A Greener Tomorrow Through Green Fiscal and Monetary Policies: A Systematic Review of Policy Tools, Impacts, Implementation Challenges, and Solutions

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Abstract

With the acceleration of climate change, developing and emerging economies (DEEs) face urgent demands for effective green policies, however, evidence remains fragmented and contradictory for their practical application, performance, and impacts, particularly in DEEs. This systematic literature review addresses this critical knowledge gap by providing the first comprehensive synthesis of green fiscal and monetary policy effectiveness across DEE contexts through PRISMA-guided analysis of 10 carefully selected studies, identifying six themes related to green monetary policy tools (e.g., green asset purchases and quantitative easing (QE), interest rate and inflation adjustments) demonstrating limited but promising impacts, however, constrained by institutional path dependencies, and six themes related to green fiscal policy tools (e.g., carbon pricing, subsidy reforms and incentives) showing stronger outcomes yet facing political economy barriers. The crux of our analysis also reveals the existence of the policy trilemma, i.e., the near-impossible challenge of achieving price stability, growth, and decarbonization via conventional instruments simultaneously. The synthesis also reflects why isolated interventions fail, like monetary tools lack transmission channels in shallow financial markets, while fiscal measures encounter implementation bottlenecks. And, to overcome those challenges, evidence-based solutions are recognized, such as hybrid policy frameworks, climate-aligned central bank mandates, and just transition mechanisms, all requiring unprecedented international coordination. While covering DEEs, geographic imbalances persist in selected studies and flag the critical need for post-COVID empirical studies, small-state vulnerability analyses, and private-sector engagement strategies. This systematic review establishes a vital baseline for accelerating evidence-based climate policy in the DEEs, and with COP28 stressing finance mechanisms, the findings have the potential to provide guidance for policymakers navigating the complex tradeoffs between economic stability and climate action in developing contexts.

Keywords Green monetary policy, Green fiscal policy, Developing and emerging economies, Climate finance, Policy trilemma

JEL Classification Q58, E52, E62, O44, F64

1. Introduction

The ever-increasing climate crisis has become a bigger threat to the survival of nations, and the severity of it can be projected by the findings of the Intergovernmental Panel on Climate Change (Rhodes, 2019) that the world by the early 2030s is on track to surpass the critical 1.5°C warming threshold, demanding immediate and systemic interventions across all sectors of the economy. Not only the ongoing academic and policy discussions on the necessity to achieve the net-zero GHG emissions goals (Ozili, 2025), but also the increased advocacy for united effort from the international development agencies, public sector, and private sector to contribute to achieving the net zero GHG emissions goal (Deutch, 2020; Sun et al, 2021) have ultimately intensified the need to adjust and develop such policies that allow not only individuals but also firms and governments to diminish their carbon footprint or CO2 emissions (Bataille, 2020; Sasse et al, 2020).

It is interesting to note that each country's fiscal and monetary authorities are considered powerful agents to control fiscal and monetary policy tools even to slow down the economic activities' pace which will not only decrease economic growth but sooner or later reduce CO2 emissions as fewer goods and services will be produced, leading to fewer CO2 emissions (Dikau et al, 2021; McConnell et al, 2022; Semmler et al, 2021). Considering the climate change issues and power of policies, fiscal and monetary policies, which were traditionally focused on economic stability and growth, are now being reoriented to address environmental sustainability (Cœuré, 2018). To deal with GHG emissions, now green fiscal policies, like carbon pricing mechanisms and renewable energy subsidies, along with green monetary policies, including central banking operations aligned with climate and favored lending for sustainable projects, have appeared as critical tools in this transition (Campiglio et al., 2018). The Organization for Economic Co-operation and Development (Russel & Benson, 2014; Moser-Plautz & Korac, 2025) highlighted that these green policies will not only support in mitigating environmental harm but also foster equitable economic development, particularly in those regions that are most vulnerable to climate change.

Despite there is growing adoption of green economic policies in developed nations, developing and emerging economies (DEEs) face not only structural barriers but also institutional barriers to their implementation (Monasterolo et al., 2024). Bhattacharya and Stern (2023) highlighted the factors that often constrain the ability of DEMs to enact strong environmental policies, including underdeveloped financial markets, limited fiscal space, and competing socio-economic priorities. In the same way, political resistance to such reforms that may disrupt fossil fuels-rooted industries worsens these challenges (Allan et al., 2021). According to Network for Greening the Financial System, DEMs are both excessively affected by climate change and critical to global mitigation efforts due to their rapid industrialization, and understanding how these economies can deploy green fiscal and monetary policies effectively is essential (Boneva et al., 2022).

Not only are the practical applications of these green policies still limited as compared to the traditional policies, but also the insights on their impacts and performance on inclusivity and financial stability are still developing (Monasterolo et al., 2024). The purpose of the current systematic literature review is to address existing critical gaps in the current developed

economies-focused literature by exploring the green fiscal and monetary policy tools and their applicability, effectiveness, challenges of green fiscal and monetary policies in DEMs, and solutions or strategies to overcome those challenges by exploring the four key research questions, i.e., What are the green fiscal and monetary policy tools for promoting sustainable economic growth in developing and emerging economies? How do green monetary and fiscal policies impact environmental and other outcomes and achieve sustainability goals in developing and emerging economies? What are the key challenges faced in implementing green fiscal and monetary policies? How can these challenges in implementing green fiscal and monetary policies be overcome by developing and emerging economies?

Moreover, the research also aims to provide actionable insights by synthesizing the carefully selected studies for international organizations, policymakers, and central banks working particularly in resource-constrained settings which are in the progress of a sustainable economic transition. The contributions of this paper are as follows: Section 2 of the study deals with the background of green fiscal and monetary policies in developing and emerging economies for sustainable economic growth and the tools of those green policies, their impacts, implementation challenges, and strategies or solutions to mitigate those challenges. Then, research methodology by defining research questions, search string, screening criteria, study selection process illustrated in PRISMA flowcharts, quality assessment criteria, data extraction method, keywording-guided screening for full-text analysis, and classification schemes are discussed in Section 3. Section 4 deals with the research results by synthesizing the selected papers and presenting them in the form of tables. In the end, a summary of findings and the conclusion of the study are presented in Sections 5 and 6.

2. Background

The necessity to address the market failures that are increasingly contributing to environmental deterioration forms the basis of green policy concepts, including green monetary policy and green fiscal policy (Benkhodja et al., 2023). According to Gramkow and Anger-Kraavi (2018) and Milne and Andersen (2012), green fiscal policies, which are a collection of financial tools under the direction of the government, are intended to deter detrimental environmental activities by placing a burden on them and to promote green innovations and use incentives to reward sustainable activities. And, those burdens are imposed by carbon pricing mechanisms, like emissions trading schemes and carbon taxes, to internalize the social cost of pollution while also bringing in money for the government to support or subsidize energy-efficient and renewable technologies (He & Guo, 2023; Wu et al., 2023). Unfortunately, according to the International Monetary Fund, many countries still underprice fossil fuels, and these subsidies on fossil fuels are large enough to affect national economies, however, fixing energy prices could bring big benefits for public health, the environment, and overall economic well-being, therefore, IMF highlights the need for fiscal reforms to reallocate public spending toward sustainability (Coady et al., 2019). Empirical studies, like Sun et al. (2024), Khan et al. (2025), and Yan et al. (2023) suggest that the fiscal policies that are designed well have the potential to lower CO2 emissions and have co-benefits in the form of improved energy security and job creation. According to the World Bank, mechanisms like effective revenue recycling, political acceptability, and equitable

policy design play a crucial role in diminishing negative impacts on low-income households and, in other words, are critical to the success or failure of such green programs (Santikarn et al., 2021).

By contrast, green policies, central banks and financial regulators oversee green policies, like green monetary policies, which involve measures to align the financial system with environmental objectives (Boneva et al., 2022). For example, central banks can use key green monetary tools like green quantitative easing (QE), which involves purchasing green bonds or other sustainable assets, with the aim to reduce financing costs for environmentally friendly projects (Aloui et al., 2023; Bolton et al., 2020). And, other important tactics include policies like exclusionary lending that restrict credit to highly polluting industries (Kim et al., 2022) and differentiated reserve requirements that decrease banks' capital buffers with the aim to fund renewable energy projects (Luo & Kamarudin, 2024). As per the reports published by the Network for Greening the Financial System (NGFS), central banks are now seemed to incorporate climate-related risks into their monetary policy frameworks (ECB, 2021). Yet, implementation in developing and emerging markets (DEMs) remains unreliable due to several challenges like financial market illiquidity, a lack of technical expertise, and data gaps.

Also, some DEEs have created creative green policy frameworks that serve as helpful case studies. For example, to limit funding for high-emission projects and to promote or support sustainable business practices, the Green Credit Guidelines of China, have been in effect since 2012 and require banks' lending operations to commit to and adhere to environmental criteria (Tan et al., 2022; Zhang et al., 2022; Zhou et al., 2022). Similarly, the Brazilian ABC Program provides farmers with low-interest loans and subsidies to promote sustainable farming methods and help lower Amazonian deforestation rates (Arias et al., 2017; Assad et al., 2020). Another example is the Indian Perform, Achieve, and Trade (PAT) scheme, which has successfully decreased energy intensity in important industries and is a market-based mechanism to enhance industrial energy efficiency (Bhandari & Shrimali, 2018; Sarangi & Taghizadeh-Hesary, 2020). However, some research has reflected that there are still major barriers that prevent the adoption of green policies in DEMs, which include corruption, weak law enforcement, and opposition from companies depending on fossil fuels (Shakeyev et al., 2023; Wenlong et al., 2023). Also, many of these nations are under the burden of high levels of public debt, which become hinderance in their ability to fund major efficient and effective green initiatives (Missaglia & Vaggi, 2025).

