June 2024

Fondazione Eni Enrico Mattei

Working Paper

14.2024

How the nature of inequality reduction matters for CO_2 emissions

Tobias Angel, Alexandre Berthe, Valeria Costantini, Mariagrazia D'Angeli

How the nature of inequality reduction matters for CO_2 emissions

Tobias Angel (Università degli Studi Roma Tre and Université Paris Cité), **Alexandre Berthe** (Université Rennes 2 and LiRIS), **Valeria Costantini** (Università degli Studi Roma Tre and SEEDS), **Mariagrazia D'Angeli** (Università degli Studi Roma Tre and SEEDS)

Summary

This study investigates the relationship between distinct types of inequality and CO_2 emissions using panel data on 156 countries from 1995 to 2020. Using fixed effects panel and quantile regression techniques, we report estimates that indicate that pre-distribution (inequality reduction by structural changes and social protection) is better aligned with the goal of carbon emission reduction than redistribution (inequality reduction by transfers). However, those countries who contribute the least to global warming face the highest environmental degrading effect of pre-distribution. In contrast, pre-distribution decreases or does not affect the carbon emissions of the biggest global polluters. Redistribution, on the other hand, exhibits the reverse pattern. Moreover, we differentiate in this analysis between production-based and consumption-based emissions, finding on average higher challenges regarding joint inequality and emission reduction in countries that produce carbon intensive commodities. These findings call for international cooperation, structural changes and social protection policies to achieve the Sustainable Development Goals of joint inequality and carbon emission reduction.

Keywords: Inequality, Redistribution, Emissions, Climate Change, Social Protection

JEL classification: C33, D63, H23, Q54

Corresponding Author:
Mariagrazia D'Angeli
Post-doc researcher
Department of Economics, Università degli Studi Roma Tre
Via Silvio D'Amico 77, Rome (Italy)
e-mail: mariagrazia.dangeli@uniroma3.it

How the nature of inequality reduction matters for CO_2 emissions

Tobias Angel [*] Alexandre Berthe[†] Valeria Costantini[‡]
Mariagrazia D'Angeli[§]

Abstract

This study investigates the relationship between distinct types of inequality and CO_2 emissions using panel data on 156 countries from 1995 to 2020. Using fixed effects panel and quantile regression techniques, we report estimates that indicate that pre-distribution (inequality reduction by structural changes and social protection) is better aligned with the goal of carbon emission reduction than redistribution (inequality reduction by transfers). However, those countries who contribute the least to global warming face the highest environmental degrading effect of pre-distribution. In contrast, pre-distribution decreases or does not affect the carbon emissions of the biggest global polluters. Redistribution, on the other hand, exhibits the reverse pattern. Moreover, we differentiate in this analysis between production-based and consumption-based emissions, finding on average higher challenges regarding joint inequality and emission reduction in countries that produce carbon intensive commodities. These findings call for international cooperation, structural changes and social protection policies to achieve the Sustainable Development Goals of joint inequality and carbon emission reduction.

1 Introduction

The challenge of combating climate change represents one of the most significant international issues of our time. The strategy for addressing this challenge has been set out in the 2015 Paris Agreement (Paris Agreement, 2016), which is intrinsically linked the UN's Sustainable Development Goals of poverty alleviation, inequality reduction and climate action (United Nations (ed.), 2024). Consequently, the correlation between emissions and rising global inequalities is receiving increasing attention among scholars (Piketty, 2015; Chancel and Piketty, 2021; Chancel, 2022). Moreover, it is well established that economically disadvantaged and marginalised

[*]University of Roma Tre, Italy; Paris Cité University, France
[†]Rennes2 University, France; LiRIS, France
[‡]University of Roma Tre, Italy; SEEDS, Italy.
[§]University of Roma Tre, Italy; SEEDS, Italy.

social groups are the most affected by climate change (Ash and Boyce, 2018; Cappelli et al., 2021), while the carbon inequality literature highlights the high carbon footprints of the rich and the increasing carbon footprints in the lower parts of the income distribution (Bruckner et al., 2022; Chancel, 2022; Semieniuk and Yakovenko, 2020). The link between within-country inequality and environmental degradation has been receiving conspicuous attention since the mid-2010s among researchers (Dorn et al., 2024; Jorgenson et al., 2017; Rojas-Vallejos and Lastuka, 2020) and intergovernmental organizations (IPCC, 2022; IPBES, 2022). Nevertheless, numerous research gaps remain. The implications of distinct types of inequality for the environment and its determinants have not been studied yet. In addition, the literature itself remains isolated from topics like public provisioning systems and unequal exchange. In fact, unequal exchange places polluting production in developing countries (Hickel et al., 2022), which presumably creates huge challenges regarding joint inequality and emission reduction. A comprehensive analysis of this matter is required in order to provide policy makers with a guideline for the joint accomplishment of the UN Sustainable Development Goals (SDGs) and to create the conditions for a successful green transition.

Despite the extensive existing literature on the subject, there is still no clear consensus on the relationship between inequality and carbon emissions. The existing literature offers two main theoretical explanations for this relationship. The political economy argument developed by Boyce (1994) assumes positive synergies between inequality and emission reduction. Inequality reduction enhances the political influence of those who bear the costs of pollution relative to those who profit from environmental degradation. This argument has been supported by a number of empirical investigations (Jorgenson et al., 2017; Knight et al., 2017; Hailemariam et al., 2020). On the other hand, the consumption theory, as proposed by Ravallion et al. (2000) and Heerink et al. (2001), assumes a trade-off between social justice and environmental action with the marginal propensity to consume being higher at the bottom of the income distribution. This negative association was validated by the empirical assessments of Hübler (2017), Sager (2019) and Chen et al. (2020). Recently, the literature was further enriched by studies that draw a more differentiated picture of the inequality-emission nexus. First, many studies highlighted the non-linear effect of inequality on carbon emissions. Usually, in low and middle-income countries, the nexus is typically regarded as negative, whereas in high-income countries, it is perceived to be positive (Grunewald et al., 2017; Guo et al., 2022; Rojas-Vallejos and Lastuka, 2020. Second, case studies have attempted to investigate the nexus in individual countries. Among them, Jorgenson et al. (2017), Andersson (2023) and Safar (2022) have found that post-tax indicators are more likely to indicate a trade-off between inequality reduction and carbon emissions.

In this paper, we estimate the effect of income inequality on consumption-based (CBE) and production-based (PBE) CO_2 emissions using a sample of 156 countries from 1995 to 2020. In line with Blanchet et al. (2022), we differentiate between changes in inequality resulting from structural changes (pre-distribution) and in-kind/in-cash transfers (redistribution), which is calculated as the difference between pre-tax and post-tax inequality. To ensure the validity of our estimates, we utilize various inequality indicators and estimation techniques. The main findings of this study offer new insights into the inequality-emission nexus. In the benchmark model, the reduction of inequality through pre-distribution (structural changes & social protection) yields improved environmental outcomes compared to redistribution (transfers) in high and middle-income countries. A more detailed investigation on pre-distribution indicates that it has worse environmental implications in terms of production-based emission than consumption-based emission. This possibly highlights greater challenges that producers of polluting commodities face during a just transition process. Consequently, this study argues that structural changes towards in conjuction with social protection, are pivotal elements of a successful just transition process (Carrosio and De Vidovich, 2023; European Commission, 2023).

This work presents three novelties in comparison to the current literature. First, we compare the effects of inequality reduction through transfers (redistribution) with inequality reduction through structural changes (pre-distribution) on two kinds of CO_2 emissions, namely production and consumption-based emissions. Previous studies have focused on a specific type of inequality and emission indicators without fully exploiting their theoretical differences (Grunewald et al., 2017, Rojas-Vallejos and Lastuka, 2020, Wan et al., 2022). The theoretical background is discussed in greater detail in Section 2.3.1. By calculating the difference between pre and post-tax inequality, we provide an indicator of the level of redistribution, expressed in the same measurement unit as the pre-tax indicator, which makes their effects comparable. Second, this approach is applicable in the same model as pre-tax inequality without correlation issues. In addition, this approach allows us to avoid dealing with the issue of redistribution seemingly increasing income inequality in a few countries, as evidenced by the data from the WID, 2024. However, a simple comparison of models using pre and post-tax indicators suggests similar results (Appendix C, Table A.10 - C.16). Through these transformations we can compare the effects of pre-distribution and redistribution on different measures of emission patterns.

Second, we employ novel emission and inequality estimates. Consumption-based CO_2 emissions per capita are retrieved from the World Inequality Database (WID) and have been calculated by Burq and Chancel (2021) and Chancel (2022). Their estimates are based on data from the Global Carbon Project, but their coverage has been extended via external sources (EORA database). It is worth noting that only three studies have employed CBE to assess the income inequality-emission nexus so far (Baležentis et al., 2020, Baloch and Danish, 2022, Dorn et al., 2024). However, using CBE allows to examine the inequality-emission nexus while accounting for environmental justice and unequal exchange. The production-based emission of country A may be reduced if polluting production is outsourced to country B, while consumption-based emissions remain unchanged or even increase as a result of transportation costs. This is not accounted for in previous studies. The post-tax indicators have also been retrieved from the WID. Previous studies have relied on the post-tax Gini estimates of the Standardized World Income Inequality Database (SWIID) by Solt (2009). However, this database has the disadvantage that estimates are obtained by employing a custom missing-data multiple-imputation algorithm using the Luxembourg Income Study (LIS) methodology as the standard (Grunewald et al., 2017, Rojas-Vallejos and Lastuka, 2020, Wan et al., 2022). Finally, we employ quantile and FE panel models, thus ensuring the robustness of our results while applying two frequently used methods in the literature that previously exhibited contrasting results (Hübler, 2017).

Third, the dataset utilized in this study covers 156 countries over a time span of 26 years, ranging from low to high-income countries. The benchmark model contains 3848 observations per variable, which represents a significant increase in comparison with previous studies (Grunewald et al., 2017, Wan et al., 2022). The coverage of both the main indicators for carbon emissions and inequality and the control variables, including *civil liberties*, *renewable energy consumption* (% of total final energy consumption), *GDP per capita*, *industry value added*(% of GDP), and other frequently employed control variables in the literature exhibit exhibits almost no missing values. Table 2 provides an overview of the variables. Previous studies lacked observations in low and middle-income countries. Consequently, this required researchers to either exclude these countries from the analysis or impose higher uncertainty on their estimates. Thus, low and middle-income countries are typically underrepresented in studies examining the inequality-emission nexus (Baležentis et al., 2020; Dorn et al., 2024; Grunewald et al., 2017; Rojas-Vallejos and Lastuka, 2020; Wan et al., 2022). In contrast, the dataset utilized in this study provides comprehensive data on almost all low and middle income countries.

The aim of this analysis is to provide policy recommendations for joint inequality and carbon emission reduction while acknowledging the inherent complexity of this agenda. The analysis will be organized as follows: Section 2 will elaborate on the theoretical and the empirical framework of this analysis. Section 3 will describe the data and elaborate on the methodological approach. Section 4 will present the results, while Section 5 discusses and concludes.

2 Literature Review: Inequality-Emission nexus

Two main arguments and their transmission channels have been proposed to explain the relationship between inequality and emissions: the political economy argument and the consumption argument. We will review these two mechanisms and further discuss the theoretical differences of the inequality and carbon emission indicators employed in this paper.

2.1 The Political Economy Argument

The political economy argument developed by Boyce (1994) and Torras and Boyce (1998) assumes positive synergies between inequality and emission reduction. Thus, it postulates that a more equitable distribution of income equals a more equitable distribution of power. Inequality reduction enhances the political influence of those who bear the costs of pollution relative to those who profit from environmental degradation. To better understand these mechanisms, we will take a closer look at the core assumptions on which the argument is based.

First, low-income households bear the costs of environmental degrading activities while the affluent profit from them. Indeed, many empirical studies showed that the poor as well as ethnic minorities are usually the most affected by negative environmental impacts (pollution, extreme weather events, etc.), while the rich are responsible for them (Ash and Boyce, 2018, Otto et al., 2019, Palagi et al., 2022, Starr et al., 2023). On the other hand, there is little research on the assumption that the wealthy class benefits the most from environmental degradation. Boyce (1994) and Boyce (2007), focusing on industrial pollution, suggest that the rich are the beneficiaries of polluting activities. Accordingly, Roemer (1993) hypothesises that the income of the affluent depends on the reduction of production costs. Other studies do not address this question and solely deal with the the demand of different income groups for better environmental policies (Berthe and Elie, 2015). In the case of CO_2 emissons, we hypothesize a direct and indirect link. The rich profit from carbon-emitting industries by owning them directly or through shares. In addition, wealthy and affluent people profit relatively more from the possibilities many carbon-intensive industries provide (e.g. aviation). The increased global mobility of the wealthy enables them to access the best educational and employment opportunities, thereby consolidating their influential position. The mobility, coupled with the acquisition of luxury goods, also allows the affluent to cultivate beneficial international social relations that may, in the future, yield tangible benefits. (Bourdieu, Richardson, et al., 1986).

Second, the rich do not demand environmental policies but those most affected by climate change. Scruggs (1998) argues based on Inglehart (1990) that once short-term material needs are satisfied, individuals tend to adapt post-materialist values and request environmental policies. For Scruggs (1998), the rich are those who demand environmental action. However, this might not influence their individual carbon footprints (Barros and Wilk, 2021). On the other hand, Martinez-Alier (2014) points out that poor and indigenous populations involved in resource extraction conflicts around the world have always been the backbone of the environmental justice movement. Furthermore, Dechezleprêtre et al. (2022) documents in a survey including respondents from twenty major emitting countries overall support for climate action across income deciles. The support for specific policies depends on three factors: effectiveness, fairness and one's interest. Thus, low income households could hesitate to support specific environmental policies like CO_2 taxes if they are perceived as socially regressive (Dechezleprêtre et al., 2022; Douenne and Fabre, 2022; Wier et al., 2005). Furthermore, Andre et al. (2024) reports exceptional high support for climate mitigation in nations that are most affected by climate change. Consequently, we argue that the support of marginalized households for climate action is contingent upon the perceived regressiveness of the climate policy.

Finally, the political system needs to allow for transmitting the demands for environmental policies. Whether low-income or high-income households demand environmental policies, the political system plays a pivotal role. Roemer (1993) distinguishes between two decision-making models. In the first, dominant social groups in unequal societies are able to enforce their political demands. In the second case, the demands of the median electorate are those who will enter into force. If we accept the premise that low-income households bear the cost of environmental degradation while the rich benefit from it, then the outcome of the political argument depends on two factors: first, who might demand environmental polices and second, if the political system allows for transmitting these demands (Berthe and Elie, 2015). However, the transmission of the demands of those who are most affected can be aggravated if the costs of consumption-related environmental degradation are displaced to other countries (Roca, 2003). We suppose that this is the case for CO_2-emissions. In this analysis, we account for this channel by utilizing the variable "Civil Liberties" from the Freedom House Index, which has already been proposed as an adequate measure by Torras and Boyce (1998).

2.2 The Consumption Argument

In contrast, the consumption argument, proposed by (Heerink et al., 2001; Ravallion et al., 2000), posits a trade-off between social justice and environmental action, with the marginal propensity to consume being higher at the bottom of the income distribution. Kahn (1998)'s study on the efficiency of cars being higher among richer households is the basis of Heerink et al. (2001)'s assessment of the individual Environmental Kuznets Curve (EKC) for the inequality-emission nexus, which argues that higher inequality implies less emissions. Carbon emissions are lowest among the poor and the rich while they are highest in the middle of the income distribution. However, the carbon inequality literature has demonstrated that the carbon footprint of the rich exceeds those of the median citizen by a considerable margin (Chancel et al., 2022). This would advocate a positive relationship between inequality and carbon emissions. Therefore, it is necessary to consider the reason why the nexus might still be negative. Consumption levels do not necessarily determine the elasticity of consumption. In particular, in low-income countries, high levels of income inequality prevent individuals at the lower parts of the income distribution from accessing energy supply, private ownership of cars and the purchase of internationally produced products (Heerink et al., 2001; Dorn et al., 2024). Thus, low-income earners' elasticity of consumption might be higher than those of high-income earners. Nevertheless, studies focusing on the elasticity of consumption disregard the environmental impact of savings (Berthe and Elie, 2015).

Nevertheless, it is not only the act of consumption that matters, but also the nature of the consumption itself. Veblen (1899) posits in his theory of conspicuous consumption that higher levels of inequality exacerbate status competition. Additionally, high levels of inequality may increase the desire of the poor to emulate the lifestyle of the rich (Veblen, 1992). An alternative interpretation of this theory could suggest that status competition for environmentally friendly goods, although this is not observed in reality (Berthe and Elie, 2015), might nevertheless be a factor. Further, income inequality might increase the social pressure to consume private goods, increase short-terminism and undermine social cohesion and trust. Thus, studies focusing only on the marginal propensity to consume often disregard the holistic effect of income inequality (Berthe and Elie, 2015; Boyce, 1994; Boyce, 2007; Wilkinson and Pickett, 2010). It is important to note that the reduction of inequality may initially have an adverse effect on the environment in unequal societies, as low-income households attempt to emulate the lifestyle of the rich. However, over time, this may become beneficial for the environment. It is reasonable to assume that values change only slowly over time. This matter is worthy of further investigation, as it may help to explain the empirical results observed by Andersson (2023), who observed a negative inequality-emissions nexus until 1980 in the US and a positive afterwards.

2.3 Empirical Background

We will now turn our attention to the empirical literature on the relationship between income inequality and emissions. Overall, the results of this body of research are inconclusive, varying depending on the time frame, country group, indicators and methods employed. A number of studies have found a positive correlation between inequality and emissions (Hailemariam et al., 2020; Jorgenson et al., 2017; Knight et al., 2017). Conversely, the application of methodological approaches that account for non-linear effects, as evidenced by Chen et al. (2020), Hübler (2017), and Sager (2019) finds empirical evidence for the consumption argument. A considerable body of research has implicitly linked the impact of inequality on carbon emissions to GDP levels. Typically, the relationship is perceived to be negative in low- and middle-income countries but becomes positive in high-income countries (Grunewald et al., 2017; Jorgenson et al., 2016; Rojas-Vallejos and Lastuka, 2020). Nevertheless, further studies have challenged this idea. Among them are Baležentis et al. (2020), Chen et al. (2020), and Guo et al. (2022) and Uzar and Eyuboglu (2019), who find a positive association between the Gini Index and emissions in developing countries. However, all four studies did not control for the role of the political system. Furthermore, recent studies highlight the role of the inequality indicators chosen for the analysis (Safar, 2022). The application of post-tax measures appears to be more likely to yield negative results in the same country (Andersson, 2023; Jorgenson et al., 2017; Sager, 2019). Furthermore, the nexus appears to be capable of reversing its sign over time (Andersson, 2023; Uddin, 2020). Finally, only a few studies investigate the nexus between inequality and consumption-based emissions (Baležentis et al., 2020; Dorn et al., 2024). Table 1 provides an overview of the empirical work related to this study. By employing several estimation techniques, inequality and emission indicators this study sets out to explore the reason behind contradicting results that different measure of inequality yield.

2.3.1 Various inequality and carbon measures: What theoretical differences and policy implications?

The present study examines the impact of changes in inequality on consumption- and production-based CO_2 emissions, with a focus on the effects of market outcomes (pre-distribution) and

Table 1: Summary of related empirical studies

Geographic scale	Time	Emission measure	Inequality measure	Estimation technique	Results	N	Authors
Studies in developed countries							
50 US states	1997-2012	production-based CO_2-emissions per capita	Gini & top 10%	Prais-Winsten regression model with panel-corrected standard errors and RE-models	insignificant for Gini, positive for top 10%	816	Jorgenson et al., 2017
US	1997-2012	consumption-based CO_2-emissions of households	post-tax income	IO-Analysis	negative relationship	-	Sager, 2019
17 OECD countries	1945-2010	production-based CO_2-emissions per capita	Gini & top 10% (pre-tax)	dynamic common correlated effects based on mean group estimators	negative for Gini, positive for top 10%	1054	Hailemariam et al., 2020
G7	1870-2014	production-based CO_2-emissions per capita	Gini (post-tax)	non-parametric estimation (LLDVE method)	positive 1970-1880, negative 1950-2000, otherwise insignificant	357	Uddin et al., 2020
France	1945-2010	production-based CO_2-emissions per capita	Gini & top 10% (pre-tax, and post-tax)	ARDL model	insignificant, positive for pre-tax, negative for post-tax measures	39	Safar, 2022
US	1929–2019	production-based CO_2-emissions per capita	Gini & top 10%, top 1% (pre-tax)	Linear regression model and a smooth-varying coefficients model	negative until 1980, positive afterwards	91	Andersson, 2023
Studies in developing countries							
ASEAN-5	1985-2015	production-based CO_2-emissions	Gini overall and for the bottom 40%	Panel regression and granger non-causality test	overall mixed results, negative relationship between for the bottom 40%.	155	Muhammad Mehedi Masud and Saiful-lah, 2018
Turkey	1963–2011	production-based CO_2-emissions	Gini	ARDL model	negative in the long-run, positive in the short-run	49	Demir et al., 2019
Turkey	1984-2014	production-based CO_2-emissions	Gini	ARDL model	positive association long- and short-run	31	Uzar and Eyuboglu, 2019
48 Sub-Saharan African countries	2010-2016	production-based CO_2-emissions	Poverty headcount ratio at $1.90/day (%)	Quantile Regression Estimation	negative relationship	336	Koçak et al., 2019
46 Sub-Saharan African countries	2010-2016	Ecological Footprint	Poverty headcount ratio at $1.50/day (%)	D–K regression	negative relationship	321	Baloch et al., 2020
18 Asian developing countries	2006–2011	Ecological Footprint	Gini (post-tax)	D–K regression	negative relationship	216	Khan et al., 2022
Studies worldwide							
158 countries	1980-2008	production-based CO_2-emissions per capita	Gini (post-tax)	(group) FE Panel model	negative for low- & middle-, positive for high-income countries	2939	Grunewald et al., 2017
149 countries	1985-2012	production-based CO_2-emissions per capita	Gini (pre-tax)	Quantile Regression Estimation	negative relationship	863	Hübler, 2017
68 countries	1961-2010	production-based CO_2-emissions per capita	Gini (post-tax)	FE panel estimation technique & others	negative for low-, positive for high-income countries; level of inequality influences the magnitude of the effect	615	Rojas-Vallejos and Lastuka, 2020
17 G20 countries	1988-2015	production-based CO_2-emissions per capita	Gini (post-tax)	Quantile Regression Estimation	positive for developing countries, negative or insignificant for developed countries (no institutional var.)	472	Chen et al., 2020
217 countries	1960-2021	production-based CO_2-emissions per capita	Gini (post-tax)	instrumental variable approach	negative relationship	2795	Wan et al., 2022
109 countries	1960-2019	consumption-based CO_2-emissions per capita	Gini (post-tax)	bivariate distributional copula regression	negative for low-, no effect for high- income countries	2866	Dorn et al., 2024
109 countries	1990-2014	consumption-based GHG-emissions per capita	Gini (post-tax)	partially linear regression	mixed results, positive for countries with low-income & inequality, level of inequality seems to matter	801	Baležentis et al., 2020

transfers (redistribution). Different inequality and emissions indicators have distinct theoretical foundations and policy implications. To illustrate this, we will proceed with the case of pre-tax and post-tax inequality indicators. On the one hand, changes in market inequality (pre-tax) can be achieved through structural changes (public policies for new green sectors) as well as changes in the market outcome of the income distribution (union bargaining, social insurance benefits). Conversely, achieving equity through transfers (redistribution) may entail implementing measures such as tax and dividend policies (carbon taxes) (Douenne and Fabre, 2022), a universal basic income (UBI) and other transfer policies that affect post-tax inequality outcomes. As argued by Büchs (2021), these two distinct approaches to combating inequality may affect carbon emissions stemming from the consumption-side as well as the production side of the economy in different ways. The use of CBE in this study allows to account for environmental justice and unequal exchange, as carbon emissions are reallocated to the country where the consumption occurs rather than where the production takes place (Burq and Chancel, 2021; Chancel, 2022). PBE estimates the polluting production within the borders of a country. Differences between these variables can provide valuable policy insights into the challenges that producing and consuming countries face in the context of the SDGs. Based on these considerations, we hypothesize that reducing inequalities pre-tax is preferable for the environment than reducing them by transfers, since it decreases the magnitude of the Veblen effect. Furthermore, decreasing inequalities could have higher environmental costs in countries where polluting production is carried out.

The pivotal role of structural changes accompanied by social protection for a "just transition" process has been advocated by several international institutions, first and foremost by the International Labour Organisation (ILO (ed.), 2019; ILO (ed.), 2023; Rigolini, 2021). Social protection helps to address the challenges of intensified risks and changing working requirements during the green transition. In addition, it may positively influence the support for environmental policies (Dechezleprêtre et al., 2022; Douenne and Fabre, 2022). The results of this paper confirm that social protection policies during a just transition process are also ecologically speaking a suitable measure for inequality reduction. Against the common belief that economic growth will once allow countries to "grow out" of environmental problems (Anand and Kanbur, 1993; Grossman and Krueger, 1991; Grossman and Krueger, 1995), several scholars have highlighted that a green transition is not feasible without major changes in the structure of the economy accompanied by the construction of a socio-ecological welfare state (Carrosio and De Vidovich, 2023; Hickel and Kallis, 2020; Kallis, 2011; Svartzman and Althouse, 2022). Moreover, this involves also taking into account global power imbalances and hierarchies (Hickel et al., 2022; Svartzman and Althouse, 2022). From an ecological perspective, this analysis advocates for policies that decrease inequality through changes in the market outcomes (structural changes, social protection, caps on rents) rather than through ex post redistribution in line with Gough (2013) and Berthe et al. (2022)). However, within the global framework of production, this imposes higher challenges on producing countries.

3 Data and methods

In this paper, we utilise an unbalanced panel dataset spanning from 1995 to 2020, which contains observations from 156 low to high-income countries. The dataset comprises 4056 observations per variable, with 3848 in the benchmark model. This is a significant increase in scope compared to previous studies (Grunewald et al., 2017; Wan et al., 2022; Dorn et al., 2024). The core of of this extensive dataset comprises various pre- and post-tax inequality measures, as well as two measures of carbon emissions (CBE & PBE). The present study employs fixed effects (FE) panel and quantile regression estimation techniques in order to exploit the advantages of both approaches. While FE models help to mitigate potential biases stemming from cultural norms and institutional frameworks, quantile regression models account for the postulated non-linearities of the inequality-emission nexus (Grunewald et al., 2017; Dorn et al., 2024). Furthermore, quantile regression estimation techniques do not impose the conditions of homoskedasticity and normality on empirical models (Chen et al., 2020). The following sections discuss the employed data and estimation techniques.

