EXPLORING THE CLIMATE CHANGE-MONETARY POLICY NEXUS: A BIBLIOMETRIC STUDY ON THE EVOLVING ROLE OF CENTRAL BANKS IN THE CONTEXT OF GLOBAL WARMING

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ABSTRACT

Climate change has become an increasingly important concern for central banks, particularly due to its implications for financial and price stability. While the integration of climate risks into macroprudential regulation has been widely studied, their impact on monetary policy remains relatively underexplored. This study addresses the aforementioned gap through a bibliometric analysis of the academic literature on climate change and monetary policy over the past three decades. The findings reveal a significant surge in publications after 2020, driven by growing interdisciplinary interest and rising policy urgency following major global climate events. However, as per the keyword analysis and methodological trend analysis, notable gaps observed as much of the literature focuses on implication of climate change on financial system stability, with relatively little attention to monetary policy frameworks. Accordingly, as climate risks increasingly affect economic stability, this study highlights the urgent need for central banks to integrate climate considerations into their monetary policy framework.

Key words; Climate Change, Monetary Policy, Central Banking, Bibliometric Analysis

JEL classification; Q 54, E 52, E 5

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1. Background

The importance of mitigating adverse effects of climate change is one of the core objectives of many economies by now and it has been progressively recognized by the central banks worldwide. Many central banks have made substantial effort in assessing climate-related risks and enhancing the resilience of the banking sector against these threats. An extensive body of literature on how central banks integrate climate risks into financial stability frameworks (Dietz et al., 2016, Aglietta & Espagne, 2016; Batten et al., 2016; Scott et al., 2017), specially, employing macro-prudential policies and financial supervision measures to ensure the robustness of financial institutions is available in the field(Bolton et al., 2020). However, the focus on how climate change affects monetary policy and price stability remains relatively underexplored in comparison.

There is growing recognition that climate risks constitute a major financial risk, necessitating action from financial regulators and central banks (Batten et al., 2016). Although some institutions acknowledge the relevance of climate risks to price stability (Matikainen et al., 2017; Volz, 2017; Monasterolo & Raberto, 2018, Grippa et al.,2019; Bullock, 2023) effort on incorporating these risks into the monetary policy framework is not yet recognized by countries. Many central banks have prioritized addressing climate-related financial risks through macro-prudential regulation rather than directly linking climate change to their price stability mandate (Van der Ploeg, 2020, Krogstrup & Oman,2019; Eickmeier & Petersen, 2024). Given that macro prudential policies mainly target financial stability, monetary policy targets price stability, a gap emerges in understanding the wider implications of climate change on inflation and interest rates.

Similarly, when focusing the limited literature on central banking in relation to climate change challenges it appears highly fragmented, addressing the various functions and roles of central banks in an uneven manner. While most studies focus on prudential supervision strategies and tools (Basel Committee on Banking Supervision, 2022; ECB, 2020; NGFS, 2022a; Stiroh, 2020; Basel Committee on Banking Supervision, 2021), and, regulatory process aimed at strengthening financial stability by integrating the potential impact of climate change (Campiglio et al., 2018; NGFS, 2022b), fewer studies examine the conduct of monetary policy as a tool to address climate change (Campiglio, 2016; NGFS, 2021; NGFS, 2022a; Volz, 2017).

Although limited, existing literature highlights several channels through which climate change influences monetary policy, Lane (2019) notes that physical and transition risks associated with climate change impact macroeconomic stability and inflationary expectations among households and firms. A study conducted by International Monetary Fund (IMF,2021) further elaborates on three primary transmission channels of climate change into monetary policy, i.e. (1) climate change weakens the transmission of monetary policy by affecting financial conditions, (2) it lowers the equilibrium real interest rate, thereby limiting conventional monetary policy space, and (3) both climate change and mitigation policies influence inflation dynamics. Further the study emphasized that the risk of unexpected climate shocks and the implementation of carbon pricing measures can lead to persistent inflationary pressures, affecting core monetary policy objectives.

In addition, Dikau & Volz (2018) highlights the impact of climate change on the agricultural production, leading to supply shocks that drive food price inflation. This is particularly noticeable in developing economies, where agriculture is the mostly contributing sector of the economy. Moreover, Volz (2017) discusses that climate mitigation policies, such as shifts in energy production, can have direct implications for inflation. Similarly, McKibbin et al. (2017) analyse how different climate policy regimes, including carbon taxation and emissions trading systems, influence various monetary policy frameworks. Their findings suggest that central banks need to account for climate-induced price fluctuations and output changes to avoid worsening economic recessions. Further in her speech the deputy governor of the Reserve Bank Australia (Bullock, 2023) highlighted the economic implications of physical and transition risks stemming from climate change, particularly in relation to monetary policy. She explained that, in the short term, physical risks often resemble negative supply shocks, for instance, extreme weather may temporarily disrupt production and raise prices. While monetary policy typically looks through such short-term shocks, increasing frequency or severity of climate-related disruptions could lead to more persistent inflationary pressures. If inflation remains elevated for an extended period, there is a risk that inflation expectations may rise, thereby increasing the long-term costs of restoring price stability.

Accordingly, it is essential to examine the extent to which the impact of climate change on monetary policy has been studied over the past three decades. This paper conducts a bibliometric analysis to evaluate the literature's coverage on this issue, identifying gaps in current research and assessing whether central banks

are adequately addressing climate risks within their monetary policy mandates. By analysing the evolution of academic discourse, this study aims to highlight the critical need for integrating climate considerations into monetary policymaking, safeguarding that central banks remain prepared to maintain price stability in a climate-affected economic landscape.

The analysis adopted in this research enables several key insights: (i) an understanding of the development of the literature in the field of monetary policy and climate change, (ii) the identification of frequently occurring research themes through density and temporal mapping based on keyword analysis, and (iii) the recognition of potential directions for future research.

