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Integrating Carbon Trading and Pricing Within a Global Climate Club: A Unified Approach to Enhance Climate Mitigation Efforts

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Abstract. As the problem of global climate change is becoming increasingly serious, governments and international organizations are focusing more and more on reducing greenhouse gas emissions through various mechanisms. Nevertheless, due to the lack of mandatory mechanisms and the implementation of reasonable carbon pricing, the current carbon market system is insufficient to fully address this problem. The effectiveness and flaws of the current carbon pricing and trading systems, as well as the examples of climate clubs, are examined in this study through a number of case studies. These analyses, taken together, lead to a recommendation for the creation of a global climate club, which would serve as an expanded carbon market system with consistent pricing and trading practices. This envisage is then elaborated from the aspects of its constitution and functions. By investigating those prevailing mechanisms, the study provides a novel view for improving the carbon market mechanisms to enhance climate mitigation efforts, which is integrating carbon trading and pricing within a global climate club.

Keywords: Carbon trading, Carbon pricing, Climate club, Carbon market.

1. Introduction

Climate change is one of the most challenging situations confronting humankind in the twenty-first century and is, as of now, influencing the whole world. The Paris Agreement offers essential diminishments in global greenhouse gas emissions, constraining the upward push in global temperatures to 2°C this century while seeking out measures to restrain temperature upward push to 1.5°C [1]. With the steady actual difficulty of global climate change, governments and widespread corporations are paying extra attention to lessening greenhouse gas emissions through numerous components. The contemporary carbon market framework, while a step in the right direction, has shown limitations in its ability to drive the necessary emission reductions on a global scale. Territorial carbon trading markets, inclusive of the EU ETS, RGGI, and NZ ETS, have made strides

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in advancing emanation diminishments internal their locales. Pricing Mechanisms like EU ETS and EU CBAM have also tried to set reasonable standards for markets of various sizes. However, they have become too exposed to the severe situations of fragmentation, lack of unified standards, and the capacity for carbon leakage, which empathize with the requirement for an extra cohesive and universally coordinated approach to carbon pricing and trading.

The concept of a climate club, as supported by researchers like Nordhaus [2], gives a realistic association to the collective action difficulty in global climate governance. This paper advocates for further globalization and improvement of the carbon market framework into a climate club. The club is primarily based on uniform changing benchmarks and separated carbon pricing. It is designed to deal with the inadequacies of the contemporary framework by advancing a more equitable distribution of the emission reduction burden among developing and developed nations. In this manner, because of the urgency of climate change and the insufficiency of the contemporary carbon market mechanism, a climate club with uniform trading benchmarks and differentiated carbon pricing can force a more effective and equitable global response to this existential risk.

2. Thesis and road map

2.1. Thesis

The carbon market system must be further globalized and improved into a climate club with uniform trading standards and differentiated carbon pricing.

2.2. Road map

The paper is structured as follows: Section 3 reviews the literature on the effectiveness, flaws, and further improvement of the existing carbon market mechanism in the context of climate change. Section 4 discusses the methodology and hypothesis, followed by detailed case studies on their effect and flaws. Finally, Section 5 concludes with a recommendation to establish a climate club with uniform trading standards and differentiated carbon pricing.

3. Literature review

3.1. Different opinions on existing carbon markets

The growing body of literature has focused on existing carbon markets, reflecting its increasing importance in the field of responding to global climate change. This part reviews the existing literature on existing carbon markets by various scholars.

3.2. Effectiveness

Some researchers strongly support carbon market mechanisms with several points to demonstrate their effectiveness. In quantitative terms, carbon markets cover many parts of the world. Pearse and Böhm said that there are 16 operational carbon markets worldwide, with more in the planning stages [3]. Baranzini et al. provided seven arguments to support carbon pricing on its effectiveness [4], including its effect of "Reduces the Overall Abatement Cost" and providing ongoing incentives for the adoption and innovation of low-carbon technologies, etc. The potential impact of CBAM on the effectiveness of three policy objectives was highlighted by Zhong and Pei: protecting fair competition, reducing carbon leakage, and limiting global welfare costs [5].

