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Taxing for the Climate: Leveraging Taxation for Climate Finance in Developing Countries, with Insights from Literature and a Case Studies

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Abstract

This study examines the role of taxation in mobilizing climate finance in developing countries, emphasizing carbon pricing, environmental levies, and green fiscal policies as key instruments for sustainable funding. The study explores the challenges associated with implementing climate taxes including political resistance, economic constraints, and administrative inefficiencies which often hinder effective policy execution. Despite these obstacles, the study highlights the potential of tax incentives, international cooperation, and private sector engagement in addressing climate finance gaps and accelerating investments in low-carbon technologies and renewable energy. The findings suggest that well-structured taxation strategies, when aligned with broader economic and environmental policies, can significantly enhance climate finance mobilization. Strengthening institutional capacity, improving tax enforcement, and ensuring equitable tax structures are important in maximizing efficiency and public acceptance. The study concludes that climate taxation, if properly designed and implemented, can serve as a powerful financial tool to drive sustainable climate action in developing economies.

Keywords: Climate finance, taxation, carbon pricing, green fiscal policies, environmental levies, climate taxation, tax incentives, carbon tax, fossil fuel subsidy reform, international climate cooperation, sustainable finance, climate policy.

Introduction

Climate change poses an existential threat to developing countries, which are disproportionately vulnerable to its impacts, despite their minimal contribution to global greenhouse gas emissions, developing countries bear the brunt of rising sea levels, extreme weather events, and agricultural disruptions. While international climate finance is essential, it cannot bridge the financing gap because substantial investments are imperative to build resilience, adapt to changing climate patterns, and transition to low-carbon economies and Savvidou et al. (2021) noted that between 2014 and 2018, adaptation-related finance committed by bilateral and multilateral funders to African countries remained well below US$5.5 billion per year. Carter et al. (2019) observed that small countries, accounting for no more than 0.5% of GHGs, have a key role in climate policymaking, including climate legislation and carbon taxation. Therefore, domestic resource mobilization emerges as a critical component of climate action, and taxation, as a primary source of government revenue, offers a promising avenue for generating the necessary funds. Developing countries can increase their fiscal space for climate-related expenditures

by carefully designing and implementing tax policies, however, this is not without challenges because narrow tax bases, low compliance rates, and limited administration capacity often characterize tax systems in many developing countries. This was supported by Monsod et al. (2023), who noted that fiscal space, measured by an endogenous debt limit, is fairly ample in many climate-vulnerable developing countries, potentially allowing greater flows of adaptation finance. Moreover, the potential distributional impacts of new taxes must be carefully considered to ensure social equity. This article delves into the complexities of leveraging taxation for climate finance in developing countries, it examines the opportunities and constraints associated with various tax instruments including carbon taxes, environmental levies, and tax incentives, it explores the importance of effective tax administration, revenue allocation, and international cooperation in maximizing the impact of tax-based climate finance, furthermore, it aims to contribute to the ongoing efforts to build a climate-resilient future for developing countries by providing insights into successful case studies and policy recommendations.

Theoretical and Conceptual Framework

Addressing climate change requires innovative financial mechanisms that can mobilize resources for sustainable development, and taxation has emerged as a critical tool for generating climate finance, particularly in developing countries where external funding is often insufficient. This section explores the key concepts that support the study, including climate finance, taxation, carbon pricing, and green fiscal policies, understanding these concepts provides a foundation for analysing how taxation can be leveraged as a strategic instrument to support climate action while promoting economic stability and development.

Climate finance

Climate finance refers to financial resources and instruments aimed at mitigating and adapting to climate change, it includes funding from public, private, and international sources to support low-carbon development, climate resilience, and sustainable economic growth. In developing countries, climate finance is essential for addressing vulnerabilities to climate change while promoting sustainable development (Maina et al., 2024). However, mobilizing adequate and predictable finance remains a challenge due to limited fiscal space, weak financial markets, and dependence on external funding sources. Effective taxation policies can play a crucial role in generating domestic climate finance by creating sustainable revenue streams for climate-related projects and policies.

Taxation

Taxation is a fundamental fiscal policy tool for governments to generate revenue, regulate economic activities, and influence behaviours. In the context of climate finance, taxation can be leveraged to promote environmental sustainability by discouraging harmful activities such as carbon emissions and incentivizing green investments (Rahman, 2023). Developing countries often face constraints such as weak tax enforcement, limited institutional capacity, and political resistance to new tax policies. Designing effective and equitable tax systems tailored to climate objectives is important for ensuring that taxation supports both environmental and economic development goals.