This study contributes to the literature by emphasizing the roles and responsibilities of central banks in addressing climate-related risks in connection with their price stability mandates and by identifying gaps in the existing research.

2. *Data and Methodology*

This study utilizes bibliometric analysis to mainly explore the evolving role of central banks in the area of addressing climate change and monetary policy nexus. The analysis aims to highlight influential contributions from authors, journals, and countries, as well as to explore key research themes and emerging trends related to how central banks link climate risks with its monetary policy objectives.

Bibliometric analysis uses for quantitative evaluation of academic literature. It enables researchers to identify publication trends, influential authors, core journals, and thematic developments over time (Donthu et al., 2021). In recent years, this method becomes increasingly popular due to its ability to offer objective insights into large volumes of scholarly output (Aria & Cuccurullo, 2017). According to Zupic & Čater (2015), bibliometric techniques such as co-citation, co-authorship, and keyword analysis are influential in understanding the structure and dynamics of academic research domains Further, the most appealing quality of bibliometric analysis is its capacity to handle large volumes of data, enabling the identification of recurring patterns and thematic clusters. Its effectiveness in processing complex datasets has contributed to its widespread use across various interdisciplinary research fields (Donthu et al., 2021; Khan et al., 2022). Additionally, this approach incorporates both performance analysis and science mapping techniques (Noyons et al., 2006; Shashi et al., 2021). Accordingly, this study employs bibliometric analysis to examine the evolution of literature related to monetary policy and climate change using data extracted from Scopus with the aim of displaying key research patterns and influential contributions.

Following well recognized literature that use bibliometric method, this study employs Scopus database to retrieve data as it is well recognized for its comprehensive coverage of high-quality academic publications. Then a structured search strategy was applied using the following keyword combinations: "climate change" AND "central banks," "climate risk" AND "central banks," Analysis of the initial search results revealed that literature using the term "central banks" primarily focuses on the impact of climate change on financial system stability. However, since the objective of this study is to explore the relationship between climate change and monetary policy specifically, the search was refined to include only publications using the terms "climate change" AND "monetary policy."

While the initial search using the terms "central Bank" AND "climate Change" returned over 30,000 results, the refined search strategy focusing on "Monetary Policy" AND "Climate Change" yielded 1,668 publications. To ensure relevance and uphold academic quality, only peer-reviewed research articles and book chapters were included. Further, the dataset, spanning publications from 1992 to 2024, was subjected

to a thorough data cleaning and standardization process using Microsoft Excel. This step involved removing irrelevant entries and ensuring consistency in the data. Final dataset comprises 1182 data fields containing Journal, title of the article, authors, year published, abstract, keywords, and country affiliated.

To understand the relationships between different research elements, following Cobo et al. (2011) and Donthu et al. (2021), techniques such as co-citation, co-authorship, and co-word analysis were employed.

The dataset was curated and standardized using Microsoft Excel, while Power BI and VOSviewer were utilized for data analysis.

3. Results and Discussion
a. Trends of literature on monetary policy and climate change
Figure 1. Publication trends overtime
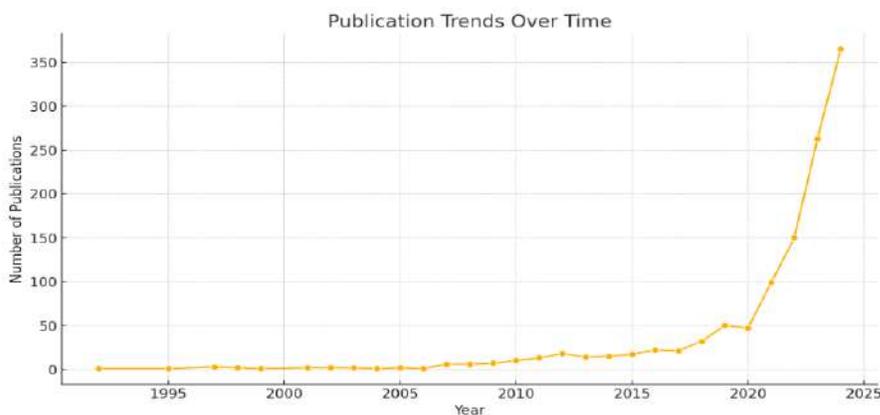
Source; Author's analysis using *Scopus* database

The study first explored the evolution of literature on climate change and monetary policy which showed a relatively slow trajectory until recent years, with a notable increase occurring after 2020. From the mid-1990s to around 2010, research activity in this domain remained limited, with only a few publications seen each year. However, a modest increase in interest appeared between 2010 and 2015, coinciding with broader discussions on climate risks within financial stability frameworks, such as Paris Agreement, etc. However, from 2020 that publication numbers rose significantly, with annual output increasing from around 50 to 360 publications, shows an increase from 4% to 30% of the total sample. Remarkably, approximately 1,020 publications, or 86% of the dataset, were published between 2020 and 2024 alone.

These trends reflect an increasing focus on the role of central banks in addressing climate-related economic disruptions. The sharp rise aligns with growing global awareness of climate risks, increased policy attention on green finance, and the introduction of climate-related mandates for financial institutions, mainly after the Paris Agreement and resultant policy adoptions. The exponential growth in publications post-2020 suggests that climate change is becoming an increasingly prominent consideration in monetary policy discourse in recent years

Furthermore, the findings of the analysis reaffirm the positive influence of international engagement on climate-related research within the field of economics. As mentioned earlier, the Paris Agreement (2015)

marked a turning point, with its ambitious goals to limit global warming to below 2°C and mobilize $100 billion annually for climate finance by 2020, prompting deeper integration of climate considerations into economic and financial policies and strategies. Further, the establishment of the Network for Greening the Financial System (NGFS) in 2017 highlighted the proactive role of central banks in managing climate-related financial risks and fostering green investments. The European Green Deal (2019) further reinforced this trajectory by mobilizing €1 trillion for sustainable investments to achieve carbon neutrality by 2050. In parallel, fiscal instruments like green bonds gained prominence, with the European Commission issuing bonds under the Next Generation EU recovery plan (2020) to fund climate-related projects. The commitments made at COP26 (2021), particularly the pledge to phase down coal and reduce methane emissions, underscored the urgency of coordinated global action, while the Sustainable Finance Disclosure Regulation (SFDR) ensured transparency in investments targeting sustainability goals.

