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Theoretical and empirical analysis of financial system and mechanism based on the low carbon economy

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ABSTRACT

Low carbon economy has become the main trends of the current international financial development, thus more in-depth researches and explorations should be conducted for the construction of the financial mechanism. The study first carries discussion on the financial market and its corresponding elements, during which clarifying the specific structure for international financial market and the corresponding transaction subject. And the study makes as specific analysis of the function of trading subjects, to provide the premise and strong basis for the construction of the financial system and the perfection of mechanism. The second part is the further discussed of the price mechanism, making researches on the influence of price mechanism based on different ways of transactions through and laying a solid foundation for the perfection of the financial industry. The followed part goes to a specific study on the instruments of the trade, so that the overall construction of operating mechanism of the financial industry in the process of developing low carbon economy can achieve the requirements of the times. The final part makes explorations on the financial influence on the proportion of tertiary industry in GDP as well as the impact of the financial mechanism on the adjustment of industrial structure, providing effective support for using data and building models. That is the main idea of this study, and also fully reflects the main content of the research and its important target.

KEYWORDS

Low carbon economy; Financial mechanism; Financial system; Empirical analysis.



INTRODUCTION

From the perspective of market economic development, the development of low carbon economy has become the main direction of the development of the market economy. And the operation system and the operation mechanism of financial industry should be unified with development of the economy and the time, so that it can adapt to the modern era of economic development environment. The study makes the corresponding researches combining with the financial market and its factors, the price mechanism, transaction instruments, finance effect on the ratio of tertiary industry taking in GDP as well as the impact of the financial mechanism on the adjustment of industrial structure. Therefore it makes the research more clear at the same time ensure that the research process become scientific and reasonable.

FINANCIAL MARKET AND ITS FACTORS

Market structure

From the current development of international finance, the development of low carbon finance mainly carries out in two a legal framework. From the differences of the trade subjects in transaction process, the trade can be made through the voluntary or forced cooperation. And the different transaction levels are then formed namely regional cooperation among different countries, national market and regional market and retail market.

Transaction subjects

In the current development process of financial market economy, low carbon industry economy has developed from an important tool for policy implementation to the functioning of the economy market, during which process the function of financial financing is becoming increasingly powerful^[1]. And the low carbon financial market is mainly consist of the national financial institutions, greenhouse gas emissions enterprises, relevant international organizations and other institutions. However from the angle of the differences existed in the development, the low carbon financial market can be divided into participants, investors, promoters and intermediary institutions (as shown in Figure1).

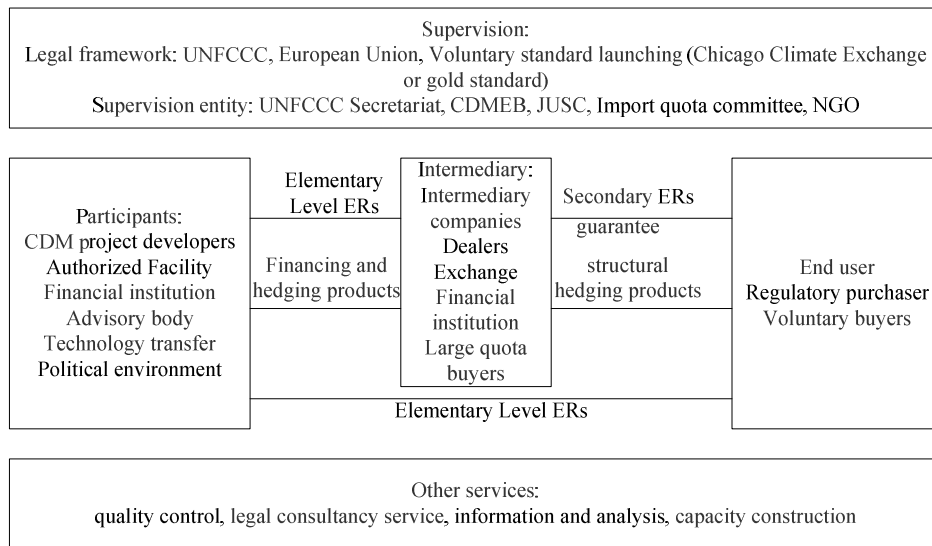


Figure 1 : The participants in the financial market

Participants

The participant of international financial market mainly exists in the quota market and the project market of and is main body between the development of low carbon economy and trade. The quota market, mainly through the production of petrochemical enterprises, fully provides national required daily energy, which makes the petrochemical industry become the main body of industry, and industry become the main power source in the low carbon finance. However, in the CDM project market, the participants mainly consists of five parts, namely the project owners, the responsible organization of the host country, the executive board of clean energy development and mechanism of United Nations, and management entity.

