An Empirical Study on the Driving Path of Optimizing the Resources Allocation of Foreign Trade Enterprises from the Perspective of Energy Supply-side Reform

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Abstract. From the perspective of energy supply-side reform, this paper, by conducting an empirical study on foreign trade enterprises, conducts a research on the cross-role effect of optimizing the resources allocation and enhancing the energy efficiency. Methodologically, this paper creatively introduces the HILE's probabilistic structured property into Granger causality test analysis, forming an HILE–Granger (H-G) model, so as to empirically estimate both the short-term and long-term causal relationship effects between the energy efficiency and resources allocation . Conclusion is drawn that optimization of resources allocation is positively proportional with the energy efficiency enhancement. This paper is to provide a decision-making reference for the supply side reform strategy of foreign trade enterprises under the background of green energy economy.

1. Introduction

Since the commencement of the 21st century, China's manufacturing development environment has undergone profound changes, confronted with the dual constraints of the rising costs and environmental regulation. With the policy of reform and opening up, the rapid growth has made the "Chinese Economic Miracle", but ,nevertheless, with the rapid destruction of domestic ecological conditions, frequent environmental pollution, coal over-exploitation, low energy efficiency and other issues, China 's economic development has entered into a slow growth and environmental constraints rigid dilemma. In 2015, the nation-wide reform has been conducted, from the demand side management to the supply side reform, aiming to adjust the balance between supply and demand from the stimulus into a guide. Facing the new thinking of the supply side reform, the structural optimization of economic development is most likely to become an important engine of economic growth. A new round of industrial revolution has emerged, entailed by large data applications, intelligent manufacturing and other advanced manufacturing technology and other manufacturing methods just are emerging in an endless stream. In this International context, it is impossible for China to change in energy demand situation dramatically in such a short time; how to seize the opportunity of the new industrial revolution to promote China's manufacturing transformation and upgrading and industry structural optimization have become a major strategic issue on the sustainable and healthy development of China’s economy and trade. Therefore, to explore the path of China's energy efficiency, as well as the development of green economy, is a means to get rid of the current dilemma, especially of the ecological constraints so as to achieve a decent access. In this paper, from the perspective of energy supply-side reform and green economy, is intended to provide useful inspiration

for the green economy under the energy supply side of the reform.

2. Literatures Review

Energy serves as an important foundation for the economic development of a country. Energy efficiency research has become a hot topic of scholars at home and abroad as early as the 20th century. The World Energy Commission's has defined energy efficiency as reducing the provision of equivalent energy services in that energy efficiency is an activity to reduce energy investment while maintaining the energy effectiveness.

2.1 Literatures from home and abroad

With regard to the understanding of the relationship between the resources allocation of foreign trade enterprises and its energy efficiency, domestic and foreign scholars generally believe that resources allocation plays a key role in energy efficiency. Manufacturing carbon emissions is an important factor affecting the quality of environmental changes, the earliest quantitative researches are from Ehrlich(1971) ,who has put forward the IMPAT model to conduct the study of environmental quality and its influencing factors from three dimensions ,namely ,the population, wealth, technology ; quite a large number of scholars ,including Dietz (1996) and Waggoner (2002), used and improved the model of environmental impact factors. Dietz (1996) improved the linear estimation model into a logarithmic estimation model, which divides the technical factors into two factors: energy intensity and unit energy emission. Hu & Wang (2006) initially cited the multi-input, multi-output nonparametric method --- data envelopment model (DEA), the labor force, capital and other elements into the index system, the construction of all elements of energy efficiency indicators. Subsequently, in China , quite a large number of scholars began to conduct the empirical studies on the Direction of Total Energy Efficiency based on (C2R or BCC) or extended (super-efficient DEA, Malmquist index) data envelopment model to carry out a deep study of China's total factor energy efficiency in terms of the energy structure, energy endowment, resources allocation, economic development direction and so on. Stiglitz initially noticed the interaction between energy and resources allocation, and pointed out the relationship between long-term balanced development path and energy mining. Ayres , by deepening the understanding of resources allocation and energy efficiency, has pointed out that various other means are all dependent on the resources allocation to improve energy efficiency. Recently, some scholars claimed the "Undesirable" output would undermine the convexity of the model leading to the negative external effects; and thus some scholars like Chung et al. (1997) took the direction of the distance function as the third approach to study. This method not only requires the expected output increase in efficiency measurement, but also requires the non-expected output to decrease, in line with the actual production process and model convexity requirements, so the relevant empirical research began to increase. Referring to the relationship between the resources allocation and energy efficiency , more and more scholars use Causality Test method (VAR model) such as Granger to conduct other conventional statistical analysis.

