment-friendly.
- There is a clear negative relationship between unemployment rate and the share of individuals who prioritise the environment over the economy. Regression analyses indicate that, when unemployment rate increases by 1%, the probability that individuals will prioritise the environment falls by 1.6 percentage points.
- Sensitivity to the trade-off between the environment and the economy differs across groups of individuals. In particular, the attitudes of individuals with fewer educational qualifications or who have lower incomes are more likely to change as a result of changing economic conditions than those of individuals with high levels of educational qualifications and high incomes.
- Beliefs change when people have more extensive experience with natural disasters and when the natural disasters have significant humanitarian consequences. Individuals are more willing to prioritise the environment over the economy when they perceive higher risk of being affected by climate-change-related natural disasters.

Overall, results indicate that people's economic vulnerability and the sectors they work in impact their attitudes towards the environment and support for public policy. Furthermore, increases in unemployment and exposure to natural disasters influence the extent to which individuals report that environmental protection should be prioritised over economic growth and job creation. The results suggest that decision makers should consider environmental and economic conditions when implementing climate policies to ensure widespread support. The findings also highlight that political division over the environment and climate change is not purely a question of ideology, knowledge or ethics, but rather that it has a substantial economic dimension pertaining to inequalities in economic security and well-being. These findings thus imply that it is important to implement economic policies in tandem with policies aimed at moving towards a green economy.

Résumé

Les pays vont devoir prendre des dispositions ambitieuses pour faire face au changement climatique et accompagner leur économie sur la voie de la sobriété en carbone. Ces mesures, toutefois, auront inévitablement des répercussions sur le marché du travail à travers leurs effets économiques, du côté tant de l'offre, en raison des modifications de la production, que de la demande, avec l'évolution des comportements des consommateurs (Martinez-Fernandez, Hinojosa and Miranda, 2010[1]). Les politiques d'atténuation des effets du changement climatique vont donc, selon toute attente, avoir de sérieuses conséquences sur la répartition des secteurs d'activité, des professions et des emplois et, en dernière analyse, sur la demande de compétences (Vona et al., 2018[2]).

Pour bien accompagner la transition vers une économie neutre en carbone, les pouvoirs publics doivent tenir compte de ces modifications attendues sur le marché du travail, calmer les inquiétudes suscitées par les effets attendus des politiques environnementales sur l'emploi et obtenir l'adhésion de la population aux mesures qu'ils comptent appliquer. La bonne mise en œuvre des politiques d'atténuation des effets du changement climatique passe dès lors par une bonne compréhension de l'attitude des adultes vis-à-vis du phénomène et des différents instruments dont l'emploi est envisagé. Il est essentiel de savoir comment les adultes perçoivent le changement climatique, car on peut ainsi anticiper le comportement qui sera le leur vis-à-vis de l'environnement et ainsi que leur adhésion à l'action des pouvoirs publics. De la même manière, savoir comment se forment les attitudes et quelle influence peuvent exercer sur elles des facteurs externes comme les difficultés économiques ou les catastrophes naturelles aide à saisir le moment opportun pour mettre sur la table des mesures de lutte contre le changement climatique. Cela permet aussi d'être plus attentif au seuil de tolérance des adultes vis-à-vis de la réglementation environnementale et des changements que celle-ci entraîne sur le marché du travail.

Nous verrons dans le présent document comment l'attitude des adultes à l'égard de l'environnement varie selon les pays et nous nous intéresserons de plus près au lien qui existe entre cette attitude, d'une part, et l'adoption d'un comportement écofavorable et le soutien aux mesures environnementales, d'autre part. Nous chercherons de plus à déterminer à quel point les individus font primer l'environnement sur l'économie, ou inversement, en fonction de leur exposition aux catastrophes naturelles ou des difficultés qu'ils rencontrent sur le marché du travail.

Le présent document a pour objet d'apporter, à propos de l'attitude des adultes, des renseignements propres à étayer les débats autour des possibilités et des enjeux associés à la définition de mesures climatiques efficaces et politiquement applicables. Il vise en outre à mettre en lumière certains des facteurs susceptibles de causer des divisions politiques autour de l'action environnementale et des mesures de lutte contre le changement climatique.

L'analyse repose sur un vaste ensemble de données renseignant sur l'attitude des individus vis-à-vis de l'environnement et issues du *Wellcome Global Monitor 2020*, de l'Enquête sociale européenne (8e édition), et des différents cycles de l'enquête *World Values Survey.* Le document est étayé d'autre part par des données sur les catastrophes naturelles tirées de la base de données *Emergency Events Database* (EM-DAT), ainsi que par des données sur le chômage, servant à caractériser la situation du marché du travail, en provenance d'OECD.Stat. Enfin, les données sur les émissions de CO_2 de chaque secteur

d'activité sont issues des multiplicateurs sur les émissions de CO_2 élaborés par le Fonds monétaire international.

Les principales conclusions sont les suivantes :

- En moyenne, 85 % des adultes des pays de l'OCDE déclarent avoir une compréhension « assez bonne » ou « très bonne » du changement climatique ; et 67 % déclarent y voir une menace majeure.
- En moyenne, le pourcentage d'individus déclarant comprendre le changement climatique est plus élevé, de 3 points de pourcentage, chez les hommes que chez les femmes. Pour autant, pour ce qui est d'y voir une menace majeure, l'écart est de 8 points de pourcentage en faveur des femmes.
- Les individus des différentes classes d'âge font état, dans leurs déclarations, d'une compréhension analogue du changement climatique et perçoivent de la même manière la menace que celui-ci représente.
- Il existe une corrélation positive entre le niveau d'instruction et la compréhension du changement climatique chez les individus : 90 % des diplômés du supérieur déclarent avoir une compréhension « assez bonne » ou « très bonne » du changement climatique, contre 75 % de ceux qui n'ont pas achevé d'études secondaires. D'autre part, le niveau d'études va de pair avec une perception plus aiguë de la menace liée au changement climatique. Dans les pays de l'OCDE, 71 % des diplômés du supérieur, 65 % des diplômés du secondaire et 62 % des individus sans diplôme d'études secondaires déclarent que le changement climatique est à leurs yeux une menace majeure.
- Dans de nombreux pays, les personnes qui travaillent dans les 25 % de secteurs qui émettent le plus de gaz à effet de serre sont moins enclines à se déclarer convaincues de la réalité du changement climatique que ceux qui travaillent dans les 25 % de secteurs les plus sobres. De même, ceux qui appartiennent à un secteur d'activité classé parmi les plus gros émetteurs de CO_2 ont tendance à se montrer moins inquiets que ceux qui travaillent dans un secteur dont les émissions comptent parmi les plus faibles. En moyenne, 31 % des individus se déclarent très ou extrêmement inquiets du changement climatique dans ces seconds secteurs, contre 27 % dans les premiers.
- Il existe un lien net entre les convictions des individus vis-à-vis du changement climatique et leur propension à déclarer adopter un comportement écoresponsable et soutenir les politiques en faveur de l'environnement. Inversement, le fait de travailler dans un secteur à forte intensité de carbone et de ne pas prendre la mesure du changement climatique ni de la menace qu'il représente va de pair avec un comportement moins écoresponsable.
- Il existe une relation négative indéniable entre le taux de chômage et le pourcentage d'individus qui font primer l'environnement sur l'économie. Des analyses de régression montrent en effet que, lorsque le chômage augmente de 1 %, la probabilité de donner la priorité à l'environnement diminue de 1.6 point de pourcentage.
- La sensibilité aux arbitrages à opérer entre environnement et économie varie selon la catégorie de population considérée. L'attitude des individus les moins qualifiés ou aux revenus les plus modestes, en particulier, a plus de chances d'évoluer sous l'effet d'un changement de situation économique que celle d'individus très qualifiés et avec des revenus élevés.
- Les convictions changent lorsque les individus ont une expérience plus directe des catastrophes naturelles et que ces dernières ont des conséquences humanitaires significatives. On est en effet d'autant plus enclin à privilégier l'environnement sur l'économie que l'on se sent fortement exposé aux catastrophes naturelles liées au changement climatique.

Il ressort, dans l'ensemble, de l'étude que la vulnérabilité économique et le secteur d'activité des individus ont une incidence sur le comportement vis-à-vis de l'environnement et l'adhésion aux politiques publiques. La progression du chômage et de l'exposition aux catastrophes naturelles, qui plus est, influence la

propension des individus à déclarer que la protection de l'environnement devrait l'emporter sur la croissance économique et la création d'emplois. Les résultats de l'étude tendent à indiquer que les responsables de la formulation des politiques devraient tenir compte du contexte environnemental et économique dans la mise en œuvre des mesures climatiques pour assurer à celles-ci une large adhésion du public. Il apparaît aussi que les clivages politiques autour de la question de l'environnement et du changement climatique ne sont pas qu'une question d'idéologie, de connaissance ou d'éthique, mais qu'ils comportent au contraire une dimension économique substantielle qui a à voir avec les inégalités au regard de la sécurité et du bien-être économiques. Par suite, il importe donc que des mesures économiques accompagnent celles visant à faire émerger une économie verte.

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Introduction

1. Climate change negatively impacts every region of the world and poses a threat not only to the environment and biodiversity but also to economies and societies. Consequences of climate change include food insecurity due to changes in crop yields, increased healthcare expenditures as a result of more respiratory and infectious diseases, loss of land and capital because of rising sea levels and natural disasters, as well as changes in labour productivity. According to the OECD, the combined negative effect on global annual Gross Domestic Product (GDP), if there are no further policies implemented to tackle climate change, could be between -1.0% and -3.3% by 2060 (OECD, 2015[3]). Simultaneously, the World Bank estimates that more than 100 million people could be pushed back into poverty by 2030 as a result of climate change-related impacts (Hallegatte et al., 2015[4]) and over 216 million people will have to migrate within their own countries by 2050 (Clement et al., 2021[5]).

2. To prevent the forecasted outcomes and help countries transition to low-carbon economies, ambitious climate change regulation is needed. These policies, however, will impact the labour market, with effects on the supply side of the economy due to changes in production – including changes in the types of industries, jobs and skills needed – as well as on the demand side due to changes in consumer behaviour (Martinez-Fernandez, Hinojosa and Miranda, 2010[1]). For climate mitigation policies to be successfully implemented there needs to be a degree of buy-in from those who will be affected and so understanding adult's attitudes towards the environment is imperative.

3. "Environmental attitudes" has been defined as, "the collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues" (Schultz et al., 2004[6]). Such attitudes are usually expressed in degrees of favourability (Milfont and Duckitt, 2010[7]). For example, citizens who agree that climate change is happening and perceive it as a threat are more in favour to incur the costs associated with changes in energy production and consumption (Franzen and Meyer, 2009[8]). Whereas electorates that do not believe in anthropogenic climate change are less in favour of climate mitigation policies and as a result their governments may be reluctant to take meaningful action or even commit to ambitious targets (Poortinga et al., 2019[9]).

4. Existing research finds largely consistent patterns in adults' attitudes towards the environment based on socio-economic and demographic characteristics such as gender, education, and income (Poortinga et al., 2019[9]; Marquart-Pyatt, 2008[10]). In general, having a secondary or tertiary education, earning a higher income and being a woman are all factors that are positively correlated with pro-environmental attitudes (Torgler, Garcia-Valiñas and Macintyre, 2008[11]; Zelezny, Chua and Aldrich, 2000[12]; Casaló and Escario, 2018[13]; Marquart-Pyatt, 2008[10]; Meyer, 2015[14]; Lübke, 2021[15]; Olofsson and Öhman, 2006[16]). In contrast, the effect of age on environmental attitudes is mixed (Lübke, 2021[15]; Poortinga et al., 2011[17]; Wang, Hao and Liu, 2021[18]).

5. Knowing how adults perceive climate change is key because attitudes can be used to anticipate environmental behaviour (Gifford and Sussman, 2012[19]; Mobley, Vagias and DeWard, 2009[20]). Studies have shown that environmental attitudes can influence individual behaviours (Waqas, Rehman and Rafiq, 2021[21]; Luzar and Cosse, 1998[22]; Ajzen, 1996[23]) whether it is their consumption behaviour (Wang, 2017[24]; Saari et al., 2021[25]; Nauges and Wheeler, 2017[26]; Sapci and Considine, 2014[27]; Tanner and

Wölfing Kast, 2003[28]; Beck, Rose and Hensher, 2013[29]), policy support (Sharpe, Perlaviciute and Steg, 2021[30]), voting behaviour (Papp, 2022[31]) and/or labour market decisions (Aiman-Smith and Bauer, 1996[32]). Given this context, it is crucial to understand adults' attitudes towards climate change and the environment more generally because they influence consumption, policy, and labour market decisions.

6. Importantly, attitudes are not static. This paper explores how changes in economic conditions (measured through unemployment rates) and exposure to natural disasters influence environmental attitudes at the country level. Understanding how adults' environmental attitudes are influenced by economic hardship or natural disasters provides insight into which moments should be seized to put forth climate change mitigating policies. It also provides awareness regarding where adults' thresholds for green regulation and ensuing labour market changes lie.

7. Furthermore, the environment is a global public good and protecting it requires committed cooperation among countries, so understanding variations in countries' attitudes towards the environment in general and climate change more specifically is imperative. Countries may vary in their attitudes and policy engagement due to differences in geographical conditions and economic structure, resulting in differential constraints, costs, and benefits of engaging in policies and regulations designed to halt or reduce climate change and environmental degradation. The attitudes held by individuals in certain countries could also change as a result of repercussions following other countries' environmental policies and the resulting carbon leakage. Carbon leakage – when businesses transfer production to countries with more lenient emission rules – could affect countries' labour markets and subsequently their environmental attitudes. Although, the existing empirical literature finds that carbon leakage resulting from the implementation of climate change mitigation policies has been limited (OECD, 2021[33]; Dechezleprêtre and Sato, 2017[34]), the concern about carbon leakage may still effect people's perception about climate change and the effectiveness of climate change mitigation policies. Finally, the attitudes of adults living in different countries may also reflect cultural, social and institutional dimensions of different countries. Therefore, the paper also explores how environmental attitudes vary across countries in order to understand why countries have responded to the challenges of climate change so differently and how they can work together moving forward.

8. The paper is organised as follows. Section 1 provides an overview of how adults' attitudes towards climate change vary across and within countries. Section 2 details how attitudes towards climate change are associated with adults' engagement in pro-environmental behaviours and support for policies designed to protect the environment. Section 3 illustrates the variation in attitudes towards climate change and support for pro-environmental policies among individuals who work in different sectors. Section 4 explores if the extent to which individuals prioritise the environment over the state of the economy or *vice versa* depends on individuals' exposure to natural disasters or negative labour market conditions. Analyses rely on a wide range of data containing information on attitudes towards the environment: the Wellcome Global Monitor 2020, the European Social Survey round 8, and multiple waves of the World Values Survey. Data on natural disasters come from the Emergency Events Database (EM-DAT) and unemployment data, used to characterise labour market conditions, come from OECD.Stat. Finally, data on industry-level CO_2 emissions come from the CO_2 emissions multiplier developed by International Monetary Fund.

1 How the environmental attitudes of adult populations vary across and within countries

9. Climate change and the policies needed to mitigate it are key variables that will affect the labour market and career decisions available to individuals. In particular, the economic and lifestyle changes needed to address climate change will have a profound impact on the distribution of industries, occupations and jobs, and ultimately the demand for skills (Vona et al., 2018[2]). Examining how knowledge and perceptions of climate change differ across individuals within countries and across countries can provide insight into how they foresee the trajectory of different occupations and how they will receive climate change mitigation policies.

10. Studying how adults' attitudes towards climate change vary across countries is also necessary because the impact of climate change is global and cross-country coordination is required to implement mitigation policies. Research has found that individuals' attitudes towards climate change impact national policies (Tjernström and Tietenberg, 2008[35]). Thus, attitudes towards climate change help explain why some countries adopt climate mitigation regulations, while others do not, and they also explain why some countries adopt more ambitious climate change policies than others (EBRD, 2011[36]). Cross-country differences in attitudes can therefore make international accords difficult to negotiate because each government has to account for varying domestic attitudes towards climate change and as a result varying appetites for international climate mitigation action.

1.1. An overview of adults' attitudes towards climate change across countries

11. This section documents how self-reported understanding and perceptions of climate change differ across countries as well as across demographic and social groups. Data from the Wellcome Global Monitor 2020 – an international survey on people's perception and trust in the areas of science, health, and government as well as climate change (see Box 1.1) – are used for the analysis. The findings reported are for OECD countries with available data.

12. Figure 1.1 and Figure 1.2 suggest that the majority of adults in OECD countries believe that they understand climate change "fairly well" or "very well" and consider climate change to be a "major threat". Figure 1.1 indicates that, on average, 84% of adults across OECD countries report that they understand climate change "fairly well" or "very well". Figure 1.1 also suggests that self-reported understanding of climate change is varied across countries. For example, in Belgium 94% of adults report that they understand climate change "fairly well" or "very well", while in the Czech Republic only 62% of adults report the same understanding. Unfortunately, only self-reported understanding of climate change data exist at the large-scale international level and self-reports may not accurately reflect actual knowledge. However, the literature similarly indicates that across countries people have relatively good knowledge of climate change, with less than one-tenth of people (except in Australia, France and the United States) outright denying the existence of climate change (Dechezleprêtre et al., 2022[37]). Existing research also finds that

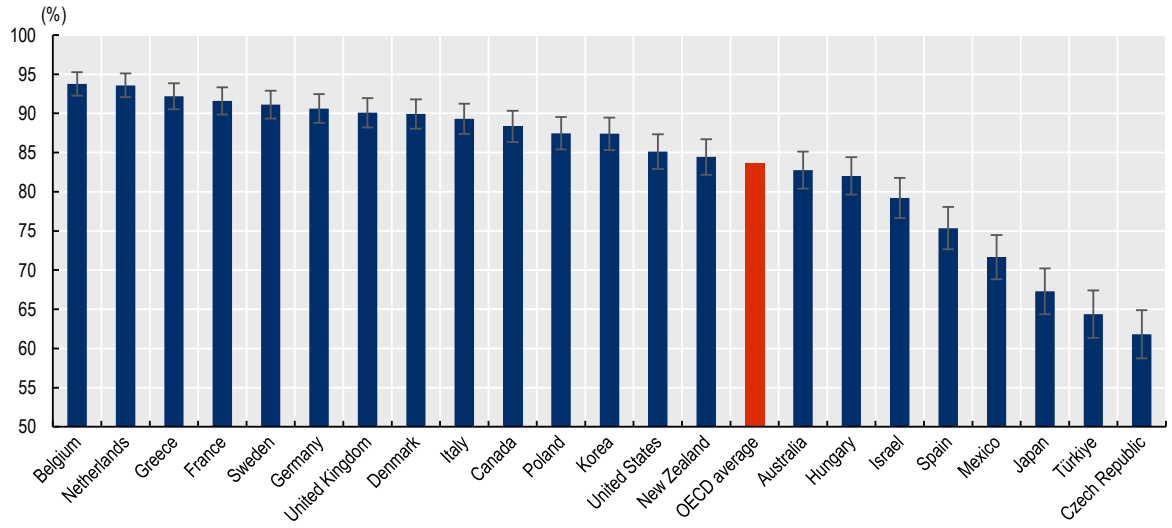
among teenagers, individuals with greater scientific proficiency are more likely to report greater understanding of climate change and that self-reported understanding of climate change predicts willingness to engage in pro-environmental behaviours and support for pro-environment policies (Borgonovi et al., 2022[38]). Among adults, evidence from the United States indicates that self-reported understanding of climate change is positively related to knowledge, with the exception of very conservative voters (Hamilton, 2018[39]).

13. Figure 1.2 shows that on average, across OECD countries, 68% of adults report that they perceive climate change to be a threat, though threat perception varies greatly across countries.[1] In Mexico and Italy, for instance, nearly 90% of adults regard climate change as a major threat but only around 44% of adults report the same in the Czech Republic. Of note is that responses to whether adults perceive climate change to be a threat are more varied across countries than responses to whether adults understand climate change. For example, there is a 32 percentage point difference in understanding between Belgium, the country with the highest self-perceived understanding and the Czech Republic, the country with the lowest self-perceived understanding of climate change (Figure 1.1), while there is a 46 percentage point difference between Mexico and Italy, the countries with the highest percentage of adults that perceive climate change to be a threat and the Czech Republic, the country with the lowest percentage of adults who perceive climate change to be a threat. This means that although there are variations across countries, adults in OECD countries have more similar self-reported understandings of climate change than perceived threat perceptions.

14. The wider spread for climate threat perceptions can in part be explained by a country's experience with natural disaster. Research suggests that the more familiarity and experience individuals have with extreme weather, the less psychological distance they have from the threat of climate change (Spence, Poortinga and Pidgeon, 2011[40]). Therefore, one may have high self-perceived understanding of climate change but low threat perception because the risk of experiencing extreme weather or natural disasters may be temporally and/or spatially distant for them. While those who say they understand climate change "well" or "very well" and have experienced a natural disaster first-hand are likely to have a much higher threat perception because they have witnessed climate change, so the risk to them is much more imminent. According to the World Bank, Mexico is "highly vulnerable", and Italy is "particularly vulnerable" to the adverse impacts of climate change (World Bank Group, 2021[41]; World Bank Group, 2021[42]). In addition, they both have experienced significantly more natural hazards between 1980 and 2020 than the Czech Republic, which comparatively is just considered "vulnerable" (World Bank Group, 2021[43]; World Bank Group, 2021[42]; World Bank Group, 2021[41]). The fact that Mexico and Italy have experienced more extreme weather can therefore help explain why the threat perception among adults in these two countries is much higher than the threat perception in Czech Republic – a country that has had comparably few extreme climate events in the same time period.