Further, this trend emphasizes the need for further investigation into the mechanisms through which climate change impacts price stability and broader macroeconomic conditions, highlighting a significant research gap that remains to be addressed. It is important to note that these figures reflect the selected sample used in this study and do not represent the entirety of existing literature. However, they indicate a growing academic interest in the intersection of monetary policy and climate change.

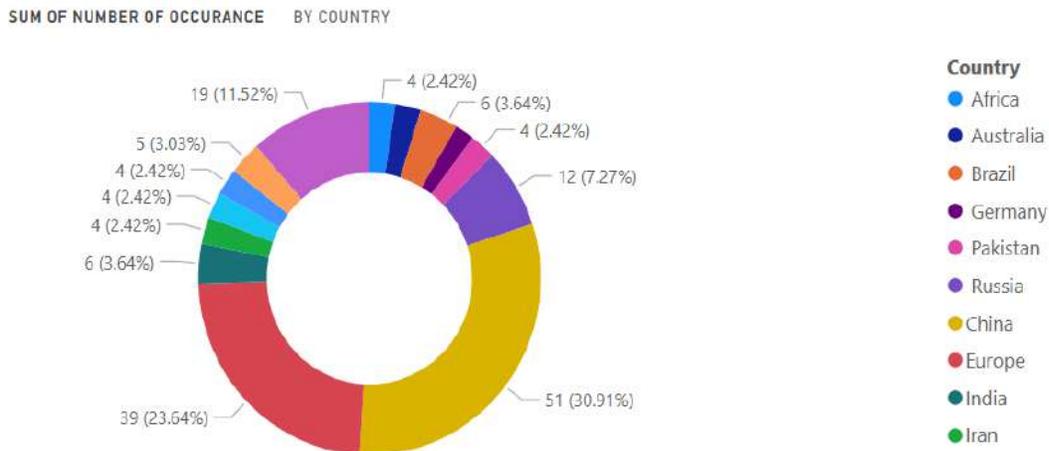***Figure 2. Contribution of scientific journals***
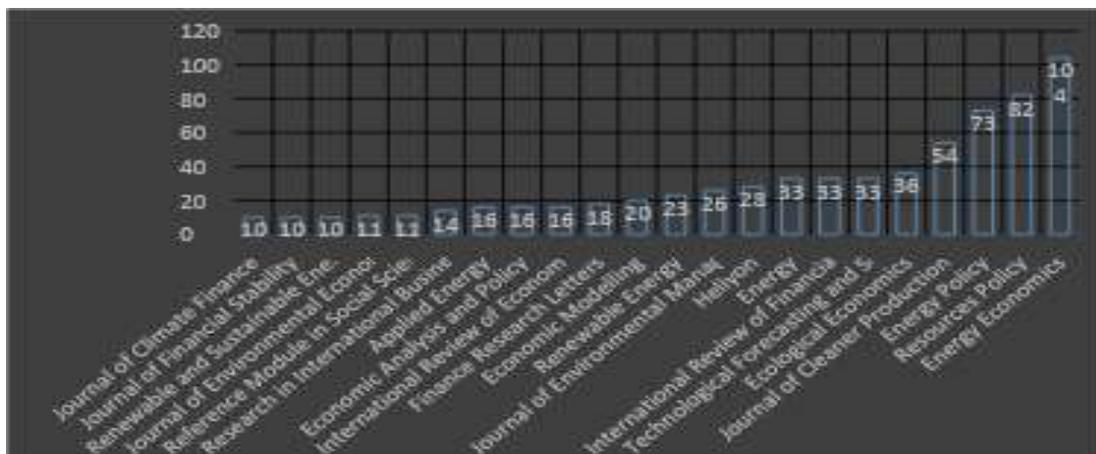
Source; Author's analysis using *Scopus* database

Further, the study focuses on the distribution of publications on climate change and monetary policy across various scientific journals, and it reveals a diverse but concentrated research landscape. According to the findings, while several journals related to Monetary policy and central banking, such as the Journal of Climate Finance and Journal of Financial Stability, have contributed a modest number of publications (around 10–20 each), the highest concentration is shown in journals specializing in energy economics, environmental policy, and resource management. Energy Economics, Resource Policy, and Renewable Energy have published the most articles, with over 70 contributions each, indicating that the subject "climate change" is more concentrated in the fields of energy and environmental economics rather than monetary policy or central banking. Also, this trend suggests that even a relatively small number of financial and monetary policy journals engaged with the topic, the majority of research is still published from the perspective of environmental and energy policy rather than monetary policy standpoint. Further, the increasing presence of publications in journals such as the International Review of Financial Analysis and Economic Modelling signals an improvement in recognition of the monetary and financial stability

implications of climate change. However, the relatively lower representation in traditional monetary policy journals highlights a research gap, indicating the need for greater integration of climate-related risks into mainstream central banking and monetary policy discussions.