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3.3. Flaws and further improvement

There are still arguments pointing out the flaws of current mechanisms, one of which is the issue of effectiveness. Weber explained that while economists generally agree that ETS is the most effective policy option for reducing GHG emissions [6], there are several challenges to its practical implementation, such as increased transaction costs and market differences. And through analysis of data, Rogelj, et al. found that even with full implementation of all INDCs [7], the projected median global average temperature increase is estimated to range between 2.6 and 3.1°C by 2100, surpassing the target set by the Paris Agreement. This is an example of the inadequate limiting capacity of INDCs. Weber acknowledged the ETS as a theoretically effective tool in addressing climate change; however, he underscores the necessity of meticulous planning and reforms to address deficiencies in its practical application. The article's conclusion underscores the potential of a well-designed ETS in reducing greenhouse gas emissions and fostering market compatibility. Moreover, while ETSs are theoretically cost-effective and promote market efficiency, their successful execution requires consideration of various factors such as political determination, regulatory capabilities, diversity among market players, and international collaboration.

Another controversy is the issue of equity. One argument stated that current pricing mechanisms will have distributional impacts on its objects, such as countries and households, due to the difference in affordability. For instance, “while wealthier households produce more carbon emissions in absolute terms, carbon-intensive spending as a share of income is significantly higher for poorer households” [8,9]. There is also concern that CBAM is pressure on some developing countries may violate the United Nations Framework Convention on Climate Change (UNFCCC) [10], which reveals that the distribution of mitigation responsibility is still under dispute [5]. To solve the problem, Jenkins argued that progress can be made if members are more aware of distributional impacts, which may be weak in implementation. Another idea is building a climate coalition [10]. At the same time, Bataille et al. discussed the rationality of differences existing among countries in carbon pricing strategies [11]. In a word, while having multiple advantages, the existing carbon markets hinder the ability to respond effectively and democratically to climate change. Thus, further improvement in demand. Combining those inspiring ideas, the study will further argue that global uniform trading standards and a differentiated pricing system should be set up and put into action by a globalized climate club to make powerful contributions with a fair distribution of responsibility.

3.4. The scholarly views on climate clubs

The climate club, as a novel mechanism for global climate governance, has picked up noteworthy footing in recent scholarly research [2]. The Climate Club is a pragmatic solution to foster cooperation among nations with diverse interests and capabilities by using monetary motivations to deal with the free-rider problem inborn in international climate agreements. However, while the hypothetical mechanism of the climate club gives promising roads for upgrading global climate action, the writing has yet to comprehensively deal with the execution challenges and political achievability of extending such climate club, specifically which include nations with much less unified political and economic systems. Evaluations of the climate club have highlighted potential troubles inclusive of exacerbating power imbalance and diminishing the multilateral UNFCCC process [12]. However, the proposed improvement of the G7 climate club, which initially comprised advanced economies, can function as a testing ground for alleviating those concerns. By intentionally consolidating an extra substantial variety of nations, including growing economies and

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members with much less unified political and economic systems, this paper offers insights into the adaptability and scalability of the climate club mechanism.

4. Individual research components

4.1. Methodology

The study does several case studies on the effectiveness of current carbon trading and carbon pricing mechanisms, proposing recommendations for each based on their flaws. As cases of current organizations reflect that they are not effective enough to carry out correspondent implementations, the study envisages establishing a globalized climate club as an extended carbon market system with uniform trading standards and differentiated carbon pricing.

4.2. Individual research----arguments and case studies

4.2.1. Carbon trading mechanisms

Argument: A global carbon trading system with a mandatory mechanism and internationally uniform standards should be established to enlarge the positive effect of carbon trading because current, regional, and voluntary trading mechanisms cannot adequately contribute to the global carbon market.

Case Studies: By analyzing case studies, the strengths and weaknesses of existing carbon markets can be summarized, showing that maintaining the strengths can continue to help in the achievement of emission reduction targets, and improving the weaknesses can optimize the mechanism to further achieve emission reductions.