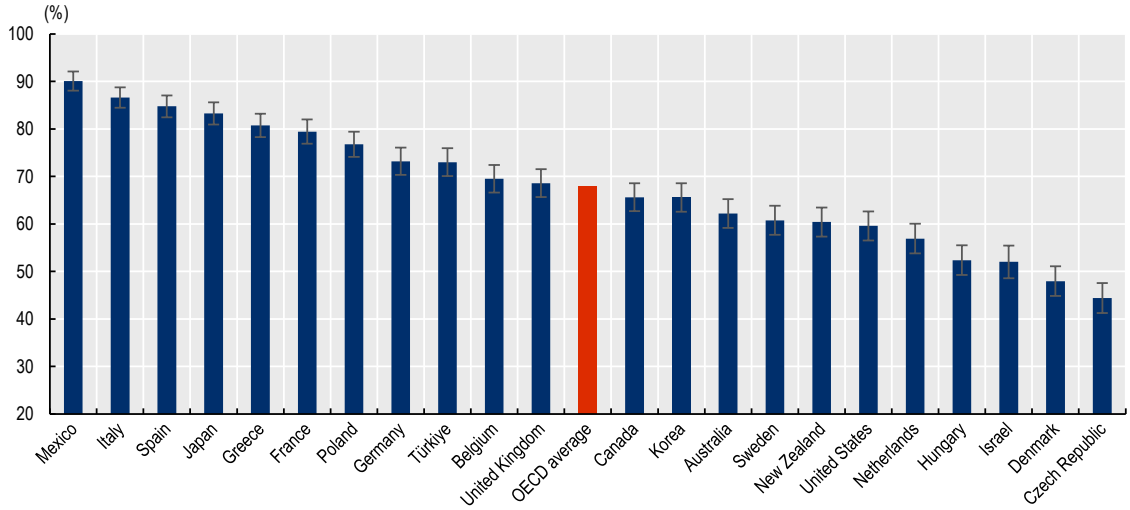
[1] Note that the percentage of individuals who consider climate change to be a major threat is somewhat lower than in the other OECD study, where 70% to 90% somewhat or strongly agree with the statement "climate change is an important issue" (Dechezleprêtre et al., 2022[37]). This discrepancy is due to multiple reasons, including the way in which the question was framed (threat or important problem), the answer choices, and the countries considered. In particular, the dichotomous variable constructed in this work take 1 only if the respondent believes that climate change is a major threat, whereas Dechezleprêtre et al. (2022[37]) consider both "somewhat agree" and "strongly agree" to classify respondents who believe that climate change is an important problem. The percentage of individuals in the Wellcome Global Monitor who believe that climate change is either a major or a minor threat is high, about 90% in most countries.

Figure 1.1. Percentage of adults who report that they understand climate change, by country



Note: Countries are ranked in descending order based on the percentage of the population aged 16 years or older who reported understanding climate change well. Using the variable "Understand the Issue of Climate Change/Global Warming" that can be answered on a 1-4 scale, a person is regarded as understanding climate change when their response was either 3 (fairly well) or 4 (very well).
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45.

Figure 1.2. Percentage of adults who perceive climate change as a major threat, by country



Note: Countries are ranked in descending order based on the percentage of the population aged 16 years or older who reported that they believe climate change is a major threat with the question item "Threat of Climate Change/Global Warming to People".
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45.

Box 1.1. The Wellcome Global Monitor 2020

The Wellcome Global Monitor is an international survey designed to measure people's perception and trust in the areas of science, health, and government. It was implemented as an additional module in the annual Gallup World Poll survey series. The Global Monitor is a representative survey that was carried out in 113 countries and territories in 2020 and early 2021, with approximately 1 000 adults aged 15 and older interviewed per country. Because of COVID-19 and social distancing the survey had to be conducted remotely since face-to-face contacts were not possible. The survey was conducted using telephone interviews (also referred to as computer-assisted telephone interviewing in this document, or CATI). The sampling frame represents adults aged 15 and older with access to a phone (either landline or mobile). Gallup used random-digit-dialling (RDD) or a nationally representative list of phone numbers. All samples were probability based and were nationally representative of the target population. Telephone coverage was measured across an entire country, including rural areas, and all eligible landline exchanges and valid mobile service providers were included.

In 2020, the Wellcome Global Monitor asked several questions related to climate change. First, respondents were asked to report if they had ever heard of climate change and global warming. They could answer "yes" or "no". Those who indicated that they had heard of climate change and global warming were asked to indicate if they understood climate change and global warming "very well"; "fairly well"; "not very well"; or "not at all". Similarly, individuals were asked to indicate if they felt climate change and global warming are a "major threat", a "minor threat", "not a threat", or "not at all".

In this paper responses were categorised so as to create two dichotomous indicators.

1. The indicator of ***self-reported understanding of climate change and global warming*** takes the value 1 if respondents answered that they had heard of climate change and global warming and that they understand these phenomena either "fairly well" or "very well". It takes the value 0 if they indicated that they had never heard of climate change and global warming or if they indicated that they had heard of these terms but reported "not very well" or "not at all" when asked if they understood them. The indicator represents individuals' self-reported understanding of climate change and global warming, rather than a test-based assessment of climate change knowledge.
2. The indicator of ***threat perceptions*** takes the value 1 if respondents answered that they had heard of climate change and global warming and perceived these to be a "major threat". It takes the value 0 if they indicated that they had never heard of climate change and global warming or if they indicated that they had heard of them but that they represented "a minor threat " or "not a threat".

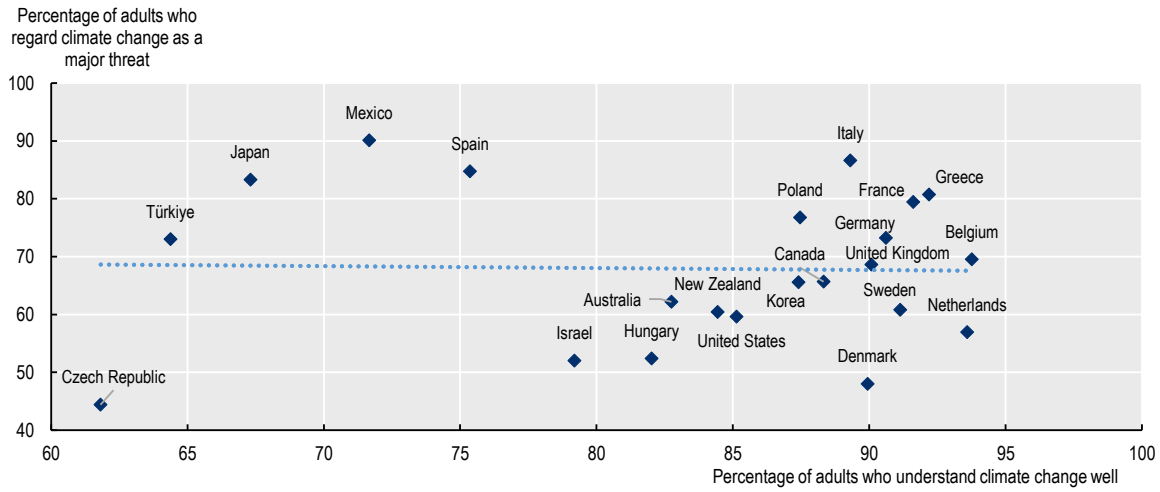
Both indicators use data for individuals that are 16 years old or older (here on out referred to as "adults").

Source: Wellcome (2020[44]), *Wellcome Global Monitor 2020* (database), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

15. The relationship between adults' understanding of climate change and their threat perception differs greatly across countries. Among some countries, there is no association between the percentage of the population who perceive climate change to be a threat and the percentage of the population who report understanding climate change. Figure 1.3, for example, indicates that in countries such as Japan, Mexico, Spain and the Republic of Türkiye a comparatively large percentage of the adult population considers climate change to be a major threat and comparatively few adults report that they understand climate change "fairly well" or "very well". By contrast, in countries such as Denmark and the Netherlands, a relatively large percentage of the adult population report that they understand climate change "fairly well"

or “very well” and relatively few individuals indicate that they consider climate change to be a major threat. In other countries there seems to be a relationship between knowledge of climate change and threat perception. For instance, in Italy and Greece high levels of self-reported understanding of climate change are accompanied by high levels of perception that climate change is a threat. While in the Czech Republic low levels of self-reported understanding of climate change are accompanied by low levels of threat perception. Overall, a lack of cross-country correlation between self-reported understanding of climate change and threat perceptions may reflect that a greater understanding of climate change leads individuals to appreciate how dangerous climate change can be and how difficult it is to halt it. At the same time, a greater understanding of climate change is key to develop adaptation, mitigation and prevention strategies to reduce climate change and its impact on individuals and communities. Moreover, each country differs in the extent to which its population is exposed to climate-change-related disasters, which can impact the inherent level of threat individuals feel for any given level of understanding of climate change. Finally, heterogeneity in patterns of self-reported understanding of climate change may introduce measurement error.

Figure 1.3. Association between self-reported understanding of climate change and threat perception, by country



Note: The figure shows the cross-country association between the percentage of adults (aged 16 years or above) who regard climate change as a major threat and who understand climate change well.
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

1.2. Disparities in attitudes towards climate change

16. Attitudes towards climate change vary not only across countries but also across groups within each country. This subsection highlights how climate attitudes are related to key socio-economic factors: gender, age and educational attainment.

17. The literature identifies largely consistent patterns in adults’ attitudes towards the environment in general and climate change in particular based on socio-economics and demographic characteristics such as gender, education, and income (Liere and Dunlap, 1980[45]; Poortinga et al., 2019[9]; Marquart-Pyatt, 2008[10]). For example, studies show that women generally tend to be more concerned about climate change than men (Poortinga et al., 2019[9]; Torgler, Garcia-Valiñas and Macintyre, 2008[11]; Zelezny, Chua

and Aldrich, 2000[12]) and that individuals with greater educational attainment tend to have more positive attitudes towards the environment (Casaló and Escario, 2018[13]; Marquart-Pyatt, 2008[10]). Income is also a factor that is positively correlated with pro-environmental attitudes (Franzen and Meyer, 2009[8]; Franzen and Vogl, 2012[46]; Franzen and Vogl, 2013[47]; Gelissen, 2007[48]). Individuals with higher relative incomes tend to display higher levels of environmental concern than people in the same country who earn less (Franzen and Meyer, 2009[8]). However, the association between age and environmental attitudes is unclear. Some research identifies a positive relationship between age and pro-environmental attitudes and other research indicates a negative relationship between age and green sentiments.

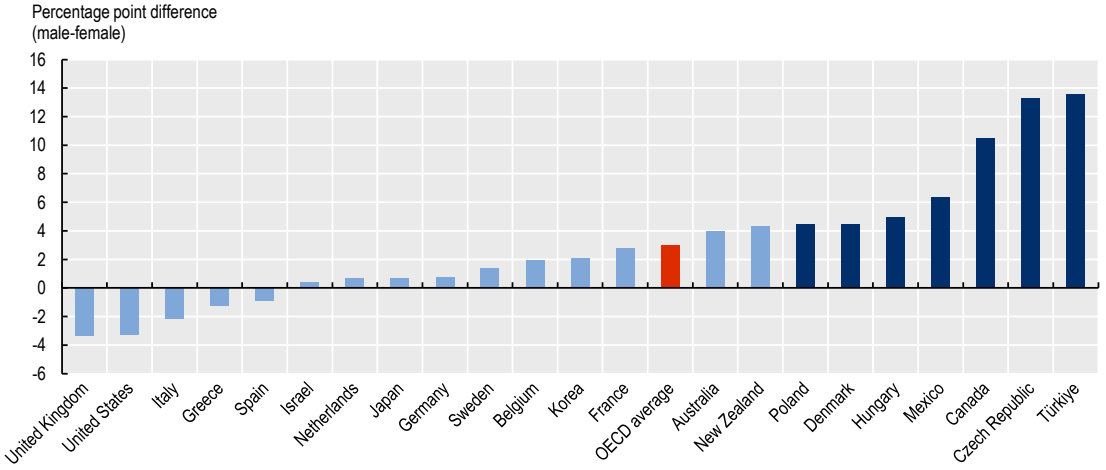
18. The following subsections of the paper provide more evidence on how socio-economic and demographic characteristics relate to adults' attitudes towards climate change.

1.2.1. Gender differences in environmental attitudes

19. The literature indicates that women generally report lower confidence in their scientific knowledge and abilities than men (Jacobs and Simpkins, 2005[49]). Gender differences in self-perceived knowledge of scientific phenomena, interest in science and confidence in science abilities arise early and may lead to gender differences in educational and career choices (OECD, 2015[50]; VanLeuvan, 2004[51]; McCright, 2010[52]). Women have also been found to express less trust in science to solve problems than men and are more critical of science and technology than men (McCright, 2010[52]). Interestingly, however, the literature finds that although women tend to report less factual knowledge or understanding of climate change than men, they are more likely to be concerned about the environment than their male counterparts (Gifford and Nilsson, 2014[53]; Levine and Strube, 2012[54]). While Dechezleprêtre et al. (2022[37]) confirm the results of these previous studies, they also show that women are less accurate, especially since they tend to magnify the possible negative effects of climate change more than men. However, the extent of gender differences in climate change knowledge varies widely across countries, with some countries having no significant gender differences. Therefore, there is no consistent relationship between gender and support for policy action: gender can be a important predictor, but the magnitude of the support depends on the policy considered and in which country it is studied.

20. This paper finds that in the majority of countries gender differences in reported understanding and knowledge of climate change are small or non-existent. Using the available data, the results show that on average, across OECD countries, the gender gap in self-reported understanding of climate change corresponds to 3 percentage points (Figure 1.4). This means that men are, on average, 3 percentage points more likely to report understanding climate change than women. Gender differences are pronounced in Türkiye, the Czech Republic and Canada where they correspond to 14, 13 and 11 percentage points, respectively.

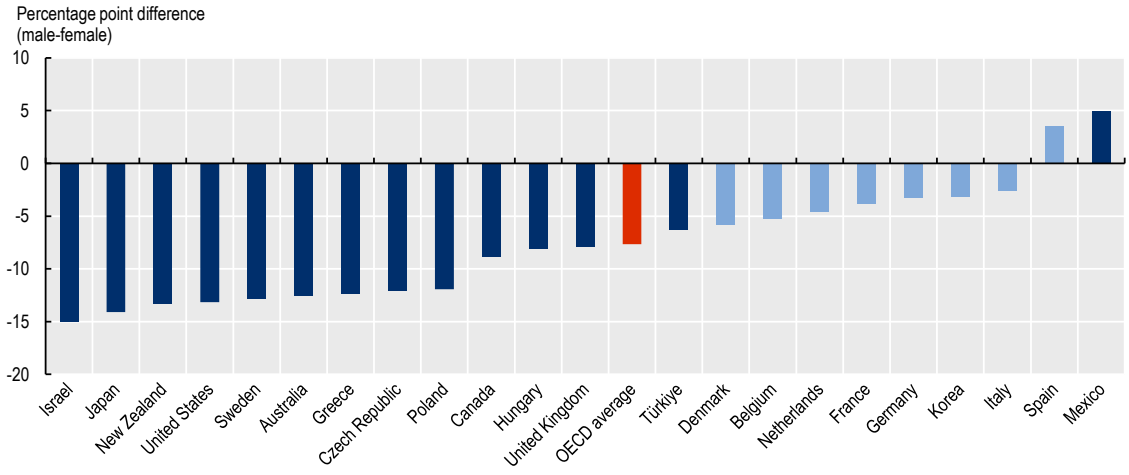
Figure 1.4. Gender differences in self-reported understanding of climate change, by country



Note: Countries are ranked in ascending order based on the percentage point difference between men and women who reported that they understand climate change "fairly well" or "very well". A darker blue bar indicates that the difference between men and women is statistically significant at the 5% level.
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

21. By contrast and in line with the previous literature (McCright, 2010[52]; Gifford and Nilsson, 2014[53]; Levine and Strube, 2012[54]), Figure 1.5 reveals that women are more likely to consider climate change to be a major threat than men. On average, across OECD countries, women are 8 percentage points more likely than men to perceive climate change as a major threat, but gender differences are as large as 15 percentage points in Israel. The gender gap in threat perceptions is also larger than 10 percentage points in Japan, New Zealand, the United States, Sweden, Australia, Greece, the Czech Republic and Poland (listed in descending order by gender gap in threat perception). Cross-country differences in the size of the gender gap in perceived threat are not driven by the differences in mean value across countries. That is, correcting for differences in mean value does not alter the magnitude of gender differences nor the rank order of countries.

Figure 1.5. Gender differences in the perception of climate change as a threat, by country



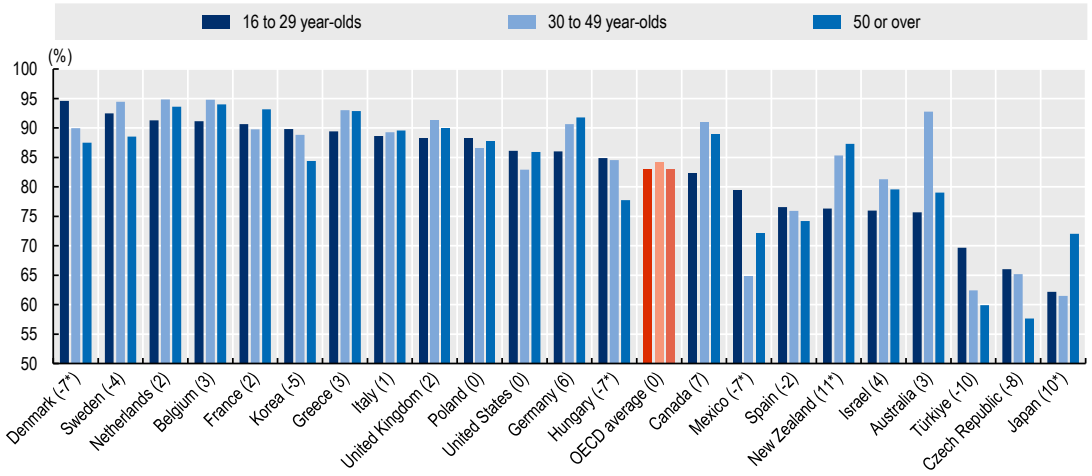
Note: Countries are ranked in ascending order based on the percentage point difference between men and women who reported that they perceived climate change to be a major threat. A darker blue bar indicates that the difference between men and women is statistically significant at the 5% level.
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

1.2.2. Age differences in attitudes towards climate change

22. Existing literature finds mixed results regarding the effect of age on adults' environmental attitudes in general and climate change in particular. Some scholars argue that climate change denial increases with age (Lübke, 2021[15]; Liere and Dunlap, 1980[45]; Poortinga et al., 2011[17]) in part because older people are more integrated in the existing social structures and may therefore have more to lose when changes are implemented (Poortinga et al., 2019[9]). While others argue that older people are more likely to have pro-environmental attitudes and participate in pro- environmental behaviour (Wang, Hao and Liu, 2021[18]) such as conserving natural resources and reducing pollution (M. Wiernik, S. Ones and Dilchert, 2013[55]) because they would like to leave a lasting legacy for future generations (Warburton and Gooch, 2007[56]; Frumkin, Fried and Moody, 2012[57]) and/or because they would like to improve environmental conditions for health reasons (Wang, Hao and Liu, 2021[18]).

23. Figure 1.6 identifies few differences in individuals' perceived understanding of climate change and global warming based on age. On average, across OECD countries, 83% of 16 to 29-year-olds report that they understand climate change and global warming "fairly well" or "very well". Similarly, 84% of 30-49-year-olds and 83% of over 50-year-olds report the same understanding. In the majority of the countries, the age difference is not statistically significant, except in Denmark, Hungary and Mexico, where individuals aged 16 to 29 years have higher probability to self-report their understanding of climate change relative to individuals aged 50 years or above, and in New Zealand and Japan, where this relationship reverses.

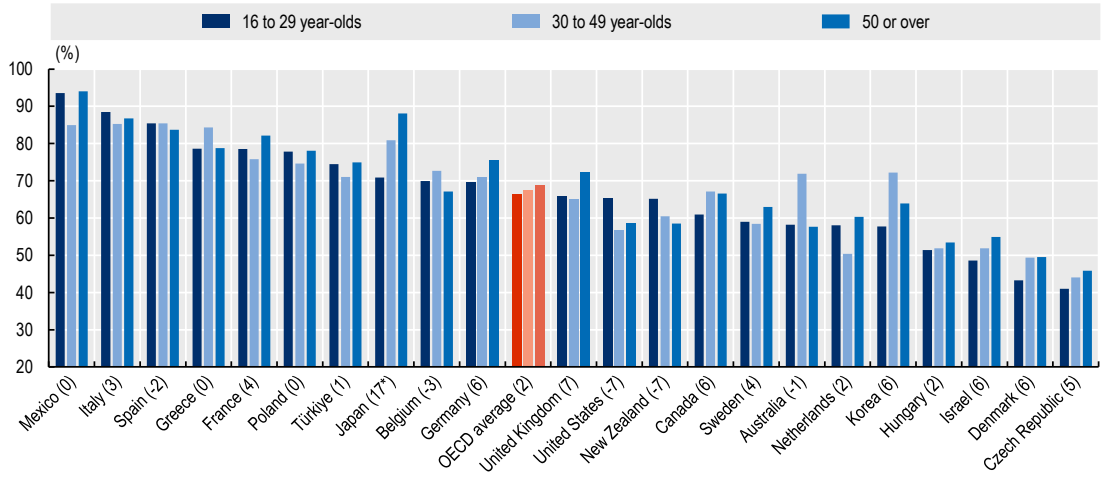
Figure 1.6. Differences in self-reported understanding of climate change across age groups, by country



Note: Countries are ranked in descending order based on the percentage of those aged 16-29 years old who reported that they understand climate change and global warming "fairly well" or "very well". The number in bracket next to the country name represents the difference between the percentage of individuals aged 50 or above and those between the age of 16 and 29 who reported understanding climate change "fairly well" or "very well". The asterisk next to a country name indicates that the difference is statistically significant at the 5% level.
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

24. Furthermore, Figure 1.7 shows that different age groups tend to have similar perceptions about the threat posed by climate change and global warming. For example, on average across OECD countries, 66% of 16 to 29-year-olds perceive climate change to be a threat and 69% of individuals aged 50 or over also perceive climate change to be a threat. In many countries, older people seem to be only marginally more worried about potential climate threats than younger people; Japan is the only country where the age difference is pronounced: 71% of 16 to 29-year-olds perceive climate change as a threat, in contrast to 88% of individuals aged 50 or over – a difference that is statistically significant at conventional levels ($p<0.05$). These results are consistent with the previous literature that finds mixed effects of age on attitudes toward climate change (Lorenzini, Monsch and Rosset, 2021[58]; Gray et al., 2019[59]).