Therefore, a multifaceted approach is crucial and needs of the time to address these challenges involving not only domestic reforms but also international cooperation. For example, the Green Climate Fund and other similar funding bodies play an important role by providing not only financial assitance but also technical assistance to DEEs with the goal to strengthen their capacity to invest in climate resilience and renewable energy projects. Previous studies like Fontana-Raina & Grund (2024) and Jiang & Cao (2024) suggest that Countries such as Belize and Seychelles, where debt-for-nature swaps have been found promising as nations' some portion of external debt is written off in exchange for their commitments to environmental conservation. Also, what can be done at the domestic level? The answer lies in the establishment of

independent climate councils to support depoliticizing environmental policymaking (Merlo, 2023), on the other hand, just transition frameworks can make sure that vulnerable workers or communities are not disproportionately affected during the transition or by this shifting away from carbon-intensive industries (Neuhuber, 2025). Moreover, financial innovations, like blended finance models that can combine public and private funding, and the initiative of developing local currency green bond markets, have the potential to further improve the feasibility of green investments in DEMs (Anjanappa, 2024). In the end, by examining green policies in depth, the aim of this study is to contribute to the identification of key tools, their impacts, challenges in implementation, and the development of robust and context-specific strategies or solutions for those challenges for advancing sustainability in developing and emerging economies, where previous studies using a fragmented approach fail to notice key synergies among them.

3. Research Methodology

The current systematic literature review follows a review protocol (Inshal, 2025), which was registered at Open Science Framework (OSF) as https://doi.org/10.17605/OSF.IO/DK6WR. It is illustrated in Figure 1, which outlines the methods for minimizing any potential biases in the study.

Figure 1 Research Protocol

The research questions of this systematic review, as in Section 3.2, are derived from the study's objectives in Section 3.1. The search strategy is formed through pilot searches to obtain a refined search string in Section 3.3, and in order to identify papers in the relevant category. Next, to screen the relevant papers, screening criteria are established in Section 3.4. Furthermore, Section 3.5 deals with the study selection process using the PRISMA flowchart, and in Section 3.6, quality assessment (QA) criteria for included studies are discussed. In section 3.7, a data extraction strategy related to collecting data from included studies is formulated. Furthermore, Sections 3.8 and 3.9 deal with keywording-guided screening for full-text analysis and classification schemes. Finally, forms are created to extract data and present synthesized results in the analysis section.

3.1 Research Objectives

RO1: To investigate and identify green fiscal and monetary policy tools for promoting sustainable economic growth in developing and emerging economies.

RO2: To assess the impact of green fiscal and monetary policy on environmental and other outcomes and achieve sustainability goals in developing and emerging economies.

RO3: To identify the challenges faced in implementing green fiscal and monetary policies by developing and emerging economies.

RO4: To identify solutions and strategies for overcoming the challenges linked with the implementing green fiscal and monetary policies.

3.2 Research Questions

RQ1: What are the green fiscal and monetary policy tools for promoting sustainable economic growth in developing and emerging economies?

RQ2: How do green monetary and fiscal policies impact environmental and other outcomes and achieve sustainability goals in developing and emerging economies?

RQ3: What are the key challenges faced in implementing green fiscal and monetary policies?

RQ4: How can these challenges in implementing green fiscal and monetary policies be overcome by developing and emerging economies?

3.3 Search Strings

In order to gather relevant studies from a large pool of search results, the selection criteria must meet the objectives of the systematic review. Previous study suggests that a high recall search strategy has the potential to lead to false positives; on the other hand, a precise strategy narrows down the search results (Avci et al., 2020). At first, in the pilot phase, search strings were created by using Boolean operators, such as "AND" to narrow search results (i.e., all the terms required in the search result) and "OR" to broaden results (i.e., any term is acceptable in the search result).

Also, for search query design, the 256-character limits in the search engine of Google Scholar were considered (Kousha & Thelwall, 2019). Since it is crucial for optimal results to design search strings with the right keywords (Avci et al., 2020), and for the same reason, to identify an appropriate search string on Google Scholar, search strings with maximum relevant keywords were tested, and a refined search query was obtained as demonstrated in Table 1.

Table 1 Search String (Green Monetary Policy and Green Fiscal Policy in Developing & Emerging Economies)

Source	Search String	Context
Google Scholar	"Green monetary policy" AND "Green fiscal policy" AND ("Developing and Emerging Economies" OR "Low- and Middle-Income Countries" OR "LMICs" OR "developing countries" OR "developing economies" OR "Low-income countries" OR "Emerging economies")	Green Monetary and Fiscal Policies in the context of developing and emerging economies.

The search was performed on April 20, 2025, and no publication date restrictions were applied to the timeline.

3.4 Screening of Relevant Papers

Since not all the papers in the search results returned precise relevance to the research questions, a systematic assessment for actual relevance was needed. Consequently, the search process for the screening of the relevant studies defined by Dybå and Dingsøyr (2008) was used. Primarily, during the first screening phase, studies were selected based on their titles, and studies unrelated to the research area were omitted, such as articles relevant to Fiscal and Monetary Policies in other contexts, with different meanings than those applied in the emerging and developing economies and environmental or sustainability context, and therefore, such papers were reasoned entirely out of scope for the systematic review and were excluded. In the second screening phase, the abstract of each article selected in the first screening phase was read, and inclusion and exclusion criteria were also applied, and the following 4 types of publication were excluded:

1. Publications not available in the English language.
2. Publications with no relevance to the search string used.
3. Publications with non-availability of full text.
4. Publications released outside of journals, conferences, patents, technical reports, and scholarly books.

In the end, papers were selected based on the provided exclusion criteria.

3.5 Study Selection Process

In the current systematic review for the selection of eligible studies addressing green fiscal and monetary policies in the context of developing and emerging economies, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) flowchart has been employed. In the initial electronic search, a total of 32 records were identified. Out of these, 10 were removed due to non-existent articles (n = 10). After this exclusion, a set of 22 studies was available for screening. After screening, 4 studies were further excluded based on irrelevant titles, keywords, and abstracts, and from this group of studies, 8 studies were eliminated further because of full-text unavailability. In the end, a set of 10 studies was included in the qualitative synthesis. The outcomes of the search and selection process are shown in Figure 2 via the PRISMA flowchart.

