



**The Competition and Cooperation of China, the US and the EU in
the Realm of Global Climate Governance**

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Abstract

This thesis explores the China, the United States and the European Union of their domestic or regional policy and stances in international climate negotiations. I borrow the concept of “relative gains” in neo-realism theory and two game models- the Prisoner's Dilemma Game Model and Stag Hunting Model to analyze the cause of the competition in the realm of the climate governance among the three key actors- China, the US and the EU. In order to pursuit relative gains, the three stakeholders have discords in economic and political interests. Besides, the pace and phase of their development is not in accordance to each other and they have different political system and cultural philosophy. Additionally, the international political economy theory and neo-liberal institutionalism are used for the analysis of the present situation and possibility of the international cooperation. The current situation of global climate governance among the three actors is that they are cooperating to promote the mitigation and adaption proceeding of climate change, meanwhile competing with each other. Thus their relationship in climate governance is cooperative, competitive and dynamic, which affects the international mechanism implementation efficiency under UNFCCC and impacts the GHG emission reduction results of global climate governance. The thesis illustrate that because of the deepening cognition and the common interests of all mankind, cooperation under international regimes is possible, but also full of competition at the current stage.

Key Words: global climate governance, competition, cooperation, China, the US, the EU

1. Introduction

Mitigation and adaptation to global climate change are a cross-boundary, multi-level, multi-sector and multi-actor challenge with the specific characteristics of long-lasting and uncertainty. Therefore, a large amount of different countries' sectors, strategies, actors and interests are affected. In light of obtained theories and derivations, my study of this thesis focus on examining the mix of policy and international regime/mechanism for climate governance based on the examples of China, the United States and the European Union with their specific regional and local contexts. By using the method of comparison, I am keen on to seek the answer for why they have to cooperate meanwhile compete with each other.

1.1 Background of the Topic

Climate governance is the diplomacy, mechanisms and response measures which is the “aim at steering social systems towards preventing, mitigating or adapting to the risks posed by climate change” (Jagers & Stripple, 2003). A definitive interpretation is complicated by the wide range of political and social science traditions (including comparative politics, political economy and multilevel governance) that are engaged in conceiving and analyzing climate governance at different levels and across different arenas. The term “global climate governance” came to public in 1979 when the first World Climate Conference organized by World Meteorological Organization. Later on, Intergovernmental Panel on Climate Change (IPCC) was established in 1988, which could be seen as the starting of global climate governance. The issue of climate change is a survival problem of all human beings. In the process of global climate change governance, the EU has played a precursor role for its leading the process of global climate governance because of earliest started industrialization and latest governance experience; the United States has played an important role as a former superpower in the climate negotiation process, but this is closely related to the domestic economic and political situation, and the new president has a negative attitude towards climate problems; With the rapid development of China's economy, its power is stronger in developing countries and its international status has risen.

China pays more attention to the right of discourse and international cooperation in climate governance and together with the EU and the US playing significant role.

After the end of the cold war, the issue of international relations has changed from the traditional "high politics" to non-traditional security fields such as population crisis, environmental destruction, climate change, north-south gap and other issues. In this process, the interaction between national sovereignty and international mechanism reflects some academic ideas are changing from zero-sum game to multiple benefits game. (Baldwin, 1993)

Within the scope of climate change governance, a large number of scholars have mainly focused on time node before and after the Copenhagen Climate Conference, while the study of the Paris Climate Conference and latest Marrakech Conference is still rare and need to update. My thesis mainly focus on the period after the financial crisis, in order to see how have China, the US and the EU played the game in the field of climate governance through evaluating the leadership of the three players and analyzing the reasons of their relatively positions changing. Finally, on the basis of analyzing the causes of the change, my thesis reviews different negotiation outcome from the Copenhagen Climate Conference to Paris Climate Conference. I hope that through the analysis of how and why China, the US and the EU compete meanwhile cooperate in global climate change governance, to a certain extent, which can make us have a deeper understanding of the game between the three powers and better cope with climate change in the future.

1.2 Innovation of the Thesis

My paper deduces similar opinions based on the mainstream scholars' arguments, but stresses that under the rational choice in realism, there still exists the optimization solution which obeys the law of human society development and the global common interests, or can be called a reflection and combination of neo-realism and neo-liberalism. I agree with Keohane's opinion that realism and liberalism are not

completely opposite to each other. He also suggests to gather more evidence on effects of institutions and to go on more research at level of the state (Keohane, 1993). So I try to study the global governance on both domestic and international level.

From the horizontal comparison dimension, the studies that combined China, the US and the EU all together only have a small amount. In the research methods, the theoretical paradigm I choose is based on the needs to explain the competition and cooperation, as well as in accordance with my personal academic background- Public Diplomacy and Cultural & Communication and China and International Relations, therefore it has a relatively unique features. I attempt to study the climate change problems with both qualitative and quantitative data with international relations theories and first hand material I obtained from my intern in China Renewable Energy Industries Association (CREIA). The global climate governance is a huge and hard topic, but it also needs studying in depth in order to minimize the negative impact on people's daily life and to improve the development of human civilization. So I try to narrow down the scope on analyze why under the fierce competition, the three influential parts-China, the US and the EU can still maintain a cooperative relationship, as well as the future prospect of global climate governance.

1.3 Problem Formulation

Why can the three actors eventually reach the Paris Agreement after their divergence at Copenhagen Conference?

The sub-questions are:

- How did the three actors compete and cooperate with each other in realm of global climate change?

- What climate change policies China, the US and the EU have adopted at their domestic level?

- What stances China, the US and the EU have taken on the global climate negotiations under international regime/mechanism?

- Why they have to cooperate meanwhile compete with each other?

2. Literature Review

In phase of reading background material and collecting data, I find both Chinese and English material relevant to global climate governance and international relations from China National Knowledge Infrastructure, Social Science Publishing House website and Denmark Aalborg University library search engine.

2.1 Literature in Chinese

The issue of global climate change is from the natural scientific agenda to the international political agenda. It can be seen that the first World Meteorological Conference which was held in February 1979 was essentially a gathering of scientists and the global climate governance start when the Intergovernmental Panel on Climate Change (IPCC) established. The World Meteorological Organization further supports climate change assessments by providing data and models and by hosting and co-sponsoring IPCC, the Global Climate Observing System (GCOS) and the World Climate Research Program (WCRP). Then with this problem is widely concerned, the discussion expand to governments and become a global issue. At the UN General Assembly, the delegates agreed to start a Framework Convention on Climate Change as soon as possible, finally disclosed in June 1992 the signed UNFCCC came into force in 1994.

At present, Chinese scholars research on climate change from perspectives of international relations in the following four: the first researches are focus on global climate change governance mechanism or international climate change negotiations; the second is studying the EU's position and leading role in global climate governance; the third is some scholars have analyzed China stance, action and role in the international climate change negotiations in; fourth, some works discussed the United States and other major powers in the field of climate change. Such as Ge Hanwen's article studying climate change governance mechanism asking and trying to answer the question: which entity should be responsible for formulation, supervision,

operation and maintenance of the climate change governance mechanism. (Ge, 2005) As one of the specific areas of international relations, global climate governance should also be regarded as a functional international mechanism. The climate problem is a global problem, which restricts the national sovereignty, affects the national strength, and guides the international ethics. The classical theory of realism in international relations believes that the status and role of the state in the international power system is depended on the strength of the state. When a country has strong economic strength, it will often be more powerful in the international mechanism. This is also an important reason for I choose China the US and the EU as key study cases, because these three subjects are not only hinges to the international relations, but also significantly impact the international mechanism of climate governance.

From the economic perspective, the domestic scholars study the construction of the mechanism of carbon tax and carbon emission tax, such as Jing Kedi, mainly introduce the basic countermeasure frame and system of the international community in dealing with global climate change. (Jin, 2014) As well as they step into further thematic study in China's carbon budget proposal on a framework for an equitable and sustainable international climate regime. Chen Ying, director of Sustainable Development Office of the Institute for Urban and Environmental Studies, holds the view that carbon tariffs are a policy tool in some developed countries to appease internal and external pressures, which means Chinese exports will bear the brunt of carbon tariffs in Europe and America. (Chen, 2012) Additionally, Zheng Shuang has written a book- The Development of International Carbon Market and Its Influence on China to describe the current situation of carbon market in the EU, the US, Australia, Japan and Russia and analyze what experiences and measures can be taken to build carbon market in China. (Zheng, 2013)

Some scholars engaged in applied researches studying the scientific methods of developed countries in global climate governance and having influence on China's

policy making. For example, the director of the Shanghai Institute for International Studies in Comparative Politics and Public Policy Institute researcher Yu Hongyuan, who obtained the relevant material in American Center for strategic and International Studies and analyzes the situation of climate governance from the perspective of institutional construction and multilateral force game. (Yu, 2010) He encourages Chinese government to take the chance of the possible transfer leadership in global climate governance diplomacy. In addition, Pan Jiahua, current director of the Institute for Urban and Environmental Studies and Chinese Academy of Social Science, has learned China's the current status and potentials for 2020 in green economy, giving policy makers suggestions on energy supply, public transportation, forest management and new technology to accelerate China's green transition. (Pan, 2012) What is more, Scholar Gan Junxian represent the mainstream positive view in China's climate governance that the current time China has played a leading role in both domestic and international levels, which has a significant impact on global climate governance model and path in the near future. (Gan, 2016) He believes that China needs to strengthen Climate Governance on two levels, one is to improve the country's ability to deal with climate issues, and the other is to improve the country's participation in global climate cooperation.

2.2 Literature in English

The research of non-Chinese scholars on climate change is more extensive in scope, from the original focus on the field of natural science research on meteorology to both a wide range of humanities and social sciences. Because my thesis is within International Relations framework, so review the researches on climate governance through the perspectives of IR as follow.

