

# Impact of Climate Change on Chinese Economy

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## ABSTRACT

After experienced all sorts of extreme weather, people start to pay more attention to the impact of climate change on the economy, not just narrowing on the effects on the people's health. The purpose of this paper is to examine the impact of climate on the economy and the feasible measures to reduce it. The author first analyzes the causes of climate change, which impacts a lot on Chinese economy. Next, the author divides the impact of climate change on economy into macro and micro aspects, which is mainly reflected in the impact of climate change on the stock market, the operation and decision-making of enterprises and investment institutions. In addition, the author also puts forward four aspects, namely green quantitative easing, hedging risks, improving carbon information transparency and improving ESG database. Finally, strategies for reducing the economic impact of climate change are proposed.

**Keywords:** Carbon neutrality, Green investment, Climate risk, Business operations.

## 1. INTRODUCTION

After all countries around the world have experienced extensive economic development, such as large-scale development of industry and urbanization, the need for more refined development has been put on the agenda. At the same time, as people have paid more attention to the current environment, China implemented various emission reduction and energy-saving policies.

At the climate conference in Madrid in January and February 2019, countries are strongly concerning about their ability to cope with climate change, and the term climate economy was repeatedly mentioned. Climate economy is a discipline that studies the impact of climate on the economic sphere and actively uses meteorological information to transform into business opportunities. As extreme weathers change, for example, California fires or earthquakes have taken a heavy toll on people's lives over the years, the main purpose of this article is to provide measures to reduce climate risk, and provide some ideas for business operations including business transformation, technology investment and cash planning. The author also aims to propose these suggestions to fit in with China's latest policy. As China has recently announced a series of policy to

promote green finance and carbon neutrality, it can be expected that companies that adapt to these new policies first will perform better.

## 2. ANALYSIS ON THE CAUSES OF CLIMATE CHANGE

Climate change refers specifically to changes in the average state of the climate over time, in other words, one or both of the climatic mean states and the deviations have changed greatly together. The degree of climate change will be reflected in the size of the deviation value, the greater the value of the deviation indicates that the greater the climate change. Climate change can be divided into three main types, climate change, acid rain and ozone layer destruction, climate change is the most important, but also the most closely related to people's lives. The causes of environmental change can be divided into two categories, natural and man-made. The effects of man-made causes on the climate are far from supernatural, which can simply be divided into population growth, air pollution and other causes.

First of all, with the increase of population, people's demand for resources will continue to grow. Not only food, but also domestic water and electricity and a variety of daily necessities are needed. In order to meet these needs, suppliers will

produce more commodities. In the process, a large number of waste water will inevitably be produced, and excessive development of resources will undoubtedly lead to some resources non-renewable, which will form a vicious circle. The air pollution will mainly be caused by emissions from various factories during the production process, as well as from automobile exhaust. As these wastes contain high concentrations of carbon dioxide, sulfur dioxide and nitrogen dioxide, sulfur dioxide is catalyzed into sulfur trioxide, which reacts with water in the air to form sulfuric acid, or acid rain. Acid rain can cause wide range of hazards, such as corroding buildings, affecting the growth of crops, and bring about great hidden dangers to human health. Moreover, there are other factors, including the sharp decline in land and forest resources, the deterioration of the marine ecological environment, the reduction of biodiversity, water pollution and the environmental damage caused by toxic waste.

### **3. THE ECONOMIC IMPACT OF CLIMATE CHANGE**

By understanding the causes of climate change, it is helpful to analyze the economic impact of climate change. The effects of climate change mainly reflect the changes in the business and management models of financial practitioners, which could cause a broad range of impacts. Because of the high degree of uncertainty about the occurrence of extreme weather, including the location, duration and severity of the occurrence, as well as the interrelation between the weather, climate change can also bring a variety of long-term and short-term advantages and disadvantages to the financial sector. For example, China is a large agricultural country that owns large number of crop exports annually, as agriculture is an extremely imperative part of China's economy. In this case, the climate is a factor that can directly amplify the effect on China's national economy and social stability. Even minor changes in rainfall can lead to reduced or increased crop yields, which can affect the prices of crops on the market. Additionally, as commodities are interrelated, fluctuations in crop prices can have an impact on the economy by causing fluctuations in meat and even daily necessities.