Figure 3. Country affiliation

SUM OF NUMBER OF OCCURANCE   BY COUNTRY

Country
- Africa
- Australia
- Brazil
- Germany
- Pakistan
- Russia
- China
- Europe
- India
- Iran

Source; Author's analysis using *Scopus* database

The bibliometric analysis helps understanding the contribution of individual countries to the literature (Figure 3). Accordingly, China leads with the highest share (30.91%), underscoring its strong academic and policy-driven focus on integrating climate considerations into monetary frameworks. Europe follows with a significant proportion (23.64%), reflecting the region's commitment to sustainable financial strategies. Other notable contributors include India (11.52%) and Russia (7.27%), indicating growing engagement in climate-related economic policies. Meanwhile, countries such as Pakistan, Brazil, and Iran each account for a smaller percentage, demonstrating emerging but limited contributions to this field of research. The relatively low representation of Africa and Australia suggests a research gap that needs greater academic collaboration and policy interest. Further, these findings highlight a regional imbalance in climate change and monetary policy research, emphasizing the need for broader efforts to strengthen the research initiative in the field for inclusive policies in relation to impact of climate change.

Figure 4. Map illustration of the geographical concentration of literature
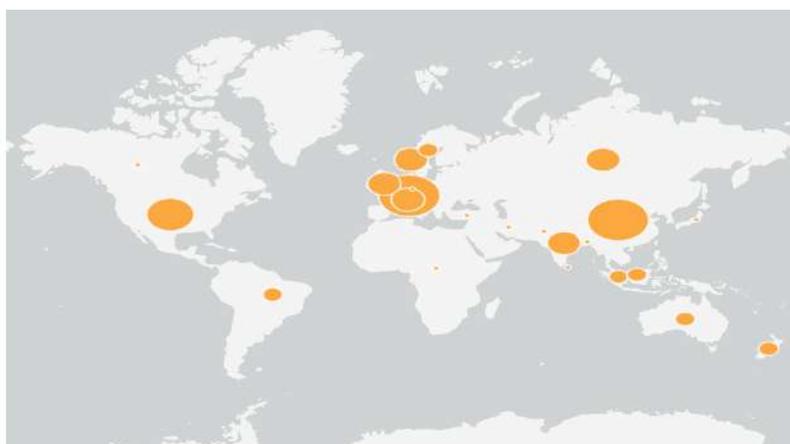
Source; Author's analysis using *Scopus* database

Similarly, Figure 4 illustrates geographical concentration of scholarly contributions to climate change and monetary policy research. The visualizations indicate that European nations, particularly Germany, France, and the United Kingdom, emerge as prominent hubs of research activity, as evidenced by the large bubbles in these regions. Secondly, when we take as individual countries the map highlights China as the leading contributor to this research domain, demonstrating China's strong academic and policy-driven focus on climate-related monetary strategies. Additionally, despite the political standpoint of climate change-related matters in the United States, significant research contributions to the climate change-related literature originate from the United States, reflecting their academic influence in climate-related monetary policy discourse. Southeast Asian nations, including India and Indonesia, also display a growing interest in the field, aligning with their increasing focus on sustainable economic policies. The map further highlights research efforts in Australia, Brazil, and select African nations, suggesting a globally expanding interest in the intersection of climate change and monetary policy. This distribution underscores the collaborative and transnational nature of research in addressing climate-induced economic challenges and policy frameworks.

In addition to the above analysis methodologies employed in research on the field of study is considered important as it hints at widely used methods as well as directs future research on new methods that can be utilized. As per the analysis, climate change and monetary policy span a wide range of econometric techniques. Among the most frequently used approaches are Dynamic Stochastic General Equilibrium (DSGE) models, which allow for the analysis of policy impacts within a structural macroeconomic framework. As per the results, DSGE models are widely adopted for studies on monetary policy and climate change. It is due to their ability to simulate economic shocks and policy interventions while incorporating expectations and constraints (Favero, 2001). Resent papers in the field Batten et al. (2020), Battiston et al. (2021) are some of the examples. Further, it is noted that Autoregressive Distributed Lag (ARDL) models have been extensively used, particularly for examining long-run relationships between economic variables, making them suitable for assessing monetary policy responses to climate-induced shocks (Fukac & Pagan, 2006).

Other notable methodologies include Difference-in-Differences (DiD) and Bayesian Estimation, both of which are employed to evaluate the causal impacts of monetary policy shifts and climate policies. DiD is particularly useful for policy evaluation, whereas Bayesian methods provide a probabilistic framework to estimate model parameters efficiently (Hansen, 1982). GARCH (Generalized Autoregressive Conditional Heteroskedasticity) models are also applied in studies dealing with financial volatility and uncertainty arising from climate risks (Forni et al., 2000). More advanced approaches, such as Agent-Based Modeling (ABM) and Computable General Equilibrium (CGE) models, are gaining traction as they provide micro-level simulations of economic behavior in response to policy changes (Dufrénot & Matsuki, 2018).

To enhance future research in this area, integrating machine learning techniques with traditional econometric models could improve predictive accuracy in climate and monetary policy interactions. Additionally, expanding the use of structural vector autoregression (SVAR) models can help identify monetary transmission mechanisms more effectively. Furthermore, given the increasing relevance of climate finance, coupling environmental economic modeling with monetary policy analysis could offer a more comprehensive view of policy trade-offs.

b. *Analysis based on keywords of the literature*

This study further conducts content-based analysis using keywords and their interconnectedness, which provides in depth analysis to the study. This type of keyword analysis is an important part of a bibliometric study. Accordingly, initial keyword analysis (Figure 5 highlights the dominant themes in bibliometric research on climate change and monetary policy. "Climate change" appears as the most frequently occurring keyword, underscoring its central role in the subject area. "Renewable energy" follows closely, indicating a significant focus on the transition to sustainable energy sources. "Monetary policy" ranks high but is notably less frequent than climate-related terms, suggesting that while monetary policy is acknowledged in the context of climate change, it is not yet a primary research focus. Other key terms, such as "economic growth," "environmental impact," and "sustainability," suggest an emphasis on the broader economic and financial consequences of climate change. Interestingly, keywords like "green monetary policy" and "central bank" appear with much lower frequencies, reinforcing the study's observation that direct links between climate change and monetary policy remain underexplored. The relatively lower mention of terms like "carbon tax," "carbon pricing," and "fiscal policy" suggests that market-based policy mechanisms receive comparatively less attention in the literature. This gap presents an opportunity for further research into the integration of climate risks into monetary frameworks, particularly in assessing their influence on inflation, interest rates, and financial stability.

