The Economic Threat of Climate Change

A multilevel analysis of the relationship between occupational greenhouse gas intensity, perceived job insecurity and climate change skepticism among the lower educated in 21 European countries

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Abstract

This research set out to assess the understudied effect of occupational greenhouse gas intensity on climate change skepticism and perceived job insecurity among the lower educated distributed across 21 European countries (N = 12,210). Based on previous research, this study expected occupational greenhouse gas intensity to positively affect climate change skepticism due to commonly held anti-environmentalism values present in the social environment of greenhouse gas intensive sectors. Furthermore, it was expected that this positive relationship could be partially explained by perceived job insecurity, since greenhouse gas intensive sectors might experience economic threat from climate policies. This effect of economic threat was expected to be stronger in a context of strong national commitment to climate change mitigation, since a stronger national commitment makes the direct threat more palpable and makes the societal discourse surrounding climate change and its main perpetrators more salient. By performing multilevel analysis using the data of the European Social Survey (2016), this research concludes that occupational greenhouse gas intensity does not lead to more climate change skepticism and that this relationship is thus not explained by perceived job insecurity. This study did, however, find that a strong national commitment to climate change mitigation leads to more job insecurity among the lower educated active in greenhouse gas intensive sectors. Although the effect is small, it still has important implications with regards to the implementation of climate policy. Politicians and legislators who propose and draft climate policy need to consider and further monitor its effect on job insecurity and climate change skepticism, since ample public support is essential for the successful implementation of climate policy.

Keywords: Climate Change Skepticism; Job Insecurity; Climate Policy; Organizational Culture

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1. Introduction

Climate change is one of the biggest global challenges of today. Within the climate sciences there is overwhelming consensus about the human-induced causes of climate change (Cook et al., 2016) and its disastrous consequences for humanity (Battisti & Naylor, 2009). This overwhelming scientific consensus inspired the international community to collectively try and combat anthropogenic climate change via initiatives like the Kyoto Protocol (United Nations, 1998) and the Paris Agreement (United Nations, 2015). This scientific consensus and these international initiatives, however, did not necessarily translate into a socio-political consensus on the climate change issue. Although the majority (69%) of the European population indicates that they worry about the potentially disastrous consequences of anthropogenic climate change, 9% thinks it is not a serious problem at all (Eurobarometer, 2014). Besides, although climate change concern in Europe is relatively high compared with the United States (Kvaløy, Finseraus, & Listhaugen, 2012), it is found to be declining (Eurobarometer, 2009; Scruggs & Benegal, 2012; Whitmarsh, 2011). This decline in public concern towards climate change might be detrimental to the successful implementation of climate change policy (Hughes & Urpelainen, 2015).

Some of the most prevalent individual predictors for this climate change skepticism in Europe are a political rightwing orientation (Clements, 2012; Kvaløy et al., 2012; Lewis, Palm, & Feng, 2019; McCright, Dunlap, & Marquart-Pyatt, 2016a), a lower education level (Clements, 2012; Gelissen, 2007; Kvaløy et al., 2012; Lewis et al., 2019), a materialist value orientation (Gelissen, 2007; Kvaløy et al., 2012), identifying as male (Clements, 2012; Lewis et al., 2019) and religiosity (Kvaløy et al., 2012; Lewis et al., 2019). Another, rather understudied, predictor of climate change skepticism is sector of occupation. Bechtel, Genovese, and Scheve (2019) found that the greenhouse gas intensity of one's occupation positively affected climate change skepticism and that this relationship can be partially explained by economic insecurity. They argue that to reduce the amount of greenhouse gases in the atmosphere, governmental bodies predominantly target the most pollutive sectors (Heede, 2014; Kolstad, 2014). Examples of such initiatives are decreasing the financial support of greenhouse gas intensive sectors (e.g. Ambrose & Henley, 2019) or establishing emission quotas (e.g. Sikkema, 2019). These mitigation initiatives thus lead these pollutive sectors to experience economic strain. This may cause individuals working in these sectors to perceive more economic insecurity, which might lead them to become opposed to the development that threatens their livelihoods: climate change.

However, this experienced or perceived economic insecurity resultant of climate change mitigation policies may not be equally distributed among all individuals active in these sectors. One of the most important predictors of perceived job insecurity is a lower education level (Anderson & Pontussen, 2007; De Bustillo & De Pedraza, 2010; Näswall & De Witte, 2003). In general, the jobs of the lower educated are more likely to be displaced (Gesthuizen, Solga, & Künster, 2011; Spitz-Oener, 2006), outsourced (Hummels, Munch, & Xiang, 2016) or automated (Handel, 2012; Manyika et al.,

2017). Next to having a higher chance of becoming unemployed, the lower educated also have a higher chance of remaining unemployed when compared to their higher educated counterparts (Garrouste, Kozovska, & Arjona Perez, 2010). These findings thus suggest that the lower educated working in greenhouse gas intensive sectors experience more job insecurity than their higher educated counterparts.

Although a central part of their theoretical argument, the studies that addressed the relationship between the greenhouse gas intensity of one's occupation and climate change skepticism did not directly test if occupational greenhouse gas intensity has an effect on perceived job insecurity (Bechtel et al., 2019; Tvinnereim & Ivarsflaten, 2016). This gap in the literature regarding the validity of their job insecurity argument can be best tested by focusing on the group who is most likely to experience job insecurity: the lower educated.

Besides not directly testing for job insecurity, these studies also did not elaborate on how national contexts might influence the perceived economic threat of climate change mitigation policy. Since supranational initiatives like the Kyoto Protocol (UN, 1998) and the Paris Agreement (UN, 2015) are not legally binding, national governments retain a high degree of maneuverability when it comes to climate change regulation. This results into nationally differing levels of commitment with regards to climate change regulation (Burck, Marten, & Bals, 2015; Shishlov, Morel, & Bellassen, 2016). These international differences in climate change regulation might subsequently influence the perceived job insecurity of individuals active in greenhouse gas intensive sectors.

The aim of this research is to address these gaps in the literature by performing a cross-national research into the effect of occupational greenhouse gas intensity on the job insecurity and climate change skepticism of the lower educated in Europe, while examining the contextual influence of national commitment to climate change mitigation. The data used to perform this analysis is retrieved from the 8th round of the European Social Survey (2016), Eurostat (2016) and the Climate Change Performance Index (2016). Throughout the article, climate change skepticism is conceptualized as impact skepticism. Impact skepticism is the belief that the potentially negative consequences of climate change are non-existent, overexaggerated, harmless or even beneficial (Rahmstorf, 2004) and is the most prevalent form of climate change skepticism in Europe (Eurobarometer, 2014; Whitmarsh, 2011). Individuals active in greenhouse gas intensive sectors might not outright deny the general existence of climate change (trend skepticism), but might be quicker to trivialize the potentially negative consequences of climate change as a form of livelihood protection.

The central question of this study reads as follows: *"To what extent can climate change skepticism among the lower educated in Europe be explained by the greenhouse gas intensity of one's occupation and the job insecurity it entails, while also examining the contextual influence of national commitment to climate change mitigation?"*

The article is structured as follows. In the upcoming paragraphs, the terms introduced in the research question will be conceptualized and theoretically substantiated in the theoretical framework.

The theoretical framework will be followed by a methodology section which covers the introduction of the datasets, the operationalization of the key concepts and the research design. The outcomes are subsequently elaborated and visualized in the results section. The article will conclude with a discussion, which covers the main caveats and possible recommendations for future research.

2. Theoretical Framework

The theoretical framework is structured as follows. The first subsection discusses the conceptualization of climate change skepticism. The second part of the theoretical framework substantiates the expectation that more occupational greenhouse gas intensity leads to more climate change skepticism and that this relationship can be partially explained by job insecurity. During the third part, the possible influence of national commitment to climate change mitigation on the perceived job insecurity of individuals active in greenhouse gas intensive sectors is discussed. The theoretical framework concludes with a conceptual model, which illustrates and summarizes the main theoretical expectations.

