Market Competition, Business Model Innovation and Enterprise Innovation Performance

Qing Xu*

School of Accounting Fujian Jiangxia University Fuzhou, China, 350108

*Email: fzxuqing@qq.com

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Abstract: The research results of business model and enterprise performance are relatively rich, but the research literature on how market competition and business model innovation affect enterprise innovation performance is relatively rare. This study uses 289 companies as research samples to construct a dynamic interaction model between market competition, business model innovation and corporate innovation performance, empirically testing the effects of market competition, business model innovation and corporate innovation performance. Research shows that market competition is an important external influence factor of enterprise innovation performance.Market competition has a significant positive effect on corporate innovation performance.Different market competition levels have different effects on the innovation performance of enterprises;business model innovation is enterprise innovation. The important internal influencing factors of performance, business model innovation has incentive effect on enterprise innovation performance, business model innovation has greater incentive effect on private enterprise innovation performance than in state-owned enterprise innovation performance, and business model innovation improves high-tech enterprise innovation performance The effect is greater than the improvement effect on the innovation performance of traditional enterprises;there is an interaction between market competition, business model innovation and enterprise innovation performance.

1. Introduction

In the new era, new business logic and new economic models are rapidly changing the market supply and demand relationship and trading methods. Currently, they have entered the era of business four. The market competition pattern is undergoing profound changes. Enterprises are facing how the era of homogenization stands out and how the industry is meager. Achieve high-speed growth across the stairs. Fierce market competition is not only a competition between products and individual enterprises, but a contest between enterprise populations under different business models. Only by forming a unique business model from multi-dimensional innovation can enterprises win in the competition. Through business model innovation, enterprises can gain competitive advantage, can highlight the encirclement and create a blue ocean market in the homogenization competition, and open up new profit margins and realize profit expansion in the era of industry meager profit. Business model is the profit logic of enterprises, and business model innovation is an important support for enterprise innovation performance. However, the existing literature lacks an in-depth examination of what is the mechanism of market competition affecting the innovation performance of enterprises, and the mechanism of business model innovation affecting the innovation performance of enterprises. The mechanism and effect of market competition and business model innovation affecting the innovation performance of enterprises. More is less explored.

In view of this, this paper hopes to solve these problems to a certain extent and make up for the gap in the above literature research. This paper argues that market competition can promote the innovation of business model, and accordingly construct the corresponding theoretical framework, deeply analyze the mechanism of market competition and business model innovation affecting enterprise innovation performance, and obtain empirical data to test market competition, business

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model innovation and innovation performance through research. The dynamic interaction between the two, open the market competition and business model innovation to the "black box" of enterprise innovation performance, which provides an important reference for the development of enterprise business model innovation theory and innovation performance.

2. Literature Review

At present, the academic research on market competition affects the innovation performance of enterprises presents two opposite views. One research conclusion is that market competition improves corporate innovation performance. Representative research results are: market competition affects the innovation performance of enterprises, large enterprises with higher market power can achieve better innovation performance, competitive market environment helps to improve the innovation performance of private enterprises, market forces have a positive impact on the independent innovation performance of enterprises, market orientation has a positive and significant impact on corporate innovation performance. Another research concluded that market competition inhibits corporate innovation performance. Representative research results are: the degree of market competition is inversely proportional to the efficiency of enterprise technology innovation, and the degree of regional market competition also has a significant negative impact on corporate innovation performance [1], and the degree of market competition negatively affects innovation efficiency.

There are currently three main conclusions in the academic world on business models and corporate innovation performance. First, business model innovation has a positive effect on corporate innovation performance. Business model innovation promotes corporate performance far more than technology or service innovation. An effective business model is the main source of corporate performance[2], innovative business The model can enhance the innovation ability and performance level[3] , the efficiency business model innovation positively affects the market performance, while the novel business model innovation has a significant effect on the financial performance, the business model innovation can significantly promote the improvement of the manufacturing enterprise performance, business model innovation can significantly promote legitimacy and the improvement of new business performance[4], business model innovation can promote the improvement of corporate performance[5], business model innovation can gain more value for enterprises, business model innovation It can improve the performance of enterprises in sales, profits and cash, business model innovation can promote market performance and financial performance[6], and novel business model innovation has a direct positive effect on performance[7]. Second, the impact of business model innovation on corporate innovation performance is uncertain. The novel and efficient business model is positive for innovation performance. The balanced business model has no significant impact on innovation performance. The interactive business model negatively affects innovation performance[8]. Different types of business model innovation have different indicators for business performance. There are different effects[3]. Third, business model innovation and enterprise innovation performance are U-related. Efficiency-based business model innovation and business performance are inverted U-shaped.The relationship between novel business model innovation and business performance is U-shaped[3].

