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Consideration on the relationship between the establishment of pilot free trade zone and corporate carbon emission behaviour

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Abstract: The establishment of pilot free trade zones has an important impact on micro enterprise behaviour. This paper reviews the existing research from two aspects: the economic consequences of the establishment of pilot free trade zones and the influencing factors of enterprises' carbon emission behaviour, and puts forward the shortcomings of the existing research. The results of this paper provide theoretical evidence and a useful perspective for the establishment and promotion of China's pilot free trade zones.

1. Introduction

As the micro subject of low-carbon transformation, enterprises undertake the important mission of energy saving and consumption reduction and green development. Regional institutional innovation will change the preferences of micro-economies and thus affect their behaviours (Scott, 1988)[1]. As a major institutional innovation measure for China to deepen economic system reform and expand opening up, the establishment of pilot free trade zones will inevitably have an important impact on the behaviour of micro enterprises.

In the stage of rapid economic growth, China sacrificed the ecological environment for economic growth, resulting in severe ecological and environmental problems. As China shifts from high-speed growth to high-quality development, low-carbon transformation and green development have become the only way to alleviate the contradiction between economic growth and ecological and environmental constraints. China's 14th Five-Year Plan clearly points out that improving green manufacturing system, building low-carbon cities, and promoting ecological civilization construction will achieve sustainable development. The report to the 20th National Congress of the Communist Party of China once again stressed that we should actively yet prudently promote carbon peak and carbon neutrality, accelerate the research and development, promotion and application of advanced technologies for energy conservation and carbon reduction, and promote the formation of green and low-carbon production and life styles. Enterprises are the core and micro carrier of low-carbon transformation and green development. However, the existing research mainly

explores the influencing factors of carbon emission behaviour from macro perspectives such as trade openness, environmental regulation and per capita income, ignoring the micro corporate carbon emission behaviour and the institutional factors behind it. According to the new economic geography theory, regional institutional innovation is an important factor influencing the behaviour change of micro-economies in space (Scott, 1988) [1]. An important purpose of the establishment of the pilot free trade zone as the "top-level design" is to promote the transformation of the economy from the stage of high-speed growth to the stage of high-quality development by improving the level of opening-up, and low carbonization is the key link to achieve high-quality development. Therefore, from the perspective of institutional innovation, it is of great theoretical and practical significance to explore the mechanism and economic consequences of the establishment of pilot free trade zones affecting the carbon emission behaviour of enterprises.

Since the reform and opening up entered the critical period and deep water zone, the traditional path dependence has hindered China's low-carbon transformation and green development. The root cause is that the establishment of preferential zones in the past has continued the extensive economic growth mode, and the "race to the bottom" generated by the GDP championship among regions has led to the formation of preferential zones in the "policy depression." The report to the 20th CPC National Congress clearly pointed out that we should promote high-level opening-up, implement the strategy of upgrading pilot free trade zones, and expand the network of high-standard free trade zones for the whole world. The national strategic deployment determines that the original intention of setting up pilot free trade zones in the stage of high-quality development is different from the purpose of building various economic functional zones in the stage of high-speed growth. In the overall plan for the establishment of pilot free trade zones, The State Council proposed that the pilot free trade zones built by China are not "policy depression" but "institutional highland." As a test field for deepening reform and opening up, the pilot free trade zone can use opening up to promote reverse capital, technology and human spillover (Yao and Whalley, 2015, 2016) [2] [3]. The construction plans of major pilot free trade zones in Shanghai, Shandong, Yunnan and other provinces all emphasize the requirements of "taking low-carbon concept as the core and leading the green development of free trade zones". Subsequently, a very important question is whether the pilot free trade zone can affect the carbon emission behaviour of enterprises through reverse spillover to drive China to achieve the strategic goal of "dual carbon." Therefore, in the context of China's improving the level of opening-up and promoting high-quality development, it is crucial for China's institutional innovation practice to systematically evaluate the policy effects of the establishment of pilot free trade zones from the perspective of micro-enterprise carbon emission behaviour.

2. Review of Research Status

This paper reviews the existing research from two aspects: the economic consequences of the establishment of pilot free trade zones and the influencing factors of carbon emission behaviour, with a view to laying a foundation for the subsequent research on the relationship between the establishment of pilot free trade zones and the carbon emission behaviour of enterprises. Based on the important scenario of China Pilot Free Trade Zone, studying the impact of the establishment of pilot free trade zones on the carbon emission behaviour of enterprises is helpful to reveal the mechanism of institutional innovation on the carbon emission behaviour of enterprises, and expand and deepen the applicable boundary of the new economic geography theory. In addition, facing up to China's strategic goals and revealing the institutional determinants of Chinese enterprises' carbon emission behaviour from the perspective of the establishment of pilot free trade zones, this paper also provides an explanation from the perspective of institutional innovation for interpreting the

driving factors of enterprises' carbon emission behaviour.

2.1. Economic Consequences of the Establishment of Pilot Free Trade Zones

Research on the economic consequences of the establishment of pilot free trade zones can be divided into two levels: macro and micro. The mainstream literature has explored the impact of the establishment of pilot free trade zones from the macro level, but has not reached a consistent conclusion. On the one hand, existing studies believe that the construction of pilot free trade zones has brought "policy dividends." Previous studies have found that the establishment of pilot free trade zones can improve the efficiency of resource allocation (Chauffour and Maur, 2011) [4] and increase social welfare (Miyagiwa, 1986; Castilho et al., 2019) [5] [6]. On the other hand, it has been argued that the construction of pilot free trade zones has adverse effects. Specifically, the establishment of pilot free trade zones has brought about the imbalance of regional resource allocation (Polaski, 2006) [7] and the reduction of social welfare (Hamada, 1974; Hamilton and Svensson, 1982; Young, 1987) [8] [9] [10], and the increasing burden on low-income groups (Jenkins and Kuo, 2013) [11].