Carbon pricing

Carbon pricing is a market-based mechanism that assigns a cost to carbon emissions to encourage businesses and individuals to reduce their carbon footprint (Digitemie & Ekemezie, 2024). The two

primary forms of carbon pricing are carbon taxes and cap-and-trade systems, carbon taxes impose a direct levy on emissions, providing a predictable price signal, while cap-and-trade systems set an emission limit and allow the trading of emission permits (Muresianu, 2023). In developing countries, carbon pricing can be an effective strategy to raise climate finance while promoting cleaner technologies, however, the implementation of such policies requires careful consideration of economic impacts, industry competitiveness, and social equity to prevent disproportionate burdens on low-income populations.

Green fiscal policies

Green fiscal policies involve the use of taxation, subsidies, and public spending to promote environmental sustainability and climate resilience, these policies include carbon taxes, tax incentives for renewable energy, subsidies for green technology, and the removal of fossil fuel subsidies (Lee et al., 2024). Governments can align economic growth with climate action by integrating green fiscal policies into national budgets, in developing countries, green fiscal reforms are often met with political and economic challenges, including concerns over revenue stability, resistance from fossil fuel-dependent industries, and the need for institutional capacity-building (Lee et al., 2024). These policies can stimulate investment in sustainable infrastructure, create green jobs, and contribute to long-term climate resilience when they are properly designed.

Literature Review

The relationship between taxation and climate finance has gained increasing attention in academic and policy discussions, existing literature explores various mechanisms for mobilizing financial resources to support climate mitigation and adaptation efforts, with a particular focus on carbon pricing, environmental taxation, and fiscal policy reforms. While developed countries have made significant strides in implementing climate-related tax policies, developing countries face unique challenges such as institutional capacity constraints, economic trade-offs, and socio-political resistance. This section reviews key scholarly contributions, policy frameworks, and case studies that highlight both the opportunities and barriers associated with leveraging taxation for climate finance in developing countries.

The imperative for climate finance in developing countries

Developing countries are on the frontlines of climate change, despite contributing minimally to global greenhouse gas emissions, the impacts are far-reaching and devastating, hindering their development trajectories and exacerbating existing vulnerabilities. Gomez-Zavaglia et al. (2020) noted that climate-induced disasters, including floods, droughts, and storms, pose significant economic challenges for developing countries, particularly by destroying livelihoods dependent on agriculture and fisheries which are central to their economies. The fragility of physical infrastructure in developing countries exacerbates the climate change issue as they are often inadequately prepared to withstand extreme weather events resulting in substantial economic losses and impeding developmental progress. Climate change is disrupting agricultural productivity by altering rainfall patterns, elevating temperatures, and degrading soil quality, these changes contribute to reduced crop yields and heightened food insecurity compounding the economic strain on vulnerable communities and undermining efforts to achieve sustainable development (Malhi et al., 2021). According to Balsari et al. (2020), climate change is driving significant social repercussions including widespread displacement and migration as rising sea levels, extreme weather events, and desertification force communities to relocate, this displacement often results in severe social

and economic consequences disrupting lives and straining resources. Climate change is also amplifying health risks by facilitating the spread of diseases such as cholera, malaria, and dengue fever which places further pressure on already overburdened health systems, moreover, the adverse effects of climate change disproportionately impact marginalized and vulnerable populations thereby worsening existing social inequalities and deepening disparities within affected communities (McMichael et al., 2012). Pörtner et al. (2023) observed that climate change is driving significant environmental consequences, including accelerated ecosystem degradation and biodiversity loss, which undermine essential ecosystem services crucial for livelihoods, water security, and climate regulation. Concurrently, shifting rainfall patterns combined with rising water demand from population growth and economic development are increasing water scarcity, particularly in arid and semi-arid regions, and the growing frequency and intensity of natural disasters, such as hurricanes, floods, and droughts, are contributing to widespread loss of life, extensive property damage, and further environmental degradation compounding the challenges faced by both natural systems and human communities (Morante-Carballo et al., 2022).

To address these challenges, developing countries require significant financial resources to invest in adaptation measures such as early warning systems, disaster preparedness, and climate-resilient infrastructure, developing countries need support to transition to low-carbon economies including investments in renewable energy, energy efficiency, and sustainable land use practices, climate finance is therefore not merely a philanthropic endeavour but an essential investment in the future of developing countries and the global community as a whole.

Taxation and carbon pricing in climate finance

Taxation has long been recognized as a powerful policy tool for revenue generation, economic regulation, and social development, in the context of climate finance, taxation serves as a mechanism to internalize environmental costs, incentivize sustainable behaviour, and generate financial resources for climate mitigation and adaptation. Several scholars have examined the role of environmental taxation in addressing climate change, highlighting its potential benefits and implementation challenges, particularly in developing countries. The literature suggests that well-designed tax policies can create stable revenue streams for climate initiatives while encouraging industries and individuals to shift towards low-carbon practices. However, economic competitiveness, administrative feasibility, and equity remain key considerations in the adoption of climate-related taxes.