2.1 Defining Climate Change Skepticism

Climate change skepticism is generally defined as the rejection, disputation or questioning of the mainstream thesis that the global climate is changing primarily due to human activities and that these changes will affect severely both ecosystems and human populations if left unchecked (Van Rensburg, 2015). This definition shows the ambiguity and the multifaceted nature of the concept "climate change skepticism", since it can refer to the denial of the existence of global climate change, the denial of the anthropogenic causes of climate change, a denial of the seriousness of climate change or a distrust in the objectivity of the producers of climate change knowledge. This multifaceted nature signals the importance of a clear conceptualization of the term (Capstick & Pidgeon, 2014; Rahmstorf, 2004; Van Rensburg, 2015), since different operationalizations lead to inconsistent findings (Klineberg, McKeever, & Rothebach, 1998).

To address this conceptual problem, scholars distinguish between different forms of climate change skepticism (Capstick & Pidgeon, 2014; Rahmstorf, 2004; Van Rensburg, 2015). This research focuses on evidence skepticism, which is a disbelief in the scientific evidence of climate science (Van Rensburg, 2015). Evidence skepticism, however, is not a uniform concept and distinguishes between three different types, namely trend, attribute and impact skepticism. Trend skepticism refers to a disbelief in the existence of climate change, attribute skepticism to a disbelief in the anthropogenic causes of climate change and impact skepticism to a disbelief in the potentially negative consequences of climate change (Rahmstorf, 2004).

This research focuses on the notion of impact skepticism. A first argument for doing so is the theoretical core of this research. To explain the relationship between occupational greenhouse gas

intensity and climate change skepticism, this research uses the theory of Bechtel et al. (2019). They argue that individuals active in greenhouse gas intensive sectors are climate change skeptic because climate change policy poses an economic threat to their sector of occupation. This indicates that opposition to climate policy and climate change skepticism are closely intertwined. This indication is further substantiated by Van Rensburg (2015), who argues that to justify opposition towards climate change policy (response skepticism), one is likely to downplay the severity of climate change (impact skepticism). This connection between opposition to climate policy and impact skepticism makes impact skepticism the most relevant form to study.

A second argument for impact skepticism is its prevalence in European society. Although the prevalence of the other types of evidence skepticism, trend and attribute skepticism, has remained constant, impact skepticism seems to be increasing (Eurobarometer, 2009; Scruggs & Benegal, 2012; Whitmarsh, 2011). This growing prevalence makes impact skepticism the most relevant form to study.

The third argument for the conceptualization of climate change skepticism as impact skepticism is its connection with economic wellbeing. Scruggs and Benegal (2012) found that the decline in climate change concern detected by Eurobarometer (2009) can be partially explained by the economic recession. They argue that in times of economic downturn, people's short-term economic needs are prioritized over long-term worries like climate change. This phenomenon is not unique to climate change concern. In fact, in times of economic recession, the economy is more likely to dominate any other issue (Singer, 2011). These findings show that one's propensity for impact skepticism is influenced by one's economic insecurity. Since the aim of this research is to assess the relationship between the greenhouse gas intensity of one's occupation and its subsequent economic insecurity with climate change skepticism, impact skepticism is the most relevant form to study.

2.2 Occupational Greenhouse Gas Intensity, Job Insecurity and Climate Change Skepticism

There are several individual predictors of climate change skepticism. Some of the most prominent indicators are political orientation (Clements, 2012; Kvaløy et al., 2012; Lewis et al., 2019; McCright et al., 2016a), education (Clements, 2012; Gelissen, 2007; Kvaløy et al., 2012; Lewis et al., 2019), value orientation (Gelissen, 2007; Kvaløy et al., 2012), gender (Clements, 2012; Lewis et al., 2019) and religiosity (Kvaløy et al., 2012; Lewis et al., 2019). These explanations, however, always consider climate change skepticism as a cultural predisposition or an individual characteristic, whilst for a certain group of people – lower educated employed in greenhouse gas intensive sectors – climate change skepticism might have a more economic basis, namely: a defensive reaction to the economic threat of climate change policy.

2.2.1 Organizational Culture of Climate Change Skepticism

In general, individuals active in greenhouse gas intensive sectors are more likely to display climate change skepticism than their non-greenhouse gas intensive counterparts (Bechtel et al., 2019). To

better understand the nature of this relation one needs to identify its origins. According to McCright, Marquart-Pyatt, Shwom, Brechin, and Allen (2016b), climate change skepticism originated as a capitalist-industrial countermovement to the environmentalism movement of the 1980s and 90s. The industrial elite perceived environmentalism as detrimental to their way of conducting business, since environmental policies would constrain their freedom with regards to production. This economic threat of the environmentalism movement is tangible when reading supranational agreements like the Kyoto Protocol, which identifies five sectors as having the most mitigation potential, namely energy, industrial processes, solvent and other product use, agriculture and waste. Besides, one of the objectives of the Protocol is the progressive phasing out of subsidies and tax exemptions for greenhouse gas intensive industries (United Nations, 1998). This economic threat explains the attitudes of the industrial elite and their representatives when denying the existence of climate change or the downplaying of its consequences. Although these historical origins explain why the industrial elites are more prone to display climate change skeptic viewpoints, it does not necessarily explain why this would be the case for their employees.

To understand the climate change skepticism of the lower educated employed in greenhouse gas intensive sectors, we need to further examine the effect of the economic restraint resultant from climate change policy initiatives. The elites of greenhouse gas intensive sectors have a propensity to be climate change skeptic to protect their business interests. Especially in the United States, but also in some Western-European countries, the environmentalism lobby was vehemently countered by a pro-industry lobby. Although in Europe the extent of political representation of these industrial elites has remained rather limited when compared to the United States (McCright et al., 2016b), it is not unreasonable that within greenhouse gas intensive companies and sectors in Europe certain anti-environmentalism viewpoints are embedded in the organizational culture.

Organizational culture refers to commonly held values and beliefs that are present in the social environment of an organization. This organizational culture subsequently socializes individuals active within these organizations (Schneider, Goldstein, & Smith, 1995). Since industrial elites have the propensity to be climate change skeptic to protect their business interests, it is probable that climate change skepticism is imbued in the general organizational culture. This research would argue that this organizational culture of skepticism subsequently socializes individuals active in greenhouse intensive sectors to prioritize profit, to trivialize the consequences of their practices on the climate change process or to even deny the existence of climate change. In addition, there is also the self-selecting aspect of an organizational culture, since people, in general, do not like to work in sectors that defy their personal beliefs and values (Kristof-Brown, Zimmerman, & Johnson, 2005). This means that individuals who choose to work in sectors that are identified as core contributors to climate change are not likely to be environmentalists and are probably more likely to trivialize or deprioritize climate change. This socialization within greenhouse gas intensive sectors combined with the self-selection process, makes it likely that individuals active in greenhouse gas intensive sectors are more likely to

have climate change skeptic viewpoints than individuals who are not active in these sectors. This so leads to the following hypothesis: *H1: Lower educated individuals active in more greenhouse gas intensive sectors are more likely to have climate change skeptic viewpoints than lower educated individuals active in less greenhouse gas intensive sectors.*

2.2.2 Economic Threat of Climate Change

The lower educated active in greenhouse gas intensive sectors are, however, not only influenced by a general anti-environmentalism culture characteristic of greenhouse gas intensive sectors. The lower educated, in general, also experience more economic threat in the form of job insecurity than their higher educated counterparts (Anderson & Pontussen, 2007; De Bustillo & De Pedraza, 2010; Näswall & De Witte, 2003) and are more likely to remain unemployed (Garrouste et al., 2010).