In wide field of humanities and social sciences, foreign scholars also mainly study the climate governance policies of the influential states implementing and international climate negotiation. For instance, transfer from the debate the uncertainty of climate

change, scholars look into present scientific knowledge about how and why the climate is changing, how it is likely to change over and what can be done with the associated mighty impacts. Andrew E. Dessler and Edward A. Parson discussed the relations between science and politics in their book *The Science and Politics of Global Climate Change* (Dessler & Parson, 2006). Besides, international law scholar Kenneth W. Abbott studies the legitimacy of global environmental governance within the international community, claiming that the national actors is still of most power but the non national, market driven governance system is trying a different path. (Abbott, 2012) For instance, some studies can be identified that links municipal and sub-national climate policy with transnational municipal networks as a distinct form of governance. Exploring the link between city's specific characteristics (such as being hubs of international economic and policy interactions) and membership in transnational municipal networks, they think globalization is a driving factor for city participation in transnational networks. (Bansard, Pattberg, & Widerberg, 2016)

Jörg Knieling conceptualizes “climate change governance” and summarizes the challenges for governments, economic administration, enterprises and civil society. He and Walter Leal Filho edit the book *Climate Change Governance to supply theoretical* and conceptual framing of climate governance and use case study to depict the policy- related and business- related approaches in climate governance. (Knieling & Filho, 2013) In this book the scholars explore the concept of climate governance and discuss normative principles for designing policies in adaptation to climate change. One of the articles in the book describe theoretical considerations and practical approaches used in the preparation of Latvian policy to climate change as case study, and at last it conclude the importance of making climate change policy under the normative frame of UNFCCC and its relevant project. In another chapter of this book analyzes the institutional development approaches that may be adopted to enhance the capacity of developing countries facing the consequences and challenges of climate. They conclude there is need for national-level leadership in formulating

policies and legislation to provide a framework for dealing with the impact of climate change. Besides, the non-governmental organizations should be put in formal and informal arrangements under the frame and for sure developing countries ought to cooperate with each other in sharing information and building organizational and technical capacity to deal with climate change issues.

Researchers like Christine Bakker and Francesco Francioni edited book *The EU, the US and Global Climate Governance* to study the drivers and future of transatlantic power, reckoning that the leadership of global climate governance would hand over to the US. The book reviews the key environmental challenges including climate change challenges, concept and approaches; examines the role of global actors, institutions and processes; and considers the links between the global economy and climate change politics. They stress that experience with aid has shown the importance of harmonization of international financial flows. It is important for the community to coordinate their actions, simplify procedures, and share information to avoid proliferation and duplication of funding mechanisms. (Bakker & Francioni, 2016) In sum, sub-national governments might be markedly shaping the climate leadership narrative, but transnational municipal networks are not yet the representative, ambitious and transparent player they are thought to be.

The Climate Change Economics is a journal I have looked up, for it provides insight into several critical but uncertain areas related to the future climate governance investment environment. For example in terms of where capital expenditures may need to flow regionally, into which sectors they might be concentrated, and what policies could be helpful in spurring these financial resources. They find that stringent climate policies consistent with a 2°C climate change target would require a considerable up scaling of investments into low-carbon energy and energy efficiency, reaching approximately \$45 trillion (range: \$30–\$75 trillion) cumulative between 2010 and 2050, or about \$1.1 trillion annually. This represents an increase of some

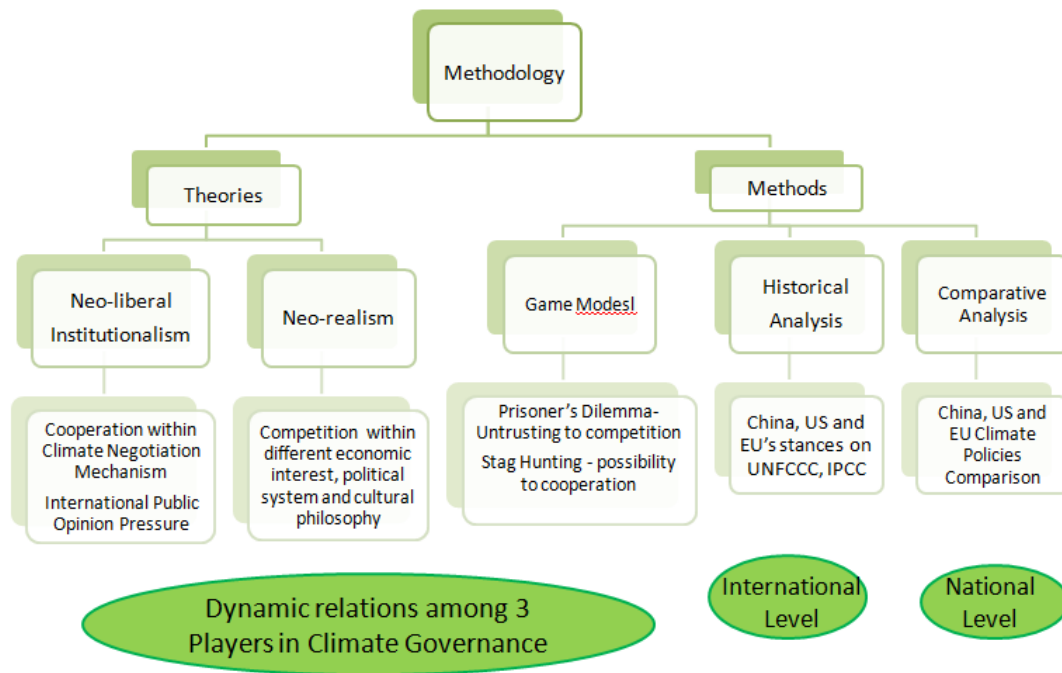
\$30 trillion (\$10–\$55 trillion), or \$0.8 trillion per year, beyond what investments might otherwise be in a reference scenario that assumes the continuation of present and planned emissions-reducing policies throughout the world. In other words, a substantial "clean-energy investment gap" of some \$800 billion per year exists — notably on the same order of magnitude as present-day subsidies for fossil energy and electricity worldwide (\$523 billion). Unless the gap is filled rather quickly, the 2°C target could potentially become out of reach (McCollum, 2013). It is also related closely to my thesis writing and worth to note that emerging research direction is focusing on the institutional accountabilities and capability for change involved in effective global climate governance, from a perspective of individual organizations involved, as well as systemic responsiveness to people most affected by climate change (Hammer et al., 2012).

3. Methodological Consideration

This section contains two parts: the first part introduces the scientific study methods supporting the main content and the following part demonstrates what theories I will use later. In addition, the empirical analysis in case study and discussion parts explore the different interests and logic behind the actions of affected stakeholders to identify and categorize options for future mitigation and adaptation measures.

3.1 Diagram of the Structure

Here I draw a diagram to explain how I can use the methods of historical literature review and comparative analysis to answer the sub-question of my problem formulation: how did the three actors compete and cooperate with each other, both on domestic and international levels. Furthermore, by using neo-liberalism, neo-realism and game theory to answer why the three actors have to cooperate meanwhile compete with each other.



3.2 Sources and Data

The sources of my thesis mostly use relevant secondary sources in a wide range, such as electronic official documents, concrete books, academic literature, scholarly research papers and articles, theses or presentations from previous conferences and lectures. They are mainly from the classical works of international relations: Robert O. Keohane's *After Hegemony: Cooperation and Discord in the World Political Economy*; Kenneth N. Waltz's book *the Theory of International Politics* and *Neo-realism and Neo-liberalism: the Contemporary Debate* edited by David A. Baldwin. Additionally, I reviewed journals such as *Global Environmental Politics* and *Climate Policy* to have knowledge of other scholars' arguments. Each section in the analysis applies multiple sources. The research is largely based on a qualitative analysis but quantitative methods are also applied to provide direct evidences. Besides, a deductive approach is utilized.

The first hand statistics and data used in the thesis are from the World Bank, Organization for Economic Cooperation and Development, US Energy Information Administration, International Energy Agency, European Environment Agency and PRC's Ministry of Environmental Protection. I choose to use the latest data and make

all the figure and tables by my own.

3.3 Historical Method, Comparative Analysis Method and Game Model

3.3.1 Historical Method

To complete a social science paper decently needs to read a large number of related academic works and to track the latest developments in the field of relevant research topic before writing. After determining the topics, it needs to collecting relevant information, through analysis, reading, sorting and refining on the latest progress in research topics. On this basis, I use historical method to trace China, US, and the EU's domestic and foreign climate change policy and need to apply the theories which match the content I want to express, then to put forward my own views and suggestions for the topic, so as to make a comprehensive academic research. In the former part of this chapter, I have combed the important scholars both Chinese and non-Chinese in the field of climate change governance and found their related basic research directions and general opinions.

3.3.2 Comparative Analysis Method

In logic, the form of thinking from the individual to the general is called induction. On contrary, the contrast method is to find the common rules or different orders in comparing the large amount of different things. By using the methods of induction and comparison, the scattered and non systematic knowledge can be systematized and theorized, and the similarities and differences of the objects can be found out in the process. This thesis makes a contrastive analysis in the application of comparative analysis method and neo-realism power and political-economic interest theory, which will compare China, the US and the EU's climate governance policies, including the three state-actors' domestic or regional integration climate governance diachronic comparison in recent years. In addition, it will also make a synchronic comparison of their positions and stances in global climate governance under key international climate mechanism and the important negotiation nodes.

3.3.3 Game Model

Game theory is elaborated as a methodological approach to international politics by contrasting it with metaphorical and analogical uses of games. Because it embraces a diversity of models, game theory is especially useful for capturing the most important contextual features of the international system that affect prospects for international cooperation. (Snidal, 1985) Structural realism holds that the nature of the international structure is defined by its ordering principle, anarchy, and by the distribution of capabilities (measured by the number of great powers within the international system). The anarchic ordering principle of the international structure is decentralized, meaning there is no formal central authority; every sovereign state is formally equal in this system. These states act according to the logic of self-help, means that states seek their own interest and will not subordinate their interest to the interests of other states. (Mearsheimer, 2014) States are assumed by using any means to ensure their own survival as this is a prerequisite to pursue other goals. This lacking of trust, based on uncertainty, is called the security dilemma. Later I will use two game models known as Prison's Dilemma to explain why countries compete with each other in climate governance cooperation.

States are deemed similar in terms of needs but not in capabilities for achieving them. The positional placement of states in terms of abilities determines the distribution of capabilities. The structural distribution of capabilities then limits cooperation among states through fears of relative gains made by other states, and the possibility of dependence on other states. The desire and relative abilities of each state to maximize relative power constrain each other, resulting in a balance of power, which shapes international relations. It also gives rise to the security dilemma that all nations face. There are two ways in which states balance power: internal balancing and external balancing. Internal balancing occurs as states grow their own capabilities by increasing economic growth or increasing military spending. External balancing occurs as states enter into alliances to check the power of more powerful states or

alliances. Due to the analogical situation in climate governance, I will use a stag hunting game model (also called Rousseau game model) to demonstrate the optimal solution of strengthening internal capability and enhance the external cooperation to cope with global climate change.