Investors

Investors in financial market mainly include commercial banks, low carbon industry funds, hedge funds and other parts. Low carbon industry fund, through the agreement purchase of equity investors, realize the front-end pay, and it is an effective investment process for low carbon economic development projects. It is important for the fund and can produce positive effect of for the effective financing for low carbon enterprise^[2]. And the low carbon industry fund is divided into several important parts by the international side. First one is the project organization, and the second is related the government purchase plan. The most basic part of this fund for investors is the agreement of energy saving and emission reduction. Early in 2000, the process of the development of international low carbon finance, the proportion of private fund investors become larger and larger, and it can be seen that its importance is continuously rising. Private fund helps to expand the market capacity, and will gradually lower lead a mature development of carbon financial market.

Promoter

In the international financial development environment, financial organizations have become the main promoters of the rapid development of financial market, and there are three main financial organizations. First one is the low carbon financial sector of World Bank, the main focus of whose work is to effectively control the development of low carbon industry in the market economy, so as to continually reduce the costs of the industry and ultimately achieve the national industrial development which can maximize the interests and make a sustainable development. Second is the International Finance Corporation, which is the specialized agencies of the international finance in United Nations, the focus of whose work is to provide more credit service and equity financing guarantee for the private enterprise to develop a project, further broadening the source of funds of national low carbon industry development. It has a certain positive role for coping with climate change and strengthening the financial services. The last one is the European investment bank, which can coordinate with the World Bank, perfecting economic development of the low carbon industry and investment plans and continuously expanding the involved areas.

Intermediary institutions

Intermediary institutions in the international financial market can be divided into several kinds. According to its nature and function, it can be divided into asset management Co, credit rating firm, audit service corporation, trade and legal service organizations and so on.

PRICE MECHANISM

In the current environment of international financial development, the financial transaction ways also has many different characteristics, so that the transaction type is gradually revealed a diversified developing trend^[3], which gives the price mechanism a diversified characteristic. In this study, the researching process is carried out through combining mainly with in spot and futures markets in the low carbon economy and OTC, with the specific explanation in TABLE 1.

TABLE 1 : The characteristics of the elements that impact the transaction price in three financial markets

	OTC market	spot market	futures market
Mobility	highest	relatively low, in which the European Climate Exchange is the highest	low, in which the French Blue Next is relatively high
Publicity of the information	not public	public	public

This part of the study and discussion mainly conducted with trading data provided by of the European Climate Exchange, showing in the TABLE 2.

TABLE 2 : EUA and CER

	EUA	CER
Full name	European Allowance	Certified Emission Reduction
Contents	European emissions quota, belonging to EUETS market	Certified emission reductions, produced by CDM project
The degree of standardization	under the protection of law, the price is carbon price benchmark	nonstandard
Transaction modes	inside and outside	more outside
Forms of the products	futures load and option contracts	forward contract
Risks	low risk	high risk, existing the risk discount of 1-10 Yuan
Whether affected by the price gap	no	yes, Prime cost of CEM gained in CDM is lower that CER price, thus the CDM project is determined to be conducted. The supplying number of CER has increased.
		CDM primary market-pCER (primary CER)
		CDM secondary market-sCER(secondary CER)
		Contract is not very standardized.
		Contract is standardized.
		The price is not transparent.
		The price is transparent.
		Mobility is general.
		High mobility
		20% -25% price differences exist.

TRADING INSTRUMENTS

Along with the global climate change intensifying, a huge internal contact between financial markets and the ecological environment has been formed. However, with the unceasingly expand of energy-saving and emission reduction as well as reducing carbon market development, thus the corresponding financial instruments and financial products have emerged in large-scale. The financial instruments mainly exist in the form of spot transactions and derivative financial instruments.