3.1 Dependent Variables

Consumption-based CO_2-emissions are measured as the National CO_2 footprint per capita in tons of CO_2 equivalent emissions and are retrieved from the World Inequality Database (WID, 2024). The use of CBE enables the reallocation of emissions to the country where the consumption occurs rather than where the production takes place, thus accounting for the role of trade and global value chains. The estimates are calculated by Burq and Chancel (2021) & Chancel (2022), who primarily rely on the high-quality estimates from the Global Carbon Project (2024) (GCP). However, Burq and Chancel (2021) extends these estimates by combining them with external sources (EORA database), thus providing a wider coverage of CBE and their respective institutional sectors. Previous studies have relied on data directly from the GCP or the Global Footprint Network (Dorn et al., 2024; Baležentis et al., 2020; Khan et al., 2022), which contain less detailed information than the data used in this study. Furthermore, this study utilizes production-based CO_2 emissions in metric tons per capita from the World Development Indicator Databank (WDI (ed.), 2024). This indicator, which is widely used in academic literature, contains annual carbon dioxide emissions stemming from the burning of fossil fuels and the manufacture of cement.

3.2 Key independent variables

The core of this analysis is based on the pre and post-tax estimates of the Gini Index, the income share of the top 10% and bottom 50% from the WID (2024). We calculate the difference between the pre and post-tax inequality measures to assess the level of redistribution within the countries and call them "red. Gini", "red. top10" and "red.bot50". Thus, in the present study information provided by both, pre-tax and post-tax estimates can be employed in the same model and the magnitude of their respective effects can be compared without concern for multi-collinearity issues. In addition, it allows for the consideration of different notions of inequality in specific countries. Six out of 156 countries in our sample exhibit with a higher income share of the top 10% after redistribution in at least one year of our time frame. This is the case for Angola, Brazil, the Dominican Republic, Peru, Qatar and Suriname. With regards to the Gini Index, redistribution is regressive only in the case of Angola and Qatar, while the income share of the bottom 50% remains unchanged following transfers. This indicates that these countries redistribute income from the middle to the upper class. While this study will mainly focus on the Gini Index as an inequality measure, the findings highlight the necessity to verify the robustness of the obtained results with the top 10% and bottom 50% measure as well.

The Gini Index is selected as the main indicator of inequality in this analysis, as it allows the examination of the effect of the average inequality of a country (scale 0 - 100) on carbon emissions. However, the Gini Index does not directly indicate the location where inequality occurs. Consequently, it can be distorted by variations in earnings between low and middle-income households. In contrast, the top 10% measure better captures political economy and Veblen effects since it is more influenced by the political power of the affluent as well as status competition (Jorgenson et al., 2017). The share of the bottom 50% has not been utilized in the literature yet. However, we hypothesize that this measure will account best for the effect of poverty alleviation in highly unequal countries, where the majority of the population lives under poor circumstances. In addition, it estimates the political influence of low-income households.

One of the main novelties of this study is that we exploit the theoretical differences between pre and post-tax estimates of inequality. The recently published post-tax inequality estimates of the WID (2024) allow for the assessment the environmental impact of inequality reduction by structural changes and transfers. With regards to post-tax measures, previous studies have employed the post-tax Gini Index by SWIID Solt (2009), which has the disadvantage that estimates are obtained by employing a multiple imputation algorithm based on the Luxembourg Income Study. In contrast, the WID post-tax estimates allocate the entirety of tax revenue and public expenditure to individuals. This is achieved by combining household surveys, national accounts, government budgets, tax simulators, and existing fiscal incidence studies within the methodological framework of Distributional National Accounts (DINA) (Fisher-Post and November, 2023; Blanchet et al., 2024). The post-tax indicators are calculated by taking the pre-tax national income and subtracting all taxes on production, income and wealth, plus social assistance benefits in cash. Conversely, pre-tax income inequality is calculated on the basis of the total sum of income flows accruing to owners of production factors (labour & capital), before the effects of the tax- and transfer system, but after the operation of the social insurance system (Blanchet et al., 2024). These differences allow the current paper to differentiate between the effect of pre-distribution and redistribution in the subsequent analysis.

Table 2: Descriptive Statistics of the main variables (1995-2020)

Variable	Mean	Median	Standard Deviation	Min.	Max.	N.obs.	Source
Consumption-based CO_2-emissions (CBE)	5.829	3.054	7.890	0.016	92.075	N = 4056	WID
Production-based CO_2-emissions (PBE)	4.642	2.676	5.821	0.022	47.657	N = 4056	WDI
pre-tax Gini	0.571	0.583	0.091	0.322	0.781	N = 4056	WID
red. Gini	0.054	0.034	0.049	-0.002	0.267	N = 4051	WID
GDP per capita	18629.4	11059.0	20092.07	459.9	120647.8	N = 4027	WDI
pop. Urban (%)	56.917	57.358	22.486	7.211	100.000	N = 4056	WDI
Renewable Energy Consumption (%)	34.83	26.26	30.735	0.00	98.34	N = 4041	WDI
Civil Liberties	3.414	3.000	1.769	1.000	7.000	N = 4034	Freedom House Index
Industry VA (%)	27.949	25.620	11.469	3.243	86.670	N = 3914	WDI
Agriculture VA (%)	12.173	8.130	11.801	0.030	79.042	N = 3956	WDI
Services VA (%)	52.33	52.95	11.621	10.86	93.63	N = 3891	WDI

Notes: The logarithm is taken for CBE, PBE & GDP in the subsequent analysis

3.3 Other control variables

The benchmark model of this paper controls for various factors following previous studies, including Jorgenson et al. (2017), Grunewald et al. (2017), Dorn et al. (2024) and Baloch and Danish (2022). The most relevant control variables are described here. GDP per capita in purchasing power parity is retrieved from the WDI (ed.) (2024) and is expressed in constant 2017 International Dollars. Furthermore, the World Development Indicators provide us with data on the proportions of value added by agriculture, manufacturing, and the service sector as percentages of total GDP, along with the percentage of the population in urban areas and the share of renewable energy consumption of total energy consumption. Furthermore, the model incorporates the "Civil Liberties" variable from the Freedom House Index to account for the political channel proposed by Boyce (1994). All of these variables are part of the benchmark model. A summary is provided in Table 2.

Furthermore, we control for the weighted mean effectively applied tariff rate following the methodology proposed by Rojas-Vallejos and Lastuka, 2020 in the extended IV model, in order to check for the robustness of the previously obtained findings. The results for the IV model are depicted in Appendix B, Figure B.1 - Table B.8 and confirm the findings of the benchmark model. Finally, the dataset was divided into four income groups: low, lower-middle, upper-middle-, and high-income groups following the methodology of Grunewald et al. (2017), Rojas-Vallejos and Lastuka (2020) & Dorn et al. (2024). The groups are subdivided in accordance to the World Bank's classification of country groups (World Bank, 2020). This allows for the proposed dependency of the relationship between inequality and CO_2 emissions on income to be taken into account. Appendix A, Table A.1 provides a detailed list of included countries.

3.4 Model Estimation Techniques

This paper uses both linear panel and quantile regression estimation techniques following previous empirical works (Grunewald et al., 2017; Rojas-Vallejos and Lastuka, 2020; Hübler, 2017; Chen et al., 2020). The advantages and disadvantages of these techniques are discussed in more detail below.

3.4.1 Fixed Effects (FE) panel estimation techniques

FE panel models are static approaches that have the advantage of mitigating potential biases due to unobserved time-invariant factors such as cultural norms, institutional frameworks and social infrastructure by employing country and year fixed effects (Grunewald et al., 2017; Rojas-Vallejos and Lastuka, 2020). This is well suited to the needs of this analysis. Indeed, empirical research often faces limitations when trying to account for the effects of social and cultural norms. However, FE panel models can control for these constant unobserved factors. Nonetheless, they do not account for time-varying influential factors, which is the reason we employ different control variables discussed in Section 3.3 in the following FE models (Boyce, 1994; Berthe and Elie, 2015; Rojas-Vallejos and Lastuka, 2020).

Following Wooldridge (2013) and Box and Cox (1964), we determine the most reliable function of the FE model as follows.

$$\ln(c_{it}) = \beta_0 + \beta_1 \alpha_{it} + \beta_2 \sigma_{it} + \beta_3 \ln(y_{it}) + X\beta + \delta_i + \lambda_t + \epsilon_{it} \quad [1]$$

where:

- c_{it} denotes the logarithm of CO_2 emissions (either PBE or CBE) per capita for country i at time t,
- α_{it} is the measure of pre-tax inequality, represented by the Gini-Index for country i at time t,
- σ_{it} is the measure redistribution, defined as the difference between the pre-tax and post-tax Gini.
- y_{it} is the logarithm of GDP per capita for country i at time t,
- X is a matrix of control variables excluding inequality measures and GDP per capita,
- δ_i represents country time-invariant unobservable heterogeneity (country fixed effects),
- λ_t captures time fixed effects that account for common temporal shocks, and
- ϵ_{it} is the idiosyncratic error term.

The logarithms of the carbon emission indicators, GDP per capita and tariffs are calculated to ensure the normality assumption of the Ordinary Least Squares (OLS) estimator. In addition, the correlations between the variables used in the analysis are presented in Table A.2, Appendix A. As in previous studies, this research faces minor problems of autocorrelation. GDP per capita is highly correlated (≈ 0.8) with Agriculture VA (%) and the rate of urbanization (%). However, as shown in Table 3 & 4, adding or removing these correlated variables from the analysis does not change the model results. The robustness of the findings of this model is further ensured by re-estimating the models for CBE and PBE using different panel estimation techniques as well as the income share of the top 10% and bottom 50%.

In addition to the assumptions of normality, autocorrelation & multi-collinearity, the OLS estimator is the best linear unbiased estimator (BLUE) only if the standard errors of the described model are homoskedastic. This means that the variance of the error term has to be constant over all observations. In fact, the variance formula that determines the significance of the results of this study would no longer be valid if heteroskedasticity is present. We test for this assumption using the Breusch-Pagan test, originally proposed by Breusch and Pagan (1979). For all models, the test indicates the presence of heteroskedasticity. However, White (1980) & Wooldridge (2013) provide a mathematical solution to this problem. Following the latter, we compute robust standard errors for the models of this study as follows (2).

$$\widehat{\text{Var}}(\hat{\beta}_j) = \frac{\sum_{i=1}^{n} \hat{r}_{ij}^2 \hat{u}_i^2}{\text{SSR}_j^2} \quad [2]$$

where $\hat{r}_{ij}$ denotes the i^{th} residual from regressing x_j on all other independent variables, $\hat{u}_i$ the error term of the i^{th} residual and SSR_j the sum of squared residuals. This transformation overcomes the limitations of heteroskedasticity in the static panel models of this paper and ensures the validity of all estimators. For further explanation see Wooldridge (2013), p. 269 - 275.

3.4.2 Other linear panel estimation techniques

As mentioned above, we additionally re-estimate the previous linear panel model with two alternative model specifications suitable for panel data. First, random effects (RE) and second, pooling models. Both of them have already been used in research area (Jorgenson et al., 2017; Grunewald et al., 2017). The difference between these models lies in the treatment of the error term, which usually consists out of constant individual and time fixed effects and an independent well-behaved idiosyncratic error term. The general error term can be written as follows.

$$u_{it} = \mu_i + \lambda_t + \epsilon_{it} \quad [3]$$

where μ_i is the constant individual effect, λ_t the constant time effect and ϵ_{it} the idiosyncratic error term. In equation [1], country and year fixed effects have been included to be part of the general disturbance term. This assumes that the individual error component μ_i and the time component λ_t are correlated with at least one of the other regressors in the model. On the other hand, random effects models produce the most efficient estimators, if and only if the individual error component of the model is independent of the other regressors in the model. Estimates from pooling models are BLUE when the individual error component of the model is completely missing (Croissant and Millo, 2008; Wooldridge, 2013). In general, we assume that constant unobserved factor such as cultural norms, institutional frameworks and common time-specific shocks influence the results of the present research. These factors are likely to be correlated with other influential factors like GDP or inequality itself. Therefore, this study relies primarily on the fixed effects estimators in the linear panel estimation. Nevertheless, we re-estimate the results of the benchmark model with RE- as well as pooling estimation techniques. Robust standard errors accounting for heteroskedasticity are applied to all models, calculated as shown in equation [2]. The results of our RE and pooling estimations are presented in the Appendix A, Table A.7 - A.9 and confirm the main findings of this research.

3.4.3 Quantile regression estimation techniques

However, the relationship between inequality and carbon emissions is deemed to be highly non-linear (Uddin et al., 2020; Andersson, 2023; Hübler, 2017). Quantile regression, originally proposed by Koenker and Bassett (1978) assesses the effect of an independent variable on a dependent variable range and has two main advantages for this analysis. While traditional mean regression estimates are unable to address proposed non-linearities without choosing ex ante the condition, quantile regression is a suitable technique to address this issue. Furthermore, quantile regressions do not impose the conditions of homoskedasticity and normality on the variables (Chen et al., 2020). Indeed, when dealing with rather non-normally distributed variables, the results obtained from quantile regression are more reliable than those obtained from other regression techniques (Lin and Xu, 2018). In this study, the quantile regression models are estimated as follows.

First, we utilize the model specification from equation (1) without the fixed effects:

$$\ln(c_{it}) = \beta_0 + \beta_1\alpha_{it} + \beta_2\sigma_{it} + \beta_3\ln(y_{it}) + X\beta + u_{it} \quad [4]$$

Here, u_{it} represents the entire disturbance term for country i at time t, as this model does not account for any constant effects. Otherwise, the notation is the same as in equation [1]. Following Koenker and Bassett (1978) and Chen et al. (2020), assuming that the population quantile of the conditional distribution $y|x$ is a linear function of x, the quantiles are obtained as follows:

$$y_q(x_i) = x_i'\beta_q \quad [5]$$

where β_q represents the estimated coefficient of the q quantile. Its estimator, denoted as $\hat{\beta}_q$, can be assessed by solving the minimized objective function below:

$$\min_{\beta_q} \sum_{i:y_i \le x_i'\beta_q} q|y_i - x_i'\beta_q| + \sum_{i:y_i > x_i'\beta_q} (1-q)|y_i - x_i'\beta_q| \quad [6]$$

The $\hat{\beta}_q$ for different quantiles can be obtained by varying the parameter q. The unknown parameters can be determined using linear programming techniques as proposed by Buchinsky

(1995). Before the results of this research are presented, we are confronted with two more challenges. First, the asymptotic variance of the quantile regression estimator is dependent upon the error term's density. Consequently, constructing a 95% confidence interval would involve a direct non-parametric density estimation. Secondly, we test for conditional heteroskedasdicity utilizing the Breusch Pagan test (equation [2]), which reveals that the non-linear models presented in this study do not fulfill the assumption of conditional homoskedasticity. However, as shown by Hahn (1995), bootstrapping methods can be employed to achieve two objectives simultaneously. The design matrix bootstrap estimator proposed by Koenker and Bassett (1978) allows to circumvent a direct non-parametric density estimation since confidence intervals obtained by bootstrap percentile methods have asymptotically correct coverage probabilities. Furthermore, this approach enables the generation of robust standard errors. The present study is thus in a position to undertake a meticulous comparison of the impact of pre-distribution and redistribution on carbon emissions, with the benefit of the aforementioned methods.

4 Results

Table 3: The impact of pre-distribution/ redistribution on CBE (FE Model)

	Base. model	II. model	Bench. model	IV. model
	(log of consumtion-based emissions per capita)			
Pre-tax Gini	-0.990^{**}	-0.586	-0.686	-0.662^{*}
	(0.406)	(0.423)	(0.440)	(0.347)
Red. Gini	1.355^{*}	0.877	1.010	1.234^{**}
	(0.758)	(0.632)	(0.664)	(0.579)
GDP pc	0.731^{***}	0.607^{***}	0.596^{***}	0.650^{***}
	(0.107)	(0.113)	(0.117)	(0.120)
Pop. Urban		0.004	0.005	0.006
		(0.006)	(0.005)	(0.005)
Rnew. energy		-0.016^{***}	-0.014^{***}	-0.012^{***}
		(0.004)	(0.005)	(0.004)
Civil liberties			-0.013	-0.021
			(0.016)	(0.018)
Industry VA			-0.006	-0.005
			(0.005)	(0.005)
Agri. VA			-0.016^{*}	-0.026^{***}
			(0.009)	(0.010)
Services VA			-0.0003	-0.002
			(0.004)	(0.005)
Tariffs				0.019
				(0.027)
Observations	4,022	4,009	3,848	2,951
Adjusted R^2	0.171	0.272	0.301	0.340
F Statistic	337.1^{***}	336.6^{***}	204.7^{***}	171.1^{***}
	(df=3; 3838)	(df=5; 3823)	(df=9; 3658)	(df=10; 2761)
Note:		*p<0.1; **p<0.05; ***p<0.01		

Table 4: The impact of pre-distribution/ redistribution on PBE (FE Model)

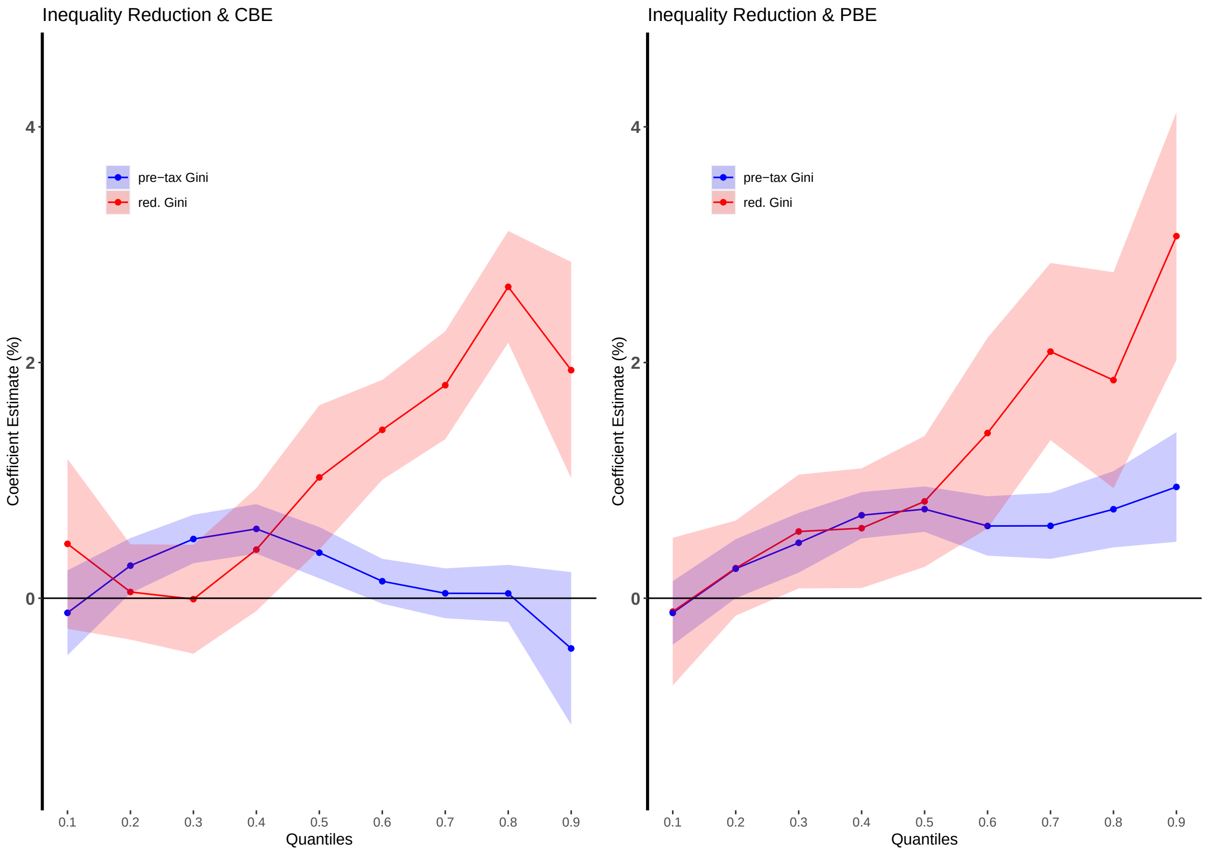
	Base. model	II. model	Bench. model	IV. model
	(log of production-based emissions per capita)			
Pre-tax Gini	-1.238^{***}	-0.512	-0.279	-0.532^{*}
	(0.465)	(0.332)	(0.311)	(0.290)
Red. Gini	1.850^{**}	0.987^{*}	0.948^{*}	1.294^{**}
	(0.804)	(0.558)	(0.544)	(0.519)
GDP pc	0.642^{***}	0.421^{***}	0.382^{***}	0.442^{***}
	(0.097)	(0.068)	(0.073)	(0.066)
Pop. Urban		0.008^{**}	0.007^{*}	0.008^{**}
		(0.004)	(0.004)	(0.003)
Rnew. Energy		-0.028^{***}	-0.027^{***}	-0.025^{***}
		(0.002)	(0.002)	(0.002)
Civil Liberties			-0.022^{*}	-0.010
			(0.012)	(0.011)
Industry VA			-0.001	0.001
			(0.003)	(0.003)
Agri. VA			-0.010^{***}	-0.012^{**}
			(0.003)	(0.005)
Services VA			-0.004^{*}	-0.004
			(0.002)	(0.003)
Tariffs				-0.017
				(0.013)
Observations	4,022	4,009	3,848	2,951
Adjusted R^2	0.168	0.560	0.582	0.597
F Statistic	332.0^{***}	$1,058.9^{***}$	615.7^{***}	455.5^{***}
	(df=3; 3838)	(df=5; 3823)	(df=9; 3658)	(df=10; 2761)
Note:		*p<0.1; **p<0.05; ***p<0.01		

Table 3 provides the estimates of four FE-models for consumption-based CO_2 emissions in 156 low to high-income countries between 1995 and 2020. The initial step in the analysis is the estimation of a baseline model, which controls solely for the pre-tax Gini Index, redistribution as measured by the Gini Index (post-tax) and GDP per capita. The estimated coefficients support the consumption argument of Ravallion et al. (2000) & Heerink et al. (2001), indicating a trade-off between inequality reduction and emissions. Nevertheless, a reduction in the pre-tax Gini by 1 increases consumption-based emissions by 0.99% at the 5% significance level, while the indicator for ex post redistribution exhibits an even more environmentally degrading effect: a decrease in the Gini by 1 through redistribution increases CBE by 1.35%. To account for the omitted variables bias, we systematically add control variables to the baseline model as described in Section 3.3. The II. model additionally contains the share of urban population (%) and the share of renewable energy consumption (%), while the benchmark model further expands the factors this study controls for to the political freedom indicator "Civil liberties" and the structure of the economy (share of value added in GDP of Industry, Agriculture and Services). Consistent with previous literature (Baloch and Danish, 2022), a highly significant negative influence of renewable energy consumption on CBE can be found. While the benchmark model contains all frequently proposed control variables, the IV. model additionally controls for the effect of trade barriers following the argumentation of Rojas-Vallejos and Lastuka (2020). Interestingly, across all models, the effect of inequality reduction via transfers has almost twice the environmental damaging effect as of inequality reduction pre-tax. Although the inequality indicators are not significant in the II. and benchmark models, the 95% confidence intervals indicate a clear direction of their effects (Wooldridge, 2013). The lack of significance in this model might be attributed to the non-linearities between the dependent variables and consumption-based CO_2-emissions.

Table 4 presents the same analysis for production-based CO_2 emissions. The results of these models indicate that there is a distinct impact of pre-tax inequality and redistribution on CO_2-emissions. The negative environmental effect of inequality reduction is in all models up to three times bigger if higher equality is achieved through transfers. These results are consistent across all inequality indicators, as shown in Appendix A, Table A.3-A.6. Furthermore, Appendix A, Table A.7 - A.9 presents the results of the re-estimation of the benchmark model specification with random effects and pooling models. It can bee observed that the direction, magnitude and significance of the explanatory variables across estimation techniques are similar to the effects observed in the FE models. Of particular importance for this analysis, the effect of redistribution consistently yields worse environmental outcomes than pre-distribution. Only for the pooling model regarding the effect of pre-distribution on consumption-based CO_2-emissions, the direction of the effect is reversed, having a positive sign. However, the regressor is fairly insignificant. The consistency of the estimators obtained in this study across panel estimation techniques is noteworthy when considering the mixed results in the literature (Jorgenson et al., 2017; Hübler, 2017; Mader, 2018). This highlights the robust findings obtained in this study.

The initial findings of this research align with the initial hypothesis that income inequality reduction through structural changes and social safety nets is more conducive to environmental outcomes than inequality reduction through transfers. Thus, we will proceed to expand the argument that pre-distribution is more environmentally friendly than redistribution and can support a just transition process. In fact, it seems reasonable to suggest that pre-distribution shapes social and cultural norms to a greater extent than redistribution. Consequently, it can restrict the extent to which individuals at the lower end of the income distribution emulate the lifestyles of the affluent (Veblen, 1992). Furthermore, pre-distribution might impose limits to the appropriation of developing country's environmental space by the affluent (Jorgenson, 2009).

Figure 1: The effect of pre-distribution and redistribution on CBE and PBE across quantiles



Notes: bootstrapped standard errors

To account for the potential non-linearities discussed above, we proceed by estimating the benchmark model from Table 3 & 4 with quantile regression techniques. Figure 1 depicts the effect of inequality reduction by pre-distribution and redistribution on consumption-based (left-hand side) and production-based (right-hand side) CO_2 emissions across quantiles. Table A.10 and A.11 in Appendix A provide the underlying quantile regression estimations. Figure 1 shows that for both countries with high per capita CBE and PBE, pre-distribution has better environmental implications than redistribution. However, there are differences across quantiles between the two estimations. In the lower quantiles of the model for CBE (left-hand side) pre-distribution has a low but significantly positive effect on CBE while the effect of redistribution cannot be said to be different from zero. For PBE (right-hand side), the effects of both pre-distribution and redistribution exhibits the same pathways in the lower quantiles of the model. However, when examining the confidence intervals of the estimations in Figure 1, it is evident that for both CBE and PBE the method of inequality reduction does not influence consumption and production-based CO_2 emissions per capita until the 5^{th} quantile differently. Therefore, the results do not provide clear policy implications for countries exhibiting low levels of per capita emissions. Consequently, redistribution always has a significantly higher environmental degrading impact than pre-distribution.