Recent literature explores the economic consequences of the establishment of pilot free trade zones at the micro level. Existing studies have found that the establishment of pilot free trade zones has improved the digital transformation of enterprises (Wang et al., 2024) [12], foreign investment (Chen et al., 2021) [13], and technological innovation (Lei and Xie, 2023) [14] and green TFP (Jiang et al., 2021) [15].

2.2. Influencing Factors of Carbon Emission Behaviour

The research on the influencing factors of carbon emission behaviour is mainly carried out from three aspects: trade openness, environmental regulation and per capita income.

In terms of trade openness, the existing research supports the pollution paradise hypothesis, the pollution halo hypothesis and the race to the bottom hypothesis respectively. According to the "pollution paradise" hypothesis, after trade liberalization, countries with lower environmental standards will receive pollution-intensive enterprises from developed countries with higher environmental standards (Copeland, 1994; Cole, 2004; Managi, 2004; Streteskya and Lynchb, 2009) [16] [17] [18] [19]. The "pollution halo" hypothesis holds that international trade and foreign investment have technology spillover effect, that is, through strengthening market competition, enterprises in the host country are forced to improve the efficiency of resource utilization and increase the environmental protection and energy saving technology and management experience of the host country, thus inhibiting carbon emission behaviour (Grossman and Krueger, 1995; Letchumanan and Kodama, 2000; Frankel and Rose, 2005; Vogel, 2009) [20] [21] [22] [23]. The "race to the bottom line" hypothesis points out that as trade openness leads to more intense market competition, countries compete to lower environmental standards in order to enhance international competitiveness, thus increasing pollutant emissions (Esty and Dua, 1997) [24].

In terms of environmental regulation, the existing research has also formed three hypotheses, namely, the "forced emission reduction" hypothesis, the "green paradox" hypothesis and the "dynamic relationship" hypothesis. The "forced emission reduction" hypothesis holds that stricter environmental regulation can force highly polluting enterprises to upgrade emission reduction technology, thus inhibiting carbon emission behaviour (Zhu et al., 2014) [25]. The "green paradox" hypothesis points out that environmental regulation not only does not have a "restraining effect" on carbon emission behaviour, but also has an "aggravating effect" (Sinn, 2008; Wang and Wei, 2020) [26] [27]. According to the dynamic relationship hypothesis, the nonlinear relationship exists between environmental regulation and carbon emission behaviour (Cole et al., 2005) [28].

In terms of per capita income, the research on the influencing factors of carbon emission behaviour mainly focuses on the carbon emission Kuznets curve. Some studies have verified the existence of the Kuznets curve of carbon emissions (Selden and Song, 1994; Galeotti and Lanza, 2005) [29] [30]. However, other studies have denied the existence of the carbon emission Kuznets curve (Agras and Chapman, 1999; Richmond and Kaufmann, 2006; He and Richard, 2010) [31] [32] [33].

2.3. Reflection on the Above Literature

The existing literature provides a good foundation for subsequent research, but the existing research still has the following shortcomings.

First, when the existing studies discuss the influencing factors of carbon emission behaviour, they do not pay enough attention to institutional innovation, an important policy factor, which leads to great differences in research conclusions. Based on the perspectives of trade openness, environmental regulation and per capita income, the existing literature discusses the influencing factors of carbon emission behaviour from the national or regional level, but ignores the important role of deeper institutional factors. Institutional innovation will directly affect the motivation of enterprises to emit carbon and then affect their behaviours.

Second, when examining the economic consequences of the establishment of pilot free trade zones, the existing literature ignores the impact on the behaviour of micro-economies, especially the carbon emission behaviour of enterprises. This paper argues that enterprises are the micro subjects to achieve emission reduction targets, and clarifying the carbon emission behaviour of enterprises is helpful to deeply understand the institutional logic behind carbon emissions. In addition, although the existing research has explored the environmental effect of the establishment of pilot free trade zones from the macro level, the existing literature has ignored the impact of the establishment of pilot free trade zones as a major institutional innovation on the environmental governance of enterprises at the micro level. In the stage of high-quality development, the establishment of pilot free trade zones, as a major institutional innovation measure for the country to improve the level of opening-up, will inevitably affect the carbon emission behaviour of micro enterprises.

Third, due to the availability of data, the existing literature mainly examines the carbon emissions at the national or regional level, while there is a lack of research results on the carbon emission behaviour of micro enterprises.

3. Conclusions

This paper argues that it is of great theoretical and practical significance to study the relationship between the establishment of pilot free trade zones and the carbon emission behaviour of enterprises. Therefore, this paper summarizes the research on the economic consequences of the establishment of pilot free trade zones and the influencing factors of corporate carbon emission behaviour, providing important theoretical contributions for the next step of empirical research.

This paper helps to systematically evaluate the policy effect of the establishment of pilot free trade zones, and provides experience for China to improve the level of opening-up and promote high-quality development. China's Guangdong province has set up three pilot free trade zones (Nansha in Guangzhou, Shekou in Shenzhen, and Hengqin in Zhuhai). The results of this paper are important for assessing the micro-environmental benefits of the Guangdong Pilot Free Trade Zone. In addition, this study provides a useful perspective for relevant departments to formulate scientific and reasonable institutions to promote China's low-carbon transformation and green development to achieve strategic goals.

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