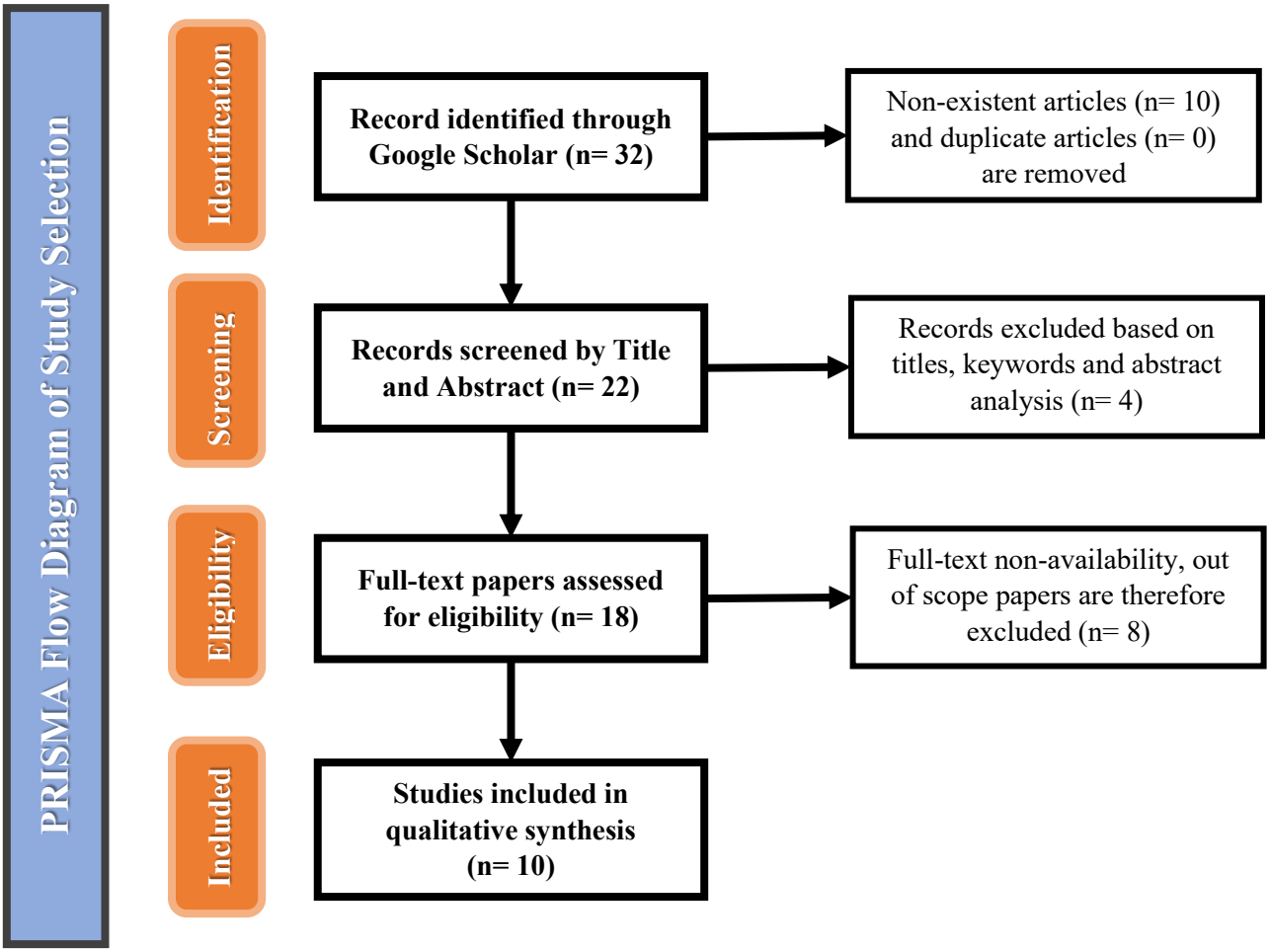

Figure 2 PRISMA Flowchart for Green Monetary Policy and Green Fiscal Policy in Developing & Emerging Economies

3.6 Quality Assessment

According to Farooq et al. (2020), it is a common practice in Systematic Literature Review (SLR) to conduct quality assessment (QA) in order to appraise the selected papers for their reliability. In this SLR, a questionnaire was adapted, which was employed in prior mapping studies (Farooq et al., 2020; Fernandez et al., 2011) to assess the quality of the selected papers.

The quality assessment covered the following dimensions:

(a). Does the selected study contribute to both green fiscal policy as well as green monetary policy in promoting sustainable economic growth, environmental outcomes, and/or achieving sustainability goals in developing and emerging markets? Yes (+1) or No (0)
(b). Are the findings, solutions or strategies specifically tailored to the promotion, impact assessment, challenge identification, or overcoming barriers related to green fiscal and monetary policies? Yes (+1), Partially (0.5), or No (0).
(c). Have other publications cited the published study? It will be regarded as "Partially (0)" if the number of citations is between 1 and 5, if no author cites it, it will be considered as No (−1), and if the number of citations exceeds five, it will be regarded as "Yes (+1)."
(d). What's the published study's source? For that, the following Journal Citation Reports (JCR) lists will be taken into consideration while evaluating this:

Table 2 Quality criteria. JCR: Journal Citation Reports.

Sources	Ranking	Score
Journal	Q1	2
	Q2	1.5
	Q3 or Q4	1
	If the study is not ranked by JCR	0

Each selected study for the systematic review is allocated a score for each quality assessment question, and the sum of these scores is then presented as a cumulative score for each study, ranging from -1 to 5.

3.7 Data Extraction Method

To gather the potential responses to the defined research questions of this systematic review, the following data extraction strategy has been employed.

RQ1: The answer to this research question is given by identifying key green fiscal and monetary policy tools for promoting sustainable economic growth.

RQ2: The answer to this research question is given by identifying the impact of green fiscal and monetary policy on environmental and other outcomes and achieving sustainability goals.

RQ3: The answer to this research question is given by identifying the key challenges faced in implementing green fiscal and monetary policies.

RQ4: The answer to this research question is given by identifying key solutions and strategies for overcoming the challenges linked with the implementing green fiscal and monetary policies.

3.8 Keywording-guided Screening

An approach was used by Petersen et al. (2008) to identify relevant papers by analyzing abstracts with specific keywords. And, this approach has two stages, i.e., to observe the abstracts first in order to find the main ideas and words that show what the studies were about. The second stage was to investigate deeper into these keywords to not only understand them better in the context of the research questions but also to organize the reviews in an effective manner by grouping and categorizing the keywords. Also, it was suggested to explore the introduction or conclusion sections in case of a poor-quality abstract (Petersen et al., 2008). In the case of the current systematic review, the full text was analyzed for a robust classification scheme.

3.9 Classification Schemes

As outlined by Petersen et al. (2008), the classification scheme methodology was adapted for the key green fiscal and monetary policy tools, their impact on environmental and other outcomes, key challenges faced in implementing green fiscal and monetary policies, and key solutions and strategies as presented below in Tables 3, 4, 5 and 6.

Table 3 Classification Scheme: Key Green Fiscal and Monetary Policy Tools

Research Question	**Classification**	**Themes**	**Sub-Themes**
RQ1	**Green Fiscal Policy Tools for Promoting Sustainable Economic Growth**	Carbon Pricing	Carbon taxes
			Emissions trading systems (ETS)
		Public Investment & Spending	Clean energy infrastructure
			Government spending on renewables
			Green infrastructure projects
		Subsidy Reforms & Incentives	Removal of energy subsidies
			Tax exemptions for electric/hybrid vehicles
			Green subsidies for renewables

		Public-Private Partnerships (PPPs)	World Bank's de-risking strategies
		Revenue Recycling & Fiscal Rules	Using carbon tax revenues for green R&D or labor tax cuts
			Deficit-financed green expenditures
			Fixed deficit-to-output ratio
		Other Fiscal Measures	Feed-in tariffs for renewables
			Mission-oriented green R&D
			Sovereign green bonds
			State investment banks for funding resilient infrastructure
			Poverty alleviation programs linked to sustainability
	Green Monetary Policy Tools for Promoting Sustainable Economic Growth	Green Asset Purchases & Quantitative Easing (QE)	Green bond purchases
			Banning purchases of carbon-intensive bonds unless for green projects
		Lending Policies & Credit Allocation	Differential interest rates for green loans
			Subsidized loans for green projects
			Credit guidance
			Quantitative restrictions on dirty lending
			Credit quotas (minimum for green sectors, maximum for brown sectors)
		Collateral & Financial Regulation Adjustments	Greening collateral frameworks
			ESG criteria for central bank asset purchases
			Adjusting reserve requirements (lower reserves for green loans)
			Modifying capital adequacy rules
			Differentiated capital requirements
		Macroprudential & Financial Stability Measures	Green counter-cyclical capital buffers (GCCBs)
			Climate stress tests
			Liquidity coverage ratio (LCR) adjustments (lower NSFR/LCR for green assets)
			Climate risk disclosure requirements
			Central bank green interest rate (low-cost financing for green projects)

		Interest Rate & Inflation Adjustments	Generalized Taylor Rule (adjusting nominal rates for climateflation)
			Inflation target adjustments (accommodating climate-related supply shocks)
		Market Development & Digitalization	Green finance market tools (green bonds, loans, credits)
			Digitalization of green finance (proposed for market efficiency)

Table 4 Classification Scheme: Impacts of Green Fiscal and Monetary Policies on Environmental and Other Outcomes

Research Question	**Classification**	**Themes**	**Sub-Themes**
RQ2	**Green Monetary Policy Impacts**	Positive Effects on Environmental Outcomes	Lowers financing costs for renewables
			Reduces fossil fuel dependency (mitigates "fossilflation")
			Expands private sector access to green financial instruments
			ESG integration shifts investments (capital reallocation)
			Green finance improves sustainable development index
			Collateral framework increases green bond issuance
			Lending quotas reduce exposure to high-emission sectors
		Negative or Mixed Effects on Environmental Outcomes	High interest rates disproportionately hurt green investments (more capital-intensive)
			Quantitative tightening (QT) ends green-tilted asset purchases, slowing the transition
			Expansionary monetary policy increases CO_2 emissions by boosting credit and fossil fuel demand.
			Contractionary monetary policy reduces CO_2 emissions marginally
			Climateflation raises inflation, requiring tighter policy

		Risk and Adaptation	Stranded fossil fuel assets (unburnable carbon)
			Climate stress tests identify sector-specific risks
	Green Fiscal Policy Impacts	Positive Effects on Environmental Outcomes	Carbon taxes reduce emissions
			Renewable investments lower CO_2
			Environmental tax has long-term positive impact
			Green loans boost investment
			Green bonds fund renewables
			Sustainable power generation improves sustainability
			Green deficits improve both environmental and output outcomes
			Job creation in green sectors
			Health benefits from reduced pollutants
		Negative or Mixed Effects on Environmental Outcomes	Carbon pricing may cause short-term inflation (greenflation)
			Short-term emission increases from expansionary spending
			Expansionary fiscal policy increases CO_2 emissions
			Contractionary fiscal policy reduces CO_2 emissions
			Green tax reduces sustainability
			Poverty rate worsens sustainability
			Non-green deficits harm output and environmental quality (crowding out capital)
			Green subsidies increase renewable adoption but may not reduce fuel use
			Green bonds increase costs for marginalized groups
			Infrastructure trade-offs (displacing communities)
		Adaptation and Limitations	Rebound effects and decoupling limitations
			Pollution displacement to periphery
			Stranded asset risks
			Short-term ineffectiveness of environmental tax due to adaptation period

			Securing livelihoods via climate adaption (drought-resistant crops)

Table 5 Classification Scheme: Challenges in Implementing Green Fiscal and Monetary Policies