Figure 1.7. Differences in the perception of climate change as a threat across age groups, by country



Note: Countries are ranked in descending order based on the percentage of those aged 16-29 years who reported that they perceive climate change to be a major threat. The number in bracket next to the country name represents the difference between the percentage of individuals aged 50 or above and those between the age of 16 and 29 who report perceiving climate change to be a major threat. The asterisk next to a country name indicates that the difference is statistically significant at the 5% level.
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

1.2.3. Differences in attitudes towards climate change by educational attainment

25. The literature indicates that education is positively correlated with environmental attitudes in general and towards climate change specifically (Casaló and Escario, 2018[13]; Marquart-Pyatt, 2008[10]) and can cause individuals to behave in a more environmentally friendly manner (Meyer, 2015[14]). In fact, it has been argued that education has the strongest effect on environmental concern (Franzen and Vogl, 2013[47]) and is the single, most-stable variable that explains environmental concern (Olofsson and Öhman, 2006[16]).

26. Education promotes an understanding of a wide range of issues, including the scientific phenomena surrounding climate change. Studies have found that information – both general knowledge and subject-specific knowledge – is a crucial component in attitude formation (Tjernström and Tietenberg, 2008[35]). As a result, what individuals learn in school helps shape their attitudes on that subject - in this case climate change. Furthermore, studies have shown that education is associated with people's pro-environmental behaviours (Ahamad and Tanin, 2021[60]). Therefore, it can be inferred that education influences individuals' attitudes towards the environment, which then shapes their behaviour. In fact, a study conducted by Hoffman and Muttarak found that additional years of schooling significantly increased pro-environmental actions because education increases awareness of the anthropogenic causes of climate change, which in turn increases individuals' belief that they have the capacity to make a difference (Hoffmann and Muttarak, 2020[61]).

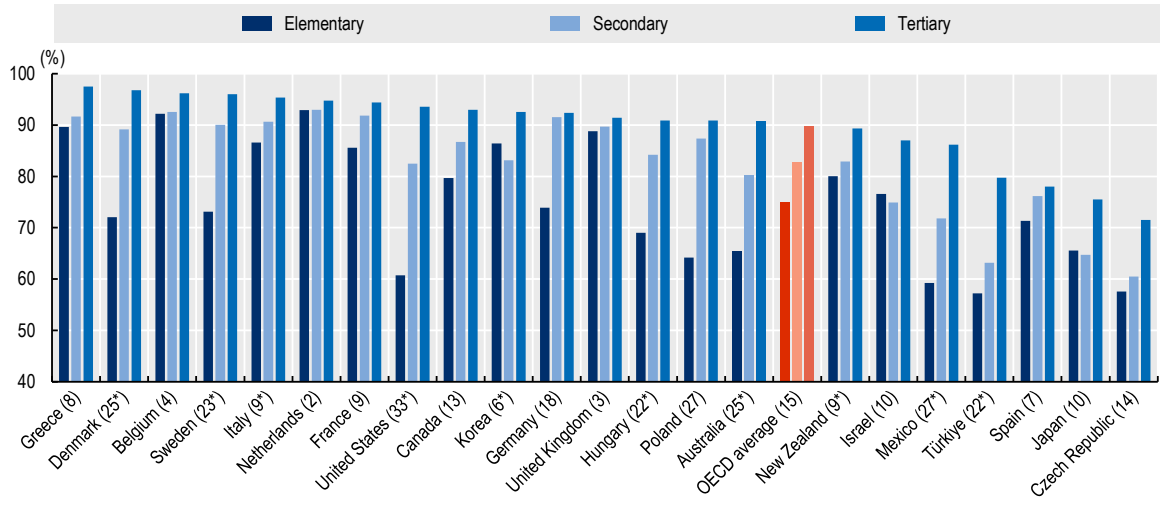
27. Similarly, studies have shown that additional years of education exposes individuals to more information about the anthropogenic and pollution-related aspect of climate change, which then affects their knowledge, attitudes and behaviours (Ahamad and Tanin, 2021[60]). Research has also shown that individuals with secondary or tertiary education are much less likely to deny climate change than those who only had completed their primary school education (Lübke, 2021[15]). Thus, one would expect that when children and young adults learn (and continue to learn) about the determinants and consequences

of climate change at school, they then have overall higher levels of self-reported understanding of climate change and will go on to make more informed decisions in their daily lives through political and civic participation.

28. The fact that individuals with additional education, and in particular tertiary education, are more likely to have an understanding of climate change than individuals who did not complete secondary school is shown in Figure 1.8. On average across OECD countries the difference in self-reported understanding of climate change is 15 percentage points between individuals who completed a tertiary education and those who did not (Figure 1.8). More specifically, 90% of individuals who completed a tertiary degree report that they understand climate change "fairly well" or "very well", while 75% of those who did not complete a secondary school degree report the same understanding (Figure 1.8). Differences by educational attainment are highest in the United States (33 percentage points), Australia (25 percentage points) and Sweden (23 percentage points). By contrast, in the Netherlands, Belgium and the United Kingdom there are virtually no differences based on educational qualifications in how adults report their understanding of climate change.

29. Results presented in Figure 1.8 also indicate that across countries there is less variation in the percentage of tertiary educated adults who report that they understand climate change "fairly well" or "very well" than in the percentage of adults who report the same understanding but who did not obtain secondary education qualifications. That is, across countries adults who obtained a tertiary degree tend to have a similar understanding of climate change, while adults who have not finished secondary school have varying knowledge of climate change. The standard deviation across countries is nearly 61% larger among individuals who did not obtain a secondary qualification than among those who completed a tertiary education degree. In the Netherlands over 93% of individuals without a secondary education qualification report their understanding climate change as "fairly well" or "very well", while in the United States only 61% report the same – a difference of over 32 percentage points. In Greece and Denmark 97% of elementary educated graduates report that they understand climate change "well" or "fairly well". In the Czech Republic this percentage is 72%, a difference of 25 percentage points.

Figure 1.8. Educational attainment and self-reported understanding of climate change, by country

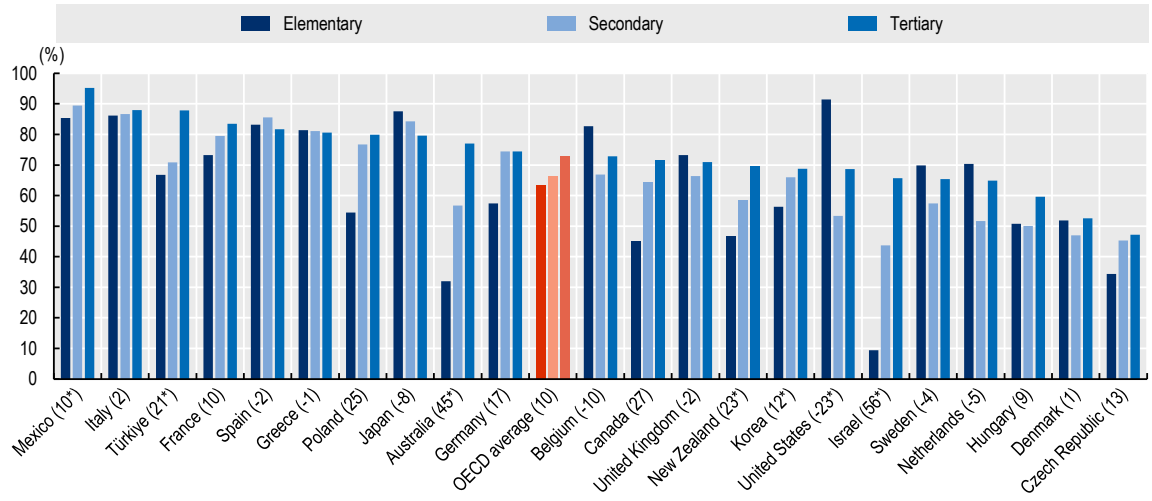


Note: Countries are ranked in descending order based on the percentage of tertiary educated individuals who reported that they understand climate change "fairly well" or "very well". The number in brackets next to the country name represents the percentage point difference between tertiary educated individuals and individuals without secondary qualifications. The asterisk indicates if the difference is statistically significant at the 5% level.

Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

30. Figure 1.9 reveals that in the majority of countries, individuals with higher levels of education are more likely to consider climate change to be a major threat. In 14 out of the 22 countries, tertiary educated adults report higher perceptions of threat than those who did not complete secondary education. Across OECD countries, 73% of individuals with a tertiary qualification, 66% of individuals with a secondary qualification and 63% of those without secondary qualifications report perceiving climate change as a threat. In 8 countries perceptions of climate change as a major threat are higher among individuals without secondary qualifications than among individuals with tertiary qualifications. The difference is statistically significant and quantitatively large in the United States. Cross-country differences in the association between education and perceptions of threat could be due to differences in exposure to the potential impact of climate change across education groups in the different countries.

Figure 1.9. Educational attainment and the perception of climate change as a threat, by country



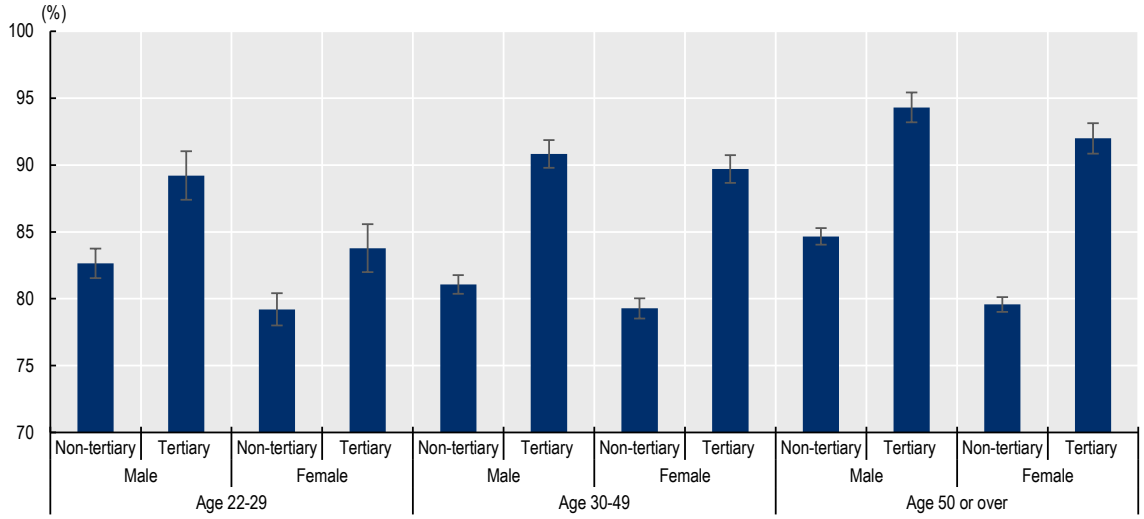
Note: Countries are ranked in descending order based on the percentage of tertiary educated individuals who reported that they perceived climate change to be a major threat. The number in bracket next to the country name represents the percentage point difference between tertiary educated individuals and individuals without secondary qualifications. The asterisk indicates if the difference is statistically significant at the 5% level.

Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

1.2.4. Population profiles and the heterogeneous effects of educational attainment

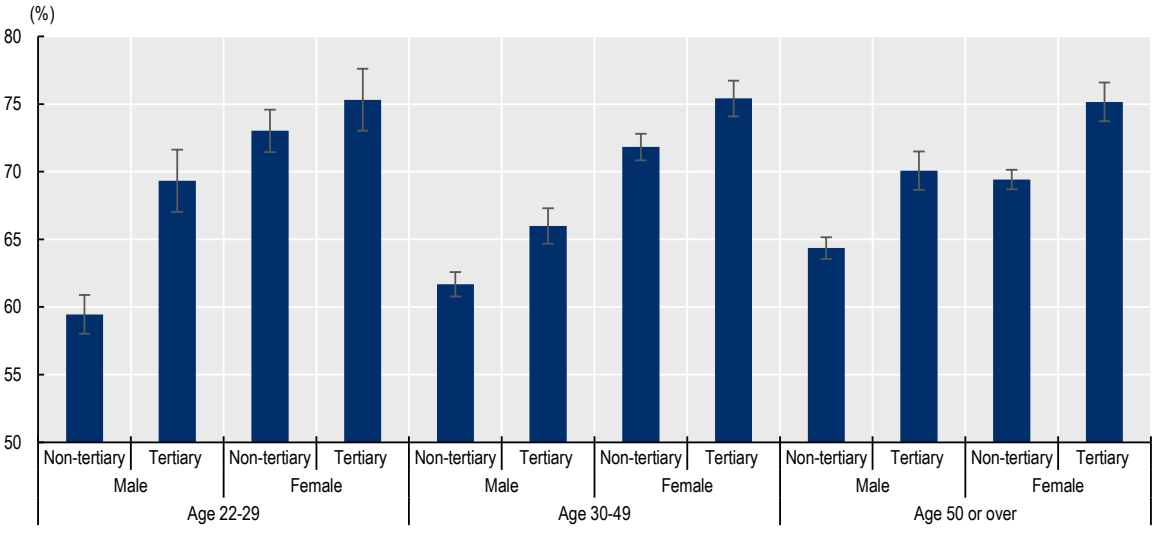
31. Since gender, educational attainment and age intersect and overlap, Figure 1.10 and Figure 1.11 illustrate average differences across countries in the sample in perceived understanding of climate change as well as perceptions that climate change constitutes a major threat across key demographic groups (education is expressed in terms of tertiary education degree holders and non-holders, hence individuals younger than 22 are not considered in this section because most individuals will not have completed their tertiary education by then). The results suggest that self-reported understanding of climate change is markedly higher among tertiary educated graduates and among men, irrespective of age. By contrast, perceptions that climate change poses a threat are higher among women than among men, with educational attainment playing a more minor role and age playing no role.

Figure 1.10. Differences in self-reported understanding of climate change among key socio-economic groups



Note: The figure shows the percentage of individuals who self-reported understanding climate change well by combination of socio-economic group. The sample pools all participating OECD countries. The sample drops those aged 21 years or younger in order to avoid misclassifying those currently in tertiary education as instead being in secondary education.
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

Figure 1.11. Differences in the perception of climate change as a threat among key socio-economic groups



Note: The figure shows the percentage of individuals who think climate change is a major threat by combination of socio-economic group. The sample pools all participating OECD countries. The sample drops those aged 21 years or younger in order to avoid misclassifying those currently in tertiary education as instead being in secondary education.
Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

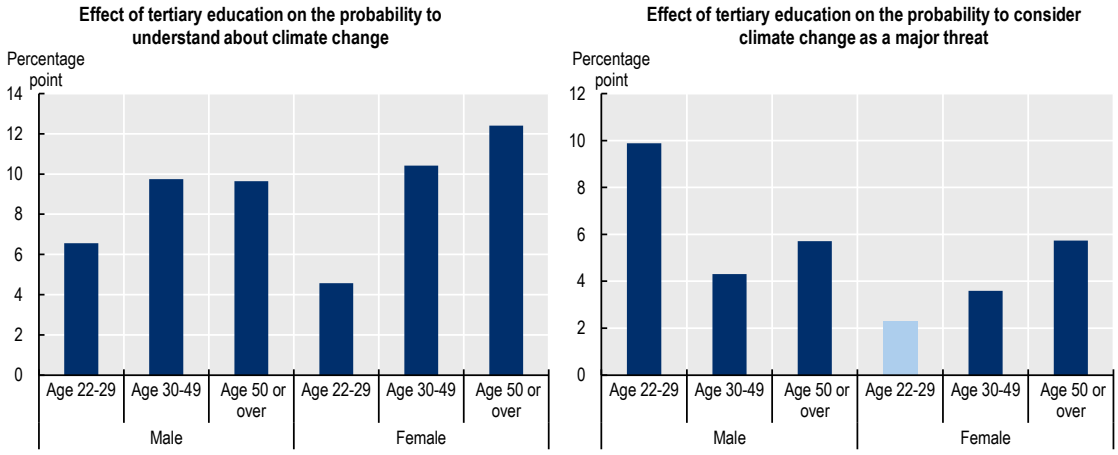
32. The two panels displayed in Figure 1.12 identify the heterogeneity in the association between educational attainment and attitudes towards climate change across different demographic groups. First, across different groups defined in terms of age and gender, educational attainment is associated with greater perceived understanding of climate change and global warming. Second, the difference in perceived levels of understanding that are associated with educational attainment are larger among older individuals (50 or over) than among younger ones (30 to 49-year-olds and 22 to29-year-olds). Although this finding might reflect selection bias,[2] it might also imply that education has a long-term impact on individuals' awareness of climate change. The general results remain unchanged when these estimated coefficients are normalised with respect to the non-tertiary-education group's mean outcome value in each demographic combination.

33. Education not only helps shape attitudes towards the environment in general and climate change in particular and subsequently pro-environmental behaviour, but it is also key in equipping students with a solid foundational understanding of environmental phenomena and fostering the desire to learn more about, and engage with, environmental problems. Individuals who continue their studies and pursue higher educational qualifications generally acquire skills and habits that allow them to search for and understand information about environmental issues. In fact, educational attainment has been found to be one of the strongest predictors of the willingness to learn (OECD, 2021[62]). Given this, more educated individuals are more likely to continuously seek out relevant information and update their beliefs and understanding even with regard to climate change, which could result in an even larger gap in environmental awareness over time. The implication is that obtaining a higher education may not only provide additional environmental information, but also, more importantly, it may prepare individuals to be lifelong learners, capable of constantly updating their knowledge and understanding.

34. However, the right panel of Figure 1.12 reveals a less clear-cut association between education and whether individuals perceive climate change and global warming to be a threat. Male tertiary level graduates are more likely to perceive climate change to be a threat than their non-tertiary level educated counterparts. This gap is widest among the young (22 to 29-year-olds), although there is no linear increase in the estimated associations with respect to age. By contrast, there is much less association between educational attainment and threat perceptions among young women. Such gender differences reflect, in part, the fact that young women who did not complete tertiary education are considerably more likely than young men to perceive climate change to be a threat (73% vs 60%). It also implies that current educational provision might be limited in changing the climate change perception beyond a certain point. The tertiary-education effect is increasing with respect to age in the case of women.

[2] Since the tertiary enrolment rates are increasing, tertiary level graduates and non-tertiary graduates may be more similar in younger than older cohorts. When only few individuals enrol and complete tertiary studies, those who do tend to be more selected in terms of ability or other unobservable characteristics that may also correlated with environmental awareness and attitudes.

Figure 1.12. Heterogeneity in the association between educational attainment and attitudes towards climate change



Note: The figure shows the estimated effect of tertiary education on the probability that an adult self-reports their understanding of climate change as "well" (left panel) and on the probability of considering climate change a major threat (right panel). The effect of tertiary education on these two outcomes is broken down by demographic group. The dark blue bar indicates a statistical significance of the effect of tertiary education at 5% level. The estimates are based on a linear probability model where the tertiary dummy is interacted by dummy variables indicating each demographic group. The analysis uses the pooled sample of participating OECD countries and restricts the data to those aged 22 years or above.

Source: Calculations based on Wellcome (2020[44]), Wellcome Global Monitor 2020: COVID-19 (dataset), https://wellcome.org/reports/wellcome-global-monitor-covid-19/2020#downloads-6b45

2 Attitudes towards climate change and support for policies protecting the environment

35. Environmental attitudes are good predictors of individuals' engagement in pro-environmental behaviours and support for policy action to protect the environment (Kaiser, Wölfing and Fuhrer, 1999[63]; Gifford and Sussman, 2012[19]; Mobley, Vagias and DeWard, 2009[20]). In fact studies have found that environmental attitudes can directly influence behaviour (Waqas, Rehman and Rafiq, 2021[21]; Luzar and Cosse, 1998[22]; Ajzen, 1996[23]; Wang, 2017[24]; Saari et al., 2021[25]; Nauges and Wheeler, 2017[26]). This subsection will use data from the European Social Survey (Box 2.1) to show that attitudes are good predictors of pro-environment behaviours and policy support.

36. The existing literature largely supports the Theory of Planned Behaviour (Ajzen, 1991[64]) which posits that intentions to perform behaviours can be predicted with high accuracy from attitudes toward the behaviour. However, studies are mixed on the degree to which environmental attitudes influence behaviour, with some arguing that pro-environmental behaviour is only associated with strong environmental attitudes when people believe that the environment should be protected, even if this goal is expensive (Casaló and Escario, 2018[13]). While others argue that although pro-environmental attitudes are linked to pro-environmental behaviour, they are more strongly linked when the (financial) opportunity cost to do so is low (Wyss, Knoch and Berger, 2022[65]; Diekmann and Preisendörfer, 2003[66]; Farjam, Nikolaychuk and Bravo, 2019[67]).

37. Nonetheless, specific studies have observed the link between environmental attitudes and consumption behaviours. Using multilevel data from 31 countries, Wang found that pro-environment attitudes tend to promote sustainable consumption behaviours (Wang, 2017[24]). Similarly, evidence from Europe shows that individuals' environmental knowledge and risk perception led to more sustainable consumption behaviour with regard to water usage, energy consumption, and purchase of sustainably grown food products (Saari et al., 2021[25]). Nauges and Wheeler also observed that climate change concerns positively impact household water and energy mitigation behaviour in 11 OECD countries (Nauges and Wheeler, 2017[26]). Country- and topic-specific research furthers the notion that pro-environmental attitudes can lead to environmentally-friendly consumption. In Wyoming, United States, households with favourable environmental attitudes were more conservative with their use of electricity (Sapci and Considine, 2014[27]). In Switzerland, consumers' pro-environmental attitudes and beliefs were strong predictors of green purchases (Tanner and Wölfing Kast, 2003[28]). In Australia, attitudes towards the environment explained preference variation in the choices of motor vehicles (Beck, Rose and Hensher, 2013[29]).

38. Pro-environmental attitudes are not only a predictor of pro-environmental behaviour but also of environmental policy support (Sharpe, Perlaviciute and Steg, 2021[30]). While conducting three studies (two online experiments and a field study) in the Netherlands in which they varied the order of measuring environmental behaviour and policy support, Sharpe, Perlaviciute and Steg found that climate friendly behaviour does not lead to policy support (or vice versa) but rather that both pro-environmental behaviour and policy support are rooted in adults' underlying environmental attitudes (Sharpe, Perlaviciute and Steg, 2021[30]). This suggests that people who have pro-environmental attitudes are likely to undertake actions to protect the environment in various ways, through multiple channels including behaviour and policy

support. Another way through which pro-environmental attitudes can be channelled is through voting. Looking at survey data from 38 countries between 1995 and 2006, Papp found that adults with greener attitudes voted for greener parties (Papp, 2022[31]).