#### **3.1 Macro-level Impact**

From a macro perspective, climate change would have a more complex response to the global financial system than that on a single financial

institution. One is to cause the pro-cyclicality of assets, which is the tendency of financial variables to fluctuate around a trend value, so a pro-cyclical increase means an increase in the magnitude of volatility. Once climate risks cause asset prices to be too high, this phenomenon may affect the stability of the market, and the existence of a non-cyclical period will lead to a concentrated outbreak of risk, resulting in greater harm. Moreover, this may cause credit requirements to shrink, making the lending process more complicated and difficult for companies large and small. The revaluation of large amounts of assets can cause problems with the cash flow of these companies [1].

Technological advances are also one of the reasons for the change. Because the government's advocacy for low-carbon enterprises, high-carbon enterprises will try to transit to low-carbon industries, at this time, a company's corresponding technology reserves are crucial. If the company is technically behind, company will be gradually divided by other companies, and more seriously, he will be eliminated. Therefore, it is imperative to increase investment in this technology. However, because of different corporate culture, cash flow and even different systems, different enterprises will have different performance in the difficult transition exploration period, some will face new transformation opportunities, some will face a crisis, which is due to different adaptations of enterprises, which will also be reflected in the stock of enterprises. Even if there are mitigation technologies available to ease the situation, if they are to achieve the desired results, they must strengthen investment and evaluation of low-carbon technologies to help them through the transition period [2].

#### **3.2 Microscopic Impact**

From the micro level, because of the deterioration of the ecological environment in recent years, enterprises for sewage treatment and the impact on the surrounding environment will be more concerned by the government, so that low-carbon enterprises in the coming days will be more favored by the market, stock prices in the future for a period of time will continue to rise, more funds will also help develop the company. High-carbon companies, on the other hand, are likely to be ordered by the government to overhaul their share prices because they are not handling pollutants in place. This will undoubtedly also be a loss to the interests of financial institutions, as climate change

is uncertain and the impact on share prices will be affected in this way. Some financial institutions may be unable to obtain stable sources of funding because of the abnormal volatility of the market, which may further exacerbate the vicious circle by affecting his ability to service and lend [3].

In addition, climate change can also affect corporate assets and corporate finance. In addition to reducing the existing assets of some companies, the impact on corporate assets will increase their stranded assets, such as oil, natural gas and coal. It is imperative to reduce the use of fuel for reducing carbon emissions. Meanwhile, when the uses of oil, gas, and coal are decreased, they will become stranded assets. Due to the climate uncertainty, there are plenty of difficulties in assessing the risks to those assets, which can create serious asset problems for businesses, for example, the stock market value of the U.S. coal industry was about \$37 billion in 2011. Today, it has a market value of about \$2 billion. So, anyone who borrowed a lot of money from the coal industry 10 years ago is going to be in trouble. Moreover, companies that are climate-dependent, such as agricultural or tourism enterprises, are more vulnerable to climate risks. For agricultural enterprises, they need to prepare more funds to prevent disasters and recovery, which also places higher demands on their capital chains [4]. For tourism companies, because their operations often depend on the local climate and natural scenery, then unfriendly climate change will often have a negative impact on the local, such as the number of tourists, such as a decline in the local hotel industry will also suffer.

The impact of climate change on corporate finance is due to lenders buying up assessments of climate risks. This is because some areas are in extreme weather zones, where local businesses have a higher probability of default within a business cycle, so many banks now consider their climate risk-taking capacity when lending to companies, and even some banks indicate that coal companies are on their borrowing blacklist [5]. This will also make it more difficult for these companies to raise capital and to develop.