CASE 1 EU ETS: The EU ETS, also known as the European Union Emissions Trading System, is a market mechanism designed by the EU to reduce greenhouse gas emissions. EU ETS has its own limitations. During the initial phases of EU ETS, member countries allocated an excessive amount of emission allowances, resulting in oversupply in the market and a decline in prices, impacting the efficiency of emission reduction efforts. Weber found that there were many reasons for the over-allocation; one of the main reasons is that the government protects its domestic industry and thus issues too many certificates [6]. Although the EU ETS aims to reduce emissions, companies may move production to countries with less stringent climate policies to avoid the cost of carbon, which could lead to an increase in global emissions. The EU ETS has responded to this problem by lowering the price of carbon and introducing the CBAM, but the effectiveness of these measures remains to be seen. However, as the first established emissions trading scheme, it has made a significant contribution. Appunn and Wettengel claim that the system has helped reduce emissions from these sectors by about 47 percent [13]. What's more, according to the changes the proposal would bring, With the reduction of the emission cap and the introduction of the carbon boundary adjustment mechanism, the number of free allowances will be gradually reduced [14]. This shows the change nicely addresses the previous question about free allowances. It can prove that the system is constantly evolving. So, there is a lot of worth in EU ETS that may be preserved and developed. In conclusion, The EU ETS is an effective emissions trading mechanism that promotes the reduction of greenhouse gas emissions through market means and promotes the development and application of low-carbon technologies. Despite some problems and challenges, the EU ETS is expected to play a greater role in the future and contribute to the fight against climate change through continuous reform and adjustment.

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CASE 2 RGGI: RGGI is a coalition of states in the Northeastern and Mid-Atlantic regions of the United States. The main goal of RGGI is to control and reduce carbon dioxide emissions in these states through market-based mechanisms to combat climate change. Research analysis shows that RGGI is effective to some extent. In the early stage, due to the abundant emission allowances, the price is relatively low, which indirectly promotes emission reduction. Second, emission allowances represent a new form of currency. Emission allowances can be used to support many policy targets, including energy efficiency and investment in renewable energy. By auctioning emission rights, RGGI provides states with a new source of revenue. Jonathan L. Ramseur said that to date, the auction has raised more than $2.7 billion, providing a new source of revenue that has been used to support a variety of policy goals [15]. One study argued that this allowance value allocation strategy "creates wider benefit than any other use of allowance value." [16]. But from a practical perspective, the RGGI program's contribution to directly reducing the accumulation of greenhouse gas emissions in the global atmosphere can be said to be minimal. There is uncertainty about the future of RGGI. What's more, a potential problem with RGGI is 'emissions leakage' [15], which means that uncovered sources may increase their emissions, thereby cancelling out emissions reductions from covered sources. RGGI does not include regulation of emissions from out-of-region electricity, which could result in imported electricity displacing electricity production within the RGGI states, while emissions from imported power are not limited. While RGGI has been successful in reducing greenhouse gas emissions and promoting clean energy development, there are also challenges, such as how to further expand the scope of emission reductions, increase emission reduction targets, and how to better address the broader impacts of climate change. Overall, however, RGGI is an effective regional GHG reduction policy.

CASE 3 NZ ETS: The New Zealand Emissions Trading System (NZ ETS) is a market mechanism established by the New Zealand Government to reduce greenhouse gas emissions. Companies and members offset their emissions by buying or acquiring emission allowances. These emission allowances can be obtained through government auctions or purchased on the secondary market. The NZ ETS has worked on several levels. It is the world's first designed to fully cover all sectors of the economy and target the six major greenhouse gases [17]. By covering relevant areas and emission sources, New Zealand's ETS can reduce the overall cost of emission reduction. It also helps to improve the equity of the responsibility of each economic agent. NZ ETS utilizes a two-step cost containment strategy. They are a fixed price option and an auction mechanism, which helps to avoid excessive price volatility. This mechanism helps to ensure that market expectations remain stable. However, until 2019, the NZ ETS has never imposed limits on domestic emissions. The system is not designed to control greenhouse gas emissions by setting caps on emissions [18]. New Zealand meets its Kyoto Protocol targets through international market mechanisms [19]. To better support New Zealand's emissions reduction plans, improvements must be made to the current system. Measures include setting a clear emissions cap, adjusting the policy of free allowances, and developing appropriate price strategies for agricultural emissions. These reforms will make NZ ETS a more efficient tool. And they will facilitate New Zealand's achievement of its international accountability goals.

CASE CONCLUSION: When formulating carbon trading policies, each country will consider economic conditions, industrial characteristics, environmental needs, and other circumstances. These factors lead to different carbon trading systems. For example, the EU ETS is a long-established system. It reflects Europe's leadership in climate change policy. RGGI and NZ ETS also consider their specific circumstances but also refer to the EU ETS's design. In addition, the political, economic, and legal environment in different regions will also affect the design and implementation

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of carbon trading systems. Case studies show that voluntary mechanisms and inconsistent standards limit the positive effects of carbon trading. Therefore, a global carbon trading system, with mandatory rules and uniform standards, is needed to achieve greater emission reduction. Through the establishment of a global climate club, global emission reduction targets can be achieved more effectively, and the process of global climate governance can be promoted.