Research Question	Classification	Themes	Sub-Themes
RQ3	Green Monetary Policy Challenges	Financial System Limitations	Higher borrowing costs for renewables vs. fossil fuels
			Collateral frameworks favoring carbon-intensive assets
			Capital shortages for green projects
			Underdeveloped capital markets weakening policy transmission
		Policy Mandates and Trade-offs	Conflict between contractionary policies and green goals
			Price stability as primary mandate, sidelining climate objectives
			Risk of monetary tools distorting carbon markets
		Market and Institutional Barriers	Private sector reluctance due to perceived risks/returns
			Difficulty issuing green bonds in low-income countries
			Weak climate risk assessment capacity
		Data and Credibility Gaps	Lack of emissions data (corporate reporting gaps)
			Greenwashing (inconsistent ESG ratings)
			Fiduciary conflicts (ESG pledges vs. fossil holdings)
	Green Fiscal Policy Challenges	Financial and Structural Constraints	High costs of sustainable infrastructure
			Budget deficits limiting green investments
			Revenue dependence on hydrocarbon exports
			Stranded fossil assets/capital flight
		Political and Administrative Hurdles	Opposition to carbon taxes (inequality/carbon dependency)
			Low carbon tax credibility
			Challenges in measuring firm-level emissions

			Data gaps (cyclically adjusted metrics)
		Social and Equity Issues	Poverty excluding marginalized groups
			Non-green FDI flowing into polluting sectors
			Non-green FDI flowing into polluting sectors
			Geographic disparity in climate finance
		Policy Design Flaws	Greenflation (inflation from carbon pricing)
			Delayed fiscal impact (adaptation lags)
			Inefficient green tax systems

Table 6 Classification Scheme: Solutions and Strategies for Overcoming Implementation Challenges

Research Question	**Classification**	**Themes**	**Sub-Themes**
RQ4	**Green Monetary Policy Solutions**	Regulatory & Risk Adjustments	Risk weights reflecting climate risks
			Climate stress tests and disclosure mandates
			Macroprudential regulations
		Central Bank & Financial Tools	Cheaper funding for green projects
			Binding decarbonization roadmaps for banks
			Emissions databases and climate dashboard
		Green Finance Innovation	Digitalization of green finance
			Hybrid instruments (debt-for-nature swaps)
			Expand green financial instruments
		Global Standards & Collaboration	Join NGFS for best practices
			Standardization (TCFD, EU taxonomy)
			Divestment campaigns
		Policy Flexibility	Higher inflation targets (climateflation accommodation)
	Green Fiscal Policy Solutions	Taxation & Subsidies	Carbon taxes + renewable incentives
			Reform green taxation (rates, penalties)

			Efficient tax/subsidy design
			Phase out fossil subsidies
		Green Bonds & International Support	Mobilizing private capital via green bonds
			International financial support
			Multilateral green bonds
		Public Investment & Spending	Direct deficits to environmental projects
			Promote green FDI
			Direct spending on renewables
		Social Equity & Transition	Poverty alleviation programs
			Just Transition Funds (worker retraining)
		De-risking & Coordination	World Bank guarantees for private investment
			Global emissions coordination

4. Analysis

In this analysis section, the results associated with the systematic review's research questions are discussed. After careful selection of the research studies through the screening process, the responses to each research question have been utilized to provide answers. This section has five main sub-sections: the first sub-section addresses RQ1, which explores the key green fiscal and monetary policy tools for promoting sustainable economic growth in developing and emerging economies, the second sub-section addresses RQ2 and deals with those green policies' impact on environmental and other outcomes and achieving sustainability goals, the third sub-section addresses RQ3 and deals with the key challenges faced in implementing those green policies, and fourth section addresses RQ4 and deals with key solutions and strategies for overcoming those challenges. In the end, the fifth sub-section is related to the overall quality assessment score.

4.1 Key Green Monetary and Fiscal Policy Tools for Promoting Sustainable Economic Growth in Emerging and Developing Economies

The adapted method for the classification scheme (Petersen et al., 2008) is applied to ten extracted articles through the PRISMA method for the identification of key green monetary and fiscal policy tools, as indicated in Table 7 for green monetary policy tools and Table 8 for green fiscal policy tools.

Table 7 Classification: ***Key Green Monetary Policy Tools***

	RQ1					
	Classification: Green Monetary Policy Tools for Promoting Sustainable Economic Growth					
Reference	**Green Asset Purchases & Quantitative Easing (QE)**	**Lending Policies & Credit Allocation**	**Collateral & Financial Regulation Adjustments**	**Macroprudential & Financial Stability Measures**	**Interest Rate & Inflation Adjustments**	**Market Development & Digitalization**
Aguila & Wullweber (2024)	Green bond purchases, Banning purchases of carbon-intensive bonds unless for green projects	Differential interest rates for green loans, Credit guidance, Quantitative restrictions on dirty lending	Greening collateral frameworks, Adjusting reserve requirements (lower reserves for green loans), Modifying capital adequacy rules	Liquidity coverage ratio (LCR) adjustments (lower NSFR/LCR for green assets)		
Ramlogan & Nelson (2023)	Green bond purchases	Subsidized loans for green projects	ESG criteria for central bank asset purchases			
Ramlogan & Nelson (2024)			Greening collateral frameworks		Central bank green interest rate (low-cost financing for green projects)	

Zhang & Guo (2023)	Sovereign green bonds	Green loans (low-interest loans for green projects)				
Inogamov & Shodieva (2024)		Differential interest rates for green loans, Credit quotas (minimum for green sectors, maximum for brown sectors)	Greening collateral frameworks	Green counter-cyclical capital buffers (GCCBs), Climate stress tests, Liquidity coverage ratio (LCR) adjustments		
Zhao & Xing (2024)						Green finance market tools (green bonds, loans, credits), Digitalization of green finance (proposed for market efficiency)
Dávila-Fernández et al. (2023)					Generalized Taylor Rule (adjusting nominal rates for climateflation), Inflation target adjustments (accommodating	

					climate-related supply shocks)	
Braga & Ernst (2023)	Green bond purchases		Greening collateral frameworks	Climate stress tests		
Althouse, J. (2022)	Green bond purchases	Green loan subsidies	Differentiated capital requirements			
Bryant & Webber (2024)			Greening collateral frameworks, Climate risk disclosure requirements	Climate stress tests		

Table 8 Classification: ***Key Green Fiscal Policy Tools***

RQ1						
Classification: Green Fiscal Policy Tools for Promoting Sustainable Economic Growth						
Reference	**Carbon Pricing**	**Public Investment & Spending**	**Subsidy Reforms & Incentives**	**Public-Private Partnerships (PPPs)**	**Revenue Recycling & Fiscal Rules**	**Other Fiscal Measures**
Aguila & Wullweber (2024)	Carbon taxes, Emissions trading systems (ETS)					
Ramlogan & Nelson (2023)	Carbon taxes, Emissions trading systems (ETS)	Clean energy infrastructure, Government	Removal of energy subsidies, Tax exemptions			

		spending on renewables, Green infrastructure projects	for electric vehicles			
Ramlogan & Nelson (2024)	Carbon taxes, Emissions trading systems (ETS)	Clean energy infrastructure	Tax exemptions for electric/hybrid vehicles			
Zhang & Guo (2023)	Carbon taxes		Green subsidies for renewables			Sovereign green bonds
Inogamov & Shodieva (2024)	Carbon taxes	Government spending on renewables	Green subsidies for renewables			
Zhao & Xing (2024)						Poverty alleviation programs linked to sustainability
Dávila-Fernández et al. (2023)					Deficit-financed green expenditures, Fixed deficit-to-output ratio	
Braga & Ernst (2023)	Carbon taxes, Emissions trading systems (ETS)	Green infrastructure projects, Government spending on renewables			Using carbon tax revenues for green R&D or labor tax cuts	

Althouse, J. (2022)	Carbon taxes					Feed-in tariffs for renewables, Mission-oriented green R&D
Bryant & Webber (2024)	Carbon taxes, Emissions trading systems (ETS)	Green infrastructure projects	Green subsidies for renewables	World Bank's de-risking strategies		Sovereign green bonds, State investment banks for funding resilient infrastructure

4.1.1 Assessment of RQ1: What are the green fiscal and monetary policy tools for promoting sustainable economic growth in developing and emerging economies?