3.4 Limitations

This thesis is based on the theories of international relations to study the global climate governance, thus the analysis subjects are national states- China and the United States or integration state like the European Union. However, the trend of privatized, non-governmental organizations/committees and market-based governance mechanisms for climate change mitigation has been able to see. And there already have been some scholars observing and focusing on relevant research as I mentioned in the literature review. Therefore, the non-governmental actors should be studied further in the realm of climate governance for the next step. To make up for the deficiency, I mentioned the multi-level actors in discussion section and focus on the role of public opinion and society consciousness in my thesis.

4. Theory

4.1 Neo-realism

Neo-realism, or structural realism, is a theory of international relations, outlined by Kenneth Waltz in his 1979 book *Theory of International Politics*. Waltz made a clear exposition in his international political theory about neo-realism, he believes the ultimate concern of a nation is not the state power, but the security of the world. Power is not a purpose, but a means and a tool, that countries will make the primacy in security, thus they will not give up the current obtained safety for other interests. Waltz argues in favor of a systemic realist approach: the international structure acts as a constraint on state behavior, so that different states behave in a similar rational manner, and outcomes fall within an expected range. (Waltz, 1979) Actually, at first I want to use the neoliberal international relations theory alone in y thesis, but as it still

has some limitations in theory and practice, which is insufficient to solve the key problems such as power distribution in international society, national identity and state sovereignty, so in the process of analysis on global climate governance I will also use the neo-realism theory to remedy the defects of too ideal liberalism.

The concept of “relative gain” in international relations theory is the actions of states only in respect to power balances and without regard to other factors, such as economics. In international relations, cooperation may be necessary to balance power, but concern for relative gains will limit that cooperation due to the low quality of information about other states' behavior and interests. Relative gain is related to zero-sum game, which states that wealth cannot be expanded and the only way a state can become richer is to take wealth from another state. However comes to the issue of climate change, it is actually not a zero-sum game. On the micro level, countries with resources can transfer highly polluting and highly emission enterprises to other countries at present, but the atmospheric circulation and marine pollution are spreading all over the world, and the global ecosystem is a whole. Although the natural resources on the earth are limited, it is much wiser to save costs, increase efficiency and develop renewable energy by means of cooperation, rather than cut-throat competing against each other.

Neo-realists contend that there are essentially three possible systems according to changes in the distribution of capabilities, defined by the number of great powers within the international system. A uni-polar system contains only one great power, a bipolar system contains two great powers, and a multi-polar system contains more than two great powers. Neo-realists conclude that a bipolar system is more stable (less prone to great power war and systemic change) than a multi-polar system because balancing can only occur through internal balancing as there are no extra great powers with which to form alliances. (Waltz, 1979) Because there is only internal balancing in a bipolar system, rather than external balancing, there is less opportunity for

miscalculations and therefore less chance of great power conflicts. That is a simplification and a theoretical ideal. (Adam, 2012) Additionally the change of international system structure is caused by each unit strength contrast change, resulting from changes in the number of national states. He also believes in the cooperation of international relations, competitive relations still play a role and more powerful countries will account for a larger share of income and benefit in the cooperation (Baldwin, 1993). Though realism also has serious problems in research of cooperation, neo-liberal institutionalism is inadequate as a critique of realism and as a basis for analysis of real-world international cooperation (Grieco, 1992).

4.2 Neo-liberal Institutionalism

Neo-liberalism refers to a school of thought which believes that nation-states are, or at least should be, concerned first and foremost with absolute gains (economic, political strategic, etc.), rather than relative gains to other nation-states. Since their approach tends to emphasize the possibility of mutual wins, they are interested in institutions which can arrange jointly profitable arrangements and compromises. The main viewpoints of neo-liberalism include: Firstly, the whole world is interdependent. With the strengthening in multi polarization trend of the world politics and economy, many subjects are active in the international society, so the national states are no longer the role of the traditional center of the international arena. Secondly, the international system includes two parts: the structure and process, which emphasizes the role of the interaction of institution and power system model. Thirdly, countries for international cooperation intend to obtain the "absolute benefit", so all the countries in the process of international communication only need to pay attention to their own benefits; however they do not need to consider other states' relative benefit is more or less. Fourthly, in order to strengthen the cooperation between the countries and solve the international anarchy, the state should use its rationality to establish international mechanisms, rules and systems.

Neoliberal international relations thinkers often employ game theory to explain why states do or do not cooperate; since their approach tends to emphasize the possibility of mutual wins, they are interested in institutions which can arrange jointly profitable arrangements and compromises. Neo-liberalism argues that even in an anarchic system of autonomous rational states, cooperation can emerge through the cultivation of mutual trust and the building of norms, regimes and institutions.

Institutionalism emphasized the role of shared interests created by economic interdependence and the effects of institutions. International institutions are defined as “relatively stable sets of constitutive, regulative and procedural norms and rules that pertain to international system, the actors (including states and non-state entities) in the system and their activities. (Duffield, 2007)” But I think there is difference between institution and regime, that is to say institution is a concrete organization to practice and fulfill the value of a regime. Regime theory reflects the value of neo-liberal institutionalism, which argues that nation-states are the central actors in global negotiations, with civil society playing only a minor or supportive role in shaping outcomes. Regimes are defined as sets of principles, norms, rules and decision-making procedures around which actor expectations converge in a given issue area (Krasner, 1982). Young, Keohane and Nye are leading advocates of regime theory (Nye, 1991). As climate change is a global phenomenon, regime theorists focus on mitigation rather than adaptation. The climate regime reflects this strand, though talks of increasing cooperation about adaptation are present. This is due to the mutuality of interests in mitigation. Regime theory reflects the values of liberal institutionalism, which considers international institutions to be a force in global politics. For environmental problems straddling the global commons, it is difficult to draw a dichotomy, as statist model does, in policy debates between domestic and international sphere, and it is in these common issues that international organizations play an active role. For this reason, Rosenau challenged the statist model in his work on global governance (Rosenau, 1997). This is true particularly in climate change

diplomacy, as the UNFCCC Secretariat, the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the World Bank and some other bodies play very important roles in articulating and setting the agenda for discussion.

In Bulkeley and Newell's book, they present a critique of this power-based regime theory. According to them, regimes are formed and dominated by hegemony. Unlike power-based accounts, functionalists of interest-based approaches to regimes are concerned with how different institutional designs shape and affect the behavior of nations (Bulkeley & Newell, 2010). Along these lines, a political economy critique states that these institutions, with the agenda of promoting neo-liberal market philosophy, help capital formation and perpetuate the existing order. Tanner and Allouche argue that within a liberal-market system, climate change is seen as a challenge that threatens to derail progress in poverty reduction and the dominant mode of capitalist development (Tanner, 2011). Newell and Paterson argue that, as a result of corporate power, international capital's response to climate change is weak (Newell & Paterson, 1998).

Compared to regime theory's 'high politics' approach to international relations, political ecology brings in the 'low politics' issues of global politics, such as inequality, poverty, structural weaknesses and the ethical and justice dimensions, including compensation for damages around which the climate change debate is centred (Abdullah et al., 2009). Saurin argues that non-recognition of political ecology considerations in climate change is hardly surprising and this is reflected in ignoring scholars writing about social, political and economic conditions because they are largely unconcerned with the state system (Saurin, 2001). Thus, political ecology is viewed as presenting an alternative to conventional analyses of the climate regime by its way of explaining economic rationality through social and environmental lenses (Glover, 2006). It is concerned more with the implications of Convention outcomes

for ecological justice among present and future generations and for non-human life, and also with applying the ‘Commons’ concept to the global atmosphere (Brown D. A., 2002). Singer argues that national boundaries, in their traditional conceptualizations, are rendered obsolete by global environmental problems such as climate change (Singer, 2004). Actually, realism and institutionalism theories are both able to account for the order that characterized the world political economy during the twenty years after WW II, but they deduce so in different ways. (Keohane, 1984) Therefore, a synthesis of realism and institutionalism is necessary.

In summary, the analysis part will apply both the theories of neo-realism and neo-liberal institutionalism, discussing the three actors’ climate governance games and negotiations with their differences core interests in global climate governance, and finally to explain the three trilateral relations constitute and look forwards to the future development trend of global climate governance.

5. Analysis

The term “global climate governance” came to public mass eyes in 1979 when the first World Climate Conference organized by World Meteorological Organization. Later on, Intergovernmental Panel on Climate Change (IPCC) was established in 1988, which could be seen as the starting of global climate governance. This section includes the longitudinal diachronic policies combing of China the United States and European Union within their respective areas of climate governance, their positions and stances of the international climate mechanism, the relationship between GDP and carbon emission reduction actions, and the game model used for simulate negotiation in climate governance and its dilemma, in order to compare the three parts’ similarities and differences for climate change governance and to find the reasons of the competition with cooperation among the three.

5.1 China, the US and the EU's Climate Policy Comparison

5.1.1 The Climate Policy of China

China's climate governance policy was set up clearly in 2008 during the eleventh National People's Congress in the government work report (Qi & Winchester, 2016). It has claimed that "China should implement the national plan to combat climate change and strengthen the capacity building for climate change adaptation." In 2009, the Standing Committee of the National People's Congress (SCNPC) passed the resolution of the SCNPC on actively responding to climate change draft. After the Copenhagen Climate Conference, China announced quantitative objectives for controlling greenhouse gas emissions, deciding that by 2020, the unit GDP carbon dioxide emissions decreased by 40%-45% compared to 2005. From 2010, China has made it a binding index and long-term planning for the national economic and social development formally, and developed the corresponding domestic statistics, monitoring, assessment methods to reduce carbon emissions. In August 2010, the National Development and Reform Commission launched Low Carbon Pilot Plan, determined to carry out carbon emissions trading pilot in Beijing, Tianjin, Shanghai, Chongqing, Guangdong, Hubei, Shenzhen, covering 700 million tons of carbon emissions quotas, involving manufacturing power, steel and cement, petrochemical and related services. The third Plenary Session of the 18th CPC Central Committee also stressed the promotion of carbon emissions trading system. Since 2011, China has invested 410 million RMB to help dozens of countries to improve the response to climate change infrastructure, strengthen the ability to respond to climate change. In June 2015, China submitted the "action to strengthen climate change - China's national contribution"- putting forward China to address climate change action objectives, path and policy measures for 2020 to 2030. On September 2015, Xi Jinping announced at the UN summit that China will set up the China and South-South Cooperation Fund for climate change governance. At the Paris Conference, China pledged to start in to carry out 10 low-carbon demonstration zones in the developing countries, the 1000 projects to mitigate and adapt to climate change,

and the number of training programs (Liu, 2016.4.8). China published the “China Energy Outlook 2030” report on 1 March 2016, which indicates that its GHG emissions may reach peak earlier than 2030 if the share of low-carbon energy is enhanced. New attention is being given to this.