4.2.2. Carbon pricing mechanisms

Argument: The study argues that current carbon pricing mechanisms are effective in mitigating carbon emissions, but there are some flaws that need to be fixed. The issue of equity hasn't been resolved, which may finally impair its effectiveness. A recommendation of establishing a differentiated pricing system by the climate club to remedy the defect will be raised at the end of case studies.

Case Studies: Case studies on EU ETS and EU CBAM will include the introduction to the mechanisms and evaluation of their effectiveness, pointing out their flaws at the same time, and proposing a recommendation to further improve them.

Case 1 EU ETS: This case will focus on the role of the European Union Emission Trading System as a pricing mechanism, which distinguishes it from the case discussed under the part of carbon trading mechanisms. The EU ETS aims to significantly reduce greenhouse gas emissions across the European Union. The system works on the 'cap and trade' principle. It sets a legal limit, or cap, on the total amount of greenhouse gas emissions, mostly carbon dioxide. Then, it allocates allowances, which represent the right to emit a certain amount of CO2. The cap on allowances was set at the national level through national allocation plans (NAPs) [20], which include the total emission control of the country and the emission quota allocated by each emission entity. Based on the cap, companies can sell their excess allowances and buy extra ones as needed. This incentivizes them to cut emissions as much as possible to reduce costs.

The EU ETS has a significant effect on the carbon market. Directly, it "makes polluters pay for their greenhouse gas emissions, and helps bring emissions down and generates revenues to finance the EU's green transition" [20]. In the long term, more benefits will emerge. By incorporating carbon credits into a market mechanism, ETS reduces the number of dedicated resources and administrative costs required for traditional management. And with the regulation of the market mechanism, the management of carbon credits will be more sustainable and efficient. Meanwhile, a standard pricing system will offer enormous convenience for cross-national trading. Also, the emission reduction target and regulation provide strong motivation and force to guarantee its implementation. Furthermore, the new profits will lead to investment flows in the direction of low-carbon energy and production, as well as create new opportunities for industrial upgrading and meeting global climate goals. Finally, the mechanism can set a model in the international society, encouraging more countries and regions to take similar measures to cut emission reduction. However, one inherent flaw of ETS also poses a challenge to implementation. The scope of the strict ETS is restricted to the EU, which not only limits its effectiveness but also leads to the risk of carbon leakage. In response to this, in 2023, the European Parliament formally voted to approve the CBAM proposal, which aims to consolidate the achievements of ETS development and expand its influence. In conclusion, ETS introduces carbon credit as a trading object to the market mechanism, realizing its internal value at the same time [8]. It promotes the development of carbon market mechanisms as a powerful tool to mitigate carbon emissions. While it still contains an inherent flaw, the EU CBAM is constructed later to make up for it.

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Case 2 EU CBAM: “Carbon Boarder Adjustment Mechanism (CBAM) is the EU's tool to put a fair price on the carbon emitted during the production of carbon intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries” [21]. “Climate change is a global problem that needs global solutions. As the EU raises its own climate ambition, and if less stringent climate policies prevail in many non-EU countries, there is a risk of so-called 'carbon leakage'” [21]. If companies find that they can lower the cost when moving factories to countries with less stringent climate policies, most probably, they will relocate those factories, bringing carbon emissions to another part of the planet, which offsets the emission reduction effort of EU ETS.

As an auxiliary mechanism to the ETS, CBAM can help reduce carbon leakage and mitigate the damage to the competitiveness of enterprises within the EU by eventually raising the price of imported products to the same level as the price of EU products. Revenue from CBAM can be used as a subsidy to enhance innovation to invest in research and manufacturing of low-carbon alternatives. It also encourages non-EU countries to implement their own carbon pricing system and gain benefits for their own finance [12]. However, there has been controversy around the world over the issue of its equity. The CBAM is envisioned by the implementing developed countries to safeguard fair competition but developing countries believe that fair competition measured by equal emission costs is inherently unfair [5]. There are basically two reasons. The historical issue is the first one. Most developed countries experienced the Industrial Revolution and emitted a large number of greenhouse gases during that period while developing countries usually produced less emissions in history because of the level of development. So, they bear less responsibility for climate change. Another one is their affordability. Developing countries with lower levels of economic development usually can not afford to set emission reduction as the priority because of their need for development. It’s their right to decide for themselves the goal to set for emission reduction to avoid disturbing the process of development. However the BAM may expand its own standard to the whole world as many countries depend greatly on the market of EU, thus causing an unfair situation for developing countries.