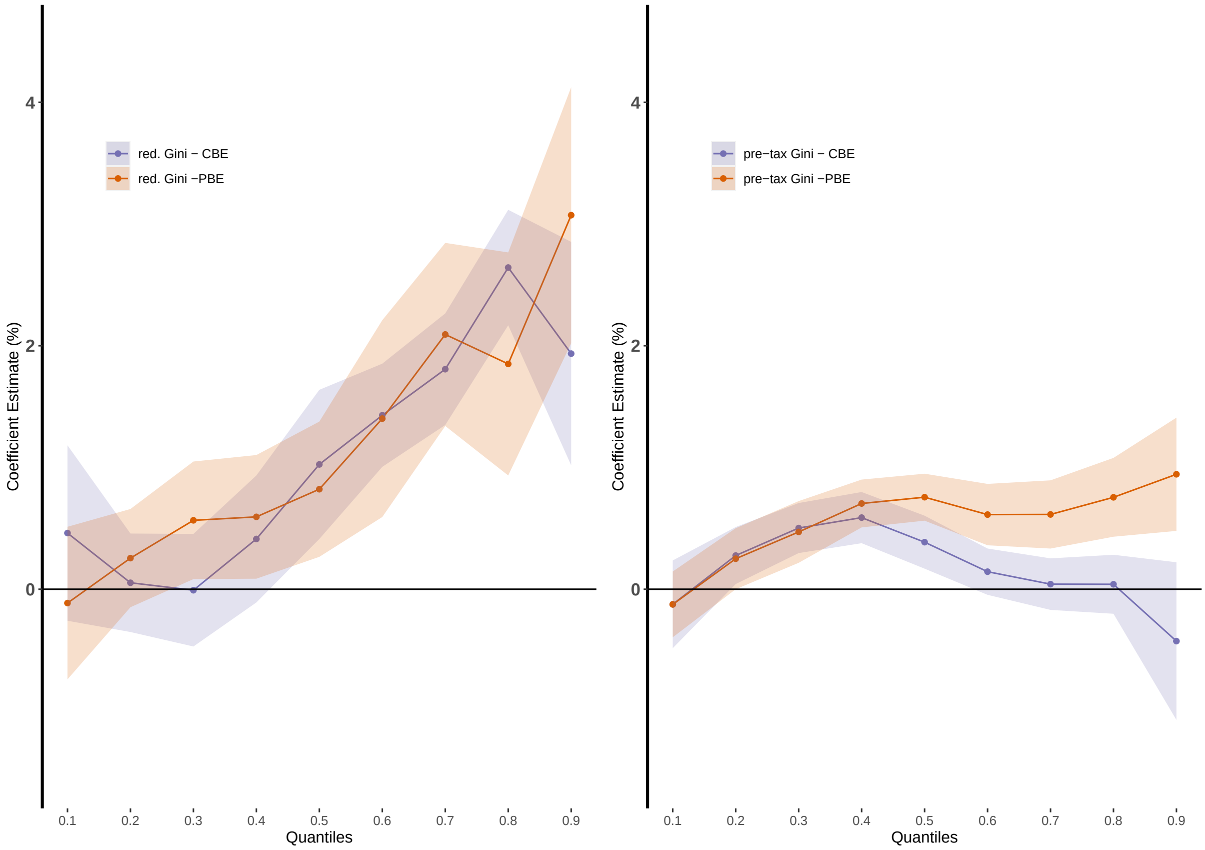
Although the effect of pre-distribution is insignificantly higher than the one of redistribution for a few lower quantiles of CBE, it would be premature to disregard these findings. In light of the existing literature on global unequal exchange (Jorgenson, 2009; Hickel et al., 2022), these results do not seem to be too surprising. The low average consumption levels within low-income countries leave them with more environmental space for redistribution within the ecological limits of the planet. Nevertheless, it can be argued that if low-income countries grow, pre-distribution through the building up of a public provisioning system has better long-term implications for the environment and inequality itself. Redistribution treats the symptoms of inequality, but not the causes.

The results of the quantile regression estimations presented in this paper offer a novel perspective on previous studies. For France, Safar (2022) finds that inequality reduction increases CO_2 emissions if the post-tax inequality indicator is utilized, while it decreases emissions when using the pre-tax indicator. A similar pattern can be found when comparing the studies of Jorgenson et al. (2017) & Andersson (2023)) for the US. The results of this research explain these differences through the nature of inequality reduction. Pre-distribution is more environmentally friendly than redistribution.

In accordance with the second initial hypothesis of this paper, as outlined in Büchs (2021), inequality reduction exerts a differential influence on CBE and PBE, contingent on the nature of the inequality reduction. Structural changes (pre-distribution) might result in an increase in production-based emissions but a decrease in consumption-based emissions. Figure 2 does not provide evidence that there are differences between the effect of redistribution (left-hand side) on consumption-based and production-based emissions across all quantiles. However, the effect of pre-distribution varies depending on the carbon emission indicator employed as can be seen on the right-hand side of Figure 2. For CBE, the effect of pre-distribution is insignificant from the 6^{th} quantile onwards, turning even insignificantly negative in the 9^{th} quantile. This suggests that pre-distribution and the reduction of CBE are compatible goals for the biggest global emitters, namely upper-middle and high-income countries. In contrast, pre-tax inequality reduction has a significantly positive effect on production-based emissions, which increases from the 1^{st} to the 4^{th} quantile and remains approximately constant afterwards. A statistical difference between the effect of pre-distribution and redistribution on PBE can be assessed from the 6^{th} to the 9^{th} quantile.

The adverse effect of pre-distribution for PBE in comparison to CBE will be explained by two arguments. First, referring to the literature on unequal exchange (Jorgenson, 2009; Hickel et al., 2022), we argue that countries where the majority of polluting production is carried out face greater challenges regarding joint inequality and emission reduction. In the model for PBE (Figure 1, right-hand side) reducing inequality always has a positive effect on CO_2-

Figure 2: Comparing the effect of pre-distribution and redistribution on CBE and PBE

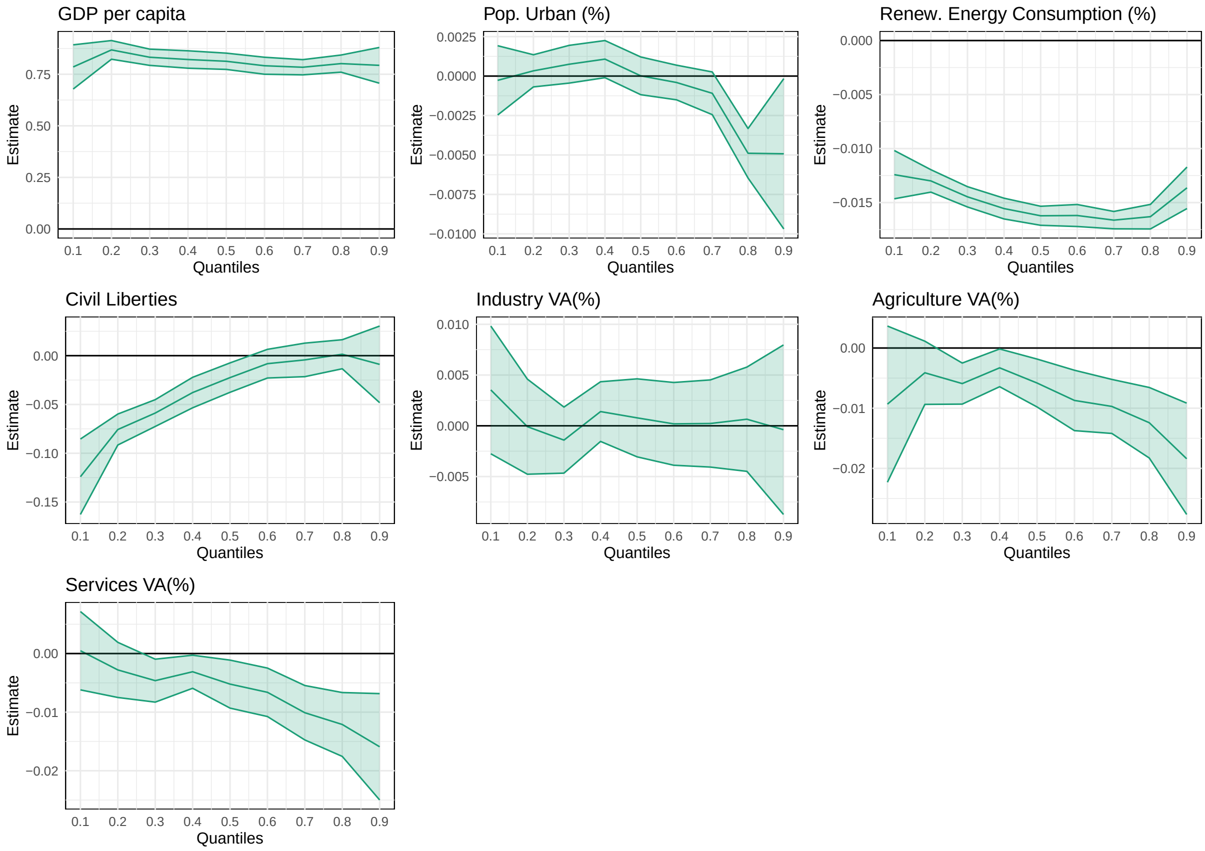


Notes: bootstrapped standard errors

emissions, except for $Q_{0.1}$. In contrast, reducing structural inequality does not affect CBE for many quantiles. This potential trade-off between unemployment and a just transition process in resource-dependent economies has recently been highlighted by Godin et al. (2023) for the case of Colombia. Secondly, a successful restructuring of the economy to decrease inequality can involve higher degrees of local employment and production. The effect of inequality reduction on emissions depends on the carbon intensity of the old and new mode of production. In addition, if incentives are created to encourage the consumption of locally produced products, consumption-based emissions could even fall in high-income countries while production-based emissions increase (see Figure 2, $Q_{0.9}$).

In addition, the findings from Figure 2 highlight that policy-makers who base their policy decisions on the PBE of their respective countries may encounter higher trade-offs between poverty alleviation and carbon emission reduction. Nevertheless, they should not fall for the fallacy that pre-distribution and emission reduction are incompatible. Consequently, we argue that policy makers should focus on decreasing the CBE of their countries in order to enable a worldwide green transition while taking unequally distributed carbon footprints and structural dependencies into account (Chancel, 2022, Hickel et al., 2022. These findings highlight the need for international cooperation for a just transition process.

Figure 3: Benchmark Model (CBE) - Control Variables



Notes: bootstrapped standard errors

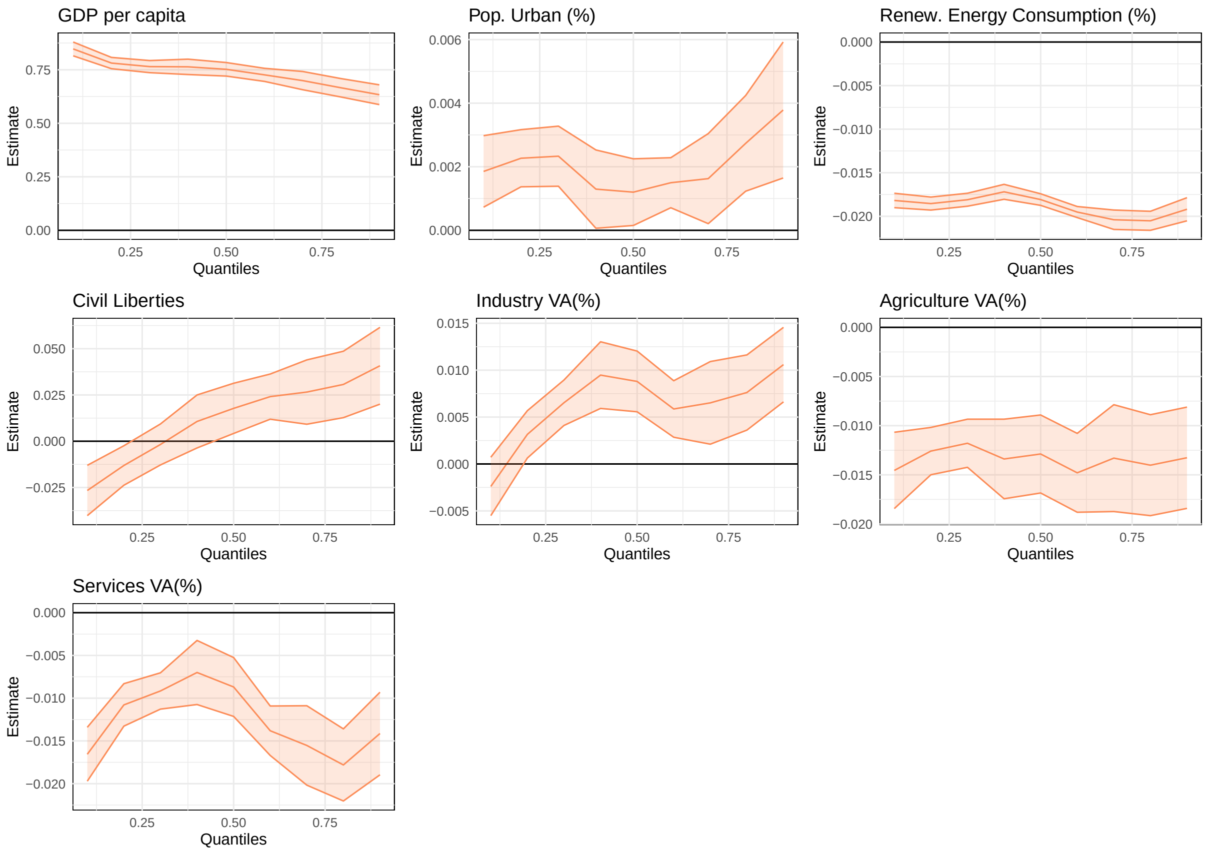
This research examines the environmental implications of the control variables used in the benchmark model. Figure 3 shows the control variables of the previous model regarding CBE (Table A.10, Appendix A). The respective effect of the pre-tax Gini and redistribution are depicted in Figure 1, left-hand side. GDP per capita exerts a constant and positive effect on CBE across all quantiles. This contradicts a considerable amount of previous studies that found evidence for an Environmental Kuznets Curve (EKC) (Grunewald et al., 2017; Chen et al., 2020). Nevertheless, some studies do not provide evidence for the EKC, including Rojas-Vallejos and Lastuka (2020) and Hübler (2017). However, they still assess a decreasing impact of GDP per capita on carbon emissions across income groups, utilizing production-based emissions as their independent variable. The only comparable empirical investigation that employs CBE is conducted by Baležentis et al. (2020). Nonetheless, Baležentis et al. (2020) use a static estimation technique with solely the share of urban population and years of schooling as additional control variables. Consequently, their results might be biased since they hypothesize the EKC in their static analysis by adding a quadratic effect to their model. The results of this study, which employs a non-linear modeling technique, indicate a constant positive effect of GDP per capita on CBE. Thus, the evidence of this research rejects the EKC hypothesis and the feasibility of "green growth" (Hickel and Kallis, 2020).

Furthermore, it is important to highlight the influence of political freedom on CBE in Figure 3. The indicator "Civil liberties", supports the political argument put forth by Boyce (1994). The effect of political freedom on CBE is negative and the strongest in low-income countries, while it is insignificant in high-income countries. This might support the political argument put forth by Boyce (1994), who argues that low-income households demand environmental policies if their political power increases, given that they are most affected by climate change (Martinez-Alier, 2014; Dechezleprêtre et al., 2022). This effect is most pronounced in low-income countries and the most vulnerable communities in high-income countries. It might therefore be the case that the negative environmental impacts of consumption in high-income countries are offset to developing countries (Roca, 2003). This finding is consistent with Andre et al. (2024), who postulates that the demand for environmental policies is especially high among those countries who suffer the most severe consequences of climate change. Furthermore, urban population (%) has only a negative significant effect on CBE in high income countries, while the share of renewable energy consumption (%) has a constant negative effect across all quantiles. Moreover, the effect of industry VA (%) is insignificant, while agriculture VA (% and Services (%) decrease consumption-based CO_2-emissions across all quantiles, with the exception of the lowest quantiles. These findings are consistent with the results of the FE panel regression obtained in Table 3 as well as the quantile regression estimation of the extended IV. model (Appendix B, Table B.3 & B.4).

Figure 4 depicts the control variables of the quantile regression model of the PBE (Appendix A, Table A.15). The respective effect of pre-distribution and redistribution are depicted on the right-hand side of Figure 1. In contrast to Figure 3, the effect of GDP per capita can be described as a downward-pointing slope. As previously observed, similar results were already obtained by Hübler (2017) and Rojas-Vallejos and Lastuka (2020). The findings of this research are consistent with Makarov and Alataş (2024), who emphasizes that only net importers of carbon emissions exhibit the EKC pattern. It appears that only countries that are able to outsource their polluting production can achieve growth jointly with better environmental quality. Upon correcting the data of this study by trade, the evidence does not suggest a decreasing effect of GDP per capita on CO_2-emissions (Figure 3). Thus, GDP growth and the achievement of various environmental objectives, all of which are listed within the framework of the Sustainable Development Goals, appear to be contradictory (Hickel, 2019; Hickel and Kallis, 2020).

The effects of Renewable Energy Consumption (%), Agriculture VA (%) and Services VA (%) on PBE are comparable to those observed for CBE in Figure 3, with a constant negative effect across quantiles. However, the Industry VA (%) has a constant positive effect on PBE, except for the first quantile, in line with the results of Hübler (2017) and Wan et al. (2022). The differing effect of Industry VA (%) between the models can be explained by the technical construction of PBE and CBE. While industrial production has a direct effect on PBE, CBE are only indirectly influenced by productive activities through consumption. The rate of urbanization has a positive influence on carbon emission except for a few quantiles of PBE. Finally,

Figure 4: Benchmark Model (PBE) - Control Variables



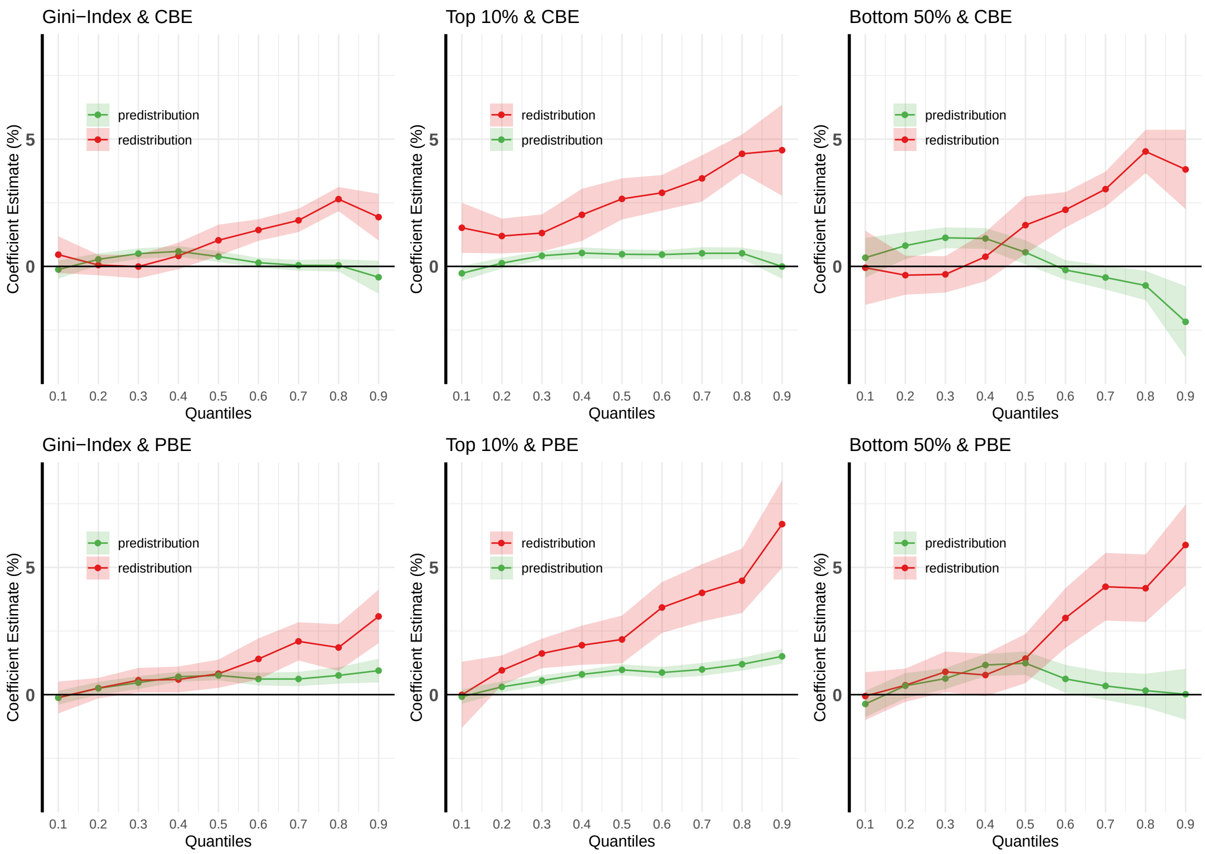
Notes: bootstrapped standard errors

Figure 4 shows that civil liberties first have a negative effect on PBE, which then turns positive among richer, higher emitting countries. To elucidate these discrepancies, we draw upon the insights of Dechezleprêtre et al. (2022) & Douenne and Fabre (2022). According to these authors, the support of specific environmental policies depends on their effectiveness, fairness and one's interest. Thus, less privileged households might support fiscal policies that steer local production and employment. Conversely, the results in Figure 3 advocate that the same households facilitate policies that reduce consumption-based emissions, which are especially high among the most affluent households. These findings provide valuable insights for researchers investigating the relationship between democracy & the environment (Midlarsky, 1998, Winslow, 2005). In particular, the findings from this study can be used to inform future investigations into the dynamics behind the support for environmental policies.

4.1 Robustness Checks

We perform a number of robustness checks on our results. Figure 5, shows the estimation of the quantile regression benchmark specification for three inequality indicators, namely the previously employed Gini-Index, the income share of the top 10% and the income share of the bottom 50%. As mentioned in Section 3.2, these variables are well suited to investigate the political argument of Boyce, 1994, by accounting more precisely for the location of the change in income and thus changes in the distribution of power.

Figure 5: The effect of pre-distribution and redistribution on CBE and PBE across quantiles (different inequality measures)



Notes: bootstrapped standard errors

The first row of Figure 5 displays the effect of the three different inequality indicators on CBE across quantiles, while the second row depicts the same estimations for PBE. The respective tables can be found in Appendix A, Table A.10-A.15. The effect of inequality reduction, as measured by the income share of the top 10% and the bottom 50%, indicates similar results to those obtained with the Gini Index. In general, pre-distribution yields better environmental outcomes than redistribution, especially among the biggest global polluters. A closer examination of the effect of the income share of the top 10% reveals that pre-distribution consistently has more favourable environmental implications in comparison to redistribution. The effect is only insignificant for the 3^{d} quantile. For the effect of inequality reduction measured by the top 10% on PBE, the results in Figure 5 indicate that pre-distribution consistently yields preferable ecological outcomes in comparison to redistribution. The difference is not significant in the first two quantiles.

In general, the income share of the bottom 50% produces similar relationships between pre-distribution, redistribution and consumption-based CO_2-emissions across quantiles (Figure 5). However, from the 1st to the 4th quantile, pre-distribution appears to be more environmentally damaging than redistribution. The impacts of the two indicators are only for the 3^{d} quantile significantly different from each other. A similar pattern can be observed when employing the Gini-Index as an inequality indicator, although to a lesser extent. The existence of this pattern is also supported by the results of the IV. model, although with greater uncertainty (Appendix B, Figure B.5). This further corroborates the hypothesis that redistribution might not increase CO_2-emissions among low-income countries as the extent of their consumption is within their ecological limits (Jorgenson, 2009; Hickel et al., 2022). However, pre-distribution imposes greater challenges on low-income countries than high-income countries within the global framework of production, which can be assessed for all inequality indicators. With regards to PBE, until the 5^{th} quantile the impact of pre-distribution and redistribution is identical. Thereafter, pre-distribution yields improved ecological outcomes.

Nevertheless, it is evident from Figure 5 that there are differences between the effect of the top 10% on CBE and the bottom 50% on CBE. When the pre-distribution is measured by the top 10%, it has a slightly positive effect on CBE for the top 40% emitters, whereas the effect is negative when it is measured by the income share of the bottom 50%. These results suggest that increasing the income of the bottom 50% of the population in high-income countries yields better environmental outcomes than just cutting the earnings of the affluent. This provides strong support for the political argument put forth by Boyce (1994). However, the consumption argument might dominate in low-income countries. Pre-distribution measured by the top 10% of the population yields better environmental outcomes than when measured by the top 50%. The estimation for production-based CO_2 emissions also suggests similar patterns. Furthermore, the robustness checks in Figure 2 verify the results obtained in Figure 1, which indicate that pre-distribution has worse environmental effects on production-based emissions than consumption-based emissions. The current study highlights the fact that those countries who contribute the least to global warming face the highest challenges of inequality and carbon emission reduction.

Finally, we examine the differences between country groups in relation to the nexus between inequality reduction and environmental degradation. Table 5 depicts the benchmark model for CBE by subgroups of low-, low-middle-, upper-middle-, and high-income countries according to the World Bank, 2020's classification of income groups. Across all income groups, pre-distribution is the optimal policy choice for the environment. The reduction of inequality through pre-distribution has a negligible effect on consumption-based CO_2-emissions in low and low-middle-income countries, while it increases carbon emissions in upper-middle income countries at 10% significance level. For high-income countries, pre-distribution insignificantly increases carbon emissions at a low level. Conversely, the magnitude of redistribution is considerably high across all income groups, with the exception of low-income countries, where significant results were obtained for low-middle and high-income countries. These findings are in line with the results obtained in Section 4, in which it was demonstrated that low-income countries have more environmental space left for redistribution since their average consumption levels are still within planetary boundaries. Furthermore, it is worth noticing that pre-distribution appears to provide more favourable conditions, especially in high-income countries, for a just transition process than redistribution. This is encouraging when considering that these countries are primarily responsible for climate change. The presented results become stronger when utilizing the top 10% or bottom 50% income share (Appendix A, Table A.16 & A.18).