Although job insecurity among individuals working in greenhouse gas intensive sectors can be caused by multiple factors from automation (Handel, 2012; Manyika et al., 2017) to changing job standards (Spitz-Oener, 2006), Tvinnereim and Ivarsflaten (2016) found that individuals active in the fossil fuel industry of Norway are more likely to support climate policy when this policy does not negatively affect their sector of occupation. Furthermore, Michaelowa (2005) found that support for renewable energy in Germany is higher when these initiatives provide job opportunities. This shows that, in general, individuals employed in greenhouse gas intensive sectors are more likely to have favorable views towards climate change when it does not directly threaten their livelihoods.

These examples are further substantiated by the recent example of the farmer protests in the Netherlands. In 2019 and 2020 Dutch farmers took to the streets because of an economically threatening nitrogen reduction policy initiative and a general feeling of underappreciation of their occupation (Van den Berg, Sterling, & Meijer, 2019). In this specific case, the opposition of the Dutch farmers towards the climate change policy agenda only became apparent when they were specifically targeted. This might indicate that there is a latent discontent within greenhouse gas intensive sectors towards the perceived economic threat of a rigid climate policy agenda.

These observations lead to the expectation that the relation between the greenhouse gas intensity of one's occupation and climate change skepticism can be partially explained by perceived job insecurity. As previously mentioned, climate change policy is mainly concerned with limiting the amount of greenhouse gases in the atmosphere and is thus mainly aimed at greenhouse gas intensive sectors (Heede, 2014; Kolstad, 2014). This policy agenda imposes higher adjustment costs on 'dirty' sectors than on relatively 'clean' sectors. According to Bechtel et al. (2019), these higher adjustment costs for greenhouse gas intensive sectors affect their relative profitability. This subsequently leads individuals working in greenhouse gas intensive sectors to associate extensive climate change regulation with economic constraint and thus higher job insecurity. These feelings of job insecurity will, most likely, be more prominent among the lower educated segment of the work force because they are more easily displaced (Gesthuizen et al., 2011; Spitz-Oener, 2006). To reduce the economic

threat posed by climate change policy, the lower educated active in these greenhouse gas intensive sectors become opposed to the proponents of climate change policy and the knowledge that justifies and legitimizes these policies. Vice versa, the lower educated employed in less greenhouse gas intensive sectors do not experience this economic insecurity resultant of climate change policy and thus have less reason to be skeptic about the potentially disastrous consequences of climate change. In fact, reasoning along the line of rational action theorizing (Goldthorpe, 1998), they are even more likely to realize the collective benefits of climate change policy and so are potentially even likely to display high levels of climate change concern.

Rational cost-benefit theorizing – losing one's job is a greater cost than the abstract consequences of climate change – is not the only explanation for the perceived economic threat of climate change among the lower educated active in greenhouse gas intensive sectors. The nature of the political and media debate regarding the climate change issue might also contributes to this perceived economic threat and its subsequent climate change skepticism.

Climate change is an issue that has become highly politicized over the last few decades. Since the scientific finding of anthropogenic climate change, Green parties have established a foothold in most Western democracies. In fact, the Greens are considered to be the most enduring and cohesive new party family since the rise of the Social Democrats a century ago (Grant & Tilley, 2019) and have contributed to making climate change a politically salient issue. Partially due to the increase of Green parties and the scientific consensus on climate change, a clear narrative has been written with regards to the perpetrators of anthropogenic climate change, namely: greenhouse gas intensive industry in Western countries (Heede, 2014). This rise of Green parties in Western Europe has, however, not been uncontested. Lockwood (2018), for example, found that nearly all rightwing populist parties in Europe are, to a degree, climate change skeptic. One of the most frequently used arguments to substantiate this position is that the benefits of such an extensive climate policy agenda do not outweigh the economic costs. These opposing viewpoints frame support or opposition to climate change as either pro-environment or pro-economy, whilst these are not necessarily mutually exclusive. This political conflict outlines the policy options of climate change as either constraining greenhouse gas intensive sectors or not. The salience of the climate change issue in Western societies combined with the two options put forward by political parties make individuals active in greenhouse gas intensive sectors aware of the economic stakes involved in the climate change issue. To protect their livelihoods, they become more climate change skeptic.

This public salience and the framing of the climate change issue is reiterated by the media coverage on the issue. During the 2000s the media coverage of climate change or global warming more than tripled (Boykoff & Roberts, 2007) and this rapid increase in climate change coverage is especially high in carbon dependent countries with strong commitments to the Kyoto Protocol (Schmidt, Ivanova, & Schäfer, 2013). This coverage, however, is not unison, in the sense that it covers both reports on pro-environmentalism viewpoints and climate change skeptic viewpoints (Boykoff,

2013; Schmidt et al., 2013). Where pro-environmentalists promote greenhouse gas mitigation and heavier taxation of heavy industry, climate change skeptics reiterate the economic importance of greenhouse gas intensive sectors and dismiss climate change as a nonissue. The nature of this media coverage thus reiterates its public salience and the main narrative around it: climate change policy will be economically detrimental to greenhouse gas intensive sectors.

This salience of the climate change issue in politics and the media makes it omnipresent and almost unescapable in Western societies. Since in both cases the climate change issue is framed as an issue that will be economically detrimental to greenhouse gas intensive sectors, individuals active in greenhouse gas intensive sectors cannot help but perceive climate change as an economic threat. This leads to the following two expectations, namely: *H2a: Lower educated individuals active in more greenhouse gas intensive sectors are more likely to experience job insecurity than lower educated individuals active in less greenhouse gas intensive sectors* and *H2b: The relationship between occupational greenhouse gas intensity and climate change skepticism can at least be partially explained by job insecurity*.

2.3 National Context of Climate Change Policy Commitment

The impact of the greenhouse gas intensity of one's occupation on climate change skepticism can be tempered by external efforts like the national implementation of climate change policy (Bechtel et al., 2019). Since the subjects of study are likely to perceive the economic threat posed by the climate change policy agenda, their opposition to climate change is probably also influenced by the national commitment to climate change mitigation.

As established in the introduction, different countries have different mitigation responsibilities. Supranational agreements like the Kyoto Protocol (UN, 1998) and the Paris Agreement (UN, 2015) are structured around the principal of "common but differentiated responsibilities and respective capabilities", which, in practice, comes down to: some countries have a bigger responsibility than others when it comes to climate change mitigation. Besides, these supranational agreements are not legally binding. Although it can be argued that noncompliance with the emission abatement targets can lead to international condemnation, it does not officially have any legal or financial repercussions. This means that although a lot of European countries signed these supranational agreements, national governments retain a high degree of maneuverability when it comes to climate policy implementation. Certain countries therefore have more extensive climate policy agendas than others (Burck et al., 2015; Shishlov et al., 2016).

These national differences in climate policy implementation might affect the perceived economic threat posed by climate change policy. In countries with a rather lenient climate policy agenda, the most greenhouse gas intensive sectors are less economically restrained. This means that the lower educated active in these sectors are less likely to perceive job insecurity as a result of a rigid climate policy agenda. Besides, in countries with a rather lenient climate policy agenda, its public

salience is most likely lower. This should lead to less perceived job insecurity among individuals active in greenhouse gas intensive sectors. When the contexts are reversed, the direct opposite is expected. As found by Schmidt et al. (2013), climate change is a more salient topic in countries with strong commitments to international agreements like the Kyoto Protocol. This higher salience of the issue combined with more economic restraint resultant of an extensive climate policy agenda might subsequently lead to more perceived job insecurity among individuals active in greenhouse gas intensive sectors. This leads to the following hypothesis: *H3: The positive effect of the greenhouse gas intensity of one's occupation on perceived job insecurity is stronger in countries with a more extensive climate policy agenda.*

2.4 Conceptual Model

In Figure 1 the previously discussed theoretical expectations are visualized in a conceptual model.