Also, under its 13th National Economic and Social Development Planning (2016-2020) China has included a chapter on “Actively Addressing Climate Change” which calls for a priority to be placed on actions to control GHG emissions in the energy and industrial sectors; for pilot low-carbon cities to be launched to help ensure early peaking; and for near-zero-emission engineering projects to be demonstrated. This chapter also calls for the establishment of a nationwide emission trading scheme, and for measures related to emission accounting and emission standards to be enforced. There are currently 42 Pilot Low-Carbon Cities in China, and the government plans to expand that number to 100 by the end of 2016. All of them are being asked to set their targets for peaking emissions earlier than 2030. Moreover, the National Development and Reform Commission and the Ministry of Housing, Urban and Rural Development issued the “Adaptation Action Plan of Cities” on 17 February 2016, to guide policies and actions for enhancing the resilience of cities to climate change (Lu, 2016).

5.1.2 The Climate Policy of the US

Only after China, the United States is world's second largest emitters of GHG, which makes the United States play an important role in climate governance. From a historical perspective, the United States played one of the dominant roles in climate negotiations and the key players in global climate governance.

During the George Herbert Walker Bush, he promised to take more positive environmental protection policy than Reagan. Faced opposition pressure from the business community the Bush administration passed some important legislation from

1990 to 1992 and extended the Clean Air Act. But at the global level, even though many industrialized countries advocate to develop greenhouse gas emissions legally binding targets and timetables on climate change, the United States' view on the UNFCCC is different from the mainstream view of international community, that means the US does not accept the seventh rule in Convention, besides American reject the responsibility or obligation in climate change meanwhile against any weakening responsibility of developing countries.

The Clinton administration associated the climate change problem with national security, enhance the priority of climate issues on the US political agenda, but in this phase the multilateral climate cooperation has not achieved substantial results. Clinton signed the Kyoto protocol but it has not been submitted to the U.S. Congress, which means that the US has the legality to not fulfill the relevant commitments of the protocol. In addition, when the US Senate and House of Representatives, although not directly against the "the principle of common but differentiated responsibilities" of global climate change governance, the US denied that the "Kyoto Protocol" is a completely balanced agreement.

During the administration of George W. Bush, the climate policy presents a situation that at first to suppress then uplift. Compared to the Clinton administration, climate issues in the status of George W. Bush showed further decline foreign policy agenda. Shortly after he took place, the US announced its withdrawal from the Kyoto Protocol. The direct aim is to give priority to the protection of the economic growth and competitiveness for the core of national interests of America. But with the scientific consensus on climate change and the increasing international criticism of the United States, George W. Bush has made a new change in climate change governance. In 2005, he launched the Asia Pacific Partnership Plan (APP) on Clean Development and Climate. was an international, voluntary, public-private partnership among Australia, Canada, India, Japan, the People's Republic of China, South Korea, and the United

States announced July 28, 2005 at an Association of South East Asian Nations (ASEAN) Regional Forum meeting and launched on January 12, 2006 at the Partnership's inaugural Ministerial meeting in Sydney. (However, the conclusion of the APP and cancellation of many of its projects attracted almost no media comment.) At the G8 summit in July 2007, the US accepted the global target of reducing emissions by 50% before 2050, and rhetorically supported the IPCC's fourth assessment report and the Bali Roadmap. In September 2007, the George W. Bush administration proposed to hold the Major Economies Forum on Energy and Climate Change (MEF) and invite 15 national representatives, trying to reshape for the principle of global climate change mechanisms and norms of consensus in international society, particularly on the norms of equality and fulfill the flexibility, so that to prevent the US economy caused by excessive burden. From 2005 to 2009, the United States mayor's climate protection agreement signed also can see the U.S. government's focus on climate change has been strengthened, from the initial 141 cities to the last all 50 states have joined the agreement. (Fu, 2012)

The last U.S. President Obama in the election campaign has repeatedly called on to focus on the relationship between climate change and human factors, and stressed the need to actively respond to the problem. In the inauguration ceremony in 2009, Obama has made green politics of as the theme of inauguration, that green new deal has become the world's expectations of his government. At the 2009 Copenhagen climate conference, Obama promised to reduce America's total GHG emissions by 17% before 2020 based on the emission of 2005. Climate change has become a major priority in Obama's presidency, and has also become his main political legacy. In 2013, the White House Presidential Office released the U.S. president's climate action plan to explain in Obama's second term attempt to take a package of measures to deal with climate change. According to the White House work record, since the beginning of 2015 to the end of August 2015, Obama launched new initiatives to address climate change every 4.5 days averagely. (Liu , 2015) At present, the federal level of ongoing

climate governance action is mainly through the Executive Office of the president, the Council on environmental quality, the Revitalization and Reinvestment Act", the "Climate Action Plan" promulgated in 2013 to standardize and implement. Among them, the Executive Office of the president through presidential executive order to implement climate action; the function of Council on Environmental Quality is to coordinate federal climate agencies and the White House; "the American Recovery and Reinvestment Act" mainly focus on providing funding and policy to support for clean energy development and climate science research; the "Climate Action Plan" is mainly dependent on the United States Environmental Protection Agency and to launch a wide-ranging action in order to promote efforts to deal with climate change in the US and the global level. The plan consists of three major areas- emission reduction, adaption and mitigation, as well as international cooperation, lists 75 goals to achieve in the federal level to deal with climate change.

5.1.3 The Climate Policy of the EU

We can distinguish three main phases in the development of EU climate policy: 1988-1997 (up to and including the Kyoto Protocol); 1998 to 2004 (gearing up to the new drive); and 2005-present (the new drive and beyond). The EU climate change governance policies including adapt to the impacts of climate change policies and climate change mitigation policy, which contains the carbon emissions trading policy, carbon capture and storage policy, renewable energy policy, energy efficiency policies and transportation policy.

The European Parliament adopted the first official EU document on climate change in the form of a resolution in 1986, setting in motion the interplay between global governance and EU development. Latter on the Toronto Conference in June 1988 stands as a land mark for the heightened international attention to climate change, as it produced the first proposed international emissions reductions target: a 20% reduction of CO₂ emissions by 2005. In the same year, UNEP and WMO established the Intergovernmental Panel on Climate Change (IPCC), which spurred further EU action.

The first commission communication on the greenhouse issue was issued in 1988, recommending further scientific studies and review of policy options. The interplay between international developments and EU initiatives continued during the spring of 1990, the use of economic and fiscal instruments in environmental policy was discussed within the Commission, including the question of a tax on CO₂ emissions; hereafter refer to as a “carbon tax”. In October 1990, prior to an upcoming World Conference on Climate Change, Council agreement was reached on stabilizing EU CO₂ emission at 1990 levels by 2000. However, the Council did not manage to adopt any of the proposals prior to the Rio Conference. This was mainly due to the carbon tax proposal, which proved too controversial for member states to accept. In particular, a small but active group of member states led by UK campaigned against it. In February 1997, after two years of internal deliberations, the EU was able to hammer out an agreement on a 15% common target, combined with differentiated internal target (Ringius, 1999). This enabled the EU to stand out as the most ambitious of the major global actors.

In the second phase during 1998-2004, the EU broadened its climate policy portfolio, most notably by managing to establish a key market measure: the Emission Trade System (ETS). This was accompanied by other EU-level policies such as the directives on renewable energy, Even though EU climate policy became far more elaborate during this period, it was still marked by low centralization of control, with significant authority left in hands of the member states. In essence, this phase was characterized by efforts directed at Kyoto Protocol implementation and the group of actors positive to a stronger EU climate policy expanded. Central industrial actors welcomed the adoption of the ETS as the cornerstone of climate policy.

From 2005 and onwards, the EU took up the new drive of climate governance. In February 2005, the Commission responded by issuing “Winning the Battle Against Global Climate Change”, noting that the EU would have to strengthen its internal

climate policy, drawing attention on carbon capture and storage (CCS) and announced European Climate Change Program II. The vision and rhetoric were certainly bold: the EU aimed at gaining “world leadership in a diverse portfolio of clean, efficient and low-emission energy technologies.” (European Commission, 2007) further policy development in the form of launching of a specific climate and energy policy package was planned for the autumn of 2007, in order to underpin EU positions and leadership at the global climate meeting in Bali. In this phase the EU moved to a new level of climate policy making, as France, Germany and UK perform positive with strong presidency. Even after the Copenhagen Conference, which turned out to be a failure, the EU has remained a great role in climate governance. (Boasson & Wettstad, 2013)

Through combing above it is generally believed that the European Union has played a leading role in the establishment of the international climate regime and the negotiation process since 1990s to 2010 (Cao, 2015). The EU became the main leader in international climate negotiations and institutional construction in 2001 with the US withdrew from the "Kyoto Protocol". At the same time, under the pressure of the "leader" status, the EU will take advantages of the driving force to accelerate the internal climate legislation, establish a market mechanism based on the core carbon emissions trading system (EU-ETS), further integrate internal climate and energy policy, forming its unique concept of global climate governance. According to the theory of hegemonic stability, the hegemony, or dominant power, assumes leadership, perhaps for the entire globe, in dealing with a particular issue (Viotti & Kauppi, 1987). Thus, the EU is seen as a leadership in global climate change governance.

From the above analysis we can see that the policies and regulations settings within China, the US and the EU to reduce carbon emissions and enhance them to tackle climate change resilience, improve their ability to adapt to climate change. At the diplomatic level, China and the US and the EU are fighting for the right to speak and

build the core leadership of the international climate governance negotiations, in order to increase the influence of all parties in global climate governance. And the three parties are actively participating in and acting as a leading role in the field of climate change under the stable condition of their own domestic economy and politics.

5.2 China, the US and the EU's Position of the International Climate Mechanism

The research for international climate regime mainly focused on the United Nations Framework Convention on Climate Change (UNFCCC) and annual climate conference under the frame, in fact the international climate mechanism also includes international institutions: the Intergovernmental Panel on Climate Change (IPCC) held by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO), as well as the Green Climate Fund (GCF) headquartered in Korea and Global Climate Forum (GCF) located in Germany. In this chapter, I will focus on these four mechanisms as a whole reference to the international climate mechanism, to analyze the position of China and the US and the EU's stances to the international climate mechanisms.

