



Research Article

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Study of the relationship between the foreign trade of energy and the industrial structure in our country

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ABSTRACT

Energy plays a vital role in the development of industry. Due to the imbalance of demand and supply in our country, the energy of our country is heavily reliant on foreign countries. This paper makes an in-depth analysis of the foreign trade of energy as well as the relationship between the foreign trade of energy and the industrial structure. The study finds out that the foreign trade of energy has significant influence on the industrial structure, and the industrial structure also indirectly affects the foreign trade of energy through influencing energy supply and consumption.

Key words: Energy; foreign trade; industrial structure

INTRODUCTION

With economic development, our country has increasing demands for energy, whereas domestic energy production can't meet the requirements of economic development. The gap between energy production and consumption has emerged as early as 1992, and it grows bigger and bigger, thus leading to ever growing imports of energy. The increase of imports demonstrates that energy basis that our national economic growth depends on is increasingly reliant on foreign countries. Because energy exerts significant influence on the economy, then the foreign trade of energy can certainly affect the economic development through affecting the whole energy industry, which includes the industrial structure in the economic system.

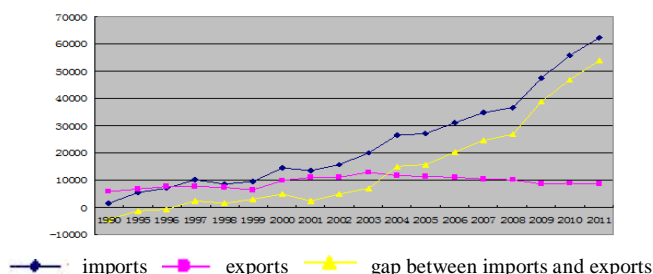
At present, there are few studies about the relationship between the foreign trade of energy and the industrial structure, but many scholars have studied the relationship between energy and the industrial structure. Feng Zhuo (2013) has studied the relationship between energy consumption and the industry for three times and found out that the secondary industry has the greatest influence on energy consumption. Zhou Mi (2008) has verified that optimizing the industrial structure can promote the development of the energy industry. Wang Qiang (2011) has made an empirical analysis that the tertiary industry is more efficient than the secondary industry in improving the energy efficiency. Besides, the adjustment of industrial structure can restrain the energy efficiency in the short run. And the change of Chinese industrial structure has stronger impact than the change of energy consumption structure in influencing the energy efficiency. Moreover, adjusting and upgrading the industrial structure are vital to the improvement of Chinese energy efficiency and the implementation of energy conservation and emission reduction policies. Zhou Minglei (2011) made an empirical study and found out that there was a significant spatial correlation between energy intensity and industrial structure: energy intensity was strong in the northwest area and low in southeast coastal areas. Yan Xiaofei(2009) studied that energy consumption growth had different impacts on the primary and secondary industries. From the perspective of a long-term balanced relationship, energy consumption plays a certain role in spurring the growth of the primary and secondary industries in the same direction. Xu Bo (2004) concluded that changes in the proportion of the primary industry and the industry were the main factors affecting the total Chinese energy consumption, and electricity would become the principal consumption energy with the industrial change and the improvement of the general economic level. Zhou Jiang (2011) found that in the

industrial structure, the industry had the greatest influence on the energy consumption structure; in the energy consumption structure, coal had the greatest impact on the industrial structure. Non-industrial sectors were very sensitive to electricity, and the application of new technologies, the appearance of new industries and the promotion of new energy resources have altogether enhanced the energy consumption efficiency and changed the traditional inherent link between the energy consumption structure and the industrial structure. Tao Ye (2009) found out that the coordinative value between the energy structure and industrial structure experienced a wavy evolution from growth, decline to growth again and there was no sufficient positive interaction between the current energy structure and industrial structure. As can be seen from the above studies, there is certainly a correlation between energy and the industrial structure.