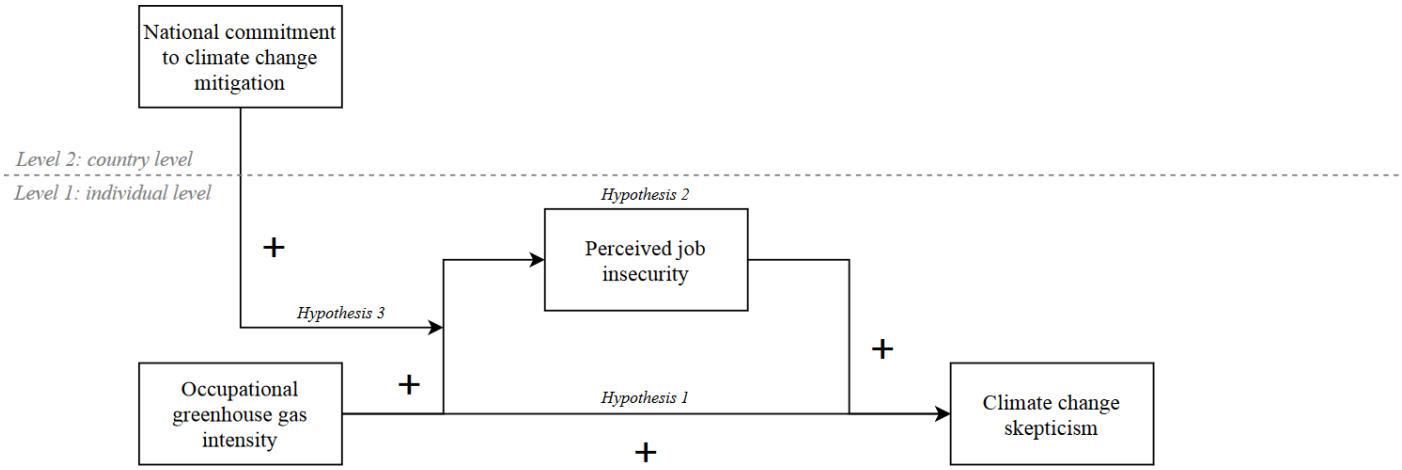

Figure 1. Conceptual model

3. Methodology

The used dataset is the 8th round of the European Social Survey (ESS), which is a European and academically driven multi-country survey covering 23 countries. In total, the ESS contains 44,387 participants. These participants are randomly sampled and the response rate is 70%. Some of the core topics addressed in the survey are social trust, demographics and political interest and participation. The 8th round of the ESS is unique compared to other rounds of the ESS because it includes the topic of climate change attitudes (ESS, 2018a). The inclusion of climate change attitudes makes the 8th round of the ESS the most applicable dataset when researching cross-national climate change skepticism in Europe. To test the hypotheses, the 8th round of the ESS is complemented with the '*Air emissions per NACE Rev. 2 activity*'-dataset of Eurostat (2020a) and the Climate Change Performance Index (CCPI) of Burck et al. (2015).

The relevant subpopulation for this study is selected by applying three selection criteria. The first selection criterion is having a low level of education. In general, the lower educated are operationalized as ISCED levels 1 and 2 (Abrassart, 2013; Steedman & McIntosh, 2001). However, since this research argues that climate change skepticism among the lower educated active in greenhouse gas intensive sectors can be explained by job insecurity, also the vocational tracks of ISCED levels 3 and 4 are included. Vocational education is focused on acquiring a specific skillset, which can be applied to a particular occupation or trade (e.g. carpentry, masonry, nursing) (ESS, 2018b). Given that, in general, manual laborers experience more job insecurity than non-manual laborers (Handel, 2012; Hummels et al., 2016; Näswall & De Witte, 2003; Spitz-Oener, 2006), the job insecurity argument is best assessed via the inclusion of these tertiary vocational tracks.

A second selection criterion is permanent employment. To make sure that the subjects of this research were permanently employed during the time of surveying, only the respondents who stated that they were predominantly occupied with paid work were selected.

The third and final selection criterion is perceived job insecurity. Since perceived job insecurity is a core concept within the context of this research, individuals who indicated that this question did not apply to their personal situation were excluded from the analyses.

3.1 Operationalization

The dependent variable – *climate change skepticism* – is conceptualized as impact skepticism. Since impact skepticism refers to the trivialization of the potentially disastrous consequences of climate change, this concept is operationalized using the following question: *"How worried are you about climate change?"*. This item ranges from zero to four (0= 'not at all worried' and 4 ='extremely worried'). Since this item measures the degree of climate change concern, this item is reversely coded so that a higher score indicates more climate change skepticism.

The independent variable – *occupational greenhouse gas intensity* – is operationalized by connecting the sectoral greenhouse gas emission data of 2016 (Eurostat, 2020a) to the economic

sectors included in the 8th round of the ESS. Eurostat (2020b) is an institution which processes and publishes comparable statistical information at the European level and has monitored the occupational greenhouse gas emissions per capita for all EU Member States since 2009. The two datasets can be merged because both categorize occupation according the European Classification of Economic Activity (NACE Rev. 2). NACE Rev. 2 is constructed to designate the various statistical classifications of economic activities in the European Union and distinguishes between 21 different economic sectors (European Communities, 2008). However, this research excludes the categories '*Activities of households as employers*' and '*Activities of extraterritorial organizations and bodies*' due to missing greenhouse gas emission statistics. The greenhouse gas intensity of one's occupation is measured as the relative share of the total greenhouse gas emissions of all NACE Rev. 2 sectors in a country. The reason for coding occupational greenhouse gas intensity relative to the country-level emissions is because climate change policy is enforced at the national level. This research subsequently assumes that sectors with relatively high greenhouse gas emissions, experience more threat of a rigid climate policy agenda. Since occupational greenhouse gas intensity has a broad range, the variable is standardized to enable comparisons with smaller scale variables.

The mediating variable – *perceived job insecurity* – is operationalized via the following item: *"Please tell me how likely it is that during the next twelve months you will be unemployed and looking for a job at least for four consecutive weeks?"*. The answers range from zero to three (0='not likely' and 3='very likely').

At the individual level, the following control variables are included: political orientation, education, age, gender and religiosity. *Political orientation* is measured via an 11-point left-right scale where 0 is 'left' and 10 is 'right'. *Education* is measured via ISCED. However, since this research only looks at the lower educated, education only distinguishes between ISCED level 1, 2, 3 and 4. To enable comparisons between the different categories this variable is dummy-coded. *Age* is a continuous variable and measures age in years. *Gender* is measured via a dichotomous variable which differs between 'male' and 'female', where male has a score of 1. *Religiosity* is also measured via a dichotomous variable and distinguishes between people belonging to a religious denomination (1) and people who do not (0).

The contextual variable – *governmental commitment to climate change mitigation* – is operationalized using the Climate Change Performance Index (CCPI) of 2016 (Burck et al., 2015). The CCPI is yearly published and measures national climate change performances via different indicators ranging from absolute greenhouse gas emissions to the implementation of renewable energy initiatives. One of the components of the CCPI is a nation's climate policy score. This score is determined via a questionnaire that is filled in by climate change experts of different countries and covers the national performance of a country on the national and international policy front (Burck et al., 2017). These scores are ordinally ranked as follows: 'very good', 'good', 'moderate', 'poor' and 'very poor'. However, since no countries were awarded a 'very good' climate policy score, only the

latter four categories are incorporated in this research. To enable comparisons between the different categories this variable is dummy-coded. Since the CCPI is not included in the 8th round of the ESS, this data is merged with the relevant countries in the ESS dataset.

At the country level the following control variables are included: social protection and gross domestic product (GDP) per capita. *Social protection* is measured as a country's social protection expenditure relative to its GDP in 2016 (Eurostat, 2020c). *GDP per capita* measures the value of total final output of goods and services produced by a country in 2016 (Eurostat, 2020d). Since both these variables are not included in the 8th round of the ESS, this data is merged with the relevant countries in the ESS dataset. Furthermore, due to their broad range, both variables are standardized to enable comparisons with smaller scale variables.

3.2 Research Design

The program used to perform the analysis is IBM SPSS Statistics version 25. To successfully perform multilevel analysis all independent variables that have not been dummy-coded or standardized are grand-mean centered. This is done to better interpret the intercept, since grand-mean centering allows the intercept to be interpreted as the mean outcome when all independent variables are at their mean value (Heck, Thomas, & Tabata, 2014).