5.2.1 China, the US and the EU's Stances under UNFCCC

The formation of UNFCCC has been experienced a long time for member countries to reach an agreement. In March 1989, heads of government of the United States and European Union and China with other major countries representative issued the "Hague Declaration" which has called on countries all over the world to establish an international authoritative organization with legal decisive force, to promote international cooperation in global climate change (Wan, 2011). Although all the countries acknowledge the need for establishing authority mechanism in the international climate governance, but who should and could become the core of leadership is consulted and discussed lasting for one and a half years (February 1991 to May 1992). Finally in 1992 the United Nations Headquarters in New York achieved the UNFCCC motion, and 155 countries signed in Rio De Janeiro the United Nations Conference on Environment and Development in June 1992, including China, the US

and the EU. From this time, a meeting of all parties (by now reaching 197 countries) will be held every year to review the results of last year's emissions reduction and to check whether the current target is reasonable (UNFCCC, 2017).

The Copenhagen Accord, worked out by the leaders of Brazil, China, India, South Africa and the United States (US), is viewed as a return to realism, though some scholars disagree (Bernstein et al., 2010). Though the main concern of the Copenhagen Accord architects is mitigation, it contains rich references to adaptation. Two points may be mentioned: first, the urge for international cooperation for adaptation and, second, the need for a balanced allocation of the pledged amount of US\$30 billion between adaptation and mitigation. Vanderheiden (2008) further posits that the effects of climate change on other people with no spill over effect on a realist do not bother him. From this perspective, adaptation in developing countries is not a concern for rich states since it does not provide them with any direct benefit (Barrett, 2008). In contrast to this perspective, normative international political theory brings the issue of international justice into focus. Brown argues that normativism emphasises that states will act not just for self-interest but also in accordance with justice-related principles, whereby 'states receive what is their due or have the right to expect certain kinds of treatment' (Brown, 2002).

From Copenhagen to Paris, we can see that the negotiation process is continuously optimized. The Paris Climate Conference is one of the most mature negotiations since the Kyoto protocol was signed in 1997, and it has the latest substantive progress compared to the previous one. The 196 parties unanimously adopted the Paris Agreement reached a consensus on keeping the global average temperature increase within 2 degrees Celsius to 1.5 degrees Celsius compared with the pre industrial level. The parties will participate in the global climate governance in the form of independent contribution. With greater recognition of the consequences of climate change, the willingness to cooperate is more pressing. Countries like China, the US

and European countries have reached consensus on many issues through bilateral and multilateral agreements, so the Paris conference is more optimistic than ever before. However, the complexity and sensitivity of climate issues determine the existence of different national interests. In this section, I will analyze the latest positions of the China, the US and the EU in the Paris conference, so as to pave the way for further analyzing the factors that led to the parties for holding such a stance.

China actively submitted its "National Independent Contribution" beneath the framework of the Paris Agreement including reduction commitments in carbon dioxide emissions, emissions peak ratio, the proportion of non fossil energy consumption, forest volume and a series of goals. And for the first time, China held the side-meeting focus on the theme of "measurable, reportable and verifiable" (MRV) system in the conference on the national level. It is important to note that China has consistently adhered to the "common but differentiated responsibilities" in the Paris agreement from the "Kyoto Protocol". About the international supervision mechanism, China's stance has improved from the Copenhagen conference. In 2009 negotiations, China firmly believe that there is no way for international supervision practices once conflict with state sovereignty, but the attitude change can be seen in the Paris meeting that China is willing to take an open and transparent mechanism to cooperate with the United Nations on climate change supervision work. Overall, China has demonstrated its efforts in Paris to promote communication with the US and the EU, and actively participate in global climate governance.

At the Copenhagen Climate Conference (COP15) the US on behalf of the developed countries made a statement, saying that by 2020, the developed countries each year will provide 100 billion U.S. dollars to support the development of climate change governance. The goal is signed into the Paris Agreement, which has a legal validity at present. But on the issue of technology transfer, the position of the US at the Paris Conference is more negative. Because the biggest problem of technology transfer is

intellectual property, the US repeatedly claim that the intellectual property is in the hands of enterprises, the government has no right to let them transfer to the developing countries. Therefore there is not yet feasible appropriate method and mechanism for the US to provide emission reduction technical support to developing countries. Even though the position of the US in terms of climate adaption capacity building is very firm, as it called on developed countries join in the cooperation team under UNFCCC and UN law, in particular to the platform budget and project etc.. From the performance of the US in the Paris Agreement 2015, it can provide practical in capacity in climate change mitigation and adaption measures, as well as provide fund to support developing countries action in climate governance. However, the election of the new president made these promises a dud, and Trump even declared that he would withdraw from the Paris Agreement.

The primary contribution of the EU to Paris Climate Conference is the host of the meeting and made it a success. Although there are still a lot of problems have not been solved yet in the parties' negotiations, at least in the form of consensus and intention, the EU leaded the Paris Conference to a promising and cooperative way. The European Commission became the first disclosure of the group contribution plan, put forward the long-term goal of 60% of global emissions and at least 40% of their own contribution to emission reduction goals, but did not clearly reflect the two issues most concerned by developing countries, including climate capital position and the loss and damage of the position. France as chairman of the Paris formation of the basic preparation package, which contains four aspects, the first is the goal, the second is the capital, is the third independent contribution commitments problem, the fourth is the Paris Agenda for latter action. During the Paris conference, the negotiation process among all parties was very difficult. In the first week, there was almost no progress. All the leaders came to Paris to express their wishes and then left. It was not until the second week of negotiations among ministers that reached the points of key elements. The end result, of course, is that ministers largely abide by

their decent political vision in climate governance cooperation, even though it is difficult to reach an agreement.

In general, China's diplomacy in the post-Kyoto Protocol international climate change negotiations under the UNFCCC presents both proactive and reactive feature. On the one hand, China has proactively built several new coalitions including its bilateral climate coalition with India, the BASIC group and the Like-minded Developing Countries (LMDCs) while maintaining its traditional coalition with the Group-77 and China to facilitate its bargaining power against developed countries and their negotiating blocs. On the other hand, however, China has reactively made significant compromises to its negotiation partners on mitigation obligations of greenhouse gas emissions. Such a proactive and reactive feature of China's climate diplomacy has been mainly shaped by: first, China's desire to maximize its wealth/profits from its participation in the Clean Development Mechanism (CDM); secondly, its desire to build a responsible great power status in the international system; and thirdly, its asymmetric dependence on the developed countries especially the US and the EU for transferring climate mitigation-related technologies. (Wu, 2016) In Paris Climate Conference, all of China, the US and the EU have showed the ambitious purpose to make the corresponding contribution to global climate governance, but differences remain unresolved and focused on the significant aspects of financial support, technology transfer, and unified supervision and verification mechanisms.

5.2.2 China, the US and EU's Positions of IPCC

The rising attention of public opinion, international community and all countries' governments on the relationship between human and natural environment degradation is from 1960s. Silent Spring published in 1962 is the beginning of modern environmentalism in human history. In 1972, the Rome Club released the "Limits of Growth" to predict the depletion of oil resources will become a human catastrophe. As part of environmental issues, the global climate change became one of the scientific

understandings of international society in 1970s. In this period people have advanced consciousness of environmental protection devote them into daily work, and in the top of the superstructure, there also appeared the international institution like IPCC. In 1988, the first world climate change conference held in Toronto, it claimed to reduce carbon dioxide emissions by 20% by 2005; reduced to 50% by 2050. But after 12 years since 2005, the target of global carbon dioxide emission reduction by 1/5 did not achieve on time. China, the US and the EU are three member countries of the IPCC, and then we specifically analyze the specific performance of the three parties in this international standing institution.

China has actively involved in IPCC and annual conference. One of the co- chairman of IPCC's first working group is Zhai Panmao, who is the vice president of Chinese Academy of Meteorological Sciences, another is from the French Ms. Valérie Masson-Delmotte. The unit responsible for providing technical support to the first working group contains Chinese and European relevant government departments, that is to say they are more involved in IPCC than the US. The technology group sponsored by the Paris Thackeray University, Italy Salam International Center for theoretical physics, jointly supported by the French government, the Ministry of Foreign affairs, the Ministry of Education, Ministry of Environmental Protection and the French Environment and Energy Management Bureau. It is worth mentioning that in the technical support unit, the 7 of 8 core representatives are from France, the other one is from China's young science researcher.

America's involvement in IPCC was high before the 2008 financial crisis, and IPCC and Vice President Al Gore won the Nobel Peace Prize in 2007 for their working on climate change. However, the current U.S. participation is not as often as China and the EU, the current IPCC working group did not appear a representative on behalf of the US, only one of the Canadian representative in Umbrella Group is a member of the vice chairman group in IPCC.

As the EU is responsible for organizing and conducting administrative work of the IPCC, the EU's executive power and influence on the IPCC can be regarded as the largest among China, the US and the EU. The framework of standard, method and technical support of five assessment reports in IPCC conference, were implemented respectively in 2003 the twentieth session of the Paris conference, in 2008 the twenty-eighth session of the Budapest conference, and the twenty-ninth session of the conference in Geneva. IPCC the two chairpersons of second working group are from Germany and South Africa, who were elected in Croatia in 2015 the forty-second session, and will be responsible for the sixth assessment report, focusing on the socio-economic vulnerability and the climate change in nature system.

5.2.3 China, the US and the EU's Relations in Climate Negotiation

China, the US and the EU are the key actors in global climate governance, so they are the main objects of this thesis. Their relationship in global climate change is cooperative, competitive and dynamic.

First of all, in the field of global climate change governance, the three sides' relations among China and the US and the EU are generally a cooperative multilateral relationship, and the "three-party coexistence model" is the basic state of the three relations. In the early stage of negotiations on climate change, the European Community (the predecessor of the European Union) the US, and the "Group of 77 developing countries and China" show in an opposite situation, but in the case of lingering disagreements they still reached the UNFCCC, which means the overall cooperation basically realized. Although George W. Bush withdrew from the Kyoto Protocol, the United States remained a party within UNFCCC. The fact indicates that the basic relationship among three parties did not change fundamentally. The US agreed to sign in 2007 "Bali road map", which is a signal to cooperate again under international framework and multilateral negotiations of climate governance. The

setting has become a common institutional framework and it made the three key players' relationship to a new climax. After the Copenhagen Climate Conference, the reaching achievements of Cancun Agreement, Durban Package Agreement and the Paris Agreement reflect the general cooperation among China, the US and the EU.