In summary, there is currently no consensus on the mechanism and effect of market competition, business model innovation and corporate innovation performance, but the existing research results provide a basis for understanding the mechanism of action between the three and their effects. It is also possible to expand research from the following three aspects: to integrate market competition, business model innovation and enterprise innovation performance into the same theoretical framework, to explore the dynamic interaction mechanism between the three; sample selection and data source diversification, to explore market competition and business The influence of model innovation on enterprise innovation performance is linear or non-linear; according to the relationship between market competition, business model innovation and innovation performance, the logical relationship and internal law of "external environment - innovation behavior - innovation result" are explained.

3. Theoretical Analysis and Research Hypothesis

3.1. Market Competition and Enterprise Innovation Performance

In the new economic era, market competition is becoming more and more fierce. The market rules for survival of the fittest are more mainstream in the contemporary era. In this era of innovation, the effective measures for enterprises to deal with competition are only innovation, and innovation is the guarantee for the survival and development of enterprises in market competition. And the key, through the development of innovative activities and non-R&D innovation activities to enhance competitiveness and establish competitive advantages, the results of research and development of innovative activities and non-R&D innovation activities have formed corporate innovation performance. Enterprises carrying out innovation activities need to have the ability to innovate, organize, execute, absorb, and market. These capabilities are the guarantee for the success of innovation activities and the basis for enterprises to cope with market competition.Enterprise R&D and innovation activities include product innovation and technological innovation. Enterprise non-R&D innovation activities include business model innovation, management innovation, service innovation, process innovation, etc. Product innovation can enhance the product power of enterprises in market competition, and technological innovation can improve enterprises. The core competitiveness, management innovation can improve the management efficiency of enterprises, and business model innovation can improve transaction efficiency. Enterprises rely on innovation to enhance their value creation capabilities, and they can build differentiated service capabilities through iterative innovation. Enterprise R&D innovation activities and non-R&D innovation activities require resources and capabilities. Capabilities are the most important factors influencing innovation activities. Innovation is to improve the internal quality of enterprises and drive enterprises to gain more internal changes through the essential resources in the market. The ability to differentiate from other competing enterprises, the improvement of enterprise innovation ability is the sign of the improvement of enterprise competitiveness, and the stronger the innovation, the stronger the competitiveness of enterprises in the market competition. Organizational power is the synergy of an organization's organizational work. It is the ability of an enterprise to invest and transform its various elements into products or services with better production efficiency or higher quality under the same conditions as competitors' investment. It is the basis for improving other capabilities of enterprises. Organizational power is the link of enterprise innovation activities. Organizational strength is one of the guarantee factors for achieving innovation performance goals. Execution is the core standard for measuring the vitality of an enterprise. Execution is one of the key capabilities of an enterprise to compete in the market. It is the supporting force for implementing the strategic goals of the enterprise. The execution is the guarantee of marketing power. Only when the enterprise has the executive power guarantees. Marketing power is fully reflected in the market, so as to achieve corporate marketing goals, execution is a necessary condition to achieve innovative performance goals. Marketing power is the starting point of enterprise innovation activities and the guarantee of the output of innovation results. Marketing power determines whether the goal of innovation performance can be achieved. It can be said that market competition encourages enterprises to actively carry out innovation to enhance market competitiveness, market competition promotes enterprise improvement capability, enterprise capability improvement and innovation activities provide guarantee and source for enterprise innovation performance, and thus market competition to enterprise innovation The transmission path of performance is “market competition—innovation activities—enterprise ability—enterprise innovation performance”, market competition is the external factor of enterprise innovation performance, innovation activity and enterprise capability. The internal factors of enterprise innovation performance are only organic integration of external factors and internal factors. Only then can we achieve the goal of corporate innovation performance. Therefore, this paper proposes hypothesis one.

Hypothesis one: Market competition has a positive effect on corporate innovation performance.

