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Unpacking the Climate-Economy Nexus

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Trade, Development, and the Climate Crisis: Unpacking the Climate-Economy Nexus

Dr S. Thirunavukkarasu¹ and Dr T. Lakshmi Pradha²

Abstract

Globally, countries have implemented several programmes to achieve speedy economic development. This is not only to improve the standard of living but also to address the insatiable needs of the growing population, given the limited resources. The inputs given to achieve this goal are human capital investment, technological innovation, and liberal economic policies, which have driven rapid industrialisation and trade, especially among populous Asian economies. This growth, however, has come with a heavy environmental cost. The interconnected global economy, through mechanisms like FDI, FII, and international trade, has accelerated greenhouse gas emissions, half of which are trade-related and predominantly contributed by a handful of industrialised and emerging economies.

Climate change, once a peripheral concern, has now become a central theme in economic treatises. This study explores the intricate nexus between economic growth, trade, and environmental degradation. It assesses how climate distortions are manifesting as heatwaves, rising sea levels, floods, cyclones, disrupting global economic activities, and deepening vulnerabilities, particularly in developing nations. It is attempted by using historical examples and contemporary climate data. This paper attempts to analyse the uneven distribution of climate-induced risks, revealing how countries that are least responsible for emissions often suffer the most devastating consequences. The study also advocates for a rethinking of growth models to balance economic aspirations with environmental sustainability.

Keywords: Economic Development, Climate Change and Resilience, Globalisation, Trade and Environment Nexus, Greenhouse Gas Emissions, Sustainable Growth, Global Economic Risk.

Introduction

¹ President, Center for Development Economics Studies, Chennai 600 091 and former Principal and HOD of Economics, Ramakrishna Mission Vivekananda College (Autonomous), Chennai.

² Assistant Professor, Department of MBA, Guru Nanak College (Autonomous), Chennai.

Economic development dwells between ends and scarce means, where the scarce resources have been abundantly exploited to satisfy ever-demanding and never-ending human wants. Investment in people improved their educational level. Technology, invention and innovation have contributed to development. New economic policies of the countries further accentuated the development. Globalisation has linked all the countries together, and each depends on the other for some reason. FDI, FII and international trade are expanding with varied concentrations between regions. The populous Asian countries are exporting more goods and services, and are also the fastest-growing economies of the world. Resources of these countries have been used for consumption by people in all the countries. It resulted in more employment and income for the people. The poverty level has drastically reduced. Economic development has brought many positive changes to the world, but the major negative contribution is climate change. It incinerated the climate-economy nexus, which directly intensified various economic sectors from agriculture and energy to real estate and healthcare.

This study deals with the relationship between climate change and the global economy. It explores how climate impacts disrupt economic activities and the ways in which trade and development are intertwined with environmental factors. The key topics are: the science of climate change and its economic implications; the historical context of climate-related disruptions in trade; and climate change as a global economic risk.

The upswing in the standard of living made people aspire for new products and necessitated more industrial production, trade and transportation, agriculture, etc., driving greenhouse gas emissions, concerning further intensification of climate change. Nearly half of the global emissions emanate from international trade, and 70 per cent of it is contributed by China, the European Union, India, Japan, the Russian Federation, and the United States to the world (Paul Brenton and Vicky Chemutai, 2021). The fruit of global emissions is not only realised in these countries but also transferred to all other innocent countries. Globalisation and urbanisation also necessitate higher economic growth, and more consumption also leads to environmental problems.

The climate distortions resulting from climate change are omnipresent and their impact is evenly felt in the form of heatwaves, extreme weather conditions, unprecedented rains in all the countries and surprisingly in the deserts, rising sea levels, etc., and roots climate risks and resilience. The WMO (2021) reported that such events occurred in developing countries, causing 50 per cent of all disasters, 45 per cent of human loss and 74 per cent of economic losses, resulting in climate vulnerability, insecurity to living things, and cyclical instability (Peter Läderach et.al.,2023). Cyclone Idai killed more than 1000 people across Zimbabwe, Malawi and Mozambique in Southern Africa in 2019. India, Nepal and Bangladesh have experienced heavy rains, floods and heavy losses. In India, during this century, about a billion innocent people have cost \$120 billion to the country due to climate disasters. India's climate database claims that over 15 million people were affected, with 2000 deaths in Sikkim due to floods, landslides and the glacial lake outburst (Business Standard, 2004). The torrential downpour in Chooralmala and Mundakkal villages of Wayanad in Kerala was hit by massive landslides in the early hours of July 30, 2024 and claimed more than 230 lives (The Hindu, 2024). According to K.S. Sajinkumar, "The scale of the debris avalanche, which travelled eight kilometres from the landslide's crown,

underscores its enormity. The generation of 5-6 million cubic metres of sediment is significantly larger than the Malpa landslide” (The New Indian Express, 2024).