Therefore, the study recommends that a global differentiated pricing system should be set up and put into action by a climate club to globalize regional pricing mechanisms, incentivize countries to further reduce carbon emissions, and address the issue of equity between developing and developed countries. It can be hard to formulate a pricing system according to the complex and varied situation of every country, but Climate Club may have the ability to design comprehensive research and form a treaty over it according to their responsibility and capability.

To conclude, theoretically, it is postulated that CBAM can be effective in protecting fair competition, preventing carbon leakage, and limiting global welfare costs [5], but there should also be a concern on the issue of equity so that the condition of developing countries will also be taken into consideration. It is recommended that the equity could be achieved through a global differentiated carbon pricing system. The system proposed requires comprehensive and systematic research on the development condition of each country and a powerful organization to promote globalized implementation. Thus, a global climate club is in urgent demand to unite forces and carry out correspondent measures.

4.2.3. Uniting through a global climate club

Argument: A climate club centered around the most important carbon emitters should be established as a supplement to the global carbon market since the climate club will promote more ambitious commitments and deal with free-rider problems by increasing authorization manipulation and advancing implementation, eventually leading to a climate club of all countries.

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4.2.4. Exploring the climate club's affect through case studies

Through in-depth analysis of carbon trading and carbon pricing mechanisms, it is discovered that each revels in challenges: Carbon trading struggles with problems together with market fragmentation and the risk of carbon leakage. Similarly, carbon pricing mechanisms confront implementation obstructions and issues with concerns about equity and distributional impacts. A climate club can be a potentially feasible solution to it. Climate clubs, as proposed by Nordhaus [2] and investigated in the scholarly discourse, provide a unique method for cultivating participation amongst nations with diverse interests and abilities. To conduct comprehensive qualitative research exploring the political feasibility and desirability of climate clubs, two case studies will be analyzed: the G7 climate club and a potential climate club, including the United States, the European Union, and China.

4.3. Case study 1: the evolution of the G7 Climate Club to the G20 Climate Club

4.3.1. The G7 Climate Club

The G7 Climate Club, propelled in 2022, is a vital step by the world's most advanced economies in dealing with the severe global climate crisis. By progressing ambitious and transparent climate mitigation policies, this club seeks to promote climate actions and enhance their effect, with a particular focus on driving change within the industrial sector. The climate club is constructed on three pillars: advancing climate mitigation policies, transforming industries to accelerate decarbonization, and boosting international ambition through partnerships and cooperation [22]. The G7 Climate Club's effect is significant. Its members, including major economies such as the United States, Germany, and Japan, have the economic power to uphold stricter climate procedures interior their locales. For instance, France, Germany, and Italy, which are part of the European Union, have a mandatory carbon market and are arranging to implement a Carbon Border Adjustment Mechanism. This mechanism acts effectively as a carbon tax for products getting into the EU, illustrating the club's dedication to internal climate action.

4.3.2. Challenges and opportunities for expansion

Despite its potential, the G7 Climate Club faces imminent challenges, especially in guaranteeing climate justice. Addressing incongruities in economic development and historical emissions profiles calls for giving financial assistance and different forms of bolstering to support developing nations' net-0 moves. The Climate Club has to balance ambition with inclusivity and address the concerns of both developed and developing nations to maintain its adequacy and importance in the global warfare against climate change. Given these challenges, the next step for the G7 Climate Club naturally is to develop its enrollment to encompass a larger range of nations, especially those with more greenhouse gas emissions. The inclusion of the G20 economies can enhance the club's global representation and leverage as they represent most of the world's economic volume and population.

