

# *A Review of Climate Finance*

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**Abstract:** Climate finance is a financial solution to cope with climate change and develop a low-carbon economy, which is a very important trend in the development of the modern financial industry. The author conducts an analysis of climate finance based on the relevant literature. Specifically, on the basis of summarizing the impact path of climate change risks on the financial system and sorting out the measures taken by major economies at home and abroad to cope with climate change risks, this paper analyzes and studies the shortcomings of China's financial system in coping with climate change and puts forward policy suggestions for strengthening top-level design and overall coordination, attaching importance to climate risk management, strengthening incentives and constraints, and further increasing international cooperation.

**Keywords:** climate finance, green finance, climate change, financial stability, climate risk

## 1. Introduction

There is great uncertainty and a two-way approach to the impact between climate and human activity, and estimating the social cost of carbon takes into account both the impact of climate on human well-being and the impact of human activities on climate. Climate change and the risk of natural disasters it brings are important factors affecting economic development and financial stability. The international community does not have a clear and authoritative definition of climate finance. According to the author, climate finance has at least two levels of connotation. The first is climate finance in a broad sense, which refers to the general term for all financial businesses involved in responding to climate change. The second is climate finance in the narrow sense, that is, a certain type of financial derivative specifically related to climate change, especially greenhouse gas emission rights trading businesses, such as carbon finance, carbon funds, and other climate risks and asset pricing [1].

This paper provides a holistic analysis and summary of climate finance based on existing research and data. Specifically, this paper analyzes people's perceptions of climate finance and the assessment and pricing of climate risks in the current economic context from a micro-macro perspective [2]. The next article examines the response to climate risks, including an analysis of the response policies of central banks, policy regulators. What are the implications of international experience for China's response to climate risks? It can give people a more forward-looking prejudgment to predict the general trend of the future and further reserve corresponding measures to reduce losses. Judging from the performance of financial mechanisms in the field of environmental protection, effective environmental protection depends on innovative financial mechanisms. In the face of the thorny

problem of climate change, the financial mechanism will also play an important role, such as the emergence of carbon financial markets to mitigate climate change and the emergence of climate financial markets in order to adapt to climate change [3].

## **2. Assessment and Pricing of Climate Risks**

In this paper, both micro and macro aspects are discussed and analyzed on the results of the existing research literature.

### **2.1. Microscopic Perspective**

The first is the pricing of climate change by real estate companies. Compared to homes in areas exposed to sea-level rise risk, houses in these areas are 7% lower than those in areas with an equal distance from the beach but not exposed, which means that companies' fears of global warming and consumers' propensity to spend will change with climate change [4]. Evidence in developed countries suggests that financial institutions such as banks that provide mortgages to home buyers in high-climate risk areas are gradually selling such assets to mortgage companies, which package them as financial assets for sale around the world, so climate risks are spreading within the financial and economic system as asset security is carried out.

The second is investors' propensity towards climate change risks. Climate change can change the expectations of businesses and households for the future economy. In terms of physical risk, extreme weather and weather events may reduce the value of collateral for businesses and households, damage their balance sheets, undermine business and household confidence, and thus reduce the willingness to invest and consume. At the same time, the price effect of consumers on real estate is limited. Part of the reason is that people remain optimistic about climate change and the geography of their homes. Therefore, investors will weigh the pros and cons of consumer psychology and the trend of reality to decide whether to invest in such projects. Most investors prefer to participate in climate risk management rather than divest, leaving things to go unchecked, illustrating the very different sensitivities of consumers and investors to climate finance. Investors have expressed a promising outlook for climate finance, which has excellent reference value in assessing pricing [5].

The third is the impact of business on climate change. Temporary temperature shocks in specific geographical locations are estimated to have an impact on a company's sales performance and production capacity, and it has been discovered that the per capita impact of temperature rise on corporate sales and productivity is close to zero, implying that large enterprises can better adapt to temporary temperature shocks. However, small businesses will be affected by natural and man-made disasters, such as this COVID-19. Many small companies and even large companies have gone bankrupt or even face the difficulty of bankruptcy, so climate and environmental factors and large enterprise sectors will have a direct and obvious impact. A series of natural disasters such as global warming, hurricanes, sea level rise, and extreme climate change pose a great threat to the operating environment and energy resources required by enterprises. To mitigate the impact of climate change on the market, various governments have introduced relevant policies to limit carbon emissions, which have certain constraints on the production and operation of enterprises. At the same time, these policies also provide a new development direction for enterprises and contribute to the diversified development of enterprises. The transformation of a low-carbon economy is a global economic development trend, so companies should not only keep up with the pace of policies but also adjust their internal operating models to improve their ability to adapt to climate change [6].

## 2.2. Macro-angle

At present, research at the macro level is divided into two major blocks: physical risk and transformation risk.

From a macro perspective, climate risks have triggered the deterioration of the balance sheets of financial institutions, affecting financial stability. On the one hand, there is the impact of physical risks on financial stability. Physical risks encompass not only direct losses from extreme weather events but more potential impacts on economic output. In the literature that looks at the impact of temperature changes on economic output, there are large differences in results. On the other hand, is the impact of transformational risks on financial stability. Transformational risk primarily affects business operations and household wealth, increases the financial risks of lenders and investors, and has an impact on the macro economy through factors such as investment, productivity, and prices [7]. Adaptive measures taken by countries will mitigate the shock in the long run. The economic losses caused by climate change are unevenly distributed across regions, resulting in greater losses in less developed regions. Climate change is having a greater impact on developing countries, resulting in higher deaths.

