

Review of the Impact of Carbon Risk on Enterprises with Different Strategic Types

Liyu Hou^{a,*}

School of Economics and Management, Tongji University, Yangpu, 200092, Shanghai, China
^aliyu.hou0612@gmail.com
**Corresponding Author*

Abstract: 2026 marks the 10th anniversary of the adoption of the Paris Agreement. Over the past decade, the number of countries setting carbon neutrality goals has increased from 1 in 2015 to 165, and the global issuance scale of green bonds has grown more than 10 times, indicating that the global transition towards carbon neutrality has achieved structural progress. China has actively responded to the call of the Agreement, elevating the "Dual Carbon" goals to the national strategic level. Against this backdrop, uncertainties in carbon emission-related policies and the rationality of enterprises' internal planning have created "carbon risk" exposure for enterprises, and enterprises with different strategic types respond to such risks differently. This paper systematically reviews relevant literature: first, it analyzes the economic consequences of carbon risk and concludes that the "Porter Hypothesis Puzzle" also exists in the field of carbon emissions; second, it sorts out the factors influencing enterprises' strategic type choices and the economic consequences of different strategic types; third, it explores the impact of carbon risk on enterprises with different strategic types; finally, it summarizes relevant research and provides prospects for future studies.

Keywords: Carbon Risk; Strategic Types; Porter Hypothesis; Literature Review

1. Introduction

Carbon neutrality has become a major global challenge and topic in recent years. As a responsible major country, China has consistently fulfilled its carbon neutrality commitments and actively promoted the economic transition from high-carbon to low-carbon. In this dynamic transition process, external policies, market feedback, and enterprises' internal strategies collectively constitute enterprises' "carbon risk" exposure. There remains academic controversy regarding whether this emerging risk exerts a positive or negative economic impact on enterprises—which implies the existence of the "Porter Hypothesis Puzzle" in the field of carbon emissions. Notably, enterprises possess subjective initiative. Based on contingency theory and classical strategic management theory, enterprises with different strategic types may adopt differentiated response strategies when facing changes in the external environment. Specifically, in the face of carbon risk, enterprises' choices in core operational activities such as financing, operation, and investment vary according to their strategic positioning, and such differences further influence the direction and intensity of carbon risk's impact on enterprises. By systematically sorting out and summarizing relevant literature in the fields of carbon risk and enterprise strategic types, this paper clarifies the research context and provides a theoretical reference for subsequent in-depth studies.

2. The "Porter Hypothesis Puzzle" in the Field of Carbon Emissions

With the continuous advancement of the Dual Carbon goals, research related to "carbon emissions" has gradually deepened, and academic understanding of carbon risk has evolved from a single perspective to a comprehensive one. In the early stage of the concept's emergence, academia mainly defined carbon risk from a financial perspective. Hoffmann and Busch argued that carbon risk refers to the magnitude of changes in carbon emission-related financial impacts on enterprises over a specific period, i.e., the degree of performance changes caused by enterprises' carbon use and emissions [1]. Currently, scholars have a more comprehensive understanding of carbon risk, generally viewing it as "all corporate risks associated with climate change or fossil fuel use," which is not limited to the financial perspective nor solely linked to carbon emissions. A typical definition is proposed by Gorgen,

who defines carbon risk as all positive and negative impacts on corporate value arising from carbon emission-related uncertainties during enterprises' transition from a high-carbon to a low-carbon economy^[2]. Its core connotations include: essentially an uncertainty risk inherent in the transition process, covering multiple sources such as changes in policy regulation, shifts in market preferences, and technological substitution; not only related to enterprises' current carbon emission levels but also involving their adaptive capacity to cope with low-carbon transition; ultimately manifested as a systemic impact on enterprises' stock returns, cash flow expectations, and market valuations.

As a comprehensive and complex risk, carbon risk significantly increases the uncertainty of the environment in which enterprises operate, and the microeconomic consequences it triggers also exhibit obvious complexity and uncertainty. Based on traditional economic theories, some scholars propose that carbon risk will increase operational burdens by raising enterprises' compliance costs and the risk of violations, thereby exerting a negative impact on corporate value. However, other scholars support the Porter Hypothesis, whose core view holds that carbon risk is not merely an obstacle to corporate competitiveness but can instead force technological innovation and efficiency optimization, offset additional compliance costs, and help enterprises build long-term competitive advantages^[3]. Both perspectives have received certain empirical support, and there is currently no clear evidence significantly favoring one hypothesis—this is a typical manifestation of the "Porter Hypothesis Puzzle" in the field of carbon emissions.

Empirical results from some scholars support traditional economic theories. In terms of enterprise financing, carbon risk pushes up financing costs through both debt and equity channels, exacerbates financing constraints, and restricts business operations. On one hand, carbon risk intensifies information asymmetry, significantly increasing enterprises' debt costs, with media attention playing a moderating role in this transmission process^[4]; on the other hand, carbon risk undermines market investors' confidence, raises the cost of equity capital, and imposes pressure on enterprises' equity financing^[5]. In terms of investment behavior, carbon risk also has negative impacts: it causes enterprises' investments to deviate from the optimal level, either reducing necessary investments due to risk aversion or triggering over-investment due to blind transformation, ultimately leading to inefficient investment.