4.3.3. Expanding to the G20 Climate Club

As highlighted in the recent policy brief, the attention of G20 economies can improve the club's global representation, particularly major emitters like China, India, and Russia. These countries' significant greenhouse gas emissions and economic power can make them crucial for driving ambitious climate action [23]. However, the variations in G20 members' interests, political

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frameworks, and economic abilities pose noteworthy challenges. While a few G20 members have cooperated collectively, such as CCAC, others, like Russia and Turkey, have shown limited commitment to the Paris Agreement [23]. Therefore, careful consideration of the following aspects is crucial to the success of an extended club:

1.Create clean and complete participation standards that apprehend the diverse contributions and needs of potential members. Financial and technical support mechanisms might also additionally incentivize growing economies to enter the club, addressing issues about unequal burdens and benefits.

2.Establish a governance structure that is flexible to accommodate the various political and economic systems of the G20 members. A secretariat, controlling committee, and specialized subgroups appear to inspire decision-making and assure an adjusted representation of members.

3.Recognize common focus areas for collaboration, such as industrial decarbonization or green energy technologies. Regular technical and implementation experience exchanges can integrate trust and promote cooperation among members.

4.Create solid mechanisms for conflict resolution and ensure inclusive decision-making bureaucracy. This consists of includes all members in forming the club's guidelines providing platforms for their voices to be heard.

5.Address the issues of powerless nations and assure equitable dispersion of benefits and burdens. Financial and technical support has to be provided to countries in need, cultivating a sense of reasonableness and collective obligation.

By promoting G20 economies entering into the climate club, the expanded model can serve as a testing ground for adjusting the first G7 method to more diverse political and economic contexts. This expansion can alleviate issues over power imbalances and the capacity degradation from multilateral bureaucracy like the UNFCCC. By centering on common goals, sharing experiences, and providing necessary support, the G20 Climate Club can become a more inclusive and effective way for broader climate cooperation.

4.4. Case study 2: a climate club encompassing the United States, European Union, and China

This case study delves into the potential effectiveness of a climate club that includes the three major emitters, the United States, the European Union, and China, investigating the challenges arising when reconciling their diverse national interests towards a sharing climate goal, particularly given the less unified political and economic systems among them. The association of the sort of club relies on the acknowledgment that, despite their unique national settings, these entities hold the key to accelerating or obstructing international efforts to combat climate change. The Biden management's reestablished dedication to the Paris Agreement and the introduction of the US Inflation Reduction Act (IRA) signal a shift toward domestic climate initiatives, which might also additionally invigorate global technological advancements and cost reductions in clean energy sectors. The European Union, with its Emissions Trading System (ETS) and the proposed Carbon Border Adjustment Mechanism (CBAM), demonstrates a proactive function in internalizing carbon prices and developing a platform for trade. China has pledged to peak emissions by 2030 and achieve carbon neutrality by 2060, acknowledging its pivotal role and integrating climate considerations into its Five-Year Plan.

However, the foundation of a climate club encompassing those three powers faces significant challenges, especially concerning their varied political frameworks and economic structures. The US, EU, and China each have unique governance structures and decision-making bureaucracy, which could, moreover, prevent consensus-constructing and policy coordination within the club.

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Additionally, the exchanging degrees of advancement and capacity among those countries might also lead to inconsistencies over the distribution of financial and technical support, as well as the pace and scope of climate actions. To overcome those obstacles, the proposed climate club needs to adopt a delicate balance that recognizes the national contexts of each member. This entails building transparent and inclusive decision-making processes where all voices are heard and concerns are addressed. Sound working mechanisms for conflict resolution can be vital to manage differences and maintain the cohesion of the club. Furthermore, guaranteeing equitable distribution of benefits and burdens through targeted financial and technical support to members in require will boost a sense of fairness and shared commitment. To address the challenges emerging from less unified political and financial systems, the Climate Club must make an adaptable and versatile governance structure. This carries regular surveys of club policy and commitments, in addition to mechanisms for members to advocate and vote on adjustments as required. By taking a dynamic method, the club can adapt to the evolving needs and circumstances of its members, making sure of its long-term period relevance and effectiveness inside the global climate governance scene. In conclusion, the establishment of a climate club enveloping the US, EU, and China presents both opportunities and challenges. By discovering and addressing the differences among its members, cultivating inclusive decision-making, and developing an adaptable governance structure, such a club can function as a potent force in driving global climate action. Its success will depend on the ability to harmonize the diverging interests, ensuring that all members are accountable for the club's goals and activities.

