Original Paper

Research on Customer Relationship, Market Level and Enterprise Innovation Relationship

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Abstract

Enterprise innovation is an important content of enterprise management and a key element to determine the direction, scale and speed of the development of the company. Enterprise innovation has always been the focus of academic attention. Customer relationship is the contractual relationship established between the enterprise and the customer when purchasing and selling transactions. The research found that customer relationship can affect the innovation investment of enterprises to some extent. Based on a sample of listed companies in China's A stock manufacturing industry from 2008 to 2018, this paper empirically examines the impact of concentration of customer relationship on innovation output and its mechanism. The research found that the higher the concentration of customer relationship, the lower the innovation investment. Further research found that the level of marketization can alleviate this inhibition, with the promotion of market-oriented level, the excessive concentration of customer relations on enterprise innovation inhibition can be weakened. This research explores the factors that affect enterprise innovation from different angles, enriches the research on enterprise innovation, and provides a reference for enterprises to improve their innovation level.

Keywords

Customer Relationship, Customer Concentration, Marketization Level, Corporate Innovation

1. Introduction

1.1 Background

With the continuous progress of supply-side structural reform, China's economic growth is changing from "factor-driven" to "innovation-driven". As China's economy shifts from high growth to high quality development, the cost advantages that used to drive business development are diminishing and innovation investment is becoming increasingly important (Qu, Shao, & Cheng, 2020). The report also emphasises the need to once again implement the innovation-driven development strategy and further

states that "innovation is the first driving force leading development and is a strategic support for building a modern economic system". The "innovation-driven strategy" has become one of the main development strategies of China. The implementation of the innovation-driven development strategy is of strategic importance for China to develop a new international competitive advantage and long-term development momentum. In addition, an innovation-driven strategy can accelerate the shift from low-cost advantage to innovation advantage and can provide a strong impetus for China's sustainable development (Liu, 2015). The innovation drive can also improve the quality and efficiency of China's economic growth, accelerate the transformation of the economic development mode, and effectively contribute to the transformation of the economic development mode (Peng et al., 2021). Therefore, to make China strong and rejuvenated, it is necessary to vigorously develop science and technology, implement an innovation-driven strategy, and gradually become a major R&D centre and innovation hub in the world.

As one of the most important micro-entities in the economic system and the most important practitioner and promoter of technological innovation, enterprises play an extremely important role in China's current economic transformation (Bena & Li, 2014). Innovation is the core competitive advantage of firms and is the driving force for value creation within firms. At the same time, corporate innovation can also reflect the economic development of a region or even a country, and is the most intuitive measure of the level of technology and science (Fagerberg et al., 2010). China is currently at a critical stage of marketization, and the ability and level of corporate innovation directly affects the sustainable development of the Chinese economy as well as industrial transformation and upgrading (Ma & Zhang, 2020). In recent years, corporate innovation has become a widely discussed topic and a hot topic of academic interest. Research on firms' innovation behaviour provides a reliable basis for corporate innovation decisions and a reference for macro policy formulation.

1.2 Motivation

Among the studies on the factors influencing corporate innovation, Yasuda (2005) studied the relationship between firm size and corporate innovation, and Carbonell and Rodríguez-Escudero (2009) studied the relationship between the speed of corporate innovation and uncertainty from the perspective of corporate governance. structure on firm innovation. They all provide academic contributions to the field of corporate innovation research. However, most of the studies on the factors influencing corporate innovation have explored the factors influencing corporate innovation from the perspectives of internal characteristics of firms, the level of corporate governance as well as industrial policies and market environment, but there is still room for research on the influence of stakeholders with whom firms have strong business relationships, especially the major customer relationships, on corporate innovation.

In addition, no studies have examined the level of marketization, a measure of the degree of market development (Fan et al., 2016), as a moderating variable. There is also no research linking the level of marketization and customer relationships to explore the impact of both on firm innovation. Therefore,

this paper will examine the impact of customer relationship on firm innovation, which will fill the gap in the study of the relationship between the two, and add the level of marketization as a moderating variable to explore the relationship between the three. This will provide a reference for research on corporate innovation.

1.3 Research Aims and Objectives

This paper takes customer concentration as an entry point to explore the effect and mechanism of the level of customer concentration on firms' innovation investment. It also explores the causal relationship between the two from the perspective of the moderating variable of marketization, with the aim of exploring the impact of the relationship between the level of customer concentration and firms' innovation output driven by the level of marketization.

This study collects information by reviewing secondary research and incorporates quantitative data, selected from Chinese a-share manufacturing listed companies. Based on the objectives of the study, this research poses two research questions:

1. What is the impact of customer relationships on corporate innovation?

2. What role does the level of marketization play in the impact caused by question 1?

1.4 Contributions

Contributions of this paper: The study explores the factors influencing corporate innovation from different perspectives: customer relationship and market level, enriching the research on corporate innovation and providing a multi-faceted reference for corporate innovation decisions.

1.5 Structure of Study

The remainder of this research is structured as follows:

Chapter 2 reviews the definition of customer relationship and corporate innovation. The findings of a large body of literature are used to discuss the positive and negative effects of customer relationships on firm innovation and the moderating effect of the level of marketization on the negative relationship between the two. Two hypotheses are proposed for this study based on previous research.

Chapter 3 outlines the research methodology and selection of the sample for this study, as well as how the data was collected and analysed, in relation to the Sanders Onion theory. The research methods include hypothesis testing, construction of the model, data analysis and robustness testing.

The results of the research methodology are analysed in Chapter 4, followed by a further discussion of the reasons for the results in Chapter 5 and an analysis in conjunction with the literature review in Chapter 2.

Chapter 6 summarises the main findings and results of the paper and provides recommendations and limitations, as well as contributions to future research.

2. Literature Review and Hypothesis

This section focuses on the relationship between customer relations and corporate innovation. The relationship between the two is discussed through a large body of literature and two hypotheses are

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proposed in this paper based on previous research.

2.1 Customer Relationship and Corporate Innovation

Corporate innovation requires significant investment of economic resources. For firms, trading products or services in the market to obtain funds through business activities is the most common way of financing, and this action is also a manifestation of the relational contract (Winn, 1994). The customer is an important external non-financial stakeholder of the company. Companies deal with their customers on the basis of their day-to-day activities, establishing a contractual relationship of sale and purchase transactions, i.e. a customer relationship.

The degree of customer concentration is an important dimension for characterising relationship-based transactions between firms (Reinartz, Krafft, & Hoyer, 2004). This is because customer concentration is a measure of customer relationship, which can be a good measure of the relationship between a firm and its customers and can visualise the relationship between a firm and its customers. A study by Li et al. (2017) shows that Chinese listed firms usually rely on major customers. Nearly half of a firm's transactions with its top five customers exceed 30 per cent, and about one-fifth or even more than 50 per cent of a firm's sales to its top five customers.