Figure 5 Key word occurrence analysis
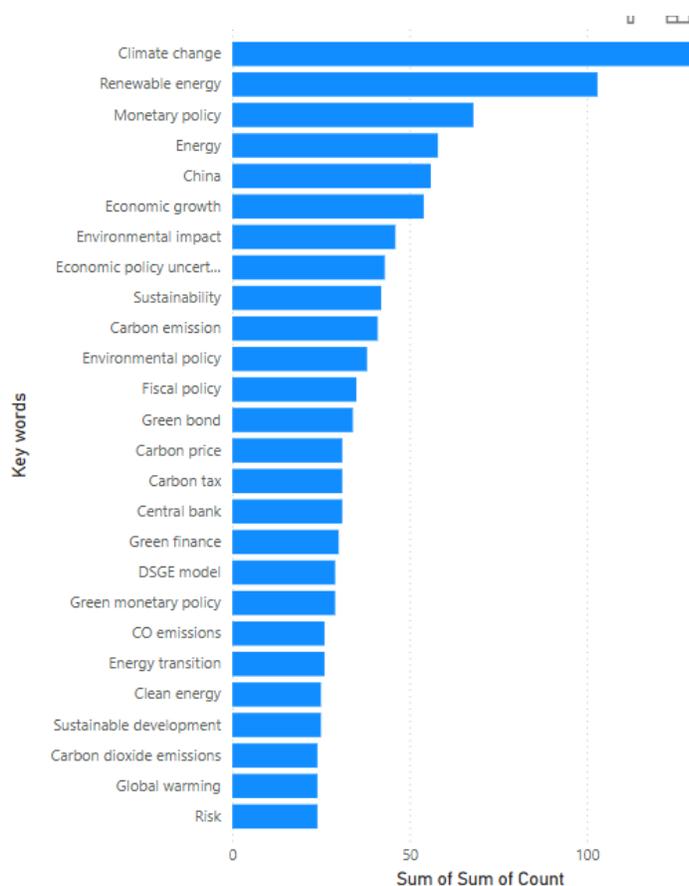
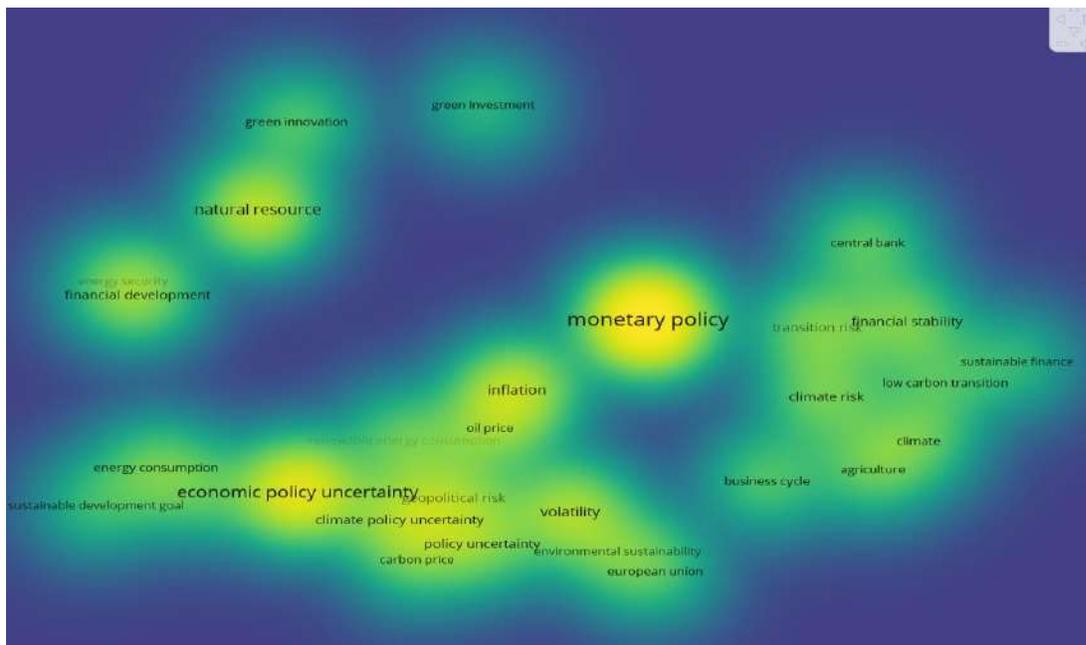Source; Author's analysis using *Scopus* database

In addition, tree map visualization (Figure 6) and word cloud analysis (Figure 7) reinforce the keyword frequency distribution, emphasizing the dominant presence of "Climate change," "Renewable energy," and "Monetary policy" in bibliometric research. The large blocks for these keywords indicate their significant representation in the literature, with "Climate change" remaining the most researched topic. "Monetary policy," while visible, occupies a relatively smaller portion, further highlighting its underexplored connection to climate change. Other economic and financial terms, such as "Carbon price," "Carbon tax," "Fiscal policy," and "Green finance," appear in smaller sections, suggesting that while these topics are recognized, they are not as extensively studied in relation to climate risks. The inclusion of "Central bank" and "Green monetary policy" in smaller segments aligns with the study's assertion that central banks have primarily focused on climate-related financial stability rather than integrating climate risks into monetary frameworks. This visualization supports the argument that while climate change's macroeconomic implications are widely acknowledged, its specific influence on monetary policy and price stability remains a relatively niche research area, presenting opportunities for further academic exploration.