2.2 Review

From the above literature review , it is evident that plentiful of studies have been done on the relations between resources allocation and energy efficiency , yet the previous literatures which explained the internal driven path between resources allocation and energy efficiency are quite limited. Other than that, literatures on energy efficiency from the specific perspective of foreign enterprises are also seldom found. In view of this, this paper , by conducting a particular study on foreign trade enterprises , is intended to study the cross-role effect of optimizing the resources allocation and enhancing the energy efficiency .

3. Research Design

3.1 Research hypothesis

In light of those previous literatures which claimed that resources allocation has a close relation with energy efficiency, this paper proposes the following hypothesis: by optimizing the resources allocation, the energy efficiency can be lifted significantly. In other words, optimization of resources allocation is positively proportional with the energy efficiency.

3.2 Research variables

In this research, the optimization of resources allocation functions as an indicator of the degree of rationalization of resources allocation. An optimization measure of resources allocation is used to calculate the standardized value of the comprehensive benefits of the industry from the perspective of the productivity of the production factors and compare it with the actual value of the industry, and obtain the irrational speed of the industrial development. The optimization method is more scientific in assessing the rationality of industrial development and the rationality of the resources allocation because it is a comparison with a reasonable speed, that is, it is based on a judgment after a reasonable speed calculation. The degree of optimization is clear for the further adjustment of the resources allocation, the intensity is clear and the operability is stronger. Resources allocation rationalization index (RARI) indicates the rationalization of resources allocation in the proportion of the performance of the industry, as well as the reflection of the cooperation and facilitation relations amongst resources. Therefore, the higher the technology RARI reflects the higher the rationality of the resources allocation. The specific formula is as follows.

$$(\boldsymbol{RARI}) \quad = \sum_{\boldsymbol{k=0}}^{\boldsymbol{n}} (\boldsymbol{Y}\mathbf{k}/\boldsymbol{Y}) \boldsymbol{ln}\mathbf{X}^{\boldsymbol{k}} \qquad \textbf{(1)}$$

In this formula, RARI stands for Resources allocation rationalization index and Y is the industrial output value of the enterprises. X stands for the energy production factor. k stands for the period.

Energy intensity is an important measure of energy efficiency and serves as another indicator in this present study. It is expressed as the amount of energy used per unit of output. The formula is: □□

$$\mathbf{Ei = E / O} \qquad \textbf{(2)}$$

In this formula, E stands for the amount of energy used and O is the industrial output value of the enterprises. Ei stands for the energy intensity.

3.3 Research data

The energy consumption required to measure emissions is derived from the annual China Energy Statistical Yearbook, and the rest are of unchangeable conversions. The heat required for the energy unit is derived from the 2006 IPCC GHG Emission Inventory (hereinafter referred to as the list).The calorific value of coal washing is treated according to the mean value of the calorific value of coal and slime. Other gas heating values are in accordance with other coal calorific value of the average treatment. Emission factors come from the list. The data of this paper are mainly derived from the data needed from the "China Statistical Yearbook", "China Industrial Statistical Yearbook", "China Energy Statistical Yearbook" WIND database. The time span is 2006 - 2016 for a total of 10 years. In order to ensure the validity and authenticity of the data, this paper follows the following principles: (1) The selected industries are the industrial enterprises on the scale of SOE (2) the relevant data available for 10 consecutive years from 2006 to 2016 (3) to achieve the goal of forming a balanced panel, this paper eliminates the lack of data in the relevant industry variable items.