Several important green monetary and fiscal policy measures have been found in various studies to be successful in fostering sustainable economic growth in developing and emerging nations, as shown in Tables 7 and 8. These key green policies tools include:

4.1.1.1 Green Monetary Policy Tools. Green monetary policy instruments are gaining grip in DEEs as central banks become more aware of the systemic risks that is being posed by climate change. This systematic review has identified 6 key themes of tools, each having distinct policy mechanisms:

a). Purchasing Green Assets with Quantitative Easing (QE). The use of green bond purchases and sovereign green bonds as part of central banks' asset portfolios has been discussed in multiple studies, e.g., Aguila and Wullweber (2024), Ramlogan and Nelson (2023), Zhang & Guo (2023), Althouse (2022), and Braga and Ernst (2023). The goal of these instruments is to direct financial resources toward low-carbon investments and disincentivize carbon-intensive assets by prohibiting the purchase of dirty bonds unless they are connected to green projects. Considering their significance, green bonds have been accepted as collateral by the European Central Bank (ECB), the People's Bank of China and the Bank of Japan (Aguila & Wullweber, 2024).

b). Lending Policies & Credit Allocation. Green credit guidance, subsidized loans, and differential interest rates are emphasized by Ramlogan and Nelson (2023), Inogamov and Shodieva (2024), which include quotas for green lending and restrictions on high-emission sectors, and these interventions direct the private credit flows toward sustainable sectors. E.g., in Bangladesh, to encourage financial institutions to fund environmentally friendly initiatives, the 5% rule establishes minimum quotas for green sectors. Also, maximum limitations for brown sectors have been imposed in order to penalize or deter developments or activities that disrupt the environment (Inogamov & Shodieva, 2024), while Banco do Brasil has restricted lending in areas, which are environmentally sensitive (Aguila & Wullweber, 2024).

c). Collateral & Financial Regulation Adjustments. It has been a recurring theme in several studies, including Aguila and Wullweber (2024), Bryant and Webber (2024), and Inogamov and Shodieva (2024). The greening of collateral frameworks involves adjusting reserve and capital adequacy requirements to support green finance and giving priority to green assets in central bank operations. E.g., in Lebanon, for green loans, Banque du Liban decreases its reserve requirements (Aguila & Wullweber, 2024).

d). Macroprudential & Financial Stability Measures. As mentioned by Braga and Ernst (2023) and Inogamov and Shodieva (2024), macroprudential policies, which include green counter-cyclical capital buffers (GCCBs), climate stress testing, and liquidity coverage ratio (LCR) adjustments, are considered essential for integrating risks associated with climate into financial stability frameworks. E.g., to assess sectoral risk, the Central Bank of Uzbekistan (CBU) piloted climate stress testing, and found climate change as a major risk for the agriculture sector (25% of GDP in 2022). Also, its impact on agricultural products could lead to loan defaults. These will account for 11% of total bank loans (Inogamov & Shodieva, 2024).

e). Interest Rate & Inflation Adjustments. Although it is a less-studied but developing theme, the study by Dávila-Fernández et al. (2023) emphasizes the incorporation of climate-related considerations into interest rate policy, such as modifying inflation targets to account for climate supply shocks or implementing a "Green Taylor Rule." The same idea related to central bank green interest rates was noted in the study by Ramlogan and Nelson (2024). E.g., as per Aguila & Wullweber (2024), to incentivize sustainable lending, the ECB is considering "greening" its TLTROs (Targeted Longer-Term Refinancing Operations).

f). Market Development & Digitalization. Zhao and Xing (2024) emphasize the significance of the growth of green finance markets and the use of digital tools in light of the digital age. Reasons include increament in market efficiency as well as inclusivity. This suggestion is particularly pertinent to the fast digitization of developing nations, e.g.,

in Uzbekistan, to evaluate the effect of climate change risks on financial stability, a climate change dashboard was developed (Inogamov & Shodieva, 2024).

4.1.1.2 Green Fiscal Policy Tools. On the fiscal side, there is a range of tools employed by governments not only to steer economies toward sustainability but also to maintain economic growth, and this systematic review has identified 6 key themes of tools as well, each having distinct policy mechanisms:

a). Carbon Pricing. The most commonly known green fiscal tools are carbon taxes and emissions trading systems (ETS) which was also recognized by selected studies, such as Aguila and Wullweber (2024), Braga and Ernst (2023) and Ramlogan and Nelson (2023) and discuss that carbon taxes and ETS have potential to not only internalize environmental costs but also generate price signals that ultimately discourage carbon-intensive production and consumption. Like the carbon tax rate in India is 1.6 USD per tonne of CO_2 emissions (Zhang & Guo, 2023).

b). Public Investment & Spending. Public investment plays an important role in clean energy and green infrastructure. As emphasized by several studies (Bryant & Webber, 2024; Inogamov & Shodieva, 2024; Ramlogan & Nelson, 2023), these investments serve dual purposes in developing economies. Firstly, they stimulate economic growth. Secondly, they address infrastructure deficits, such as the case of the government of Trinidad and Tobago. They feed renewable energy into the grid by investing in solar PV plants (i.e., 92.2 MW and 20 MW) (Ramlogan & Nelson, 2023).

c). Subsidy Reforms & Incentives. Zhang and Guo (2023) and Althouse (2022) emphasized the widely accepted approach of gradually eliminating fossil fuel subsidies and implementing green subsidies for renewable energy and electric vehicles, as these actions are crucial in coordinating market incentives with environmental goals. As an example, the International Monetary Fund (IMF) estimates that if Trinidad and Tobago removed its energy subsidies, the economy of country could save 2% of its GDP (Ramlogan & Nelson, 2023).

d). Public-Private Partnerships (PPPs). PPPs are acknowledged for their role in using private investment for large-scale green projects, and de-risking strategies by multilateral institutions like the World Bank play a significant role in the success of large-scale green projects, even though the theme of PPPs is less highlighted in some studies (Bryant and Webber, 2024).

e). Revenue Recycling & Fiscal Rules. Green fiscal policies, such as fixed deficit-to-GDP ratios associated with green investments, are becoming cutting-edge instruments for long-range planning. According to studies like Dávila-Fernández et al. (2023) and Braga and Ernst (2023), the proceeds from carbon pricing should be used for green research and

development or to reduce labor taxes and other taxes that cause distortions. Like the revenue-neutral carbon tax model of British Columbia (Braga & Ernst, 2023).

f). Other Fiscal Measures. Zhao and Xing (2024) and Althouse (2022) have emphasized several innovative fiscal approaches that are especially pertinent for inclusive green growth strategies. These include feed-in tariffs, mission-oriented green R&D, and poverty-linked sustainability programs. Take the case of the Reserve Bank of India, issuing sovereign green bonds to fund green projects (Zhang & Guo, 2023)

The evidence supports an expanding arsenal of green monetary and fiscal strategies designed for emerging and developing nations. Among the most widely used and studied tools are carbon taxes, green asset purchases, climate-sensitive collateral frameworks, green interest rates, and green government investment. While central banks are only beginning to incorporate climate concerns into their missions, fiscal authorities are more adept at using direct measures, such as taxes and subsidies, to alter economic structures. Coordination between monetary and fiscal actors, as well as institutional innovation and capacity building, will be necessary to scale these tools for meaningful climate and development benefits.

4.2 Impacts of Green Fiscal and Monetary Policies on Environmental and Other Outcomes

Similarly, the adapted method for the classification scheme (Petersen et al., 2008) is applied to ten extracted articles through the PRISMA method for the identification of impacts of green monetary and fiscal policies on environmental and other outcomes and achieve sustainability goals in developing and emerging countries, as indicated in Table 9.

Table 9 Classification: ***Impacts of Green Monetary and Fiscal Policies on Environmental and Other Outcomes***

RQ2						
Classification						
	Green Monetary Policy Impacts			**Green Fiscal Policy Impacts**		
Reference	**Positive Effects on Environmental Outcomes**	**Negative or Mixed Effects on Environmental Outcomes**	**Risk and Adaptation**	**Positive Effects on Environmental Outcomes**	**Negative or Mixed Effects on Environmental Outcomes**	**Risk and Adaptation**
Aguila & Wullweber (2024)	Lowers financing costs for renewables, Reduces fossil fuel dependency (mitigates "fossilflation")	High interest rates disproportionately hurt green investments (more capital-intensive), Quantitative tightening (QT) ends green-tilted asset purchases,			Carbon pricing may cause short-term inflation (greenflation)	

		slowing the transition				
Ramlogan & Nelson (2023)		Contractionary monetary policy reduces CO_2 emissions marginally		Carbon taxes reduce emissions, Renewable investments lower CO_2	Short-term emission increases from expansionary spending	
Ramlogan & Nelson (2024)		Expansionary monetary policy increases CO_2 emissions by boosting credit and fossil fuel demand, Contractionary monetary policy reduces CO_2 emissions marginally			Expansionary fiscal policy increases CO_2 emissions, Contractionary fiscal policy reduces CO_2 emissions	
Zhang & Guo (2023)	ESG integration shifts investments (capital reallocation)			Environmental tax has long-term positive impact, Green loans boost investment		Short-term ineffectiveness of environmental tax due to adaptation period

Inogamov & Shodieva (2024)	Collateral framework increases green bond issuance, Lending quotas reduce exposure to high-emission sectors		Climate stress tests identify sector-specific risks	Carbon taxes reduce emissions	Green subsidies increase renewable adoption but may not reduce fuel use	Securing livelihoods via climate adaption (drought-resistant crops)
Zhao & Xing (2024)	Green finance improves sustainable development index, Expands private sector access to green financial instruments			Sustainable power generation improves sustainability	Green tax reduces sustainability, Poverty rate worsens sustainability	
Dávila-Fernández et al. (2023)		Climateflation raises inflation, requiring tighter policy		Green deficits improve both environmental and output outcomes	Non-green deficits harm output and environmental quality (crowding out capital)	
Braga & Ernst (2023)				Carbon taxes reduce emissions; Green bonds fund renewables,		

				Job creation in green sectors, Health benefits from reduced pollutants		
Althouse, J. (2022)				Job creation in green sectors		Rebound effects and decoupling limitations, Pollution displacement to periphery, Stranded asset risks
Bryant & Webber (2024)	ESG integration shifts investments (capital reallocation), Stranded fossil fuel assets (unburnable carbon)			Carbon taxes reduce emissions	Green bonds increase costs for marginalized groups, Infrastructure trade-offs (displacing communities)	Stranded asset risks

4.2.1 Assessment of RQ2: How do green monetary and fiscal policies impact environmental and other outcomes and achieve sustainability goals in developing and emerging economies?