Instruments of spot transactions

The essence of the so-called spot trading instruction refers to the effective consultation carried out both in the transaction process for emissions trading time, place and manner, so that the quantity and price of trading emissions can be determined effectively, making the transaction successfully be carried out^[4]. In this way with the trading of emission rights, emission rights and the circulation process will undergo a qualitative change, and thus the financial exchange process of trading emissions rights can be completed. However with the continuous changes of ecological environment, the market of international greenhouse gas emissions has changed. And at the beginning, the emission rights are traded in stock form, which embodied mainly in the form of EUA spot, CER spot and EUA/CER difference spot.

Derivative financial instruments

From the point of view of financial development, because the coordinated development trend have been formed between the market economy and the ecological environment, and the development of financial instruments shows a diverse characteristic on its original basis, more new financial products are constantly emerging. Derivative products are measured mainly based on carbon dioxide emissions and not able to conduct related transactions beyond the market boundary, with the details shown in TABLE 3.

TABLE 3 : Derivative financial instruments

Markets and framework	Trading products
IET market built by <i>The Kyoto Protocol</i>	AAU and forwards and options trading
EU ETS	EUA and forwards and options trading
The original and secondary markets	CER related products
JI market	ER related products
Voluntary market	Self imposed quota and VER related products

The own value of international financial derivatives mainly lies in the price of the product in low carbon industry itself, and its function is reflected in the risk of the specific management process for a low carbon financial instruments. Then it can be divided into futures, forward transactions, options and structural products. While the project transaction is a kind of forward transactions, in the process of transaction, both parties need to sign the relevant contracts, specifying the time, price and transaction authority. However, in the current project transaction process, the attribute of transaction items are defined in the forward transaction. The main reason is that during process of the transaction parties signing trade contracts, the project does not begin immediately, thus the corresponding credit relationship does not exist. As for the credit project of forward contracts, it mainly can be divided into fixed and floating pricings. Fixed pricing suggests that the price is determined during the transaction process, while the floating pricing makes, according to the resource consumption and pollution situation generated in the industrial production process transactions with no fixed price on the project. Floating project pricing needs to take corresponding the corresponding foundation price and the international reference prices as specific standard^[5].

There are some differences between the futures and options trading in low carbon economy development era and the traditional ones, mainly embodied in the difference of asset and its characteristic are shown in three aspects. The first one is that the foundation of the option contract is a futures contract, thus the price of a futures contract has certain effects on option prices. The second is that the effective calculation, according to the corresponding data statistical software, of the futures price and spot price, and will effectively calculate the volatility of its cycle. And the volatility exist certain sameness. The last characteristic lies in the effective calculation of the management fees and transaction costs, and the main product of options and futures include the European climate exchange financial contracts, emission index futures and the certified emission reductions futures and so on.

The so-called structural products refers to the structured financial products proposed by the financial institutions in every country to deal with climate changes, and most of these products is the corresponding stock aiming at the climate index and constructing climate changes.

THE FINANCIAL INFLUENCE ON THE PROPORTION OF TERTIARY INDUSTRY IN GDP

In the development of low carbon economy, China's industrial structure and financial structure are unreasonable to some degree. Effective planning for air pollution and the second industry growth rate are still achieved, so that economic development and ecological environment cannot coordinate with each other. And the proportion of the third industry is rather low, so that the road of sustainable development and can not effectively be broaden. The huge amount of carbon dioxide emissions in China's industry has great influence for the country's industries. Here the third industry includes mainly the clean energy technology industry, power generation industry by the energy of nuclear, wind and solar, that provide powerful to the development of low carbon economy^[6].