Box 2.1. The European Social Survey

The European Social Survey (ESS) is an academically-driven multi-country survey which focuses on the European region and which has been administered in over 30 countries to date. The ESS has been implemented every two years since 2002 and ten survey rounds have been implemented so far monitoring public attitudes and values in Europe. The survey employs random probability sampling, a minimum target response rate of 70% and rigorous translation protocols. Interviews are conducted face-to-face and are designed to require around one hour for completion. The ESS is structured around a core module with questions on attitudes such as political and interpersonal trust, political participation, well-being, religion, and attitudes towards migration and minorities, as well as additional modules.

The European Social Survey has been administered every two years since 2002. In this work data from Round 8, which was implemented in 2016, was used because that round is the latest round containing information on individuals' attitudes, perceptions and beliefs on climate change. Round 8 contained an *ad hoc* module on Public Attitudes to Climate Change, Energy Security, and Energy Preferences. The target population in all ESS rounds includes all persons aged 15 and over resident within private households, regardless of their nationality, citizenship, language or legal status, in participating countries. From the participating countries of Round 8, the following countries are included in the analyses: Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

Respondents were asked several attitudinal questions related to environment and climate change. The analyses in this section focus on the following items:

1. ***Belief in changing climate.*** "You may have heard the idea that the world's climate is changing due to increases in temperature over the past 100 years. What is your personal opinion on this? Do you think the world's climate is changing?" Response options were: "Definitely changing"; "Probably changing"; or "Probably not changing"; "Definitely not changing". Responses to this question are positively correlated with responses to a question asking if respondents believe that climate change is due to human (rather than natural) processes. For example, the share of individuals in the sample who believe that climate change is due mainly or entirely to human activities is only 24% among those who responded "Probably not changing" to this climate belief question, but this share sharply increases to 34% and 55% for those who answered "Probably changing" and "Definitely changing", respectively. This indicates that individuals interpret the question: "You may have heard the idea that the world's climate is changing due to increases in temperature over the past 100 years. What is your personal opinion on this? Do you think the world's climate is changing?" in terms of human driven climate change. A dichotomous variable is created which takes 1 if the response is "Definitely changing" and 0 otherwise.
2. ***Climate worry.*** "How worried are you about climate change?" Response options were: "Not at all worried"; "Not very worried"; "Somewhat worried"; "Very worried"; or "Extremely worried". A dichotomous variable is created which takes 1 if the response is either "Very worried" or "Extremely worried" and 0 otherwise. Respondents could interpret this as worry about existing climate situation or as worry about future environmental conditions.

Respondents were also asked about pro-environmental behaviours and support for policies designed to reduce harmful effects on the environment:

3. ***Purchase of energy efficient equipment.*** "If you were to buy a large electrical appliance for your home, how likely is it that you would buy one of the most energy efficient ones?" Responses could range from 0=not at all likely to 10=extremely likely. A dichotomous variable is created which takes 1 if the response is between 6 and 10, and 0 if it is 5 or below.
4. ***Energy conservation.*** "There are some things that can be done to reduce energy use, such as switching off appliances that are not being used, walking for short journeys, or only using the heating or air conditioning when really needed. In your daily life, how often do you do things to reduce your energy use?" Response options were: "Never"; "Hardly ever"; "Sometimes"; "Often"; "Very often"; or "Always". A dichotomous is created which takes 1 if an individual engages in that behaviour often, very often or always, and 0 if never, hardly ever, or sometimes.
5. ***Taxation on fossil fuels.*** "To what extent are you in favour or against the following policies in [country] to reduce climate change? Increasing taxes on fossil fuels, such as oil, gas and coal." Response options were: "Strongly in favour"; "Somewhat in favour"; "Neither in favour nor against"; "Somewhat against"; or "Strongly against". A dichotomous variable is created which takes 1 if the response is either "Strongly in favour" or "Somewhat in favour" and 0 otherwise.
6. ***Subsidies.*** "To what extent are you in favour or against the following policies in [country] to reduce climate change? Using public money to subsidise renewable energy such as wind and solar power." Response options were: "Strongly in favour"; "Somewhat in favour"; "Neither in favour nor against"; "Somewhat against"; or "Strongly against". A dichotomous variable is created which takes 1 if the response is either "Strongly in favour" or "Somewhat in favour" and 0 otherwise.
7. ***Banning energy inefficient equipment.*** *"*To what extent are you in favour or against the following policies in [country] to reduce climate change? A law banning the sale of the least energy efficient household appliances." Response options were: "Strongly in favour"; "Somewhat in favour"; "Neither in favour nor against"; "Somewhat against"; or "Strongly against". A dichotomous variable is created which takes 1 if the response is either "Strongly in favour" or "Somewhat in favour" and 0 otherwise.

Source: European Social Survey (2020[68]), European Social Survey (Round 8) (dataset), https://doi.org/10.21338/ESS8E02_2

39. This subsection examines the associations between climate change beliefs and pro-environmental behaviour and policy support, based on large observational data from European Social Survey (Round 8) conducted in 2016, which include a module dedicated on the public attitudes towards climate change and energy. Box 2.1 provides general information on the survey, sample, and the question items used in the analyses. The sample used in the analyses in this subsection consists of individuals who are aged 15 years or older and there is no sample restriction imposed.

40. Figure 2.1 and Figure 2.2 indicate that climate change beliefs are significantly associated with climate-friendly behaviour and pro-environment policy supports. For example, in Figure 2.1 there is approximately a 10-point difference in percentage of individuals who choose an energy-efficient product when purchasing a large electrical appliance between those who believe that climate change is definitely happening and those who are unsure or do not believe so. Individuals who believe in climate change are also more likely to support pro-environmental policies, ranging from fossil-fuel taxation, renewable energy subsidies, and bans on energy-inefficient household goods. The figure also makes it clear that, in general, taxation is less favoured than subsidies and product-market interventions. One of the reasons that taxation is less favoured than subsidies and product-market interventions could be because the focus is on taxation of fossil fuels and such fossil fuel taxes are already high in most OECD countries. For example, in 2018 OECD and G20 countries priced 80% of carbon emissions from road transport at EUR 60 or more (OECD, 2021[69]). Furthermore, research from the OECD has found that although taxes on fossil fuels appear to be

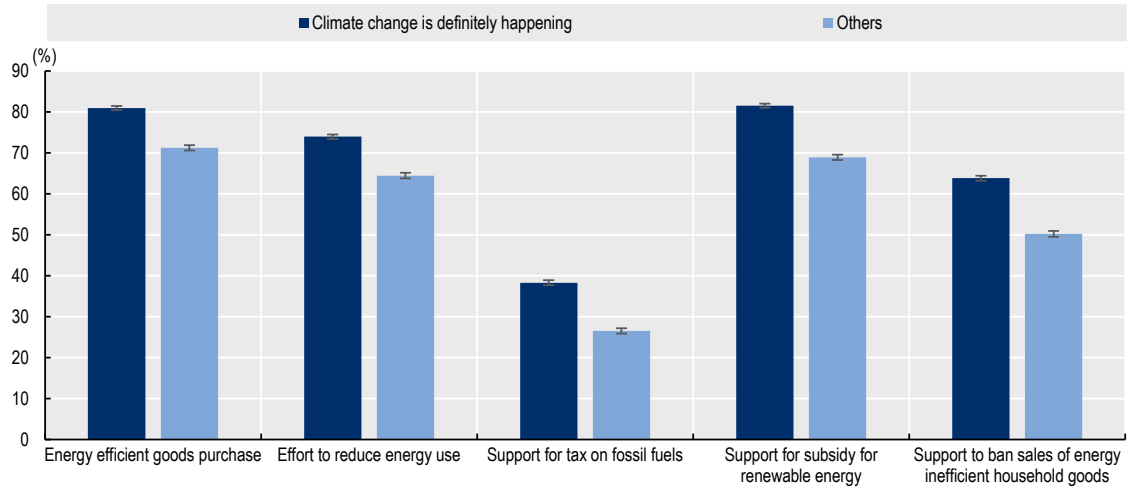
among the least popular policies what matters greatly is the use of the carbon tax revenue (Dechezleprêtre et al., 2022[37]). The study found that if carbon taxes were used to fund environmental infrastructure, subsidize low-carbon technologies, or reduce income taxes, they would receive more support than if they were simply distributed equally to everyone (Dechezleprêtre et al., 2022[37]). The higher willingness of populations to support incentives and subsidies for low carbon technologies over carbon taxes may have driven the adoption of the Inflation Reduction Act of 2022. The bill includes incentives, such as tax credits, to encourage people to upgrade their homes in energy-efficient ways (Gabbatiss, McSweeney and Viglione, 2022[70]) and purchase clean vehicles (Ermey, 2022[71]).

41. This association remains quantitatively meaningful and statistically significant when a different attitudinal measure is used. For example, Figure 2.3 shows that individuals who are more worried about climate change tend to act more pro-environmentally and express support for pro-environment policies. As visualized in Figure 2.4, climate worry and pro-environmental behaviour and policy support are almost linearly linked. In the case of fossil fuel tax, the percentage of individuals who support the policy is nearly double for those who are extremely worried about climate change than for those who are not at all worried about it.

42. These results are broadly consistent with previous work that found a positive association between environment attitudes and pro-environmental behaviour and political support, confirming the practical implications of the studies based on stated environmental attitudes.

Figure 2.1. Beliefs in changing climate and engagement in pro-environmental behaviours and support for policies protecting the environment

Percentage of population who engage in pro-environment behaviour and support environment-protecting policies

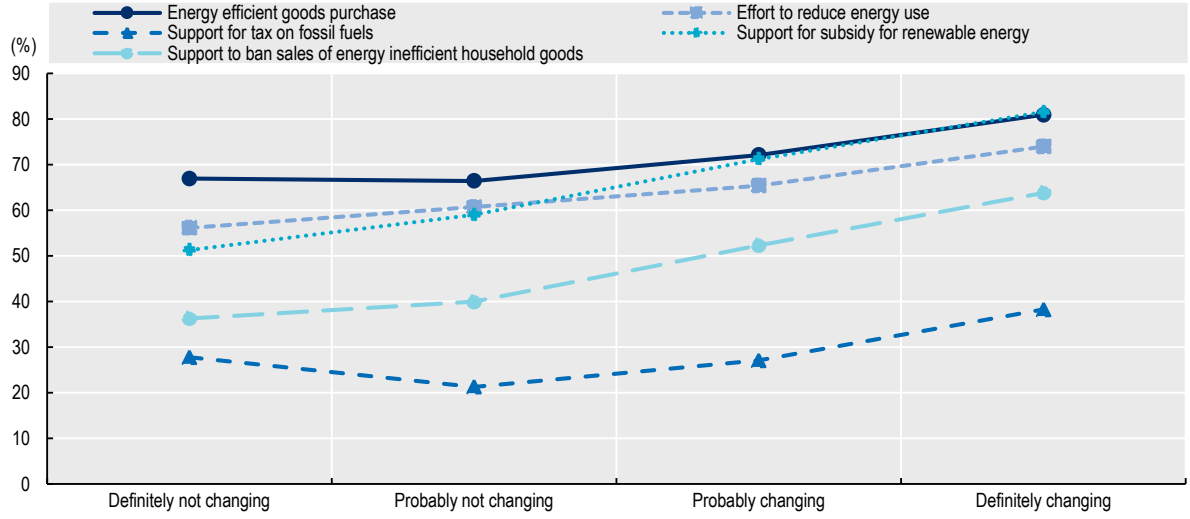


Note: Each bar represents the percentage of the population (aged 15 years or over) who engage in pro-environment behaviour and support environment-protecting policies. The figure compares those who believe that climate change is definitely happening and those who do not (i.e. either definitely not changing, probably not changing, or probably changing). Box 2.1 specifies how the dichotomous variables are constructed.

Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2

Figure 2.2. Gradients in the association between beliefs in changing climate and engagement in pro-environmental behaviours and support for policies protecting the environment

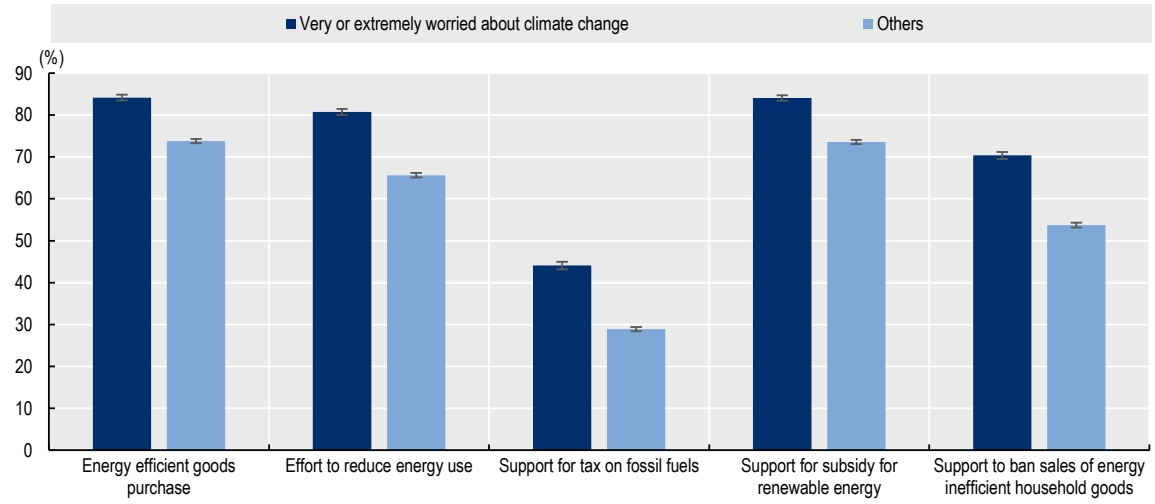
Percentage of population who engage in pro-environment behaviour and support environment-protecting policies



Note: The figure shows the percentage of population (aged 15 years or over) who engage in pro-environment behaviour and support environment-protecting policies, for each group of individuals with different degree of beliefs about climate change. Box 2.1 specifies how the dichotomous variables are constructed.
Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2

Figure 2.3. Perceptions of climate change threat and engagement in pro-environmental behaviours and support for policies protecting the environment

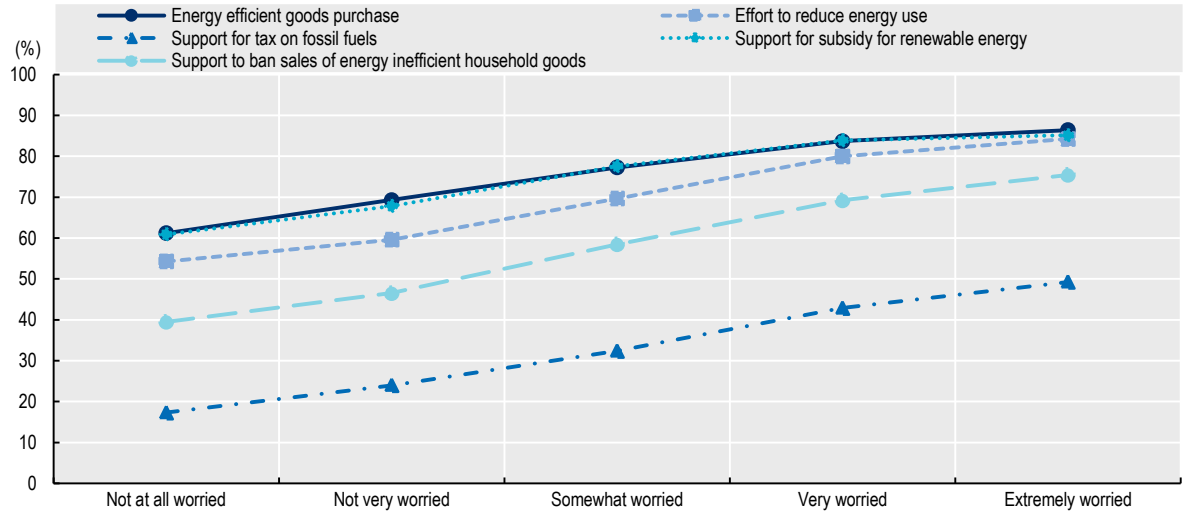
Percentage of population who engage in pro-environment behaviour and support environment-protecting policies



Note: Each bar represents the percentage of population (aged 15 years or over) who engage in pro-environment behaviour and support environment-protecting policies. The figure makes comparisons between those who are very or extremely worried about the climate change and those who are not (i.e. either not at all worried, not very worried, or only somewhat worried). Box 2.1 specifies how the dichotomous variables are constructed.
Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2

Figure 2.4. Gradients in the association between perceptions of climate change threat and engagement in pro-environmental behaviours and support for policies protecting the environment

Percentage of population who engage in pro-environment behaviour and support environment-protecting policies



Note: The figure shows the percentage of population (aged 15 years or over) who engage in pro-environment behaviour and support environment-protecting policies, for each group of individuals with different degree of worry about climate change. Box 2.1 specifies how the dichotomous variables are constructed.

Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2

3 Attitudes towards climate change and the labour market

43. Adults' attitudes towards the environment in general and climate change in particular can also directly and indirectly impact their labour market choices. For example, a study found that a company's proactive stance on the environment was positively related with how attractive the company seemed to individuals, with intentions to pursue employment at the firm as well as with acceptance of a job offer (Aiman-Smith and Bauer, 1996[32]).Thus, it appears that companies that are more environmentally friendly attract more recruits. Adults' environmental attitudes can also indirectly impact their labour market decisions through the degrees they choose to pursue. For example, Hodgkinson and Innes found that different university disciplines attracted students based on their attitudes towards the environment (Hodgkinson and Innes, 2001[72]). Students who cared more about the environment were more likely to enrol in courses related to the fields of biology, sociology or environmental studies (Hodgkinson and Innes, 2001[72]). Students who study in fields that are more environmentally-conscious may then be more likely to end up in greener jobs. At the same time, employment ethos, context and peer pressure could shape individuals' attitudes and dispositions. Being surrounded by individuals who express greater environmental concerns and care about environmental protection every day at work might change the environmental concerns or the pro-environmental dispositions of someone with less positive attitudes towards the environment. Similarly, individuals who work in an industry that pollutes or degrades the environment might perceive climate change to be less threatening over time as a way to cognitively justify their everyday work.

44. These mechanisms are likely to result in sectoral differences in attitudes towards climate change. This section explores empirically whether the sector in which one works is associated with attitudes towards climate change, environmentally-friendly behaviour, and support for climate change mitigating policies. The analysis also highlights sector differences in the costs of transitioning to a greener economy, which arise from resource and technological constraints and initial conditions. Furthermore, it elucidates why some countries express higher environmental awareness than others. Finally, this section also provides suggestive empirical evidence for why inter-industry coordination and cross-industry redistribution policies may be necessary in implementing effective climate change mitigation measures.

45. The International Monetary Fund (IMF) provides data on estimated CO_2 emissions per output across industries and countries (see Box 3.1 for details). The analyses below use the "CO_2 emissions multiplier", which measures the estimated direct and indirect emissions in metric tons released into the atmosphere per USD 1m of output. This measure provides information on sectors' approximate dependence on CO_2, not only in the final output but throughout the production process. The CO_2 emissions multiplier can, therefore, be used to identify the impact of pro-environmental policies and regulations, such as increases in fuel tax rate, by looking at the differences in sectors' CO_2 emissions before and after a policy is introduced.

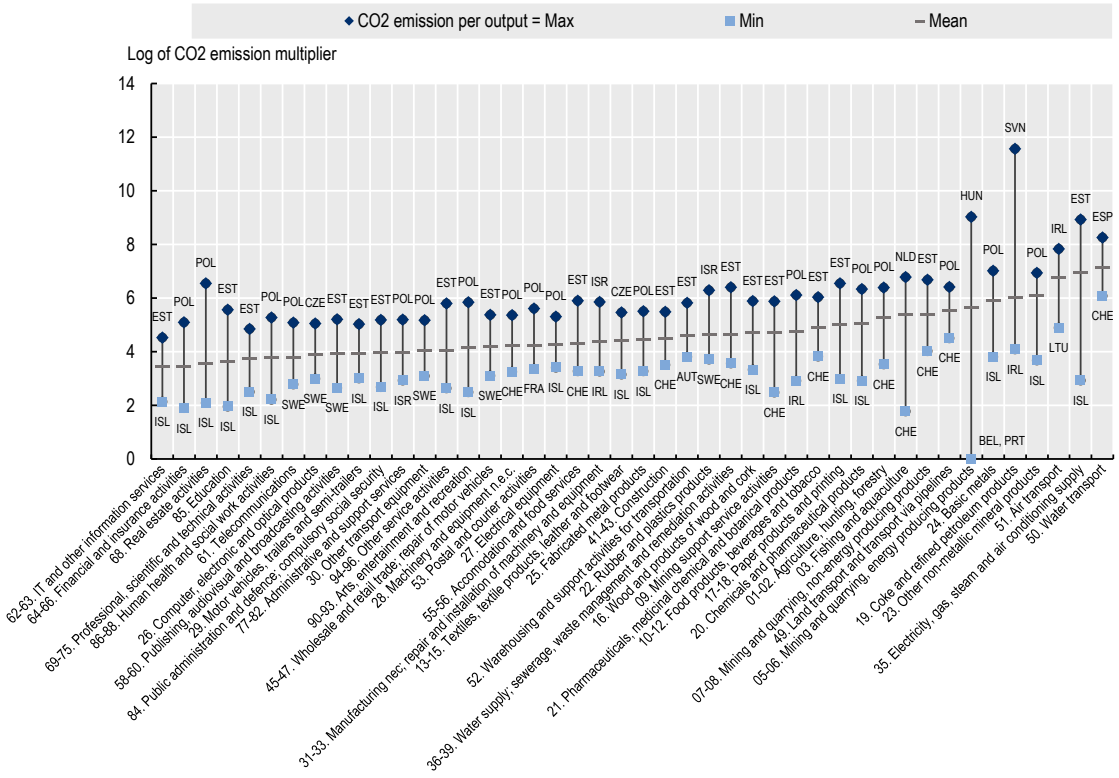
46. The International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4 identifies 44 overarching industries. The 44 industries identified by ISIC are combined with the CO_2 emissions multiplier to determine average levels of CO_2 emissions per output for each industry. Figure 3.1 shows average levels of CO_2 emissions per output in the country where emissions are lowest in that industry and in the country where emissions are highest in that industry. The table version is available in

Annex A Table A A.1, so is the CO_2 intensity (Table A A.2) for the comparisons with the CO_2 multiplier used in this paper. Results reveal large differences in the amount of CO_2 used in the output across industries but also across countries. Such cross-country differences may originate from fundamental geographical, physical or industrial factors and technological parameters affecting the degree of environmentally efficient production. For example, the water transport industry exhibits the highest mean log CO_2 emissions multiplier. Within this industry, the value is 8.3 in Spain, substantially larger than 6.1 in Switzerland. This difference indicates that CO_2 emissions multiplier in Spain is nearly 9 times as high as that in Switzerland.