Secondly, the relations among China, the US and the EU in the field of climate change have obvious competitiveness, which makes the three sides show the general characteristics of discord. In addition to maintaining a delicate balance between the three sides, each has also sought to cooperate with other countries in pursuit of improving its hegemony position and strengthening its discourse in the field of climate change. Specifically, at the beginning of negotiations, China joined the group of 77 to form a "77 group plus China" participation model. This allows China to maintain its own independent position in the climate negotiations and to be able to negotiate even more forcefully with the group of 77. As climate negotiation continues to advance, China, India, Brazil, and South Africa in the framework of the BRIC countries formed a "base four countries" negotiating group. At the climate conference in Copenhagen and Durban, China on behalf of developing countries reaffirmed the principle of "common but differentiated responsibilities" and further enhance China's influence and status in global climate governance; By contrast, the United States is also actively seeking their partners in the negotiations on climate change, it is a member of "umbrella group" countries, including Japan, Canada, Australia, New Zealand. They claimed the mandatory emission reduction should not only be the responsibility of developed countries but also obligations of developing countries, especially countries with emerging economic market should also be involved; The European Union has not only sought support from developed countries in its climate change negotiations, but has also sought allies from developing countries, especially united and supported with Association of Small Island States (AOSIS).

Thirdly, the relations among China, the US and the EU are general stable but with

mutual bilateral dynamic changes in the field of global climate governance. During the period when China and Europe jointly pushed forward the Kyoto Protocol process, the United States withdrew from the signed Protocol in 2001, making the United States an orphan. In this case, the EU and China began the action to save Kyoto Protocol, paying effort to offset the negative impact of America withdraw on Japan, Canada and Australia. Affected by the United States, umbrella group took measures to raise the price in the negotiation, put forward to use of carbon trade substantially and transfer carbon emission to overseas, in order to offset their domestic emission reduction targets. Therefore when the Bonn Climate Conference reached an impasse, the President Pronk proposed a compromise, making concessions to countries such as Japan and Canada in their using of forest cover to offset emissions cuts. This enabled the 178 countries to sign Bonn Political Agreement without the United States, and saved the Kyoto Protocol on the brink of collapse. But it is worth noting that, in this joint relationship between China and the EU, there is also a competition within themselves. Although they have maintained the same position and made efforts to promote the international consensus in international mechanism, there are still many problems that have not yet been clearly solved between China and the EU. For example, how can they equitably share responsibility for climate change, and how to minimize global emissions while minimizing costs? The principle of "common but differentiated responsibilities" became a bridged between China and Europe to ease bifurcation a certain extent. But after all, they are independent individuals, so this vague concept has also been a constant quarrel between "husband and wife".

5.3 The Game Model and Dilemma of Global Climate Governance

There are many kinds of game models for description and simulation for issues in the realm of international relations, as shown below. The difficulties of cooperating are illustrated best not by either purely conflictual games or fundamentally cooperative ones, but mixed-motive games. (Keohane, 1984) We can choose the *Stag Hunting Game* and the *Prisoner's Dilemma* in the field of global climate governance model, to

analyze the divergence held by all players in the current situation of global climate governance.

Game Models	The Examples in International Politics
Zero-sum Game	The hostile relations formed because of ideological opposition during the cold war between the Soviet Union and the United States.
Coward Game	Nuclear deterrent, An analysis of the appeasement policy used by Britain and France to Germany before WWII
Prisoner's Dilemma	International disarmament, nuclear test and climate governance
Stag Hunting	The signing and maintenance of international multilateral agreements
Unbalanced game	From the standpoint of the weak, such as the conflict between Palestine and Israel and the colony struggles for national independence

5.3.1 Prisoner's Dilemma Game Model and Global Climate Governance

As shown above in the table, several mixed-motive models of game have been identified as relevant to international politics. Of particular interest is the well-known game of "Prisoner's Dilemma", since it demonstrates that under certain conditions rational actors find themselves unable to reach a Pareto-optimal solution, despite a certain degree of convergence of interests between them (Taylor, 1976). Actually not all institutions in world politics or international political economy take the form of Prisoner's Dilemma, but climate change governance do, that the issues- untrusting exist ubiquitously, posed by Prisoner's Dilemma are pertinent to the problems of discord and cooperation discussed in this thesis. Prisoner's Dilemma is just a collective action that cooperation is necessary by all players to obtain a better situation, but self-interested country with rational choice is likely to calculate that they are better off by not contributing, since their contribution is costly to them but has an imperceptible effect on whether the climate change situation will be better.

When it comes to Prisoner's Dilemma, we have to mention the famous Nash equilibrium. Nash equilibrium also known as non cooperative game equilibrium,

refers to all factors in the optimal strategy under the condition of any of the parties involved in the game are not motivated to change and break the balance of the current situation to gain greater benefits (DeCanio & Andres Fremstad, 2013). At micro level, the classic example of this game model is the Prisoner's Dilemma. This concept is worked out by Merrill Flood and Melvin Dresher 1950 then interpreted by consultant Albert Tucker and named it "prisoner's dilemma". The model describes a scenario in which two partners co- planning and executing criminals were put into prison, so they could not communicate with each other. If two people do not expose the other one, due to the uncertainty and lack of evidence that everyone shall be put in jail for a year; If a person came to light, while the other one keep silent, so that the whistleblowers would become meritorious and immediately released, however, the silent one suffered five years imprisonment. If they exposed to each other, because the evidence is true, they both would be sentenced two years. Since the prisoners could not trust each other, they tend to expose each other, rather than keep silent. The game model, which eventually led to the Nash equilibrium only on the non cooperative point, is also a good illustration of why it is difficult to maintain cooperation even if it is beneficial to both parties. Prisoner's dilemma is a typical representative of non zero-sum game in game theory.

When we use the Prisoner's Dilemma game to explain the phenomenon of climate governance, can we understand why does every country or region have the motivation to maintained high carbon emissions, especially when the developing countries still rely on fossil fuel consumption and need to develop economy first. Thus it is impossible to sacrifice their own development opportunities to implement energy-saving policy and to keep emission reduction. While the developed countries have entered the high-level stage of industrialization, its advantageous and constant strategy is to call for developing countries bear the responsibility of climate governance with them together. In this situation, the US and the EU chose their optimal constant but not optimal strategy, making the co-operation to achieve the

optimal goal of reducing global emissions in global climate governance more difficult, just as invisible barrier. This is seen in the Copenhagen Climate Conference of developed and developing countries on behalf of the dispute most incisive. This is reflected in the Copenhagen Climate Conference that why the developed countries and developing countries dispute so fiercely in the negotiation.

5.3.2 Stag Hunting Game Model and Global Climate Governance

The Stag Hunting differs from the Prisoner's Dilemma in that: there are two pure strategies reaching to Nash equilibrium. When both players cooperate and both players defect. In the Prisoner's Dilemma, in contrast, despite the fact that both players' cooperating is Pareto efficient, the only pure Nash equilibrium is when both players choose to defect.

A/B	expose	silent	A/B	stag	rabbit
expose	(0,0)	(1,0)	stag	(2,2)	(0,1)
silent	(0,1)	(1,1)	rabbit	(1,0)	(1,1)

Matrices of Prisoner's Dilemma and Stag Hunting Model

The Stag Hunting is a game that describes a conflict between safety and social cooperation. Other names for it include “assurance game”, “coordination game”, and “trust dilemma”, which is suitable for analogizing global climate governance. As Jean-Jacques Rousseau tells a story in his book *A Discourse upon the Origin and Foundation of the Inequity among Mankind*, that described a situation in which two individuals go out on a hunt. Each can individually choose to hunt a stag or hunt a rabbit. Each player must choose an action without knowing the choice of the other. If an individual hunts a stag, they must have the cooperation of their partner in order to succeed. An individual can get a hare by themselves, but a rabbit is worth less than a stag. (McCarty & Meirowitz, 2007) This has been taken to be a useful analogy for social cooperation, such as international agreements on climate change.

When the number of participants in the global climate governance is certain, the problem of international climate cooperation can be understood as a special case of applying collective action to the international system. Due to the negative impact of climate change is to be shared by all countries and their people in the world. Carbon emissions will have a global impact on atmospheric circulation; therefore climate change governance should be a collective event. When the EU plays a leading role in climate policy governance, the relative consequence is the US's participation in climate governance reduced; Similarly, China as a representative of the developing countries to bear the responsibility of climate change, while some smaller developing countries demand to ensure their own development needs, while delaying the peak period of reducing carbon emissions. The reality of the situation is more complex, even though in the case of the international community work hard together in dealing with climate change, there is no guarantee that cooperation will be able to get the results of hunting stag successfully. One of the strong evidence is that in the early stages of renewable energy development, plenty of countries have encountered a similar bottleneck situation, that renewable energy is squeezed by traditional energy obviously. This is not because the countries do not know the "stag/deer" has higher value, but their national ability still stays in catching "rabbit" stage. Therefore, they will not consider using the renewable energy which is relatively high cost, but also more beneficial to global environment and human health.

5.3.3 The Causes of Climate Governance Dilemma

From the perspective of neo-realism, because of the mismatch between the emission level and the degree of economic development in different countries, the main body of the climate negotiations between different countries or regional state in the international community constitutes a game to safeguard their own interests. In addition, the international climate change decision-making is knowledge-intensive, means that significant uncertainties about the nature and scale of risks and the effectiveness of solutions will persist (Termeer, Dewulf, & Breeman, 2013).

Just like the Prisoner's Dilemma describing: none of the players know exactly what others will do and even has been done within their own state in dealing with climate change problems, because until now it is still lacking of unified measurable and verifiable mechanism on international level. Due to the uncertainty and untrusting among the players and with the prerequisite of self-protection and rational choice, the global governance becomes a dilemma. Furthermore, the Stag Hunting model illustrates advantages and possibilities of cooperation. Of course, cooperative action may take place when a country is sufficiently confident of its own development. At current stage, the consensus reached by all countries on climate change is one of the bases for cooperation, but the expansion of action will be the pursuit on the next stage. At that time, all the countries will realize the necessity and importance of coordination work in global climate governance.

5.4 The Reasons of the Game (Competition and Cooperation) among the Three

Why the discords or conflicts exist and arise between the emerging norm of climate governance responsibility and existing norms of international society meanwhile to maintain the mechanism of consultation, but not to cause the collapse of international mechanisms? The later part will develop a better understanding of the reasons for China, the US and the EU's competition and cooperation.