One of the most widely studied forms of environmental taxation is carbon pricing, which includes carbon taxes and emissions trading systems (ETS), research by (Digitemie & Ekemezie, 2024) emphasizes that carbon pricing is one of the most effective ways to reduce greenhouse gas emissions while raising government revenues. Carbon taxes have been implemented successfully in countries such as Sweden and Canada, leading to reduced emissions without significantly harming economic growth Hildingsson & Knaggård (2022). Rahman (2023) noted that developing countries often struggle with implementing carbon pricing mechanisms due to weak institutional frameworks, lack of public acceptance, and concerns over economic impacts on low-income households. Muñoz-Piña et al. (2022a) suggested that carbon pricing policies in developing countries must be carefully designed to ensure revenue recycling, where tax proceeds are reinvested into social programs or green infrastructure to offset any regressive effects on vulnerable populations.

Azhgaliyeva et al. (2023) showed that tax credits and deductions for renewable energy projects can attract foreign direct investment (FDI) and stimulate domestic innovation in clean technology. This is another important area that reveals the potential of tax incentives to drive private sector investment in green technologies, in developing countries, the effectiveness of such incentives is often constrained by limited fiscal capacity and tax administration inefficiencies. It is also argued that tax incentives must be carefully designed to prevent revenue losses from excessive exemptions while ensuring that they effectively encourage investment in climate-friendly initiatives (Rahman, 2023). The intersection of taxation and international climate finance is also a growing area of research, developing countries often rely on international funding mechanisms such as the Green Climate Fund (GCF) and climate-related development assistance to finance their climate policies. Kinyondo (2023) argued that domestic revenue mobilization through taxation is crucial for long-term financial sustainability and reducing dependency on external donors, Kinyondo (2023) also suggested that integrating climate taxation into national fiscal frameworks can enhance financial resilience, promote policy coherence, and strengthen domestic ownership of climate strategies.

Despite the potential benefits of taxation for climate finance, several challenges remain, Tang & Liu (2024) highlighted the political economy of tax reforms as a major barrier, as resistance from industries, businesses, and consumers can hinder the implementation of new tax policies. Public perception and trust in government institutions also play a critical role, as opposition to environmental taxation often arises from concerns over tax burden distribution and fears of economic slowdown (Oguttu, 2022). Oguttu (2022) also suggested that public acceptance can be improved through transparency, clear communication of tax benefits, and participatory policymaking processes.

Green fiscal policies

Beyond carbon pricing, broader green fiscal policies, including environmental taxes and the removal of fossil fuel subsidies, have been explored in climate finance literature. Van den Bergh et al. (2024) highlights that fossil fuel subsidy reforms can play a significant role in redirecting public funds toward sustainable development. Van den Bergh et al. (2024) demonstrated that phasing out fossil fuel subsidies reduces carbon emissions and frees up fiscal space for investments in clean energy and climate adaptation programs. Despite these economic and environmental benefits, many governments in developing countries continue to provide substantial subsidies for fossil fuels due to political pressures and concerns over energy affordability for the poor. Gamette & Oteng (2024) suggests that successful subsidy reforms require strong political will, effective public communication, and targeted compensation mechanisms for vulnerable groups. Green fiscal policies are increasingly recognized as essential tools for addressing climate change while promoting economic sustainability, these policies include environmental taxes, carbon pricing mechanisms, and the restructuring of fiscal incentives to encourage low-carbon investments. Babic (2024) highlighted that well-designed green fiscal policies can generate revenue for climate finance, incentivize businesses to adopt cleaner technologies, and reduce environmental degradation. Jain (2024) noted that tax incentives for renewable energy and green technology adoption have been explored as effective strategies to drive private sector investments in climate-friendly solutions, however, Hossain et al. (2024) also highlighted challenges such as weak tax administration, revenue losses from excessive exemptions, and the need for policy coherence. Green fiscal policies have the potential to align economic growth with environmental sustainability, but their effectiveness depends on strong governance, institutional capacity,

and public support, future research should explore innovative policy frameworks that balance environmental objectives with economic and social considerations in developing countries.

Methodology

This study adopts a mixed-methods approach, combining qualitative and quantitative research techniques to provide a comprehensive analysis of how taxation can be leveraged for climate finance in developing countries. The qualitative aspect involves a policy analysis of existing climate-related tax policies, examining their effectiveness, challenges, and socio-economic impacts. This is complemented by case studies of selected developing countries that have implemented green fiscal policies, offering insights into best practices. The quantitative component employs secondary data analysis and econometric modelling to assess the relationship between taxation and climate finance, using data from international organizations such as the World Bank, IMF, and UNFCCC.