47. Since many industries use energy as an intermediate input, countries that rely more on CO_2-intensive energy sources and less efficient energy supply technologies tend to have higher CO_2 emissions multipliers across sectors. This explains why Estonia, Poland, and the Czech Republic, which rank first, second, and third (out of 22 countries in the sample) in terms of CO_2 intensity in the "electricity, gas, steam, and air conditioning supply" industry, have the highest CO_2 multipliers in many industries. Thus, if the focus is on the CO_2 intensity rather than the multiplier, these countries do not necessarily have the highest CO_2 emissions per unit of output (see Table A A.1 and Table A A.2). Similarly, Iceland and Switzerland, which have the lowest CO_2 intensity in energy supply, appear to be the most environmentally friendly countries in certain areas.

48. It should be noted, however, that energy supply is only one part of the equation. When ranked by multipliers and intensity in each industry, the correlation between the two is relatively high at about 0.72. For example, while Israel and Sweden appear to have low CO_2 emissions in many sectors, these countries do not necessarily have an efficient energy sector. In fact, Israel ranks 4th in CO_2 intensity in the energy supply industry, while Sweden ranks 17th. Furthermore, the figure shows that large country-specific variations exist even in sectors such as "real estate activities" and "education," which are less energy-intensive industries.

Figure 3.1. CO_2 emissions per output by sector



Note: The figure summarises CO_2 emissions multipliers (direct and indirect emissions in metric tons released into the atmosphere per USD 1m of output) in log by sector. The figure also provides mean, maximum and minimum CO_2 emissions for the countries included in the analyses sample matched with European Social Survey (Round 8). Sectors are sorted in ascending order by the mean values. The log value is assigned 0 in cases where the emission per output is 0.

Source: Calculations based on International Monetary Fund (IMF) (2021[73]), *CO_2 Emissions, Emissions Intensities, and Emissions Multipliers* (dataset), https://climatedata.imf.org/pages/access-data

Box 3.1. CO_2 emission multiplier

The International Monetary Fund (IMF) produces CO_2 emission indicators on the IMF Climate Change Indicators Dashboard (International Monetary Fund (IMF), 2021[73]). Apart from total CO_2 emissions, they provide CO_2 emissions intensity and CO_2 emissions multiplier by country-industry combination, measuring the emissions associated with production and industry activities. The IMF mainly uses information on CO_2 emissions from fuel combustion from International Energy Agency (IEA) and national input-output tables from the OECD.

The emission intensity is the direct CO_2 emissions per USD 1m of output, computed as a ratio of total direct CO_2 emitted to the air and output of the industry. On the other hand, in addition to the direct emissions, the multiplier also considers indirect emissions associated with the production of inputs used. Indirect emissions were estimated by combining the industry-level CO_2 combustion data with the industry input-output table. Essentially, they apply the emission intensity to the standard Leontief Inverse Matrix to estimate the comprehensive effect of increasing output of one industry on the total CO_2 emitted from the ensemble of all industries. They consider only the domestic input-output structure, ignoring imported intermediary inputs. Industry classification is 45 industries used in the OECD

input-output tables, partially aggregated from the 2-digit codes of The International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4. The industry "Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use" is omitted from the analyses in this subsection.

While the multiplier measure remains an approximation based on a number of theoretical assumptions, the multiplier serves as a useful measure of how much each industry in each country relies on CO_2 emissions in producing goods and services. The multiplier is more comprehensive than the intensity; it captures more accurately potential impacts of pro-environmental policies such as fossil fuel tax. For example, some industries may not emit CO_2 in the final production process, but use intensively the inputs that were produced with much greenhouse gas in other industries. In this case, the multiplier is more informative than the intensity because it is able to capture the indirect effects from the other industries that were directly hit by the policies and regulations. For this reason, this subsection uses the CO_2 emissions multiplier. Note that since the multipliers are computed based on several assumptions and only are estimates, the results in this subsection must be interpreted with caution and the obtained estimates are subject to potential imprecision. The CO_2 emissions multiplier used in this subsection is the multiplier values averaged over 2016, 2017 and 2018. Finally, the terms "CO_2 emissions multiplier" and "CO_2 emissions per output" are used interchangeably in this subsection.

Alternative data sources exist, most notably, the Greenhouse Gas Emissions from Energy dataset (International Energy Agency, 2022[74]) however in this work it was decided to use the CO_2 emissions multiplier data because they consider cross-industry input-output structures.

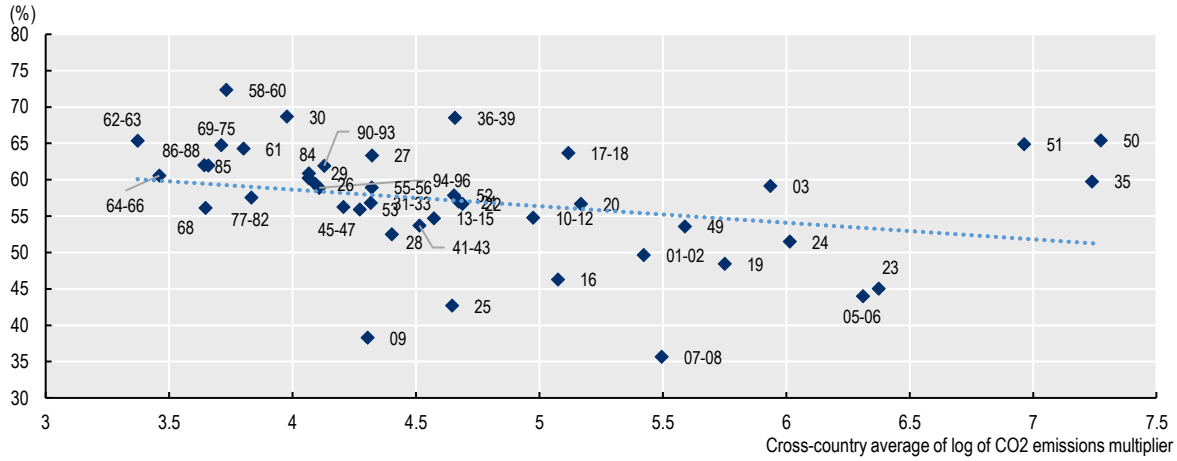
Source: International Monetary Fund (IMF) (2021[73]), CO_2 Emissions, Emissions Intensities, and Emissions Multipliers (dataset), https://climatedata.imf.org/pages/access-data

49. The large variation in CO_2 reliance in production processes across industries and countries suggests that efforts to move towards a green economy will have very heterogeneous consequences for individuals employed in different sectors and in different countries. CO_2-intensive industries can be expected to suffer heavily when public policy aimed at moving towards net zero is implemented. As a result, it is possible that individuals working in these sectors may have different attitudes toward climate change and express a different level of support for policies designed to limit climate change. To examine this, the following analyses use information on the sector in which respondents work, contained in the European Social Survey (NACE Rev. 2, 2-digit base). Sector information from the ESS is first aggregated into sector classifications at which the CO2 multipliers are available. Then the two datasets were matched based on the sector.

50. Figure 3.2 shows that the percentage of individuals who believe in climate change tends to be lower in sectors with higher average CO_2 emission multiplier. This relationship is statistically significant at 10% level even with small observations of 44 industries. On average, the share of individuals who believe that climate change is definitely happening decreases by 2.3 percentage point when the sector's mean CO_2 emission multiplier increases by 1%. This negative relationship is also found when individuals' concern for the environment is considered, as shown in Figure 3.3. On average, individuals in higher CO_2-emitting sectors are less likely to express worry about climate change, although the relationship is not very strong – when sector mean of the CO_2 emission multipliers increase by 1%, share of individuals who worry about climate change decreases by 1.3 percentage point and this effect is statistically significant at 10% level. This association may simply be driven by differences in the composition of the labour force across sectors. In particular, more environmentally friendly industries, such as high-skilled services, may attract more educated people, who tend to be more conscious of climate change. Later analyses show that working in CO2-intensive sectors is significantly associated with more negative attitudes towards climate change, even when controlling for observable characteristics such as educational attainment, which are most likely to drive selection effects.

Figure 3.2. Climate change beliefs across sectors with different CO_2 emissions per output

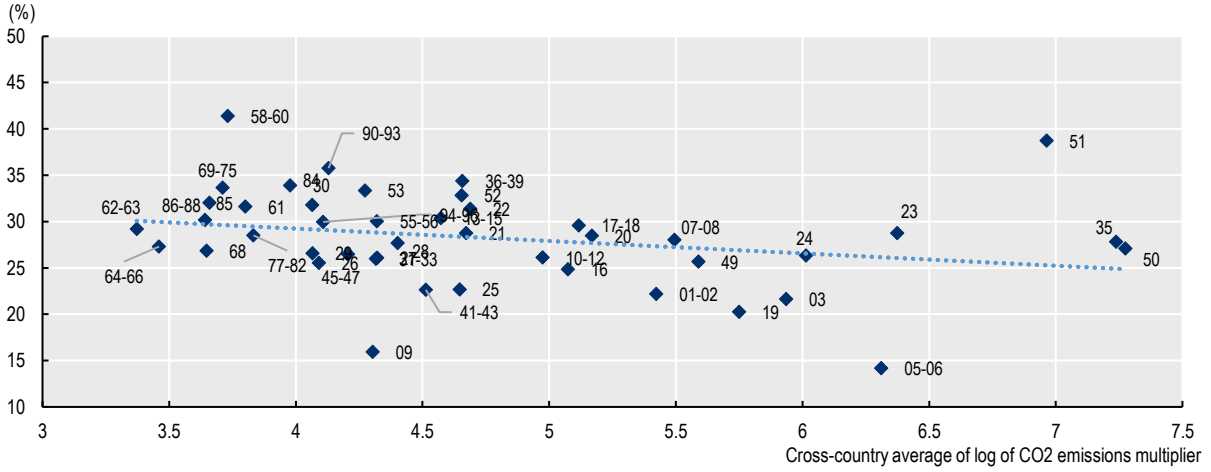
Percentage of population who believe that climate change is definitely happening



Note: The figure shows the relationship between the sector-level CO_2 emissions multipliers (in logs and taken averaged across countries) and the percentage of individuals who believe climate change is definitely happening. In a few cases where the emission multipliers are 0, log values are assigned 0 (i.e., the emission multipliers are set as 1). Each label represents the 2-digit industry codes based on ISIC Rev.4 (Table A A.1).
Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2 and on International Monetary Fund (IMF) (2021[73]), *CO_2 Emissions, Emissions Intensities, and Emissions Multipliers* (dataset), https://climatedata.imf.org/pages/access-data

Figure 3.3. Climate change concern across sectors with different CO_2 emissions per output

Percentage of population who are very or extremely worried about climate change



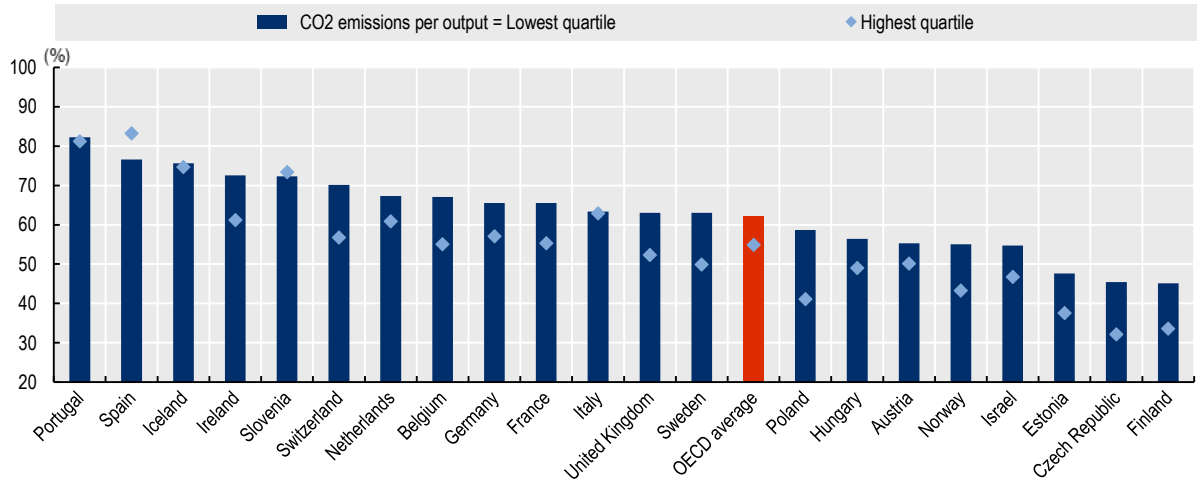
Note: The figure shows the relationship between the sector-level CO_2 emissions multipliers (in logs and taken averaged across countries) and the percentage of individuals who are very or extremely worried about climate change. In case where the emission multipliers are 0, log values are assigned 0 (i.e., the emission multipliers are set as 1). Each label represents the 2-digit industry codes based on ISIC Rev.4 (Table A A.1).
Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2 and on International Monetary Fund (IMF) (2021[73]), *CO_2 Emissions, Emissions Intensities, and Emissions Multipliers* (dataset), https://climatedata.imf.org/pages/access-data

51. Results presented in Figure 3.4 indicate that in many countries individuals working in industries that are among the 25% heaviest emitters of CO_2 are less likely to believe in climate change than

individuals working in industries that are among the 25% lowest emitters of CO_2. For example, in Ireland 60% of individuals working in high CO_2-emitting industries report believing that climate change is definitely happening, while 72% of individuals working in low CO_2-emitting industries report believing that climate change is definitely happening. Similarly in Switzerland, the Netherlands, Belgium, Germany, France, the United Kingdom, Sweden, Poland, Hungary, Austria, Norway, Israel, Estonia, the Czech Republic and Finland (ranked in descending order based on the percentage of the population that believe climate change is definitely happening) individuals working in high greenhouse gas (GHG)-emitting industries were less likely to report that they believe that climate change is definitely happening than individuals working in low CO_2-emitting industries. Note that this relationship does not necessarily indicate a causal effect of sectoral CO_2 emissions on attitudes towards climate change, but may reflect the different sorting of workers into different sectors.

Figure 3.4. Climate change belief and CO_2 emissions per output, by country

Percentage of population who believe that climate change is definitely happening

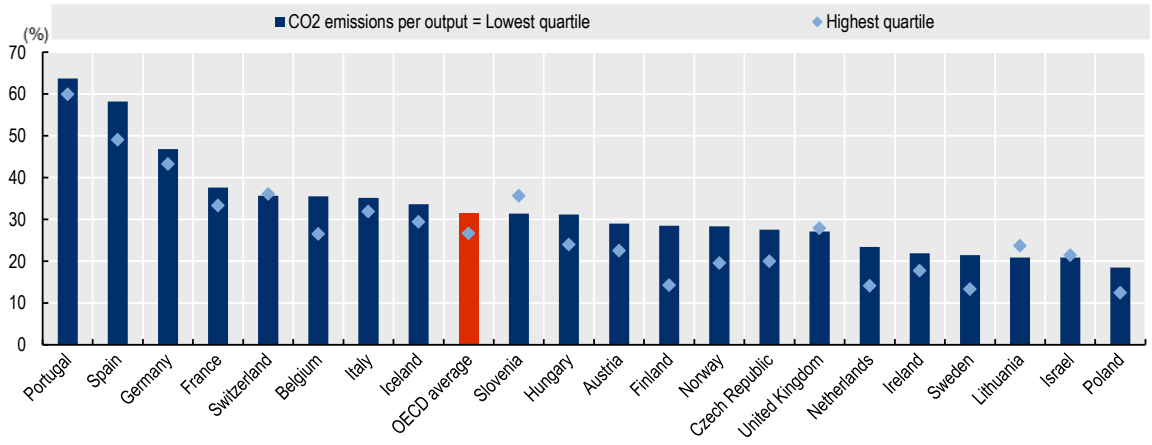


Note: Countries are sorted in descending order of the percentage of population aged 16 years or above who believe that climate change is definitely happening, and work in the sectors with lowest quartile of CO_2 emissions multiplier within each country. The figure also shows the same outcome for the individuals working in the sectors with highest quantile in terms of CO_2 emissions multiplier.
Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2

52. Figure 3.5 also shows that in the majority of countries, the percentage of individuals who are very or extremely worried about climate change is lower among individuals working in the most CO_2-intensive sectors than among individuals working in the least- CO_2-intensive sectors, with the exceptions of Switzerland, Slovenia, United Kingdom, Lithuania, and Israel (ranked in descending order based on the percentage of the population that is very or extremely worried about climate change). On average, 31% of individuals working in the least CO_2-emitting industries report being very or extremely worried about climate change, in contrast to 27% of individuals working in the most CO_2-emitting industries.

Figure 3.5. Climate change concern and CO2 emissions per output, by country

Percentage of population who are very or extremely worried about climate change



Note: Countries are sorted in descending order of the percentage of population aged 16 years or above who are very or extremely worried about climate change and work in the sectors with lowest quartile of CO_2 emissions multiplier within each country. The figure also shows the same outcome for the individuals working in the sectors with highest quantile in terms of CO_2 emissions multiplier.
Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2

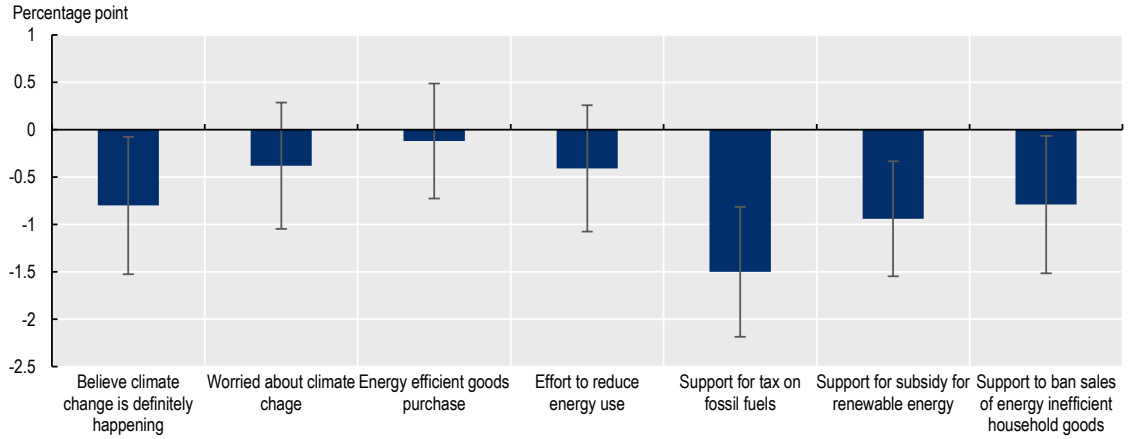
53. Figure 3.6 investigates more formally – using a regression framework that controls for country-specific effects as well as personal characteristics such as age, gender and educational attainment – the extent to which individuals working in more CO_2-intensive industries report less positive attitudes towards the environment, lower engagement in pro-environmental behaviours, and lower levels of support for climate-change mitigation policies (the full regression results available in Table A A.3 in Annex A). Results indicate that, other things being equal, individuals who work in a more CO_2-intensive sector tend to hold more negative attitudes towards climate change, although results are imprecisely estimated. The estimated effects are significant for belief in climate change and policy support. For example, working in sectors that emit 1% more CO_2 per output is associated with a lower probability of believing that climate change is definitely happening of 0.8 percentage point. Similarly, working in sectors that emit 1% more CO_2 per output is associated with a 1.5 percentage point lower probability of supporting a fossil fuel tax. Conversely, the estimated effects are smaller and statistically insignificant with respect to climate worry and engagement in pro-environmental behaviour. To put this into perspective, workers in the most emitting sectors among the top quartile in terms of the average CO_2 emission per output across countries are less likely to state that climate change is definitely happening approximately by 17 percentage points, relative to workers in the least emitting sectors among the lowest quartile. Examples of most-emitting industries include “Coal and refined petroleum products”, “Mining and quarrying, non-energy producing products” and “water transport”, while the least emitting industries include “IT and other information services”, “Human health and social work activities” and “Administrative and support services”.

54. The fact that there is an association between individuals’ support for environmentally-friendly policy and the CO_2 emission levels of the sectors they work in has implications for policy making. In particular, it implies that in order to obtain support for climate change policies, intentional efforts are needed to engage with, and address the concerns of, those working in CO_2-intensive industries. In addition, the fact that the industry one works in does not have a strong association with climate worry or personal behaviour may imply that reluctance to support pro-environmental policy relates to perceived potential negative impacts of the policies on individuals’ economic situation, including employment prospects and

wages. These results suggest that individuals working in the industries that will be most impacted by public efforts to transition towards a green growth model do not differ from the rest of the population with respect to personal worry about climate change. Therefore, they could be mobilised to support the green transition if such transition will be implemented in a way that will not penalise them economically.

Figure 3.6. The impact of working in CO_2-intensive industries on attitudes towards climate change and support for pro-environmental policies

Impact of 1% increase in sector CO_2 emissions multiplier on attitudes, behaviour and policy support



Note: The figure shows the regression coefficients on the log of CO_2 emissions multiplier in which individuals work on the various environmental attitudes. The regression is based on pooled sample of countries and the specification includes country fixed effects and control for personal characteristics (age, gender, and educational attainment).
Source: Calculations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2 and on the World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7).

4 Where and when individuals prioritise the environment over the economy

55. The transition to a sustainable economy and the implementation of climate change mitigation policies are likely to require a significant shift in the behaviour of individuals as consumers and producers (Martinez-Fernandez, Hinojosa and Miranda, 2010[1]). The rapid industrial shift towards net-zero carbon emissions and the set of policies that will need to be implemented to sustain human activities with minimal detrimental effects on the environment may have short to medium term negative consequences on the economy, even though they may be necessary for long term economic sustainability and growth (Dietz, Groom and Pizer, 2016[76]). There is, therefore, potentially a non-negligible trade-off between the state of the economy and the state of the environment.