5.4.1 Pursuit of Economic Interests

The development of economy cannot avoid human exploiting of natural resources, and economic development seems inevitable to bring about climate change. The neo-realism theory I mentioned in the theory section can be used to explain: why a state's domestic political and economic vibration occurs it will directly affect the process of international climate governance. First of all, this is because the ultimate concern of the state is not the essence of access to power itself, but rather the loss of power in the international climate negotiations means lose part of national security. Secondly, it is because the power is no longer to become the means and tools, three

sides will take priority in non-traditional security. In different periods, countries have different priorities in politics, economy, military and diplomacy affairs. Global climate governance and negotiation belongs to a state's diplomacy issue, which will make place for politics, economy and national security. This is accordance with Kenneth Waltz's point of view that no states will not give up the core power and interests they have been obtained to pursuit other areas of security. Thirdly, all countries do not want to give up the relative power, and are not willing to lose the right of discourse in global climate regime.

Climate change has sometimes become a means of national trade protection, which has led to conflicts in economic interests during climate governance negotiation. Take the United States and China as an example; in June 2009 the United States House of Representatives passed the Clean Energy Act claims that: from 2020 onwards, the US will impose trade sanctions to countries which do not accept new pollutant emission reduction standards. After that, Canada and France followed the step, brewing the relevant carbon tariffs policies, that this will have further impact on China's international trade even the international trade (China is the world's largest exporter and the second largest importer).

From the perspective of international climate negotiation process, when the economy of a country slump in a period, the climate governance will fall into abeyance. For instance, on the 2009 Copenhagen negotiations, many countries have paid more attention to the economic crisis than to climate change; Australia in 2014 totally abolished the carbon tax; Gulf countries with the world's leading oil and gas production has not come up with specific emission reduction targets; and the US's Republican dominated Congress veto "clean power plan" in response to climate change; in the next day of Paris Climate Change Conference the Republican vetoed Obama's emission reduction plan. All this shows that without the strong restraint of the international mechanism, it is difficult to expect countries to consciously fulfill

their emission reduction obligations. In the complex interests and human common development, some countries often choose to take into account the recent national interests.

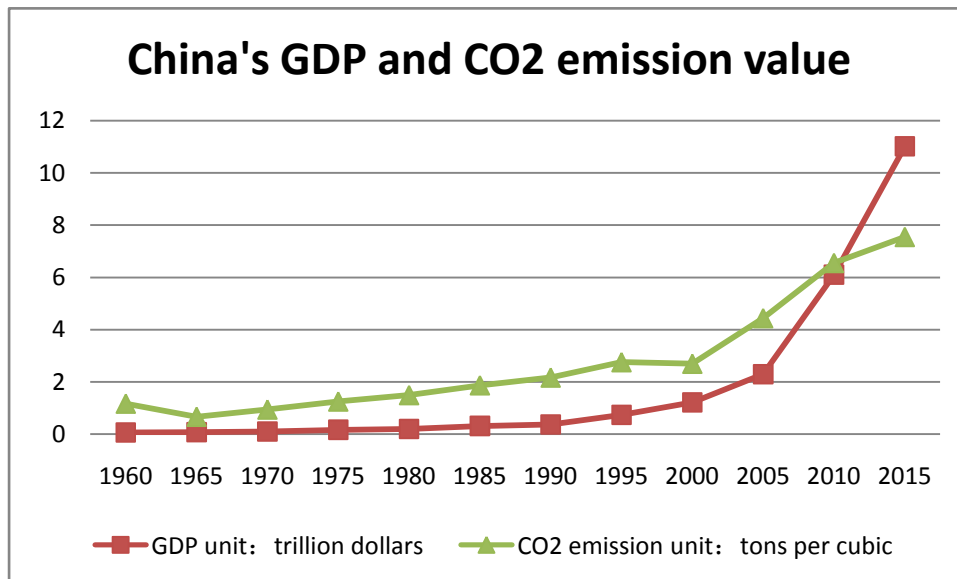
5.4.1.1 Case Study- The Relations between GDP and Carbon Emission in China, the US and the EU

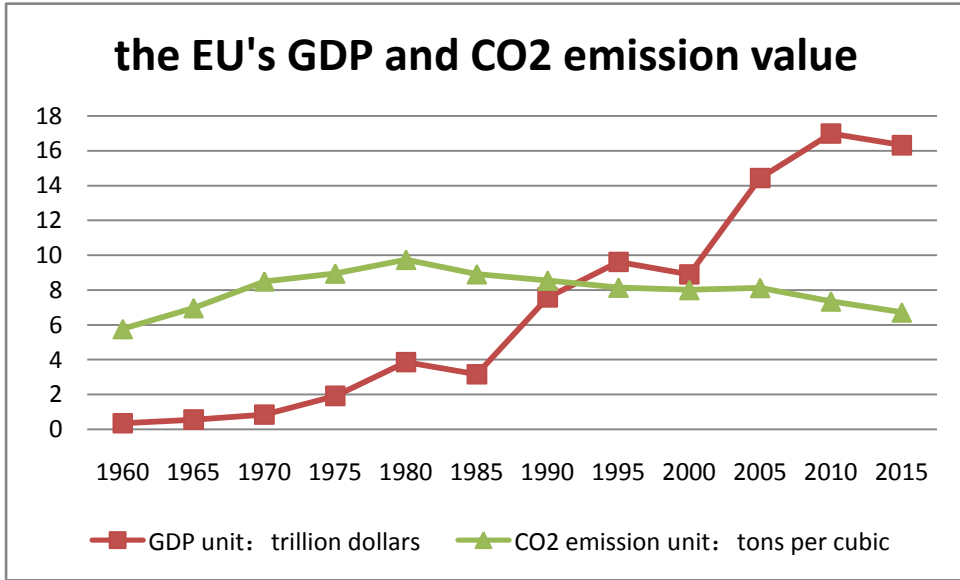
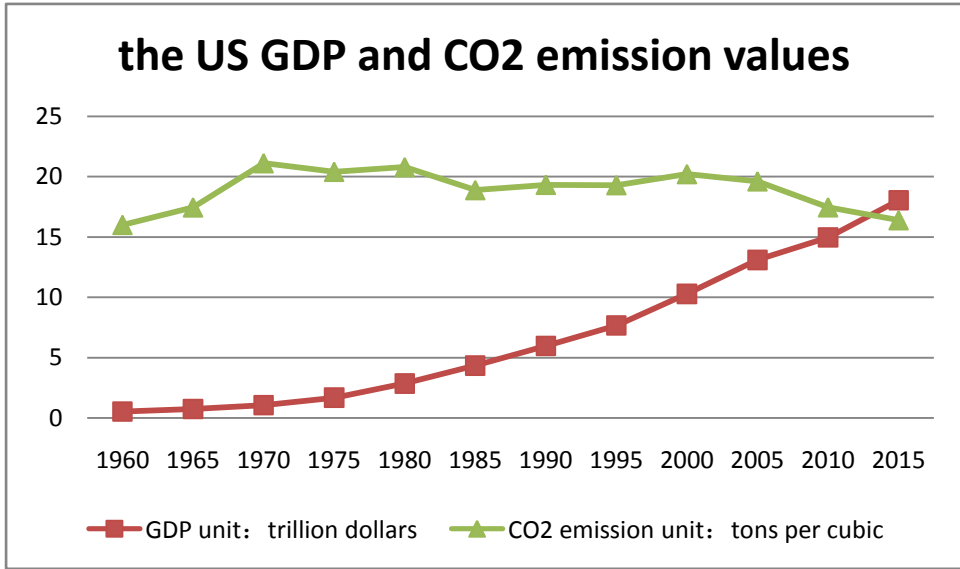
Both sides of the United States and Europe have recognized the importance of Climate Governance, but slightly different in the domestic strategic level of deployment. I collected the World Bank's 1960-2015 GDP data of China, the US and the EU and carbon dioxide emission values, hopes to analyze whether the reality of the situation in CO₂ emissions and climate change through specific data is relatively consistency with policies and actions. As shown below, the US and EU's GDP and CO₂ emissions from the time line horizontal contrast, remains at a stable level and the emission peak appears after the slowdown and decline trend, however the carbon emissions of China has not reached the peak until now, which is still increasing year by year.

Unit GDP CO₂ emissions in the US showed a downward trend, but the total emissions are still at the first place of the global rank. The relationship between GDP and CO₂ emissions is essentially a reflection of the relationship between economic development and climate governance. At the same time to ensure economic growth while reducing carbon emissions, is currently in the field of climate management countries are actively exploring the issue. However, in the process of I interned in CREIA to have a chance talk with MS. Jiang Guoying from Taiwan Green Productivity Foundation, I have learned that the US has transferred heavily polluting enterprises to other countries in the developing world, only on this basis could it make the corresponding between GDP and carbon emissions. The US and the EU in the transfer some of the high energy consuming capacity in the early stage after a mature industrialization, and the EU emissions trading system (EU-ETS) dominate the global carbon price within the framework of "Kyoto Protocol". In the meantime, the US,

Japan and Australia are the basic controllers of the "Kyoto Protocol" outside the framework of the carbon trading market quota.

From the longitudinal comparison of the historical timeline, China and the United States in 2010 around the stage to achieve a gradual reduction in carbon emissions, while the European Union as early as in 1990 to ensure economic growth while continuing to reduce carbon emissions. Overall, China, the US and the EU as the representative of the carbon emissions intensity and emission reduction actions roughly proportional, but compared with mitigation goal of climate governance, urgent requirements of circular economy and the development of green low carbon economy, the global climate governance process is still on the primary stage. Driesen (2009) argues that barriers to promoting adaptation concern the free market orthodoxy under the neoliberal agenda worldwide, with markets, not governments, ruling the game – as in the way that atmospheric sink capacity has been turned into property rights through carbon trading (Driesen, 2009).





Note: the above table data from the World Bank, chart drawn by thesis author.

5.4.2 Differences in Political System

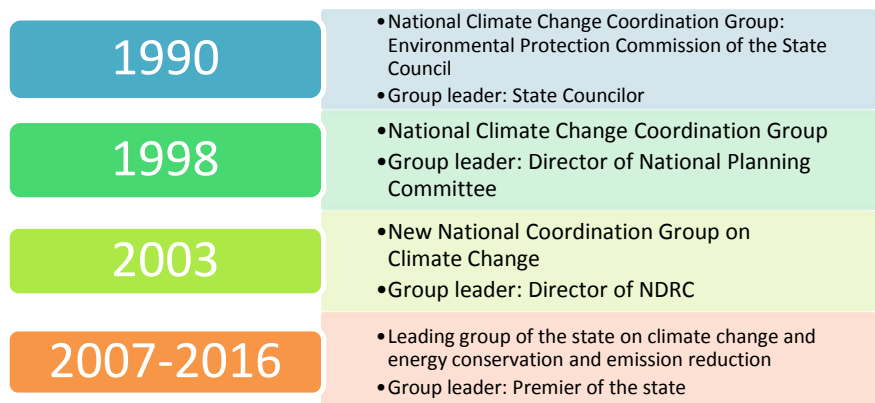
James G. March and Johan P. Olsen pointed out in *Rediscovering institutions - the Organizational Basis of Politics*, that there are three logics which can impel a state to act and shape identity of the state: appropriate embedded norms, braking and identification, and underlying preferences from beforehand expected results (G.March & P.Olsen, 1998). As the political system of China and the United States and the European Union is different, the game in the climate change governance also presents different characteristics I will compare the different political structure of the

three sides as empirical material to find out their differences in climate governance.