The purpose of this assessment is to investigate the environmental and broader impacts of green monetary and fiscal policies in developing and emerging countries, and Table 9 of the results contains the primary themes and sub-themes of impacts of those green policies.

4.2.1.1 Green Monetary Policy Impacts.

a). Positive Effects on Environmental Outcomes. According to a study conducted by Aguila and Wullweber (2024), the outcome of green monetary policy, which includes green-aligned financial instruments has encouraging environmental advantages in lowering financing costs for renewable energy sources and reducing reliance on fossil fuels, which facilitates the acquisition of green assets. Green bond issuance and capital reallocation are facilitated through mechanisms such as adjusted collateral frameworks and ESG integration (Inogamov & Shodieva, 2024; Bryant & Webber, 2024; Zhang & Guo, 2023). Improved sustainable development is linked to enhanced private sector access to green financial instruments (Zhao & Xing, 2024).

b). Negative or Mixed Effects on Environmental Outcomes. In some circumstances, the environmental benefits of green monetary policy may be put at risk: According to Aguila and Wullweber (2024), due to their capital intensity, green investments are disproportionately impacted by rising interest rates and quantitative tightening (QT). According to Ramlogan and Nelson (2024), expansionary monetary policy may inadvertently increase CO_2 emissions by increasing demand for fossil fuels, whilst contractionary monetary policy only slightly reduces emissions. Furthermore, climateflation i.e., inflation caused by climate policies or shocks complicates monetary responses and may need tightening that hinders the green transition, according to Dávila-Fernández et al. (2023).

c). Risk and Adaptation. Monetary policy also contributes to risk assessment in order to create more resilient monetary strategies. In this regard, according to Inogamov and Shodieva (2024), climatic stress testing of financial institutions can identify vulnerabilities and climate hazards unique to a given industry.

4.2.1.2. Green Fiscal Policy Impacts.

a). Positive Effects on Environmental and Other Outcomes. Studies like Braga and Ernst (2023) and Ramlogan and Nelson (2023) claim that budgetary interventions appear to be more effective consistently in producing environmental advantages. In general, carbon taxes, green bonds, and renewable energy subsidies support reducing emissions and financing environmentally friendly infrastructure. According to Althouse (2022) and Braga and Ernst (2023), there are several examples of how investments in green sectors

result in the creation of jobs and improved health. According to Dávila-Fernández et al. (2023), green deficits i.e., public spending dedicated toward sustainable objectives in the form of both economic and environmental benefits.

b). Negative or Mixed Effects on Environmental and Other Outcomes. Nonetheless, fiscal measures also carry trade-offs: Short-term inflation (greenflation) can result from carbon pricing and environmental taxes, affecting affordability (Aguila & Wullweber, 2024; Zhao & Xing, 2024). Green subsidies may increase renewable adoption but not necessarily reduce fossil fuel use if substitution is incomplete (Inogamov & Shodieva, 2024). Infrastructure investments funded through green bonds can raise costs for marginalized groups and lead to community displacement (Bryant & Webber, 2024). There are also rebound effects and pollution displacement risks from policies that do not fully internalize environmental costs (Althouse, 2022).

c). Risk and Adaptation. Fiscal policy plays a crucial role in building climate resilience, such as Adaptation efforts such as drought-resistant agriculture and livelihood protection reflect a shift toward integrating climate risk management with fiscal planning (Inogamov & Shodieva, 2024). Risks associated with stranded assets, especially investments in fossil fuels that could depreciate, are becoming more widely acknowledged and impacting both public and private capital (Bryant & Webber, 2024; Althouse, 2022).

Green monetary and fiscal policies are critical tools for advancing sustainability goals in developing and emerging economies. Although in terms of green monetary policy, macroeconomic factors and policy coherence play key roles, it has the potential to promote capital reallocation and increase access to green finance. Green fiscal policies that prioritize tools such as carbon taxes and green investment tend to yield greater and more immediate environmental benefits. Nonetheless, managing trade-offs involving inflation, equity, and transitional risks requires both policy domains. Achieving equitable and long-lasting sustainability benefits appears to need a well-balanced policy mix that takes macroeconomic and social factors into account.

4.3 Challenges in Implementing Green Fiscal and Monetary Policies

Similarly, the adapted method for the classification scheme (Petersen et al., 2008) is applied to ten extracted articles through the PRISMA method for the identification of key challenges in implementing green monetary and fiscal policies, as indicated in Table 10 for green monetary policy and Table 11 for green fiscal policy tools.

Table 10 Classification: ***Challenges in Implementing Green Monetary Policies***

RQ3				
Classification: Green Monetary Policy Challenges				
Reference	**Financial System Limitations**	**Policy Mandates and Trade-offs**	**Market and Institutional Barriers**	**Data and Credibility Gaps**
Aguila & Wullweber (2024)	Higher borrowing costs for renewables vs. fossil fuels, Collateral frameworks favoring carbon-intensive assets	Conflict between contractionary policies and green goals		
Ramlogan & Nelson (2023)		Conflict between contractionary policies and green goals, Price stability as primary mandate, sidelining climate objectives		
Ramlogan & Nelson (2024)	Underdeveloped capital markets weakening policy transmission			
Zhang & Guo (2023)				
Inogamov & Shodieva (2024)		Conflict between contractionary policies and green goals, Risk of monetary tools distorting carbon markets		Lack of emissions data (corporate reporting gaps)

Zhao & Xing (2024)	Capital shortages for green projects		Private sector reluctance due to perceived risks/returns	
Dávila-Fernández et al. (2023)				
Braga & Ernst (2023)			Difficulty issuing green bonds in low-income countries, Weak climate risk assessment capacity	
Althouse, J. (2022)				
Bryant & Webber (2024)				Greenwashing (inconsistent ESG ratings), Fiduciary conflicts (ESG pledges vs. fossil holdings)

Table 11 Classification: ***Challenges in Implementing Green Fiscal Policies***

RQ3				
Classification: Green Fiscal Policy Challenges				
Reference	**Financial and Structural Constraints**	**Political and Administrative Hurdles**	**Social and Equity Issues**	**Policy Design Flaws**
Aguila & Wullweber (2024)				Greenflation (inflation from carbon pricing)

Ramlogan & Nelson (2023)	High costs of sustainable infrastructure	Low carbon tax credibility, Challenges in measuring firm-level emissions		
Ramlogan & Nelson (2024)	Revenue dependence on hydrocarbon exports			Data gaps (cyclically adjusted metrics)
Zhang & Guo (2023)				Delayed fiscal impact (adaptation lags)
Inogamov & Shodieva (2024)	Budget deficits limiting green investments			
Zhao & Xing (2024)			Poverty excluding marginalized groups, Non-green FDI flowing into polluting sectors	Inefficient green tax systems
Dávila-Fernández et al. (2023)				
Braga & Ernst (2023)	Budget deficits limiting green investments	Opposition to carbon taxes (inequality/carbon dependency)		
Althouse, J. (2022)	Stranded fossil assets/capital flight			
Bryant & Webber (2024)	High costs of sustainable infrastructure	Opposition to carbon taxes (inequality/carbon dependency)	Geographic disparity in climate finance	

4.3.1 Assessment of RQ3: What are the key challenges faced in implementing green fiscal and monetary policies?

The purpose of this assessment is to investigate the implementation challenges of green monetary and fiscal policies in developing and emerging countries, and Tables 10 and 11 of the results contains the primary themes and sub-themes of implementation challenges.

4.3.1.1 Green Monetary Policy Challenges. Green monetary policies face institutional, structural, and operational constraints, which are grouped into 4 themes:

a). Financial System Limitations. Green projects often struggle to secure financing due to systemic financial biases because of higher borrowing costs for renewables relative to fossil fuels as indicated by Aguila and Wullweber (2024), and studies by Ramlogan and Nelson (2024) and Zhao and Xing (2024) demonstrate that capital shortages and underdeveloped capital markets, particularly in emerging economies, weaken monetary policy transmission to green investments.

b). Policy Mandates and Trade-offs. As per few studies (Aguila & Wullweber, 2024; Ramlogan & Nelson, 2023, 2024; Inogamov & Shodieva, 2024), central banks are inherently faced with tensions between climate aims and traditional mandates. For instance, there is often conflict between green investment aims and contractionary policies (such as interest rate hikes), and price stability often overshadows climate goals, making it difficult to defend climate-focused monetary interventions within current frameworks.

c). Market and Institutional Barriers. As per Zhao and Xing (2024) indicated, institutional inefficiencies and private sector reluctance are the main causes of barriers in implemention. For example, perceived risk-return mismatches deter private investment in green sectors. According to a study, insufficient institutional frameworks are also hurting climate risk assessment and the green bond issue, particularly in developing countries (Braga & Ernst, 2023).

d). Data and Credibility Gaps. Reliable data is critical for credible climate-aligned monetary policy: Corporate emissions reporting gaps and inconsistent ESG metrics undermine the effectiveness of green asset allocation (Inogamov & Shodieva, 2024; Bryant & Webber, 2024). Fiduciary conflicts, where institutional investors promote ESG goals while holding fossil fuel assets—highlight deeper trust issues.