56. This can be particularly problematic when the cost of transitioning to a net-zero economic model is not shared equally across industries and individuals, making it difficult to reach a political consensus. For example, fossil fuel and energy intensive industries that fear that their economic growth will be hampered by climate change regulation have put up significant opposition to green policies (Vesa, Gronow and Ylä-Anttila, 2020[77]) thereby preventing political consensus and policy implementation. These select economic interest groups have been able to influence policy agendas and effectively oppose climate change policies in different contexts. In Finland, for instance, a significant minority of organizations that believe economic and energy concerns are more important than climate mitigation have used economic arguments and inside lobbying to collaborate closely with like-minded ministers to influence policy (Vesa, Gronow and Ylä-Anttila, 2020[77]). Whereas, in the United States, the fossil fuel industry has led efforts to deny the impact of climate change (Dunlap and Brulle, 2015[78]; Boussalis and Coan, 2016[79]; Basseches et al., 2022[80]). Using a strategy of manufacturing uncertainty, the industry has been able to create a denial countermovement that increases in intensity whenever climate change policy making is placed on the agenda both domestically and internationally (Dunlap and Brulle, 2015[78]). More generally, the five largest oil companies spend USD 200 million a year lobbying to delay, control or block policies to tackle climate change (InfluenceMap, 2019[81]). While in Europe, specifically, industries that are among the worst perpetrators of climate change employ lobbying consultancies in order to influence European Union (EU) institutions (Michaels and Ainger, 2020[82]).

57. Overall, sectors that stand to be most impacted by climate change mitigation policies employ various methods and invest a significant amount of money to prevent political consensus and the implementation of green policies. Given the potential trade-off between the economy and the environment, studying the relationship between income and environmental attitudes is of particular interest. Existing research finds that individuals with higher relative incomes tend to display higher levels of environmental concern than people in the same country who earn less (Franzen and Meyer, 2009[8]). The relationship between income and attitudes towards climate change was observed during the Great Recession where labour market conditions and incomes deteriorated, and as a result belief in climate change decreased (Scruggs and Benegal, 2012[83]). The findings that higher incomes and pro-environmental attitudes are correlated supports the post-materialism hypothesis (Inglehart, 1995[84]), which posits that societies and

individuals can pursue post-materialistic goals such as environmental protection once they become more affluent and are less preoccupied with basic material needs. In the same vein, the findings support the argument that individuals have a 'finite pool of worries' (Evensen et al., 2021[85]) and so environmental concern diminishes as other worries rise.

58. Some scholars, however, have found that it is not only current economic worries that reduce pro-environmental attitudes. Lübke found that people who believe that their economic situation will be worse in the future are more inclined to reject climate change in comparison to those who are more optimistic about their future economic prospects (Lübke, 2021[15]). This indicates that individuals' pro-environmental attitudes are not only based on current income but also on their predictions of what will happen in the future. Those who are most likely to be exposed to labour market risks are also those who more commonly deny climate (Lübke, 2021[15]). In particular, people who live in countries or regions that are more dependent on fossil fuels for production, job security and consumption are more sceptical about climate change because they are inclined to defend their economic interests (Lübke, 2021[15]; Knight, 2018[86]; Tranter and Booth, 2015[87]). Similarly, economically insecure individuals have lower levels of political trust, which implies that they would be less willing to trust and accept green policies put forth by the government (Wroe, 2015[88]).

59. Therefore, it is important to consider how preferences are shaped by short to medium-term trade-offs between environmental protection and the state of the economy. An OECD study found that support for climate policies depends on the perceived effectiveness of the policies in reducing emissions, their perceived distributional impacts on lower-income households, and household's gains and losses (Dechezleprêtre et al., 2022[37]). Even when individuals recognise the importance of environmental protection, they may nonetheless prioritise economic comfort and security, and try to prevent household losses. This is especially relevant given deteriorating living standards among many (Egger et al., 2021[89]; OECD, 2019[90]), growing wealth and income inequality (OECD, 2011[91]), as well as the polarising effect of automation in labour markets and economic prospects in OECD countries (Arntz, Gregory and Zierahn, 2016[92]).

60. Surveys that ask about environmental protection in the context of this trade-off can shed light on how public support for environmental protection may translate in concrete support for environmental legislation and policy action. This section uses data from multiple editions of the World Value Survey (WVS) dating back to the 1980s to examine whether preference for environmental protection or the economy is shaped by the environmental and economic conditions individuals experience. Respondents were asked to report if they prioritised the environment over economic growth and job creation. Since the question was asked consistently over time, WVS data can also provide information on the historical evolution of individual views towards the trade-off between the state of the environment and the state of the economy (see Box 4.1). The first subsection sketches the evolution of environmental priorities and socio-demographic determinants. The following two sections examine how the contemporaneous economic and environment conditions affect people's perception on the environment-economy trade-off. Details on the sample used are described in Box 4.1.

Box 4.1. The World Values Survey

The World Value Survey (WVS) is a cross-national and longitudinal survey on beliefs and values. It has been conducted since 1981 and 7 waves have been published to date. The WVS series are academically grounded and designed to enable comparisons across countries and time on people's social, political, economic, religious and cultural values. It is nationally representative survey and typically has sample size of at least 1 000 per country. Of interest for this report, is a question on the survey which asks respondents whether their priority is the environment or the economy. The precise question is, "Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view?". The answers given are either: a) "Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs", or b) "Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent".

Using this data, a dichotomous variable indicating environmental priority was created. The variable takes the value of 1 if a respondent answered that priority must be given to the environment, and 0 if a respondent noted that economic growth and creating jobs should be the priority or if a respondent was unsure how the answer the question.

This paper uses the last 5 waves of the WVS starting from the mid-1990s (1995-1998, 1999-2004, 2005-2009, 2010-2014, 2017-2020). Unfortunately, the question regarding whether the environment or the economy should be given priority was not asked in every wave in all countries. Nonetheless, the survey still provides a detailed picture of how people's perception about the economy-environment trade-off has evolved over the past 25 years and how such perceptions are related to the economic and environmental conditions when the survey took place.

In total, there are 90 pairs of waves and countries for which information on individuals' stated environmental-economic trade-off are recorded. On average, for each country, information is available for three time periods. Observations for which no background information was collected (e.g. gender, age, income decile etc.) were removed and all analyses are weighted so that estimates reflect relations in the underlying target population.

Source: World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp

4.1. Differences in perceived priority between environment and economy

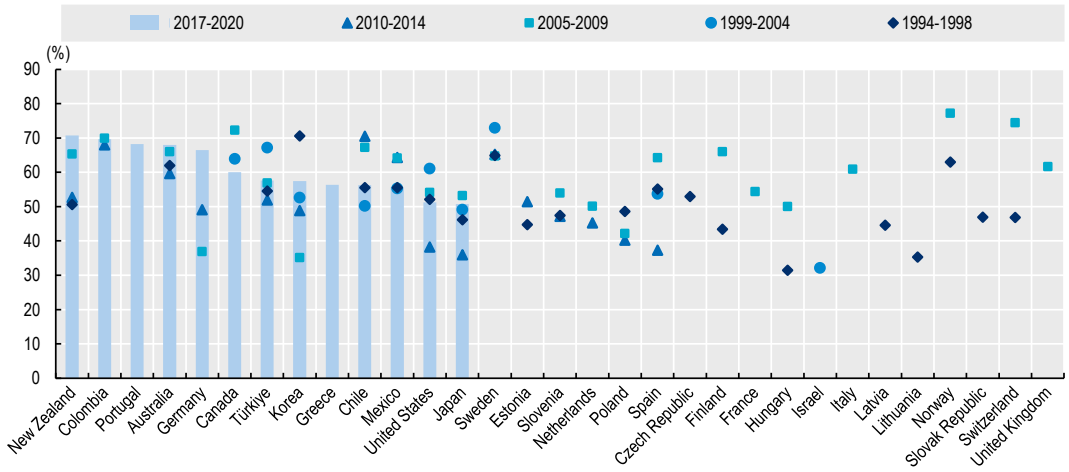
4.1.1. Where individuals prioritise the environment: mapping between country differences

61. For each survey wave, Figure 4.1 shows the percentage of respondents who reported that the environment should be a higher priority than economic growth and job creation. Results presented in Figure 4.1 do not reveal strong time trends – respondents participating in the most recent survey waves did not report a marked tendency to prioritise the environment over the economy or *vice versa*. This is despite increasing evidence about the severity of the climate crisis and increasing awareness of climate change among general populations (Poortinga et al., 2011[17]; Lorenzoni and Pidgeon, 2006[93]). The non-linearity in the evolution of individuals' perceived trade-offs between the environment and economic conditions hints to the fact that the complexity of the environment-economy trade-off has not eased. Moreover, the finding that the environment priority fluctuates substantially across survey waves within a

given country indicates the existence of temporary factors affecting people's perception about the priorities. In this sense, the slow down or the decline in the environmental priority in the latest two surveys may have emerged in the aftermath of the financial crisis. This question is asked in the next subsection which examines the relationship between the environment priority and the local unemployment rate.

Figure 4.1. Trends in stated prioritisation of the environment over the economy, by country

Percentage of 16 year-olds or above who reported that the environment has priority over economy



Note: The figure shows the percentage of individuals aged 16 years older who prioritise the environment over economic growth and job creation, by country and wave. The missing value indicates either the country did not participate in the survey or the question was not asked.
Countries are ranked in descending of the mean value for the latest available wave.
Source: Calculations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7).

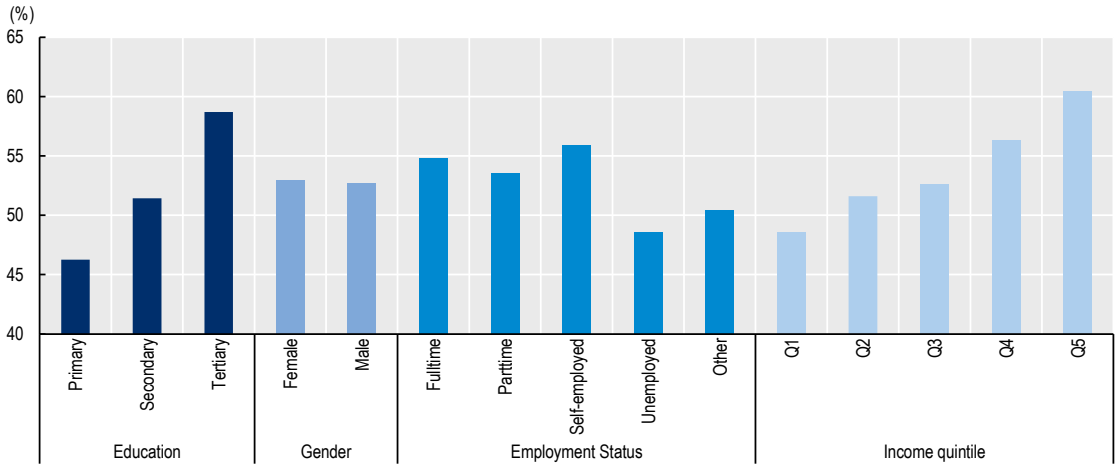
4.1.2. Differences across socio-economic groups

62. Figure 4.2 suggests that individuals who obtained higher educational qualifications and who have higher incomes are more likely to prioritise the environment over the economy. For example, less than half (46%) of those with only primary education prioritise the environment whereas 59% of tertiary graduates do. The difference is similar in magnitude to the difference observed between the first (lowest) and the fifth (highest) income quintiles.[3] There is, however, no marked gender differences – a somewhat surprising finding given the results reported in Figure 1.5, which indicate that a higher share of women than men perceive climate change and global warming as a threat. Finally, with respect to employment status, unemployed individuals and those with other statuses (e.g. out-of-labour-force) appear to be less likely than employed workers to prioritise the environment over the economy, possibly reflecting the vulnerability of these groups to macroeconomic conditions. Although this hypothesis is somewhat inconsistent with the relatively high values of prioritisation of the environment expressed by part-timers and self-employed workers, whose reports are comparable to those expressed by fulltime workers'.

[3] In each wave, income deciles are defined in each country/region.

Figure 4.2. Stated prioritisation of the environment over the economy, by socio-economic group

Percentage of 16 year-olds or above who reported that the environment has priority over economy



Note: Each bar represents the percentage of those aged 16 years older who prioritise the environment over economic growth and job creation, by socio-economic group.
Source: Calculations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7).

4.2. Role of economic conditions

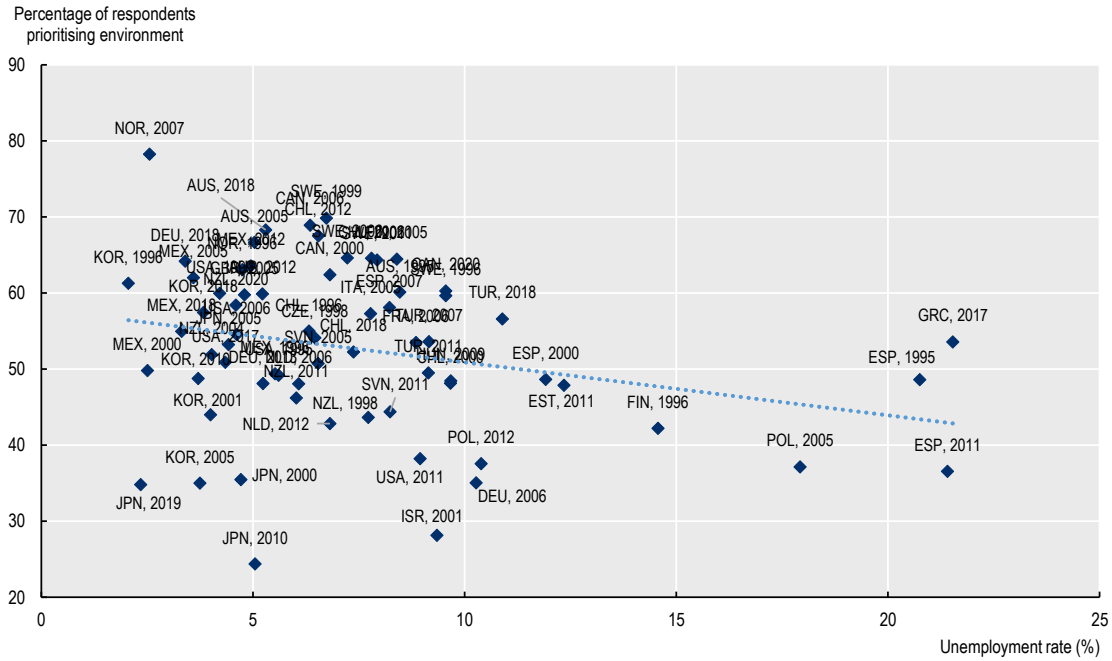
4.2.1. The effect of unemployment on prioritising the environment over the economy

63. Given the substantial volatility in individuals' willingness to prioritise the environment over the economy between time periods and across countries, this section considers the role of short-term economic conditions in shaping the extent to which individuals report being willing to prioritise the environment over the economy. When the economy is in the phase of downturn and unemployment increases, individuals' support for the environment decreases (Kenny, 2019[94]). During this time people may expect policy makers to focus on economic recovery rather than on the environment, since immediate economic costs may become more salient than future benefits arising from environmental protection.

64. In the analyses that follows, the unemployment rate is used as a measure of economic conditions. The unemployment rate derived from the OECD database is matched with the WVS based on the year and the country/region in which the WVS survey took place. In total, 67 matched pairs of year and country/region are identified in the final sample. The average unemployment rate in the estimation sample is 7.5% with the standard deviation of 4.2%, providing a sufficiently large variation across time and country to allow the identification of the impact of economic conditions on people's perception of the environment-economy trade-off. Figure 4.3 illustrates the association between the unemployment rate and the share of individuals who prioritise the environment over the economy. There is a clear negative relationship, indicating that when unemployment is higher, individuals are less likely to prioritise the environment over the economy.[4]

[4] The negative relationship is not driven by the outliers such as extremely high unemployment rates. In fact, removing the top 4 high unemployment cases rather makes the estimate negative slope steeper.

Figure 4.3. Unemployment rate and stated prioritisation of the environment over economy



Note: The figure shows the relationship between the unemployment rate in the year of the survey and the percentage of population aged 16 years or older who state prioritisation of the environment over economic growth and job creation.
Source: Calculations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7) and OECD (2022[95]), *Unemployment rate (indicator),* https://doi.org/10.1787/52570002-en.

65. The robustness of this association is formally tested and results are presented in Table 4.1. The regression is carried at the individual level in order to fully leverage the information about the characteristics of the respondents. The baseline specification used to estimate the effect of unemployment rate on individuals' support for the environment over the economy is presented in the equation below, which was fitted using a linear probability model:

$$Y_{ict} = \alpha + \beta \cdot Unemp_{ct} + \gamma X_{ict} + FE_c + FE_w + \epsilon_{ict}$$

66. Outcome Y_{ict} is a dummy variable for individual i in a country c in year t, which takes value 1 if an individual states the environment should be prioritised over economic growth and job creation and value 0 otherwise. On average 55% of respondents reported that the environment should be prioritised over economic growth and job creation. $Unemp_{ct}$ represents the unemployment rate, which varies only at the level of country and year. X_{ict} represents individual-level characteristics (i.e., gender, age, employment status, educational attainment and income quantiles). FE_c is the country (or region) fixed effect; FE_t is the year fixed effects, where in practice, wave fixed effects are used[5]. Finally, ϵ_{ict} is the error term. Under the assumption that the unemployment rate is exogenous, β provides the estimated impact of the local economic conditions on the probability that the environment is considered a higher priority than the economy. The expected sign for β is negative. Note that, due to the country fixed effects, all the observations from the eight countries for which the outcome variable is available only in one wave are systematically removed from the regression.

[5] The results remain unchanged by the use of year fixed effects, but the estimation lose more variation in unemployment.

67. The results are presented in Table 4.1. Results reported in the first row indicate the estimated difference in the likelihood that an individual will report prioritising the environment over the economy that results from a one percentage point difference in the unemployment rate. Column (1) provides the results from the baseline specification as described above. The estimated coefficient on unemployment is negative and statistically significant at 1%, confirming that when the economic situation is worse (i.e. higher unemployment), people are less likely to state that the environment is more important than the economy. To put this in perspective, the coefficient of -1.68 indicates that if unemployment rate increases by 1%, the probability that individuals will prioritise the environment falls by 1.6 percentage points. The relatively high responsiveness of individuals' willingness to prioritise the environment over the economy as a function of the contemporaneous unemployment rate suggests that public support for green-growth policies are likely to be very sensitive to the economic conditions individuals experience.

68. Columns (2)-(5) provide robustness checks and allow to assess the stability of the estimated results. Column (2) includes country-specific trends over waves. This is done to ensure that the relation does not capture spurious correlation in the time trend between the outcome and the unemployment rate. Column (3) keeps countries that participated in at least 3 of the 5 waves and that were asked the environment-economy priority question in order to ensure that the effect is identified from a relatively stable sample set. In both cases (Column 2 and 3), the estimated effects are negative and are similar in magnitude to those reported in the baseline specification. In column (4), the sample excludes very high unemployment rates – rates that exceed 15%. When doing so, the relationship becomes even stronger, indicating that the finding is not driven by outliers. Finally, column (5) removes the 2010-2014 wave that was strongly affected by the financial crisis in order to assess if the impact of local economic conditions on environmental priority is a general phenomenon or one that is specific to a situation when the economy was affected by a particularly unexpected negative shock. The estimated results are fairly similar to the baseline specification, indicating that the effect of the economic conditions is unlikely to be shock-specific.

Table 4.1. The impact of unemployment rate on the likelihood that individuals will report being willing to prioritise the environment over the economy

The coefficients on unemployment rate from the regressions

	(1) Baseline	(2) Country trend	(3) >=3 waves	(4) Omit high unemployment	(5) Omit crisis year
Unemployment rate	-1.68*** (0.091)	-1.53*** (0.12)	-1.84*** (0.099)	-2.80*** (0.14)	-1.79*** (0.13)
Individual controls	Yes	Yes	Yes	Yes	Yes
Fixed effects	Country, wave	Country, wave	Country, wave	Country, wave	Country, wave
Country trend	No	Yes	No	No	No
Observations	83431	83431	65767	79459	63124

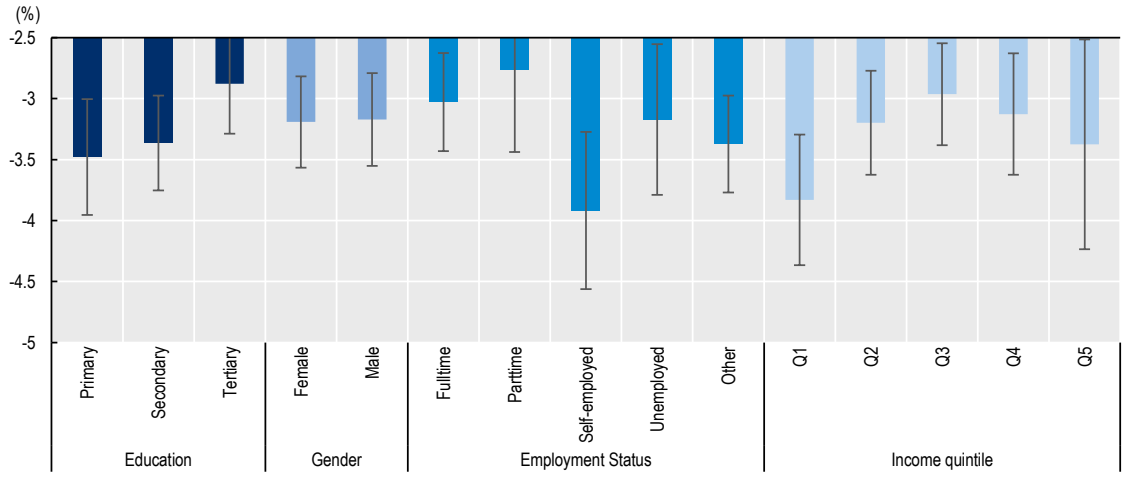
Note: The table summarises the estimated effects of unemployment rate on the probability to prioritise environment over economic growth and job creation. All regressions control for individual characteristics (age, gender, educational attainment, employment status, and income deciles) and include fixed effects in country and survey wave. Column (1) provides the baseline estimate from the whole sample. Column (2) includes country-specific trend over waves to deal with spurious correlation over time. Column (3) limits sample to countries that participate and asked the environment-economy priority question in at least 3 out of 5 waves. Column (4) removes country-year pairs with extremely high unemployment rates exceeding 15%. Lastly, column (5) removes the 2010-2014 wave to check if the effects are particularly driven by the financial crisis. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The full regression tables are available in Table A A.4.
Source: Calculations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7) and OECD (2022[95]), *Unemployment rate (indicator),* https://doi.org/10.1787/52570002-en.