3.2. Business Model Innovation and Enterprise Innovation Performance

The speed and popularity of technological innovation in the new era is getting faster and faster. Currently, it has entered the era of business 4.0. The competition among enterprises is no longer the competition between supply chain, product, channel, marketing and other low dimensions. The competition between the value chain and the ecosystem system consisting of five dimensions of products, services, communities, platforms and ecosystems, products are the source of competition, business model is the support of competition, and the intensification of market competition leads to business models. The speed of homogenization and aging is also getting faster and faster. The only effective means for enterprises to participate in and cope with market competition is product iteration innovation and business model optimization and reconstruction. Business model is the logical origin of corporate profitability. Business model competition is replacing the competition of enterprise elements and becomes a major feature of market competition. Business model innovation helps enterprises find business opportunities in the depressed market. Business model innovation helps enterprises to find new ones fundamentally. Competition methods and methods, business model innovation helps companies stay away from the fierce competition in the Red Sea. Enterprises can only innovate from multiple dimensions and form a unique business model. They use business model innovation to break through homogenization competition, use business model innovation to create blue ocean market and open up new profit space, and realize rapid development and profit through business model innovation. expansion. Business model innovation designs new business models through optimization and refactoring of value proposition, profit model, customer segmentation, customer relationship, channel approach, core resources, partners, key business, and cost structure. Business model innovation has changed the way value creation and transaction structure, and reconstructed the way of resource integration. Business model innovation combines corporate R&D innovation activities with non-R&D innovation activities. Business model innovation helps companies identify new customers, innovate new value, and achieve new competitive advantages. Business model innovation is an effective measure for companies to increase market participation and increase market winning rates.

Enterprise innovation performance is the result of various innovation activities. Market competition is the same behavior of companies in the market economy environment to exclude their peers in order to enhance their economic strength. The basic content of market competition includes information competition, commodity competition, price competition, service competition, reputation competition, and quality ability competition. The business model is a business network operation system and profit model that uses business opportunities to create value. The business model helps companies create new markets and occupy existing markets. Business model innovation is an enterprise that reconstructs the business management model, develops innovative business processes and channels, optimizes the trading network and existing resources in the restructuring industry ecosystem, changes the competition rules, and subverts the existing competitive order. Innovation process. Business model innovation is the master of various innovation activities of enterprises. Business model innovation generally affects the innovation performance of enterprises through three ways. First, business model innovation improves corporate innovation performance through systematic innovation. Enterprises are keenly observing in the ever-changing market, accurately judging market demand, positioning needs, and design requirements. On this basis, the existing market structure is changed through resource integration, and the profit distribution and channel relationship of the value chain are changed to meet the demand; in fact, Business model innovation is to achieve systematic innovation in four aspects: value proposition, value creation, value realization and value transfer. Systematic innovation is conducive to the efficient coordination of internal and external capabilities and resources. Systematic innovation is also conducive to corporate restructuring and construction. Key advantages to improve corporate innovation performance. Second, business model innovation enhances the level of innovation performance of enterprises by improving transaction efficiency. Business model innovation is conducive to companies paying attention to the trading methods in the industrial ecosystem and designing new trading mechanisms, constructing new forms of

cooperation or developing new value propositions, reducing transaction complexity, transaction information asymmetry, transaction uncertainty, and improving transactions. Transparency, increase the transaction frequency of trading participants in the industrial ecosystem, reduce the communication costs and coordination costs of trading participants, attract new customers and new partners, expand trading networks, reduce trading risks, increase market share, and enhance enterprises The development potential in the industrial ecosystem, business model innovation is also conducive to improving labor productivity, thereby improving corporate innovation performance. Third, business model innovation promotes corporate innovation performance through value creation. Business model innovation can increase the value of customers through relevant products and services, use new links and new trading methods according to market changes, and gain potential first-mover advantage by learning and accumulating special knowledge to establish higher conversion costs for buyers. The reputation effect expands the user base or raises the pricing power, thereby improving customer satisfaction and the public image of the company, enhancing consumers' value perception and stimulating consumer desires, and promoting the improvement of corporate innovation performance.