3.4 HILE –Granger(H-G) model

This present study is based on the HILE –Granger(H-G) model. This model is an improvement of Granger decomposition test which is based on the improvement of the standard –Granger test. The HILE –Granger(H-G)'s specific improvement lies at its adding short-term causal items to the Granger

model. The formula is as follows.

$$Y=f(x)=a_0+\sum_{i=1}^{n}(a_n b+b_n \mathrm{a})+\Phi,\quad \Phi=\sum_{i=1}^{n}(e|n-m) \qquad (3)$$

Based on the above model, the present study applied the SOFTWARE of "STATA12" for further empirical analysis . Similarly, we believe that RARIs can investigate flexible epistemologies without needing to visualize the deployment of architectures. We consider a system consisting of n short-term networks. We use our previously evaluated results as a basis for all of these assumptions. Figure 3- 1 is a probabilistic structured property of HILE.

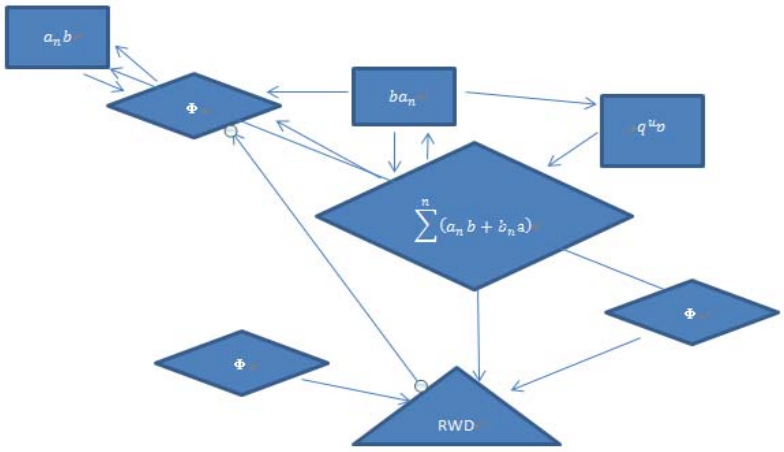

Figure 3- 1: HILE's probabilistic structured property

4. Results and analysis

Table 4--1 indicates the technical effect of energy intensity and foreign trade enterprises as follows.

Table 4--1 HILE –Granger Results

X	Y	Statistical Magnitude	DOF	P Value
TE	SE	30.5162***	5	0.0003
TE	DOIS	1.0032	5	0.9755
TE	DISR	21.9901**	5	0.0298
SE	DISR	4.6523	5	0.3426
SE	DISR	9.5523*	5	0.1222
DOIS	DOIS	15.2623**	5	0.0520

Note: * ,** and *indicate 1%, 5% and 10 % significant level respectively**

Table 4--1 indicates the technical effect of energy intensity and foreign trade enterprises, there are high-level one-way Granger causal relationship, the table shows the TE on the DI of the Granger impact of the statistics is for the 30.5162, Which is 1% of the significant level, but in turn DOIS on the TE statistics only is1.0032, not significant. In addition, it also shows that there is a significant unilateral Granger causality between DISR and the DOIS. And the statistics are only 4.6523 and 9.5523, respectively, and are 10% and 5% confidence level. According to the results of Table 4--1, we

can obtain the feedback share or contribution degree of the long-term and the immediate (short-term) with significant causal relationship. It can be found that the response between the technical effect and the structural effect of the internal optimization process time of the foreign trade enterprises structure is relatively lagging behind, because the internal optimization of the resources allocation has been Granger's long-term causality, and the manufacturing energy The strength of the two effects are W-based relationship as shown by Figure 4-1 .