4.2.2. Differences in sensibility to economic conditions, by demographic group

69. Individuals may differ in how sensitive they are to contemporaneous economic situations. In particular, the effect of unemployment on the probability that individuals will prioritise the environment over the economy could be higher among social groups that are more vulnerable to economic shocks and fluctuations. Conversely, those with higher education and stable fulltime jobs may be less sensitive to economic situations because they may be less likely to lose their job and be personally affected by negative economic conditions. To investigate this, the unemployment rate was interacted with individual socio-economic characteristics (i.e. education, gender, employment status, and income quantile) in the base specification to obtain group-specific estimated effects. Figure 4.4 illustrates group-specific effects alongside 95% confidence interval. Results indicate that the effects of unemployment are negative and statistically significantly different from the null hypothesis of no effects among all groups. The effect of unemployment over the likelihood that individuals will prioritise the environment over the economy is similar among men and women, and among individuals who completed different levels of education. Self-employed individuals appear to be more sensitive to the unemployment rate than other individuals. Finally, Figure 4.4 reveals an inverse U-shape: individuals in the lowest and highest income groups appear to be the most sensitive to the unemployment rate.

Figure 4.4. Heterogeneity of the effect of unemployment on environment prioritisation, by socio-demographic group

Impact of 1% increase in unemployment rate



Note: Each bar represents the impact of unemployment rate on environmental prioritisation by socio-demographic group (educational, attainment, gender, employment status, and income quantile). The coefficients were obtained by interacting unemployment rate with dummy variables associated with each socio-demographic group from separate regressions.
Source: Calculations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7).

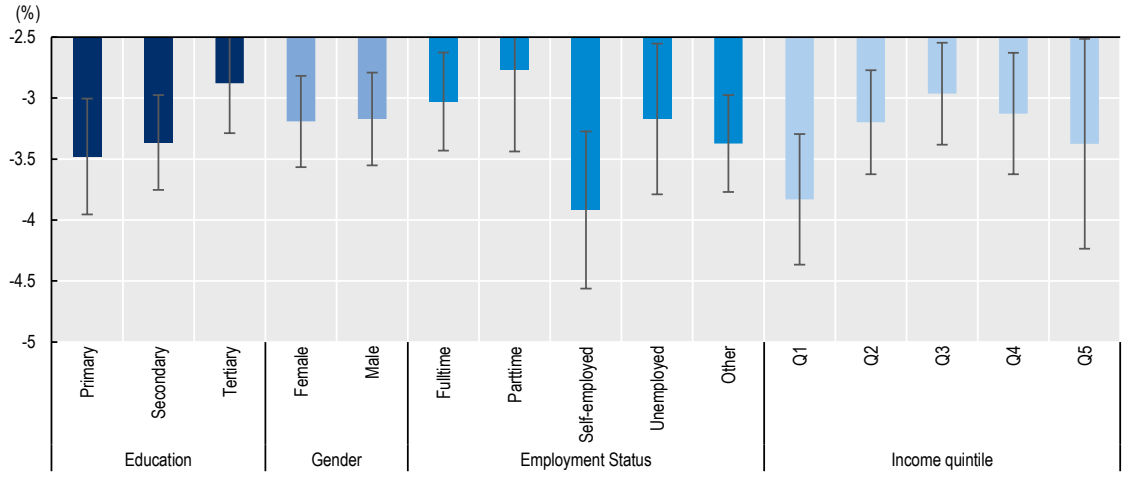
70. However, these estimates could be misleading as the underlying mean outcome values are different across groups. To facilitate comparison, Figure 4.5 provides the estimated effect of unemployment on the likelihood that individuals will prioritise the environment over the economy while taking into account differences in group means,[6] i.e. the estimated effect divided by the group mean.

[6] Mean values are calculated from the same pooled samples used in the regression.

Therefore, Figure 4.5 represents the effect of a 1% increase in unemployment relative to each group mean (e.g., -0.03 means that with a 1% increase in unemployment, the probability that individuals will prioritise the environment over the economy declines by 3% with respect to the group mean).

Figure 4.5. Heterogeneity of the effect of unemployment on environment prioritisation relative to group mean

Effect of 1% increase in unemployment, relative to group mean



Note: Each bar represents the impact of unemployment rate on environmental prioritisation by socio-demographic group, divided by mean of each group and multiplied by 100.
Source: Calculations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7).

71. The heterogeneous coefficients across groups provide more interpretable results. Adults with tertiary degrees appear to be less sensitive to economic conditions compared to individuals who completed, at most, primary and secondary school. There are no discernible gender differences. Self-employed and unemployed individuals exhibit a stronger negative effect, suggesting that economically vulnerable individuals are more sensitive to economic fluctuations when forming their beliefs about the importance of prioritising the environment over the economy. When income groups are considered, the inverted U-shaped relation remains pronounced with the lowest earning groups appearing to be the most sensitive to unemployment rate. The fact that the standard errors are much larger for the quintile five group indicates that the opinions and beliefs are more divisive or diverse among the top earners.

4.3. Role of environmental conditions

4.3.1. The effect of natural disasters on prioritising the environment over the economy

72. Just as temporary economic conditions can affect whether individuals prioritise the environment over the economy or *vice versa*, the occurrence of natural disasters can also affect how people perceive the environmental and economic trade-off. For example, if individuals experience a natural disaster that is potentially due to climate change or environmental degradation, their perception of the environmental and economic benefits associated with enacting climate change mitigation policies could increase thereby pushing them to prioritise the environment over short term economic benefits. In fact, some scholars have

shown that natural disasters raise the endorsement of pro-environmental attitudes. Papp found that when individuals experience bad environmental conditions, they are more willing to take environmental action irrespective of their attitudes towards environmental protection (Papp, 2022[31]). For example, individuals who have been negatively affected by air pollution are more likely to take environmentally-friendly action and believe that additional measures are needed by the government to tackle climate change (Whitmarsh, 2008[96]). Those who have experienced flooding also express more concern about climate change and are more willing to take climate mitigating action (Spence et al., 2011[97]). This is in part due to the fact that risk perceptions increase as a result of experiential factors, such as natural disasters (Spence et al., 2011[97]; Leiserowitz, 2006[98]; Akerlof et al., 2013[99]). When one personally experiences a natural disaster, the psychological distance of climate change decreases – that individual no longer perceives climate change to be something that will affect people and places far away and they will be more willing to support green policies. Risk perception and concern for climate change have been found to increase right after a recent natural disaster, however the increased risk perception caused by extreme weather appears to fade with time (Osberghaus and Fugger, 2022[100]; Konisky, Hughes and Kaylor, 2015[101]).

73. This subsection explores whether the occurrence of natural disasters influences individuals' priorities – whether it pushes them to believe that the environment should be given more priority than the economy. As with the previous regression, this question is asked using historical and cross-country data in order to test the generality of the effects.

74. Data from the WVS survey were combined with the natural disaster measures calculated based on the list of natural disasters recorded in the Emergency Events Database (EM-DAT) (Box 4.2). Only certain types of natural disasters that are related to climate change are considered: drought, extreme temperature, flood, landslide, storm, and wildfire. Other types of natural disasters, such as earthquake and volcanic activity, are not considered as the link with human economic activity is less clear. As a first step, all the natural disasters in EM-DAT that occurred within 12 months prior to the end of the WVS survey were identified for each country-wave pair.[7] Then, based on these disasters, multiple measures of natural disaster intensity were constructed. These measures are:

- Number of disasters
- Number of affected persons per 1 000
- Number of deaths per 1 000
- Number of injured people per 1 000.

75. The last three measures are population-standardised (i.e. per 1 000) to take into account the differences in population size, providing the likelihood of exposure to and damages from the natural disasters. When there are no recorded natural disasters in EM-DAT, all measures take the value 0. The regression is specified as a linear probability model:

$$Y_{ict} = \alpha + \beta \cdot Disaster_{ct} + \gamma X_{ict} + FE_c + FE_t + \epsilon_{ict}$$

76. $Disaster_{ct}$ is the natural disaster measures described above, which vary across countries and years. As with the previous regression, the countries that show up only once in the sample do not contribute to the identification of the effect as they are absorbed in the country fixed effects. The matched final sample constitutes a total of 79 country-year pairs.

[7] In case of missing information on when the survey fieldwork period ended, it is simply assumed that the survey ended in December.

Box 4.2. The Emergency Events Database (EM-DAT)

EM-DAT is a large database of natural disaster made available by The Centre for Research on the Epidemiology of Disasters (CRED) at the School of Public Health of the Université Catholique de Louvain (UCL) in Brussels. The database covers realised natural and technological disasters across the globe since 1900, which meet at least one of the following criteria: (1) 10 or more people dead; (2) 100 or more people affected; (3) the declaration of a state of emergency; (4) a call for international assistance. They are collected from multiple sources such as UN agencies and non-governmental organizations. In total, the database contains more than 21 000 disaster events. For each disaster event, EM-DAT provides detailed information on type of the disaster, country and location, date, duration, humanitarian impact (e.g. number of death, missing, homelessness, injuries, and affected individuals), as well as estimated financial damages. Although the coverage of disasters is not perfect due to the reporting quality of external sources and other factors, the database provides a useful and relatively comprehensive list of large natural disasters. The database is constantly checked and updated in order to ensure the quality and completeness of the data.

Source: EM-DAT (2022[102]), *The CRED/OFDA International Disaster Database* (database), www.emdat.be

77. The baseline results are summarised in Table 4.2. Each column uses different natural disaster multiplier measures under the same specification. In all of the four estimates (in the first row), the coefficients are positive. This suggests that an increased prevalence of higher natural disasters is associated with a higher share of individuals reporting that they prioritise the environment over the economy. However, the estimated effect of the number of natural disasters is not significant. This may be because the occurrence of natural disasters alone may not alter the perceived cost and damage of environmental destructions.

78. Results reported in columns (2)-(4) report estimates based on alternative measures that better reflect the higher risk of exposure and the extent to which natural disasters had significant humanitarian consequences. For example, results indicate that when the number of affected persons per 1 000 in year before the survey took place increased by 1 (that is, when the probability of being affected by natural disasters increased from 0.001 (=1/1000) to 0.002 (=2/1000)), the probability that respondents reported being willing to prioritise the environment over the economy increased by 0.15 percentage point. Since one standard deviation (s.d.) for the number of affected persons per 1000 is 3.6 in the sample, a 1-s.d. effect will be 0.83 percentage point. The results therefore suggest that individuals are more willing to prioritise the environment over the economy when they perceive a higher risk of being affected by climate-change-related natural disasters.

79. Table A A.6 and Table A A.7 in Annex A indicate that estimates are robust to the exclusion of outliers and to the use of alternative measures of natural disasters.

Table 4.2. Effect of natural disasters on the likelihood that individuals will prioritise the environment over the economy

Regression coefficients of natural disaster measures

	(1)	(2)	(3)	(4)
Number of disasters	0.0020 (0.0015)			
Number of affected persons per 1 000		0.0015** (0.00078)		
Number of death per 1 000			0.79** (0.39)	
Number of injured persons per 1 000				15.3*** (2.39)
Individual controls	Yes	Yes	Yes	Yes
Fixed effects	Country, year	Country, year	Country, year	Country, year
Observations	79 145	79 145	79 145	79 145

Note: The table summarises the estimated effects of natural disasters on the probability of prioritising the environment over economic growth and job creation. All regressions control for individual characteristics (age, gender, educational attainment, employment status, and income deciles) and include fixed effects in country and year in which the survey took place. Natural disaster measures were constructed based on all the disasters recorded in EM-DAT that occurred within 12 months before the survey month. Each column differs in the natural disaster measures used as indicated in the table. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. Full regression table is available in Table A A.5.
Source: Calculations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7) and EM-DAT (2022[102]), *The CRED/OFDA International Disaster Database* (database), www.emdat.be

4.3.2. Is the effect of natural disasters persistent or temporary?

80. The effect of experiencing a natural disaster and the subsequent change in the likelihood of being willing to prioritise the environment over the economy could be temporary. In other words, the impact of natural disaster shocks could be transitory, and have little long-term effects on environmental attitudes and beliefs. Yet, effects could be permanent or be long-term if individuals regularly experience natural disasters and thus their risk perceptions are permanently updated or if affected individuals experience scarring effects and long-term economic costs due to the disasters. To examine these questions, in this subsection regressions that include lagged disaster measures were estimated using disaster measures that consider exposure within 13-24 months prior to the end of the survey. Table 4.3 summarises estimated coefficients, both of short-term disaster exposure (within 12 months - corresponding to *t*) and long-term disaster-exposure (within 13-24 months – corresponding to *t-1*). Total number of disasters are not used in this analysis due to the high correlation (=0.89) between *t* and *t-1*, which makes the estimated coefficients uninformative.[8]

81. In all the disaster multiplier measures considered, the signs of the coefficients on the lagged variables are positive and significant, although the relative size of the effects between short-term and long-term exposure vary by measure.[9] The number of affected persons per 1 000 has a statistically

[8] The other disaster measures do not have particularly high correlations (with the maximum roughly 0.25). However, there might be a possible mean reversion process of disasters across time. Therefore, the results must be interpreted carefully.

[9] The result in column (2) must be interpreted carefully, as the number of death per 1 000 within 13-24 months is much smaller than that within 12 months in the data (0.002 vs 0.0008), this partly explains the sizable differences in the two coefficients.

significant effect on the likelihood that individuals will prioritise the environment over the economy even 13-24 months after the natural disaster occurred. In fact, the coefficient for the number of affected persons per 1 000 within 13-24 months is slightly larger than the coefficient for the number of affected persons per 1 000 within 12 months. Conversely, the lagged effect is substantially smaller in the case of number of injured persons 1 000.

82. These results highlight that experiencing natural disasters may have a relatively persistent effect on the likelihood that individuals will be willing to prioritise the environment over the economy.[10] The effect is however unlikely be permanent as it is inconsistent with the fact that despite a long-term increase in the occurrence of natural disasters, Figure 4.1 did not reveal a long-term increase in the likelihood that individuals reported being willing to prioritise the environment over the economy.

Table 4.3. Long-term effect of natural disasters on the likelihood that individuals will prioritise the environment over the economy

	(1)	(2)	(3)
Number of affected persons per 1000 (t)	0.0013* (0.00078)		
Number of affected persons per 1000 (t-1)	0.0018*** (0.00041)		
Number of death per 1000 (t)		0.63 (0.39)	
Number of death per 1000 (t-1)		8.71*** (1.67)	
Number of injured persons per 1000 (t)			16.2*** (2.39)
Number of injured persons per 1000 (t-1)			2.22*** (0.51)
Individual controls	Yes	Yes	Yes
Fixed effects	Country, year, month	Country, year, month	Country, year, month
Observations	79145	79145	79145

Note: The table shows the estimated effects of natural disasters that occurred within 12 months (t) and that occurred 13-24 months prior to the survey (t-1) on the probability to prioritise environment over economic growth and job creation. All regressions control for individual characteristics (age, gender, educational attainment, employment status, and income deciles) and include fixed effects in country and year in which the survey took place. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Source: Calculations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7) and EM-DAT (2022[102]), *The CRED/OFDA International Disaster Database* (database), www.emdat.be

[10] However the magnitude is difficult to evaluate due to the lack of consistency in the relative size of close vs. distant disasters across the measures.

Conclusions

83. Successfully implementing climate change mitigation policies both domestically and internationally requires an understanding of adults' attitudes towards climate change and the environment. Governments need to know how adults understand and perceive climate change in order to anticipate environmental behaviour and determine which policies (if any) citizens would be prepared to support and how ambitious such policies could be.

84. Results indicate significant variation in adults' attitudes across countries and individuals. The paper found that women are more likely to perceive climate change as a threat than men, although the gender differences were not statistically significant in many countries. Individuals with higher levels of education and more income report a higher understanding of climate change and are more likely to perceive climate change to be a threat than individuals with fewer educational qualifications. By contrast, no differences across age groups were identified. Different age groups have similar self-reported understandings of climate change as well as similar perceptions about the threat posed by climate change.

85. Findings also indicate that individuals facing different levels of economic vulnerability and working in different sectors express different attitudes towards climate change as well as different levels of support for policy action aimed at reducing environmental degradation. For example, individuals, who anticipate being negatively impacted by climate change mitigation policies, are more likely to report low understanding of climate change and low threat perceptions. In particular, results show a negative correlation between working in a big CO_2 emitting sector and supporting pro-environmental policies. Individuals working in industries that are among the heaviest emitters of greenhouse gases are less likely to believe in climate change and less likely to see climate change as a threat than individuals working in industries that are among the lowest emitters of greenhouse gases. The paper finds that working in a more CO_2-intensive sector and having lower climate change understanding and threat perception is also, subsequently, associated with being less supportive of environmental policies. In addition, the results show that at the macro-level over the past 40 years, individuals have not progressively adopted more pro-environmental attitudes. Instead, whether people prioritise the environment or the economy is significantly impacted by temporal factors such as unemployment. There is a clear negative relationship between unemployment rate and the share of individuals who prioritise the environment over the economy: when unemployment is higher individuals are less likely to prioritise the environment over the economy and *vice versa*. The relationship is negative across all socio-economic groups, which means that the impact of unemployment on the environment-economy debate is not limited to groups that are most likely to be directly affected by unemployment spells because of labour market vulnerability. However, different social groups have varying sensitivities to the trade-off. In general, people in more vulnerable positions are more sensitive to such temporary factors. For example, individuals who obtained fewer educational qualifications or have a lower income are more responsive to local economic conditions than those who are more educated and well off.

86. Natural disasters are another example of a temporary factor that influences beliefs. Pro-environmental beliefs increase and individuals are more willing to prioritise the environment over the economy when they experience climate-change-related natural disasters.

87. The results reported in this work suggest that, other things being equal, public support for climate change mitigation policies tends to increase following climate-change related natural disasters and to decrease during periods of high unemployment. It also informs where adults' thresholds for green regulation and ensuing labour market changes lie. For example, the findings indicate that environmental and economic conditions should be considered by policy makers when implementing climate policies to ensure widespread support. Policies also need to be inclusive and allow for the smooth transition across sectors. In particular, individuals who work in sectors that will be negatively impacted by green policies need to be supported through active labour market policies, upskilling and reskilling programmes and other social programmes. Such policies can help increase the breadth of public support for climate-change mitigation policies.

88. Finally, the fact that there is a negative correlation between unemployment and pro-environmental attitudes across all socio-economic groups but in particular those that are less educated and have lower incomes, indicates that political division over climate change is not purely a question of ideology or knowledge. Instead, political differences regarding climate change have a substantial economic dimension pertaining to the inequality in economic security and well-being. These findings further imply that it is important to implement economic and social policies to ensure that the green transition is a just transition if ambitious climate-change action is to be successfully implemented and supported in the long term.

89. Further research is needed to better understand attitudes towards climate change and their determinants discussed in this paper. First, this paper does not explicitly distinguish between self-reported understanding of climate change and knowledge based on actual testing. Second, more in-depth analysis and country-specific studies are needed to fully understand the causes of cross-country differences in attitudes towards climate change and climate change mitigation policies. Finally, the analysis of the impact of unemployment and natural disasters on environmental attitudes relies on a fairly conceptual questionnaire (whether the environment is a priority over economic growth and job creation). Additional research could build on this work and explore relations using more specific question items regarding attitudes towards climate change and support for policy interventions. For example, support for increased taxation of certain goods may decline, whereas support for redistributive climate change mitigation policies might increase during economic recessions and periods of high unemployment. Such analyses could also be extended to capture variations in attitudes and economic and environmental conditions at the subnational levels.

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Annex A. Supplementary tables

This annex provides supplementary tables for the main text.

Table A A.1 summarises the CO2 multiplier by industry as introduced in Figure 3.1. For each industry, it provides mean, standard deviation, maximum and minimum value of the multiplier in levels across countries. Table A A.2 shows the CO_2 intensity by industry. Table A A.3 shows the full regression table for Figure 3.6. Table A A.4 shows the full regression table on the effect of unemployment rate on the environmental attitudes discussed in Table 4.1. Similarly, Table A A.5 provides the full regression table on the effect of natural disasters on the environmental attitudes (see Table 4.2).

Table A A.6 provides robustness checks of the effects of natural disasters on environmental attitudes to confirm the results in Table 4.2 are not driven by outliers. Here considers the number of affected persons per 1000. Column (1) cites the result from the main regression in Table 4.2. Column (2) removes country-year pairs with top 5% natural disaster – the coefficient remains similar. Column (3) removes country-year pairs for which there was no disasters. The estimate is larger, indicating that the impact of the disaster is strong in intensive margin. Column (4) removes both, providing a similar estimate as the baseline. Table A A.7 also performs robustness checks by using alternative disaster measures that are not standardised by population. It also adds another measure to the disaster exposure, total duration of days in which there were disasters. Again, the signs are consistent with the main results from Table 4.2.