Past research has shown that there are two sides to the impact of customer relationships on corporate innovation. Patatouka (2012) argues that a high degree of customer concentration reduces a firm's operating costs. Patatouka's research investigates whether and how customer concentration affects supplier firm fundamentals and stock market valuations. Patatouka compiles a comprehensive sample of supply chain relationships and developed a measure (CC) to capture the degree of concentration of a supplier's customer base The study shows a positive contemporaneous association between CC and accounting returns, which suggests that efficiency is gained by suppliers with a concentrated customer base. Patatouka's research shows that big customers are an important source of capital supply for companies. When there is a high concentration of customers, big customers can supply a large amount of capital to the firm and the firm will rely more on them and work with them for a long time. In this way, the company has a long-term stable source of capital revenue and reduces the cost of customer acquisition and customer demand awareness. At the same time, the greater the concentration of customers, the easier it is for companies to focus their resources, thus enhancing customer management and saving marketing costs.

Casciaro et al. (2015) show that firms in highly concentrated industries are more likely to have co-dependent relationships with their customers, and Casciaro's study finds that such dependencies can facilitate supply chain integration between suppliers and customers, enhancing cooperation, resulting in synergies. At the same time, this synergy enhances the profitability of the company and, to a certain extent, brings sufficient capital to the company, which helps it to innovate and develop.

Adamson, Chan, and Handford (2003) found that customer concentration is positively related to a firm's ability to borrow money from banks. This is because high customer concentration increases a firm's cost of debt and reduces the cost of equity capital, leading to an optimal level of capital structure,

which increases the market value of the firm, thus attracting more investors, increasing the firm's cash inflows, and helping the firm to invest in innovation.

In summary, Patatouka, (2012), Casciaro et al. (2015), Adamson, Chan, and Handford (2003) and other scholars argue that: an increase in customer concentration promotes corporate innovation to a certain extent.

However, more studies have found that high customer concentration can hinder firm innovation.

On the one hand, high customer concentration increases the business risk of firms. When customer relationships are excessively concentrated, big customers can have a "predatory effect" on the firm and take advantage of suppliers (Zhao et al., 2019). The 'predatory effect' means that big customers use their dominant position to control and plunder the firm's resources so that the firm is forced to meet their demands (Zhao et al., 2019) firm's performance and growth, and made an empirical study. The study suggests that big customers may use their strong position and the bargaining power they possess to demand that firms meet their needs, for example, by asking firms to adjust the timing of orders, order sizes, payment schedules, etc., as well as asking firms to increase stock levels or produce higher quality goods.

This finding is consistent with Jackson, Holland, Albrecht, and Woolstenhulme (2010), who suggest that "firms often face the dilemma of being robbed of resources by big customers". Irvine et al. (2016) examined the relationship between supplier and customer data and found that a high degree of customer concentration can have a significant negative impact on a company's profits when it is early in its life cycle. The study noted that early stage companies are in an initial stage of development and require a significant amount of capital to sustain the business. As the largest stakeholder in the business, customers become an important source of capital in the development of the business. In this situation, customers dominate and they will make unreasonable demands on the firm in order to satisfy their own needs, which will increase the business risk and negatively impact the firm's profitability. Irvine et al.'s study makes up for the fact that Patatouka (2012) has not studied many loss-making firms in early relationships and found that the market responds to increased customer concentration of the market response to increased customer concentration. This result provides strong validating evidence for the value of customer concentration.

To reduce business risk, firm managers tend to adopt defensive responses, such as increasing short-term working capital investment and thus liquidity, reducing the level of public disclosure and increasing information asymmetry (Crawford, Huang, Li, & Yang, 2020), increasing the level of tax avoidance (Huang et al., 2016), reducing firm management shareholding incentives (Albuquerque, 2014). Although these measures help to reduce a firm's business risk to some extent, they undermine the long-term interests of the firm. In addition, the risk appetite of firm management is set, and when a firm's operational risk is high, rational firm executives tend to reduce their investment in riskier R&D activities, which has a crowding-out effect on firm innovation (Zhao et al., 2019).

On the other hand, excessive concentration of customer relationships can exacerbate the degree of

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financing constraints for firms. Research by Chen (2016) suggests that excessive customer concentration will squeeze a firm's working capital, and the firm's actual working capital will be off-target. This is because credit sales are common in transactions, and when big customers sell on credit in larger amounts, this will also create bad debt risk for the firm, especially for poorly managed or financially challenged firms. In response to this phenomenon, the company's management uses more funds for short-term working capital, which increases liquidity and prevents the company from facing the risk of bankruptcy due to a shortage of funds (Baños-Caballero, 2014). In this case, the firm does not have more funds to invest in innovation, which reduces the level of innovation of the firm. Moreover, high customer concentration makes it necessary for firms to make large 'dedicated investments' to maintain contractual relationships with customers (Titman, 1984).

Liu, Xiao, and Xie (2020) find that customer concentration increases the risk impact of risk impact on bond investors, and to compensate for the higher risk premium demanded by creditors and shareholders, firms will pay more for capital and debt costs, leading to an increased level of financing constraints and reduced investment in innovation.

In summary, although customer concentration will enhance the financing level of enterprises to a certain extent, the negative impact of high customer concentration on enterprise innovation is more obvious. Based on the above analysis, this paper puts forward the following hypotheses.

Hypothesis 1: The higher the degree of customer concentration, the lower the level of corporate innovation.

2.2 The Moderating Role of Marketization Level

The level of marketization is the main indicator of the maturity of the marketization mechanism. It is a comprehensive indicator of the development of a region's national economic property rights system, economic externalities, the degree of government control over social resources and the development of product markets (Fan & Wang, 2011). The impact of customer relationships on firm innovation varies across market environments. The level of marketization can moderate the relationship between customer concentration and firm innovation, and the inhibiting effect of excessive customer concentration on firm innovation may be limited by the level of marketization in the firm's region.

Regions with a high level of marketization usually have a higher level of economic development and the market allocates more resources (Fan & Wang, 2011). In this case, firms have more capital to spend on their day-to-day operations and their risk-taking capacity will increase. Specifically, the more resources a firm is allocated, the more factors of production are increased, the firm's production capacity is enhanced and the volume of output increases, making the seller's market dominant and demand greater than supply (Penttinen & Palmer, 2007). In this way, even if some customers' sales contracts are interrupted due to their own business failures, the firm does not need to worry about the risk of a rapid decline in sales revenue.

At the same time, the company's access to a wealth of resources has helped it to grow. There is also less need to focus on key customers and invest too much in "relationship-specific investments" in them, so

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there is less risk of resource grabs by customers (Biggar, 2009). Since R&D investment activities are usually risky, management can increase the company's R&D investment when it reduces the company's business risk and increases its risk tolerance, thus increasing the company's innovation input and output (Yaqin & Wucheng, 2022).

Buck, Liu, and Skovoroda (2008) show that the market itself has the ability to correct errors and that a high level of marketization can improve the distortion of executive compensation incentives. Moreover, the quality of corporate social responsibility disclosure is also improved when companies are in a good market environment (Zhao, Shan, & Liu, 2018). When the quality of corporate social responsibility is improved, corporate governance will be strengthened, information will be more transparent and accurate, reputation will be good, and the company will be more likely to be recognized by stakeholders, which will attract more customers and help improve the competitive position of the company in the market (Urip, 2010). When a firm's competitive position in the market is improved and its market power is high, the firm will attract a larger customer base, which will bring more lucrative capital investment and market resources to the firm (Bugg-Levine, Kogut, & Kulatilaka, 2012). This will result in a lower level of financing constraints for the firm. Firms set aside more funds for R&D investment and innovation, thus increasing their level of innovation.