Business model innovation optimizes the transaction structure and raises the level of value creation, thereby improving the performance of corporate innovation. The improvement of corporate innovation performance has promoted the active implementation of business model innovation. In addition to market competition, technology upgrade, business model aging and homogenization, enterprises have great enthusiasm and initiative to implement business model innovation to participate in the market. Compete and improve the level of innovation performance. As a result, a two-way interactive cycle between market competition, business model innovation and corporate innovation performance has emerged, which has led to the formation of dynamic interactions among the three. Therefore, this paper proposes hypothesis two and hypothesis three.

Hypothesis two: Business model innovation has a positive incentive effect on corporate innovation performance.

Hypothesis three: There is a dynamic interaction between market competition, business model innovation, and corporate innovation performance.

4. Research Method

4.1. Data Source and Sample Selection

This paper takes the relevant high-tech enterprises and traditional enterprises in Guangdong, Fujian, Zhejiang, Jiangsu, Jiangxi and Hubei provinces as research objects. From November 2015 to March 2017, the data was collected through questionnaire survey and field research. The screening criteria of the research object are: the establishment of the enterprise for more than 5 years; the annual sales income of the enterprise exceeds 20 million yuan; the number of employees of the enterprise exceeds 100; the executives surveyed have worked in the enterprise for 3 or 3 years. The design of the questionnaire was mainly derived from the maturity scale of the existing literature. The members of the project team conducted field research and recovered 127 questionnaires in 127 companies during the winter and summer vacations. The project team used various social networks to reach 296. The company's senior executives issued 296 questionnaires, and 296 recovered and recovered, of which 162 were valid questionnaires, and the effective questionnaire recovery rate was 54.73%. In the end, 289 companies were selected as research samples. Among the research samples, there were 114 state-owned or state-controlled enterprises, 175 private enterprises, 126 high-tech enterprises, and 163 traditional enterprises. This paper uses Stata14.0 statistical software to analyze the relevant data.

4.2. Variable Measurement and Reliability and Validity Test

4.2.1. Enterprise Innovation Performance

Based on the research of Qian Xihong et al[9] and Zheng Yu et al[10] , this paper considers the characteristics of Chinese enterprises and designs the scale of innovation performance of enterprises

as 10 items: Enterprise Authorized The ratio of the number of invention patents to the R&D personnel of every 1,000 companies; the sales revenue of new products accounts for the proportion of the main business income; compared with their peers, they often take the lead in promoting innovation in organization and management; they are often the first in the industry compared with their peers. Introducing new products/new services; adopting new technologies in the industry compared with peers; product improvement and innovation have a very good market response compared with peers; products contain first-class advanced technologies and processes compared with their peers; Compared with peers, the success rate of new product development is very high; the number of patent applications; the speed of development of new products. Ten items were evaluated using the Likert seven-level scale. The multiple dimensions of innovation performance may be related. The principal component analysis method is used to reduce the multidimensional index to a single comprehensive index. The KMO value is 0.874, the Bartlett spherical test value is 491.311, and the significant level is 0.000, indicating that it is very suitable for the factor. Extraction; the public factor explained 78.412% of the total variation, indicating that the innovation performance scale has a good construction validity; the reliability test results showed that the α coefficients of each study variable exceeded 0.911, and the overall reliability of the questionnaire was better.Enterprise innovation performance is expressed by EIP.

4.2.2. Market Competition

Market competition is replaced by the degree of competition. This paper draws on the competitive degree measurement method of Mia and Clarke[11] , Pan Fei and Zhang Chuan[12], and designs the competition degree scale as seven items: the competition situation of the company's industry, production (or service) speed of technology update, speed of new products, number of competitors, market share of the company in which the company is located, degree of government regulation of the company's industry, and degree of price competition in the industry. Seven items were evaluated using the Likert seven-level scale. The multiple dimensions of market competition may be related. The principal component analysis method is used to reduce the multidimensional index to a single comprehensive index. The KMO value is 0.836, the Bartlett spherical test value is 481.715, and the significant level is 0.000, indicating that it is very suitable for the factor. Extraction; the public factor explained 78.411% of the total variation, indicating that the market competition scale has a good construction validity; the reliability test results showed that the α coefficients of each study variable exceeded 0.911, and the overall reliability of the questionnaire was better.Market competition is expressed by MC.