2. THE RELATIONSHIP BETWEEN THE FOREIGN TRADE OF ENERGY AND THE INDUSTRIAL STRUCTURE

2.1 Analysis of the current situation of our country's foreign trade of energy

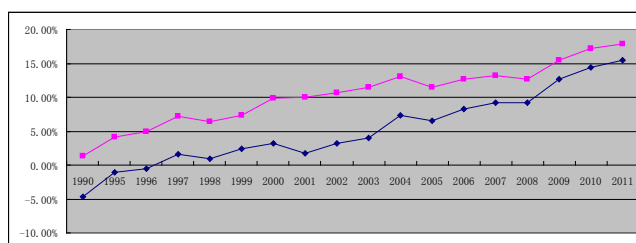
The structure of the foreign trade of energy is import-oriented. As can be seen from Fig.1, there was always trade surplus before 1996 whereas such surplus declined by year. Just as the export trend curve illustrates, there was no increase since 1990 whereas the total export has maintained around 11 thousand tons of coal a year. In comparison with export, import has maintained a robust growing trend, particularly since 2001. Imports and exports can reflect the actual condition of our country's foreign trade of energy – significant trade deficit, which demonstrates a severe imbalance between energy production and consumption and the fact that domestic supply falls short of demand greatly.



Note: Data originates from the China Statistical Information Network, and it has been processed in this paper. Unit: ten thousand tons of standard coal

Fig.1: Trend of the import and export of energy in our country

Energy in our country is increasingly reliant on foreign countries. Just as Fig.2 demonstrates, prior to 1996, energy was not reliant on foreign countries and domestic energy production exceeded consumption, thus resulting in energy overproduction. Nevertheless, the trend afterwards went that the proportion of overproduction increasingly declined. To sum up, the curve is generally upwards, which reflects that domestic energy production is insufficient and its gap with consumption is increasingly greater. In 2011, the external dependence of energy in our country is more than 15%, which shows that nearly 1/6 of domestic energy consumption actually belongs to trade deficit. In other words, the gap between energy production and consumption in our country is nearly 1/6, which demonstrates that the import of energy has increasingly greater influence on the whole energy industry in our country. As can be seen from the proportion of the import to the total consumption, imports of energy in 2011 reached 622.62 million tons of standard coal, accounting for nearly 18% (over 1/6) of the total energy consumption.



Note: Date originates from China Statistical Information Network and it has been processed and calculated in this paper. The upper curve represents the proportion of total imports to the total energy consumption and the lower curve represents the proportion of total exports to the total energy consumption.

Fig. 2: Trend of the proportion of imports and exports of energy to the total consumption in our country

Some principal energy resources are reliant on the import. The pattern of import of energy is fuel oil-dominated, and crude oil dependence is also very high. During 2006 and 2012, fuel oil dependence on the import has demonstrated a rapid growing trend, maintaining the percentage of over 60%. By 2011, our country has imported over 26.8 million

tons of fuel oil with a consumption dependence of over 80%. At present, the crude oil dependence is as high as over 50%, which not only impedes economic development but also threatens national security.

2.2 Analysis of the influence of the foreign trade of energy on the industrial structure

First, the foreign trade of energy lays the basis of the development of all the industries in that their development can't be realized without the support of energy. The maintenance and development of the agriculture, industry and services industry should be based on energy. For the modern agriculture, rice transplanters, seeders, harvesters need to consume energy, and the processing industry of fertilizers, seeds and agricultural products needs to be supported by energy as well. So is the services industry, in which all the equipment in the bank, the venue construction and chairs and desks in the hotel also call for energy's support. Likewise, the mechanized production in the industry should be based on energy support. With the advancement of science and technology, energy can be regarded as a necessity in production as well as daily life nowadays. Energy has covered all the spheres in life, including food, accommodation, transportation, entertainment and sports and culture. The foreign trade of energy accounts for 18% of the total energy consumption, thus reflecting a necessity that the import of energy caters to the demands of all the industries for their development. Besides, in light of the current situation that domestic energy demand far outstrips supply, imports of energy can directly affect the energy price, thus influencing the production costs for all the industries.

Second, the foreign trade of energy has different impacts on different industries, which is reflected in their different requirements. As can be seen from Table 1 which illustrates different industries' energy consumption conditions, the industry has maintained the highest level, accounting for 70% of the total; the agricultural industry originally ranked the second whereas fell to second last place bottom gradually; the transportation and services industries originally ranked the third whereas they surpassed the agricultural industry and reached the second place finally; wholesale, retail businesses and accommodation and catering industries has kept the forth place; the construction industry ranks the last place. The amount of energy consumption and the development level can reflect the real conditions of our country's different industries. To be specific, the industry has kept a high pace of development, other industries have maintained stable development and the agriculture is relatively lagging behind. Moreover, the energy consumption level of different industries can also reflect the extent they rely on foreign trade. Because energy, especially crude oil, is largely dependent on imports, then the global energy prices can have a great impact on domestic prices. Thus, energy can influence the development of all the industries not only in the supply amount, but also in the price. Concerning that different industries have different demands of energy, then energy's influence on industries also varies. But such differences have no impact on the significance of energy to the development of all the industries.