In addition, Zhao, Cao, and Ye (2019) show that when firms are in a strong market position, they will not deliberately satisfy the product needs of a single big customer, but will instead increase the opportunities for firms to exchange resources with external markets and consumers. This is because, in regions with a high level of marketization, where external markets offer more resources, firms will face more opportunities to win the trust of their customers (Zhao, Cao, & Ye, 2019). In this case, the number of customers increases and firms do not need to rely excessively on big customers, thus weakening the bargaining power of big customers, reducing the amount of credit sales and lowering firms' risk of bad debts. At the same time, more customers increase the company's access to finance and the company does not need to borrow to finance its operations, which reduces the company's debt holdings and reduces the level of financial leverage, thus reducing the company's financial risk (Abor, 2008). In this case, management does not need to spend a large amount of money on debt repayment, so that it can invest in long-term investments and corporate technological innovation, thus increasing the level of innovation input and output of the company.

Based on the above analysis, it can be deduced that an increased level of marketization is to some extent beneficial to the development of firms and improves the negative impact of high customer concentration on firm innovation. When the business risks of enterprises are reduced and the economic level is raised, more funds will be available for enterprise innovation. Therefore, the following hypothesis is proposed in this paper.

Hypothesis 2: A high level of marketization can mitigate the negative impact of customer concentration on the level of corporate innovation.

3. Methodology

3.1 Sanders Onion Research Stage
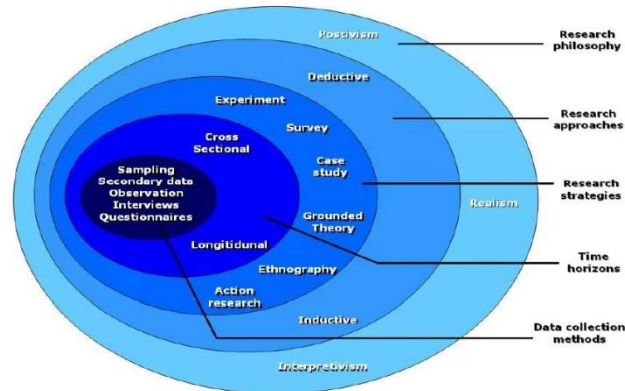
Saunders, M., Lewis, P., & Thornhill, A. (2007). Research Methods for Business Students, (6th ed.) London: Pearson.

3.1.1 Research Philosophy

This study is based on the classification of Saunders' onion research methods and belongs to positivism. Positivism is based on the nature of the observed phenomena and puts forward research questions and hypotheses that can be evaluated and analyzed (Saunders et al., 2007). This is consistent with the research methods, such as data collection, data modeling and data analysis.

3.1.2 Research Methods and Strategies

According to Saunders' onion theory, this study adopts the deductive method, which is a designated research method based on the development of existing theories. The deductive method can be considered to be particularly suitable for the positivist method, which allows the hypothesis to be put forward and the expected results to be statistically tested to reach the acceptable probability level of the hypothesis (Saunders et al., 2007).

This research is based on reading a large number of relevant literature, combining the current market situation, the obtained research direction, and formulating research questions and hypotheses for testing. This method satisfies the requirements of deductive method. Therefore, the research method of this paper belongs to deductive method.

3.1.3 Data Selection and Time Frame of the Study

In terms of data selection, this study uses auxiliary data to obtain data from different databases. In addition, the research method is a combination of qualitative and quantitative methods. Quantitative research mainly includes statistical test and data collection and processing; Qualitative research is to analyze the results of the test data, compare the analysis results with the literature review, and test the accuracy of the analysis results.

In terms of data collection, the time range of this study is a cross-sectional time range, which is used for the investigation and design of the study of specific phenomena in a specific time.

3.2 Sample Selection and Data Source

This paper takes manufacturing A-share listed companies as the research sample. Compared with the non manufacturing industry, the upstream and downstream relationship of the manufacturing industry is closer and more typical (Ellison & Glaeser, 1997), and its enterprise innovation data is more intuitive and easier to obtain. The sample interval is from 2008 to 2018. The reason for choosing this time period is that the market environment in China is in a stable and developing stage from 2008 to 2018, and the marketization level of various places shows an increasing trend every year (Li, long, Ning, Zhu, Guo, Huang, & Hao, 2022). In the past decade, the market environment has not been subject to sudden turbulence, and the data of each company is complete and considerable, which is more convenient for research on the whole. However, after 2019, the global market economy environment was seriously damaged by civid-19, resulting in many companies going bankrupt due to the economic crisis. In the process of data collection, it was found that many data were missing after 2019, and the number of companies decreased. This phenomenon is not conducive to the study of this paper, so this paper does not study the situation after 2019, which also becomes a gap of this study. Research on the relationship among customer relationship, marketization level and enterprise innovation under the influence of covid-19 may become the future research direction.

After data processing, this paper obtained 11489 sample data of 1546 A-share listed enterprises in the manufacturing industry, and processed the data as follows: (1) in order to eliminate the adverse effects of special factors, the abnormal samples that were specially treated (st) by the exchange and suspended from listing due to abnormal financial conditions were excluded; (2) In consideration of the integrity of the sample data and the purpose of the study, the sample data are classified according to each province, and the missing and incomplete sample data are removed to facilitate the study of regression analysis and avoid abnormal results due to the missing data.

In terms of data sources, enterprise innovation data and customer concentration data are from wrds research database; The marketization level data is from the China marketization report by Fan Gang (2016). This paper uses the practice of Yu et al. (2011) for reference, and uses the average growth rate of the marketization index over the years as the basis for predicting the marketization index in 2017-2018, so as to deduce the marketization index in 2017-2018. The financial data of other control variables are from the CSMAR research database in WRDS.

3.2.1 Variable Definition

Enterprise Innovation

The dependent variable of this paper is the level of enterprise innovation. Measuring the level of enterprise innovation mainly includes the number of patents applied by enterprises and the R & D investment of enterprises. The former focuses on innovation output, while the latter focuses on innovation input (Zhong, Zhu, Sun, & Lee, 2020). In order to more intuitively analyze the innovation level of the manufacturing industry, this paper takes the R & D investment ratio (RD asset) of the enterprise as the dependent variable, and focuses on the impact of the customer concentration level on

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the technological innovation investment of the enterprise.

Customer Concentration and Marketization Level

Customer relationship concentration: This paper uses the important feature of customer concentration to measure the relationship between enterprises and customers. Referring to the practices of pan, Yu, Liu, and fan (2020), two variables, i.e. the proportion of sales revenue of major customers (c-top5) and the Herfindal index of major customers (c-hhi), are used to measure the concentration of customer relationship. Among them, c-top5 is the total of the sales volume of the top five customers in the total sales volume, and c-hhi is calculated based on c-top5 and the sum of the squares of the sales revenue of the top five customers in the total sales revenue (Shen, Xia, & Zhang, 2018).