Source: Army personnel with others search the Chooralmala area after a landslide triggered by heavy rainfall hit the village in Wayanad district, Kerala, Aug. 1, 2024. Photo Credit: PTI

Countries vary in the levels of climate impact and the types of greenhouse gas (GHG) emissions by their industrial pattern, size of population and energy sources. It is noted that developed nations in general and some emerging economies like China and India, in particular, join with the large emitters due to their rapid industrialisation and large populations. The emissions profile of a country differs based on the usage of fossil fuels for electricity, automobiles, manufacturing industries, agriculture and deforestation. The calamitous effects from these sectors vary following the level of exploitation. It also adds problems by way of huge solid and other waste generated during production and in the end use.

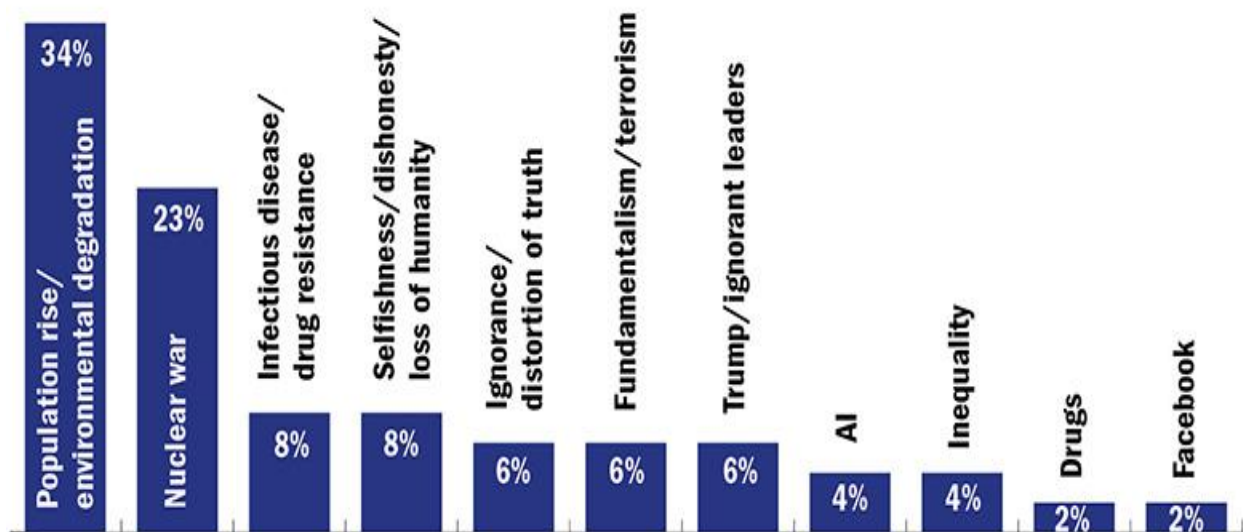
The notable impact is found in ‘the global mean temperature during January-September 2024 $1.54 \pm 0.13^\circ\text{C}$, with a single-year record of above 1.5° , the warming levels in the Paris Agreement. The annual increase of ocean heat content was up by $13 \pm 9 \text{ ZJ}$ in 2023 when compared to 2022. The sea level increased from 1993 to 2002 was $2.13 \text{ mm}\cdot\text{yr}^{-1}$, and it further exploded between 2015 and 2023 with $4.77 \text{ mm}\cdot\text{yr}^{-1}$. This is an alarming signal to the world as it will directly hit those located near the sea (John Kennedy and Blair Trewin, 2024).

The cascading effects of climate change are witnessed across countries. Geographic vulnerability is severe in coastal and island nations like Bangladesh and the Maldives due to sea-level rise. Arid regions like parts of Sub-Saharan Africa struggle with severe drought. Countries like Brazil, with large forest areas, experience deforestation and global carbon cycle disturbances. Economic vulnerability of countries due to climate change is felt according to the nature of their industrialisation, and its degree is huge if they heavily depend on agriculture or tourism. Economic hardship from climate events is realised unevenly between developed and developing countries, and the impact is more severe on the latter than the former. Such unequal distribution of climate

change also impacted the vulnerable communities disproportionately. As a result of inequality, ethical and economic implications have occurred, and the marginalised people feel the brunt in terms of health and livelihood risks, with potentially widening existing economic disparities.

Times Higher Education (2024) conducted a survey in association with the Lindau Nobel Laureate Meetings with a quarter of living Nobel Prize winners for chemistry, physics, physiology, medicine and economics. The opinion of them is given in the following chart. The study found that “Climate change [and providing] sufficient food and fresh water for the growing global population... are serious problems facing humankind,” responded one Laureate. “Science is needed to address these problems and also to educate the public to create the political will to solve these problems.” This is braced by India which supports 17 per cent of the world's population on just 2.4 per cent of the world's land area (India Budget, 2024).