Figure 6 Tree map of keyword

Figure 7. Word cloud analysis of key themes

The study conducts a more in-depth analysis of keywords using VOSviewer, which represents a content analysis that examines the co-occurrence of keywords within academic papers to identify conceptual linkages and construct a theoretical framework for a research domain. In this study, approximately 4,696 keywords were extracted from 1,182 academic publications. From this analysis, 29 keywords emerged as the most frequently occurring and significantly interconnected within the network. Keywords deemed irrelevant or overly generic were excluded from the final analysis. For instance, although "COVID-19" appeared frequently, it was removed due to its ubiquitous presence across publications during the study period (which included 1,020 papers), rendering it less effective in distinguishing contextual relevance.

Figure 8 presents the resulting network visualization, where the size of each node represents the frequency of a keyword's occurrence, while the thickness of the connecting lines indicates the strength of the relationship between terms (Van Eck & Waltman, 2013; Carrión-Mero et al., 2020). This network consists of five clusters, encompassing 29 keywords and 95 links, with a total link strength of 217. Additionally, the density visualization map (Figure 9) provides an alternative representation, where node coloration reflects the prominence and concentration of keywords within the dataset (Van Eck & Waltman, 2014). Together, these visualizations offer insights into emerging research directions and potential areas of interest for scholars and decision-makers

Figure 8 interconnectedness of different keywords analysis

Figure 9 Density visualization map of keywords

c. Cluster analysis

Cluster analysis is a significant product of the bibliometric approach, constructed upon the keyword network. Accordingly, this analysis recognized four clusters, highlighting the relationships among different keywords within each group related to the central bank and the climate change realm. Similarly, the thematic structure of the co-word analysis reveals five interconnected clusters, each representing a key dimension within the broader research landscape linking climate change and monetary policy.

Figure 10 Cluster 1 and thematic links
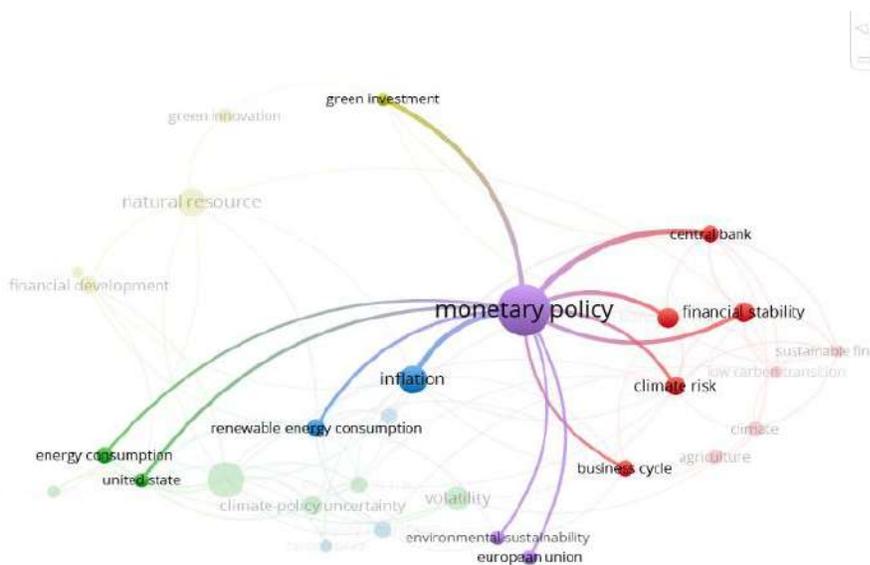
Cluster 1 (Figure 10) focuses on **Monetary Policy and Inflation Dynamics**, encompassing keywords such as monetary policy, inflation, environmental sustainability, and European Union. This cluster captures the

core economic discourse in the literature, particularly the interaction between monetary policy and inflation in the context of environmental objectives and regional governance frameworks. Studies have increasingly recognized that central banks must account for sustainability goals within their inflation-targeting frameworks (Campiglio, 2016; Batten et al., 2020). The central positioning of monetary policy within this cluster further suggests its role as a conceptual bridge connecting economic and environmental themes.