Marketization level: This paper uses the marketization index of various regions in China provided by Fan Gang and others in the "China marketization index - 2016 annual report on the relative progress of marketization of various regions" published in 2016 to measure the marketization level. The index from 2017 to 2018 is calculated based on the average growth rate of the marketization index over the years.

Control Variable

Referring to the research of existing literature, this paper takes the variables that may affect enterprise innovation such as enterprise size, asset liability ratio (Lev), return on total assets (ROA), asset growth rate (growth), net cash flow (CFO), and number of years of listing (year) as control variables.

Table 1. Variables Definition

Name of variable	Variable symbol	Variable definition
R & D investment	R D-Asset	Enterprise R & D investment/total assets
Customer concentration	C-top5	Total sales to total sales of top 5 customers
	C-hhi	Huffindar index of sales of top 5 customers
Marketization level	Mp	Data from China Market Index
Enterprise size	Size	Natural logarithm of total assets at the end of the period
Asset liability ratio	Lev	Total end of period/total end of asset
Total return on assets	R OA	Net profit/total assets
Growth rate	Growth	(current-period sales income - prior-period sales income)/pre-period sales income
Fixed asset intensity	Fixpro	Fixed assets at end of period/total assets at end of period
Net cash flows	CFO	Cash flows/total assets from operating activities
Institutional shareholding ratio	Institute	Number of shares held/total shares of largest shareholders
Board size	Board	Number of directors on board
Enterprise value	Tobin' Q	P/E instead
Shareholding ratio of largest shareholders	Share1	Number of shares held/total shares of largest shareholders
Number of years listed	Age	Number of listed companies

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3.3 Model Construction

In order to test the impact of customer concentration on the innovation level of enterprises, i.e. research hypothesis 1, the following empirical models are constructed with reference to Shen, Xia, and Zhang (2018):

$$\text{RD-Asset} = \beta 0 + \beta 1\, C\_top5/C\_hhi + \beta 2\, Size + \beta 3\, Lev + \beta 4\, ROA + \beta 5\, Growth + \beta 6$$
$$Age + \beta 7\, Institute + \beta 8\, Share1 + \beta 9\, Broad + \beta 10\, Tobin's + \beta 11 Fixpro + \beta 12 CFO + \Sigma$$
$$Year + \varepsilon i \qquad (1)$$

In the above model, RD-asset represents the R & D investment ratio of an enterprise. The larger the value, the more the enterprise invests in innovation; C-top5 and c-hhi respectively represent the proportion of the sales of the top five customers to the total sales and the proportion of the sales of the top five customers. The larger the value, the higher the concentration of customer relations.

Further, in order to test the research hypothesis 2, this paper defines the five regions (Beijing, Shanghai, Guangdong, Jiangsu and Zhejiang) that ranked in the top five in the index for 11 consecutive years from 2008 to 2018 as having a high level of marketization, with a value of 1; Other regions are defined as low marketization level, and the value is 0. Based on model (1), regression tests are conducted on the relationship between customer concentration and enterprise innovation.

3.4 Empirical Method

Descriptive statistical analysis: in the study of hypothesis 1, this paper will conduct descriptive statistics on all variables, study the characteristics of each variable data, and analyze the proportion and trend of each data.

Independent sample t-test: This paper uses the method of Zhao and Shan et al. (2016) to conduct independent sample t-test on all variables to investigate the difference in the impact of customer concentration on enterprise innovation.

This study will adopt multiple regression analysis: use Stata, SPSS and other tools to conduct multiple regression on model (1), and explore the significance level of independent variable (customer relationship concentration) and dependent variable (enterprise innovation).

In order to study the adjustment variables, this paper introduces the role of market level adjustment in multiple regression analysis: the whole sample data are divided into high and low groups according to the market level, and group regression is conducted based on model (1). Explore the differences between the two groups.

In the regression analysis, if there is a significant difference between the regression results of customer concentration and enterprise innovation, it indicates that there is a functional relationship between them. In addition, under different marketization levels (high and low), if the regression results of customer relationship concentration and enterprise innovation are different, the marketization level will play a regulatory role between them.

In order to test whether the negative impact of customer relationship on enterprise innovation is tenable, this paper conducts a robustness analysis: redefine the dependent variable (enterprise innovation), and

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replace the R &D input ratio in model (1) with the total number of patents used to measure enterprise innovation output. Under the condition that other variables remain unchanged, regression is conducted based on model (1) to verify the importance of customer relationship concentration on enterprise innovation and further verify the impact of customer concentration on Enterprise R & D innovation.

4. Data Finding

4.1 Descriptive Statistical Analysis

The descriptive statistical results of the main variables are shown in Table 2. It can be seen that the average R & D investment ratio of the sample companies is 0.022, the median is 0.019, the minimum value is 0.000, and the maximum value is 0.089, It shows that there are obvious differences in R & D investment between listed companies in China. Average C_top5 of the top five sales ratios was 28.752 with a median of 23.40, The minimum is 3.52, The maximum is 87.38, shows that the sales of major customers account for about a quarter of the total sales of the company. This provides data support for analyzing the impact of customer concentration on the company. It also shows that the dependence of different listed companies on major customers varies greatly, The values of other control variables are also close to the data and basic rules of related articles.

Table 2. Descriptive Statistics for Basic Information

	Sample size	Average	Standard deviation	Minimum value	25 quartile	Median	75 quartile	Maximum value
Top 5 customer sales ratio	11489	28.752	18.916	3.520	14.500	23.400	38.360	87.380
R & D investment ratio	11489	0.022	0.017	0.000	0.010	0.019	0.030	0.089
Huffindar Index	11489	0.040	0.070	0.000	0.005	0.014	0.040	0.428
Enterprise size	11489	21.878	1.151	19.813	21.038	21.715	22.521	25.358
Asset liability ratio	11489	0.395	0.201	0.048	0.230	0.384	0.546	0.889
Total return on assets	11489	0.045	0.054	-0.184	0.017	0.042	0.073	0.197
Asset growth rate	11489	0.156	0.310	-0.242	0.000	0.073	0.193	2.020
Number of years listed	11489	7.142	5.711	0.000	2.000	6.000	11.000	23.000
Institutional shareholding ratio	11489	6.235	7.088	0.000	0.921	3.776	9.124	33.894
Share of the largest shareholder	11489	35.271	14.234	9.440	23.980	34.010	44.885	73.970
Board size	11489	8.668	1.613	5.000	8.000	9.000	9.000	15.000

To investigate the difference of the influence of customer concentration on enterprise innovation, this paper uses Zhao, Shan et al. (2018) to divide the sample into high customer concentration group and low customer concentration group according to the median C-top sales ratio of the top five customers, and T test the average difference of the main variables. As shown in Table 3. According to the results, it

can be seen that the average R & D investment ratio of high customer concentration group is 2.1 million yuan, and the average R & D investment ratio of low customer concentration group is 0.023, and the difference of mean value is significant at the level of 1%, which indicates that high customer concentration really leads to the decline of R & D investment rate of the company, which provides preliminary support for hypothesis 1.