Along with the constant introduction of economic policy of China's low carbon industry, the production efficiency between the industries and the efficiency of using resources are constantly improved through the leverage of financial instruments, unceasingly reducing the total pollution emissions of the country's industry and change the industrial structure constantly. Through the effectively changing industry's financing mode and using the relevant policies, the diversification of the development of industrial structure has been achieved, and production technology of the industry have been constantly improved, finally meeting the requirements of the development of low carbon economy. At the same time during the process of changing industrial structure scientifically, the stability should be continuously strengthened. And through choosing the mode of lower carbon dioxide emissions, carry out effective measure of the financial means. If a state attaches much importance to carbon emissions that have been sold, the industry structure of this country and industry model appear to be more reasonable, and also the stability can reach a high level. The reason is that this country has made some achievements on the industry of environmental protection and the work of energy saving and emission reduction, so that the selling amount of carbon dioxide emissions can get further attention. Besides the industrial structure of this country has reached a relatively stable state, and the extensive economic growth mode of high energy consumption and high pollution has been finished, which makes the financial industry gradually transited to the resource-saving mode of financial development.

THE EMPIRICAL TEST OF MECHANISM OF THE FINANCIAL IMPACT ON THE INDUSTRIAL STRUCTURE ADJUSTMENT

Data using

In the process of analysis and discussion of this study, the data is selected from the total number of economic growth, structural proportion of economic growth, carbon emissions credits and the actual emissions amount of 18 European countries from 2005-2008 years. So the Panel Data model can be constructed, and it is possible to make further identification of the effect of the carbon dioxide emissions trading on the formation of the national industrial structure. In this study, the fundamental source of the data is authoritative data issued by the World Bank and the EU Statistical Bureau and the assessment parameters is got by effective collation and analysis of the corresponding data through statistical software. And the eighteen European countries are Austria, Belgium, Germany, Britain and other related countries.

The selection of econometric model

Clive Macron and others had made the relevant construction of the econometric model in the early eighty's of the last century. Through the analysis of appropriate panel data, thus obtain the corresponding advantages of the data. One of the advantages is that panel data itself has the great capacity and its information content is also relatively large^[7]. The second advantage is that the data can make effective control of detected sample according to the specific needs of model so that the specific error in detection results can be reduced. Third one is that is not easy to generate co-linearity problem between the data and variables model. And the last one is that the data using rate and the degree of freedom is relatively high, and the following is a concrete manifestation of panel data model:

$$y_{it} = \alpha + X_{it}'\beta + u_{it}$$

In the process of research and exploration, the effect of emissions of low carbon enterprise on the structure of national production gross should be put in the first place. And the calculation process of the parameters is carried out through mixed estimation calculating model and fixed effect model, then make scientific analysis of the data, with the details shown in TABLE 4.

TABLE 4 : The effect of carbon trading on GDP structure based on panel of data model

Name of variables	Mixed estimation			Fixed effect model		
	Estimated value	Standard error	P value	Estimated value	Standard error	P value
Intercept	0.0600***	0.0166	0.0005	0.0631***	0.0095	0
CO ₂ R	-0.0115	0.0135	0.3965	-0.0143*	0.0081	0.0821
R ²	0.0082			0.8875		
Adjust R ²	-0.003			0.8506		
Statistics F	0.7259			24.0298		
P value	0.3965			0		
Hausman Test						
Fixed effect Test				Statistics F=24.9420		
				P value		
				=0.0000		
Random effect model						
Name of variables	Estimated value	Estimated value	Estimated value			
Intercept	0.0630***	0.0630***	0.0630***			
CO ₂ R	-0.0141*	-0.0141*	-0.0141*			
R ²	0.0357		0.0357			
Adjust R ²	0.0247		0.0247			
Statistics F	3.2545		3.2545			
P value	0.0746		0.0746			
Hausman Test		Statistics X ² =0.0060				
Fixed effect Test		P value				
		=0.9384				

Note: "****" "***" "*" means that the estimator is respectively significant at the significant level of 1%, 5%, and 10%.

CONCLUSION

The above content is relevant research and discussion process of theoretical and empirical analysis of financial system and mechanism from the angle of low carbon economy in history and reality. And the focuses are the following three aspects: the financial market and its elements, the financial influence on the proportion of tertiary industry in GDP, and the empirical test of mechanism of the financial impact on the industrial structure adjustment. Therefore the construction of financial industry system and mechanism theory can keep pace with era development process, and a solid foundation of practice for continuous improvement of its application value can be laid.

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