Table 5: The effect of pre-distribution and redistribution on CBE in low, low-middle, upper-middle, and high-income countries

	Low	Low-Middle	Upper-Middle	High
	(log of consumption-based emissions per capita)			
Pre-tax Gini	0.564	0.456	-1.707^{*}	-0.136
	(0.898)	(0.787)	(0.910)	(0.480)
Red. Gini	0.107	3.151^{**}	2.365	1.470^{*}
	(1.883)	(1.518)	(1.587)	(0.780)
GDP pc	0.650^{***}	0.503^{***}	0.549^{***}	0.465^{***}
	(0.206)	(0.192)	(0.187)	(0.150)
Pop. Urban	0.023^{**}	0.015^{*}	-0.009	-0.002
	(0.012)	(0.008)	(0.012)	(0.008)
Rnew. Energy	-0.018^{**}	-0.012^{**}	0.006	-0.010^{**}
	(0.008)	(0.005)	(0.015)	(0.005)
Civil Liberties	0.018	-0.021	-0.059	0.006
	(0.028)	(0.019)	(0.044)	(0.020)
Industry VA	-0.003	-0.001	-0.010	-0.012
	(0.011)	(0.007)	(0.010)	(0.013)
Agri. VA	0.00001	-0.018^{**}	-0.026	-0.038
	(0.009)	(0.007)	(0.023)	(0.026)
Services VA	0.002	0.001	0.004	-0.005
	(0.007)	(0.005)	(0.008)	(0.012)
Observations	482	1,121	1,025	1,220
Adjusted R^2	0.213	0.360	0.175	0.190
F Statistic	20.357^{***}	78.558^{***}	32.544^{***}	40.921^{***}
	(df = 9; 428)	(df = 9; 1042)	(df = 9; 949)	(df = 9; 1137)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 6: The effect of pre-distribution and redistribution on PBE in low, low-middle, upper-middle, and high-income countries

	Low	Low-Middle	Upper-Middle	High
	(log of production-based emissions per capita)			
Pre-tax Gini	0.186	0.116	-0.037	-0.852^{*}
	(0.706)	(0.594)	(0.480)	(0.438)
Red. Gini	-0.747	2.228^{*}	0.703	1.445^{**}
	(1.449)	(1.225)	(0.560)	(0.709)
GDP pc	0.614^{***}	0.323^{**}	0.418^{***}	0.464^{***}
	(0.135)	(0.143)	(0.129)	(0.118)
Pop. Urban	0.031^{***}	0.008	0.006^{*}	0.009
	(0.011)	(0.008)	(0.004)	(0.007)
Rnew. Energy	-0.042^{***}	-0.024^{***}	-0.020^{***}	-0.025^{***}
	(0.006)	(0.005)	(0.003)	(0.004)
Civil Liberties	0.013	-0.016	-0.069^{***}	0.008
	(0.023)	(0.017)	(0.021)	(0.019)
Industry VA	-0.003	0.003	0.001	-0.013^{*}
	(0.008)	(0.004)	(0.003)	(0.008)
Agri. VA	-0.006	-0.018^{***}	0.003	-0.024^{*}
	(0.007)	(0.006)	(0.005)	(0.014)
Services VA	0.004	-0.006^{*}	0.001	-0.018^{**}
	(0.006)	(0.004)	(0.004)	(0.007)
Observations	482	1,121	1,025	1,220
Adjusted R^2	0.551	0.518	0.509	0.419
F Statistic	71.587^{***}	142.264^{***}	126.343^{***}	106.893^{***}
	(df = 9; 428)	(df = 9; 1042)	(df = 9; 949)	(df = 9; 1137)

Note: *p<0.1; **p<0.05; ***p<0.01

Furthermore, Table 6 depicts the benchmark model estimations across income groups for PBE. The results indicate that, for low, middle, upper-middle, and high-income countries, pre-distribution yields better environmental outcomes than redistribution. For low-income countries, both ways of inequality reduction insignificantly decrease carbon emissions, although the value for redistribution is higher. These findings once again corroborate our previous conclusions that pre-distribution is, in general, a more environmentally friendly approach than redistribution. However, low-income countries have a greater range of policy options available to them for combating inequalities. The same estimations have been also carried out with the top 10% and bottom 50 % income share. The results depicted in Appendix A, Table A.17 & A.19 confirm the findings obtained with the Gini-Index.

5 Conclusion and policy implications

This study has investigated the relationship between distinct types of inequality and CO_2-emissions using panel data encompassing 156 countries from 1995 to 2020. The findings indicate that pre-distribution (inequality reduction by structural changes and social protection measures) is more environmentally friendly than redistribution (inequality reduction by transfers). The difference is especially strong in middle and high-income countries, while for low-income countries both tools are possible. However, pre-distribution imposes a higher trade-off on those countries that contribute the least to global warming, highlighting the need for international cooperation. In addition, pre-distribution has a more detrimental environmental impact on production-based emissions than consumption-based emissions. This suggests that, in general, global producers of carbon-intensive products encounter greater challenges in achieving joint inequality and carbon emission reduction, in alignment with the Sustainable Development Goals (SDGs). Table 7 provides a summary of the results.

Table 7: Summary of the main results: The effect of inequality reduction

	CBE	**PBE**
redistribution	*strongly increases emissions*, except for the lowest emitters	*strongly increases emissions*, except for the lowest emitters
pre-distribution	*decreases or does not affect emissions* of the top 40% of global emitters; slightly increases emissions of some developing countries	*increases emissions at a low levels* across all country groups. Bigger challenges of inequality reduction and a just transition for countries dependent on polluting industries

The present analysis explicitly addresses endogeneity concerns and the results are robust across different specifications and measures of inequality. We utilize FE effects panel estimation techniques to deal with endogeneity and unobserved effects including social and cultural norms. In addition, we utilize quantile regression techniques to account for the non-linear relationship between inequality and carbon emissions. The obtained results remain robust across various measures of inequality and estimation techniques. Moreover, the relationship persists in terms of its statistical significance, direction, and, to a certain degree, magnitude. This is further confirmed by FE panel estimations for country subgroups by income level.

The two main theoretical foundations of the present analysis revolve around two contrasting effects. The consumption argument assumes a boost of carbon emissions per capita as inequality diminishes while the political argument argues that inequality reduction reduces carbon emissions as the voice of marginalized groups is given more weight. This research extends these theories by investigating the effect of pre-distribution and redistribution on CBE as well as PBE. The findings of this study indicate that, in the case of redistribution, the consumption effect is the dominant factor, exerting the greatest environmental impact on the countries with the highest emissions. In contrast, pre-distribution is better aligned with the green transition. With regard to CBE, a significant trade-off between inequality reduction and emissions emerges only for a few countries with low average emissions per capita. Among the wealthier countries, inequality reduction through pre-distribution can even result in a decrease in emissions. With regard to PBE, pre-distribution is found to exhibit a trade-off with a just transition process. It is therefore important for policy makers to be aware of this nuanced interplay between inequality and emissions. Inequality reduction is not per se incompatible with climate action; however, the manner of inequality reduction matters.

These findings have significant implications for the agendas of the United Nations and International Labour Organization as well as the governments working towards the Green New Deal (GND) (Mastini et al., 2021; IPCC, 2022; ILO (ed.), 2023). First, structural shifts in conjunction with social protection policies can be utilized to sustainably reduce inequality while enabling a just transition. Second, producers of polluting commodities face greater challenges regarding joint inequality and emission reduction while for the biggest global polluters inequality reduction supports emission reduction. This highlights the necessity of international cooperation during a just transition (Hickel et al., 2022; Svartzman and Althouse, 2022; Godin et al., 2023). Third, the incompatibility of economic growth and environmental quality remains one of the most significant challenges for policymakers. While the existing literature often proposes separate policies to address either inequality or climate change, this paper highlights the necessity of integrating these concerns when formulating policy strategies.

The present study exhibits limitations that should receive attention in the future. To start with, the environmental implications of social protection policies to reduce inequality might be different from those of structural changes. Thus, it is important to find a way to differentiate between those two policies. Next, the current empirical study does not take into account the holistic effect of inequality reduction on the environment (Berthe and Elie, 2015). Empirically, it might be possible to gain a greater understanding of the holistic effect of inequality by investigating the implications of initial inequality levels for the relationship between inequality CO_2-emissions. Lastly, the results of this work suggest greater challenges for producers of polluting products. Future studies should focus on exploring the challenges unequal exchange imposes on within-country inequality. In order to achieve the goal of sustaining or enhancing our quality of life while mitigating ecological harm, it is essential to gain a deeper understanding of the intricate interplay between carbon emissions, inequality, democracy and economic growth.

References

Anand, Sudhir and S. M. R. Kanbur (1993). “The Kuznets process and the inequality — development relationship”. *Journal of Development Economics* 40.1, pp. 25–52. DOI: https://doi.org/10.1016/0304-3878(93)90103-T.

Andersson, Fredrik N.G. (2023). “Income inequality and carbon emissions in the United States 1929–2019”. eng. *Ecological economics* 204.A. Publisher: Elsevier B.V, p. 107633. DOI: https://doi.org/10.1016/j.ecolecon.2022.107633.

Andre, Peter, Teodora Boneva, Felix Chopra, and Armin Falk (Mar. 2024). “Globally representative evidence on the actual and perceived support for climate action”. *Nature Climate Change* 14.3, pp. 253–259. DOI: 10.1038/s41558-024-01925-3.

Ash, Michael and James K. Boyce (Oct. 2018). “Racial disparities in pollution exposure and employment at US industrial facilities”. *Proceedings of the National Academy of Sciences* 115.42. Publisher: Proceedings of the National Academy of Sciences, pp. 10636–10641. DOI: 10.1073/pnas.1721640115.

Baležentis, Tomas, Genovaitė Liobikienė, Dalia Štreimikienė, and Kai Sun (2020). “The impact of income inequality on consumption-based greenhouse gas emissions at the global level: A partially linear approach”. *Journal of Environmental Management* 267, p. 110635. DOI: https://doi.org/10.1016/j.jenvman.2020.110635.

Baloch, Muhammad Awais and Danish (2022). “The nexus between renewable energy, income inequality, and consumption-based CO2 emissions: An empirical investigation”. eng. *Sustainable development (Bradford, West Yorkshire, England)* 30.5. Place: Chichester, UK Publisher: John Wiley & Sons, Inc, pp. 1268–1277. DOI: doi.org/10.1007/s10584-022-03362-7.

Baloch, Muhammad Awais, Danish, Salah Ud-Din Khan, and Zübeyde Şentürk Ulucak (2020). “Poverty and vulnerability of environmental degradation in Sub-Saharan African countries: what causes what?” *Structural Change and Economic Dynamics* 54, pp. 143–149. DOI: https://doi.org/10.1016/j.strueco.2020.04.007.

Barros, Beatriz and Richard Wilk (Jan. 2021). “The outsized carbon footprints of the super-rich”. *Sustainability: Science, Practice and Policy* 17.1. Publisher: Taylor & Francis, pp. 316–322. DOI: 10.1080/15487733.2021.1949847.

Berthe, Alexandre and Luc Elie (2015). “Mechanisms explaining the impact of economic inequality on environmental deterioration”. *Ecological Economics* 116, pp. 191–200. DOI: https://doi.org/10.1016/j.ecolecon.2015.04.026.

Berthe, Alexandre, Pascale Turquet, Thi Phuong Linh Huynh, Sarah Morcillo, and Cecilia Poggi (2022). “Just transition in Southeast Asia: Exploring the links between social protection and environmental policies”. EN. *AFD Research Papers* 225. Publisher: Agence française de développement, pp. 1–44.

Blanchet, Thomas, Lucas Chancel, Ignacio Flores, and Marc Morgan (2024). *Distributional National Accounts Guidelines. Methods and Concepts used in the World Inequality Database.* Tech. rep. Paris: World Inequality Lab.

Blanchet, Thomas, Lucas Chancel, and Amory Gethin (2022). "Why Is Europe More Equal than the United States?" *American Economic Journal: Applied Economics* 14.4, pp. 480–518. DOI: 10.1257/app.20200703.

Bourdieu, Pierre, John G Richardson, et al. (1986). "Handbook of Theory and Research for the Sociology of Education". *The forms of capital* 241, p. 258.

Box, G. E. P. and D. R. Cox (1964). "An Analysis of Transformations". *Journal of the Royal Statistical Society: Series B (Methodological)* 26.2. _eprint: https://academic.oup.com/jrsssb/article-pdf/26/2/211/49099371/jrsssb_26_2_211.pdf, pp. 211–243. DOI: 10.1111/j.2517-6161.1964.tb00553.x.

Boyce, James (Feb. 1994). "Inequality as a Cause of Environmental Degradation". *Ecological Economics* 11, pp. 169–178. DOI: 10.1016/0921-8009(94)90198-8.

Boyce, James K. (2007). "CHAPTER 12. Inequality and Environmental Protection". In: *Inequality, Cooperation, and Environmental Sustainability*. Ed. by Jean-Marie Baland, Pranab Bardhan, and Samuel Bowles. Princeton: Princeton University Press, pp. 314–348. DOI: doi:10.1515/9780691187389-013.

Breusch, T. S. and A. R. Pagan (1979). "A Simple Test for Heteroscedasticity and Random Coefficient Variation". *Econometrica* 47.5. Publisher: [Wiley, Econometric Society], pp. 1287–1294. DOI: 10.2307/1911963.

Bruckner, Benedikt, Klaus Hubacek, Yuli Shan, Honglin Zhong, and Kuishuang Feng (2022). "Impacts of poverty alleviation on national and global carbon emissions". eng. *Nature sustainability* 5.4, pp. 311–320. DOI: https://doi.org/10.1038/s41893-021-00842-z.

Buchinsky, Moshe (1995). "Estimating the asymptotic covariance matrix for quantile regression models a Monte Carlo study". *Journal of Econometrics* 68.2, pp. 303–338. DOI: https://doi.org/10.1016/0304-4076(94)01652-G.

Burq, F and L Chancel (2021). "Aggregate Carbon Footprints on WID. world". In: *WID. world Technical Note 2021/03*. World Inequality Lab.

Büchs, Milena (2021). "Sustainable welfare: How do universal basic income and universal basic services compare?" *Ecological Economics* 189, p. 107152. DOI: https://doi.org/10.1016/j.ecolecon.2021.107152.

Cappelli, Federica, Valeria Costantini, and Davide Consoli (2021). "The trap of climate change-induced "natural" disasters and inequality". *Global Environmental Change* 70, p. 102329. DOI: https://doi.org/10.1016/j.gloenvcha.2021.102329.

Carrosio, Giovanni and Lorenzo De Vidovich (2023). "Towards eco-social policies to tackle the socio-ecological crisis: energy poverty as an interface between welfare and environment".

eng. *Environmental sociology* 9.3. Publisher: Routledge, pp. 243–256. DOI: 10.1080/23251042.2023.2207707.

Chancel, Lucas (Nov. 2022). "Global carbon inequality over 1990–2019". *Nature Sustainability* 5.11, pp. 931–938. DOI: 10.1038/s41893-022-00955-z.

Chancel, Lucas and Thomas Piketty (Oct. 2021). "Global Income Inequality, 1820–2020: the Persistence and Mutation of Extreme Inequality". *Journal of the European Economic Association* 19.6. _eprint: https://academic.oup.com/jeea/article-pdf/19/6/3025/42071112/jvab047.pdf, pp. 3025–3062. DOI: 10.1093/jeea/jvab047.

Chancel, Lucas, Thomas Piketty, Emmanuel Saez, and Gabriel Zucman, eds. (2022). *World Inequality Report 2022*. Cambridge, MA and London, England: Harvard University Press. DOI: doi:10.4159/9780674276598.

Chen, Jiandong, Qin Xian, Jixian Zhou, and Ding Li (2020). "Impact of income inequality on CO2 emissions in G20 countries". *Journal of Environmental Management* 271, p. 110987. DOI: https://doi.org/10.1016/j.jenvman.2020.110987.

Croissant, Yves and Giovanni Millo (2008). "Panel Data Econometrics in R: The plm Package". *Journal of Statistical Software* 27.2, pp. 1–43. DOI: 10.18637/jss.v027.i02.

Dechezleprêtre, Antoine, Adrien Fabre, Tobias Kruse, and Planterose (2022). *Fighting climate change: International attitudes toward climate policies*. Tech. rep. 1714. Paris: OECD Economics Department Working Papers. DOI: https://doi.org/10.1787/3406f29a-en.

Demir, Caner, Raif Cergibozan, and Adem Gök (2019). "Income inequality and CO2 emissions: Empirical evidence from Turkey". *Energy & Environment* 30.3, pp. 444–461. DOI: 10.1177/0958305X18793109.

Dorn, Franziska, Simone Maxand, and Thomas Kneib (2024). "The nonlinear dependence of income inequality and carbon emissions: Potentials for a sustainable future". *Ecological Economics* 216, p. 108016. DOI: https://doi.org/10.1016/j.ecolecon.2023.108016.

Douenne, Thomas and Adrien Fabre (2022). "Yellow Vests, Pessimistic Beliefs, and Carbon Tax Aversion". *American Economic Journal: Economic Policy* 14.1, pp. 81–110. DOI: 10.1257/pol.20200092.

European Commission (2023). *Delivering the European Green Deal.*

Fisher-Post, Matthew and Amory Gethin November (2023). *Government Redistribution and Development Global Estimates of Tax and Transfer Progressivity 1980-2019*. Tech. rep. World Inequality Lab.

Global Carbon Project (2024). *Global Carbon Atlas*.

Godin, Antoine et al. (2023). "Can Colombia cope with a Global Low Carbon transition?" EN. *AFD Research Papers* 285. Publisher: Agence française de développement, pp. 1–60.

Gough, Ian (2013). "Climate change, social policy, and global governance". *Journal of International and Comparative Social Policy* 29.3, 185–203. DOI: 10.1080/21699763.2013.852128.

Grossman, Gene M. and Alan B. Krueger (1991). *Environmental Impacts of a North American Free Trade Agreement*. NBER Working Papers 3914. National Bureau of Economic Research, Inc.

– (1995). "Economic Growth and the Environment". *The Quarterly Journal of Economics* 110.2, pp. 353–377.

Grunewald, Nicole, Stephan Klasen, Inmaculada Martínez-Zarzoso, and Chris Muris (2017). "The Trade-off Between Income Inequality and Carbon Dioxide Emissions". *Ecological Economics* 142, pp. 249–256. DOI: https://doi.org/10.1016/j.ecolecon.2017.06.034.

Guo, Yawei, Wanhai You, and Chien-Chiang Lee (Feb. 2022). "CO2 emissions, income inequality, and country risk: some international evidence". *Environmental Science and Pollution Research* 29.9, pp. 12756–12776. DOI: 10.1007/s11356-020-09501-w.

Hahn, Jinyong (1995). "Bootstrapping Quantile Regression Estimators". *Econometric Theory* 11.1. Publisher: Cambridge University Press, pp. 105–121.

Hailemariam, Abebe, Ratbek Dzhumashev, and Muhammad Shahbaz (Sept. 2020). "Carbon emissions, income inequality and economic development". *Empirical Economics* 59.3, pp. 1139–1159. DOI: 10.1007/s00181-019-01664-x.

Heerink, Nico, Abay Mulatu, and Erwin Bulte (2001). "Income inequality and the environment: aggregation bias in environmental Kuznets curves". *Ecological Economics* 38.3, pp. 359–367. DOI: https://doi.org/10.1016/S0921-8009(01)00171-9.

Hickel, Jason (2019). "The contradiction of the sustainable development goals: Growth versus ecology on a finite planet". *Sustainable Development* 27.5, pp. 873–884. DOI: https://doi.org/10.1002/sd.1947.

Hickel, Jason, Christian Dorninger, Hanspeter Wieland, and Intan Suwandi (2022). "Imperialist appropriation in the world economy: Drain from the global South through unequal exchange, 1990–2015". *Global Environmental Change* 73, p. 102467. DOI: https://doi.org/10.1016/j.gloenvcha.2022.102467.

Hickel, Jason and Giorgos Kallis (2020). "Is Green Growth Possible?" *New Political Economy* 25.4. Publisher: Routledge _eprint: https://doi.org/10.1080/13563467.2019.1598964, pp. 469–486. DOI: 10.1080/13563467.2019.1598964.

Hübler, Michael (2017). "The inequality-emissions nexus in the context of trade and development: A quantile regression approach". *Ecological Economics* 134, pp. 174–185. DOI: https://doi.org/10.1016/j.ecolecon.2016.12.015.

ILO (ed.) (2019). *SOCIAL PROTECTION FOR A JUST TRANSITION. A GLOBAL STRATEGY FOR INCREASING AMBITION IN CLIMATE ACTION.* Tech. rep. Geneva.

ILO (ed.) (2023). *Social protection for a just transition.* Just Transition Policy Brief. Geneva: International Labour Organization.

Inglehart, Ronald (1990). *Culture Shift in Advanced Industrial Society*. Princeton University Press. DOI: 10.2307/j.ctv346rbz.

IPBES (2022). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Version Number: 1. DOI: 10.5281/zenodo.6417333.

IPCC (2022). *Climate Change 2022. Mitigation of Climate Change. Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Tech. rep. 6. Geneva: Intergovernmental Panel on Climate Change.

Jorgenson, Andrew, Juliet Schor, and Xiaorui Huang (2017). "Income Inequality and Carbon Emissions in the United States: A State-level Analysis, 1997–2012". *Ecological Economics* 134, pp. 40–48. DOI: https://doi.org/10.1016/j.ecolecon.2016.12.016.

Jorgenson, Andrew K (2009). "The sociology of unequal exchange in ecological context: A panel study of lower-income countries, 1975–2000 1". In: *Sociological Forum*. Vol. 24. 1. Wiley Online Library, pp. 22–46. DOI: https://doi.org/10.1111/j.1573-7861.2008.01085.x.

Jorgenson, Andrew K., Juliet B. Schor, Kyle W. Knight, and Xiaorui Huang (2016). "Domestic Inequality and Carbon Emissions in Comparative Perspective". eng. *Sociological forum (Randolph, N.J.)* 31.S1. Place: Wayne Publisher: Wayne: Blackwell Publishing Ltd, pp. 770–786. DOI: 10.1111/socf.12272.

Kahn, Matthew E. (1998). "A household level environmental Kuznets curve". *Economics Letters* 59.2, pp. 269–273. DOI: https://doi.org/10.1016/S0165-1765(98)00035-4.

Kallis, Giorgos (2011). "In defence of degrowth". *Ecological Economics* 70.5, pp. 873–880. DOI: https://doi.org/10.1016/j.ecolecon.2010.12.007.

Khan, Salim, Wang Yahong, and Asma Zeeshan (2022). "Impact of poverty and income inequality on the ecological footprint in Asian developing economies: Assessment of Sustainable Development Goals". *Energy Reports* 8, pp. 670–679. DOI: https://doi.org/10.1016/j.egyr.2021.12.001.

Knight, Kyle W., Juliet B. Schor, and Andrew K. Jorgenson (2017). "Wealth Inequality and Carbon Emissions in High-income Countries". eng. *Social currents* 4.5. Place: Los Angeles, CA Publisher: Los Angeles, CA: SAGE Publications, pp. 403–412. DOI: 10.1177/2329496517704872.

Koenker, Roger and Gilbert Bassett (1978). "Regression Quantiles". *Econometrica* 46.1. Publisher: [Wiley, Econometric Society], pp. 33–50. DOI: 10.2307/1913643.

Koçak, Emrah, Recep Ulucak, Melike Dedeoğlu, and Zübeyde Şentürk Ulucak (2019). "Is there a trade-off between sustainable society targets in Sub-Saharan Africa?" *Sustainable Cities and Society* 51, p. 101705. DOI: https://doi.org/10.1016/j.scs.2019.101705.

Lin, Boqiang and Bin Xu (2018). “Factors affecting CO2 emissions in China’s agriculture sector: A quantile regression”. *Renewable and Sustainable Energy Reviews* 94, pp. 15–27. DOI: https://doi.org/10.1016/j.rser.2018.05.065.

Mader, Sebastian (2018). “The nexus between social inequality and CO2 emissions revisited: Challenging its empirical validity”. eng. *Environmental science & policy* 89. Publisher: Elsevier Ltd, pp. 322–329. DOI: https://doi.org/10.1016/j.envsci.2018.08.009.

Makarov, Igor and Sedat Alataş (2024). “Production-and consumption-based emissions in carbon exporters and importers: A large panel data analysis for the EKC hypothesis”. *Applied Energy* 363, p. 123063. DOI: https://doi.org/10.1016/j.apenergy.2024.123063.

Martinez-Alier, Joan (2014). “The environmentalism of the poor”. *Geoforum* 54, pp. 239–241. DOI: https://doi.org/10.1016/j.geoforum.2013.04.019.

Mastini, Riccardo, Giorgos Kallis, and Jason Hickel (2021). “A Green New Deal without growth?” *Ecological Economics* 179, p. 106832. DOI: https://doi.org/10.1016/j.ecolecon.2020.106832.

Midlarsky, Manus I (1998). “Democracy and the environment: an empirical assessment”. *Journal of Peace Research* 35.3, pp. 341–361. DOI: https://doi.org/10.1177/0022343398035003005.

Muhammad Mehedi Masud Fatimah Binti Kari, Hasanul Banna and Md Khaled Saifullah (2018). “Does income inequality affect environmental sustainability? Evidence from the ASEAN-5”. *Journal of the Asia Pacific Economy* 23.2, pp. 213–228. DOI: 10.1080/13547860.2018.1442146.

Otto, Ilona M., Kyoung Mi Kim, Nika Dubrovsky, and Wolfgang Lucht (Feb. 2019). “Shift the focus from the super-poor to the super-rich”. *Nature Climate Change* 9.2, pp. 82–84. DOI: 10.1038/s41558-019-0402-3.

Palagi, Elisa, Matteo Coronese, Francesco Lamperti, and Andrea Roventini (2022). “Climate change and the nonlinear impact of precipitation anomalies on income inequality”. *Proceedings of the National Academy of Sciences* 119.43, e2203595119. DOI: 10.1073/pnas.2203595119.

Paris Agreement (2016). “Report of the Conference of the Parties on its 21st session, held in Paris from 30 November to 13 December 2015 : addendum”. Place: Geneva :. 2016-01-29 Publisher: UN, 36 p.

Piketty, Thomas (2015). *The economics of inequality*. eng. 1. print.. Cambridge, Mass.: Belknap Press of Harvard Univ. Press. DOI: https://doi.org/10.2307/j.ctvjnrtk1.

Ravallion, Martin, Mark Heil, and Jyotsna Jalan (2000). “Carbon Emissions and Income Inequality”. *Oxford Economic Papers* 52.4, pp. 651–669.

Rigolini, Jamele (2021). *Social Protection and Labor: A key enabler for Climate Change adaptation and mitigation*. Tech. rep.

Roca, Jordi (2003). “Do individual preferences explain the Environmental Kuznets curve?” *Ecological Economics* 45.1, pp. 3–10. DOI: https://doi.org/10.1016/S0921-8009(02)00263-X.

Roemer, John E. (1993). “Would Economic Democracy Decrease the Amount of Public Bads?” *The Scandinavian Journal of Economics* 95.2, pp. 227–238.

Rojas-Vallejos, Jorge and Amy Lastuka (2020). “The income inequality and carbon emissions trade-off revisited”. eng. *Energy policy* 139. Place: Kidlington, p. 111302. DOI: https://doi.org/10.1016/j.enpol.2020.111302.

Safar, Waed (2022). “Income inequality and CO2 emissions in France: Does income inequality indicator matter?” *Journal of Cleaner Production* 370, p. 133457. DOI: https://doi.org/10.1016/j.jclepro.2022.133457.

Sager, Lutz (2019). “Income inequality and carbon consumption: Evidence from Environmental Engel curves”. *Energy Economics* 84, p. 104507. DOI: https://doi.org/10.1016/j.eneco.2019.104507.

