

# Climate Stabilization Taxation-and-Bonds Strategy Adjusted for Consumption

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**ABSTRACT:** Current climate change mitigation and adaptation financing efforts are calling for innovative green investment strategies. An emerging literature and awareness on the economic gains and losses of a warming globe being distributed unequally between countries can serve as novel basis of redistribution schemes. A taxation-and-bonds strategy over the entire world could fund climate change alleviation. A financial asset transfer could be enacted in form of tax-debt mechanisms. Proposed taxation and bonds strategy could aid in broad-based and long-term market incentivization of a transition to a clean energy economy. Strategies could feature some countries' financing green bonds via carbon taxation, while other countries are climate bonds premium recipients. The bonds recipients would be funded by the climate taxation countries. The bonds could be tradable and issued controlled by global governance institutions, such as the International Monetary Fund, the World Bank, the United Nations or the World Trade Organization. In most redistribution schemes with market incentives, such as – for example – the cap-and-trade emissions trading system, the CO<sub>2</sub> emissions levels are addressed. This article advocates for attention to potential economic gains from a warming globe as a source of assets for redistribution. These gains could be redistributed to areas and industries of the world that are clearly losing from climate change immediately. Contrary to most economic redistribution models concerning climate change that primarily weight in relative CO<sub>2</sub> emissions for production, this paper argues for attention to CO<sub>2</sub> emissions consumption levels. The trade-adjusted consumption-based CO<sub>2</sub> emissions levels appear fairer in the judgment what countries have a higher responsibility to fund the burden of climate change. Market-mechanisms – such as consumption taxation and price mark-ups for consumers – are discussed as additional market strategies to redistribute costs, risks and losses implied by climate change.

**KEYWORDS:** Climate Change, Climate Stabilization, Economics, Economics of the Environment, Environmental Justice, Environmental Governance, Equality, Law & Economics, Monetary policy, Redistribution, Social Justice, Sustainability

## Introduction

The climate change crisis has gained unprecedented urgency in the most recent decade. Climate change has already led to and will continuously lead to irreversible tipping points and lock-ins that will degrade the common welfare (Kellett, Weller, Faulwasser, Grüne & Semmler 2019). The extraction and use of non-renewable fossil fuels is attributed as one of the main causes of human-made global warming and a highly volatile market endeavor (Gevorkyan & Semmler 2016; Greiner, Mett & Semmler 2012; Maurer, Preuss, & Semmler 2014; Nyambuu & Semmler 2014, 2017, 2020). Global warming can be slowed by limiting the total cumulative global CO<sub>2</sub> emissions.

Historically, the advanced countries have gained welfare and rising living standards by the use of fossil fuel energy and intensive CO<sub>2</sub> emissions, while the developing countries have not emitted the same levels of CO<sub>2</sub> emissions and appear nowadays as the most burdened with the climate disasters. In the aftermath of the United Nations COP26 meeting it has been argued that the advanced countries have an obligation and responsibility to finance the adaptation to global warming of the low-income countries through direct transfers and credit guarantees

(Sachs 2021). Now the most pressing question arises, what measures should the world community take to determine the beneficiaries and victims of climate change. This paper addresses geographically-determined economic prospects in light of climate change and outlines vast inequalities in the distribution of future climate-induced economic gain or loss prospects. Ethical imperatives will be introduced that lead to the claim for redistribution of some of the gains of global warming into territories that are losing out from climate change. In the search for redistribution schemes, a taxation-and-bonds strategy will be proposed that allows for transfers within the world community in order to distribute the gains and losses of global warming throughout the world (Puaschunder forthcoming).

### **Climate justice redistribution schemes**

A most recent World Bank Report calls for a fair and climate taxation and bonds mix around the world (Semmler, Braga, Lichtenberger, Toure & Hayde 2021). While the World Bank Report presents a global overview on the current state of climate taxation and climate bonds usage around the globe, it calls for more macroeconomic models that enact climate bonds and tax strategies concurrent use coupled with redistribution and burden sharing (Semmler et al. 2021).