Third, different industries have different requirements of energy. Our country's energy pattern is coal-dominated, with various energy forms coexisting. For each industry, its development requires the consumption of coal, since no other energy resources can replace coal. Meanwhile, coal isn't the main energy for some industries, such as fuel oil-reliant and import-oriented transportation services. With the deteriorating environment, people have increasingly greater requirements of the environment and energy.

Tab. 1: Energy consumptions of different industries in our country

year	farming, forestry, animal husbandry, side-line production and fishery	industry	construction industry	transportation, storage and post service	wholesale and retail businesses, accommodation and catering industries	other industries
1990	4852	67578	1213	4541	1247	3473
1995	5505	96191	1335	5863	2018	4519
1996	5717	100322	1449	5994	2268	5484
1997	5905	100080	1179	7543	2394	4703
1998	5790	94409	1612	8245	2552	5213
1999	5832	90797	1381	9243	2812	5502
2000	3914	103774	2179	11242	3048	5762
2001	6233	92347	1453	10257	3165	6034
2002	6514	102181	1610	11087	3464	6333
2003	6716	121771	2860	12819	4180	6819
2004	7680	143244	3259	15104	4820	7839
2005	6071	168724	3403	18391	4848	9255
2006	8395	175137	3715	18583	5522	9530
2007	8245	190167	4031	20643	5962	9744
2008	6013	209302	3813	22917	5734	11771
2009	6251	219197	4562	23692	6412	12690
2010	6477	231102	6226	26068	6827	13681
2011	6759	246441	5872	28536	7795	15189

Note: Data originates from the China Statistical Information Network, and it has been processed. Unit: ten thousand tons of standard coal

2.3 Analysis of the influence of industrial structure on foreign trade of energy

Industrial structure influences the foreign trade of energy mainly from two aspects: output and consumption.

Because foreign trade aims at meeting domestic demands, it can supplement the trade when problems of output or consumption arise, thus exerting indirect influence on the foreign trade of energy.

Industrial structure also affects the energy productivity and then the foreign trade of energy through the output. Concerning different industries have different requirements of energy, they will have different impacts on the energy. Since the industry has the greatest energy consumption, its impact is also the biggest. The equipment and technology for energy production and utilization originate from the industry, and the industrial production level determines the exploitation level, production level and processing level of energy. Besides, the exploitation and utilization of energy also depend on industrial technologies, so the industry plays a dominant role in the production of energy. At present, the industrial level of our country is limited, energy exploitation techniques, especially those of new energy resources are far from sufficient, resulting in insufficient energy production and huge demands of imports. In addition, fuel oil is basically reliant on imports, which is also decided by technique defects of production.

Industrial structure also affects the energy utilization rate and method and the foreign trade of energy through consumption. All the industries need to consume energy, whereas energy consumption needs to be completed through certain technique equipment, therefore, the energy consumption equipment of industries determines the energy utilization rate. At the same token, there are also some limitations of energy forms for different industries. Some can only use electricity, some can only use natural gas, whereas some can use various energy forms instead. Moreover, equipment consumption methods and demands determine the national consumption of energy. If the amount of energy consumption and the consumption of all energy forms differ from the amount of energy production and the production of all energy forms, then foreign trade is required to reach a balance, thus influencing the foreign trade of energy, involving the imports and exports of energy as well as detailed energy forms.

CONCLUSION

It can be concluded from the above analysis that the foreign trade of energy plays a significant role in the industrial structure and the national industrial structure also has great influence on the total foreign trade of energy and imports and exports of various energy forms. In light of such a correlation and with a view to promoting the development of energy and improving the trade deficit of energy, many steps can be taken: first, upgrade energy production and processing research and development and increase energy production; second, innovate energy utilization equipment and develop energy utilization ways of all the industries in a multiple manner and reduce its reliance on exports; third, strengthen the exploitation and utilization of new energy resources and gradually realize the trend of new energy resources replacing the old ones.

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