The first step of the analysis is to determine if there exists substantial and significant variability in climate change skepticism and job insecurity between countries. This is done by comparing the mean scores of the different countries on the two variables and by assessing the intra country correlations (ICC) via the intercept-only models. If the ICC of climate change skepticism and job insecurity exceeds 5%, multilevel modeling is the most appropriate method of analysis (Heck et al., 2014).

The remainder of the analysis is twofold (see Figure 2). The first part of the analysis assesses the effect of the greenhouse gas intensity of one's occupation and job insecurity on climate change skepticism. The second part of the analysis assesses the interaction effect of national commitment to climate change mitigation on the individual relationship between the greenhouse gas intensity of one's occupation and perceived job insecurity.

The first step of the first analysis is adding occupational greenhouse gas intensity as a fixed predictor to determine its direct effect on climate change skepticism and to see if the individual level variance decreases compared to the intercept-only model. In the second step, the relevant control variables are added as fixed predictors to assess if the relationship of step 1 changes. During the third and final step, the variable job insecurity is added to determine if the relationship between occupational greenhouse gas intensity and climate change skepticism can be explained by job insecurity. This is the case if the relationship of step 1 weakens in substantiality or significance.

The first step of the second analysis is adding occupational greenhouse gas intensity as a fixed predictor to determine its direct effect on job insecurity and to see if the individual level variance

decreases compared to the intercept-only model. Next, the relevant control variables are added to determine if the effect of occupational greenhouse gas intensity on perceived job insecurity changes. In the third step, the country level variables are added as fixed predictors to test their significance and to see if the country level variance decreases compared to the intercept-only model. In step four, occupational greenhouse gas intensity is added as a random predictor to determine if there is significant variance to be explained between groups. In the final step, the cross-level interactions between climate change policy performance and occupational greenhouse gas intensity are added to infer if the country-level interaction effect is significant or not.

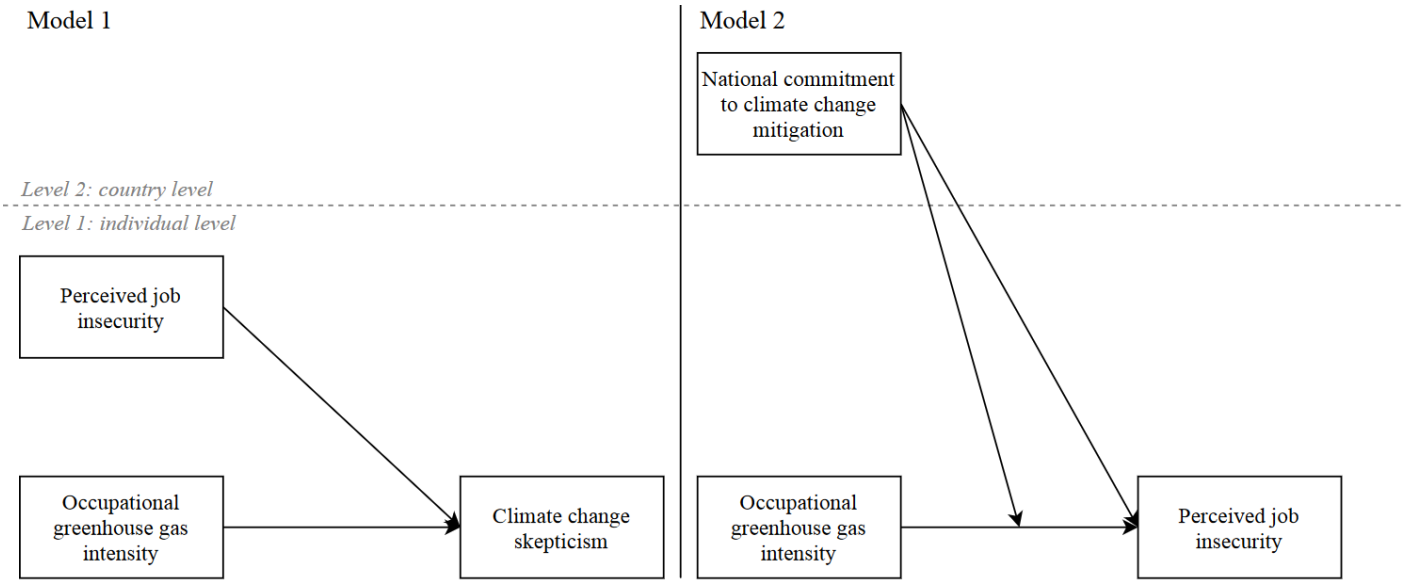

Figure 2. Schematic overview of the two multilevel analyses

3.3 Descriptive Statistics

In Table 1 the descriptive statistics are presented. The valid population consists of 12,210 respondents. These respondents are distributed across 21 European countries. The two countries present in the 8th round of the ESS but not included in the analysis are Russia and Israel. Both these countries were excluded due to the fact that Eurostat (2020a) did not provide the greenhouse gas emissions per economic sector for these countries.

Table 1: Descriptive statistics

	N	Mean	SD	Min.	Max.
Climate change skepticism	15,369	2.01	0.92	0.00	4.00
Standardized occupational greenhouse gas intensity	14,308	0.00	1.00	-0.74	5.15
Job insecurity	15,760	0.85	0.98	0.00	3.00
Good climate change policy performance	15,760	0.33	0.47	0.00	1.00
Moderate climate change policy performance	15,760	0.22	0.41	0.00	1.00
Poor climate change policy performance	15,760	0.36	0.48	0.00	1.00
Very poor climate change policy performance	15,760	0.10	0.30	0.00	1.00
Standardized social protection expenditure	15,760	0.00	1.00	-1.81	1.63
Standardized gross domestic product per capita	15,760	0.00	1.00	-1.39	2.66
Political orientation (right)	13,644	5.14	2.18	0.00	10.00
Education: Advanced vocational, sub-degree	15,760	0.08	0.27	0.00	1.00
Education: Upper tier upper secondary	15,760	0.18	0.39	0.00	1.00
Education: Lower tier upper secondary	15,760	0.33	0.47	0.00	1.00
Education: Lower secondary	15,760	0.29	0.45	0.00	1.00
Education: Less than lower secondary	15,760	0.12	0.32	0.00	1.00
Age	15,724	47.96	17.59	15.00	100.00
Gender (male)	15,756	0.52	0.50	0.00	1.00
Religiosity	15,664	0.54	0.50	0.00	1.00
Valid N	12,210				

4. Results

In the upcoming paragraphs the outcomes of the analysis are presented. First, the variances of the dependent variables between countries are assessed. In the second part of this chapter the first model is assessed, which includes hypothesis 1 and 2b. In the final part of this chapter the second model is tested, which includes hypothesis 2a and 3.

4.1 Country Level Differences in Job Insecurity and Climate Change Skepticism

Before assessing the intercept-only models, the average levels of the dependent variables per country are presented to see whether these vary substantially. As can be seen in Table 2, there is variation between countries on both climate change skepticism and job insecurity. However, on a scale of 0-4, a range of 0.86 between the lowest average of climate change skepticism (Portugal, 1.60) and the highest average of climate change skepticism (Estonia, 2.46) is not very substantial. This also applies to job insecurity, which has a range of 0.89 on a scale of 0-3. To determine if there is substantial and

significant variability in climate change skepticism and job insecurity between countries, the intercept-only models are inspected.