In the aftermath of the COP26 annual climate meeting of the United Nations, Jeffrey Sachs (2021) put forward an idea of funds for climate change mitigation and adaptation that should be raised by climate tax-funded grants provided by some countries as transfer payments, while other countries should be recipients of green bonds granted to low-income countries. While Sachs (2021) argues that half of the funds raised should be grants (transfers) and half green bonds that help the transitioning to renewable energy in low-income countries, this paper will bring forward a refinement in prioritizing which countries should be grantors and which recipients based on clear criteria.

### **Climate change gains and losses**

Approaches to raise funds for a transitioning to a green economy take a closer look at the macroeconomic impacts and economic growth prospects under climate change. Impacts of climate change vary around the world and are likely to impose considerable economic prospect changes, which will increase over time as global temperatures increase (Lomborg 2021). Global warming will likely cause economic gains and losses, which are distributed unequally throughout the world and over time (Lomborg 2021; Puaschunder 2017a, b, 2020b).

Economic research has elucidated the economic impact of climate change on the world and found stark national differences (Burke, Hsiang & Miguel 2015). Burke et al. (2015) estimate how climate change will affect GDP per capita. In addition, the International Monetary Fund conducted a cross-country analysis of the long-term macroeconomic effects of climate change and found country inequalities in global warming effects (Kahn, Mohaddes, Ng, Pesaran, Raissi & Yang 2019). One translation of climate change gains and losses in burden-sharing contribution schemes is usually defined in Nordhaus' Regional Integrated model of Climate and the Economy model (RICE model). This regional, dynamic, general-equilibrium model of the economy integrates economic activity with emissions levels as main driver of human-made climate change (Orlov, Rovenskaya, Puaschunder & Semmler 2018). In addition, The New York Times most recently discussed the disparate impact of climate policies and climate protection attention disparities (Flavelle 2021a, b).

Puaschunder (2020b) measured the Gross Domestic Product (GDP) prospect differences under climate change around the world and found exacerbating climate inequalities. Puaschunder (2020b) introduced a climate change winners and losers index based on the economic prospects under climate change around the world and over time. The index attributed economic gain and loss prospects based on the medium temperature per country in relation to

the optimum temperature for economic productivity per GDP agriculture, industry and service sector and the GDP sector composition per country in order to determine how far countries are deviating from their optimum productivity levels on a time scale (Puaschunder 2020b).

### **Ethical imperatives underlying climate justice redistribution mandates**

In order to alleviate inequalities in climate change impacts between countries ethical imperatives but also economic calculus led to redistribution mandates (Kant 1783/1993; Law & Smullen 2008; Rawls 1971). Following ethical considerations of Immanuel Kant's (1783/1993) categorical imperative and John Rawls' (1971) veil of ignorance, the climatorial imperative was formulated to advocate for the need for fairness in the distribution of the global earth benefits among nations (Kant 1783/1993; Puaschunder 2017c, 2020b). Based on Kant's imperative to only engage in actions one wants to experience themselves being done to oneself, every human being should act in such a way that one treats humanity, whether in one's own person or in the person of any other, never merely as a means to an end, but always at the same time as an end. Based on Kant's (1783/1993) categorical imperative, in the climate inequality sphere, no climate harm should be done to any country independent of a country's position on the climate winners and losers spectrum. Passive neglect of action on climate mitigation is an active injustice to others (Puaschunder 2020b).

Moral and ethical guidelines may be enhanced with the Kaldor-Hicks Compensation Criteria. The Kaldor-Hicks test for improvement potential within a society is aimed at moving an economy closer towards Pareto efficiency (Law & Smullen 2008). Kaldor-Hicks's criteria assume that any change usually makes some people better off and other worse off at the same time and tests if this imbalance can be alleviated by winners compensating losers for the change in conditions. In the Kaldor-Hicks's criteria both sides must also agree that the benefits exceed the costs of such action. The Kaldor-Hicks compensation can be applied to environmental constraints in regards to climate change.

As economic gains and losses from a warming earth are distributed unequally around the globe, ethical imperatives lead to the pledge to redistribute gains to losing territories in the quest for climate justice. Climate justice comprises fairness between countries but also over generations in a unique and unprecedented tax-and-bonds climate change gains and losses distribution strategy (Puaschunder 2018).