4.3.1.2 Green Fiscal Policy Challenges. Green fiscal policies face a mix of challenges, which are grouped into 4 main themes:

a). Financial and Structural Constraints. Governments frequently lack the resiliency and financial resources needed to fund green transitions. The two significant and

consistent obstacles are the budget deficits and high cost of sustainable infrastructure (Ramlogan & Nelson, 2023; Inogamov & Shodieva, 2024; Braga & Ernst, 2023; Bryant & Webber, 2024). Revenue dependence on fossil fuel exports presents a structural barrier to decarbonization (Ramlogan & Nelson, 2024). Risks of stranded fossil assets and capital flight further exacerbate transition hesitancy (Althouse, 2022).

b). Political and Administrative Hurdles. Political resistance and governance capacity issues impede implementation: Opposition to carbon taxes, especially due to concerns over inequality and sectoral dependency, is widespread (Braga & Ernst, 2023; Bryant & Webber, 2024). Administrative weaknesses, such as unreliable emissions measurement or low carbon tax credibility, undermine policy enforceability (Ramlogan & Nelson, 2023).

c). Social and Equity Issues. Ensuring a just transition remains a major unresolved challenge: Poverty and social exclusion, especially among marginalized groups, limit the inclusiveness of green fiscal programs (Zhao & Xing, 2024). Study conducted by Bryant and Webber (2024) shows that the usage of climate funds is significantly influenced by geographical disparities, which worsens inequality.

d). Policy Design Flaws. Fiscal strategies if designed poorly are vulnerable to unforeseen consequences, for example, Greenflation, or inflation induced through carbon taxes has the potential to complicate fiscal and monetary policy, as per Aguila and Wullweber (2024). Also, studies by Zhao and Xing (2024) and Zhang & Guo (2023) shows that the effectiveness is limited by ineffective green tax structures and delayed effects (such as from adaptation expenditures), also, as per Ramlogan and Nelson (2024), accurate policy targeting is hampered by data restrictions, such as the absence of cyclically adjusted measures.

Adoption of green fiscal and monetary policies suffers via a complex web of institutional misalignments, political economy constraints, systemic financial barriers, and gaps in data credibility; however, effective reform requires technical redesign, more extensive mandate modifications, greater transparency, and inclusive social policies.

4.4 Solutions and Strategies for Overcoming Implementation Challenges

Similarly, the adapted method for the classification scheme (Petersen et al., 2008) is applied to ten extracted articles through the PRISMA method for the identification of key solutions and strategies for overcoming green monetary and fiscal policies implementation challenges, as indicated in Table 12 for green monetary policy tools and Table 13 for green fiscal policy tools.

Table 12 Classification: ***Solutions and Strategies for Overcoming Green Monetary Policy Implementation Challenges***

RQ4					
Classification: Green Monetary Policy Solutions					
Reference	**Regulatory & Risk Adjustments**	**Central Bank & Financial Tools**	**Green Finance Innovation**	**Global Standards & Collaboration**	**Policy Flexibility**
Aguila & Wullweber (2024)	Risk weights reflecting climate risks	Cheaper funding for green projects, Binding decarbonization roadmaps for banks			
Ramlogan & Nelson (2023)	Climate stress tests and disclosure mandates			Join NGFS for best practices	
Ramlogan & Nelson (2024)				Leverage NGFS expertise for climate risk modeling	
Zhang & Guo (2023)			Digitalization of green finance		
Inogamov & Shodieva (2024)	Climate stress tests and disclosure mandates	Emissions databases and climate dashboard	Expand green financial instruments	Join NGFS for best practices	
Zhao & Xing (2024)					

Dávila-Fernández et al. (2023)					Higher inflation targets (climateflation accommodation)
Braga & Ernst (2023)	Regulatory reforms (climate stress tests, disclosure mandates)	Hybrid instruments (debt-for-nature swaps)			
Althouse, J. (2022)	Macroprudential regulations			Standardization (TCFD, EU taxonomy)	
Bryant & Webber (2024)	Divestment campaigns				

Table 13 Classification: ***Solutions and Strategies for Overcoming Green Fiscal Policy Implementation Challenges***

RQ4					
Classification: Green Fiscal Policy Solutions					
Reference	**Taxation & Subsidies**	**Green Bonds & International Support**	**Public Investment & Spending**	**Social Equity & Transition**	**De-risking & Coordination**
Aguila & Wullweber (2024)					
Ramlogan & Nelson (2023)	Carbon taxes + renewable incentives	Mobilizing private capital via green bonds			
Ramlogan & Nelson (2024)			Direct spending on renewables		

Zhang & Guo (2023)	Efficient tax/subsidy design			Financial development (worker retraining)	
Inogamov & Shodieva (2024)		Multilateral green bonds			
Zhao & Xing (2024)	Reform green taxation (rates, penalties)		Promote green FDI	Poverty alleviation programs	
Dávila-Fernández et al. (2023)			Direct deficits to environmental projects		
Braga & Ernst (2023)				Just Transition Funds (worker retraining)	
Althouse, J. (2022)	Phase out fossil subsidies	Green bonds			Global emissions coordination
Bryant & Webber (2024)		International financial support			World Bank guarantees for private investment

4.4.1 Assessment of RQ4: How can these challenges in implementing green fiscal and monetary policies be overcome by developing and emerging economies?

The purpose of this assessment is to investigate how implementation challenges of green monetary and fiscal policies in developing and emerging countries can be overcome, and Tables 12 and 13 of the results contains the primary themes and sub-themes of solutions and strategies to overcome those implementation challenges.

4.4.1.1 Green Monetary Policy Solutions.

a). Regulatory & Risk Adjustments. Numerous studies like Aguila and Wullweber (2024), Althouse (2022), Braga and Ernst (2023), Inogamov and Shodieva (2024), and Ramlogan and Nelson (2023) highlight the need for the financial regulations aligned with climate. Developing and emerging economies (DEEs) can further use climate stress testing, macroprudential policies, and adjusted risk weights to reduce systemic risk by taking climate-related hazards into account. By taking these steps, financial institutions can align in a more better way with low-carbon trajectories, reduce mispricing, and internalize environmental risks.

b). Central Bank & Financial Tools. In DEEs, central banks can use tools like climate dashboards, hybrid debt instruments, and preferential interest rates for green lending (Aguila & Wullweber, 2024; Inogamov & Shodieva, 2024; Braga & Ernst, 2023). For example, employing hybrid instruments like debt-for-nature swaps or enforcing legally enforceable decarbonization roadmaps for banks can aid in mobilizing climate finance while preserving monetary stability.

c). Green Finance Innovation. Innovations in green finance, including digitalization, can improve tracking and allocation of green funds (Zhang & Guo, 2023; Inogamov & Shodieva, 2024).DEEs can increase access to and transparency in the green finance markets by utilizing fintech to extend green financial instruments.

d). Global Standards & Collaboration. DEEs should not only adopt the best practices but also increase their capacity, and how can it done? By joining networks like the Network for Greening the Financial System (NGFS), as recommended by Ramlogan and Nelson (2023) and Inogamov and Shodieva (2024). And, taking part in global frameworks like the TCFD and EU taxonomy additionally boosts regulatory legitimacy and homogeneity (Althouse, 2022).

e). Policy Flexibility. Dávila-Fernández et al. (2023) recommended that inflation targets should be adjusted to take climateflation and other supply shocks associated with climate change into consideration, allowing for more flexible and situation-specific monetary policy, which could be crucial for DEEs coping with unpredictable climate consequences.

4.4.1.2 Green Fiscal Policy Solutions.

a). Taxation & Subsidies. A number of studies (like Ramlogan & Nelson, 2023; Zhang & Guo, 2023; Zhao & Xing, 2024; Althouse, 2022) recommend reforms like redesigning subsidies, carbon taxation, and phase-outs of fossil fuels, especially for those developing and emerging economies having limited resources. These actions are essential for internalizing environmental externalities and creating financial flexibility for green expenditures.

b). Green Bonds & International Support. International green bonds and support from global institutions (e.g., World Bank guarantees, multilateral finance) offer DEEs low-cost capital (Inogamov & Shodieva, 2024; Bryant & Webber, 2024; Althouse, 2022). Also, the mobilization of private capital via green bonds is another scalable path to climate finance, as per Ramlogan and Nelson (2023).

c). Public Investment & Spending. Further governments may spearhead the green transition by making direct investments in infrastructure and renewable energy (Ramlogan & Nelson, 2024; Dávila-Fernández et al., 2023). Therefore, focused fiscal expenditures can boost not only extensive economic transition but also private sector involvement.

d). Social Equity & Transition. Zhang and Guo (2023) along with other studies such as Braga and Ernst (2023) recommend tactics that focus on equity, and worker retraining initiatives and Just Transition Funds (JTF) can be the answer to gaining support from society, and as Zhao and Xing (2024) point out, enabling inclusive green transitions and avoiding backlash can be done via poverty reduction and fair access to clean energy.

e). De-risking & Coordination. Enhancing coordination procedures and de-risking investments through multilateral cooperation and international guarantees makes green efforts in DEEs more attractive (Bryant & Webber, 2024; Althouse, 2022). So, why this assistance is necessary? Because it helps many DEEs overcome their perceived high risk and inadequate financial resources.