4.2.3. Business Model Innovation

Drawing on the research by Zott and Amit[5] and Wu Hao et al[7], 15 business model innovations were retained after localization, ie: the new business model improved the transaction overall. Efficiency; the new business model reduces inventory costs across the channel; users believe transactions are easier; new business models reduce transaction error rates; new business models reduce participants' marketing costs, transaction costs, or communication costs; The new business model is scalable, flexible for large transactions and small transactions; new business models allow participants to make informed decisions; transactions are transparent in new business models; new business models reduce products Information asymmetry in quality and performance; participants in each transaction receive information from other participants; new business models allow companies to reach a wide range of products, services, information and other participants; new businesses The model speeds up the transaction; it implements a combination of products, information and services in new ways; in the transaction, it can stimulate other combinations in a novel way. Partners; the business model very much hope to be a leader; customers think about their business and business is simple and easy. The survey questionnaire was designed primarily using the Likert7 scale. The reliability test results showed that the α coefficients of each study variable exceeded 0.9, and the overall reliability of the questionnaire was better. Principal component analysis was used to reduce the multidimensional index to a single comprehensive index with a KMO value of 0.813, and the significance of the Bartlett test was less than the significance level.

The common factor explained 77.38% of the total variation.Business model innovation expressed in BMI.

4.3. Research Model Construction

Based on the existing research results, this paper establishes a model one to test the impact of market competition on corporate innovation performance.

$$\mathrm{EIP}_{i,t} = \lambda_0 + \lambda_1 MC_{i,t} + \lambda_2 SZ_{i,t} + \lambda_3 AG_{i,t} + \varepsilon_{i,t} \quad (1)$$

Based on the existing research results, this paper establishes a model two to test the impact of business model innovation on corporate innovation performance.

$$\mathrm{EIP}_{i,t} = \kappa_0 + \kappa_1 \mathrm{BMI}_{i,t} + \kappa_2 SZ_{i,t} + \kappa_3 AG_{i,t} + \varepsilon_{i,t} \quad (2)$$

Among them, *EIP* represents the innovation performance of the enterprise, subscript *i* represents the company, and *t* represents the year. *MC* stands for market competition and *BMI* stands for business model innovation. *SZ* stands for the size of the company, and the size of the company is measured using the natural logarithm of the number of employees. *AG* represents the age of the company, and the age of the company is based on the natural logarithm of the establishment of the company. ε is a random disturbance item.

In order to test the dynamic interaction between market competition intensity, business model innovation and enterprise innovation performance, based on the existing research results, this paper establishes panel vector autoregressive model.

$$Y_{i,t} = \eta_0 + \eta_1 Y_{i,t-1} + F_i + G_i + \zeta_{it} \quad (3)$$

Among them, $Y_{i,t}$ represents the vector of the i enterprise consisting of endogenous variables in the t year, followed by enterprise innovation performance, business model innovation and market competition.The subscript($i = 1,2,\cdots\cdots 289$)indicates 289 sample enterprises, t indicating 2014-2017. η is the regression coefficient, F_i is the fixed effect, and G_i is the time effect, and ζ_{it} is the random disturbance term.

5. Empirical Test and Result Analysis

5.1. Descriptive Statistical Analysis

It can be seen from Table one that the average innovation performance of enterprises is 18.17, and the innovation level is not too high. The maximum value is 48.21, and the minimum value is 6.13, indicating that there is a big difference in the level of innovation of enterprises. The average market competition degree is 9.67, indicating that the sample enterprise market competition level is not high, the maximum value is 35.46, and the minimum value is 7.04, indicating that there is a big difference in the market competition of sample companies. The average value of business model innovation is 3.527, the maximum is 5, and the minimum is 1, indicating that the sample business model innovation is not much different. The maximum size of the enterprise is 5.02, and the minimum value is 0.52, indicating that there is a big difference in the size of the sample enterprises.

Table 1 Variable descriptive statistics.

Variable name	Mean	Standard deviation	Maximum	Minimum value	samples
EIP	18.17	9.06	48.21	6.13	289
MC	9.67	7.87	28.46	4.04	289
BMI	3.527	0.883	5.00	1.00	289
SZ	3.15	0.894	5.02	0.52	289
AG	1.08	0.794	3.16	0.61	289

5.2. The Regression Result and Analysis of Market Competition and Enterprise Innovation Performance

Taking the innovation performance of the enterprise as the dependent variable and the market competition as the independent variable, the model one is used to test the hypothesis one. Table two gives the regression results of the whole sample. After controlling the scale of the enterprise and the age of the enterprise, the market competition has a significant positive impact on the innovation performance of the enterprise. The corresponding standardized regression coefficient reaches 0.174***, and the hypothesis one is supported.