Empirical studies by other scholars have verified the applicability of the Porter Hypothesis in the field of carbon emissions. In terms of enterprise operations, the impact of carbon risk on corporate value is not purely negative; instead, it can force enterprises to undergo green transformation, thereby driving value enhancement. For example, the carbon emission trading mechanism implemented in China in recent years has constrained enterprises' carbon-related behaviors and guided green transformation, ultimately becoming an opportunity for corporate value improvement^[6]. In terms of investment, numerous studies have confirmed that carbon risk forces enterprises to increase green investment and innovation investment, laying the foundation for long-term corporate value enhancement.

3. Influencing Factors and Economic Consequences of Enterprise Strategic Types

Strategic type refers to the decisions made by enterprises on their long-term development direction, resource allocation models, and competitive paths based on their own resource endowments and core capabilities to adapt to the external environment. In terms of the classification of strategic choices, academia has formed several classic frameworks. Early scholars divided strategies into product differentiation strategy and cost leadership strategy based on the logic of business competition.

With the maturity of theories related to strategic types, academia has further proposed three types of strategies from the perspective of environmental adaptability: prospector strategy, analyzer strategy, and defender strategy, each corresponding to different strategic radicalization levels and external response modes^[7]: (1) Prospector strategy, centered on product innovation and market expansion, emphasizing risk-taking and growth breakthroughs, characterized by high R&D investment, strong organizational flexibility, and decentralized supply chains; (2) Defender strategy, centered on cost optimization and operational efficiency, emphasizing risk aversion and stable returns, characterized by high capital intensity, low innovation expenditure, and high supply chain stability; (3) Analyzer strategy, falling between the two, combining the characteristics of innovative exploration and stable operation with a relatively moderate strategic orientation. Based on the above framework, some scholars have constructed a "Strategic Radicalization Score" synthesized from multi-dimensional financial indicators, which accurately distinguishes different strategic types through quantitative methods—the higher the

score, the more inclined the strategy is to be prospector; the lower the score, the more inclined it is to be defender. This classification and measurement system has been widely recognized and verified by academic circles at home and abroad due to its logical completeness and operability.

3.1 Influencing Factors of Enterprise Strategic Types

Enterprises' strategic choices are influenced by various factors, including both internal corporate characteristics and external environmental drivers. Internal factors include enterprise characteristics such as ownership nature, resource status, and foreign shareholding ratio, as well as the characteristics of internal stakeholders such as board type and executive confidence, all of which significantly affect enterprises' strategic choices. At the ownership level, studies focusing on Chinese enterprises have found that state-owned enterprises (SOEs) prefer defender strategies, private enterprises (POEs) tend to adopt prospector strategies, while collective enterprises (COEs) and foreign-invested enterprises (FIEs) adopt analyzer strategies between the two^[8]. At the level of executives' personal characteristics, CEO overconfidence leads enterprises to adopt more prospector strategies. At the level of board characteristics, humble boards promote enterprise risk-taking by choosing radical strategies, and this mediating effect is enhanced as the informal hierarchy of the board becomes clearer; this impact mechanism is only significant in non-state-owned enterprises and not obvious in state-owned enterprises.

Meanwhile, the external environment also exerts an important impact on strategic choices, as strategic types are the result of interactions between enterprises and the external environment. Changes in external systems, such as the "Belt and Road" initiative and short-selling mechanisms, affect enterprises' strategic choices by altering the market environment^[9]. For example, in the face of macroeconomic uncertainty, enterprises will also take the initiative to adjust their strategies to adapt to changes and gain an advantage.

3.2 Economic Performance of Enterprises with Different Strategic Types

Existing research on the economic consequences of strategic choices mainly focuses on their impact on enterprises' financial decisions. When enterprises adopt strategies inclined towards prospector, such strategies may have both positive and negative impacts on financial decisions.

Firstly, negative impacts: Prospector enterprises often face high information asymmetry, which exacerbates financing constraints; at the same time, these enterprises tend to explore new markets and carry out more innovative activities, resulting in low cash adequacy, higher financing needs, and a greater likelihood of earnings management^[10]; they also have a higher tendency to violate regulations and more violation incidents. Prospector strategies can also bring positive impacts to enterprises: prospector enterprises often show a proactive attitude, with higher risk-taking levels and stronger cash-generating capacity in core businesses, ultimately leading to higher corporate market value; meanwhile, although such enterprises are more likely to face financing constraints in the credit market, they can obtain more trade credit from suppliers to supplement financing needs^[11].

Although the impact of strategic choices on enterprises' financial behaviors has received extensive attention, existing research on their economic consequences is still not comprehensive enough, especially in key areas such as investment behavior, which has not been fully explored. Some scholars have found that prospector strategies may exacerbate over-investment or capital misallocation, leading to a decline in investment efficiency^[12]; other studies have confirmed that prospector strategies significantly increase the scale of enterprises' innovation investment.