To overcome implementation challenges, developing and emerging economies (DEEs) must blend domestic policy innovation with international cooperation and financial support. Regulatory alignment, institutional capacity-building, fiscal innovation, and socially inclusive policies are all central to advancing effective green fiscal and monetary policies.

4.5 Limitations and Quality Assessment Score

Since it is essential for a PRISMA-compliant Systematic Literature Review (SLR) to evaluate the limitations of studies selected for the review and assess their quality in order to ensure the validity of the findings of the review, transparency in the review process, reducing the risk of bias, and clarifying the scope of the conclusion. Table 14 below demonstrates the limitations and quality assessment scores of each of the 11 selected studies.

Table 14 Limitations and Quality Assessment Score

Classification						**Quality Assessment**				
Reference	**Year**	**Publication Channel**	**Journal/ Conference ranking**	**Cited by**	**Limitations**	**a**	**b**	**c**	**d**	**Scores**
Aguila & Wullweber (2024)	2024	Journal	Q2	18	The study is based on a limited analysis of fiscal tools in developing markets and lacks empirical evidence from emerging economies.	1	1	1	1.5	4.5
Ramlogan & Nelson (2023)	2023	Preprint Research Paper	-	2	The study focuses on Trinidad and Tobago, and limits generalizability, lacks sectoral granularity, and has minimal empirical evidence on the policy's impact.	1	1	0	0	2
Ramlogan & Nelson (2024)	2024	Journal	Q3	10	Limited geographic focus, data constraints, and methodology constraints are the main limitations, restricting	1	1	1	1	4

					generalizability to other emerging markets.					
Zhang & Guo (2023)	2023	Preprint Research Paper	-	0	The study is limited by its exclusive focus on India, lack of post-COVID-19 analysis, and reliance on linear modeling with limited sustainability metrics.	1	1	-1	0	1
Inogamov & Shodieva (2024)	2024	Report	-	0	The study is limited by low quantitative evidence on policy efficacy, focuses on Uzbekistan, limiting generalizability, and has data gaps.	1	1	-1	0	1
Zhao & Xing (2024)	2024	Journal	Q1	5	The study is limited to China, lacks regional or sectoral analysis, and lacks an assessment of institutional barriers, restricting generalizability to other emerging markets.	1	1	0	2	4
Dávila-Fernández et al. (2023)	2023		-	1	The study's theoretical OLG model lacks empirical validation, has no focus on emerging-market-specific challenges, does not discuss institutional or political barriers, and has narrow fiscal tools.	1	0.5	0	0	1.5

Braga & Ernst (2023)	2023	Journal	Q1	8	The study focuses on conceptual frameworks and high-income examples, with limited empirical data on emerging markets, although political economy constraints are discussed, but lacks detailed mitigation strategies.	1	1	1	2	5
Althouse, J. (2022)	2022	Dissertation	-	4	The study is limited to a theoretical critique of ecological macroeconomics and Core-Periphery dynamics and lacks empirical validation and solutions for real-world policy implementation challenges in emerging markets.	0	0.5	0	0	0.5
Bryant & Webber (2024)	2024	Book	-	15	The study is limited to financialized climate solutions, lacks empirical validation in low-income countries, and offers limited alternatives to market-based tools.	1	1	1	0	3

4.5.1 Potential Limitations

As indicated in the above Table, the included studies for the systematic review can not be applied to other emerging markets because of their narrow geographic emphasis, like focusing on countries Trinidad and Tobago, China, India, and Uzbekistan. Also, the studies lack empirical backing, sectoral and geographic specificity, and reliable quantitative data to evaluate the consequences of interventions. Also, methodological limitations, such as studies being based more on theoretical or linear models, lacking post-COVID-19 analysis, broader sustainability metrics, and failing to include institutional or political impediments, ultimately affect the applicability of actual policy implementation.

4.5.2 Overall Quality Assessment Score

According to Farooq et al. (2020), the minimum possible score for the study is -1, and the maximum possible score is 5. The average score based on the score obtained for each study is calculated as 2.6. The quality assessment table below indicates that 50% of the papers have an above-average score, while 50% of the papers have a below-average score. The results of the quality assessment show that the selected studies used for the synthesis are moderately reliable and of high quality.

Table 15 Overall Quality Assessment Score

References	Score	Total	Percentage	
Braga & Ernst (2023)	5	1	10%	50%
Aguila & Wullweber (2024)	4.5	1	10%	
Ramlogan & Nelson (2024) and Zhao & Xing (2024)	4	2	20%	
Bryant & Webber (2024)	3	1	10%	
Ramlogan & Nelson (2023)	2	1	10%	50%
Dávila-Fernández et al. (2023)	1.5	1	10%	
Zhang & Guo (2023) and Inogamov & Shodieva (2024)	1	2	20%	
Althouse, J. (2022)	0.5	1	10%	

5. Discussion

The discussion section explores into the findings related to the research questions mentioned at the commencement of the study, and provides a comprehensive evaluation of green fiscal and monetary policy tools, their impacts, implementation challenges and their solution particularly in the realm of developing and emerging economies (DEEs) by giving critical insights during an important era of climate action and sustainable development. Several key patterns and relationships are revealed during the analysis that advance our understanding of how economic policies can be leveraged for the sake of environmental objectives.

The examination of green monetary policy tools shows that central banks in DEEs are actively experimenting with innovative approaches, including green lending facilities, targeted asset purchases, and climate-adjusted collateral frameworks, and these measures are promising in redirecting financial flows toward sustainable investments, yet they operate within significant barriers. There exists a fundamental challenge, i.e., persistent tension between conventional price stability mandates and emerging climate objectives, particularly in economies with underdeveloped financial markets. Also, the findings suggest that despite the fact that monetary policy can play a supportive role in the green transition, its effectiveness in the end is bounded by structural limitations in institutional frameworks and financial systems.

On one side, this study discusses green fiscal policy tools, especially carbon pricing schemes and green public investments which face several implementation challenges without any doubt and are mainly linked to administrative capacity, political viability, and distributional effects, despite having quantifiable and more immediate environmental impacts. It also shows how these tools can give rise to difficult trade-offs between economic stability and environmental effectiveness, with unanticipated effects for otherwise well-meaning programs such as greenflation. This comprehensive grasp of policy implications through this study gives helpful information to authorities or governments interested in exploring how to balance a variety of goals in their sustainability strategies.

On the other side, green monetary tools give balancing mechanisms for effecting the financial sector's behavior, while green fiscal tools typically give larger direct environmental advantages, as per the comparative analysis of policy measures. Given this nexus, the most successful initiatives should probably integrate the use of green monetary and fiscal tools and be customized to not only unique institutional capabilities but also national conditions.

6. Conclusion

Based on the thorough analysis carried out throughout the paper using quality studies, the conclusion of the research paper "A Greener Tomorrow Through Green Fiscal and Monetary Policies: A Systematic Review of Policy Tools, Impacts, Implementation Challenges, and Solutions" points out that green fiscal and monetary policies are emerging as the foundation of sustainable development strategies in developing and emerging economies (DEEs). The evidence shows that while both green policy domains give feasible trails for advancing climate objectives, their effectiveness is intermediated by pre-existing economic conditions, institutional contexts and implementation capacities. Green fiscal tools, particularly carbon pricing and green public investments, appear as particularly potent tools, still their success depends on careful design and political support, and green monetary tools, while more restricted in their direct environmental impact, gives crucial mechanisms for aligning financial systems with sustainability goals.

6.1 Limitations and Future Recommendations

6.1.1 Limitations

Despite this study’s informative findings, it has some shortcomings, and several limitations qualify the findings of this review, including the geographic scope of included studies was uneven, with inconsistent representation from certain regions and limited coverage of smaller or less-developed economies. The quality assessment showed variation in methodological rigor among included sources, pointing out the need for more standardized approaches in future research. Likewise, many of the included studies relied on theoretical models rather than empirical evaluations.

6.1.2 Future Recommendations

For future research and the creation of policies, 3 main areas are noted: **1). Improved Policy Design:** Future research should focus on coordination and sequencing-based mechanisms, as well as the most effective ways to combine green fiscal and monetary tools. **2). Capacity Building:** Future studies should research governance frameworks and institutional development to explore and resolve implementation issues. Coupled with it, future studies should consider researching how to enhance technical capacities to evaluate climate risk and establish carbon pricing. **3). Context-Specific Solutions:** More national case studies are needed to completely comprehend how policy efficacy varies across different economic structures and development stages. Given the unique challenges less developed economies face, they need to get more attention. The results recommend some actions for policymakers, like Central banks should consider the gradual expansion of their mandates by incorporating climate stability objectives with price stability goals.

To implement sophisticated green fiscal tools like carbon pricing, governments must invest in building administrative capacity. International organizations should prioritize knowledge-sharing platforms to foster South-South learning and exchange of best practices. In summary, the study emphasizes that both political will and technological innovation will be necessary for the successful implementation of green policies in developing and emerging nations. By identifying evidence-based pathways and enduring challenges, the study lays the foundation for more targeted future research and more effective policy formation in this important area of sustainable development.

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