4.5. Cross-cutting analysis

The existing climate club has shown limitations in effectively addressing the complexities of carbon trading and carbon pricing. The club lacks a unified system, struggling to impose the necessary discipline to foster essential and equitable climate action. The first case study focuses on the G7 Climate Club, which was initiated in 2022 as a strategic move by advanced economies. The G7 Climate Club's impact is constrained by its membership. Mainly composed of developed countries, it could not fully represent the diverse interests and capabilities of the global community, especially those of developing countries. The second case study examines a potential climate club that includes the United States, the European Union, and China - the world's major emitters. While this club holds significant capability to influence global climate policy, the differences in national interests and historical responsibilities pose significant challenges. The compromise of assorted interests is primary for the success of such a club, yet the current club model does not thoroughly ensure an equitable distribution of climate action responsibilities.

To conquer the limitations above, there is a clear need for a climate club centered around the important members serving as a method to surmount the collective action challenges inherent in global climate governance. Besides, the climate club can enhance the implementation of climate policies by providing a forum for sharing exceptional mitigation experiences, technological expertise, and financial assets. This exchange is particularly beneficial to developing countries, encouraging their transition to a low-carbon economy and enhancing the effectiveness of the club's efforts.

However, a crucial concern is perceived injustice among developed and developing countries, where the latter noted might bear an unbalanced burden due to historical emissions and capacity constraints. Moreover, accommodating national interests within such clubs can be challenging, as each country seeks to protect its economic welfare and strategic priorities. Carbon pricing, on the other hand, mainly influences the cost of emissions through taxes or cap-and-trade systems. By placing economic value on carbon emissions, it incentivizes both developed and developing

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countries to acquire greener technologies and practices. This approach can be customized to mirror each country's economic condition and ability, ensuring fairness while driving down global emanations.

Envisioned not as a separate entity, the proposed climate club is deliberate to be a center for broader engagement. To elaborate on the idea, the study designs its mechanisms from two aspects: differentiated carbon pricing and uniform trading standards. The pricing system is primarily affected by the national allocation of emission quota that is determined by a model constituted of three portions: national allocation plans (NAP), development level, and historical responsibility, aiming at resolving the issue of inequity by a more comprehensive system of responsibility allocation. NAP would be submitted by countries annually, remaining the dominant portion that demonstrates their independent will. By quantifying the development level and the historical responsibility of each country, more statistics would be provided to optimize the allocation model. The model will automatically provide corresponding emission quotas to each country based on its calculation, causing dynamic fluctuation of domestic carbon prices. Under that circumstance, international trading could abandon extra carbon tax, which sometimes causes inequity. In contrast, domestic trading will take on the responsibility of covering the whole process of carbon emission with fair carbon pricing. Moreover, a set of uniform trading standards is in demand to guarantee free and stable trade, especially when carbon prices are different in each country. It should be in accordance with WTO's cardinal principles overall. Its possible success could function as a model potentially impelling a ripple effect of participation which can result in a more inclusive climate interest framework. Moreover, to ensure its long-term adaptability, the club ought to be designed with flexibility and inclusivity, accommodating the changing dynamics and needs of both its members and the wider global community.

5. Conclusion

This collective research converges on a critical insight: the contemporary carbon market system’s voluntary mechanisms and distinct measures are deficient in enhancing the transformative climate action demanded by the global community. The individual research reports on carbon pricing, carbon trading, and the innovative framework of climate clubs each contribute unique views but collectively point towards the necessity for a more unified and efficient approach to climate mitigation. Through the research on carbon trading systems, carbon pricing mechanisms, and the climate club, the following conclusions can be drawn: the contemporary divided approach to carbon management is inadequate to meet the urgent demands of climate change mitigation. It is highly advocated to create a globalized and upgraded carbon market system that evolves into a climate club framework that is helped with uniform trading standards and incorporates differentiated carbon pricing, which is crucial for addressing the inadequacies of voluntary emission reductions and for promoting equity on a global scale. Moreover, suggestions on specific mechanisms for the establishment and management of a climate club include the development of a flexible legal framework that fits the diverse capacities and duties of nations, in addition to the creation of financial and technical support systems for developing countries. This paper calls for a shift in the climate governance approach. It is a call to action for policymakers, scholars, and the international community to embrace a globalized carbon market system that is not only equitable and enforceable but also adaptable to the evolving challenges of climate change.

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