Scruggs, Lyle A. (1998). “Political and economic inequality and the environment”. *Ecological Economics* 26.3, pp. 259–275. DOI: https://doi.org/10.1016/S0921-8009(97)00118-3.

Semieniuk, Gregor and Victor M. Yakovenko (2020). “Historical evolution of global inequality in carbon emissions and footprints versus redistributive scenarios”. *Journal of Cleaner Production* 264, p. 121420. DOI: 10.1016/j.jclepro.2020.121420.

Solt, Frederick (2009). “Standardizing the World Income Inequality Database*”. *Social Science Quarterly* 90.2, pp. 231–242. DOI: https://doi.org/10.1111/j.1540-6237.2009.00614.x.

Starr, Jared, Craig Nicolson, Michael Ash, Ezra M. Markowitz, and Daniel Moran (Mar. 2023). “Assessing US consumers’ carbon footprints reveals outsized impact of the top 1%”. English. *ECOLOGICAL ECONOMICS* 205. Place: RADARWEG 29, 1043 NX AMSTERDAM, NETHERLANDS Publisher: ELSEVIER Type: Article. DOI: 10.1016/j.ecolecon.2022.107698.

Svartzman, Romain and Jeffrey Althouse (2022). “Greening the international monetary system? Not without addressing the political ecology of global imbalances”. *Review of International Political Economy* 29.3. Publisher: Routledge, pp. 844–869. DOI: 10.1080/09692290.2020.1854326.

Torras, Mariano and James K. Boyce (1998). “Income, inequality, and pollution: a reassessment of the environmental Kuznets Curve”. *Ecological Economics* 25.2, pp. 147–160. DOI: https://doi.org/10.1016/S0921-8009(97)00177-8.

Uddin, Md Main, Vinod Mishra, and Russell Smyth (2020). “Income inequality and CO2 emissions in the G7, 1870–2014: Evidence from non-parametric modelling”. *Energy Economics* 88, p. 104780. DOI: https://doi.org/10.1016/j.eneco.2020.104780.

United Nations (ed.) (2024). *Sustainable Development Goals*.

Uzar, Umut and Kemal Eyuboglu (2019). “The nexus between income inequality and CO2 emissions in Turkey”. *Journal of Cleaner Production* 227, pp. 149–157. DOI: https://doi.org/10.1016/j.jclepro.2019.04.169.

Veblen, Thorstein (1992). *The theory of the leisure class*. Routledge. DOI: https://doi.org/10.4324/9781315135373.

Wan, Guanghua, Chen Wang, Jinxian Wang, and Xun Zhang (2022). “The income inequality-CO2 emissions nexus: Transmission mechanisms”. *Ecological Economics* 195, p. 107360. DOI: https://doi.org/10.1016/j.ecolecon.2022.107360.

WDI (ed.) (2024). *World Development Indicators*.

White, Halbert (1980). “A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity”. *Econometrica* 48.4. Publisher: [Wiley, Econometric Society], pp. 817–838. DOI: 10.2307/1912934.

WID (2024). *World Inequality Database*.

Wier, Mette, Katja Birr-Pedersen, Henrik Klinge Jacobsen, and Jacob Klok (2005). “Are CO2 taxes regressive? Evidence from the Danish experience”. *Ecological Economics* 52.2, pp. 239–251. DOI: https://doi.org/10.1016/j.ecolecon.2004.08.005.

Wilkinson, Richard and Kate Pickett (2010). *The spirit level: Why equality is better for everyone*. Penguin UK.

Winslow, Margrethe (2005). “Is democracy good for the environment?” *Journal of Environmental Planning and Management* 48.5, pp. 771–783. DOI: https://doi.org/10.1080/09640560500183074.

Wooldridge, J.M. (2013). *Introductory Econometrics: A Modern Approach*. South-Western Cengage Learning.

World Bank (2020). *World Bank Country and Lending Groups*.

A Supplementary Materials

Table A.1: Subgroups of countries according to World Bank Classification

Income Level	N	Countries
Low-Income	20	Afghanistan, Burkina Faso, Burundi, Congo, Dem. Rep., Central African Republic, Ethiopia, Gambia, Guinea, Liberia, Madagascar, Mali, Malawi, Mozambique, Niger, Rwanda, Sudan, Sierra Leone, Chad, Togo, Uganda
Low-Middle-Income	45	Angola, Bangladesh, Benin, Bolivia, Bhutan, Belize, Congo, Rep., Cote d'Ivoire, Cameroon, Cabo Verde, Algeria, Egypt, Arab Rep., Ghana, Honduras, Haiti, Indonesia, India. Iran, Islamic Rep., Kenya, Kyrgyz Republic, Cambodia, Lao PDR, Sri Lanka, Lesotho, Morocco, Myanmar, Mongolia, Mauritania, Nigeria, Nicaragua, Nepal, Papua New Guinea, Philippines, Pakistan, Senegal, Sao Tome and Principe, El Salvador, Eswatini, Tajikistan, Tunisia, Tanzania, Ukraine, Uzbekistan, Zambia, Zimbabwe
Upper-Middle-Income	42	Albania, Armenia, Argentina, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Brazil, Botswana, China, Colombia, Costa Rica, Dominican Republic, Ecuador, Gabon, Georgia, Guatemala, Guyana, Iraq, Jamaica, Jordan, Kazakhstan, Lebanon, Libya, Moldova, Montenegro, North Macedonia, Mauritius, Maldives, Mexico, Malaysia, Namibia, Panama, Peru, Paraguay, Romania, Serbia, Russian Federation, Suriname, Thailand, Turkmenistan
High-Income	49	United Arab Emirates, Austria, Australia, Belgium, Bahrain, Brunei Darussalam, Bahamas, The, Canada, Switzerland, Chile, Cyprus, Czechia, Germany, Denmark, Estonia, Spain, Finland, France, United Kingdom, Greece, Croatia, Hungary, Ireland, Israel, Iceland, Italy, Japan, Korea, Rep., Kuwait, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Norway, New Zealand, Oman, Poland, Portugal, Qatar, Saudi Arabia, Seychelles, Sweden, Singapore, Slovenia, Slovak Republic, Trinidad and Tobago, United States, Uruguay

Table A.2: Correlation Matrix

	Pre-tax Gini	Red. Gini	GDP pc	Pop. Urban	R. Energy	CL	Industry VA	Agri. VA	Services VA	Tariffs
Pre-tax Gini	1	-0.584	-0.472	-0.283	0.306	0.419	0.154	0.289	-0.274	0.315
Red. Gini	-0.584	1	0.642	0.488	-0.389	-0.679	-0.208	-0.548	0.566	-0.415
GDP pc	-0.472	0.642	1	0.812	-0.739	-0.546	0.168	-0.860	0.598	-0.529
Pop. Urban	-0.283	0.488	0.812	1	-0.634	-0.453	0.136	-0.755	0.535	-0.410
R. Energy	0.306	-0.389	-0.739	-0.634	1	0.317	-0.189	0.715	-0.458	0.373
CL	0.419	-0.679	-0.546	-0.453	0.317	1	0.324	0.498	-0.608	0.335
Industry VA	0.154	-0.208	0.168	0.136	-0.189	0.324	1	-0.244	-0.497	-0.012
Agri. VA	0.289	-0.548	-0.860	-0.755	0.715	0.498	-0.244	1	-0.635	0.451
Services VA	-0.274	0.566	0.598	0.535	-0.458	-0.608	-0.497	-0.635	1	-0.363
Tariffs	0.315	-0.415	-0.529	-0.410	0.373	0.335	-0.012	0.451	-0.363	1

Table A.3: FE Model: Naive Model, different indicators

	log of consumtion-based emissions per capita			log production-based emissions per capita		
Pre-tax Gini	-0.990^{**}			-1.238^{***}		
	(0.406)			(0.465)		
Red. Gini	1.355^{*}			1.850^{**}		
	(0.758)			(0.804)		
Pre-tax Top 10%		-0.845^{**}			-1.132^{***}	
		(0.389)			(0.434)	
Red. Top 10%		1.323			2.805^{***}	
		(1.140)			(1.049)	
Pre-tax Bot. 50%			1.961^{***}			2.269^{***}
			(0.757)			(0.848)
Red. Bot. 50%			2.558^{**}			2.702^{**}
			(1.170)			(1.307)
GDP pc	0.731^{***}	0.729^{***}	0.733^{***}	0.642^{***}	0.638^{***}	0.643^{***}
	(0.107)	(0.107)	(0.107)	(0.097)	(0.097)	(0.098)
Observations	4,022	4,022	4,022	4,022	4,022	4,022
Adjusted R^2	0.171	0.168	0.173	0.168	0.168	0.167
F Statistic (df = 3; 3838)	337.099^{***}	330.762^{***}	341.435^{***}	331.984^{***}	332.515^{***}	328.953^{***}

Note: *p<0.1; **p<0.05; ***p<0.01

Table A.4: FE Model: Basic Model, different indicators

	log of consumtion-based emissions per capita			log production-based emissions per capita		
Pre-tax Gini	−0.586			−0.512		
	(0.423)			(0.332)		
Red. Gini	0.877			0.987*		
	(0.632)			(0.558)		
Pre-tax Top 10%		−0.529			−0.575*	
		(0.356)			(0.310)	
Red. Top 10%		0.533			1.409*	
		(0.954)			(0.726)	
Pre-tax Bot. 50%			1.137			0.772
			(0.870)			(0.587)
Red. Bot. 50%			1.900**			1.497*
			(0.965)			(0.901)
GDP pc	0.607***	0.605***	0.609***	0.421***	0.420***	0.422***
	(0.113)	(0.113)	(0.114)	(0.068)	(0.068)	(0.068)
Pop. Urban	0.004	0.004	0.004	0.008**	0.008**	0.008**
	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.004)
Rnew. Energy	−0.016***	−0.016***	−0.016***	−0.028***	−0.028***	−0.028***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Observations	4,009	4,009	4,009	4,009	4,009	4,009
Adjusted R^2	0.272	0.271	0.273	0.560	0.562	0.559
F Statistic (df = 5; 3823)	336.580***	334.617***	338.398***	1,058.883***	1,063.769***	1,054.182***

Note: *p<0.1; **p<0.05; ***p<0.01

Table A.5: FE Model: Benchmark Model, different indicators

	log of consumtion-based emissions per capita			log production-based emissions per capita		
Pre-tax Gini	−0.686			−0.279		
	(0.440)			(0.311)		
Red. Gini	1.010			0.948*		
	(0.664)			(0.544)		
Pre-tax Top 10%		−0.599			−0.328	
		(0.364)			(0.280)	
Red. Top 10%		1.158			1.459**	
		(0.970)			(0.713)	
Pre-tax Bot. 50%			1.336			0.438
			(0.907)			(0.570)
Red. Bot. 50%			1.868*			1.359
			(1.015)			(0.874)
GDP pc	0.596***	0.593***	0.598***	0.382***	0.381***	0.382***
	(0.117)	(0.116)	(0.118)	(0.073)	(0.073)	(0.073)
Pop. Urban	0.005	0.005	0.005	0.007*	0.007*	0.007**
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
Rnew. Energy	−0.014***	−0.014***	−0.014***	−0.027***	−0.027***	−0.027***
	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)
Civil Liberties	−0.013	−0.013	−0.014	−0.022*	−0.022*	−0.023*
	(0.016)	(0.016)	(0.016)	(0.012)	(0.012)	(0.012)
Industry VA	−0.006	−0.006	−0.006	−0.001	−0.001	−0.001
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Agri. VA	−0.016*	−0.016*	−0.016*	−0.010***	−0.010***	−0.010***
	(0.009)	(0.009)	(0.009)	(0.003)	(0.003)	(0.003)
Services VA	−0.0003	−0.0004	−0.0003	−0.004*	−0.004*	−0.004**
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Observations	3,848	3,848	3,848	3,848	3,848	3,848
Adjusted R^2	0.301	0.299	0.302	0.582	0.583	0.581
F Statistic (df = 9; 3658)	204.718***	203.683***	205.534***	615.733***	618.055***	614.209***

Note: *p<0.1; **p<0.05; ***p<0.01

Table A.6: FE Model: IV. Model, different indicators

	log of consumtion-based emissions per capita			log production-based emissions per capita		
Pre-tax Gini	-0.662^{*}			-0.532^{*}		
	(0.347)			(0.290)		
Red. Gini	1.234^{**}			1.294^{**}		
	(0.579)			(0.519)		
Pre-tax Top 10%		-0.541^{*}			-0.533^{*}	
		(0.306)			(0.273)	
Red. Top 10%		1.519^{*}			1.518^{**}	
		(0.888)			(0.702)	
Pre-tax Bot. 50%			1.364^{**}			0.888^{*}
			(0.693)			(0.504)
Red. Bot. 50%			2.195^{**}			2.095^{**}
			(0.867)			(0.820)
GDP pc	0.650^{***}	0.643^{***}	0.655^{***}	0.442^{***}	0.437^{***}	0.443^{***}
	(0.120)	(0.119)	(0.122)	(0.066)	(0.065)	(0.066)
Pop. Urban	0.006	0.006	0.006	0.008^{**}	0.008^{**}	0.008^{**}
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Rnew. Energy	-0.012^{***}	-0.012^{***}	-0.012^{***}	-0.025^{***}	-0.025^{***}	-0.025^{***}
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Civil Liberties	−0.021	−0.021	−0.021	−0.010	−0.010	−0.010
	(0.018)	(0.018)	(0.018)	(0.011)	(0.011)	(0.011)
Industry VA	−0.005	−0.005	−0.005	0.001	0.001	0.001
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Agri. VA	-0.026^{***}	-0.026^{***}	-0.026^{***}	-0.012^{**}	-0.012^{**}	-0.012^{**}
	(0.010)	(0.010)	(0.010)	(0.005)	(0.005)	(0.005)
Services VA	−0.002	−0.002	−0.001	−0.004	−0.004	−0.005
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Tariffs	0.019	0.019	0.019	−0.017	−0.017	−0.017
	(0.027)	(0.027)	(0.027)	(0.013)	(0.013)	(0.013)
Observations	2,951	2,951	2,951	2,951	2,951	2,951
Adjusted R^2	0.340	0.339	0.342	0.597	0.596	0.596
F Statistic (df = 10; 2761)	171.105^{***}	170.017^{***}	172.295^{***}	455.249^{***}	453.957^{***}	454.356^{***}

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table A.7: Different Panel estimation techniques: Benchmark Model, Gini

	FE Model	RE Model	Pooling Model	FE Model	RE Model	Pooling Model
	log of consumtion-based emissions per capita			log production-based emissions per capita		
Pre-tax Gini	−0.686	−0.569	0.700	−0.279	−0.328	−0.486
	(0.440)	(0.384)	(0.768)	(0.311)	(0.276)	(0.369)
Red. Gini	1.010	0.914	1.774^{*}	0.948^{*}	0.877^{*}	1.040
	(0.664)	(0.620)	(1.018)	(0.544)	(0.511)	(0.944)
GDP pc	0.596^{***}	0.508^{***}	0.853^{***}	0.382^{***}	0.341^{***}	0.722^{***}
	(0.117)	(0.093)	(0.140)	(0.073)	(0.057)	(0.063)
Pop. Urban	0.005	−0.001	−0.003	0.007^{*}	0.004	0.002
	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
Rnew. Energy	-0.014^{***}	-0.016^{***}	-0.015^{***}	-0.027^{***}	-0.028^{***}	-0.019^{***}
	(0.005)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)
Civil liberties	−0.013	−0.019	−0.060	-0.022^{*}	−0.015	0.013
	(0.016)	(0.013)	(0.041)	(0.012)	(0.011)	(0.025)
Industry VA	−0.006	−0.003	0.0004	−0.001	0.001	0.004
	(0.005)	(0.004)	(0.009)	(0.003)	(0.003)	(0.005)
Agri. VA	-0.016^{*}	−0.012	−0.007	-0.010^{***}	-0.007^{**}	-0.016^{**}
	(0.009)	(0.008)	(0.009)	(0.003)	(0.003)	(0.007)
Services VA	−0.0003	−0.001	−0.009	-0.004^{*}	-0.004^{**}	-0.014^{**}
	(0.004)	(0.004)	(0.010)	(0.002)	(0.002)	(0.006)
Constant		-2.593^{***}	-6.036^{***}		-1.272^{**}	-4.501^{***}
		(0.708)	(1.172)		(0.511)	(0.746)
Observations	3,848	3,848	3,848	3,848	3,848	3,848
Adjusted R^2	0.301	0.493	0.866	0.582	0.692	0.927
F Statistic	204.718^{***}	$3{,}743.575^{***}$	$2{,}773.951^{***}$	615.733^{***}	$8{,}656.100^{***}$	$5{,}422.100^{***}$
	(df = 9; 3658)		(df = 9; 3838)	(df = 9; 3658)		(df = 9; 3838)

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table A.8: Different estimation techniques: Benchmark Model, Top 10%

	FE Model	RE Model	Pooling Model	FE Model	RE Model	Pooling Model
	log of consumtion-based emissions per capita			log production-based emissions per capita		
top_10_sptinc	-0.599	-0.539^{*}	0.500	-0.328	-0.396	-0.748^{**}
	(0.364)	(0.317)	(0.736)	(0.280)	(0.252)	(0.343)
taxation_top10	1.158	0.822	3.666^{**}	1.459^{**}	1.138	2.656^{*}
	(0.970)	(0.911)	(1.623)	(0.713)	(0.707)	(1.435)
gdp_cap_ppp_const	0.593^{***}	0.509^{***}	0.841^{***}	0.381^{***}	0.340^{***}	0.702^{***}
	(0.116)	(0.095)	(0.138)	(0.073)	(0.057)	(0.064)
pop_urban	0.005	-0.001	-0.003	0.007^{*}	0.004	0.003
	(0.005)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)
renew_consump	-0.014^{***}	-0.016^{***}	-0.015^{***}	-0.027^{***}	-0.028^{***}	-0.019^{***}
	(0.005)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)
fh_cl	-0.013	-0.019	-0.056	-0.022^{*}	-0.015	0.019
	(0.016)	(0.013)	(0.041)	(0.012)	(0.011)	(0.025)
industry_va_sh	-0.006	-0.003	0.0003	-0.001	0.0005	0.005
	(0.005)	(0.005)	(0.009)	(0.003)	(0.003)	(0.005)
agri_va_sh	-0.016^{*}	-0.012	-0.007	-0.010^{***}	-0.007^{**}	-0.016^{**}
	(0.009)	(0.008)	(0.009)	(0.003)	(0.003)	(0.007)
service_va_sh	-0.0004	-0.001	-0.009	-0.004^{*}	-0.004^{**}	-0.013^{**}
	(0.004)	(0.004)	(0.009)	(0.002)	(0.002)	(0.006)
Constant		-2.653^{***}	-5.813^{***}		-1.265^{**}	-4.374^{***}
		(0.755)	(1.114)		(0.521)	(0.751)
Observations	3,848	3,848	3,848	3,848	3,848	3,848
Adjusted R^2	0.299	0.492	0.867	0.583	0.693	0.928
F Statistic	203.683^{***}	$3{,}741.214^{***}$	$2{,}793.992^{***}$	618.055^{***}	$8{,}700.243^{***}$	$5{,}524.852^{***}$
	(df = 9; 3658)		(df = 9; 3838)	(df = 9; 3658)		(df = 9; 3838)

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table A.9: Different estimation techniques: Benchmark Model, Bot. 50%

	FE Model	RE Model	Pooling Model	FE Model	RE Model	Pooling Model
	log of consumtion-based emissions per capita			log production-based emissions per capita		
bottom50_sptinc	1.336	1.081	-1.437	0.438	0.501	0.411
	(0.907)	(0.804)	(1.476)	(0.570)	(0.510)	(0.752)
redistribution_bottom	1.868^{*}	1.758^{*}	2.646^{*}	1.359	1.380^{*}	1.955
	(1.015)	(0.931)	(1.589)	(0.874)	(0.806)	(1.584)
gdp_cap_ppp_const	0.598^{***}	0.508^{***}	0.854^{***}	0.382^{***}	0.341^{***}	0.733^{***}
	(0.118)	(0.092)	(0.139)	(0.073)	(0.057)	(0.062)
pop_urban	0.005	-0.001	-0.003	0.007^{**}	0.004	0.002
	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
renew_consump	-0.014^{***}	-0.016^{***}	-0.015^{***}	-0.027^{***}	-0.028^{***}	-0.019^{***}
	(0.005)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)
fh_cl	-0.014	-0.019	-0.061	-0.023^{*}	-0.015	0.013
	(0.016)	(0.014)	(0.041)	(0.012)	(0.011)	(0.025)
industry_va_sh	-0.006	-0.003	0.001	-0.001	0.0005	0.004
	(0.005)	(0.004)	(0.009)	(0.003)	(0.003)	(0.005)
agri_va_sh	-0.016^{*}	-0.012	-0.007	-0.010^{***}	-0.007^{**}	-0.016^{**}
	(0.009)	(0.008)	(0.008)	(0.003)	(0.003)	(0.007)
service_va_sh	-0.0003	-0.001	-0.009	-0.004^{**}	-0.005^{**}	-0.015^{**}
	(0.004)	(0.004)	(0.010)	(0.002)	(0.002)	(0.006)
Constant		-3.096^{***}	-5.458^{***}		-1.543^{***}	-4.891^{***}
		(0.842)	(0.838)		(0.550)	(0.755)
Observations	3,848	3,848	3,848	3,848	3,848	3,848
Adjusted R^2	0.302	0.493	0.866	0.581	0.692	0.927
F Statistic	205.534^{***}	$3{,}749.297^{***}$	$2{,}767.671^{***}$	614.209^{***}	$8{,}638.018^{***}$	$5{,}395.856^{***}$
	(df = 9; 3658)		(df = 9; 3838)	(df = 9; 3658)		(df = 9; 3838)