Table 3. Inter-group Difference Mean T Test of Main Variables of Different Customer Concentration

	Low group					High group					T
	Sample size	Aver-age	Standard deviation	Minim-u m value	Maxim-u m value	Sample size	Aver-age	Standard deviation	Minim-u m value	Maxim-u m value	
Top 5 custome-r sales ratio	5742	14.383	5.274	3.520	23.410	5732	43.145	16.565	23.420	87.380	-125.272***
R & D investment ratio	5742	0.023	0.017	0.000	0.089	5732	0.021	0.016	0.000	0.089	5.495***
Huffind-ar Index	5742	0.007	0.016	0.000	0.428	5732	0.072	0.085	0.002	0.428	-49.77***
Enterpri-se size	5742	22.080	1.212	19.813	25.358	5732	21.675	1.047	19.813	25.358	19.167***
Asset liability ratio	5742	0.404	0.200	0.048	0.889	5732	0.385	0.201	0.048	0.889	5.200***
Total return on assets	5742	0.048	0.053	-0.184	0.197	5732	0.041	0.055	-0.184	0.197	6.597***
Asset growth rate	5742	0.150	0.288	-0.242	2.020	5732	0.162	0.331	-0.242	2.020	-2.078**
Number of years listed	5742	6.621	5.468	0.000	23.000	5732	7.669	5.898	0.000	23.000	-9.863***
Institutional shareholding ratio	5742	6.880	7.401	0.000	33.894	5732	5.588	6.699	0.000	33.894	9.804***
Share of the largest shareholder	5742	35.603	14.551	9.440	73.970	5732	34.921	13.895	9.440	73.970	2.565***
Board size	5742	8.741	1.681	5.000	15.000	5732	8.594	1.537	5.000	15.000	4.900***
Price-to-earnings Value	5742	66.004	113.987	0.000	849.437	5732	80.527	131.032	0.000	849.437	-6.257***
Fixed asset intensity	5742	6.220	5.873	1.589	44.810	5732	6.956	6.848	1.589	44.810	-6.178***
Net cash flows	5742	17.202	92.870	-445.955	558.858	5732	15.159	100.068	-445.955	558.858	1.134

4.1 Multiple Regression Analysis

4.1.1 Customer Concentration and Enterprise Innovation

Table 4 shows the multiple regression results of the ratio of customer concentration to R & D input, where column (1) shows the customer concentration C_top5 the previous five customer income ratios, and column (2) shows the customer concentration in the C_hhi of Huffindar coefficient. The results show that under the control of other factors, the top five customer income ratio C_top5, Huffindar coefficient C_hhi and R & D investment ratio are significantly negative correlation at the level of 1%, which also shows that the higher the customer concentration, the lower the R & D investment ratio of enterprises, and the hypothesis 1 proposed in this paper is verified. From the point of view of control variables, from the point of view of control variables, the price-earnings ratio enterprise value and R & D investment ratio are significantly negative correlation at 1% level, which shows that every 1% increase in enterprise value, the R & D investment ratio of enterprises will decrease, the fixed assets density and R & D investment ratio are significantly negative correlation at 1% level, and the regression results of other control variables are basically consistent with previous studies. in order to test whether there is multiple collinearity between variables, the variance expansion factor (VIF) test is also carried out in this paper. it is found that the maximum value of the VIF value is less than 2, and it can be judged that the multiple regression model does not have a serious multiple collinearity problem.

Table 4. Customer Concentration and R & D Investment Ratio

Variables	(1)	(2)
Top 5 customer sales ratio	-4.389E-05***(-5.316)	
Huffindar Index		-0.008***(-2.928)
Enterprise size	-0.002***(-12.314)	-0.003***(-12.091)
Asset liability ratio	0.007***(6.392)	0.009***(7.113)
Total return on assets	0.068***(19.768)	0.072***(18.243)
Asset growth rate	0.010***(19.9)	0.009***(16.284)
Number of years listed	5.655E-05(1.862)	-7.465E-06(-0.213)
Institutional shareholding ratio	2.211E-04***(8.804)	4.565E-05***(8.401)
Share of the largest shareholder	3.004E-05***(2.676)	4.565E-05***(3.522)
Board size	6.773E-05(0.669)	1.191E-04(1.004)
Price-to-earnings Value	-6.011E-06***(-4.583)	-5.187E-06***(-3.448)
Fixed asset intensity	-6.229E-05**(-2.539)	-9.138E-05***(-3.266)
Net cash flows	-2.682E-06(-1.733)	-3.234E-06(-1.837)
Year	Control	Control
Cons	0.066***(17.09)	0.073***(16.037)
N	9993	7673

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4.1.2 Marketization Level, Customer Concentration and Enterprise Innovation

Hypothesis 2 is to study the relationship between customer concentration, marketization level and enterprise innovation, and to explore what relationship and how to influence each other.

To test hypothesis 2, this paper divides the whole sample into two groups according to the level of marketization, and carries out group regression based on model (1). the columns (1) and (2) of Table 5 show the regression results in the high-market level group. compared with the regression results in the low-market level group shown in the columns (3) and (4) of Table 5, it can be seen that the negative correlation results of the low-market level group are more significant than those in the high-market level area. It can be concluded that the level of marketization can alleviate the negative impact of the increase of customer concentration on enterprise innovation to a certain extent. Therefore, hypothesis 2 is verified.

Table 5. Market Level, Customer Concentration and R & D Investment Ratio High and Low Groups

Variables	(1) High MP Group	(2) High MP Group	(3) MP low group	(4) MP low group
Top 5 customer sales ratio	-2.037E-05***(-1.733)		-7.000E-05***(-5.634)	
Huffindar Index		-0.005(-1.383)		-0.010***(-2.756)
Enterprise size	-0.004***(-11.508)	-0.003***(-11.095)	-0.002***(-5.509)	-0.002***(-6.829)
Asset liability ratio	0.012***(7.488)	0.010***(6.271)	0.005***(2.739)	0.004***(2.656)
Total return on assets	0.083***(15.251)	0.081***(15.939)	0.057***(9.97)	0.052***(10.588)
Asset growth rate	0.009***(10.574)	0.009***(11.672)	0.01***(12.554)	0.011***(16.002)
Number of years listed	1.244E-04***(-2.646)	-5.800E-05***(-1.326)	9.468E-05(1.802)	1.529E-04***(3.335)
Institutional shareholding ratio	3.676E-04***(9.126)	3.407E-04(9.457)	1.314E-04***(3.302)	1.163E-04***(3.46)
Share of the largest shareholder	2.460E-05(1.391)	9.681E-06**(0.587)	4.784E-05**(2.524)	3.191E-05**(1.967)
Board size	3.379E-04**(1.987)	2.693E-04***(1.698)	8.693E-05(0.526)	4.928E-05(0.359)
Price-to-earnings Value	6.440E-06***(-3.028)	-5.515E-06**(-2.767)	-3.642E-06(-1.717)	-4.722E-06***(-2.673)
Fixed asset intensity	-6.752E-05**(-1.997)	-5.779E-05(-1.839)	1.851E-04***(-3.805)	1.435E-04***(-3.457)
Net cash flows	-3.087E-06(-1.232)	-1.715E-06***(-0.738)	2.819E-06(-1.151)	-3.061E-06(-1.428)
Year	Control	Control	Control	Control
Cons	0.094***(14.131)	0.083***(14.1)	0.053***(8.32)	0.057***(10.44)
N	3982	4792	3677	4698