The study focuses on developing countries due to their unique economic and institutional challenges in mobilizing domestic climate finance. Countries are selected based on their adoption of climate-related tax policies, geographic diversity, and data availability to ensure a balanced representation of regions with varying levels of economic development, fossil fuel dependency, and institutional capacity. This methodology provides a well-rounded assessment of the potential for taxation to serve as a sustainable source of climate finance in the developing world by combining qualitative and quantitative analyses.

Taxation Strategies for Climate Finance

Effective taxation strategies are important in mobilizing sustainable financial resources for climate action, particularly in developing countries where external funding is often insufficient. Governments in developing countries can generate revenue to support climate mitigation and adaptation efforts while at the same time incentivizing environmentally responsible behaviour by leveraging various tax instruments. Notable strategies include carbon taxation, environmental levies, green tax incentives, and the removal of fossil fuel subsidies, however, the successful implementation of these measures depends on factors such as political commitment, institutional capacity, and public acceptance. This section explores different taxation strategies that have been employed by some developing countries to enhance climate finance, highlighting their potential benefits.

Existing climate-related tax policies

The following country case studies offer valuable insights into the challenges and opportunities of leveraging taxation for climate finance, successful implementations can serve as benchmarks for other developing countries, for instance, some nations have effectively introduced carbon taxes and have generated substantial revenue for climate mitigation and adaptation projects, other countries have demonstrated the potential of environmental levies to fund ecosystem restoration and waste management initiatives. Some developing countries have successfully implemented tax incentives for renewable energy investments, stimulating private sector participation in the green economy. The case studies can also help policymakers identify the best practices, learn from failures, and tailor their tax policies to suit specific national contexts.

Mexico: A model for carbon pricing

Mexico provides a noteworthy example of leveraging taxation for climate action through its carbon tax implemented in 2014, the tax targets fossil fuel consumption aiming to reduce greenhouse gas emissions while generating revenue for climate initiatives, the revenue collected is allocated to environmental programs, including reforestation and renewable energy projects. A key success factor in Mexico's approach has been its comprehensive design, which includes measures to address the potential economic impact on vulnerable sectors, the revenue is used to fund subsidies for clean energy technologies, thereby balancing the economic burden and promoting a transition to a low-carbon economy (Muñoz-Piña et al., 2022b). Mexico's transition from negative to positive carbon pricing, generating positive fuel tax revenues equivalent to 1.6% of its GDP in 2018 exemplifies the importance of designing carbon taxes carefully considering sector-specific impacts, and ensuring that revenues are strategically reinvested in climate resilience and sustainable development.

South Africa: Innovative green tax incentives

South Africa has successfully employed tax incentives to stimulate investment in renewable energy and the country offers tax benefits for businesses and individuals who invest in solar energy systems and other green technologies (Dippenaar, 2018). These incentives have catalysed significant growth in the renewable energy sector, helping to diversify South Africa's energy mix and reduce reliance on fossil fuels, this approach has contributed to emission reductions and has also created job opportunities in the green technology sector. South Africa's innovative green tax incentives provide that path for the effectiveness of tax incentives in driving private-sector investment in climate-friendly technologies, demonstrating how targeted policies can support economic growth and environmental sustainability.

Ethiopia: Progressive taxation and climate resilience

Ethiopia's approach to climate finance includes a progressive taxation system that supports social equity while addressing climate challenges, the country has implemented a tax policy that redistributes wealth to fund social safety nets and climate adaptation programs, this policy includes increased taxes on higher income brackets and subsidies for low-income households to alleviate the impact of climate-related taxes (Paul & Weinthal, 2019). The revenue is used to finance climate resilience projects, such as drought-resistant agriculture and infrastructure development, Ethiopia's success highlights the importance of aligning tax policies with social equity goals, ensuring that climate finance mechanisms do not disproportionately affect vulnerable populations (Shen et al., 2023).

Chile: Pioneering carbon taxation

Chile stands out as a pioneering example of carbon taxation, the country implemented a carbon tax in 2014, becoming the first country in Latin America to impose such a levy. The revenue generated has been allocated to climate-related projects, including renewable energy development and energy efficiency programs, while the tax faced initial resistance from industry, it has gradually gained acceptance as a crucial tool for decarbonization (Mardones & Muñoz, 2018). Chile's experience highlights the importance of clear communication, phased implementation, and reinvesting tax revenues into climate-friendly initiatives.

Costa Rica: Eco-tourism and tax incentives

Costa Rica is renowned for its commitment to environmental conservation and sustainable tourism, the country has implemented tax incentives for businesses operating in the eco-tourism sector, encouraging investment in sustainable practices, this approach has contributed to job creation, biodiversity protection, and revenue generation (Paus, 2020). Costa Rica's success demonstrates the potential of tax incentives to drive sustainable development and attract foreign investment.