In order to further analyze the degree of influence of different market competition on the innovation performance of enterprises, this paper divides the sample into three sub-sample groups of high market competition, medium market competition and low market competition according to the market competition degree score, and explores the impact degree on the innovation performance of enterprises. . The regression results show that the corresponding standardized regression coefficients of sample companies with high market competition, medium market competition and low market competition are 0.311***, 0.112**, and 0.037*, respectively, indicating that the impact of different levels of market competition on corporate innovation performance exists. Differences and increasing market competition are one of the main ways to improve the innovation performance of enterprises.

Table 2 The regression result of market competition and enterprise innovation performance.

Variable name	Total sample of market competition intensity	High market competition intensity sample group	Medium market competition intensity sample group	Low market competition intensity sample group
MC	0.174** (3.55)	0.311*** (4.18)	0.112** (3.13)	0.037* (3.01)
SZ	-0.057* (-3.08)	-0.065* (-3.22)	-0.041* (-3.12)	-0.014* (-3.01)
AG	-0.027* (-3.17)	-0.051* (-3.22)	-0.022* (-3.08)	-0.021* (-3.12)
Constant	-0.014* (-3.04)	-0.023* (-3.16)	-0.014* (-3.12)	-0.021* (-3.17)
$Adjusted - R^2$	0.325	0.378	0.305	0.281
Durbin – Watson	1.01	1.11	1.02	0.97
Number of samples	289	96	96	97

(Noting: The value of t in parentheses, ***, **, and * indicate significant at the statistical level of 1%, 5%, and 10%, respectively)

Table 3 Market competition and regression results of innovation performance of different sample groups

Variable name	Private enterprise sample group	State-owned enterprise sample group	High-tech enterprise sample group	Traditional enterprise sample group
MC	0.461*** (4.47)	0.011** (3.02)	0.521*** (4.79)	0.014** (3.31)
SZ	0.021** (3.74)	0.001** (3.21)	0.013** (3.44)	0.026** (3.27)
AG	0.011** (3.37)	0.002** (3.22)	0.052** (3.42)	0.031** (3.21)
Constant	-0.033*** (-3.54)	-0.012*** (-3.24)	-0.062*** (-3.51)	-0.033*** (-3.47)
$Adjusted - R^2$	0.364	0.253	0.371	0.261
Durbin – Watson	1.01	1.03	1.01	1.01
Number of samples	175	114	126	163

(Noting: The value of t in parentheses, ***, **, and * indicate significant at the statistical level of 1%, 5%,

and 10%, respectively)

Further, the whole sample is divided into state-owned enterprise sample group and private enterprise sample group, high-tech enterprise sample group and traditional enterprise sample group, and then regression analysis is performed on these two sample groups respectively. The regression results are shown in Table 3. The regression results show that market competition has innovation performance of private enterprises. The promotion effect is greater than the promotion effect of market competition on the innovation performance of state-owned enterprises. The effect of market competition on the innovation performance of high-tech enterprises is greater than the effect of market competition on the innovation performance of traditional enterprises.

5.3. The Regression Result and Analysis of Business Model Innovation and Enterprise Innovation Performance

Taking enterprise innovation performance as the dependent variable, business model innovation as the independent variable, and using model two to test hypothesis two. Table 4 gives the regression results of the whole sample. After controlling the size of the enterprise and the age of the enterprise, the business model innovation has a significant positive impact on the innovation and innovation of the enterprise. The corresponding standardized regression coefficient reaches 0.0.262***.Hypothesis two is supported.

Table 4 The regression result of business model innovation and enterprise innovation performance.