China's political system is the system of people's Congress; in essence it is the parliamentary republic. China's Constitution stipulates that all power in People's Republic of China belongs to the people (Yang, 2013). The political institution involved in China's climate management at the domestic level is the Ministry of Environmental Protection and its local government's subordinate agencies. On the international level, it is the International Negotiating Committee and representatives of the Ministry of Foreign Affairs and the National Development and Reform Commission (Zhang & Min, 2016). China's political system has decided that China must take part in climate governance and lay stress on great importance to promote its political power in international stage, which could be seen as the "soft power".

In the institutional setting, the Chinese central government's emphasis on climate change is gradually increasing, which can be reflected in changes in climate change leadership coordination organization. In 1990s, only the environmental protection department is relevant to climate governance, until 2007 the prime minister became the national response to climate change mitigation work group leader, who is responsible for submitting the independent contribution files to UNFCCC every year.

The evolution of China's climate change organization and leadership as shown below:



The United States adopts the parliamentary republic system. In the constitution, in order to prevent the excessive concentration of power on the individual or one

department, the legislative, judicial and administrative powers of are independent, so that they can supervise and balance with each other. The structure of the United States determines that America's climate change will be more depended on voters' opinions and how much it will be beneficial when participate in global climate change governance. Because the United States is a representative federal democracy driven by elections in which citizens' and lobbyists' diverse interests compete. Besides of this, American politics scholars and scientists have a lot of debates, that some of them doubts about the human factors caused climate change and IPCC's assessment report. The current president seems to be one of those doubters. Actually, the US concerns more about the energy security rather than focus on climate governance. We can see the acts on energy as below:

May 2001	•National Energy Policy
August 2005	•New Energy Policy Act
December 2007	•Energy Independence and Security Act
June 2009	•The Clean Energy and Safety Act

From the perspective of political system factors, the European Union is integration. This unified political structure makes it more conducive and has more advantages to defend their interests in climate governance. In the process of formulating, participating, making and implementing the climate policy, there are so many behavior subjects in the European Union, so the relationship is complicated and the overlapping. In general, it includes the following areas: regional regimes, institutions representing the European Union, representatives of Member States, and advisory or research institutes. They carry out their respective division of labor according to different climate decision-making matters, forming different functions and decision-making positions. The specific organization settings are shown in the figure:

The European Commission	<ul style="list-style-type: none"> • General Secretary for the Environment and Climate Action Division
EU Council	<ul style="list-style-type: none"> • The core decision-making body: exercises the legislative power of the EU and sets up the Environmental Council at lower level
European Parliament	<ul style="list-style-type: none"> • Set up Environment and Consumer Protection Commission
European Council	<ul style="list-style-type: none"> • The executive body is responsible for preparing meetings, drafting texts and assisting decision-making.
Other advisory and lobbying bodies	<ul style="list-style-type: none"> • European Environmental Bureau

5.4.3 Diversity of Cultural Philosophy

From the realism perspective we say that politics is ruthless and cruel, because from a realistic point of view, for the sake of human selfishness as well as pursuit and protect their interests naturally. It seems inevitable to compete for gaining power. However, with the development of human society as a whole, the compromise reflected in the climate negotiations also reflects the universal binding force of the institution in the international community, from the view of neo-liberalism. Since Copenhagen Climate Conference divergence to the Paris Climate Conference reached a basic consensus, the convention ratified by 145 of 197 parties can be seen as evidence to reach consensus on the need to strengthen Climate Governance.

Since the Han Dynasty to the Qing Dynasty, China has a tradition of Confucianism in political philosophy, of which the most important characteristic is the benevolent government under the rule of benevolence. The modern Chinese political idea is a kind of collectivism. The concept of the community of human destiny has received extensive attention from the international community. Some scholars believe that compared with the Western tradition of advocating competition, Oriental traditional values uphold with more feminine harmony, which is perhaps a kind of wisdom and maybe can provide a solution for reshaping the new international climate regime.

The United States is a very young country, as adolescent blood masculine, American political philosophy is always full of competition and challenge, advocating that pursuit of freedom, the struggle for self realization value, and the winner who is successful enjoy the glory. Because of this, American democracy is a balanced competition. From its top structural design, American political system contains separation of the three powers, “Donkey vs. Elephant” bipartisan campaign; down to the ordinary people, everyone pursuit for the dream of success, which embodies the American political philosophy in the “carrot and stick” model. (Nye, 1991) However, this value will change with the overall development of the international community, and under the pressure of international public opinion the specific performance of the US in the climate negotiations is compromising. The new president, however, sends a negative signal to climate change governance.

After years of industrialization, the European Union has accumulated rich experiences and lessons in the field of climate governance, which follows the law of the EU's overall interests and long-term interests. After the Renaissance, the universal values in Europe contained the idea of human rights supremacy, and then amended to join in the compliance of reason and morality. In compliance with the logic of appropriateness, the behavior of the actors is driven by internalized identities, values, and norms. When the identity or role of the national actors is in accordance with the identity or the role of the specific situation, the behavior and action will occur. What is more, the purpose is to seek more recognized identity rather than interests. Of course, the actor's behavior is also affected by the motivation of potential outcome. (G.March & P.Olsen, 1998) The result of climate change governance is to maintain healthy and sustainable development of human society. The logic of political integration would be: all the actors negotiate with each other about the conflicting interests and rationally allocate the diverse resources at last. The European Union is such integrated institution, so that its political system provides experience and plays

as a moral guide role in the global climate governance.

6. Discussion

6.1 The Possibility and Development Trend of International Cooperation in Climate Governance

From the above analysis, we know that international cooperation in the field of climate change is possible and necessary. My thesis taking China, the US and the EU as an example, at current stage of climate governance, they cooperate and compete with each other at the same time, but the overall process is still advancing. (Siddiqi, 2011) That is to say at present, parties under UNFCCC have cooperative will but some of them do not have relative cooperative capacity (Yan, 2013). The trend of global climate governance is promising and it is necessary to honest sharing and exchanging their information of cooperative capacity between developed and developing countries on climate change will be helpful for international climate change negotiations to proceed in a non-confrontational way.

The motives and outcomes may well be disjoined should now be easily seen (Waltz, 1979). From the perspective of neo-realism, it cannot avoid to protect a state's own interests and to keep a balanced power in international relations. Every country has the excuse to say that structure of international regimes caused actions to work out consequences which they were not intended to have. However the history and civilization of human being tells us, if we refuse to have a long run sight to stand on a higher level and pay attention to the relation between human and nature, the bright future will reject mankind as well.

6.2 The International Public Opinion

Due to climate change governance is a cross-boundary, multi-level, multi-sector and multi-actor challenge, it calls for all the members' participation- from the United State, national level to non-government organization and social public level. For example, two U.N. organizations have extended their support to a workshop on climate change

being held to strengthen public focus on the new global standards likely to be set beyond the current Kyoto Protocol. The United Nations Children's Fund (UNICEF) and the United Nations Population Fund (UNFPA) have decided to support several workshops in view of the significance of public opinion all over the world, which comprises the vast desert region, making the new pact and critical policy documents to be forged and to better tackle global climate change. (Jaipur, 2009)

The climate change is an issue of all human beings, whatever the nationality who has. In the thesis above we have talked about this complex topic on international level and state level, however come down the earth, all the policies and acts will be practiced by everybody in the atom-mass society. Every day when I open the curtain, I can be the direct observer to inspect the air condition in Beijing- the city I live. If I saw the grey sky and breathed stale air, I would wear my mask to protect myself and which is also a sign to protest. Here I want to say, not only from high level to the bottom, the government and non-governmental organizations relevant to climate change should educate more, but also the public themselves ought to protect their right on clean air and conduct to save energy and avoid waste as much as possible. For me, through the process of writing this thesis, I have learned more about the state quo of climate change which can share the environmental awareness to more people. And to my surprise, with these simple consciousnesses, I acquired the decent habits of turning off lights, double printing paper and quitting away from excessive consumption.

7. Conclusion

To answer the question why China, the United States and the European Union has kept a generally balanced power in global climate governance cooperation meanwhile has discords and competed with each other, I have explored the policies each of them has taken in domestic level and the stances of them under international mechanism of climate governance. The current international regime of climate governance generally reflects a mix of neo-realism, neo-liberalism and institutionalism.

Firstly, the international mechanism/regime is necessary in global climate governance. Since common interests are sometimes associated with cooperation but sometimes with discord, cooperation is evidently not a simple function of interests. Especially in climate change issue where uncertainty is great and actors have different access to information, obstacles to collective action and strategic calculations may prevent them from realizing their mutual interests. Thus institutions that reduce uncertainty and limit asymmetries in climate governance must also exist. The current situation of global climate governance among the three actors is that they are cooperating generally to promote the mitigation and adaption proceeding of climate change, meanwhile competing with each other. Thus their relationship in climate governance is cooperative, competitive and dynamic in a relative balanced way, which reflects the overall effectiveness of UNFCCC.

Secondly, the cooperation and competition exist simultaneously in the international political economy. Because globalization has developed rapidly in various fields and hegemony faded out gradually, the whole world becomes interdependent. Although hegemony can facilitate cooperation, it is neither a necessary nor a sufficient condition for it. Most of the countries have already recognized the importance of climate change, but at this stage it is still a diplomacy means for some countries to raise their power in international regime. On the one hand, in order to pursuit relative gains, the three stakeholders have discords in economic and political interests. Besides, the pace and phase of their development is not in accordance to each other and they have different political system and cultural philosophy. On the other hand, the international political economy theory and neo-liberal institutionalism provide the possibility of the international cooperation.

At last but not the least, even though at the current stage there are full of competitions because of the pursuit of relative gains, the deepening cognition and the common

interests of all mankind will make cooperation possible under international mechanism. So I believe that in the future with the people's in-depth understanding of the problem, with technological progress, and the promotion of civilization, climate change issues may be coped with better and appear a win-win situation.

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