## **4. SUGGESTIONS FOR REDUCING THE IMPACT OF CLIMATE CHANGE ON ECONOMY**

### **4.1 Green QE**

In order to reduce the risk of climate change, the most popular method in China is mainly green

quantitative easing [6]. Green quantitative easing is created by central bank, planning to increase its holdings of green bonds or reduce the debt of high-carbon companies to guide market funds into green enterprises. This method can reduce the financing difficulty of these enterprises and help them develop better, as well as force high-carbon enterprises to deepen transformation and move toward low carbon [7]. But this approach has two flaws. The first is that quantitative easing is only a temporary tool in bad economic conditions, and an increase in green bonds could overburden the central bank and go beyond what the market has given him to adjust basic prices [8]. Supporters argue that we should be flexible in interpreting the central bank's authority and that QE is understandable because of the need to maintain market stability, given the irreversible impact climate change will have on markets.

### **4.2 Hedging risk**

It could be a good way to hedge risk compared to green QE. Based on a survey of more than 400 institutional investors worldwide by Krueger, Sautner and Starks, we can conclude that climate risks have received more attention and recognition over the years, and that more than half of respondents believe that climate risks are beginning to emerge. They also believe that proactive climate risk management is better than increasing green bonds or reducing their exposure to high-carbon bonds [9]. Under the plan of First Bank of the Netherlands, one of the world's most vulnerable countries to climate change, climate risk was included in the risk management process as early as 2019, with a focus on strengthening risk analysis and management of property, as well as important criteria for carbon content in investment and loan portfolios. At the same time, ABN Co-ed has analyzed a number of climate risk analyses, including transformational risk stress, water stress and water risk, and in order to quantify the possible impact of water risk, i.e., the presence of minor and severe impacts, it was concluded that in both cases, the probability of default and the probability of default are linked [10].

### **4.3 Increasing the transparency of carbon information**

When consumers invest in activities, there is often information inequality, the root cause is that enterprises do not disclose to retail investors the operation of the enterprise information, which is

also because enterprises feel the pressure of low-carbon emission reduction [11]. However, the company's ability to hide from investors will make him lose the trust of investors, because in this case investors cannot monitor the internal decision-making of the enterprise, also cannot know the management of climate risks. In this case, investors may suspect that there is a high-carbon operation, that is, there is no good carbon management. But if companies can disclose their carbon management plans on their own, giving investors a better understanding of their low-carbon strategies, it will clearly increase investor confidence in the company and allow its shares to rise. So, when a company can enhance the transparency of its carbon information, it can give investors more confidence, which can even reduce the cost of financing while improving the efficiency of financing [12].

#### **4.4 Improvement of the ESG database**

Because of the government's increasing concern about environmental governance, the government's policy in the area of ESG and climate change has become more stringent, which also put forward higher requirements for the ESG database, but the current fund managers for the long-term green bond investment strategy control still needs to be improved, which is why their management of green bonds lag, the understanding is not enough [13]. The Chinese government has also set a goal of achieving carbon-to-carbon sequestration by 2060, a severe test for companies with high carbon emissions and a difficult path to transformation. At the same time, this can also help the environment to be greatly improved, in order to protect the environment at the same time to enhance the awareness of enterprises to protect the environment [14]. For investors, they can improve their ESG databases to help these high-emissions companies improve their ESG performance, thereby increasing their competitiveness and recognition in the market.

### **5. CONCLUSION**

The effects of climate change have reached deep into every aspect of our lives, not only will it affect our health, but its enormous impact on the world economy has also attracted widespread attention. The causes of climate change are diverse, but the impact of human activities on them is far from supernatural, and in order to reduce the impact of climate change on markets, governments have put in place policies to promote the transition of high-carbon industries to low carbon. This also put

forward higher requirements for the technology of these enterprises, but this is also an opportunity for enterprise development, in the process of transformation of enterprises will be more favored by investors, so that their market value, so it can be seen that the response to climate change is very important. Finally, in order to reduce the risk of climate change, it is important for business companies to invest more in low-carbon technologies, increase transparency in carbon information, and pay close attention to market and policy changes, in addition to improving ESG performance. However, the methods mentioned in this article are pretty popular in China, but whether these methods can play a role in other countries keeps unclear. Apart from studying the effects of climate change on the Chinese market, the author will also research further on how the climate affects foreign markets, and the corresponding countermeasures.

### **AUTHORS' CONTRIBUTIONS**

This paper is independently completed by Jinghan Zheng.

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