Variable name	Full sample	Private enterprise sample group	State-owned enterprise sample group	High-tech enterprise sample group	Traditional enterprise sample group
BMI	0.262*** (3.81)	0.503*** (4.14)	0.007*** (3.02)	0.478*** (4.73)	0.013*** (3.02)
SZ	0.002*** (2.97)	0.016** (3.24)	0.005** (3.11)	0.086** (3.31)	0.002** (3.07)
AG	0.003* (2.96)	0.031** (3.27)	0.001** (3.02)	0.041** (3.37)	0.001** (3.01)
Constant	-0.042*** (-3.35)	-0.052*** (-3.64)	-0.002*** (-3.04)	-0.051*** (-3.62)	-0.023*** (-3.47)
$Adjusted-R^2$	0.317	0.341	0.272	0.339	0.264
Durbin – Watson	1.01	1.02	1.04	1.02	1.08
Number of samples	289	175	114	126	163

(Noting: The value of t in parentheses, ***, **, and * indicate significant at the statistical level of 1%, 5%, and 10%, respectively)

The sample is further divided into a sample of state-owned enterprises and a sample of private enterprises, and then regression analysis is performed on the two groups of samples. The regression results show that the standardized regression coefficient of business model innovation in the sample group of private enterprises has reached 0.503***, state-owned enterprises. The standardized regression coefficient of business model innovation in the sample group reached 0.007**, which indicates that the promotion effect of business model innovation on private enterprise innovation performance is greater than the promotion effect of business model innovation on state-owned enterprise innovation performance, indicating that business model innovation is different. There are differences in the promotion of innovation performance of ownership enterprises. Private enterprises are more proactive in implementing market model innovation under the pressure of market competition.

The whole sample is further divided into high-tech enterprise sample group and traditional enterprise sample group, and then regression analysis is performed on the two groups of samples respectively. The regression results show that the standardized regression coefficient of business model innovation in the high-tech enterprise sample group reaches 0.478***, the standardized regression coefficient of business model innovation in the traditional enterprise sample group reached 0.013**, which indicates that the promotion effect of business model innovation on the

innovation performance of high-tech enterprises is greater than the promotion effect of business model innovation on traditional enterprise innovation performance, high-tech In the new economic era, enterprises are more motivated to innovate business models, and through business model innovation to optimize transaction structure and value creation methods, thereby improving innovation performance.

5.4. Regression Results and Analysis of Market Competition, Business Model Innovation and Enterprise Innovation Performance

The LLC and ADF-Fisher tests were used to evaluate *EIP, GS,* and *BMI* before the panel vector autoregressive model was estimated. The LLC test results of the three variables were -22.638***, -11.731***, -16.412***, respectively. The ADF-Fisher test results for the variables were 111.251***, 88.864***, and 97.735***, respectively. From the test results, it is known that each variable passes the unit root test and is a stationary sequence. According to the results of cointegration test, there is a long-term stable equilibrium relationship between market competition, business model innovation and enterprise innovation performance. The test results show that the regression analysis of panel data can be performed on the above variables, and the regression coefficient is obtained by using generalized moment estimation.

In the module one of Table five, the enterprise innovation performance is taken as the dependent variable. The analysis finds that the market competition and business model innovation of the first phase can improve the innovation performance of the current period, and the direct promotion effect of business model innovation on the innovation performance of the enterprise is greater than the market competition. The direct promotion effect on the innovation performance of enterprises. In the module two of Table five, the market competition is taken as the dependent variable. The enterprise innovation performance and business model innovation that lags in the first phase can significantly improve the current market competition level, indicating that the current market competition depends on the previous enterprise innovation performance and business model innovation level; The level of market competition also depends on the level of market competition in the previous period. In the module three of Table five, the business model innovation is taken as the dependent variable. The analysis shows that the enterprise innovation performance of the lag phase one has a promoting effect on the current business model innovation. The market competition after the lag of the first phase will enhance the current business model innovation level; the current business The level of model innovation depends on the level of innovation in the previous business model. Hypothesis three is verified.

Table 5 Regression results of market interaction, business model innovation and corporate innovation performance

Module area	Module one	Module two	Module three
variable	*EIP*	*MC*	*BMI*
sample	overall	overall	overall
$EIP_{i,t-1}$	0.412 (0.271)	0.171* (0.028)	0.022 (0.013)
$MC_{i,t-1}$	0.725* (0.017)	0.471* (0.032)	0.029* (0.057)
$BMI_{i,t-1}$	0.217* (0.014)	0.331* (0.045)	0.174*** (0.000)

5.5. Robustness Test

In this paper, the following methods are used to test the robustness: using the innovative performance measurement items of Qian Xihong et al[9] to measure the innovation performance of enterprises, using the business model innovation measurement items of Wu Hao et al[7]to measure business. The model innovation, repeating the above operations, the results of the robustness test are basically consistent with the previous analysis. The results of the robustness test are shown in Tables six and seven.