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table A.10: Qreg: Gini - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Gini	.124	−.277**	−.503***	−.588***	−.386***	−.144	−.042	−.041	.426
	(.206)	(.129)	(.095)	(.106)	(.116)	(.109)	(.118)	(.138)	(.312)
Red. Gini	.461	.053	−.008	.413	1.025***	1.429***	1.807***	2.642***	1.935***
	(.340)	(.232)	(.216)	(.301)	(.350)	(.208)	(.231)	(.259)	(.481)
GDP pc	.786***	.868***	.832***	.822***	.813***	.791***	.784***	.802***	.793***
	(.059)	(.024)	(.021)	(.021)	(.018)	(.019)	(.017)	(.022)	(.044)
Pop. Urban	−.0003	.0003	.001	.001*	.00001	−.0004	−.001*	−.005***	−.005**
	(.001)	(.001)	(.001)	(.001)	(.001)	(.0005)	(.001)	(.001)	(.002)
Rnew. Energy	−.012***	−.013***	−.014***	−.016***	−.016***	−.016***	−.017***	−.016***	−.014***
	(.001)	(.001)	(.0005)	(.001)	(.001)	(.001)	(.0005)	(.001)	(.001)
Civil Liberties	−.124***	−.076***	−.059***	−.038***	−.022***	−.008	−.004	.001	−.009
	(.019)	(.009)	(.007)	(.007)	(.008)	(.008)	(.009)	(.008)	(.019)
Industry VA	.004	−.0001	−.001	.001	.001	.0002	.0002	.001	−.0004
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)
Agri. VA	−.009	−.004	−.006***	−.003**	−.006***	−.009***	−.010***	−.012***	−.018***
	(.007)	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.005)
Services VA	.0005	−.003	−.005**	−.003**	−.005***	−.007***	−.010***	−.012***	−.016***
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.005)
Constant	−6.152***	−6.439***	−5.743***	−5.756***	−5.535***	−5.289***	−4.955***	−4.706***	−4.375***
	(.717)	(.300)	(.255)	(.238)	(.185)	(.258)	(.236)	(.235)	(.412)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table A.11: Qreg: Gini - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Gini	.125	−.251*	−.470***	−.704***	−.756***	−.613***	−.614***	−.755***	−.944***
	(.155)	(.139)	(.136)	(.100)	(.096)	(.133)	(.133)	(.180)	(.253)
Red. Gini	−.114	.256	.566**	.594**	.822***	1.402***	2.093***	1.851***	3.073***
	(.326)	(.193)	(.238)	(.276)	(.267)	(.426)	(.421)	(.444)	(.549)
GDP pc	.847***	.781***	.765***	.764***	.752***	.726***	.699***	.666***	.634***
	(.021)	(.024)	(.020)	(.020)	(.018)	(.020)	(.019)	(.025)	(.025)
Pop. Urban	.002**	.002***	.002***	.001	.001	.001**	.002**	.003***	.004***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.019***	−.018***	−.017***	−.018***	−.020***	−.020***	−.021***	−.019***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.027***	−.013**	−.002	.011	.018**	.024***	.027***	.031***	.041***
	(.008)	(.006)	(.007)	(.009)	(.007)	(.007)	(.008)	(.012)	(.014)
Industry VA	−.002*	.003***	.007***	.009***	.009***	.006***	.007**	.008***	.011***
	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)	(.004)
Agri. VA	−.015***	−.013***	−.012***	−.013***	−.013***	−.015***	−.013***	−.014***	−.013***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.004)
Services VA	−.017***	−.011***	−.009***	−.007***	−.009***	−.014***	−.016***	−.018***	−.014***
	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)	(.004)
Constant	−6.020***	−5.603***	−5.486***	−5.425***	−5.091***	−4.476***	−4.080***	−3.491***	−3.353***
	(.302)	(.302)	(.250)	(.252)	(.270)	(.270)	(.312)	(.258)	(.353)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table A.12: Qreg: Top 10% - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Top 10%	.273*	−.126	−.418***	−.526***	−.477***	−.464***	−.515***	−.516***	.006
	(.163)	(.096)	(.097)	(.120)	(.110)	(.087)	(.112)	(.125)	(.246)
Red. Top 10%	1.517***	1.194***	1.310***	2.026***	2.651***	2.892***	3.457***	4.422***	4.565***
	(.495)	(.328)	(.427)	(.527)	(.456)	(.340)	(.467)	(.464)	(.861)
GDP pc	.791***	.868***	.824***	.812***	.792***	.774***	.770***	.780***	.786***
	(.065)	(.023)	(.020)	(.021)	(.019)	(.021)	(.021)	(.023)	(.040)
Pop. Urban	.00003	.00004	.001	.001*	.0004	−.0001	−.001	−.004***	−.005**
	(.001)	(.0004)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.002)
Rnew. Energy	−.013***	−.013***	−.014***	−.015***	−.016***	−.016***	−.017***	−.016***	−.013***
	(.001)	(.001)	(.0005)	(.001)	(.0004)	(.001)	(.0004)	(.001)	(.001)
Civil Liberties	−.118***	−.071***	−.053***	−.033***	−.016**	−.003	.003	.004	.002
	(.019)	(.010)	(.007)	(.008)	(.007)	(.008)	(.009)	(.009)	(.019)
Industry VA	.003	−.00002	−.002	.001	−.0005	.001	.001	.001	−.002
	(.003)	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.004)
Agri. VA	−.007	−.004	−.006***	−.004**	−.008***	−.009***	−.010***	−.013***	−.020***
	(.007)	(.003)	(.002)	(.002)	(.002)	(.003)	(.002)	(.003)	(.005)
Services VA	.001	−.003	−.005***	−.004**	−.007***	−.006***	−.009***	−.012***	−.017***
	(.003)	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.005)
Constant	−6.344***	−6.585***	−5.773***	−5.789***	−5.277***	−5.072***	−4.734***	−4.364***	−4.044***
	(.711)	(.320)	(.218)	(.253)	(.222)	(.288)	(.257)	(.234)	(.426)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table A.13: Qreg: Top 10% - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Top 10%	.081	−.305***	−.553***	−.795***	−.974***	−.867***	−.989***	−1.193***	−1.503***
	(.129)	(.117)	(.119)	(.091)	(.107)	(.122)	(.125)	(.135)	(.137)
Red. Top 10%	−.008	.956***	1.617***	1.941***	2.168***	3.423***	3.998***	4.474***	6.699***
	(.612)	(.303)	(.326)	(.381)	(.455)	(.571)	(.597)	(.663)	(.857)
GDP pc	.841***	.770***	.745***	.745***	.732***	.703***	.676***	.646***	.600***
	(.022)	(.022)	(.020)	(.025)	(.018)	(.018)	(.025)	(.029)	(.020)
Pop. Urban	.002**	.002***	.003***	.002**	.001	.002**	.003***	.003***	.004***
	(.001)	(.0004)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.019***	−.018***	−.017***	−.018***	−.020***	−.020***	−.020***	−.019***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.027***	−.011*	.001	.015*	.022***	.030***	.037***	.045***	.053***
	(.009)	(.006)	(.006)	(.008)	(.008)	(.008)	(.009)	(.012)	(.016)
Industry VA	−.003*	.004***	.007***	.011***	.010***	.007***	.007**	.010***	.012***
	(.002)	(.001)	(.001)	(.001)	(.002)	(.003)	(.003)	(.002)	(.004)
Agri. VA	−.015***	−.012***	−.012***	−.013***	−.013***	−.014***	−.014***	−.012***	−.011***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)	(.004)
Services VA	−.017***	−.011***	−.009***	−.007***	−.008***	−.012***	−.015***	−.015***	−.012***
	(.002)	(.001)	(.001)	(.002)	(.002)	(.003)	(.003)	(.003)	(.003)
Constant	−5.909***	−5.554***	−5.394***	−5.423***	−5.019***	−4.414***	−3.934***	−3.598***	−3.203***
	(.340)	(.280)	(.230)	(.293)	(.253)	(.273)	(.306)	(.253)	(.299)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table A.14: Qreg: Bot 50% - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Bot. 50%	.341	.815***	1.123***	1.095***	.553**	−.143	−.437*	−.751***	−2.178***
	(.413)	(.287)	(.219)	(.198)	(.227)	(.193)	(.245)	(.290)	(.643)
Red. Bot. 50%	−.053	−.346	−.314	.379	1.620***	2.223***	3.035***	4.515***	3.808***
	(.629)	(.409)	(.368)	(.475)	(.523)	(.339)	(.365)	(.381)	(.772)
GDP pc	.787***	.867***	.839***	.830***	.819***	.804***	.790***	.806***	.817***
	(.060)	(.023)	(.021)	(.022)	(.019)	(.019)	(.018)	(.020)	(.044)
Pop. Urban	.0002	.001	.001	.001	−.0001	−.001	−.001*	−.005***	−.004*
	(.001)	(.001)	(.001)	(.001)	(.001)	(.0005)	(.001)	(.001)	(.002)
Rnew. Energy	−.012***	−.013***	−.014***	−.016***	−.016***	−.016***	−.017***	−.016***	−.013***
	(.001)	(.001)	(.0004)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.126***	−.078***	−.060***	−.040***	−.024***	−.012	−.006	−.003	.005
	(.020)	(.008)	(.007)	(.008)	(.008)	(.008)	(.009)	(.008)	(.019)
Industry VA	.004	.0002	−.001	.001	.0004	−.00001	−.0002	−.0003	−.006
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.005)
Agri. VA	−.010	−.004	−.006***	−.003**	−.006***	−.008***	−.010***	−.013***	−.023***
	(.007)	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.005)
Services VA	.001	−.002	−.004**	−.003**	−.006***	−.007***	−.011***	−.014***	−.022***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.005)
Constant	−6.220***	−6.744***	−6.269***	−6.295***	−5.849***	−5.425***	−4.920***	−4.561***	−3.618***
	(.592)	(.270)	(.219)	(.186)	(.197)	(.252)	(.238)	(.277)	(.508)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table A.15: Qreg: Bot 50% - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Bot. 50%	−.367	.349	.632***	1.164***	1.235***	.617**	.342	.158	.016
	(.267)	(.266)	(.230)	(.211)	(.226)	(.251)	(.258)	(.323)	(.524)
Red. Bot. 50%	−.057	.370	.895**	.771*	1.416***	3.011***	4.239***	4.179***	5.878***
	(.499)	(.331)	(.360)	(.420)	(.520)	(.604)	(.609)	(.723)	(.812)
GDP pc	.842***	.788***	.777***	.777***	.757***	.727***	.704***	.672***	.620***
	(.020)	(.024)	(.018)	(.020)	(.018)	(.019)	(.023)	(.021)	(.028)
Pop. Urban	.002*	.002***	.002***	.001	.001	.001**	.001*	.003***	.006***
	(.001)	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.018***	−.018***	−.017***	−.018***	−.020***	−.021***	−.021***	−.019***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.030***	−.014**	−.003	.008	.018**	.025***	.027***	.037***	.055***
	(.008)	(.006)	(.007)	(.008)	(.007)	(.008)	(.007)	(.013)	(.015)
Industry VA	−.003**	.003***	.006***	.009***	.008***	.006***	.006*	.005**	.007*
	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)	(.004)
Agri. VA	−.015***	−.012***	−.012***	−.013***	−.013***	−.014***	−.014***	−.015***	−.016***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.004)
Services VA	−.017***	−.011***	−.009***	−.007***	−.009***	−.014***	−.017***	−.020***	−.017***
	(.002)	(.001)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)
Constant	−5.758***	−5.871***	−5.919***	−6.080***	−5.703***	−4.937***	−4.439***	−3.902***	−3.712***
	(.287)	(.248)	(.209)	(.257)	(.256)	(.261)	(.354)	(.281)	(.386)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table A.16: The effect of pre-distribution and redistribution on CBE in low-, low-middle-upper-middle-, and high-income countries (Top 10%)

	Low	Low-Middle	Upper-Middle	High
	(log of consumption-based emissions per capita)			
Pre-tax Top 10%	0.322	0.267	-1.326^{*}	-0.184
	(0.787)	(0.691)	(0.796)	(0.573)
Red. Top 10%	2.057	2.883	2.237	2.211^{**}
	(3.292)	(1.950)	(2.146)	(1.097)
GDP pc	0.636^{***}	0.495^{**}	0.539^{***}	0.462^{***}
	(0.201)	(0.194)	(0.184)	(0.150)
Pop. Urban	0.023^{**}	0.015^{*}	-0.010	-0.001
	(0.011)	(0.008)	(0.012)	(0.008)
Rnew. Energy	-0.017^{**}	-0.012^{**}	0.005	-0.009^{**}
	(0.008)	(0.005)	(0.015)	(0.005)
Civil Liberties	0.020	-0.023	-0.055	0.004
	(0.028)	(0.019)	(0.044)	(0.020)
Industry VA	-0.002	-0.002	-0.010	-0.011
	(0.011)	(0.007)	(0.010)	(0.013)
Agri. VA	0.0002	-0.019^{**}	-0.027	-0.038
	(0.010)	(0.007)	(0.023)	(0.026)
Services VA	0.002	0.0004	0.003	-0.004
	(0.007)	(0.005)	(0.008)	(0.012)
Observations	482	1,121	1,025	1,220
Adjusted R^2	0.214	0.353	0.168	0.194
F Statistic	20.439^{***}	76.634^{***}	31.273^{***}	41.724^{***}
	(df = 9; 428)	(df = 9; 1042)	(df = 9; 949)	(df = 9; 1137)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table A.17: The effect of pre-distribution and redistribution on PBE in low-, low-middle-upper-middle-, and high-income countries (Top 10%)

	Low	Low-Middle	Upper-Middle	High
	(log of production-based emissions per capita)			
Pre-tax Top 10%	0.075	0.008	-0.098	-0.995^{*}
	(0.613)	(0.478)	(0.375)	(0.509)
Red. Top 10%	-0.282	2.447	1.017	1.982^{*}
	(2.211)	(1.521)	(0.797)	(1.012)
GDP pc	0.613^{***}	0.318^{**}	0.418^{***}	0.460^{***}
	(0.140)	(0.143)	(0.130)	(0.117)
Pop. Urban	0.030^{***}	0.008	0.006^{*}	0.010
	(0.011)	(0.008)	(0.004)	(0.007)
Rnew Energy	-0.042^{***}	-0.025^{***}	-0.020^{***}	-0.025^{***}
	(0.006)	(0.005)	(0.003)	(0.004)
Civil Liberties	0.014	-0.017	-0.069^{***}	0.004
	(0.023)	(0.017)	(0.022)	(0.019)
Industry VA	-0.003	0.003	0.001	-0.012
	(0.008)	(0.004)	(0.003)	(0.008)
Agri. VA	-0.005	-0.018^{***}	0.003	-0.022
	(0.007)	(0.006)	(0.005)	(0.014)
Services VA	0.004	-0.006^{*}	0.001	-0.016^{**}
	(0.006)	(0.003)	(0.003)	(0.007)
Observations	482	1,121	1,025	1,220
Adjusted R^2	0.551	0.516	0.510	0.419
F Statistic	71.357^{***}	141.583^{***}	126.534^{***}	106.941^{***}
	(df = 9; 428)	(df = 9; 1042)	(df = 9; 949)	(df = 9; 1137)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table A.18: The effect of pre-distribution and redistribution on CBE in low-, low-middle-upper-middle-, and high-income countries (Bot 50%)

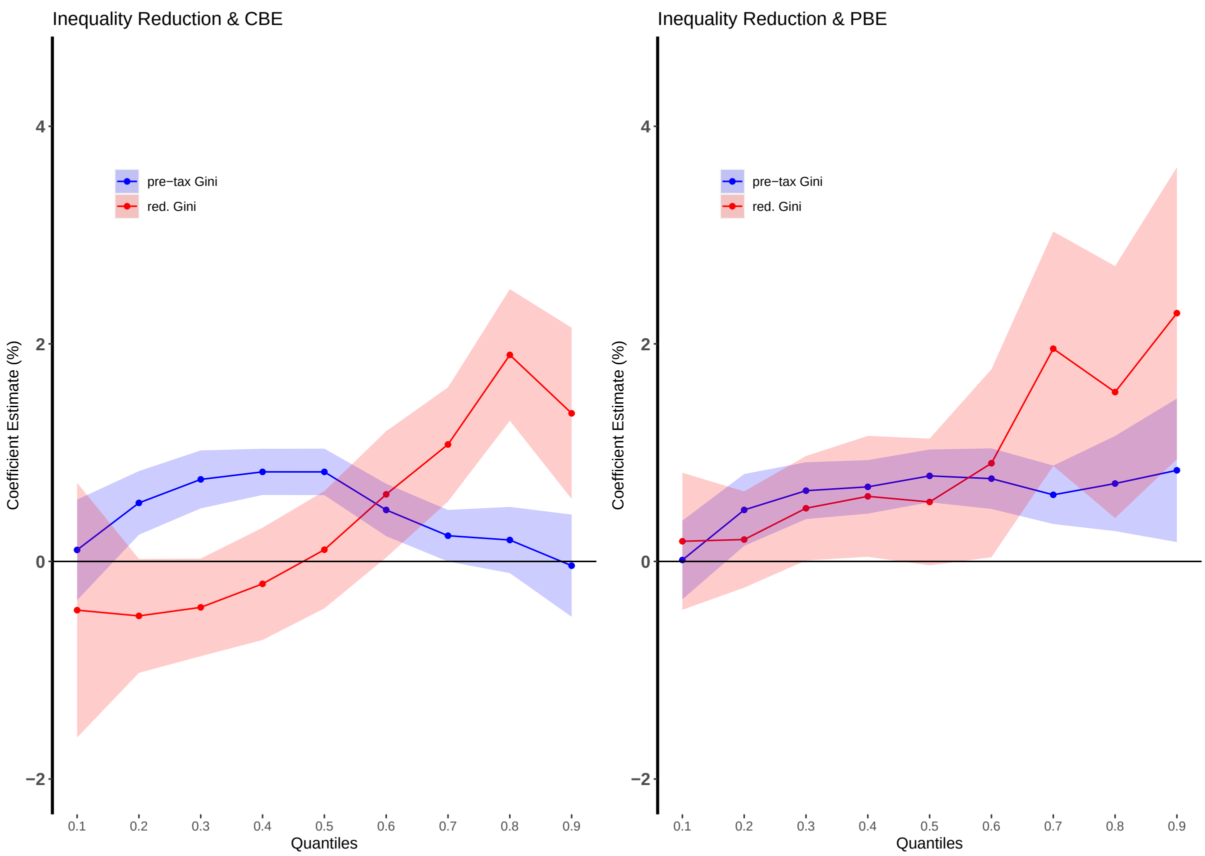
	Low	Low-Middle	Upper-Middle	High
	(log of consumption-based emissions per capita)			
Pre-tax Bot. 50%	-1.546	-1.366	3.666^{*}	0.363
	(1.981)	(1.631)	(1.988)	(0.656)
Red. Bot. 50%	-1.023	5.895^{**}	4.539^{*}	2.123^{*}
	(2.674)	(2.484)	(2.697)	(1.205)
GDP pc	0.648^{***}	0.509^{***}	0.551^{***}	0.466^{***}
	(0.209)	(0.192)	(0.188)	(0.150)
Pop. Urban	0.023^{**}	0.015^{*}	-0.007	-0.002
	(0.011)	(0.008)	(0.011)	(0.008)
Rnew. Energy	-0.018^{**}	-0.012^{**}	0.006	-0.009^{**}
	(0.008)	(0.005)	(0.015)	(0.005)
Civil Liberties	0.015	-0.020	-0.063	0.006
	(0.028)	(0.019)	(0.044)	(0.020)
Industry VA	-0.003	-0.001	-0.009	-0.012
	(0.011)	(0.007)	(0.010)	(0.013)
Agri. VA	-0.0002	-0.018^{**}	-0.026	-0.039
	(0.009)	(0.007)	(0.022)	(0.026)
Services VA	0.001	0.001	0.005	-0.005
	(0.007)	(0.005)	(0.008)	(0.013)
Observations	482	1,121	1,025	1,220
Adjusted R^2	0.216	0.363	0.181	0.188
F Statistic	20.613^{***}	79.485^{***}	33.507^{***}	40.387^{***}
	(df = 9; 428)	(df = 9; 1042)	(df = 9; 949)	(df = 9; 1137)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table A.19: The effect of pre-distribution and redistribution on PBE in low-, low-middle-upper-middle-, and high-income countries (Bot 50%)

	Low	Low-Middle	Upper-Middle	High
	(log of production-based emissions per capita)			
Pre-tax Bot. 50%	-0.690	-0.548	0.087	1.251^{**}
	(1.580)	(1.376)	(1.039)	(0.630)
Red. Bot. 50%	-1.470	3.890^{*}	0.966	2.293^{**}
	(2.409)	(2.105)	(0.948)	(1.147)
GDP pc	0.609^{***}	0.327^{**}	0.418^{***}	0.459^{***}
	(0.133)	(0.144)	(0.129)	(0.118)
Pop. Urban	0.031^{***}	0.008	0.006^{*}	0.009
	(0.011)	(0.008)	(0.004)	(0.007)
Rnew. Energy	-0.042^{***}	-0.024^{***}	-0.021^{***}	-0.025^{***}
	(0.005)	(0.005)	(0.003)	(0.004)
Civil Liberties	0.012	-0.016	-0.070^{***}	0.009
	(0.022)	(0.017)	(0.021)	(0.019)
Industry VA	-0.003	0.003	0.001	-0.014^{*}
	(0.008)	(0.004)	(0.003)	(0.008)
Agri. VA	-0.005	-0.018^{***}	0.003	-0.026^{*}
	(0.007)	(0.006)	(0.005)	(0.014)
Services VA	0.004	-0.006^{*}	0.001	-0.019^{***}
	(0.006)	(0.004)	(0.004)	(0.007)
Observations	482	1,121	1,025	1,220
Adjusted R^2	0.553	0.518	0.509	0.416
F Statistic	71.900^{***}	142.414^{***}	126.086^{***}	105.740^{***}
	(df = 9; 428)	(df = 9; 1042)	(df = 9; 949)	(df = 9; 1137)
Note:				*p<0.1; **p<0.05; ***p<0.01

B Analysis of the IV. Model

Figure B.1: IV Model: The effect of pre-distribution and redistribution on CBE and PBE across quantiles



Notes: bootstrapped standard errors

Table B.1: IV Model, Qreg: Redistribution Gini - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Gini	−.106	−.538***	−.754***	−.823***	−.823***	−.473***	−.236*	−.197	.039
	(.238)	(.156)	(.126)	(.107)	(.105)	(.116)	(.128)	(.157)	(.247)
Red. Gini	−.448	−.501*	−.422*	−.206	.108	.617**	1.075***	1.898***	1.361***
	(.610)	(.285)	(.253)	(.312)	(.266)	(.279)	(.269)	(.331)	(.421)
GDP pc	.892***	.893***	.865***	.831***	.806***	.819***	.781***	.767***	.806***
	(.042)	(.024)	(.025)	(.027)	(.024)	(.030)	(.032)	(.025)	(.035)
Pop. Urban	−.0002	.0002	.001	.001	.001	−.001	−.002**	−.005***	−.005***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.010***	−.012***	−.013***	−.014***	−.014***	−.015***	−.015***	−.015***	−.010***
	(.001)	(.0004)	(.0004)	(.0004)	(.0005)	(.0005)	(.001)	(.001)	(.001)
Civil Liberties	−.115***	−.077***	−.063***	−.044***	−.031***	−.008	−.004	−.005	−.012
	(.018)	(.009)	(.006)	(.009)	(.008)	(.009)	(.011)	(.010)	(.013)
Industry VA	.005	.001	.001	.003	.004**	.001	.003	.003	.001
	(.004)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.004)	(.004)
Agri. VA	−.007	−.004	−.005**	−.005**	−.006***	−.009***	−.010***	−.016***	−.017***
	(.006)	(.003)	(.003)	(.002)	(.002)	(.003)	(.003)	(.004)	(.005)
Services VA	.001	−.002	−.003	−.002	−.001	−.004*	−.004	−.009**	−.013***
	(.005)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)	(.005)
Tariffs	.029	.004	.011	−.008	−.012	−.008	−.034*	−.078***	−.081***
	(.024)	(.013)	(.014)	(.013)	(.012)	(.016)	(.017)	(.013)	(.011)
Constant	−7.196***	−6.620***	−6.092***	−5.777***	−5.524***	−5.519***	−5.176***	−4.403***	−4.451***
	(.615)	(.274)	(.248)	(.253)	(.248)	(.296)	(.350)	(.335)	(.375)
Observations	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951

Note: *p<0.1; **p<0.05; ***p<0.01

Table B.2: IV Model, Qreg: Redistribution Gini - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Gini	−.013	−.473***	−.650***	−.685***	−.786***	−.761***	−.612***	−.716***	−.838***
	(.168)	(.174)	(.129)	(.122)	(.120)	(.130)	(.132)	(.248)	(.305)
Red. Gini	.185	.201	.489*	.598*	.546**	.903**	1.956***	1.557***	2.282***
	(.330)	(.213)	(.251)	(.320)	(.270)	(.455)	(.525)	(.562)	(.741)
GDP pc	.833***	.789***	.771***	.785***	.778***	.732***	.693***	.691***	.681***
	(.028)	(.029)	(.020)	(.023)	(.025)	(.029)	(.033)	(.040)	(.036)
Pop. Urban	.001	.002***	.002***	.001	.001	.001	.002**	.002	.003*
	(.001)	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.002)
Rnew. Energy	−.017***	−.018***	−.017***	−.017***	−.017***	−.018***	−.019***	−.019***	−.018***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.034***	−.016**	−.006	.0004	.010	.009	.022**	.016	.014
	(.011)	(.007)	(.006)	(.009)	(.009)	(.010)	(.010)	(.011)	(.020)
Industry VA	−.007***	.003	.007***	.009***	.008***	.009***	.008*	.008**	.014***
	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.004)	(.004)	(.005)
Agri. VA	−.027***	−.017***	−.016***	−.016***	−.015***	−.016***	−.016***	−.016***	−.011**
	(.003)	(.003)	(.002)	(.002)	(.003)	(.003)	(.004)	(.005)	(.005)
Services VA	−.024***	−.015***	−.011***	−.009***	−.009***	−.009***	−.011**	−.014***	−.008*
	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.005)	(.005)	(.005)
Tariffs	.041***	.032***	.041***	.044***	.037**	.030*	.036**	.032	.024
	(.011)	(.011)	(.009)	(.015)	(.016)	(.016)	(.016)	(.026)	(.040)
Constant	−5.164***	−5.322***	−5.354***	−5.531***	−5.307***	−4.758***	−4.375***	−3.925***	−4.220***
	(.384)	(.325)	(.229)	(.275)	(.318)	(.336)	(.363)	(.371)	(.405)
Observations	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951

Note: *p<0.1; **p<0.05; ***p<0.01

Table B.3: IV Model, Qreg: Redistribution top 10 - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Top 10%	.256	−.266**	−.546***	−.754***	−.838***	−.647***	−.631***	−.628***	−.374*
	(.198)	(.135)	(.112)	(.101)	(.095)	(.117)	(.128)	(.140)	(.221)
Red. Top 10%	.924	.507	.796**	1.320***	1.423***	2.168***	2.885***	3.675***	3.638***
	(.826)	(.420)	(.402)	(.509)	(.467)	(.457)	(.524)	(.556)	(.696)
GDP pc	.894***	.885***	.853***	.807***	.786***	.784***	.750***	.746***	.790***
	(.039)	(.027)	(.023)	(.026)	(.026)	(.032)	(.033)	(.030)	(.034)
Pop. Urban	−.001	−.0001	.0004	.001**	.001	.0001	−.001	−.004***	−.004***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.011***	−.012***	−.013***	−.014***	−.015***	−.015***	−.015***	−.014***	−.009***
	(.001)	(.0005)	(.0005)	(.0005)	(.0004)	(.0005)	(.001)	(.001)	(.001)
Civil Liberties	−.109***	−.072***	−.053***	−.036***	−.026***	−.002	.005	.005	.001
	(.020)	(.010)	(.007)	(.009)	(.008)	(.009)	(.009)	(.011)	(.014)
Industry VA	.005	.002	.001	.004**	.003*	.002	.005	.003	.004
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)
Agri. VA	−.005	−.003	−.006**	−.005**	−.007***	−.009***	−.010***	−.017***	−.014***
	(.006)	(.003)	(.002)	(.002)	(.002)	(.003)	(.003)	(.004)	(.005)
Services VA	.001	−.001	−.003	−.002	−.002	−.004*	−.003	−.009**	−.010**
	(.004)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)	(.004)
Tariffs	.043*	.002	.006	.006	−.007	−.007	−.030**	−.072***	−.077***
	(.023)	(.013)	(.012)	(.015)	(.014)	(.016)	(.014)	(.014)	(.010)
Constant	−7.424***	−6.807***	−6.223***	−5.843***	−5.458***	−5.308***	−4.933***	−4.106***	−4.567***
	(.538)	(.334)	(.244)	(.288)	(.271)	(.316)	(.334)	(.316)	(.385)
Observations	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951

Note: *p<0.1; **p<0.05; ***p<0.01

Table B.4: IV Model, Qreg: Redistribution top 10 - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Top 10%	−.097	−.480***	−.688***	−.800***	−.925***	−1.013***	−1.053***	−1.173***	−1.445***
	(.171)	(.155)	(.130)	(.115)	(.125)	(.135)	(.161)	(.169)	(.176)
Red. Top 10%	.266	.933***	1.425***	2.003***	2.012***	2.818***	4.262***	3.980***	5.540***
	(.546)	(.355)	(.341)	(.421)	(.451)	(.651)	(.795)	(.853)	(.950)
GDP pc	.829***	.773***	.762***	.769***	.751***	.696***	.655***	.646***	.661***
	(.029)	(.032)	(.023)	(.022)	(.022)	(.026)	(.036)	(.041)	(.030)
Pop. Urban	.001	.002***	.002***	.001	.001	.002*	.003***	.004***	.003*
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.017***	−.018***	−.017***	−.017***	−.017***	−.018***	−.019***	−.019***	−.018***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.035***	−.012	−.003	.008	.018*	.023**	.032***	.031***	.034*
	(.009)	(.009)	(.006)	(.009)	(.009)	(.011)	(.012)	(.011)	(.019)
Industry VA	−.007***	.003	.008***	.010***	.009***	.007***	.009**	.010***	.014***
	(.002)	(.002)	(.001)	(.002)	(.002)	(.003)	(.004)	(.003)	(.004)
Agri. VA	−.027***	−.018***	−.016***	−.016***	−.017***	−.019***	−.016***	−.015***	−.011**
	(.004)	(.004)	(.002)	(.002)	(.003)	(.003)	(.004)	(.005)	(.005)
Services VA	−.025***	−.015***	−.011***	−.008***	−.009***	−.011***	−.009*	−.011**	−.009**
	(.002)	(.002)	(.001)	(.002)	(.003)	(.003)	(.005)	(.005)	(.004)
Tariffs	.042***	.029**	.040***	.050***	.048***	.037**	.038**	.049**	.044
	(.011)	(.012)	(.009)	(.011)	(.016)	(.015)	(.017)	(.019)	(.035)
Constant	−5.050***	−5.233***	−5.394***	−5.528***	−5.167***	−4.405***	−4.161***	−3.856***	−3.974***
	(.369)	(.376)	(.247)	(.286)	(.301)	(.379)	(.370)	(.392)	(.377)
Observations	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951