Chart 1: Opinion by the Lindau Nobel Laureate Meetings



Source: Times Higher Education, 2017

Economic growth produces environmental degradation as proved by many studies (Mirza Huzaifa Asif, Tan Zhongfu, Azer Dilanchiev, Muhammad Irfan, and Elchin Eyvazov, Bilal Ahmad, 2023; Alex O. Acheampong, Eric Evans Osei Opoku, 2023; India Budget, 2024). Prodigiously, economic growth stimulates environmental degradation, causing economic risks. This is endorsed by the World Economic Forum (2021), portraying that “four of the top five risks the world is facing, and the five most likely global long-term risks are environmental”. The excessive upsurge in environmental risk and its impact have been analysed in several studies (Osuntuyi, Busayo Victor, and Hooi Hooi Lean, 2023). However, studies on how environmental degradation affects economic growth are scarce (Francesco Ricci, 2007). These studies focus on environmental control policies that curb production activity and economic growth. Environmental

taxation, dealing with “pollute-pay” and the double dividend hypothesis, restricts economic progress, indicating that protecting the environment (Francisco J. Delgado, 2023).

The Environmental Kuznets Curve (EKC) hypothesis provides an inverted ‘U’ shaped curve which postulates that pollution increases with the increase in income but declines as income continues to rise (Soumyananda Dinda,2004 and Karl-Göran Mäler, 2013) but, there is no clarity about where it starts or declines (Francisco J. Delgado, 2023). The EKC interpret that less developed countries with lesser industrialisation maintain good environmental quality. The environmental damage will start if they start the growth process, which leads to environmental threats to society, companies, and individuals and also in attaining the Sustainable Development Goals (Swiss Re Institute, 2021). It will be curtailed once per capita income increases due to the demand for a clean environment. The enactment of appropriate environmental protection laws also supplements people's expectations (Cambridge University Press, 1997).

Figure 2: Climate Change-Economy Nexus



Figure 1 portrays the ‘Climate Change-Economy Nexus’ with a five-phase cycle. In the first cycle of the ‘economy sector’, all countries have enthusiastically adopted development packages to achieve speedy ‘economic growth’ irrespective of their economic system. Over time, ‘sustainable economic growth’ also forced the countries to produce more to satisfy the changing human wants. The impact is seen in the ‘economy sector’ with the increase in GDP, more jobs, industrialisation, and the growth of financial markets. The second phase is the ‘climate sector’,

experiencing more emissions, depletion of renewable energy, deforestation, and frequent disasters. In the third phase, the ‘Climate Change Impact Nodes’ provide the intricacies of rising sea levels → infrastructure loss, extreme weather → supply chain disruption, biodiversity loss, → economic risk in agriculture. The fourth phase is ‘Economic Contributors Nodes’, encompassing fossil fuel dependency, carbon pricing debates, and industrial emissions. The impact of these causes is the fifth phase, climate change, which is the be-all and end-all of the devastation around the world. As a result, it requires ‘Bridging Solutions’ with renewable energy investment, green bonds and climate finance, and public-private partnerships in sustainability with intersection solutions like green growth, carbon-neutral policies, and clean energy investment.

Climate change disrupts Global Value Chains and also influences trade costs. In less developed countries, a reasonable fall in exports from 2 per cent to 5.7 per cent is observed in agricultural products and light manufacturing industries due to an increase in the temperature by 1°C (Jones and Olken, 2010). IPCC (2022) reported that particularly Sub-Saharan Africa and South Asia region countries are likely to get negative crop yields, resulting in worsening food insecurity and agricultural trade volatility. A 4°C increase in global warming may escalate the price of maize exporting countries (Tigchelaar et al., 2018).

Climate change also results in welfare losses for the people due to a fall in trade costs in less developed countries (Gouel and Laborde, 2021; Nath, 2022). Trade and international labour mobility are also affected by climate-related migrations (Rossi-Hansberg et al., 2021). The migration impacts global warming “There could be as many as 200 million people overtaken by disruptions of monsoon systems and other rainfall regimes, by droughts of unprecedented severity and duration, and by sea-level rise and coastal flooding” (Myers, 2005). Professor Myers’ estimate of 200 million climate migrants by 2050 has become the accepted figure, cited in respected publications from the IPCC to the Stern Review on the Economics of Climate Change (Stern, 2006). It is expected that by 2050, climate change will displace one in every 45 persons in the world.

Climate change affects production structure and trade specialisation patterns according to the mechanisms followed in the country. The trade policy will also impact GHG emissions. International trade impacts climate change due to changes in technology and endowments. The need for input from supplying countries automatically absorbs international trade, and its employment in the importing countries escalates GHG emissions.

Conclusion

Economic development has enhanced living standards, reduced poverty, and expanded global trade in all economies, but it has come at the cost of environmental sustainability. The globalisation-driven growth model, heavily dependent on resource exploitation and industrial expansion, has significantly contributed to climate change. The consequences are: extreme weather events, natural disasters, and economic disruptions, which are more frequent and severe, excessively affecting vulnerable and low-emission nations. To address the problem, it need to be recalibrated development strategies to integrate environmental concerns. Sustainable development should be a practical, enforceable framework that governs economic planning and global cooperation. Economic policies must promote clean energy, resilient infrastructure, responsible consumption, and equitable climate action to drive the global economy to thrive without compromising the planet's future.

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