Applying the Kaldor criterion in the context of climate justice enacted via taxation and bonds would serve as an example by which the economy moves closer to a Pareto optimality if the maximum number of gainers are prepared to pay the losers and to agree that the change is greater than the minimum amount losers are prepared to accept. Climate change winning countries are advised to use taxation to raise revenues to offset the losses incurred by climate change. The climate change winners could therefore pay a tax in order to compensate climate change losers for climate change-induced economic losses. Climate change losers could be incentivized to receive bonds that have to be paid back by future generations (Puaschunder 2019a, b).

In order for the Kaldor compensation to work effectively, climate change economic winners and losers must also agree that the benefits of a commonly-agreed upon compensation scheme exceed the costs of such action. International cooperation and/or significant participation is an important way to internalize global externalities and avert climate change but also to agree upon a commonly-pursued rescue and resilience plan (Nordhaus 1994).

Aside from free-rider problems and penalties for non-compliance, in the environmental domain problematic appears the fungibility of compensation (money will always be there) but the irreversible lock-ins and tipping points of environmental degradation (climate may be irreversibly locked-in and degrade living conditions in a non-linear trajectory).

## Taxation and bonds strategy

A novel climate taxation-and-bonds strategy could redistribute climate change gains and raise widespread momentum for a transitioning to a zero-carbon global economy based on the notion that the redistribution is fair. A taxation-and-bonds strategy could outline a scheme of countries being either climate taxation bonds funders or climate bonds recipients based on economic prospects in light of climate change and CO<sub>2</sub> emissions consumption levels. While previous models focused on CO<sub>2</sub> emissions production levels per country, this article stresses the importance of consumption-based, trade-adjusted CO<sub>2</sub> emissions as a basis for climate justice. In a novel redistribution model, a country's starting ground on the climate gains and losses spectrum and a country's CO<sub>2</sub> emissions contributions in consumption levels could determine whether a country will be on the taxation regime for funding mutual climate stabilization or whether a country will be on the receiving end of climate bonds solutions.

Green bonds have recently been promoted as innovative climate stabilization strategy (Puaschunder 2020b; Sachs 2014; Semmler et al. 2021). Green bonds are in most cases governmental bonds. Issuance of a bond is taking a loan or getting credit that is to be repaid in the future. The issuer of bonds establishes the bond for bond buyers. Investors who purchase these bonds can expect to make profit as the bond matures.

Regarding taxation within the winning countries, foremost the gaining GDP sectors should be taxed. Those who caused climate change could be regulated to bear a higher cost through carbon tax in combination with retroactive billing through inheritance tax to map benefits from past wealth accumulation that potentially contributed to global warming (Puaschunder 2016a, b, c). Climate justice within a country should also pay tribute to the fact that low- and high-income households share the same burden proportional to their dispensable income, for instance enabled through a progressive carbon taxation and a carbon consumption tax. Climate gain and loss theories and empirical validations of the unequal climate change impact on countries lead towards contemporary climate taxation and bonds strategies to redistribute some of the gains of climate change to losing territories. As a foundation for the redistribution of climate gains and losses, the disparate impact of global warming on countries is considered. A model will be laid out that assumes that if a country has a rising GDP prospect in a warming climate, then this country should be redistributing some of the expected wealth increase to places that have a declining GDP prospect. The consumption-based, trade-adjusted CO<sub>2</sub> emissions should be taken into consideration (Our world in data 2019). Those countries that consume goods and services with high CO<sub>2</sub> emissions should be redistributing the expected gains from a warming globe into territories that are losing out from climate change the fastest and the most and do not consume goods and services that contribute to CO<sub>2</sub> emissions.

The rationale is that countries that have a current advantage from climate change, should redistribute some of the gains to losing territories and grant climate bonds in the now for those countries that lose out on climate change. Only the countries that have lowered economic prospects due to climate change should be able to shift some of the burden of climate change financing to future generations in bonds.