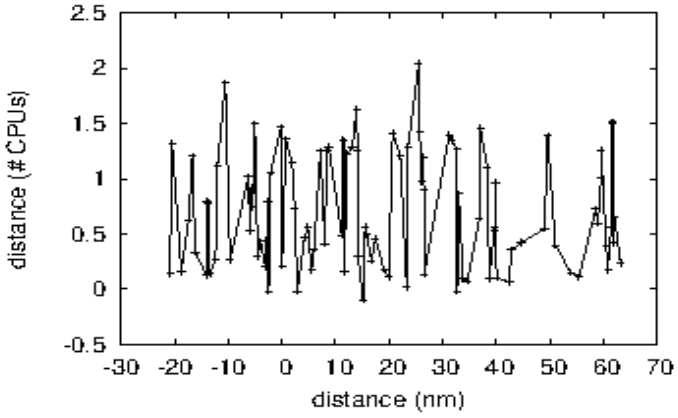

Figure 4-1 LMD index test results

Because the LMD index algorithm used in this paper decomposes the energy intensity of the foreign trade enterprises, the LMD exponential decomposition is an ideal decomposition index, so the explanatory factors have a mutual influence in the same period, so the structure of the statistical analysis is shown in Figure 4-2 The rationalization index of the resources allocation and the decomposition of the energy intensity of the foreign trade enterprises are two factors: the technical effect and the structural effect have short-term direct causal relationship. This means that the rationalization of resources allocation optimization can be short-term direct impact on the efficiency of energy use in the manufacturing sector; on the contrary, changes in manufacturing efficiency of energy efficiency will also affect the rationalization of resources allocation in the short term.

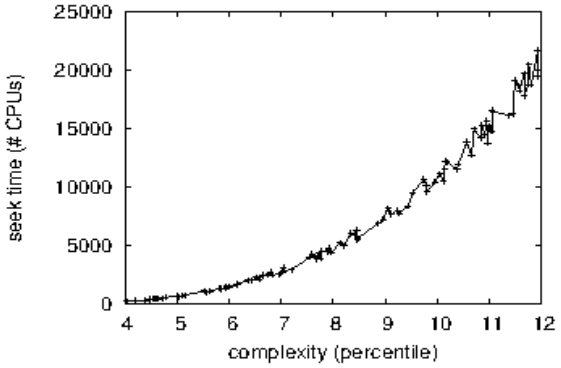

Figure 4-2 HILE –Granger' s long-term causality test

In the above text, HILE –Granger' s long-term causal relationship is mainly in the form of unidirectional form, and is mainly distributed in the resources allocation of the adjustment of the internal and energy intensity decomposition of the decomposition of the energy and strength of the resources allocation. In particular, the starting point of long-term causal relationship is the technical effect of manufacturing energy intensity, which is affected by technological innovation and structural effects or other factors. The technological effect of manufacturing energy intensity has changed and

has a long-term impact on the advanced level of resources allocation of foreign trade enterprises . To promote the foreign trade enterprises, the proportion of high-tech industries gradually increased, due to the release of high-tech role on the one hand to promote the coordination of the degree of inter-industry and resource allocation capacity, on the other hand ,due to structural adjustment to form a certain degree of energy , HILE –Granger 's long-term causality reflects the important role of technology in manufacturing energy use and resources allocation optimization, but this effect does not have short-term immediate feedback effects. This shows that the technical utility of the foreign trade enterprises and the practical effect of the structure are reflected in different time dimensions, that is, the energy efficiency of the foreign trade enterprises is mainly embodied in the immediate causality of the two effects. There is a long-term causal relationship between rationalization of resources allocation optimization and degree of energy efficiency enhancement.

5. Conclusion

Based on the improved optimization method, this paper studies the reform of the supply side of energy efficiency enhancement. The empirical analysis has verified the hypothesis, and further shows that the energy efficiency enhancement path of the foreign trade enterprises is not conflicting with the rationalization of the resources allocation of the foreign trade enterprises. The low carbonization of manufacturing and the rationalization of resources allocation adjustment does not conflict, the two forms a “win-win” situation. After a series of tests, it can be found that the technical level and resources allocation of the level of optimization on carbon intensity have a significant impact. Technical level and resources allocation optimization level are the reverse impact. To promote the foreign trade enterprises, the proportion of high-tech industries gradually increased, due to the release of high-tech role on the one hand to promote the coordination of the degree of inter-industry and resource allocation capacity, on the other hand ,due to structural adjustment to form a certain degree of energy , HILE –Granger 's long-term causality reflects the important role of technology in manufacturing energy use and resources allocation optimization, but this effect does not have short-term immediate feedback effects. In a word, it is crystal clear that a long-term causal relationship between rationalization of resources allocation optimization and degree of energy efficiency enhancement.

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