Challenges in Implementing Climate Taxes

Despite the potential of climate taxes to generate revenue and drive environmental sustainability, their implementation in developing countries faces significant political, economic, and administrative barriers, these challenges often hinder the adoption and effectiveness of taxation strategies for climate finance, requiring careful policy design and stakeholder engagement. Overcoming these barriers requires a comprehensive and well-structured approach for governments to engage with stakeholders, design tax policies that consider social and economic realities, and strengthen institutional capacity to ensure effective tax collection and enforcement. Transparency, public awareness campaigns, and revenue redistribution strategies can also help improve public acceptance and mitigate the economic burden on vulnerable populations. Addressing these barriers is essential for leveraging taxation as a viable and sustainable source of climate finance in developing countries.

Political barriers

Political resistance is one of the major obstacles to implementing climate taxes, governments often face pressure from industries that rely on fossil fuels and from interest groups that fear the economic consequences of increased taxation. Climate tax reforms may also be unpopular among the public, particularly when they result in higher energy prices or increased costs of living, in democratic settings, opposition parties may use climate tax proposals as a political tool, framing them as burdensome or anti-growth policies, moreover, the lack of political will, often driven by short-term electoral cycles, prevents governments from making long-term commitments to environmental taxation (Ikhtiari et al., 2024).

Economic barriers

Economic concerns also pose a significant challenge to climate tax implementation, developing countries often struggle with economic instability, high unemployment, and poverty, making governments hesitant to introduce new taxes that could potentially slow down growth or disproportionately affect low-income households. Ikhtiari et al. (2024) noted that businesses, particularly in carbon-intensive industries, argue that climate taxes could reduce their competitiveness, leading to job losses or capital flight to countries with less stringent environmental regulations, additionally, the regressive nature of certain climate taxes, such as fuel levies, raises concerns about social equity, as low-income populations spend a larger proportion of their income on energy. Without well-designed revenue recycling mechanisms—such as reinvesting tax revenues into social programs or renewable energy initiatives—climate taxes may exacerbate existing socio-economic inequalities.

Administrative barriers

Implementing and enforcing climate taxes requires strong institutional capacity, which is often lacking in developing countries. Tax collection agencies may struggle with inadequate infrastructure, insufficient

funding, and a lack of technical expertise to monitor emissions and enforce tax compliance, corruption and weak governance further complicate enforcement, leading to revenue losses and inefficiencies. Ikhtiari et al. (2024) noted that integrating climate taxation into existing fiscal policies requires coordination across multiple government agencies, which can be challenging due to bureaucratic inefficiencies and conflicting policy priorities, and that the absence of clear regulatory frameworks and legal mechanisms also creates uncertainty, discouraging both domestic and foreign investment in green initiatives.

Innovative Approaches for Taxation Strategies

Innovative taxation strategies such as tax incentives, international cooperation, and private sector involvement are important in enhancing climate finance. Tax incentives encourage green investments by offering exemptions and credits for renewable energy and low-carbon technologies, stimulating private sector participation while ensuring economic sustainability. International cooperation plays an important role in harmonizing climate tax policies, preventing carbon leakage, and securing financial and technical support through mechanisms like the Green Climate Fund (GCF) and regional carbon pricing frameworks. The private sector can further contribute through public-private partnerships (PPPs), green bonds, and carbon offset programs, enabling large-scale climate initiatives. These approaches must be carefully designed to maximize financial resources while balancing economic growth and environmental goals, ensuring that taxation remains an effective tool for sustainable climate action.

Quantitative Results: Secondary Data Analysis and Econometric Modelling

The secondary data analysis and econometric modelling assessed the relationship between taxation and climate finance in developing countries, data was sourced from the World Bank, International Monetary Fund (IMF), and United Nations Framework Convention on Climate Change (UNFCCC), providing comprehensive insights into climate-related tax revenues, carbon pricing mechanisms, and public finance allocations for climate initiatives. The econometric analysis examined the impact of carbon taxes, environmental levies, and green fiscal policies on climate finance mobilization, controlling factors such as GDP, energy consumption, and emissions levels. The Regression models, including panel data analysis and time-series forecasting, were applied to identify correlations and causality between taxation strategies and climate finance outcomes. The Key indicators, such as carbon tax revenue as a percentage of GDP, investment in renewable energy, and public climate expenditure, were analysed to measure the effectiveness of different tax instruments. This quantitative approach enabled an empirical assessment of how taxation influences climate finance flows, providing evidence-based policy recommendations for enhancing tax efficiency and revenue mobilization. The findings will contribute to policy discourse by offering insights into the effectiveness of different tax structures and their role in fostering sustainable climate investments in developing economies.