Table 2: Countries and their mean levels of job insecurity and climate change skepticism

	Climate Change Skepticism	**Job Insecurity**
Austria	2.02	0.57
Belgium	1.92	0.77
Switzerland	1.93	0.74
Czechia	2.31	1.02
Germany	1.68	0.63
Estonia	2.46	1.03
Spain	1.65	1.34
Finland	2.05	0.86
France	1.79	1.08
United Kingdom	2.15	0.74
Hungary	1.94	0.79
Ireland	2.35	0.86
Iceland	1.96	0.53
Italy	1.82	1.06
Lithuania	2.14	1.24
Netherlands	2.08	0.73
Norway	2.17	0.58
Poland	2.29	1.17
Portugal	1.60	0.88
Sweden	2.22	0.45
Slovenia	1.88	0.86

Job insecurity ranges from 0-3; Climate change skepticism ranges from 0-4

Table 3 summarizes the two intercept-only models and presents the differences between and within countries. In the case of both job insecurity ($^{u}0ij = 0.057$, $p < .01$) and climate change skepticism ($^{u}0ij = 0.055$, $p < .01$), the country level variance is significant. The actual differences between countries presented in Table 2 are thus reflected in significantly high parameters. Furthermore, the intra country correlation for both job insecurity and climate change skepticism exceeds the general threshold of .05, which indicates substantial levels of clustering within countries.

Table 3: Intercept-only models; fit, individual level variance, country level variance, and intra country correlation

		Individual Level Variance		**Country Level Variance**		**Intra Country Correlation**
	-2 Log L	$^{e}0ij$	**Sig.**	$^{u}0ij$	**Sig.**	$^{u}0ij / (^{u}0ij + ^{e}0ij)$
Climate change skepticism	40,076	0.790	.000	0.055	.002	.065
Job insecurity	43,167	0.901	.000	0.057	.002	.059

4.2 Model 1: Occupational Greenhouse Gas Intensity and Climate Change Skepticism Mediated by Job Insecurity

First, the relationship between occupational greenhouse gas intensity and climate change skepticism is assessed. When the relevant control variables are excluded (Model 1a), the relationship between occupational greenhouse gas intensity and climate change skepticism is positive and significant ($b = 0.023$, $p < .05$). However, one unit increase in occupational greenhouse gas intensity (range of 6) only results in a 0.023 increase in climate change skepticism (5-point scale). This increase is not very substantial. Furthermore, the individual level variance of Model 1a is only 0.5% lower than the individual level variance of the intercept only model (compare Table 3 and 4). This indicates that the explanatory power of occupational greenhouse gas intensity is low.

In Model 1b the relevant control variables are added. When controlling for political orientation, education, age, gender and religiosity, the relationship between occupational greenhouse gas intensity and climate change skepticism weakens by 69.6% and becomes non-significant ($b = 0.007$, $p > .05$). Furthermore, the individual level variance of Model 1b is 3.0% lower than the individual variance of the intercept-only model, which indicates that the explanatory power of the control variables is substantially stronger than the explanatory power of occupational greenhouse gas intensity. This thus means that the first hypothesis is rejected. In general, individuals active in more greenhouse gas intensive sectors are not significantly more climate change skeptic than individuals active in less greenhouse gas intensive sectors.

The effects of the control variables on climate change skepticism are mostly in line with the climate change skepticism literature. A more rightwing political orientation (Clements, 2012; Kvaløy et al., 2012; Lewis et al., 2019; McCright et al., 2016a), a lower education level (Clements, 2012; Gelissen, 2007; Kvaløy et al., 2012; Lewis et al., 2019) and identifying as male (Clements, 2012; Lewis et al., 2019;) are found to be positively and significantly related to climate change skepticism. The only control variable that did not conform to the climate change skepticism literature is religiosity (Kvaløy et al., 2012; Lewis et al., 2019). Within the context of this research, religiosity is found to be negatively related to climate change skepticism.

Since hypothesis 2b claims that job insecurity can, at least, partially explain the relationship between occupational greenhouse gas intensity and climate change skepticism, it should be rejected. However, the direct effect of job insecurity on climate change skepticism can still be interpreted. As can be derived from Model 1c, the relationship between job insecurity and climate change skepticism is negative and significant ($b = -0.036$, $p < .001$). This is the opposite of the theoretical expectation that job insecurity leads to more climate change skepticism. It must, however, be noted that the inclusion of job insecurity only leads to a 0.1% decrease in individual variance (compare Model 1b and 1c). Furthermore, a one unit increase on a 4-range variable only leads to a 0.036 decrease in climate change skepticism. This indicates that the effect of job insecurity is not very substantial.

Table 4: Climate change skepticism and job insecurity regressed on occupational GHG intensity, individual level control variables, country characteristics and cross level interactions, unstandardized and fixed coefficients

	Climate Change Skepticism			**Job Insecurity**			
	M1a	**M1b**	**M1c**	**M2a**	**M2b**	**M2c**	**M2d**
Individual characteristics							
Occupational GHG intensity	**0.023**	0.007	0.006	**-0.024**	-0.004	-0.004	-0.054
Political orientation (right)		***0.027***	***0.027***		***-0.016***	***-0.016***	***-0.016***
Advanced vocational (ref)							
Upper tier upper secondary		0.046	0.047		0.026	0.027	0.025
Lower tier upper secondary		**0.064**	**0.068**		**0.112**	***0.115***	***0.115***
Lower secondary		**0.070**	**0.076**		***0.165***	***0.166***	***0.166***
Less than lower secondary		***0.158***	***0.163***		***0.148***	***0.146***	***0.149***
Age		0.001	-0.001		***-0.015***	***-0.015***	***-0.015***
Gender (male)		***0.107***	***0.105***		**-0.052**	**-0.052**	**-0.054**
Religiosity		**-0.040**	**-0.042**		**-0.057**	**-0.057**	**-0.057**
Job insecurity			***-0.036***				
Country characteristics							
Very poor CCPP (ref)							
Poor CCPP						**-0.450**	**-0.448**
Moderate CCPP						-0.213	-0.209
Good CCPP						**-0.371**	**-0.367**
Social protection						0.001	-0.001
GDP per capita						**-0.164**	**-0.163**
Cross level interactions							
Occupational GHG intensity x poor CCPP							0.051
Occupational GHG intensity x moderate CCPP							0.009
Occupational GHG intensity x good CCPP							**0.084**
Constant	***2.017***	***1.922***	***1.918***	***0.850***	***0.751***	***1.068***	***1.066***
Number of observations	13,965	12,210	12,210	14,308	12,483	12,483	12,483
-2 Log Likelihood	36,367	31,539	31,530	38,716	32,678	32,672	32,673
Individual level variance	***0.786***	***0.766***	***0.765***	***0.871***	***0.793***	***0.793***	***0.792***
Country level variance	**0.056**	**0.054**	**0.054**	**0.061**	**0.071**	**0.028**	**0.029**

Bold values are significant at $p < .05$; Bold-italic values are significant at $p < .001$

4.3 Model 2: Occupational Greenhouse Gas Intensity and Perceived Job Insecurity Moderated by National Commitment to Climate Change Mitigation

First, the relationship between occupational greenhouse gas intensity and job insecurity is assessed. When the relevant control variables are excluded, the effect of occupational greenhouse gas intensity on perceived job insecurity is negative and significant (b = -0.024, $p < .05$). This result contrasts the theoretical expectation that a higher level of occupational greenhouse gas intensity leads to more job insecurity. It must, however, be noted that a one unit increase on a 6-range scale only results in a 0.024 decrease in job insecurity (4-point scale). This decrease is not very substantial. Furthermore, the explanatory power of the occupational greenhouse gas intensity variable is rather low, since it only decreases the individual level variance by 3.3%.

When the relevant control variables are included (Model 2b), the relationship between occupational greenhouse gas intensity and job insecurity weakens by 83.3% and loses its significance

(b = -0.004, p > .05). Besides, when compared to the intercept-only model, the individual level variance decreases with 12.0%. This indicates that the effect of occupational greenhouse gas intensity is neither substantial nor significant. This means that hypothesis 2a is rejected. In general, lower educated individuals active in more greenhouse gas intensive sectors are not more likely to experience job insecurity than lower educated individuals active in less greenhouse gas intensive sectors.

The effects of the control variables are in line with the job insecurity literature. In general, people who are lower educated and older experience more job insecurity than their counterparts (De Bustillo & De Pedraza, 2010; Näswall & De Witte, 2003).