Table 6 Market competition, business model innovation and firmness test results of corporate innovation performance

Variable name	Model one	Model two
MC	0.364** (3.17)	
BMI		0.318** (3.49)
SZ	-0.064* (-3.29)	-0.046* (-3.38)
AG	-0.003* (-3.12)	-0.018* (-3.59)
Constant	-0.038** (-3.67)	-0.038** (-3.74)
$Adjusted - R^2$	0.317	0.329
$Durbin - Watson$	1.03	1.08
F	45.31	44.26
Number of samples	289	289

(Noting: The value of t in parentheses, ***, **, and * indicate significant at the statistical level of 1%, 5%, and 10%, respectively)

Table 7 Market competition intensity, business model innovation and enterprise innovation performance interaction effect robustness test results

Module area	Module one	Module one	Module one
variable	*EIP*	*MC*	*BMI*
sample	overall	overall	overall
$EIP_{i,t-1}$	0.537 (0.461)	0.218* (0.017)	0.012* (0.032)
$MC_{i,t-1}$	0.618* (0.021)	0.402* (0.013)	0.046* (0.018)
$BMI_{i,t-1}$	0.318* (0.044)	0.217* (0.038)	0.251*** (0.000)

6. Research Conclusions and Enlightenment

This paper attempts to reveal the interaction mechanism between market competition, business model innovation and enterprise innovation performance. Through empirical tests on 289 sample companies, the research finds that market competition has a positive effect on the innovation performance of enterprises, with varying degrees of There is a certain difference in the impact of market competition on the innovation performance of enterprises. The effect of market competition on the innovation performance of private enterprises is greater than that of state-owned enterprises. The effect of market competition on the innovation performance of high-tech enterprises is greater than that of traditional enterprises. An effective way of innovation performance; business model innovation has an incentive effect on enterprise innovation performance; business model innovation has greater effect on private enterprise innovation performance than business model innovation on state-owned enterprise innovation performance, and may be that private enterprises face greater market competition pressure State-owned enterprises and private enterprises have an urgent desire and motivation to implement business model innovation and improve the level of innovation performance. The incentive effect of business model innovation on the innovation performance of high-tech enterprises is greater than that of business model innovation to traditional enterprise innovation performance. The incentive effect may be caused by the particularity of high-tech enterprise products, services, communities, platforms and ecosystems. High-tech enterprises have a stronger willingness to innovate the transaction structure and trading methods to realize the transformation of value re-engineering methods. Enhance the competitiveness of enterprises and the

level of innovation performance; there is an interaction between market competition, business model innovation and enterprise innovation performance. The organic integration of market competition and business model innovation is the guarantee of innovation performance improvement, and the improvement of innovation performance further promotes business. Model innovation.

The conclusions of this paper have certain theoretical value. This paper establishes a dynamic interaction mechanism model between market competition, business model innovation and enterprise innovation performance. This model reveals to some extent the interaction mechanism and path between market competition, business model innovation and enterprise innovation performance. The existing research literature has insufficiently explored the mechanism of market competition and business model innovation affecting innovation performance. The empirical research in this paper finds that there is an interaction between market competition, business model innovation and enterprise innovation performance, which to some extent compensates for the shortcomings of previous empirical research and explores, and provides new development for market competition theory and business model innovation theory evidence.

The conclusions of this paper have certain enlightenment for enterprises: for enterprises, the innovation performance of enterprises is the result of the comprehensive effect of internal and external factors of enterprises. Improving the level of market competition is an effective measure to improve the innovation performance of enterprises. Iteratively upgrading the ability of enterprises is to improve enterprise innovation. Performance, dynamic optimization and adjustment of business model are the support to improve the innovation performance of enterprises. To deal with fierce market competition, enterprises need to pay attention to the cultivation of business model design and application ability. However, this paper only selected relevant enterprises in some provinces as research samples and obtained some important conclusions. Whether these research conclusions are applicable to other regions remains to be further tested, and the number of research samples is small. These shortcomings are important for future research. In the future, a large-scale enterprise survey across regions will be carried out in the future to further test and develop the conclusions of this study.

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