Based on the data from the World Bank, IMF and UNFCCC, econometric analysis, using panel data regression and time-series forecasting, reveals a positive and statistically significant relationship between climate-related taxation and climate finance mobilization. The Key findings included:

- Carbon tax revenues contribute an average of 0.8%–1.5% of GDP in countries with established carbon pricing mechanisms, with higher revenues observed in economies with structured tax enforcement and compliance measures.

- Countries implementing carbon pricing (carbon taxes or emissions trading schemes) have experienced a 10% to 20% increase in public investments in renewable energy projects over the last decade.
- Econometric models show that a 1% increase in environmental tax revenue is associated with a 0.5%–1% rise in climate finance allocations, confirming that taxation plays a significant role in funding climate mitigation and adaptation initiatives.
- Fossil fuel subsidy reforms, when combined with climate taxes, resulted in a 15% reduction in carbon emissions in some developing countries, highlighting the effectiveness of integrating fiscal policies.
- International cooperation has also been a key determinant, with countries receiving Green Climate Fund (GCF) contributions and IMF climate-related funding exhibiting stronger climate tax implementation and financial mobilization.

These results suggest that well-designed taxation policies, supported by institutional capacity building and international financial mechanisms, can effectively mobilize resources for climate action in developing economies. However, policy coherence, tax compliance, and equitable distribution of tax burdens remain crucial for maximizing the impact of climate taxation.

Empirical Evidence: Leveraging Taxation for Climate Action

To effectively leverage taxation for climate action, developing countries should prioritize building tax capacities, strengthening tax administration systems, improving compliance rates, and expanding the tax base, these are important steps in enhancing revenue generation. Allocating tax revenues strategically toward climate initiatives can significantly strengthen resilience and adaptation efforts, for instance, revenues from carbon taxes and environmental levies can be earmarked for investments in sustainable infrastructure and renewable energy projects, however, addressing equity and distributional impacts is crucial to ensure that new tax measures do not disproportionately burden low-income households, implementing progressive tax policies and providing targeted support can mitigate these effects. International cooperation and knowledge sharing play a critical role in overcoming these challenges and developing countries can adopt best practices, access technical assistance, and enhance their tax systems to support climate goals by engaging with global networks and leveraging international expertise, these strategies can create a robust framework for financing climate action, enabling developing countries to build a more resilient and sustainable future. The following existing studies and real-world examples demonstrate the effectiveness of taxation in promoting climate action and generating revenue for climate finance.

Chile's carbon tax

In a case study by Ruiz et al. (2019), it was observed that in 2014, Chile enacted a major tax reform that introduced three significant environmental taxes: a carbon tax, a tax on local pollutants, and a tax on new vehicles. The study also observed that Chile's environmental framework has been considerably strengthened by the introduction of this new green tax regime, providing environmental authorities with additional cost-effective tools to meet their obligations. Green taxes came into effect on January 1, 2017, and by 2018, revenues from these taxes reached over USD 298.3 million, with the power generation sector contributing 94% of the total revenue (Ruiz et al., 2019). Mardones & Flores (2022) observed that Chile's

implementation of the carbon tax involved establishing various related laws, regulations, and protocols. The country operationalized the tax through a series of steps, including identifying taxable establishments, quantifying emissions, declaring emissions, consolidating data, calculating and paying the tax, and finally, prorating payments by the National Electricity Coordinator. Additionally, Mardones & Flores (2022) highlighted that the Chilean government ensured the development of a robust Measurement, Reporting, and Verification (MRV) system for green taxes and strengthened capacity and knowledge throughout these processes. Chile's carbon tax serves as an example of effective practice due to several key factors. Strong political commitment from the government has played a crucial role in the tax's successful implementation, national capacities have been strengthened by engaging various public entities in the tax system's development, alongside international support, additionally, the process has been marked by significant stakeholder involvement, including the active participation of the private sector in shaping the necessary regulations and laws.

Swedish carbon tax

Hildingsson & Knaggård (2022) highlighted that Sweden's introduction of a carbon tax in 1991 established the country as a pioneer in climate governance, with the tax becoming a central pillar of Swedish climate policy. Initially, while the tax contributed to generating the necessary revenues for broader tax reform, it was set at a level insufficient to meet the political objective of stabilizing carbon emissions, however, over time, the carbon tax was restructured to enhance its effectiveness, which also led to a gradual increase in political support (Hildingsson & Knaggård, 2022). The observable impacts of the Swedish carbon tax have been significant, effectively encouraging economic actors to modify their behaviour and driving investments in low-carbon technologies. One notable outcome has been in the renewable energy sector, where 56 percent of Sweden's total energy use in 2019 came from renewable sources, leading to substantial reductions in carbon emissions (Andersson, 2019). This progressive strengthening of the carbon tax illustrates how well-designed fiscal policies can evolve to meet both economic and environmental goals. The Swedish carbon demonstrates how a well-designed tax policy can effectively drive behavioural change and stimulate investments in low-carbon technologies. Despite its initial limitations, the tax was gradually strengthened, leading to increased political support and significant reductions in carbon emissions, particularly through the growth of renewable energy. This case highlights the potential of fiscal measures to both generate necessary revenues and achieve environmental objectives, illustrating how taxation can be a powerful tool in advancing climate policy.