In the final two models, Model 2c and 2d, the interactive effect of climate change policy performance on the relationship between occupational greenhouse gas intensity and job insecurity is assessed. In Model 2c the country level variables are added as fixed predictors to determine their direct effect on job insecurity. The inclusion of the three country level variables substantially decreases the country level variance by 50.9% (compared to the intercept-only model). Furthermore, the variables GDP per capita (b = -0.164, p < .05), poor climate change policy performance (b = -0.450, p < .05) and good climate change policy performance (b = -0.371, p < .05) had a significant and substantial effect on job insecurity. Especially the effect of GDP per capita is substantial, since a one unit increase in GDP per capita (range of 4) results in a 0.164 decrease on job insecurity.

In Model 2d the cross-level interactions of occupational greenhouse gas intensity and climate change policy performance are included. When controlling for social protection and GDP per capita, the relationship between occupational greenhouse gas intensity and job insecurity is partially moderated by national commitment to climate change mitigation. When compared to countries with a very poor climate change policy performance, the relationship between occupational greenhouse gas intensity and perceived job insecurity is more positive in countries with a good climate change policy performance (b = 0.084, p < .05). Furthermore, the interaction effects of poor (b = 0.051, p > .05) and moderate (b = 0.009, p > .05) climate change policy performance are in a similar direction, but not significant. It is, however, important to note that the effect of a good climate change policy performance is marginal. Compared to countries with a very poor climate change policy performance, an increase of 0.084 in the effect of greenhouse gas intensity is not very substantial. However, their significance still indicates that the individual level relationship between occupational greenhouse gas intensity and perceived job insecurity is moderated by national commitment to climate change policy performance.

This does, however, not mean that hypothesis 3 is fully supported. First, hypothesis 3 explicitly stated that national commitment to climate change mitigation moderated the *positive* effect of occupational greenhouse gas intensity on perceived job insecurity. Even though the individual relationship becomes positive by 0.030 when considering the cross-level interaction effect of occupational greenhouse gas intensity and good climate change policy performance, the initial individual relationship is negative (b = -0.054, p > .05). This means that a strong national commitment

to climate change mitigation positively moderates the *negative* relationship between occupational greenhouse gas intensity and perceived job insecurity. Secondly, the individual relationship is only partially moderated, since only the cross-level interaction effect of occupational greenhouse gas intensity and good climate change policy performance had a significant effect. This means that hypothesis 3 is partially supported. Compared to countries with a very poor climate change policy performance, the relationship between occupational greenhouse gas intensity and perceived job insecurity is more positive in countries with a good climate change policy performance.

4.4 Robustness Check

Two additional analyses were conducted to determine if the results were robust. The first robustness check only incorporated the valid population (N = 12,210). This check did not yield substantially different results compared to the main analysis. In the second robustness check, the dataset was split by gender to determine if the results differed for men and women. This was, however, not the case, since no substantial or significant pattern was found.

5. Conclusion and Discussion

The aim of this research was to study the effects of occupational greenhouse gas intensity on climate change skepticism and job insecurity among the lower educated distributed across 21 European countries. The first part of the analysis set out to determine the individual level relationship between occupational greenhouse gas intensity and climate change skepticism. The second part of the analysis focused on the individual level relationship of occupational greenhouse gas intensity and perceived job insecurity and how this relationship is moderated by national commitment to climate change mitigation. In the upcoming paragraphs, the main outcomes of the analysis are discussed as well as the implications and limitations.

This research found that among the lower educated in 21 European countries, the greenhouse gas intensity one's occupation (relative to the total country emissions) does not necessarily lead to more climate change skepticism. This indicates that more greenhouse gas intensive sectors do not select or socialize climate change skeptic employees, which contrasts the theoretical expectation of an organizational culture of climate change skepticism. A possible explanation for this contrasting finding is the European context of this research. The theoretical core of the organizational culture argument is derived from McCright et al. (2016b) who state that the elites of greenhouse gas intensive sectors orchestrated a pro-industry countermovement in reaction to the environmentalism movement to protect their business interests. Although they mention examples of this countermovement in Europe, their main emphasis is on the United States. The findings of this research suggest that in Europe the industrial countermovement is not as pronounced as in the United States, which might subsequently explain why, in Europe, more occupational greenhouse gas intensity does not necessarily

result in an organizational culture of climate change skepticism.

The second finding of this research is that the relationship between occupational greenhouse gas intensity and climate change skepticism is not mediated by perceived job insecurity. This implies that the assumption of Bechtel et al. (2019) – more occupational greenhouse intensity equals more threat from climate change policy and thus subsequently more job insecurity – is not necessarily correct. The findings of this research thus highlight the importance of testing assumed mechanisms.

Furthermore, this research found that among the lower educated in Europe, a higher level of occupational greenhouse gas intensity does not result in more perceived job insecurity. This indicates that, although certain political movements (Grant & Tilley, 2019; Lockwood, 2018) and media outlets (Boykoff, 2013; Schmidt et al., 2013) have presented the climate change issue as either pro-environment or pro-industry, this did not result in more perceived job insecurity among the lower educated active in greenhouse gas intensive sectors. In fact, in most cases, the direction of the relationship was negative, which implies that higher levels of occupational greenhouse gas intensity might even result in job opportunities. A literature review regarding the effects of climate policy on the employment situation in Europe provides a possible explanation for this finding (EP, 2010). This summary indicates that a shift to a greener economy most likely results in a small net gain of jobs. The work field that will, most likely, experience the highest increase in jobs is renewable energies, whilst the jobs that will most likely disappear are related to the fossil fuel industry or the production of unsustainable products. When looking at the average sectoral greenhouse gas intensity numbers, the second most intensive sector is 'Electricity, gas, steam and air supply' (Eurostat, 2020a). However, as illustrated by the European Parliament (2010), the energy sector stands to gain jobs from the climate change policy agenda. In comparison, the sector most threatened by a green revolution is the fossil fuel industry, which, on average, only ranked as the 6th most greenhouse gas intensive sector in Europe. International agreements that presumedly threaten greenhouse gas intensive sectors (e.g. Kyoto Protocol) might thus even provide job opportunities for certain greenhouse gas intensive sectors (e.g. Electricity, gas, steam and air supply). As found by Michaelowa (2005), if climate policy accommodates economic opportunities, people are less likely to have climate change skeptic viewpoints. This might subsequently explain why a research focusing on people working in the fossil fuel industry in Norway did find results (Tvinnereim & Ivarsflaten, 2016), whilst a research that focused on occupational greenhouse gas intensity did not.

It is, nonetheless, important to note that there was one main limitation to these findings. Due to limited data availability, this research operationalized job insecurity as the perceived likelihood of unemployment within the next twelve months. This is a very crude indicator of job insecurity, since it only measures if people experience a very direct and extreme threat to their livelihoods. The greenhouse gas intensity of one's occupation, however, might also lead to more subtle forms of economic threat like lower wages or prospects of demotion. Ideally, this research would have incorporated a more subtle and extensive measure of job insecurity like the Job Insecurity Scale (JIS).

The JIS measures job insecurity via four indicators and is specifically constructed to enable cross-country comparisons (Vander Elst, De Witte, & De Cuyper, 2014).

The third and final result of this research is that the relationship between occupational greenhouse gas intensity and perceived job insecurity is partially moderated by national commitment to climate change mitigation. Compared to countries with a low commitment to climate change mitigation, the individual relationship is more positive in countries with a high commitment to climate change mitigation. This supports the notion that in countries with strong commitments to climate change mitigation the threat of an extensive climate policy agenda is more publicly salient, which leads to more perceived job insecurity among individuals active in greenhouse gas intensive sectors.