As Puaschunder (2020b) found in a worldwide dataset over all countries, being a climate change winner and emissions are related. The relation between GDP growth prospects in light of climate change and percentage of GHG for ratification was investigated based on the total and percent of greenhouse gas emissions communicated by the Paris COP 21 Parties to the Convention retrieved in their national communications and displayed in GHG inventory reports as of December 2015. Over a sample of 181 countries of the world, a highly significant correlation between being a climate change winner and the self-reported percentage of GHG emissions for ratification was found. As a cross-validation check, the percentage of GHG emissions for ratification was significantly positively correlated with self-reported GHG emissions per country. This result leads to the conclusion that those countries that emit more

GHG are the ones with a positive GDP prospect on the warming earth until 2100. The more time countries seem to have in a favorable climate for production, the more they are also likely to emit GHG and hence contribute to global warming (Puaschunder, 2020b).

A redistribution scheme could build on the insights that climate winners are more likely to be responsible for human-made climate change. Puaschunder (forthcoming) therefore brings forward different indices meant to provide a basic numerical scheme how to redistribute the economic gains of climate change to those countries that lose out on climate change the first. The higher each index, the more countries are advised to be aiding in the financing of climate stability with raising funds through taxation that will then be used as transfer payments to offset the costs for climate bonds subsidies. The actual index numbers translate into a numerical key that determines the relative position of each country to other countries on a scale from taxation to raise the funds for climate stabilization and subsidize climate bonds.

### **Consumption-based trade-adjusted CO<sub>2</sub> emissions**

This paper advocates for taking into consideration CO<sub>2</sub> emissions consumption rather than production. Most economic models are primarily concerned about the CO<sub>2</sub> emissions levels during production, which creates inequalities over inequalities since it appears to discriminate against developing nations that are producing goods that are consumed in the more developed world.

CO<sub>2</sub> emissions levels are typically measured in production terms in the countries that produce them. This territorial emissions standard as target for climate change burden sharing strategies places a heavier burden onto territories, where CO<sub>2</sub> emissions production occurs but the produced goods are then exported into other places in the world, where they are consumed. To address this deficiency, Hannah Ritchie and Max Roser (2019) created consumption-based, trade-adjusted CO<sub>2</sub> emissions. To calculate consumption-based emissions, Ritchie and Roser (2019) took data that tracks goods that are traded across the world and CO<sub>2</sub> emissions production and subtracted CO<sub>2</sub> emissions that were emitted in the production of goods that were exported. Consumption-based emissions reflects the consumption and lifestyle choices of a country's citizens (Our World in Data 2019). The consumption-based, trade-adjusted CO<sub>2</sub> emissions outline countries that are net importers of emissions as they import more CO<sub>2</sub> emissions embedded in goods than they export (e.g., Switzerland but also some African countries) (Our World in Data 2019). Countries are net exporters of emissions if they export more CO<sub>2</sub> emissions embedded in goods than they import (e.g., the Bahrain, Qatar) (Our World in Data 2019). The US is a net importer, China a net exporter of CO<sub>2</sub> emissions embedded in goods (Our World in Data 2019). Most Western European countries, the Americas and many African countries are net importers of emissions while most Eastern European and Asian countries are net exporters (Our World in Data 2019). Especially the role of China as the largest CO<sub>2</sub> emissions exporter but producer of goods for the rest of the world highlights the importance of consumption-based, trade adjusted CO<sub>2</sub> emissions consumption levels. The CO<sub>2</sub> emissions consumption level that accounts for trade also gives a clearer picture of genuine reductions of CO<sub>2</sub> emissions over time rather than outsourcing emissions to other countries, such as in the cases of Western world countries.

### **Conclusion**

A novel climate justice enactment could feature a redistribution of gains from a warming globe. The more a country is considered to win from global warming economically and the more a country is causing climate change in CO<sub>2</sub> emissions consumption, the more this country could serve with taxation of climate winners to fund climate bonds in economically-losing territories due to global warming. The more a country faces declining economic prospects in light of global warming and the less consuming CO<sub>2</sub> in relation to other, the more the country should be given helicopter funding

for participating in climate bonds that remunerate a transition to a renewable energy solution and can be co-financed via debt to be repaid by future generations. Within the countries funding climate stabilization via bonds, those countries that are the worst off from climate change and have the lowest CO<sub>2</sub> emission consumption levels in relation to others, should have the best subsidized conditions for climate bonds, thus investors should have the highest premium payments. Diversified financing of common green bonds with a unique incentive scheme for carbon reduction is a new method aimed at sharing the burden but also the benefits of climate change within society in an economically efficient, legally equitable and practically feasible way.

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