4.3 Analysis of Robustness

4.3.1 Redefinition of Dependent Variable Enterprise Innovation

In order to verify the robustness of the above multivariate linear regression model, this paper adopts the method of replacing dependent variables to do the regression analysis of the model again. This paper selects the total number of patent applications to measure the innovation output of enterprises as the dependent variable, and takes the natural logarithm to it. re-regression based on model (1), respectively, in the case that the control variable is Huffindar index and the proportion of the top five customer income. According to Table 6, both regression tests passed significance at the level of 1%, and the regression results showed that the main conclusion of this paper is still unchanged, that is, the level of customer concentration has a significant correlation with R & D innovation ability, which further verifies the influence of enterprise customer concentration on enterprise R & D innovation ability.

Table 6. Robustness Test

	(1)	(2)
Top 5 customer sales ratio	-0.004***(-5.369)	
Huffindar Index		-0.616**(-2.461)
Enterprise size	0.498***(29.004)	0.506(24.92)
Asset liability ratio	0.153(1.535)	0.025(0.217)
Total return on assets	2.045***(6.277)	2.066***(5.534)
Asset growth rate	-0.192***(-3.782)	-0.194***(-3.362)
Number of years listed	0.012***(4.409)	0.007**(2.283)
Institutional shareholding ratio	0.012***(5.788)	0.012***(4.817)
Share of the largest shareholder	0.004***(4.292)	0.006***(5.134)
Board size	0.023***(2.516)	0.034***(3.16)
Price-to-earnings Value	6.200E-05(-0.492)	5.07E-05(0.358)
Fixed asset intensity	0.022***(9.343)	0.02***(7.386)
Net cash flows	1.86E-05(0.127)	5.750E-06(-0.035)
Year	Control	Control
Cons	-9.037***(-25.255)	-9.323***(-22.178)
N	8271	6300
R²	0.219	0.208
adj R²	0.217	0.205
F	105.283***	74.707***

5. Discussion and Analysis

As noted above, customer relationship concentration inhibits innovation in firms, and the empirical results confirm this view. This section is a specific analysis of Finding. To complete the logical framework of this validation, other influencing mechanisms are explored.

5.1 Inhibition of Customer Relationship on Enterprise Innovation

It can be seen from the results in Table 4 that, under the control of other factors, C-top 5 (top five customer revenue ratio), C-hhi (Herfindal index) and R &D investment ratio are significantly negatively correlated at the level of 1%. This shows that there is a restraining relationship between customer relationship concentration and enterprise R &D investment. The higher the customer concentration, the lower the proportion of enterprise R &D investment, and the investment in enterprise innovation has been negatively affected. This proves hypothesis 1 : "customer relationship concentration will have a negative impact on enterprise innovation "is accepted. It can be seen from Table 4 that under the condition of high customer concentration.

There is a significant negative correlation between the net cash flow of the enterprise, the price earnings ratio value of the enterprise and enterprise innovation at the level of 1%. This shows that the inhibition of high customer relations on the R & D investment ratio of enterprises is mainly reflected in the fact that large customers will occupy the financing of enterprises and plunder the resources of enterprises (Shen, Xia, &Zhang, 2018).

When the customer group of an enterprise is highly concentrated, customers will use their strong position to force the enterprise to comply with their requirements. These big customers will plunder the resources of enterprises to meet their own product needs. They hope that enterprises can spend more money to produce high-quality and functional products for them. However, these requirements will impose a financial burden on enterprises and increase the production pressure and financing pressure of enterprises. In the long run, the financing of enterprises is constrained, and enterprises cannot invest limited funds in high-cost and high-risk R & D innovation, which will reduce the innovation level of enterprises. This result is consistent with the view put forward in the literature review (Wang & Gao, 2017) that "with high customer concentration, key customers will have a predatory effect on enterprises, so as to facilitate their own interests". This also proves the reliability of this research and has theoretical support.

In the robustness analysis, there is also a significant negative correlation between customer relationship concentration and enterprise patent output at the level of 1%(Table 6). This shows that the higher the concentration of customer relations, the lower the level of patent output of enterprises. This result verifies the hypothesis once again. When the concentration of customer relations is too high, the key customers of the enterprise occupy the dominant position (Walter, Ritter, & Gemünden, 2001).

Big customers will impose their own demand for products on enterprises, forcing enterprises to produce and purchase raw materials in the way they require. In this case, enterprises will spend a lot of production and procurement costs to meet the needs of major customers, which will occupy the capital

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investment for innovation. And producing goods too much according to customers' requirements will hinder the enterprise's own innovative ideas for products, which will exploit the enterprise's own patent ownership, resulting in a decline in the number of patent applications. The research results of Titman (1984) and Williamson et al. (1979) also demonstrate this view. They believe that large customers will increase the "specific investment" of enterprises, which will aggravate the financing constraints of enterprises, thus squeezing the investment and output of Companies in innovation. This view provides a theoretical basis for the research of this research, and once again proves that the research hypothesis of this research is reliable.

To sum up, customer relations have a restraining effect on enterprise innovation. The higher the concentration of customer relations, the less conducive to the innovation and development of enterprises. Therefore, hypothesis one is true.

5.2 The Improvement of the Level of Marketization on the Inhibiting Effect of Customer Relations on Enterprise Innovation

Table 5 shows the regression test results of the overall sample divided into two groups according to the level of marketization. According to the data in the table, it can be seen that the significance level between customer relationship and enterprise innovation is more significant in the low level of marketization group, and the negative significant correlation between the two is weaker in the high level group. This result shows that under the high level of marketization, the negative impact of customer relations on enterprise innovation has been improved. A high level of marketization means that the development of the market is more sound, the market environment is better, and the market has a more adequate allocation of resources (Macedo & Pinho, 2006). In this good market situation, enterprises can obtain sufficient funds and resource allocation for enterprise innovation and company operations, which will not be limited to the funds invested by customers. In this way, enterprises' dependence on customers is reduced, enterprises are no longer subject to the financing constraints brought by customer relations, and more funds will be used for innovation investment. The inhibition of customer relations on enterprise innovation has been improved.

Moreover, compared with regions with low marketization level, the market legal supervision system is more perfect under the environment of high marketization level (Yi, Wang, & Kafouros, 2013). There is a contractual relationship between customers and enterprises, and the behavior of both parties needs legal supervision (Board, 2014). The legal supervision system in high market-oriented areas is perfect, and the government exercises strict control over the market. The government will severely punish some customers for their malicious default and non performance of contracts, so as to reduce the bad debt risk of enterprises and reduce the degree of financing constraints of enterprises. At the same time, it also reduces the financial risk of enterprises. If the risk cost of enterprises is controlled, more funds can be invested in enterprise innovation activities, so as to improve the innovation level of enterprises.