Note: *p<0.1; **p<0.05; ***p<0.01

Table B.5: IV Model, Qreg: Redistribution bot 50 - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Bot. 50%	.800**	1.432***	1.633***	1.539***	1.447***	.499**	−.037	−.598**	−.983*
	(.401)	(.277)	(.235)	(.209)	(.238)	(.251)	(.200)	(.284)	(.510)
Red. Bot. 50%	−1.335*	−1.331***	−1.156***	−.615	−.026	1.027**	1.911***	3.505***	2.766***
	(.809)	(.415)	(.333)	(.389)	(.449)	(.442)	(.440)	(.456)	(.561)
GDP pc	.883***	.883***	.863***	.847***	.821***	.829***	.796***	.765***	.816***
	(.039)	(.025)	(.027)	(.029)	(.027)	(.027)	(.029)	(.021)	(.042)
Pop. Urban	.0003	.001	.001	.001	.0003	−.001*	−.002**	−.004***	−.005***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.010***	−.012***	−.013***	−.014***	−.014***	−.015***	−.015***	−.015***	−.010***
	(.001)	(.0004)	(.0004)	(.0004)	(.0005)	(.0005)	(.001)	(.001)	(.001)
Civil Liberties	−.113***	−.082***	−.068***	−.047***	−.033***	−.011	−.005	−.010	−.007
	(.017)	(.010)	(.007)	(.008)	(.009)	(.009)	(.010)	(.009)	(.013)
Industry VA	.004	.001	.002	.002	.003*	.001	.002	.001	−.001
	(.004)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)
Agri. VA	−.009	−.005**	−.005*	−.004	−.006**	−.008***	−.010***	−.016***	−.020***
	(.006)	(.003)	(.003)	(.002)	(.002)	(.002)	(.003)	(.004)	(.005)
Services VA	.002	−.002	−.002	−.002	−.002	−.004*	−.004	−.012***	−.017***
	(.005)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)	(.005)
Tariffs	.028	.006	.007	−.008	−.011	−.012	−.032**	−.083***	−.088***
	(.023)	(.012)	(.013)	(.013)	(.013)	(.015)	(.016)	(.012)	(.011)
Constant	−7.340***	−6.977***	−6.738***	−6.564***	−6.284***	−5.911***	−5.427***	−4.224***	−4.124***
	(.513)	(.226)	(.252)	(.238)	(.229)	(.282)	(.319)	(.357)	(.451)
Observations	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951

Note: *p<0.1; **p<0.05; ***p<0.01

Table B.6: IV Model, Qreg: Redistribution bot 50 - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Bot. 50%	−.187	.752**	1.116***	1.241***	1.386***	1.022***	.552**	.125	−.158
	(.311)	(.303)	(.233)	(.212)	(.249)	(.299)	(.263)	(.406)	(.548)
Red. Bot. 50%	.358	.287	.665*	.806	.639	1.930**	3.843***	3.827***	4.505***
	(.457)	(.339)	(.376)	(.493)	(.463)	(.794)	(.695)	(.852)	(.852)
GDP pc	.836***	.798***	.781***	.790***	.787***	.745***	.703***	.693***	.676***
	(.027)	(.031)	(.024)	(.020)	(.028)	(.028)	(.032)	(.034)	(.033)
Pop. Urban	.0004	.002***	.002***	.001	.001	.0004	.001	.002	.004**
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.002)
Rnew. Energy	−.018***	−.018***	−.017***	−.017***	−.017***	−.019***	−.020***	−.020***	−.018***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.036***	−.020**	−.007	−.001	.010	.013	.025***	.017	.027
	(.010)	(.008)	(.007)	(.008)	(.008)	(.009)	(.010)	(.014)	(.019)
Industry VA	−.007***	.002	.007***	.008***	.008***	.008***	.007*	.006*	.009*
	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.004)	(.004)	(.005)
Agri. VA	−.027***	−.016***	−.015***	−.016***	−.015***	−.015***	−.015***	−.016***	−.016***
	(.003)	(.003)	(.003)	(.002)	(.003)	(.003)	(.004)	(.004)	(.005)
Services VA	−.025***	−.015***	−.012***	−.009***	−.009***	−.010***	−.012**	−.017***	−.013***
	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)	(.005)	(.004)	(.005)
Tariffs	.038***	.033***	.043***	.046***	.033**	.032**	.036**	.023	.024
	(.012)	(.012)	(.010)	(.013)	(.016)	(.014)	(.015)	(.029)	(.039)
Constant	−5.118***	−5.752***	−5.972***	−6.087***	−5.989***	−5.428***	−4.834***	−4.228***	−4.344***
	(.311)	(.316)	(.234)	(.285)	(.297)	(.334)	(.408)	(.397)	(.465)
Observations	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951

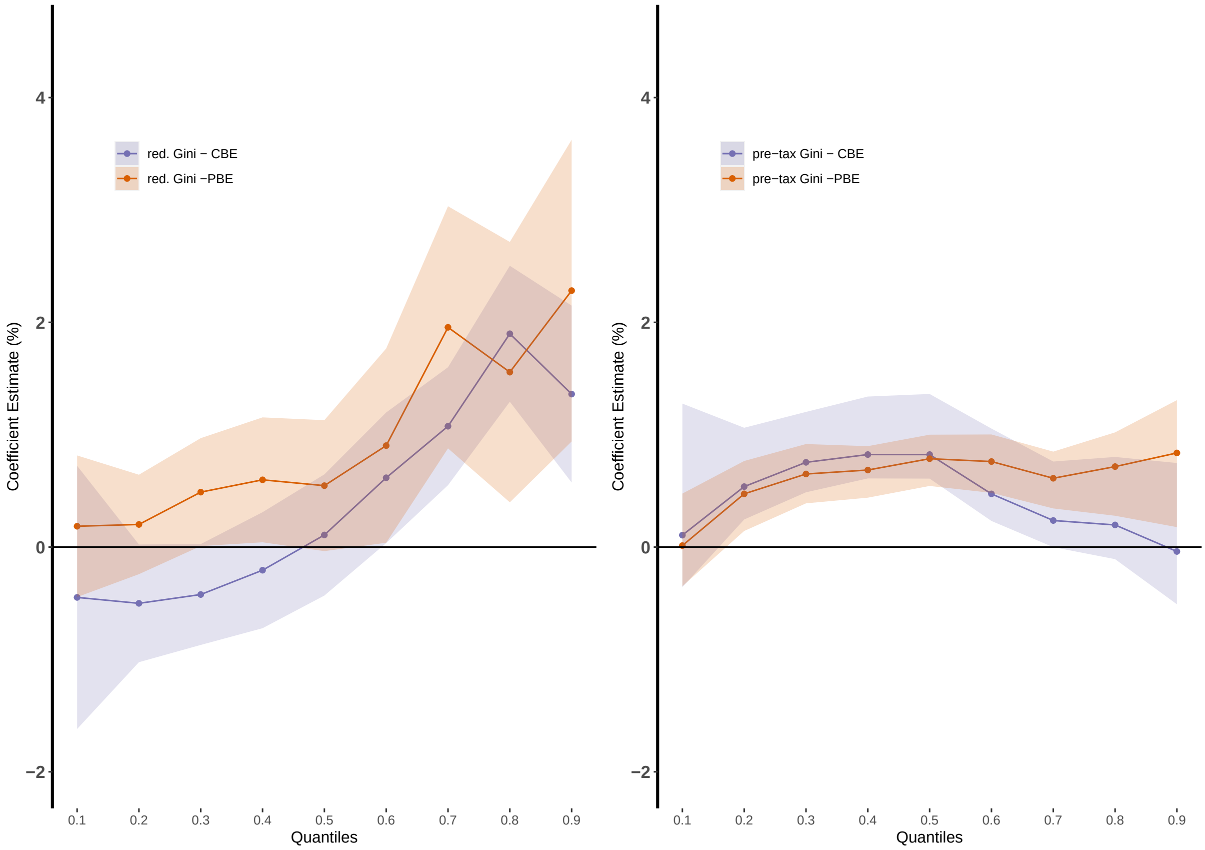
Note: *p<0.1; **p<0.05; ***p<0.01

Table B.7: IV. Model, FE panel: The effect of pre-, and redistribution on CBE in low-, low-middle- upper-middle-, and high-income countries

	Low	Low-Middle	Upper-Middle	High
	(log of consumption-based emissions per capita)			
Pre-tax Gini	0.593	0.338	−1.960***	−0.091
	(0.706)	(0.765)	(0.733)	(0.443)
Red. Gini	−0.246	1.569	1.847	2.105***
	(2.326)	(1.351)	(1.228)	(0.799)
GDP pc	0.330	0.832***	0.737***	0.561***
	(0.235)	(0.204)	(0.209)	(0.151)
Pop. Urban	0.026*	0.015*	−0.010	−0.001
	(0.014)	(0.008)	(0.012)	(0.007)
Rnew. Energy	−0.013*	−0.008*	0.004	−0.008*
	(0.008)	(0.004)	(0.012)	(0.005)
Civil Liberties	−0.041	−0.029	−0.058	0.005
	(0.028)	(0.018)	(0.045)	(0.020)
Industry VA	−0.004	−0.005	−0.001	−0.014
	(0.011)	(0.006)	(0.008)	(0.014)
Agri. VA	−0.013	−0.020**	−0.022	−0.018
	(0.011)	(0.009)	(0.021)	(0.024)
Services VA	−0.002	−0.0004	0.007	−0.005
	(0.008)	(0.006)	(0.008)	(0.014)
Tariffs	0.022	−0.029	0.010	0.032
	(0.018)	(0.038)	(0.022)	(0.061)
Observations	285	766	772	1,128
Adjusted R^2	0.033	0.372	0.174	0.226
F Statistic	6.380***	53.221***	23.686***	41.198***
	(df = 10; 230)	(df = 10; 686)	(df = 10; 696)	(df = 10; 1044)

Note: *p<0.1; **p<0.05; ***p<0.01

Figure B.2: IV Model: Comparing the effect of pre-distribution and redistribution on CBE and PBE

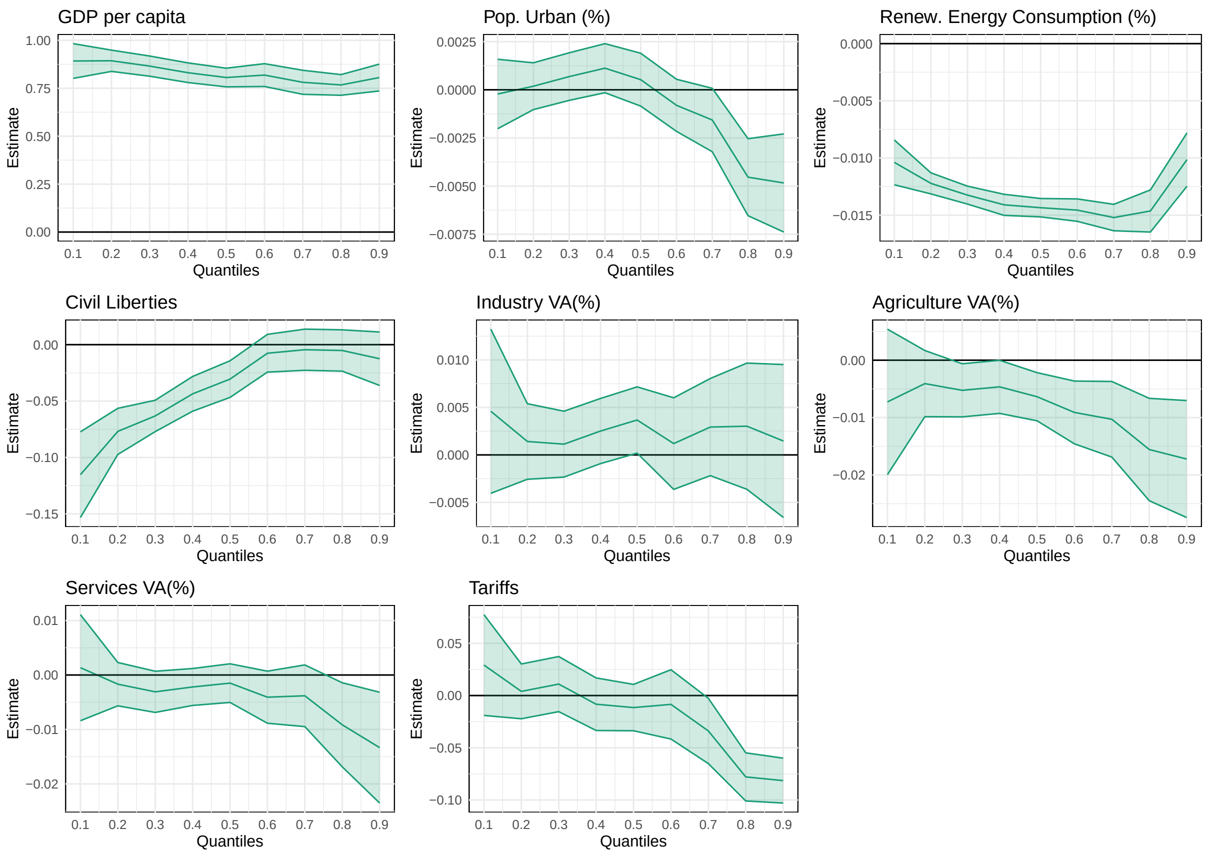


Notes: bootstrapped standard errors

Table B.8: IV. Model, FE panel: The effect of pre-, and redistribution on PBE in low-, low-middle- upper-middle-, and high-income countries

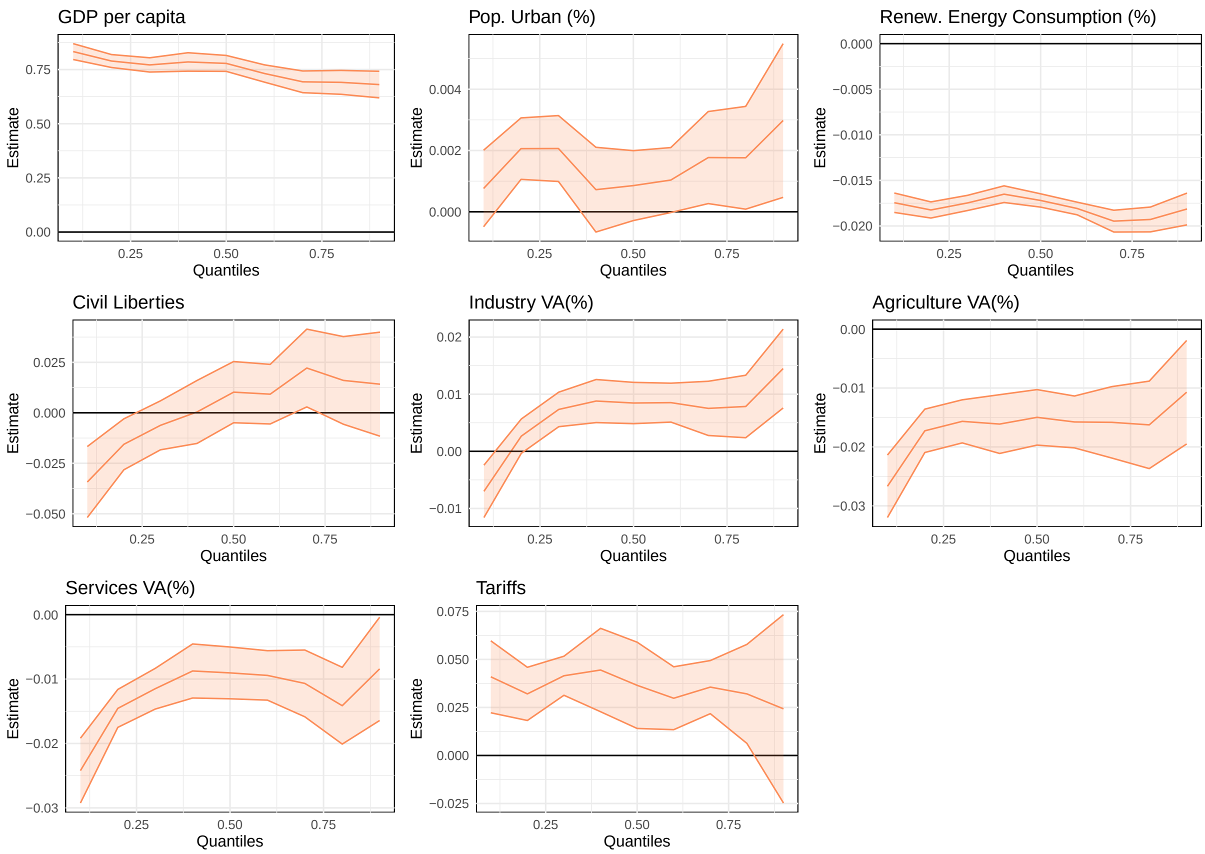
	Low	Low-Middle	Upper-Middle	High
	(log of production-based emissions per capita)			
Pre-tax Gini	−0.167	0.203	−0.729**	−0.733*
	(0.752)	(0.651)	(0.293)	(0.412)
Red. Gini	0.401	3.296**	1.154*	1.632**
	(2.312)	(1.371)	(0.666)	(0.687)
GDP pc	0.481***	0.427***	0.508***	0.487***
	(0.186)	(0.164)	(0.092)	(0.127)
Pop. Urban	0.035**	0.004	0.005	0.008
	(0.016)	(0.010)	(0.004)	(0.006)
Rnew. Energy	−0.041***	−0.022***	−0.018***	−0.022***
	(0.005)	(0.005)	(0.003)	(0.003)
Civil Liberties	0.005	−0.024	−0.046**	0.011
	(0.021)	(0.015)	(0.020)	(0.016)
Industry VA	0.0003	0.003	0.003	−0.015**
	(0.009)	(0.005)	(0.003)	(0.007)
Agri. VA	0.0003	−0.021**	0.002	−0.021*
	(0.008)	(0.009)	(0.005)	(0.012)
Services VA	0.007	−0.005	0.002	−0.020***
	(0.007)	(0.004)	(0.003)	(0.007)
Tariffs	−0.010	−0.034	−0.008	−0.054***
	(0.014)	(0.037)	(0.012)	(0.011)
Observations	285	766	772	1,128
Adjusted R^2	0.478	0.485	0.565	0.451
F Statistic	31.380***	79.981***	107.841***	100.760***
	(df = 10; 230)	(df = 10; 686)	(df = 10; 696)	(df = 10; 1044)
Note:			*p<0.1; **p<0.05; ***p<0.01	

Figure B.3: IV Model (CBE) - Control Variables



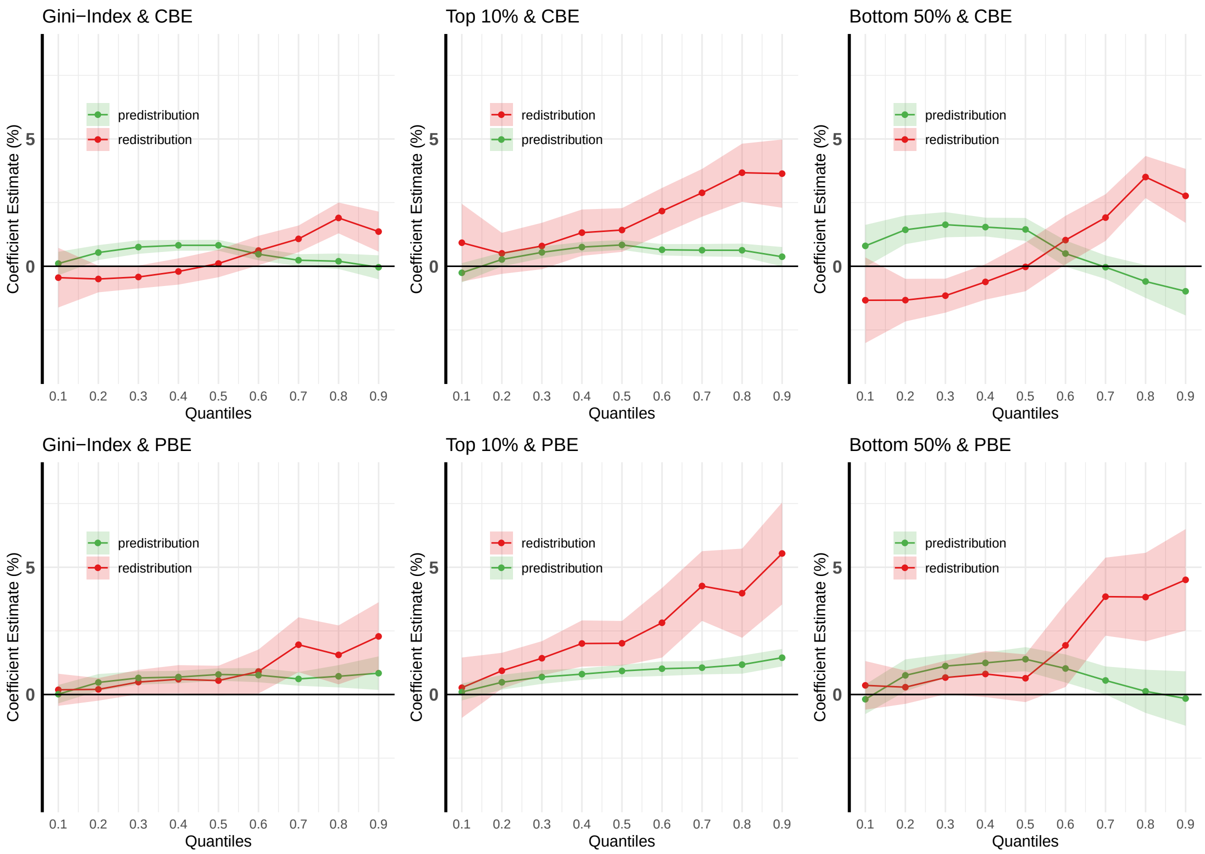
Notes: bootstrapped standard errors

Figure B.4: IV Model (PBE) - Control Variables



Notes: bootstrapped standard errors

Figure B.5: IV Model: The effect of pre-distribution and redistribution on CBE and PBE across quantiles (different inequality measures)



Notes: bootstrapped standard errors

C Seperate models regrading the effect of inequality (pre-, and post-tax)