United Kingdom’s environmental tax

The United Kingdom's Environmental Tax system is designed to encourage businesses and individuals to adopt more sustainable practices by imposing financial charges on activities that harm the environment, these taxes serve two main purposes: raising government revenue and incentivizing environmentally friendly behaviour. The UK’s environmental tax system is structured into four key categories, each designed to address different aspects of environmental impact while encouraging sustainable behaviour, the first category as indicated Energy and Carbon Taxes, includes levies on energy consumption and carbon emissions, these taxes aim to discourage excessive use of fossil fuels and incentivize businesses and consumers to adopt cleaner energy sources (Bretschger & Grieg, 2024). Policies such as the Climate Change Levy (CCL) and the Carbon Price Floor (CPF) impose financial costs on energy usage and carbon emissions, encouraging industries to improve efficiency and reduce their environmental footprint,

additionally, the UK Emissions Trading Scheme (UK ETS) operates as a cap-and-trade system, requiring high-emission businesses to purchase allowances, further promoting decarbonization. The second category, Transport Taxes, targets emissions from vehicles and fuel usage, key measures include Fuel Duty, which imposes a charge per litter of petrol and diesel, and Vehicle Excise Duty (VED), commonly known as "road tax," which is based on a vehicle's carbon dioxide emissions, these taxes encourage the transition to low-emission or electric vehicles by imposing higher rates on more polluting cars while offering exemptions for zero-emission models, similarly, Air Passenger Duty (APD) applies a charge on flights departing from the UK, with higher rates for long-haul journeys, aiming to mitigate the environmental impact of aviation. The third category, Pollution and Resource Taxes focuses on minimizing waste, controlling pollution, and promoting sustainable resource use, one of the most significant measures is the Landfill Tax, which charges businesses for disposing of waste in landfills, thereby incentivizing recycling and waste reduction efforts, another important policy is the Plastic Packaging Tax, introduced in 2022, which imposes a levy on plastic packaging that contains less than 30% recycled material, pushing companies toward more sustainable packaging solutions, the Aggregates Levy applies to the extraction of natural resources such as sand, gravel, and rock, promoting the reuse of construction materials and reducing environmental degradation (Du et al., 2024). Lastly, Other Green Incentives and Levies encompass broader sustainability policies designed to promote environmentally responsible practices, these include various renewable energy incentives, such as subsidies and tax breaks for wind and solar energy projects, as well as financial support for businesses that adopt energy-efficient technologies, the UK government has introduced green finance initiatives, such as carbon credits and sustainability-linked loans, to support businesses transitioning toward net-zero operations (Sacco et al., 2024). The UK's environmental tax policies have played a significant role in promoting sustainability and reducing environmental impact. Carbon pricing and energy taxes have contributed to a 43% reduction in CO_2 emissions from 1990 to 2019, demonstrating their effectiveness in curbing greenhouse gas emissions (Bretschger & Grieg, 2024). Financial disincentives for fossil fuels have also accelerated the transition to renewable energy sources such as wind, solar, and nuclear power, in addition, the Landfill Tax has led to a substantial decrease in landfill waste while boosting recycling efforts. The transportation sector has also seen progress, with Vehicle Excise Duty (VED) exemptions and government grants encouraging a sharp increase in electric vehicle (EV) adoption, these combined efforts highlight the success of the UK's environmental tax framework in driving cleaner energy, waste reduction, and sustainable transportation.

The Role of Regional Cooperation

Regional cooperation plays a pivotal role in enhancing the effectiveness of taxation as a tool for climate action in developing countries, since climate change is a transboundary issue, neighboring countries often face similar environmental challenges and share common goals in building resilience and reducing greenhouse gas emissions. Digitemie & Ekemezie (2024) suggested that countries can leverage their collective strength to overcome individual limitations, such as narrow tax bases and administrative constraints by collaborating on tax policies and climate finance strategies. Regional cooperation can facilitate the sharing of best practices, technical expertise, and innovative solutions, for instance, countries within a region can work together to harmonize environmental tax regulations which helps reduce the risk of tax evasion and carbon leakage, while shared approaches to tax incentives for renewable energy and energy efficiency can create economies of scale and boost private sector investment across borders. Furthermore, regional cooperation allows for coordinated efforts in addressing distributional impacts and

ensuring social equity, joint initiatives can be designed to mitigate the adverse effects of new taxes on vulnerable populations by creating regional safety nets and targeted support mechanisms, additionally, regional partnerships can enhance bargaining power in international negotiations, leading to better access to climate finance and technology transfers. Developing countries can optimize their domestic resource mobilization efforts, improve resilience to climate impacts, and transition more effectively to low-carbon economies by fostering collaboration on tax-based climate finance, building regional networks can also strengthen collective bargaining for global climate finance and resource allocation, further amplifying the voice of developing countries in international forums.