Based on the previously discussed conclusions, implications and limitations, this research offers some suggestions for future research. The first recommendation is to alter the operationalization of occupational greenhouse gas intensity to determine in what setting occupational greenhouse gas intensity is an explanatory factor. This research operationalized occupational greenhouse gas intensity relative to the total country emissions. Future research might find different results when also considering the actual size of the economic sector. For example, although one of the least sustainable forms of occupation, the economic sector 'mining and quarrying' only ranked as the 6th most 'dirtiest' sector, whilst an economic sector like 'manufacturing' was deemed more than eight times as greenhouse gas intensive (Eurostat, 2020a). This is partially due to the fact that manufacturing is a bigger economic sector than mining and quarrying and thus does not necessarily mean that manufacturing is a more greenhouse gas intensive sector. National governments might subsequently choose to target economic sectors that emit relatively large amounts of greenhouse gases compared to their actual size, which might result in an organizational culture of climate change skepticism and/or perceived job insecurity.

A second suggestion for future research is with regards to the finding that occupational greenhouse gas intensity does not lead to significantly more perceived job insecurity. Michaelowa (2005) already found that people displayed more climate change concern when they economically benefited from an extensive climate policy agenda. Since the climate policy agenda is predicted to result in a net gain of jobs (EP, 2010), future research should determine if, in certain national and sectoral contexts, an extensive climate policy agenda results in feelings of job opportunity instead of job insecurity (f.e. electricity, gas, steam and air supply).

The third and final recommendation for future research is more practical in nature and regards the finding that more national commitment to climate change mitigation positively influences the relation between occupational greenhouse gas intensity and perceived job insecurity. Although the found effect is small, it still implies that a strong national commitment to climate policy leads to more perceived job insecurity among lower educated individuals active in greenhouse gas intensive sectors. This increased economic insecurity among the lower educated might subsequently lead to higher levels of climate change skepticism (Bechtel et al., 2019; Scruggs & Benegal, 2012; Tvinnereim &

Ivarsflaten, 2016). Since climate change will most likely remain a pivotal issue in the upcoming decades and ample public support is necessary for the successful implementation of climate policy (Hughes & Urpelainen, 2015), it is important for politicians and legislators to consider these findings when proposing and drafting climate policy and to further monitor its effect on perceived job insecurity.

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Appendix I: Checklist Ethical and Privacy Aspects of Research

ERASMUS UNIVERSITEIT ROTTERDAM

CHECKLIST ETHICAL AND PRIVACY ASPECTS OF RESEARCH

INSTRUCTION

This checklist should be completed for every research study that is conducted at the Department of Public Administration and Sociology (DPAS). This checklist should be completed *before* commencing with data collection or approaching participants. Students can complete this checklist with help of their supervisor.

This checklist is a mandatory part of the empirical master's thesis and has to be uploaded along with the research proposal.

The guideline for ethical aspects of research of the Dutch Sociological Association (NSV) can be found on their website (http://www.nsv-sociologie.nl/?page_id=17). If you have doubts about ethical or privacy aspects of your research study, discuss and resolve the matter with your EUR supervisor. If needed and if advised to do so by your supervisor, you can also consult Dr. Jennifer A. Holland, coordinator of the Sociology Master's Thesis program.

PART I: GENERAL INFORMATION

Project title:

The Economic Threat of Climate Change: A multilevel analysis of the relationship between occupational greenhouse gas intensity, perceived job insecurity and climate change skepticism among the lower educated in 21 European countries

Name, email of student:
Sem Oosse
511440so@eur.nl

Name, email of supervisor:
Gijs Custers
custers@essb.eur.nl

Start date and duration:
February 1, 2020 until June 21, 2020
Is the research study conducted within DPAS YES - NO

If 'NO': at or for what institute or organization will the study be conducted?
(e.g. internship organization)

PART II: TYPE OF RESEARCH STUDY

Please indicate the type of research study by circling the appropriate answer:

1. Research involving human participants. YES – NO
   If 'YES': does the study involve medical or physical research? YES - NO
   Research that falls under the Medical Research Involving Human Subjects Act (WMO) must first be submitted to an accredited medical research ethics committee or the Central Committee on Research Involving Human Subjects (CCMO).

2. Field observations without manipulations that will not involve identification of participants. YES - NO

3. Research involving completely anonymous data files (secondary data that has been anonymized by someone else). YES - NO

PART III: PARTICIPANTS

(Complete this section only if your study involves human participants)

Where will you collect your data?

_____

_____

Note: indicate for separate data sources.

What is the (anticipated) size of your sample?

_____

_____

Note: indicate for separate data sources.

What is the size of the population from which you will sample?

_____

_____

Note: indicate for separate data sources.

1. Will information about the nature of the study and about what participants can expect during the study be withheld from them? YES –NO
2. Will any of the participants not be asked for verbal or written 'informed consent,' whereby they agree to participate in the study? YES - NO
3. Will information about the possibility to discontinue the participation at any time be withheld from participants? YES - NO
4. Will the study involve actively deceiving the participants? YES - NO
   Note: almost all research studies involve some kind of deception of participants. Try to think about what types of deception are ethical or non-ethical (e.g. purpose of the study is not told, coercion is exerted on participants, giving participants the feeling that they harm other people by making certain decisions, etc.).

5. Does the study involve the risk of causing psychological stress or negative emotions beyond those normally encountered by participants? YES - NO
6. Will information be collected about special categories of data, as defined by the GDPR (e.g. racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, genetic data, biometric data for the purpose of uniquely identifying a person, data concerning mental or physical health, data concerning a person's sex life or sexual orientation)? YES - NO
7. Will the study involve the participation of minors (<18 years old) or other groups that cannot give consent? YES - NO
8. Is the health and/or safety of participants at risk during the study? YES - NO
9. Can participants be identified by the study results or can the confidentiality of the participants' identity not be ensured? YES - NO
10. Are there any other possible ethical issues with regard to this study? YES - NO

If you have answered 'YES' to any of the previous questions, please indicate below why this issue is unavoidable in this study.

_____
_____
_____
_____

What safeguards are taken to relieve possible adverse consequences of these issues (e.g., informing participants about the study afterwards, extra safety regulations, etc.).

_____
_____
_____
_____

Are there any unintended circumstances in the study that can cause harm or have negative (emotional) consequences to the participants? Indicate what possible circumstances this could be.

_____
_____
_____
_____

Please attach your informed consent form in Appendix I, if applicable.

Part IV: Data storage and backup

Where and when will you store your data in the short term, after acquisition?

The data is stored on a personal and encrypted drive. This drive can only be entered via password. The only person who knows this password is me.

Note: indicate for separate data sources, for instance for paper-and pencil test data, and for digital data files.

Who is responsible for the immediate day-to-day management, storage and backup of the data arising from your research?
I, Sem Oosse

How (frequently) will you back-up your research data for short-term data security?
The data is publicly accessible (ESS, Eurostat and CCPI), so frequently backing up the data is not necessarily a must. However, I will save my personal progress by frequently saving them onto my secured drive. Besides, a syntax will be maintained to safeguard reliability and replicability.

In case of collecting personal data how will you anonymize the data?
Not applicable

Note: It is advisable to keep directly identifying personal details separated from the rest of the data. Personal details are then replaced by a key/ code. Only the code is part of the database with data and the list of respondents/research subjects is kept separate.

PART VI: SIGNATURE

Please note that it is your responsibility to follow the ethical guidelines in the conduct of your study. This includes providing information to participants about the study and ensuring confidentiality in storage and use of personal data. Treat participants respectfully, be on time at appointments, call participants when they have signed up for your study and fulfil promises made to participants.

Furthermore, it is your responsibility that data are authentic, of high quality and properly stored. The principle is always that the supervisor (or strictly speaking the Erasmus University Rotterdam) remains owner of the data, and that the student should therefore hand over all data to the supervisor.

Hereby I declare that the study will be conducted in accordance with the ethical guidelines of the Department of Public Administration and Sociology at Erasmus University Rotterdam. I have answered the questions truthfully.

Name student:
Sem Oosse

Date: 19-3-2020

Name (EUR) supervisor:
Gijs Custers

Date: 20-3-2020