Besides, the information disclosure of enterprises at a high level of marketization is more open and transparent (Samaha et al., 2012), and the governance ability of enterprises has also been improved,

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which will improve the reputation of enterprises, attract more customers, and weaken the predatory behavior of big customers. When enterprises are not limited to the dominance of key customers, they will have more sufficient funds, be able to allocate resources more flexibly, and allocate more funds and resources for enterprise innovation, so as to improve the innovation level of enterprises.

Overall, the market-oriented level can alleviate the inhibitory effect of customer relationship concentration on enterprise innovation. Enterprises are in a high market-oriented environment, and their innovation ability is stronger. Therefore, hypothesis 2 is verified.

5.3 Customer Concentration and Corporate Capital Holdings

The high concentration of customer relationship has a negative impact on enterprise innovation, one of the main mechanisms is to affect the capital holding of enterprises. Innovation requires economic resource input, and cash holding is an important internal resource for enterprises (Wang, Bu, & Liu, 2022). When enterprises hold more cash, they can not only enhance their daily operation ability and increase liquidity, but also invest their funds in long-term investment and innovation projects (Campello, Graham, & Harvey, 2010). However, the higher the concentration of customers, the stronger their dependence on big customers, the more vulnerable to the sanctions of big customers, which will make the level of capital holding decline.

Enterprises rely too much on some big customers, the bargaining power of big customers will be improved, some big customers will even put forward some unreasonable requirements, such as requiring enterprises to buy goods for their use, requiring enterprises to improve the speed of purchase, requiring enterprises to improve the quality of products according to the needs of customers, and so on (Ulaga, 2003). All of this will make companies spend a lot of money on inventory management. When the enterprise spends too much money on the short-term daily operation, it will certainly squeeze out the cash resources needed by the enterprise for long-term investment and technological innovation of the enterprise (Lam, 2003), thus reducing the level of innovation input and output of the enterprise.

In addition, in the sales activities between enterprises and customers, credit sale is a very common form. When the customer concentration of the enterprise is too high, some major customers will buy a large number of goods on credit, which will make the enterprise produce a large amount of accounts receivable. Generally speaking, the higher the number of accounts receivable, the longer the days required to recover the accounts receivable, the longer the capital cycle of the enterprise, and a large number of accounts receivable will enhance the risk that the enterprise faces bad debts, improve the operating risk of the enterprise and reduce the level of financing (Li, 2008). In order to fill the funding gap during this period, many enterprises will also seek help from third parties, such as borrowing funds from banks, seeking help from factoring companies and using bill discounting or financial allocation as collateral to borrow funds to cover the shortage of funds (Soufani, 2002). Although these practices can maintain the capital holding level of the enterprise in the short term, they also make the debt level of the enterprise rise, enhance the financial leverage of the enterprise, and increase the financial risk of the enterprise. And the entrustment also increase the financing cost and the extra expense of the enterprise,

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reduce the capital holding of the enterprise, and reduce the resources of the enterprise innovation (Stiglitz, 1993). For the relationship between customer relationship concentration and accounts receivable, many scholars have done empirical tests.

Li et al. (2018)'s empirical results show that customer concentration and accounts receivable are significantly positive at 1% level (Table 7), that is, the higher the customer concentration, the higher the enterprise accounts receivable. This result also further verifies that customers will occupy the capital of the enterprise through the form of accounts receivable, so that the resources used by the enterprise for innovation are squeezed out, and then the innovation level of the enterprise is reduced.

Table 7. Customer Concentration and Enterprise Innovation

变量	(1) RD_Asset	(2) RD_Asset	(3) RD_Asset	(4) RD_Asset	(5) RD_Asset	(6) RD_Asset	(7) RD_Asset	(8) RD_Asset	(9) RD_Asset
Major Customer	-0.0021*** (-4.6199)			-0.0249*** (-2.8471)			-0.0011* (-1.7612)		
Total Sales		-0.0066*** (-5.8461)			-0.0492** (-2.3961)			-0.0040** (-2.3423)	
Customer HHI			-0.0159*** (-5.3399)			-0.1486** (-2.2625)			-0.0180*** (-3.7145)
Major Customer* Size				0.0011*** (2.6055)					
Total Sales* Size					0.0020** (2.0757)				
Customer HHI* Size						0.0060** (2.0037)			
Major Customer* Sigma							-0.0150*** (-2.5966)		
Total Sales* Sigma								-0.0375** (-2.3710)	
Customer HHI* Sigma									-0.0005 (-0.0146)
Sigma							-0.0003 (-1.2465)	0.0138** (2.3153)	-0.0003 (-0.3145)
Size	-0.0019*** (-7.5828)	-0.0017*** (-7.4404)	-0.0018*** (-7.3755)	-0.0022*** (-7.9148)	-0.0022*** (-6.5875)	-0.0020*** (-7.6511)	-0.0020*** (-7.7862)	-0.0018*** (-7.4008)	-0.0019*** (-7.5670)
Lever	-0.0012 (-0.8224)	-0.0021 (-1.5581)	-0.0016 (-1.1007)	-0.0012 (-0.8455)	-0.0021 (-1.5774)	-0.0016 (-1.0679)	-0.0017 (-1.0999)	-0.0022 (-1.5724)	-0.0018 (-1.2006)
CFO	0.0146*** (5.4064)	0.0125*** (5.0846)	0.0151*** (5.5685)	0.0146*** (5.3815)	0.0125*** (5.0853)	0.0150*** (5.5420)	0.0152*** (5.2510)	0.0124*** (4.7053)	0.0160*** (5.5027)
ROA	0.0372***	0.0375***	0.0362***	0.0375***	0.0377***	0.0363***	0.0391***	0.0395***	0.0377***

Li, Shu, & Zhai (2018). How does the relationship between key customers affect the technological innovation of enterprises? Scientific research, 36(7), 1314-1324.

To sum up, the higher the concentration of customers, the less the level of funds held by enterprises, the limited resources of enterprises for innovation, and the decline of enterprise innovation level. It can be concluded that the decline of capital holding level is an important influence mechanism of customer concentration on enterprise innovation.

5.4 Customer Concentration and Business Risks

Another main way that high concentration of customers has a negative impact on enterprise innovation is the business risk. The higher the customer concentration, the higher the operating risk (Pan et al., 2020). In the process of business operation, it is very important to balance the two indicators of liquidity and profitability. Liquidity measures the short-term liquidity of the enterprise's current assets and the cash level held by the enterprise (Kontuš & Mihanović, 2019). The higher the liquidity, the more cash the enterprise holds, and the less the operating risk caused by the shortage of funds. Profitability and liquidity are opposite, profitability is measured by the profit index of the enterprise, the better the profitability of the enterprise (Pervan & Višić, 2012). The higher the profit, will attract more shareholders to invest, and increase the market competitive position of the enterprise (Pervan & Višić, 2012).