From the perspective of driving factors, the risk of transition mainly comes from the social changes caused by the transition to low carbon, including three aspects: policy, technology and concept. Transition risk usually occurs in industries with a high proportion of potential asset inventories, generally high-carbon industries, that is, industries with excessive carbon emissions. Risks are higher in carbon-intensive industries and can lead to systemic risk, so when extreme weather changes occur, the banking and insurance sectors suffer heavy losses. Therefore, financial institutions should identify and manage climate-related risks as early as possible, thereby limiting the potential negative impacts of climate risks and the low-carbon energy transition.

## 3. Policies to Address Climate Risks

NGFS is an initiative to strengthen international collaboration in financial systems to support the low-carbon transition of economic development and puts an emphasis on the importance of central banks and financial regulators in mitigating climate change. Central banks should play an active role in channeling lending and investment into the low-carbon sector. One of the main tasks of the central bank is to maintain financial stability. Therefore, from the perspective of maintaining financial stability, the monetary policy and macroprudential policy framework of central banks and financial regulators need to fully consider the impact of climate risks. Central banks and financial regulators can use the policy tools at their disposal to address the external causes of climate change. Central banks can promote green finance by improving financial markets, such as the green bond market, to ensure that the policy tools of traditional currencies are consistent with environmental sustainability. At the same time, central banks and financial regulators can effectively influence investment behavior by directly advising or providing window guidance to the banking sector, allowing funds to flow more efficiently to the low-carbon sector. Central banks are strong and trusted partners in developing countries. Existing climate policies can be broadly divided into three categories: carbon tax policies based on market behavior; green macroprudential regulation; and green unconventional monetary policies. The latter two can fall under the professional categories of central banks and financial regulators, by influencing corporate investment decisions, credit creation and distribution behavior of financial institutions, incentivizing the development of green finance, and so on. Central banks and financial regulators therefore have the capacity to mitigate the climate financial crisis through measures including: mandatory climate disclosure and transparency; green macroprudential regulation; direct green credit policy instruments; differentiated reserve requirements and capital adequacy requirements; green quantitative easing; and green finance norms and frameworks.

## **4. Implications of International Climate Risk Response Experience for China's Response to Climate Risks**

Financial regulators such as the ECB and FSOC have determined that climate change threatens financial stability through corporate assets and investor preferences. People's Bank of China plans to include climate change risks in the macroprudential framework in the Financial Stability Report. Kuroda said any response to climate-related financial risks should be consistent with the central bank's policy objectives. Isabelle Schnabel focused on the central bank's toolbox and monetary policy framework from the ECB's perspective, and proposed the idea of replacing the market neutrality principle with the principle of market efficiency [8]. Learned from the relevant international development experience and enlightenment in the specific responses: to promote the development of transitional finance with standardization; improve the macroprudential policy framework for climate; innovate and develop carbon financial products and markets; and promote the digital and green upgrading of financial institutions [9].

### **4.1. Promoting the Development of Transformation Finance with Standardization Construction**

First of all, we should actively explore transformation finance standards; refine the classification standards and support catalogue for green activities in transformation finance on the basis of existing ones; promote the effective connection between transformation finance and inclusive finance; industrial chain supply chain finance; actively build an international cooperation system for transformation finance; and strengthen the evaluation criteria for low-carbon transformation projects with international organizations.

### **4.2. Improving the Climate Macro-prudential Policy Framework**

Construct a forward-looking macro-management framework for climate risks. With information disclosure as the core, we strengthen the monitoring and assessment of climate risks; further optimize climate risk testing tools; establish climate and environmental risk databases; enrich climate risk analysis scenarios; and actively explore the transmission path between climate risks and balance sheets and asset portfolios.

### **4.3. Innovating and Developing Carbon Financial Products and Markets**

The innovative development of carbon financial products and markets is to strengthen the top-level design, explore the establishment of a coordinated early warning mechanism of market circulation quota and quota reserve, innovate carbon financial derivatives in various forms such as carbon index, carbon creditor's rights and carbon quota pledge loans, use the price mechanism of the carbon trading market to reduce risk exposure, expand the coverage of bond investors linked to sustainable development, standardize the certification and rating of sustainable development linked bonds.

### **4.4. Promoting the Digital Green Upgrading of Financial Institutions**

It is necessary to encourage large banks to establish special transformation finance research groups, improve the approval authority of low-carbon transformation projects at all stages, clarify the strategic positioning of transformation finance, and give full play to the carbon emission reduction effect of transformation financial products. Continue to improve the intelligent identification of asset classification, the automation of approval and labeling, and the digital level of environmental benefit measurement; pay attention to the systematic grasp of the whole process of low-carbon

transformation business; and accelerate the digitization process of financial institutions to accelerate the development of transformation finance.

## 5. Conclusion

It is not difficult to find that climate has different impacts on individual stakeholders from the perspective of individual investors, individual companies, and enterprises, and it is primarily the scoring objects for discussion. From the development trend of a certain industry and country, climate change has a strong impact on the financial market. Any slight change will lead to the wind direction of the whole industry. The policy regulators of the central bank use the policy tools they have to solve the external causes of climate change, and through direct advice or window guidance to the banking sector, they can effectively influence their investment behavior, improve the financial markets (such as the green bond market), and promote the development of green finance. The future direction of risk revelation indicates that climate change will threaten financial stability through corporate assets, investor preferences, and other ways. At the level of green business development of financial institutions, banking financial institutions should be encouraged to effectively cope with climate change related risks. Based on the experience of international development, it is more beneficial for China to improve the overall framework of climate finance and promote more innovation and development. The paper lacks some generalizations about the theoretical analysis of climate finance and the use of models to introduce the results of related theories. There is also the financial impact of how to use resources and energy efficiently to respond more rationally to the outbreak of climate change. Future research can move on to the next step with more data to accurately provide relevant conclusions and to illustrate the measures and policies that have been corresponding to financial changes.

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