**Figure 11. Cluster 2 and thematic links**
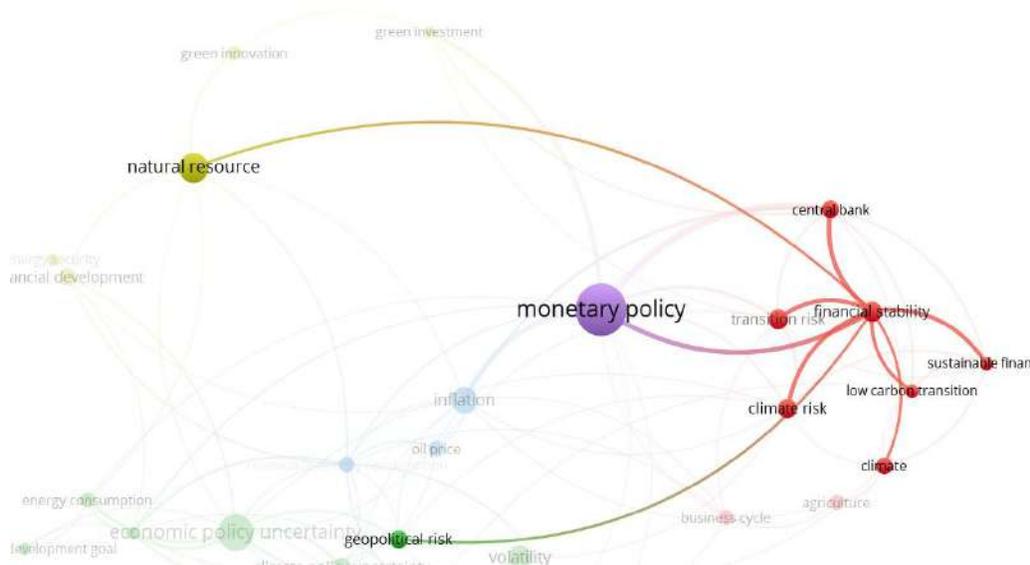
Cluster 2 (Figure 11) titled **Climate Risk and Financial Stability**, includes terms such as climate risk, financial stability, central bank, transition risk, low-carbon transition, and sustainable finance. This theme reflects the growing body of research examining how climate-related financial risks, both physical and transitional, affect the stability of the financial system. Central banks and regulatory institutions are increasingly recognized as pivotal actors in identifying and mitigating such risks (NGFS, 2021; Bolton et al., 2020). The emphasis on sustainable finance and the transition to a low-carbon economy underscores the urgent need for financial systems to adapt to environmental imperatives.

Figure 12. Cluster 3 and thematic links
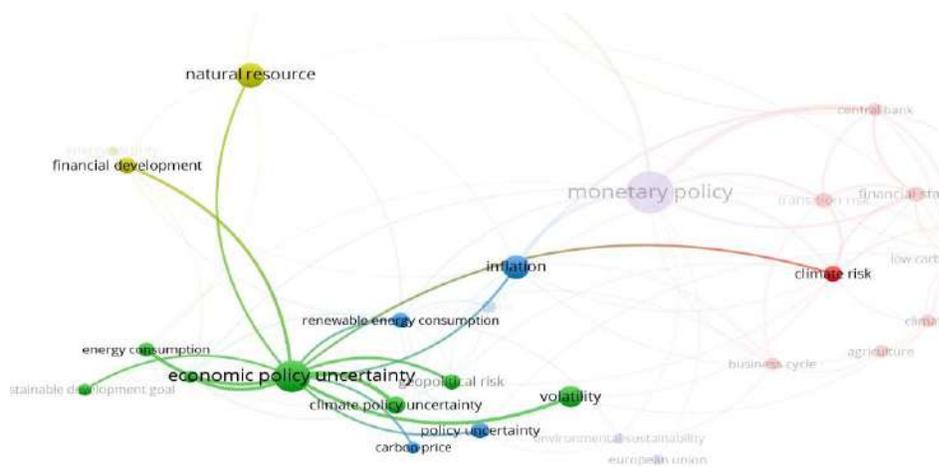
Cluster 3 (Figure 12) pertains to **Uncertainty and Energy Economics**, with key terms including economic policy uncertainty, volatility, climate policy uncertainty, energy consumption, and sustainable development. This cluster addresses the significant role of uncertainty in both economic and policy-related issues in shaping energy consumption patterns and investment decisions. Scholars have demonstrated that heightened uncertainty, particularly around climate policy, can delay green investments and exacerbate macroeconomic volatility (Pindyck, 2020; Caldara et al., 2022). The link to sustainable development goals further illustrates the broader developmental implications of these uncertainties.

Figure 13. Cluster 4 and thematic links
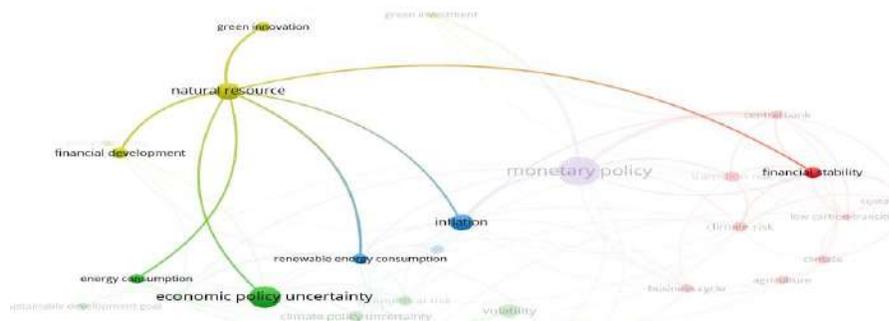
Cluster 4 (Figure 13) is associated with **Natural Resources and Green Investment**, comprising keywords such as natural resource, green innovation, green investment, financial development, and energy security. This cluster underscores the role of financial development and green innovation in promoting sustainable resource management. The literature suggests that investment in green technologies and infrastructure is essential for transitioning to a more resilient and environmentally secure economy (OECD, 2020; Aghion et al., 2016). The thematic linkage between this cluster and those focused on monetary and financial stability reflects the integrative nature of sustainable economic policymaking.

d.   *Summary of the findings and limitations*

As per the above findings, the trajectory of research on climate change and monetary policy demonstrates a slow but steady growth, culminating in a notable surge after 2020. This increase is reflected in the annual publication count, which rose from approximately 50 to 360 publications, with 86% of the dataset published between 2020 and 2024. This sharp rise coincides with heightened global attention following the Paris Agreement and the growing recognition of climate-related financial risks. Notably, the surge highlights the interdisciplinary engagement of researchers in addressing climate risks through different aspects such as, economic, environmental, and financial perspectives. More recently, actions taken by central banks in 2023, including adjustments to monetary policies to account for climate risks reflect the evolving recognition of climate change as a systemic financial concern (Bullock, 2023). Collectively, these developments mark a pivotal shift in global and regional efforts to integrate climate considerations into policy frameworks, driving both academic inquiry and practical policy innovations. At the same time, they also reveal a delayed response by central banks and researchers in systematically incorporating climate risks into monetary policy frameworks.