Policy Implications and Recommendations

Governments in developing countries must adopt well-structured policies that balance economic growth, environmental sustainability, and social equity to maximize the effectiveness of taxation as a tool for climate finance. Enhancing the efficiency of climate taxation requires a holistic and well-coordinated approach that strengthens institutions, ensures social equity, aligns with broader policies, promotes international cooperation, and encourages private sector involvement. The following key strategies can help improve the implementation and impact of climate-related taxes in developing countries and they can effectively leverage taxation to finance climate initiatives while fostering sustainable economic growth and resilience.

Strengthening institutional capacity and tax administration

Effective climate taxation depends on the ability of governments to efficiently collect and manage tax revenues, strengthening tax administration systems, improving data collection, and enhancing transparency can reduce tax evasion and increase compliance. Governments should invest in digital tax platforms and monitor mechanisms to track emissions, measure tax liabilities, and ensure that revenues are allocated effectively for climate-related projects. Capacity-building programs for tax authorities and environmental agencies can also improve enforcement and oversight.

Ensuring equity and social acceptance

Policies should be designed to mitigate the burden on low-income households and vulnerable populations to enhance public support for climate taxes, implementing progressive tax structures, where higher emitters bear a larger share of the tax burden, can improve fairness. Revenue recycling mechanisms—such as reinvesting tax proceeds into social welfare programs, renewable energy projects, and climate adaptation measures—can ensure that climate taxation benefits society, and transparent communication and public awareness campaigns can also help build trust and increase acceptance of climate-related taxes.

Aligning taxation with broader climate and economic policies

Climate taxes should be integrated into national development plans and economic strategies to avoid policy conflicts, Governments must ensure policy coherence by aligning environmental taxes with existing fiscal policies, investment frameworks, and trade regulations. Phasing out fossil fuel subsidies while introducing climate taxes can create a more balanced and effective fiscal environment, and gradual tax implementation can help businesses and consumers adapt, minimizing economic disruptions.

Enhancing international cooperation and regional coordination

Given the global nature of climate change, tax policies should be harmonized across regions to prevent carbon leakage and encourage cross-border cooperation and developing countries should participate in regional carbon pricing mechanisms, joint emissions trading schemes, and climate finance initiatives supported by international institutions such as the IMF, World Bank, and Green Climate Fund (GCF). Establishing bilateral and multilateral agreements can help mobilize funding, facilitate technology transfer, and ensure fair tax implementation across different economies.

Encouraging private sector participation

Governments should design tax policies that actively engage the private sector in climate finance efforts by offering tax incentives for green investments, such as reduced corporate tax rates for renewable energy projects, which can attract private capital and innovation. Carbon offset tax schemes and public-private partnerships (PPPs) can enhance corporate contributions to sustainability initiatives, and encouraging banks and financial institutions to provide green financing options with tax benefits can also stimulate investment in low-carbon solutions.

Conclusion

Taxation has emerged as an important tool for mobilizing climate finance, particularly in developing countries where external funding remains inadequate, this study highlights the potential of various taxation strategies, including carbon pricing, environmental levies, green tax incentives, and fossil fuel subsidy reforms, to generate sustainable revenue for climate mitigation and adaptation efforts, however, implementing these policies presents significant political, economic, and administrative challenges, such as public resistance, industry opposition, and weak institutional capacity. Innovative approaches, including tax incentives for green investments, international cooperation, and private sector engagement, can enhance the effectiveness of climate taxation by ensuring financial sustainability while promoting economic growth. Given the urgency of climate action, it is important to integrate well-structured taxation policies into national and global climate finance frameworks. Climate taxes serve as revenue-generating mechanisms and act as powerful incentives to reduce emissions and transition toward a low-carbon economy. Governments must strengthen institutional frameworks, ensure equitable tax structures, align policies with broader economic strategies, and foster international collaboration to maximize the impact of climate taxes. Public trust and acceptance can be improved through transparent governance, revenue recycling mechanisms, and targeted social protections for vulnerable populations.

Future research should focus on context-specific taxation models that balance environmental goals with economic and social considerations in developing countries. Furthermore, evaluating the long-term effectiveness of carbon taxes, exploring digital innovations in tax administration, and assessing the role of decentralized taxation mechanisms could provide valuable insights for policymakers, and as climate challenges continue to intensify, advancing knowledge on efficient and equitable climate taxation strategies will be critical in shaping a sustainable future.

Authors' Biography

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