Overall, different strategic types have significantly differentiated impacts on enterprises' economic behaviors. Currently, academic research on the financial level is relatively sufficient, but there are still deficiencies in the exploration of other core behaviors such as investment and operation, which need further deepening. This research status also brings an important insight: since strategic choices have a key impact on corporate operating results, when enterprises are exposed to carbon risk, the impact of carbon risk, the transmission path, and the final results may vary significantly among enterprises with different strategic types. This cross-cutting issue is of great research value.

4. The Impact of Carbon Risk on Enterprises with Different Strategic Types

The impact of carbon risk on enterprises is not homogeneous. Due to differences in core

orientations, organizational characteristics, and risk preferences, enterprises with different strategic types exhibit significantly different response modes and impact results when coping with carbon risk.

Prospector enterprises, centered on product and service innovation and new market development, inherently possess proactive and innovative genes with higher risk-taking levels. Faced with carbon risk, such enterprises are more inclined to actively embrace green and low-carbon transformation, viewing carbon constraints as an opportunity to explore new tracks and build differentiated competitive advantages. They proactively adapt to the Dual Carbon goals by increasing investment in low-carbon technology R&D and deploying green industrial chains. However, prospector enterprises also face high information asymmetry, large decision-making space for executives, and relatively decentralized and frequently changing internal control mechanisms. This may lead to resource allocation deviations during the carbon transformation process—for example, managers may use low-carbon projects to pursue short-term interests or personal reputation instead of focusing on long-term corporate value enhancement, thereby triggering problems such as loss of control over transformation costs and deviations in strategic implementation.

Analyzer enterprises fall in the strategic flexibility zone between "conservative and radical" and are highly sensitive to changes in the external environment. The impact of carbon risk disrupts their original strategic balance. To balance low-carbon compliance requirements and their own growth needs, the decision-making dimensions of such enterprises increase significantly, and the environmental uncertainty brought by carbon risk further amplifies decision-making deviations: they may either blindly expand green businesses due to excessive pursuit of "low-carbon hot topics," leading to resource dispersion and unbalanced transformation rhythms; or hesitate and wait due to excessive prudence towards carbon risk, missing the best transformation opportunities, and ultimately falling into a dilemma of "incomplete transformation and inadequate compliance." In addition, although the internal control of analyzer enterprises has a certain degree of flexibility, it lacks sufficient restrictiveness and rapid response capabilities, making it difficult to effectively resolve strategic wavering and implementation internal friction caused by carbon risk.

Defender enterprises, focusing on existing niche markets, take professional product services, efficiency improvement, and stable operation as their core demands, with obvious risk aversion tendencies. Faced with carbon risk, such enterprises are more inclined to adopt prudent response strategies, prioritizing low-cost and low-risk methods such as optimizing existing production processes and improving energy use efficiency to meet compliance requirements, while maintaining a cautious attitude towards large-scale green transformation investments. Benefiting from their structured internal organizational structure and sound internal control mechanisms, defender enterprises make more rational decisions in coping with carbon risk, which can effectively avoid resource waste caused by blind follow-up, and achieve stronger cost control and compliance stability during the transformation process. On the other hand, excessive risk aversion may also cause them to miss opportunities for low-carbon technology iteration and green market layout, and in the long run, they may face potential risks such as market access restrictions and damaged brand value due to high carbon footprints.

5. Conclusion

A comprehensive review of existing literature shows that research in the field of enterprise strategic types has formed a relatively mature system, with sufficient discussions on the influencing factors and economic consequences of strategic types. However, as an emerging risk, carbon risk's impact on enterprises with different strategic types has not been systematically empirically tested. Existing relevant discussions mostly remain at the theoretical deduction level, lacking solid empirical evidence to support the actual response modes, impact paths, and economic consequence differences of enterprises with different strategic types under the impact of carbon risk. It is difficult to fully reveal the internal mechanism of the interaction between carbon risk and enterprise strategies, and this cross-cutting research in the new context urgently needs to be supplemented and deepened.

To address the above research deficiencies, future studies can advance relevant explorations in multiple aspects. Firstly, an empirical research framework can be constructed based on existing theoretical deductions, selecting samples such as A-share listed companies in Shanghai and Shenzhen to empirically test the differentiated impacts of carbon risk on enterprises with different strategic types by quantifying key variables such as carbon risk levels, strategic types, corporate operating performance, and transformation effectiveness, so as to clarify the advantages and disadvantages of various enterprises in coping with carbon risk. Secondly, the moderating effects of factors such as

ownership nature, internal control quality, and industry carbon intensity can be further explored to deepen the understanding of the interaction mechanism between carbon risk and enterprise strategies. Finally, the research perspective can be expanded to explore the optimal paths for enterprises with different strategic types to cope with carbon risk, providing empirical basis for enterprises to formulate adaptive carbon risk management strategies. This review systematically sorts out the research foundation and gaps in the fields of carbon risk and enterprise strategic types, and can provide a clear literature reference for subsequent scholars to carry out relevant empirical research and theoretical expansion, helping to promote the in-depth development of research in this field.

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