While the topic has garnered interest across diverse journals, a prominent concentration is observed within energy and environmental policy journals such as Energy Economics, Resource Policy, and Renewable Energy. With over 70 contributions each, these journals highlight the role of energy transitions and resource

management in combating climate change. However, traditional monetary policy journals like Journal of Monetary Economics and Journal of Financial Stability remain less engaged, reflecting the need for mainstream monetary policy frameworks to integrate climate risks more thoroughly. This gap reinforces findings from Battiston et al. (2021), which stress the importance of central banks incorporating systemic climate risks into their models.

In terms of geographic trends, China leads with the highest research contributions (30.91%), followed by Europe (23.64%). These findings mirror the strong policy-driven focus observed in these regions, with China's robust investment in renewable energy and Europe's sustainability-driven initiatives such as the European Green Deal. Despite these advancements, relatively low representation from Africa and Australia reveals regional imbalances, underscoring the need for inclusive research collaborations to ensure comprehensive global climate policy development.

This study identifies three key methodological approaches: DSGE models for simulating economic shocks, ARDL and DiD models for assessing long-term and causal impacts of climate-induced monetary policies, and Bayesian estimation for probabilistic policy evaluation. Looking ahead, future research is encouraged to explore the integration of machine learning with econometric models and the application of Agent-Based Models (ABM) and Structural vector autoregression (SVAR) frameworks to better understand climate-related monetary dynamics.

A keyword analysis reveals the thematic priorities within the literature. "Climate change" and "renewable energy" dominate, underscoring the significant focus on transitioning to sustainable energy sources. While "monetary policy" appears frequently, its relative position among other keywords suggests that researchers are more focused on climate impacts and regulatory mechanisms than on monetary policies themselves. For instance, the limited representation of terms like "green monetary policy" and "central bank" points to underexplored connections between climate policy and monetary frameworks. The growing prevalence of keywords such as "carbon tax" and "emissions trading schemes," as discussed by Huang et al. (2020), provides an opportunity to explore their implications for inflation and financial stability.

Even though there are several merits in the bibliometric analysis this study is subject to several methodological limitations. First, Bibliometric analysis focuses on mapping research trends it does not provide theoretical depth of the research or policy effectiveness of individual papers. Second, since the analysis mainly relies on the Scopus database, even though the Scopus captures the broad range of high-quality academic studies it may not capture all relevant publications which may be popular among general public. Further the findings of the study are sensitive to selected search strategy, and it may not fully reflect all conceptual variations related to the main theme of the study.

In conclusion, the findings demonstrate substantial progress in integrating climate change considerations into scientific research, mainly in the areas of energy and environment. However, significant gaps remain in the representation of traditional monetary frameworks and regional inclusivity, indicating opportunities for further exploration and collaboration. By addressing these gaps and leveraging advanced methodologies, the research community can contribute to more effective and sustainable climate-monetary policy solutions.

e. *Policy implications*

Integrating climate change considerations into monetary policy frameworks remains challenging due to central banks' traditional mandates, which primarily focus on inflation control and financial stability. Many central banks are cautious about deviating from these mandates, fearing legal or institutional pushback. However, the accelerating economic impacts of climate change, such as rising costs from extreme weather

events, disruptions in resource availability, and shifts in labor markets, make it imperative to expand these mandates to include climate risks. As Battiston et al. (2021) argue, the systemic financial risks posed by climate change are comparable to those of the 2008 global financial crisis, underscoring the urgency for policy intervention. The reluctance to act should be replaced by coordinated efforts to adjust monetary frameworks, including tools like green quantitative easing and sustainability-linked interest rates. While it is important to consider integrating climate change into central bank mandates in the long term, they can and should begin taking action within their existing frameworks. This includes conducting research on climate-related risks, raising awareness of their economic implications, and incorporating climate scenarios into financial planning and stress testing.

Despite these advances, the reluctance of central banks to expand their mandates beyond traditional objectives of inflation control and financial stability remains a challenge (Batten et al., 2020). However, working with an aggressive timeline for incorporating climate considerations into monetary policy is increasingly critical, as climate risks are likely to exacerbate economic volatility through disruptions in resource availability, inflationary pressures, and financial instability (Favero, 2001). Meanwhile, fiscal policy must play a complementary role by implementing carbon pricing mechanisms, subsidies for renewable energy, and investments in sustainable infrastructure, thereby creating the conditions for monetary policy to operate effectively in a climate-resilient economy. These efforts should complement monetary policies designed to stabilize inflation and ensure long-term financial stability in the context of climate risks. Coordination between fiscal and monetary policies is essential to achieving systemic decarbonization and fostering global economic stability in the face of environmental challenges (Battiston et al., 2021). Enhanced research and policy collaboration can further bridge the current gaps, ensuring inclusive and regionally representative strategies to tackle climate change comprehensively.

Although the independence of central banks is crucial for implementing monetary and fiscal policies, effective coordination between the two becomes increasingly significant in the context of climate-related policies. This coordination is vital for achieving sustainable growth. For instance, fiscal policies can play a pivotal role by providing targeted funding for renewable energy projects, while monetary policies can ensure favorable lending conditions for green investments. Together, these approaches foster an enabling environment that supports climate-friendly initiatives and drives progress toward a low-carbon, sustainable future.

In summary, central banks and governments must act collaboratively to address climate risks through aligned fiscal and monetary strategies. By integrating climate considerations into policy frameworks, nations can promote sustainable growth and mitigate the long-term impacts of climate change on their economies.

Disclaimer: The views presented in this article are those of the author and do not necessarily reflect the views of CBSL

Competing Interests: The author declare that they have no competing interests.

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