Table A A.1. CO_2 multiplier by industry

ISIC Rev.4	Industry	Mean (s.d.)	Max	Min
01-02	Agriculture, hunting, forestry	223 (128)	597 (POL)	34 (CHE)
03	Fishing and aquaculture	301 (200)	879 (NLD)	6 (CHE)
05-06	Mining and quarrying, energy producing products	1354 (2536)	8387 (HUN)	0 (BEL, PRT)
07-08	Mining and quarrying, non-energy producing products	265 (170)	801 (EST)	56 (CHE)
09	Mining support service activities	152 (109)	358 (EST)	12 (CHE)
10-12	Food products, beverages and tobacco	154 (92)	417 (EST)	46 (CHE)
13-15	Textiles, textile products, leather and footwear	98 (56)	237 (CZE)	23 (ISL)
16	Wood and products of wood and cork	135 (89)	361 (EST)	28 (ISL)
17-18	Paper products and printing	195 (147)	700 (EST)	20 (ISL)
19	Coke and refined petroleum products	5190 (22502)	105932 (SVN)	60 (IRL)
20	Chemicals and pharmaceutical products	213 (146)	563 (POL)	19 (ISL)
21	Pharmaceuticals, medicinal chemical and botanical products	157 (116)	451 (POL)	19 (IRL)
22	Rubber and plastics products	129 (112)	542 (ISR)	41 (SWE)
23	Other non-metallic mineral products	522 (250)	1028 (POL)	39 (ISL)
24	Basic metals	479 (295)	1120 (POL)	45 (ISL)
25	Fabricated metal products	98 (55)	247 (POL)	26 (ISL)
26	Computer, electronic and optical products	57 (33)	156 (CZE)	20 (SWE)
27	Electrical equipment	78 (39)	202 (POL)	30 (ISL)
28	Machinery and equipment n.e.c.	81 (50)	213 (POL)	26 (CHE)
29	Motor vehicles, trailers and semi-trailers	60 (35)	152 (EST)	20 (ISL)
30	Other transport equipment	67 (40)	177 (POL)	22 (SWE)
31-33	Manufacturing nec; repair and installation of machinery and equipment	97 (75)	350 (ISR)	26 (IRL)
35	Electricity, gas, steam and air conditioning supply	1913 (1843)	7586 (EST)	19 (ISL)
36-39	Water supply; sewerage, waste management and remediation activities	135 (125)	604 (EST)	36 (CHE)
41-43	Construction	100 (56)	243 (EST)	34 (CHE)
45-47	Wholesale and retail trade; repair of motor vehicles	78 (49)	217 (EST)	22 (SWE)
49	Land transport and transport via pipelines	287 (142)	614 (POL)	91 (CHE)
50	Water transport	1437 (788)	3874 (ESP)	438 (CHE)
51	Air transport	991 (485)	2514 (IRL)	133 (LTU)
52	Warehousing and support activities for transportation	117 (82)	340 (EST)	45 (AUT)
53	Postal and courier activities	84 (58)	275 (POL)	29 (FRA)
55-56	Accomodation and food services	97 (82)	367 (EST)	26 (CHE)
58-60	Publishing, audiovisual and broadcasting activities	61 (40)	182 (EST)	14 (SWE)
61	Telecommunications	54 (38)	161 (POL)	16 (SWE)
62-63	IT and other information services	37 (22)	92 (EST)	8 (ISL)
64-66	Financial and insurance activities	41 (34)	164 (POL)	7 (ISL)
68	Real estate activities	75 (148)	699 (POL)	8 (ISL)
69-75	Professional, scientific and technical activities	50 (33)	128 (EST)	12 (ISL)
77-82	Administrative and support services	64 (42)	181 (POL)	19 (ISR)
84	Public administration and defense; compulsory social security	63 (41)	179 (EST)	15 (ISL)
85	Education	55 (61)	262 (EST)	7 (ISL)
86-88	Human health and social work activities	58 (49)	196 (POL)	9 (ISL)
90-93	Arts, entertainment and recreation	90 (88)	344 (POL)	12 (ISL)
94-96	Other service activities	78 (69)	331 (EST)	14 (ISL)

Note: The table summarises CO_2 emissions multipliers (direct and indirect emissions in metric tons released into the atmosphere per USD 1m of output) by sector, providing mean, standard deviation, maximum and minimum of the countries included in the analyses sample matched with European Social Survey (Round 8).
Source: Calculations based on International Monetary Fund (IMF) (2021[73]), *CO_2 Emissions, Emissions Intensities, and Emissions Multipliers* (dataset), https://climatedata.imf.org/pages/access-data.

Table A A.2. CO_2 intensity by industry

ISIC Rev.4	Industry	Mean (s.d.)	Max	Min
01-02	Agriculture, hunting, forestry	126 (71)	341 (POL)	10 (CHE)
03	Fishing and aquaculture	222 (205)	816 (NLD)	0 (CHE, SVN)
05-06	Mining and quarrying, energy producing products	1272 (2541)	8318 (HUN)	0 (BEL, IRL, ISL, PRT)
07-08	Mining and quarrying, non-energy producing products	129 (83)	307 (AUT)	25 (CHE)
09	Mining support service activities	85 (79)	283 (AUT)	0 (CHE, ISL, SVN)
10-12	Food products, beverages and tobacco	37 (21)	82 (CZE)	4 (ISL)
13-15	Textiles, textile products, leather and footwear	33 (25)	115 (IRL)	0 (ISL)
16	Wood and products of wood and cork	25 (17)	79 (ESP)	0 (ISL)
17-18	Paper products and printing	76 (49)	194 (SVN)	0 (ISL)
19	Coke and refined petroleum products	5084 (22506)	105848 (SVN)	49 (IRL)
20	Chemicals and pharmaceutical products	108 (92)	296 (POL)	0 (ISL)
21	Pharmaceuticals, medicinal chemical and botanical products	101 (92)	319 (NOR)	0 (ISL)
22	Rubber and plastics products	44 (87)	414 (ISR)	5 (ITA)
23	Other non-metallic mineral products	370 (172)	646 (PRT)	8 (ISL)
24	Basic metals	311 (248)	792 (IRL)	3 (ISL)
25	Fabricated metal products	15 (9)	40 (IRL)	3 (FIN)
26	Computer, electronic and optical products	13 (15)	75 (IRL)	0 (ISL)
27	Electrical equipment	14 (8)	33 (IRL)	0 (ISL)
28	Machinery and equipment n.e.c.	16 (18)	89 (IRL)	3 (FIN)
29	Motor vehicles, trailers and semi-trailers	7 (4)	15 (GBR)	0 (ISL)
30	Other transport equipment	8 (6)	21 (IRL)	0 (ISL)
31-33	Manufacturing nec; repair and installation of machinery and equipment	36 (62)	305 (ISR)	9 (NOR)
35	Electricity, gas, steam and air conditioning supply	1632 (1683)	6666 (EST)	7 (ISL)
36-39	Water supply; sewerage, waste management and remediation activities	30 (14)	57 (POL)	12 (IRL)
41-43	Construction	26 (15)	65 (HUN)	7 (ISR)
45-47	Wholesale and retail trade; repair of motor vehicles	23 (14)	59 (CZE)	6 (FIN)
49	Land transport and transport via pipelines	213 (109)	422 (PRT)	50 (CHE)
50	Water transport	1338 (793)	3776 (ESP)	312 (CHE)
51	Air transport	905 (494)	2471 (IRL)	73 (LTU)
52	Warehousing and support activities for transportation	31 (18)	71 (HUN)	8 (ISR)
53	Postal and courier activities	29 (15)	68 (POL)	12 (ITA)
55-56	Accommodation and food services	11 (7)	25 (POL)	2 (ISL)
58-60	Publishing, audiovisual and broadcasting activities	12 (10)	48 (LTU)	3 (SWE)
61	Telecommunications	11 (6)	26 (HUN)	4 (ISR)
62-63	IT and other information services	10 (6)	26 (HUN)	1 (ISL)
64-66	Financial and insurance activities	12 (11)	54 (POL)	1 (ISL)
68	Real estate activities	11 (7)	27 (HUN)	1 (ISL)
69-75	Professional, scientific and technical activities	12 (7)	32 (HUN)	3 (ISL)
77-82	Administrative and support services	20 (13)	48 (CZE)	6 (SWE)
84	Public administration and defense; compulsory social security	16 (8)	31 (POL)	4 (ISL)
85	Education	12 (6)	25 (HUN)	0 (ISL)
86-88	Human health and social work activities	12 (7)	28 (HUN)	1 (ISL)
90-93	Arts, entertainment and recreation	16 (7)	30 (HUN)	0 (ISL)
94-96	Other service activities	12 (7)	30 (HUN)	4 (ISL)

Note: The table summarises CO_2 emissions multipliers (direct and indirect emissions in metric tons released into the atmosphere per USD 1m of output) by sector, providing mean, standard deviation, maximum and minimum of the countries included in the analyses sample matched with European Social Survey (Round 8).
Source: Calculations based on International Monetary Fund (IMF) (2021[73]), *CO_2 Emissions, Emissions Intensities, and Emissions Multipliers* (dataset), https://climatedata.imf.org/pages/access-data.

Table A A.3. The impact of working in CO_2-intensive industries on environmental attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Believe climate change is definitely happening	Worried about climate change	Energy efficient goods purchase	Effort to reduce energy use	Support for tax on fossil fuels	Support for subsidy for renewable energy	Support to ban sales of energy inefficient household goods
ln(multiplier)	-0.0080**	-0.0038	-0.0012	-0.0041	-0.015***	-0.0094***	-0.0079**
	(0.0037)	(0.0034)	(0.0031)	(0.0034)	(0.0035)	(0.0031)	(0.0037)
Female	0.028***	0.035***	0.025***	0.040***	-0.011**	0.0083*	0.031***
	(0.0051)	(0.0047)	(0.0043)	(0.0047)	(0.0049)	(0.0044)	(0.0052)
Age	-0.0017***	-0.00075***	0.0028***	0.0030***	-0.0011***	-0.00069***	0.0012***
	(0.00015)	(0.00014)	(0.00012)	(0.00014)	(0.00014)	(0.00013)	(0.00015)
Education: Less than lower secondary==0							
Lower secondary	0.020*	0.034***	0.061***	0.044***	0.019*	0.071***	0.055***
	(0.011)	(0.011)	(0.0096)	(0.010)	(0.011)	(0.0098)	(0.012)
Lower tier upper secondary	0.019	0.030***	0.12***	0.082***	0.0050	0.074***	0.082***
	(0.012)	(0.011)	(0.0098)	(0.011)	(0.011)	(0.010)	(0.012)
Upper tier upper secondary	0.051***	0.056***	0.12***	0.099***	0.071***	0.11***	0.091***
	(0.011)	(0.011)	(0.0096)	(0.010)	(0.011)	(0.0098)	(0.012)
Advanced vocational sub-degree	0.053***	0.049***	0.17***	0.12***	0.065***	0.12***	0.12***
	(0.012)	(0.011)	(0.010)	(0.011)	(0.011)	(0.010)	(0.012)
Lower tertiary education BA level	0.093***	0.092***	0.17***	0.12***	0.16***	0.14***	0.16***
	(0.013)	(0.012)	(0.011)	(0.012)	(0.012)	(0.011)	(0.013)
Higher tertiary education >= MA level	0.12***	0.12***	0.19***	0.14***	0.21***	0.14***	0.17***
	(0.012)	(0.011)	(0.010)	(0.011)	(0.012)	(0.010)	(0.012)
Constant	0.63***	0.27***	0.53***	0.48***	0.39***	0.74***	0.45***
	(0.022)	(0.020)	(0.018)	(0.020)	(0.021)	(0.018)	(0.022)
Country fixed effects	Country, wave	Country, wave	Country, wave	Country, wave	Country, wave	Country, wave	Country, wave
Observations	36542	36189	36612	36948	36028	36416	36227

Note: The table shows the estimated effects of (log of) CO_2 emissions multiplier of the sector in which individuals work on the various environmental attitudes. All regressions control for individual characteristics (age, gender, and educational attainment) and include country fixed effects. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Source: Estimations based on European Social Survey (2020[68]), *European Social Survey (Round 8)* (dataset), https://doi.org/10.21338/ESS8E02_2.

Table A A.4. The impact of unemployment rate on environmental attitudes

The full regression results

	(1) Baseline	(2) Country trend	(3) >=3 waves	(4) Omit high unemployment	(5) Omit crisis year
Unemployment rate	-1.68***	-1.53***	-1.84***	-2.80***	-1.79***
	(0.091)	(0.12)	(0.099)	(0.14)	(0.13)
Female	0.0078**	0.0078**	0.0088**	0.0088**	0.0037
	(0.0037)	(0.0037)	(0.0043)	(0.0038)	(0.0043)
Age (times 10)	-0.004**	-0.004***	-0.005***	-0.003*	-0.005***
	0.001	0.001	0.002	0.002	0.002
Employment: Full time==0					
Part time	0.0021	0.0026	0.0092	0.0011	0.0029
	(0.0063)	(0.0063)	(0.0070)	(0.0064)	(0.0073)
Self employed	0.026***	0.028***	0.028***	0.028***	0.028***
	(0.0068)	(0.0068)	(0.0074)	(0.0069)	(0.0078)
Retired	-0.019***	-0.018***	-0.015**	-0.022***	-0.018**
	(0.0064)	(0.0064)	(0.0074)	(0.0065)	(0.0074)
Housewife	-0.013**	-0.013*	-0.0050	-0.013*	-0.0052
	(0.0064)	(0.0065)	(0.0069)	(0.0066)	(0.0073)
Students	0.032***	0.032***	0.022**	0.033***	0.048***
	(0.0082)	(0.0082)	(0.0092)	(0.0084)	(0.0095)
Unemployed	-0.017**	-0.017**	-0.019**	-0.018**	-0.015*
	(0.0076)	(0.0076)	(0.0089)	(0.0081)	(0.0088)
Other	-0.026**	-0.022*	-0.031**	-0.029**	-0.026*
	(0.013)	(0.013)	(0.014)	(0.013)	(0.015)
Education: Primary==0					
Secondary	0.040***	0.041***	0.032***	0.039***	0.038***
	(0.0051)	(0.0051)	(0.0058)	(0.0052)	(0.0058)
Tertiary	0.12***	0.12***	0.11***	0.12***	0.11***
	(0.0057)	(0.0057)	(0.0064)	(0.0059)	(0.0065)
Income decile: First==0					
2nd decile	0.0051	0.0039	-0.0012	0.0057	0.0068
	(0.0078)	(0.0078)	(0.0091)	(0.0080)	(0.0089)
3rd decile	0.019**	0.016**	0.011	0.017**	0.025***
	(0.0076)	(0.0076)	(0.0088)	(0.0078)	(0.0087)

	(1) Baseline	(2) Country trend	(3) >=3 waves	(4) Omit high unemployment	(5) Omit crisis year
4th decile	0.024***	0.022***	0.023***	0.023***	0.031***
	(0.0075)	(0.0076)	(0.0087)	(0.0077)	(0.0087)
5th decile	0.0087	0.0075	0.0053	0.0066	0.018**
	(0.0074)	(0.0075)	(0.0085)	(0.0076)	(0.0086)
6th decile	0.017**	0.016**	0.016*	0.015*	0.033***
	(0.0078)	(0.0079)	(0.0089)	(0.0080)	(0.0090)
7th decile	0.020**	0.017**	0.018*	0.018**	0.038***
	(0.0082)	(0.0083)	(0.0093)	(0.0084)	(0.0095)
8th decile	0.018**	0.015	0.018*	0.015	0.031***
	(0.0093)	(0.0093)	(0.010)	(0.0094)	(0.011)
9th decile	0.051***	0.046***	0.053***	0.047***	0.064***
	(0.011)	(0.011)	(0.012)	(0.011)	(0.012)
10th decile	0.027**	0.023**	0.032***	0.023**	0.037***
	(0.011)	(0.011)	(0.012)	(0.011)	(0.012)
Constant	0.59***	0.58***	0.61***	0.66***	0.61***
	(0.012)	(0.013)	(0.013)	(0.014)	(0.015)
Fixed effects	Country, wave	Country, wave	Country, wave	Country, wave	Country, wave
Country trend	No	Yes	No	No	No
Observations	83431	83431	65767	79459	63124

Note: The table shows the estimated effects of unemployment rate on the probability to prioritise environment over economic growth and job creation. All regressions control for individual characteristics (age, gender, educational attainment, employment status, and income deciles) and include fixed effects in country and survey wave. Column (1) provides the baseline estimate from the whole sample. Column (2) includes country-specific trend over waves to deal with spurious correlation over time. Column (3) limits sample to countries that participate and asked the environment-economy priority question in at least 3 out of 5 waves. Column (4) removes country-year pairs with extremely high unemployment rates exceeding 15%. Lastly, column (5) removes the 2010-2014 wave to check if the effects are particularly driven by the financial crisis. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Source: Estimations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7) and OECD (2022[95]), *Unemployment rate (indicator),* https://doi.org/10.1787/52570002-en

Table A A.5. Effect of natural disasters on the environmental attitudes

Full regression table

	(1)	(2)	(3)	(4)
Number of disasters	0.0020			
	(0.0015)			
Number of affected persons per 1000		0.0015**		
		(0.00078)		
Number of death per 1000			0.79**	
			(0.39)	
Number of injured persons per 1000				15.3***
				(2.39)
Unemployment rate	-1.48***	-1.47***	-1.41***	-1.62***
	(0.12)	(0.12)	(0.13)	(0.13)
Log of population	-0.024	-0.027	-0.077	0.010
	(0.086)	(0.085)	(0.084)	(0.084)
Female	0.0054	0.0055	0.0055	0.0053
	(0.0038)	(0.0038)	(0.0038)	(0.0038)
Age (times 10)	-0.004***	-0.004***	-0.004***	-0.004***
	-0.002	-0.002	-0.002	-0.002
Employment: Full time==0				
Part time	0.0065	0.0064	0.0059	0.0063
	(0.0065)	(0.0065)	(0.0065)	(0.0065)
Self employed	0.032***	0.032***	0.032***	0.032***
	(0.0069)	(0.0069)	(0.0069)	(0.0069)
Retired	-0.015**	-0.015**	-0.015**	-0.015**
	(0.0066)	(0.0066)	(0.0066)	(0.0066)
Housewife	-0.0085	-0.0086	-0.0084	-0.0079
	(0.0066)	(0.0066)	(0.0066)	(0.0066)
Students	0.030***	0.030***	0.030***	0.030***
	(0.0084)	(0.0084)	(0.0084)	(0.0084)
Unemployed	-0.018**	-0.018**	-0.018**	-0.018**
	(0.0080)	(0.0080)	(0.0080)	(0.0080)
Other	-0.020	-0.020	-0.019	-0.020
	(0.013)	(0.013)	(0.013)	(0.013)
Education: Primary==0				

	(1)	(2)	(3)	(4)
Secondary	0.044***	0.044***	0.044***	0.044***
	(0.0052)	(0.0052)	(0.0052)	(0.0052)
Tertiary	0.12***	0.12***	0.12***	0.13***
	(0.0059)	(0.0059)	(0.0059)	(0.0059)
Income decile: First==0				
2nd decile	0.0012	0.00068	0.0014	0.00048
	(0.0082)	(0.0082)	(0.0082)	(0.0082)
3rd decile	0.015*	0.014*	0.015*	0.014*
	(0.0079)	(0.0079)	(0.0079)	(0.0079)
4th decile	0.022***	0.022***	0.023***	0.021***
	(0.0078)	(0.0079)	(0.0079)	(0.0078)
5th decile	0.0079	0.0074	0.0086	0.0074
	(0.0077)	(0.0077)	(0.0077)	(0.0077)
6th decile	0.017**	0.017**	0.018**	0.016**
	(0.0081)	(0.0081)	(0.0081)	(0.0081)
7th decile	0.017**	0.017**	0.018**	0.016*
	(0.0085)	(0.0085)	(0.0085)	(0.0085)
8th decile	0.018*	0.017*	0.019*	0.017*
	(0.0095)	(0.0095)	(0.0095)	(0.0095)
9th decile	0.045***	0.044***	0.045***	0.045***
	(0.011)	(0.011)	(0.011)	(0.011)
10th decile	0.024**	0.024**	0.025**	0.025**
	(0.011)	(0.011)	(0.011)	(0.011)
Constant	0.99	1.04	1.90	0.38
	(1.50)	(1.46)	(1.45)	(1.45)
Fixed effects	Country, year	Country, year	Country, year	Country, year
Observations	79145	79145	79145	79145

Note: The table shows the estimated effects of natural disasters on the probability to prioritise environment over economic growth and job creation. All regressions control for individual characteristics (age, gender, educational attainment, employment status, and income deciles) and include fixed effects in country and year in which the survey took place. Natural disaster measures were constructed based on all the disasters recorded in EM-DAT that occurred within 12 months before the survey month. Each column differs in the natural disaster measures used as indicated in the table. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Source: Estimations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7) and EM-DAT (2022[102]), *The CRED/OFDA International Disaster Database* (database), www.emdat.be

Table A A.6. Robustness checks: Outliers

	(1)	(2)	(3)	(4)
	Baseline	Remove top 5%	Remove 0	Remove both
Number of affected persons per 1000	0.0015**	0.019***	0.0070***	0.024***
	(0.00078)	(0.0025)	(0.0013)	(0.0040)
Individual controls	Yes	Yes	Yes	Yes
Fixed effects	Country, year	Country, year	Country, year	Country, year
Observations	79145	77367	50580	48802

Note: The table provides robustness checks on the estimated effects of natural disasters on the probability to prioritise environment over economic growth and job creation. It uses number of affected persons per 1000 as a natural disaster measure. All regressions control for individual characteristics (age, gender, educational attainment, employment status, and income deciles) and include fixed effects in country and year in which the survey took place. Column (1) cites the result from the main regression in Table 4.2. . Column (2) removes country-year pairs with top 5% of natural disasters. Column (3) removes country-year pairs with no disasters. Column (4) removes both. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Source: Estimations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7) and EM-DAT (2022[102]), *The CRED/OFDA International Disaster Database* (database), www.emdat.be

Table A A.7. Robustness checks: Not standardised by population

	(1)	(2)	(3)	(4)	(5)
Number of disasters	0.0011				
	(0.0015)				
Number of affected persons		0.00000006**			
		(0.00000003)			
Number of death			-0.000003		
			(0.00002)		
Number of injured persons				0.0001***	
				(0.00002)	
Total sum of disaster days					0.0004***
					(0.0001)
Individual controls	Yes	Yes	Yes	Yes	Yes
Fixed effects	Country, year	Country, year	Country, year	Country, year	Country, year
Observations	79145	79145	79145	79145	79145

Note: The table provides robustness checks on the estimated effects of natural disasters on the probability to prioritise environment over economic growth and job creation. The regressions here use natural disaster measures without standardised by population. All regressions control for individual characteristics (age, gender, educational attainment, employment status, and income deciles) and include fixed effects in country and year in which the survey took place. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Source: Estimations based on World Values Survey (2014[75]), *World Values Survey: All Rounds - Country-Pooled Datafile Version* (database), https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (used waves 3-7) and EM-DAT (2022[102]), *The CRED/OFDA International Disaster Database* (database), www.emdat.be.