Table C.1: Qreg: Gini (post-tax) - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post-tax Gini	−.022	−.219***	−.379***	−.555***	−.553***	−.411***	−.420***	−.613***	−.180
	(.139)	(.078)	(.081)	(.080)	(.072)	(.072)	(.086)	(.100)	(.232)
GDP pc	.798***	.867***	.834***	.818***	.818***	.814***	.773***	.792***	.795***
	(.053)	(.023)	(.019)	(.019)	(.018)	(.021)	(.018)	(.023)	(.036)
Pop. Urban	−.0003	.0001	.001	.001*	.00005	−.001*	−.001	−.004***	−.006***
	(.001)	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.002)
Rnew. Energy	−.012***	−.013***	−.014***	−.016***	−.016***	−.016***	−.017***	−.016***	−.013***
	(.001)	(.001)	(.0004)	(.0005)	(.0004)	(.0005)	(.0005)	(.001)	(.001)
Civil Liberties	−.126***	−.075***	−.056***	−.038***	−.025***	−.009	−.012	−.021***	−.024
	(.020)	(.008)	(.007)	(.006)	(.007)	(.007)	(.010)	(.008)	(.017)
Industry VA	.004	.00003	−.002	.001	.001	−.00005	−0.00000	.003	.0002
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)
Agri. VA	−.010	−.004	−.006***	−.003**	−.006***	−.010***	−.012***	−.013***	−.020***
	(.006)	(.003)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)
Services VA	.001	−.003	−.005***	−.003***	−.005**	−.006***	−.009***	−.010***	−.015***
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.004)
Constant	−6.205***	−6.480***	−5.835***	−5.732***	−5.522***	−5.274***	−4.555***	−4.314***	−3.884***
	(.629)	(.292)	(.223)	(.213)	(.196)	(.242)	(.243)	(.236)	(.358)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.2: Qreg: Gini (pre-tax) - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Gini	−.001	−.292***	−.489***	−.591***	−.576***	−.305***	−.207*	−.356***	.290
	(.175)	(.108)	(.085)	(.092)	(.098)	(.102)	(.124)	(.136)	(.232)
GDP pc	.803***	.868***	.834***	.837***	.840***	.831***	.790***	.795***	.806***
	(.052)	(.022)	(.020)	(.020)	(.020)	(.020)	(.019)	(.022)	(.036)
Pop. Urban	−.0004	.0004	.001	.001	−.0002	−.001**	−.001	−.003***	−.006***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.0005)	(.001)	(.001)	(.002)
Rnew. Energy	−.012***	−.013***	−.014***	−.016***	−.016***	−.016***	−.017***	−.017***	−.014***
	(.001)	(.0005)	(.0004)	(.0005)	(.0004)	(.0005)	(.0004)	(.001)	(.001)
Civil Liberties	−.126***	−.076***	−.058***	−.041***	−.028***	−.015**	−.024**	−.026***	−.034**
	(.018)	(.008)	(.007)	(.007)	(.007)	(.007)	(.010)	(.010)	(.016)
Industry VA	.004	−.00003	−.001	.001	−.0001	−.001	−.001	−.001	−.001
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)
Agri. VA	−.010	−.004	−.006***	−.003*	−.006***	−.010***	−.012***	−.015***	−.021***
	(.007)	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.004)	(.003)
Services VA	.001	−.003	−.004***	−.003*	−.006***	−.007***	−.010***	−.013***	−.017***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)
Constant	−6.247***	−6.439***	−5.773***	−5.854***	−5.560***	−5.387***	−4.696***	−4.192***	−4.039***
	(.629)	(.308)	(.203)	(.216)	(.209)	(.236)	(.244)	(.307)	(.397)
Observations	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.3: Qreg: Gini (post-tax) - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post-tax Gini	.121	−.251***	−.504***	−.679***	−.774***	−.782***	−.890***	−.971***	−1.385***
	(.077)	(.086)	(.087)	(.092)	(.091)	(.095)	(.094)	(.109)	(.180)
GDP pc	.848***	.782***	.763***	.766***	.752***	.735***	.709***	.688***	.630***
	(.022)	(.024)	(.017)	(.019)	(.019)	(.018)	(.019)	(.023)	(.026)
Pop. Urban	.002**	.002***	.002***	.001	.001	.001	.002***	.003***	.005***
	(.001)	(.0004)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.019***	−.018***	−.017***	−.018***	−.019***	−.020***	−.020***	−.020***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.026***	−.013**	−.002	.012	.017**	.019**	.023**	.025**	.021
	(.010)	(.006)	(.007)	(.009)	(.007)	(.008)	(.009)	(.010)	(.014)
Industry VA	−.002*	.003***	.007***	.009***	.009***	.007***	.006**	.007***	.010***
	(.001)	(.001)	(.002)	(.002)	(.002)	(.002)	(.003)	(.002)	(.004)
Agri. VA	−.014***	−.013***	−.012***	−.013***	−.013***	−.014***	−.014***	−.014***	−.014***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)
Services VA	−.017***	−.011***	−.009***	−.007***	−.009***	−.012***	−.016***	−.018***	−.015***
	(.002)	(.001)	(.001)	(.002)	(.003)	(.003)	(.003)	(.003)	(.003)
Constant	−6.033***	−5.606***	−5.459***	−5.461***	−5.077***	−4.562***	−3.959***	−3.475***	−2.848***
	(.345)	(.293)	(.216)	(.258)	(.274)	(.235)	(.311)	(.266)	(.346)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.4: Qreg: Gini (pre-tax) - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Gini	.161	−.306**	−.589***	−.773***	−.836***	−.834***	−.942***	−1.139***	−1.338***
	(.112)	(.121)	(.125)	(.104)	(.106)	(.092)	(.116)	(.135)	(.232)
GDP pc	.845***	.789***	.773***	.776***	.759***	.748***	.717***	.694***	.637***
	(.018)	(.025)	(.020)	(.018)	(.020)	(.022)	(.019)	(.019)	(.029)
Pop. Urban	.002**	.002***	.002***	.001	.001	.001*	.003***	.003***	.005***
	(.001)	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.019***	−.018***	−.017***	−.018***	−.019***	−.020***	−.020***	−.020***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.028***	−.015***	−.006	.005	.009	.010	.015	.015	.006
	(.009)	(.006)	(.007)	(.008)	(.007)	(.007)	(.010)	(.009)	(.015)
Industry VA	−.003**	.003***	.006***	.009***	.009***	.007***	.006**	.007***	.010***
	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)	(.003)	(.002)	(.004)
Agri. VA	−.015***	−.012***	−.012***	−.014***	−.013***	−.014***	−.015***	−.014***	−.014***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.004)
Services VA	−.017***	−.011***	−.009***	−.007***	−.008***	−.012***	−.016***	−.018***	−.014***
	(.002)	(.001)	(.001)	(.002)	(.003)	(.003)	(.003)	(.003)	(.003)
Constant	−5.973***	−5.649***	−5.439***	−5.420***	−5.049***	−4.575***	−3.959***	−3.407***	−2.885***
	(.294)	(.320)	(.238)	(.244)	(.263)	(.272)	(.320)	(.263)	(.375)
Observations	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.5: Qreg: top 10 (post-tax) - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post-tax Top 10%	.043	−.256***	−.473***	−.682***	−.714***	−.570***	−.649***	−.797***	−.326
	(.156)	(.095)	(.084)	(.099)	(.087)	(.091)	(.112)	(.104)	(.275)
GDP pc	.809***	.870***	.830***	.816***	.815***	.804***	.760***	.789***	.789***
	(.062)	(.023)	(.020)	(.023)	(.021)	(.021)	(.021)	(.024)	(.037)
Pop. Urban	−.0003	.0002	.001	.001**	.0003	−.001	−.001	−.004***	−.006***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.0005)	(.001)	(.001)	(.002)
Rnew. Energy	−.012***	−.013***	−.014***	−.015***	−.016***	−.016***	−.017***	−.016***	−.013***
	(.001)	(.001)	(.0005)	(.001)	(.0004)	(.001)	(.0004)	(.001)	(.001)
Civil Liberties	−.126***	−.075***	−.057***	−.040***	−.024***	−.009	−.011	−.019**	−.022
	(.020)	(.008)	(.007)	(.007)	(.007)	(.007)	(.010)	(.009)	(.016)
Industry VA	.004	.0002	−.001	.001	.001	−.00002	.001	.003	.0003
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)
Agri. VA	−.009	−.004	−.006***	−.003**	−.006***	−.010***	−.012***	−.012***	−.020***
	(.007)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)
Services VA	.001	−.002	−.005**	−.003**	−.005**	−.007***	−.008***	−.009***	−.014***
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.004)
Constant	−6.314***	−6.532***	−5.784***	−5.731***	−5.481***	−5.141***	−4.458***	−4.344***	−3.834***
	(.718)	(.302)	(.204)	(.263)	(.188)	(.261)	(.258)	(.259)	(.395)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.6: Qreg: top 10 (pre-tax) - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Top 10%	.202	−.237**	−.449***	−.603***	−.619***	−.425***	−.430***	−.558***	.118
	(.174)	(.116)	(.097)	(.097)	(.104)	(.097)	(.130)	(.113)	(.216)
GDP pc	.826***	.875***	.845***	.835***	.833***	.822***	.781***	.788***	.799***
	(.056)	(.024)	(.023)	(.021)	(.020)	(.019)	(.020)	(.023)	(.037)
Pop. Urban	−.001	.0002	.001	.001	−.0001	−.001**	−.001	−.004***	−.006***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.0005)	(.001)	(.001)	(.002)
Rnew. Energy	−.012***	−.013***	−.014***	−.016***	−.016***	−.016***	−.017***	−.017***	−.014***
	(.001)	(.0005)	(.0004)	(.001)	(.001)	(.0004)	(.0004)	(.001)	(.001)
Civil Liberties	−.125***	−.076***	−.058***	−.042***	−.029***	−.013*	−.018**	−.026***	−.032**
	(.018)	(.008)	(.007)	(.007)	(.006)	(.007)	(.009)	(.009)	(.015)
Industry VA	.004	−.0002	−.002	.001	.0004	−.001	−.001	.002	−.0004
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.002)	(.003)
Agri. VA	−.008	−.004	−.006***	−.003**	−.006***	−.010***	−.012***	−.013***	−.020***
	(.007)	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)
Services VA	.001	−.003	−.005***	−.003**	−.005***	−.007***	−.009***	−.010***	−.016***
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.004)
Constant	−6.548***	−6.559***	−5.883***	−5.892***	−5.582***	−5.307***	−4.605***	−4.295***	−3.984***
	(.727)	(.316)	(.237)	(.219)	(.210)	(.245)	(.247)	(.236)	(.388)
Observations	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.7: Qreg: top 10 (post-tax) - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post-tax Top 10%	.069	−.410***	−.711***	−.900***	−1.001***	−1.047***	−1.294***	−1.448***	−1.798***
	(.112)	(.111)	(.121)	(.091)	(.100)	(.110)	(.104)	(.122)	(.123)
GDP pc	.842***	.770***	.751***	.752***	.742***	.725***	.689***	.672***	.632***
	(.023)	(.025)	(.018)	(.020)	(.019)	(.017)	(.021)	(.028)	(.025)
Pop. Urban	.002***	.002***	.003***	.001	.001	.001*	.003***	.003***	.004***
	(.001)	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.018***	−.018***	−.017***	−.018***	−.019***	−.020***	−.020***	−.019***
	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.027***	−.012*	−.001	.010	.015**	.019**	.027***	.026***	.021
	(.008)	(.007)	(.006)	(.009)	(.006)	(.009)	(.010)	(.010)	(.014)
Industry VA	−.003**	.003***	.007***	.010***	.010***	.009***	.008***	.009***	.011***
	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)	(.003)	(.002)	(.004)
Agri. VA	−.015***	−.014***	−.012***	−.014***	−.013***	−.013***	−.014***	−.014***	−.013***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)	(.004)
Services VA	−.017***	−.011***	−.009***	−.006***	−.007***	−.010***	−.014***	−.016***	−.013***
	(.002)	(.001)	(.001)	(.002)	(.003)	(.003)	(.003)	(.003)	(.004)
Constant	−5.914***	−5.443***	−5.346***	−5.368***	−5.008***	−4.592***	−3.890***	−3.411***	−2.940***
	(.354)	(.315)	(.219)	(.270)	(.266)	(.255)	(.298)	(.307)	(.420)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.8: Qreg: top 10 (pre-tax) - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Top 10%	.087	−.382***	−.683***	−.830***	−.905***	−.903***	−1.096***	−1.328***	−1.589***
	(.117)	(.127)	(.121)	(.104)	(.098)	(.093)	(.102)	(.103)	(.161)
GDP pc	.842***	.783***	.765***	.770***	.756***	.743***	.706***	.690***	.634***
	(.021)	(.023)	(.018)	(.019)	(.017)	(.018)	(.020)	(.023)	(.023)
Pop. Urban	.002**	.002***	.002***	.001	.001	.001	.003***	.003***	.004***
	(.001)	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.019***	−.018***	−.017***	−.018***	−.019***	−.020***	−.020***	−.020***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.027***	−.014**	−.005	.004	.009	.010	.017*	.014*	.012
	(.009)	(.007)	(.006)	(.008)	(.006)	(.007)	(.010)	(.009)	(.014)
Industry VA	−.003*	.003***	.007***	.010***	.009***	.008***	.007***	.008***	.009**
	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)	(.002)	(.002)	(.004)
Agri. VA	−.015***	−.013***	−.012***	−.014***	−.014***	−.014***	−.015***	−.015***	−.015***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)	(.003)
Services VA	−.017***	−.011***	−.009***	−.006***	−.008***	−.011***	−.015***	−.017***	−.015***
	(.002)	(.001)	(.001)	(.002)	(.003)	(.003)	(.003)	(.003)	(.003)
Constant	−5.920***	−5.575***	−5.421***	−5.468***	−5.062***	−4.670***	−3.911***	−3.446***	−2.846***
	(.313)	(.285)	(.228)	(.263)	(.251)	(.264)	(.279)	(.288)	(.341)
Observations	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.9: Qreg: bottom 50 (post-tax) - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post-tax Bot. 50%	.211	.423***	.681***	.883***	.856***	.606***	.616***	.917***	.082
	(.254)	(.119)	(.139)	(.167)	(.161)	(.157)	(.164)	(.206)	(.402)
GDP pc	.784***	.865***	.834***	.825***	.827***	.820***	.781***	.793***	.798***
	(.057)	(.021)	(.022)	(.021)	(.021)	(.019)	(.019)	(.023)	(.041)
Pop. Urban	.0002	.0002	.001	.001	−.00005	−.001*	−.001	−.004***	−.006***
	(.001)	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.002)
Rnew. Energy	−.012***	−.013***	−.015***	−.016***	−.016***	−.016***	−.017***	−.017***	−.014***
	(.001)	(.001)	(.0005)	(.0005)	(.0004)	(.0005)	(.0005)	(.001)	(.001)
Civil Liberties	−.126***	−.074***	−.057***	−.039***	−.026***	−.012	−.014	−.023***	−.028*
	(.018)	(.008)	(.007)	(.007)	(.007)	(.008)	(.011)	(.009)	(.017)
Industry VA	.004	.0002	−.001	.001	.0002	−.00002	−.001	.002	−.0002
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)
Agri. VA	−.009	−.004	−.005***	−.003**	−.006***	−.009***	−.011***	−.014***	−.020***
	(.007)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.004)
Services VA	.002	−.003	−.005**	−.003***	−.006***	−.006***	−.010***	−.011***	−.015***
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.004)
Constant	−6.186***	−6.656***	−6.180***	−6.234***	−5.928***	−5.642***	−4.919***	−4.679***	−3.965***
	(.586)	(.244)	(.218)	(.194)	(.180)	(.217)	(.244)	(.304)	(.443)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.10: Qreg: bottom 50 (pre-tax) - Consumption-based Emissions

	Consumption-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-tax Bot. 50%	.332	.678***	1.040***	1.116***	.966***	.370**	.067	.144	−.779*
	(.387)	(.219)	(.173)	(.195)	(.203)	(.175)	(.192)	(.274)	(.457)
GDP pc	.785***	.860***	.833***	.836***	.844***	.838***	.805***	.808***	.808***
	(.061)	(.026)	(.020)	(.021)	(.019)	(.018)	(.021)	(.027)	(.037)
Pop. Urban	.0003	.0004	.001	.001	−.0002	−.001*	−.001	−.003***	−.005***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.0005)	(.001)	(.001)	(.002)
Rnew. Energy	−.012***	−.013***	−.014***	−.016***	−.016***	−.016***	−.017***	−.017***	−.014***
	(.001)	(.0005)	(.001)	(.0005)	(.0005)	(.0005)	(.0004)	(.001)	(.001)
Civil Liberties	−.125***	−.077***	−.058***	−.042***	−.029***	−.018**	−.028***	−.023**	−.034**
	(.021)	(.009)	(.007)	(.008)	(.007)	(.008)	(.008)	(.009)	(.015)
Industry VA	.004	.0003	−.001	.001	−.001	−.001	−.001	−.002	−.003
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.003)
Agri. VA	−.010	−.004	−.006***	−.003*	−.007***	−.009***	−.011***	−.016***	−.022***
	(.007)	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.003)	(.004)
Services VA	.002	−.002	−.004**	−.003*	−.006***	−.007***	−.011***	−.014***	−.019***
	(.003)	(.002)	(.002)	(.001)	(.002)	(.002)	(.002)	(.003)	(.004)
Constant	−6.220***	−6.656***	−6.219***	−6.350***	−5.986***	−5.657***	−4.930***	−4.445***	−3.653***
	(.615)	(.287)	(.216)	(.188)	(.195)	(.216)	(.218)	(.314)	(.422)
Observations	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.11: Qreg: bottom 50 (post-tax) - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post-tax Bot. 50%	−.273**	.361**	.730***	1.082***	1.280***	1.213***	1.356***	1.420***	1.749***
	(.130)	(.144)	(.153)	(.174)	(.156)	(.152)	(.185)	(.179)	(.404)
GDP pc	.848***	.787***	.775***	.776***	.760***	.745***	.723***	.688***	.647***
	(.017)	(.024)	(.020)	(.019)	(.018)	(.018)	(.020)	(.019)	(.030)
Pop. Urban	.002***	.002***	.002***	.001	.001	.001	.002**	.003***	.005***
	(.001)	(.0004)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.019***	−.018***	−.017***	−.018***	−.019***	−.020***	−.020***	−.020***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.0005)	(.001)	(.001)	(.001)
Civil Liberties	−.027***	−.013**	−.003	.010	.017**	.018**	.020**	.021**	.026*
	(.009)	(.006)	(.007)	(.009)	(.007)	(.008)	(.009)	(.010)	(.015)
Industry VA	−.003**	.003***	.006***	.009***	.008***	.007***	.006*	.006***	.007*
	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)	(.003)	(.002)	(.003)
Agri. VA	−.015***	−.012***	−.012***	−.013***	−.013***	−.014***	−.014***	−.015***	−.016***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.004)	(.003)	(.003)
Services VA	−.017***	−.011***	−.009***	−.008***	−.009***	−.012***	−.016***	−.019***	−.017***
	(.002)	(.001)	(.001)	(.002)	(.003)	(.002)	(.003)	(.002)	(.003)
Constant	−5.826***	−5.870***	−5.920***	−6.054***	−5.735***	−5.220***	−4.709***	−4.140***	−3.927***
	(.262)	(.247)	(.198)	(.254)	(.280)	(.236)	(.335)	(.247)	(.350)
Observations	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848	3,848

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.12: Qreg: bottom 50 (pre-tax) - Production-based Emissions

	Production-Based CO2 Emissions								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre.tax Bot. 50%	−.386**	.501**	.938***	1.347***	1.530***	1.427***	1.333***	1.413***	1.159**
	(.197)	(.197)	(.188)	(.202)	(.214)	(.192)	(.262)	(.260)	(.513)
GDP pc	.841***	.795***	.783***	.784***	.770***	.759***	.732***	.698***	.654***
	(.018)	(.021)	(.018)	(.017)	(.020)	(.019)	(.020)	(.019)	(.033)
Pop. Urban	.002**	.002***	.002***	.001	.001	.001	.002***	.004***	.006***
	(.001)	(.0005)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Rnew. Energy	−.018***	−.018***	−.018***	−.017***	−.018***	−.019***	−.020***	−.020***	−.020***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Civil Liberties	−.030***	−.015**	−.007	.004	.008	.011	.011	.012	.023
	(.010)	(.006)	(.006)	(.008)	(.006)	(.007)	(.010)	(.009)	(.015)
Industry VA	−.003**	.003***	.006***	.008***	.008***	.007***	.004	.005**	.004
	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)	(.003)	(.002)	(.004)
Agri. VA	−.015***	−.012***	−.011***	−.013***	−.013***	−.014***	−.016***	−.016***	−.019***
	(.003)	(.002)	(.002)	(.002)	(.002)	(.002)	(.004)	(.003)	(.004)
Services VA	−.017***	−.010***	−.009***	−.007***	−.009***	−.012***	−.018***	−.020***	−.018***
	(.002)	(.001)	(.001)	(.002)	(.003)	(.003)	(.003)	(.002)	(.004)
Constant	−5.743***	−5.974***	−6.003***	−6.108***	−5.786***	−5.309***	−4.539***	−4.066***	−3.682***
	(.270)	(.226)	(.191)	(.231)	(.279)	(.260)	(.334)	(.278)	(.423)
Observations	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853	3,853

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.13: FE panel: The impact of the Gini-Index on CBE

	log of consumtion-based emissions per capita							
gini_posttax	−0.738*							
	(0.377)							
gini_ptinc		−0.650						
		(0.442)						
top_10_sdiinc			−0.643*					
			(0.341)					
top_10_sptinc				−0.558				
				(0.368)				
bottom50_sdiinc					1.439*			
					(0.765)			
bottom50_sptinc						1.254		
						(0.907)		
p90p50_diinc							−0.006*	
							(0.004)	
p90p50_ptinc								−0.004
								(0.003)
gdp_cap_ppp_const	0.596***	0.596***	0.593***	0.596***	0.597***	0.595***	0.590***	0.591***
	(0.117)	(0.117)	(0.115)	(0.116)	(0.119)	(0.118)	(0.115)	(0.115)
pop_urban	0.005	0.006	0.005	0.005	0.005	0.006	0.005	0.006
	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
renew_consump	−0.014***	−0.014***	−0.014***	−0.014***	−0.013***	−0.014***	−0.014***	−0.014***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
fh_cl	−0.014	−0.014	−0.014	−0.013	−0.014	−0.014	−0.014	−0.013
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
industry_va_sh	−0.006	−0.007	−0.006	−0.007	−0.006	−0.007	−0.006	−0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
agri_va_sh	−0.016*	−0.016*	−0.016*	−0.016*	−0.016*	−0.017*	−0.016*	−0.017*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
service_va_sh	−0.0003	−0.001	−0.001	−0.001	−0.0003	−0.001	−0.0005	−0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	3,848	3,853	3,848	3,853	3,848	3,853	3,848	3,853
Adjusted R^2	0.301	0.301	0.299	0.301	0.302	0.302	0.299	0.301
F Statistic	230.213***	231.065***	228.908***	230.354***	231.136***	231.451***	228.771***	230.742***
	(df = 8; 3659)	(df = 8; 3664)	(df = 8; 3659)	(df = 8; 3664)	(df = 8; 3659)	(df = 8; 3664)	(df = 8; 3659)	(df = 8; 3664)

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.14: FE panel: The impact of the Gini-Index on PBE

	log of production-based emissions per capita							
gini_posttax	−0.386							
	(0.296)							
gini_ptinc		−0.253						
		(0.308)						
top_10_sdiinc			−0.418					
			(0.281)					
top_10_sptinc				−0.281				
				(0.273)				
bottom50_sdiinc					0.616			
					(0.534)			
bottom50_sptinc						0.395		
						(0.564)		
p90p50_diinc							−0.001	
							(0.003)	
p90p50_ptinc								−0.001
								(0.002)
gdp_cap_ppp_const	0.381***	0.377***	0.381***	0.378***	0.380***	0.376***	0.376***	0.375***
	(0.074)	(0.073)	(0.073)	(0.073)	(0.074)	(0.073)	(0.072)	(0.072)
pop_urban	0.007**	0.007**	0.007**	0.007**	0.007**	0.007**	0.007**	0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
renew_consump	−0.027***	−0.027***	−0.027***	−0.027***	−0.027***	−0.027***	−0.027***	−0.027***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
fh_cl	−0.023**	−0.024**	−0.023**	−0.024**	−0.023**	−0.024**	−0.023**	−0.024**
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
industry_va_sh	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
agri_va_sh	−0.010***	−0.010***	−0.010***	−0.010***	−0.010***	−0.010***	−0.010***	−0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
service_va_sh	−0.004*	−0.005**	−0.004*	−0.005**	−0.004**	−0.005**	−0.005**	−0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	3,848	3,853	3,848	3,853	3,848	3,853	3,848	3,853
Adjusted R^2	0.581	0.580	0.581	0.581	0.581	0.580	0.580	0.580
F Statistic	690.622***	689.289***	691.328***	689.865***	689.630***	688.808***	686.304***	687.870***
	(df = 8; 3659)	(df = 8; 3664)	(df = 8; 3659)	(df = 8; 3664)	(df = 8; 3659)	(df = 8; 3664)	(df = 8; 3659)	(df = 8; 3664)

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.15: FE panel: The impact of the Gini-Index on CBE (different models)

	Naive Model		Base Model		Benchmark Model		IV Model	
	(5)		(6)		(7)		(8)	
Post-tax Gini	−1.047***		−0.631*		−0.738*		−0.747**	
	(0.365)		(0.370)		(0.377)		(0.311)	
Pre-tax Gini		−0.955**		−0.555		−0.650		−0.612*
		(0.406)		(0.423)		(0.442)		(0.350)
GDP pc	0.731***	0.733***	0.607***	0.609***	0.596***	0.596***	0.649***	0.643***
	(0.107)	(0.108)	(0.114)	(0.114)	(0.117)	(0.117)	(0.120)	(0.120)
Pop. Urban			0.004	0.005	0.005	0.006	0.006	0.006
			(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Rnew. Energy			−0.016***	−0.016***	−0.014***	−0.014***	−0.012***	−0.012***
			(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)
Civil Liberties					−0.014	−0.014	−0.021	−0.021
					(0.016)	(0.016)	(0.017)	(0.018)
Industry VA					−0.006	−0.007	−0.005	−0.005
					(0.005)	(0.005)	(0.005)	(0.005)
Agri. VA					−0.016*	−0.016*	−0.026***	−0.026***
					(0.009)	(0.009)	(0.010)	(0.010)
Services VA					−0.0003	−0.001	−0.002	−0.002
					(0.004)	(0.004)	(0.005)	(0.005)
Tariffs							0.018	0.017
							(0.027)	(0.027)
Observations	4,022	4,027	4,009	4,014	3,848	3,853	2,951	2,952
Adjusted R^2	0.171	0.170	0.272	0.273	0.301	0.301	0.340	0.338
F Statistic	505.193***	502.680***	420.594***	422.354***	230.213***	231.065***	189.747***	188.498***
	(df = 2; 3839)	(df = 2; 3844)	(df = 4; 3824)	(df = 4; 3829)	(df = 8; 3659)	(df = 8; 3664)	(df = 9; 2762)	(df = 9; 2763)

Note: *p<0.1; **p<0.05; ***p<0.01

Table C.16: FE panel: The impact of the Gini-Index on PBE (different models)

	Naive Model		Base Model		Benchmark Model		IV Model	
	(5)		(6)		(7)		(8)	
Post-tax Gini	-1.333^{***}		-0.585^{*}		-0.386		-0.645^{**}	
	(0.419)		(0.309)		(0.296)		(0.281)	
Pre-tax Gini		-1.195^{**}		-0.483		-0.253		-0.481^{*}
		(0.465)		(0.330)		(0.308)		(0.291)
GDP pc	0.642^{***}	0.639^{***}	0.421^{***}	0.419^{***}	0.381^{***}	0.377^{***}	0.440^{***}	0.432^{***}
	(0.098)	(0.099)	(0.068)	(0.068)	(0.074)	(0.073)	(0.065)	(0.065)
Pop. Urban			0.008^{**}	0.008^{**}	0.007^{**}	0.007^{**}	0.008^{**}	0.008^{**}
			(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Rnew. Energy			-0.028^{***}	-0.028^{***}	-0.027^{***}	-0.027^{***}	-0.025^{***}	-0.025^{***}
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Civil Liberties					-0.023^{**}	-0.024^{**}	-0.010	-0.010
					(0.012)	(0.012)	(0.011)	(0.011)
Industry VA					-0.001	-0.001	0.001	0.001
					(0.003)	(0.003)	(0.003)	(0.003)
Agri. VA					-0.010^{***}	-0.010^{***}	-0.012^{**}	-0.012^{**}
					(0.003)	(0.003)	(0.005)	(0.005)
Services VA					-0.004^{*}	-0.005^{**}	-0.004	-0.005^{*}
					(0.002)	(0.002)	(0.003)	(0.003)
Tariffs							-0.018	-0.018
							(0.012)	(0.012)
Observations	4,022	4,027	4,009	4,014	3,848	3,853	2,951	2,952
Adjusted R^2	0.168	0.162	0.560	0.559	0.581	0.580	0.596	0.593
F Statistic	496.094^{***}	479.615^{***}	$1,321.780^{***}$	$1,316.630^{***}$	690.622^{***}	689.289^{***}	503.480^{***}	498.231^{***}
	(df = 2; 3839)	(df = 2; 3844)	(df = 4; 3824)	(df = 4; 3829)	(df = 8; 3659)	(df = 8; 3664)	(df = 9; 2763)	

Note: *p<0.1; **p<0.05; ***p<0.01

FONDAZIONE ENI ENRICO MATTEI WORKING PAPER SERIES

Our Working Papers are available on the Internet at the following address:
https://www.feem.it/pubblicazioni/feem-working-papers/

"NOTE DI LAVORO" PUBLISHED IN 2024

1. A. Sileo, M. Bonacina, The automotive industry: when regulated supply fails to meet demand. The Case of Italy
2. A. Bastianin, E. Mirto, Y. Qin, L. Rossini, What drives the European carbon market? Macroeconomic factors and forecasts
3. M. Rizzati, E. Ciola, E. Turco, D. Bazzana, S. Vergalli, Beyond Green Preferences: Alternative Pathways to Net-Zero Emissions in the MATRIX model
4. L. Di Corato, M. Moretto, Supply contracting under dynamic asymmetric cost information
5. C. Drago, L. Errichiello, Remote work admist the Covid-19 outbreak: Insights from an Ensemble Community-Based Keyword Network Analysis
6. F. Cappelli, Unequal contributions to CO2 emissions along the income distribution within and between countries
7. I. Bos, G. Maccarrone, M. A. Marini, Anti-Consumerism: Stick or Carrot?
8. M. Gilli, A. Sorrentino, The Set of Equilibria in Max-Min Two Groups Contests with Binary Actions and a Private Good Prize
9. E. Bachiocchi, A. Bastianin, G. Moramarco, Macroeconomic Spillovers of Weather Shocks across U.S. States
10. T. Schmitz, I. Colantone, G. Ottaviano, Regional and Aggregate Economic Consequences of Environmental Policy
11. D. Bosco, M. Gilli, Effort Provision and Incentivisation in Tullock Group-Contests with Many Groups: An Explicit Characterisation
12. A. Drigo, Environmental justice gap in Italy: the role of industrial agglomerations and regional pollution dispersion capacity
13. P. I. Rivadeneyra García, F. Cornacchia, A. G. Martínez Hernández, M. Bidoia, C. Giupponi, Multi-platform assessment of coastal protection and carbon sequestration in the Venice Lagoon under future scenarios

Fondazione Eni Enrico Mattei

Fondazione Eni Enrico Mattei
Corso Magenta 63, Milano – Italia

Tel. +39 02 403 36934

E-mail: letter@feem.it
www.feem.it

FONDAZIONE ENI ENRICO MATTEI