As a result of the increase in profitability, companies will spend more money on long-term investments to increase the return on investment, which will reduce the liquidity of enterprises and increase operational risk (Nazir et al., 2009). Therefore, the enterprise needs to balance the size between the two in the course of operation and maintain at a specific level, so as to ensure the normal operation of the enterprise. However, when the concentration of customers is too high, the demand for large customers increases, and enterprises will take the form of excessive sales, increase inventory holdings, and provide early payment discounts to meet the needs of large customers (Niraj et al., 2001). These moves will expose companies to the risk of overdrawing, causing liquidity problems.

When the liquidity problem of the enterprise appears and the amount of cash held by the enterprise decreases, the enterprise will face the risk of bankruptcy. At the same time, in the case of excessive overdraft, enterprises can not invest funds into long-term investment, which makes the profitability of enterprises decline, and the operating risk of enterprises increases (Padachi et al., 2012). In this case, enterprises do not have more funds for investment in technological innovation, and the level of innovation of enterprises decreases.

Zhao et al. (2019) have done empirical tests on the relationship between customer concentration and business risk. Zhao et al. (2019)'s research claims that the business risk is taken as the dependent variable, and the standard deviation of sales income is used to quantify, and the influence relationship between them is studied with the concentration of customer relationship as the independent variable. The empirical results show that there is a positive correlation between the concentration of customer relationship and the standard deviation of sales income at the significant level of 5% (Table 8), that is, the higher the concentration of customer relationship, the higher the operating risk of enterprises.

Table 8. Path Test of Enterprise Operation Risk

变量	Innova (1)	ΔEU (2)	Innova (3)	Innova (4)	ΔEU (5)	Innova (6)
CCa	−1.429***	0.597**	−1.262***			
	(−3.916)	(2.434)	(−3.361)			
CCb				−0.408**	0.268***	−0.331**
				(−2.509)	(3.361)	(−2.027)
ΔEU			−0.280***			−0.286***
			(−4.931)			(−5.092)
Size	0.330***	−0.051**	0.316***	0.325***	−0.045**	0.312***
	(8.677)	(−2.519)	(8.219)	(8.414)	(−2.178)	(8.027)
Lev	−0.413**	0.376***	−0.308*	−0.419**	0.375***	−0.311*
	(−2.516)	(3.184)	(−1.849)	(−2.553)	(3.113)	(−1.877)
Fixpro	−0.296	0.137	−0.259	−0.292	0.143	−0.252
	(−1.235)	(1.284)	(−1.090)	(−1.214)	(1.346)	(−1.059)
Cf	1.498***	0.033	1.509***	1.498***	0.036	1.510***
	(3.353)	(0.108)	(3.393)	(3.355)	(0.116)	(3.409)
Roa	1.080*	−2.147***	0.478	1.060*	−2.135***	0.449
	(1.865)	(−3.967)	(0.792)	(1.840)	(−3.898)	(0.758)
Etr	0.017	−0.030*	0.009	0.022	−0.032*	0.013
	(0.298)	(−1.656)	(0.154)	(0.382)	(−1.774)	(0.223)
Bsize	0.716***	−0.174**	0.668***	0.710***	−0.171**	0.661***
	(3.838)	(−2.220)	(3.578)	(3.793)	(−2.183)	(3.534)
Indpratio	0.197	0.283	0.274	0.115	0.296	0.197
	(0.286)	(0.987)	(0.398)	(0.165)	(1.025)	(0.283)
Oholdpro	0.593***	−0.446***	0.471**	0.584***	−0.441***	0.461**
	(2.641)	(−5.251)	(2.079)	(2.601)	(−5.197)	(2.034)
Bholdpro	1.121***	−0.899***	0.869***	1.132***	−0.896***	0.875***
	(7.276)	(−14.146)	(5.419)	(7.328)	(−14.091)	(5.457)
YearDum	yes	yes	yes	yes	yes	yes
IndustryDum	yes	yes	yes	yes	yes	yes
_cons	−8.793***	2.559***	−8.078***	−8.642***	2.411***	−7.954***
	(−9.961)	(5.739)	(−8.904)	(−9.666)	(5.394)	(−8.692)
N	2 099	2 099	2 099	2 099	2 099	2 099
r^2_a	0.174	0.271	0.184	0.170	0.272	0.181

Zhao, Cao, & Ye (2019). Customer relationship, market power and enterprise innovation output. Journal of Guangdong University of Finance and economics, 166(5), 22-49.

Overall, the increase of customer relationship concentration will increase the business risk of the enterprise, and the management will consider the overall risk bearing level of the enterprise, which will reduce the investment of R & D and technological innovation, which will reduce the innovation level of the enterprise. Therefore, the concentration of customer relationship is verified by influencing the business risk to restrain the innovation of the enterprise.

6. Conclusion and Recommendations

This paper takes Chinese A-share manufacturing listed companies from 2008-2018 as the research object and empirically tests the impact of customer relationship concentration on corporate innovation and explores the role of the relationship between the three in conjunction with the level of marketization. The results show that the higher the customer concentration, the lower the share of corporate R&D investment and the lower the amount of corporate investment in technological innovation, indicating that too much customer concentration has an inhibitory effect on corporate innovation. Further research found that the level of marketization can alleviate the inhibitory effect

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between the two, and the negative impact of customer concentration on firm innovation is weakened in regions with high levels of marketization. The paper also explores the mechanism of the impact of customer concentration on firm innovation, combining knowledge of financial management with the results of previous empirical analyses, which show that the negative impact of high customer concentration on firm innovation is mainly caused by a decrease in the level of capital holding and an increase in business risk.

The research in this paper reveals the influencing factors of corporate innovation from multiple perspectives, enriches the mechanism of the role of customer relationship on corporate innovation, and provides a reference for improving corporate innovation. Combined with the research findings, this paper puts forward the following relevant policy recommendations.

Firms should pay more attention to the impact that external stakeholders bring to the firm, and take into account the impact that external stakeholders have on the firm's innovation performance in corporate governance. Firms should actively expand their customer base to a broader, multi-channel base, reduce excessive customer concentration, keep customer concentration at an appropriate level, and avoid over-reliance on large customers, which can lead to a homogeneous customer base that can rob resources and have a negative impact on economic performance and corporate risk, thus limiting innovation and diversification.

In China, the degree of marketization varies from region to region, and the level of marketization still needs to be improved. There are still significant differences in the level of marketization in Beijing, Shanghai, Guangzhou and Shenzhen, as well as in developed regions such as coastal cities and some inland remote areas. Therefore, the state should take measures to improve the level of regional marketization, and local governments should take effective measures to actively promote regional marketization, reduce economic imbalances in regional development, make China's markets more complete and create a better environment for business innovation.

There are also some limitations in this study.

Firstly, in the process of selecting the sample, the article chose the decade from 2008 to 2018, avoiding studies that examined the relationship between customer relations, the level of marketization and firm innovation during the epidemic period. The reason for this is that the market environment was turbulent after 2019 due to COVID-19 and many companies were at risk of bankruptcy during the economic crisis, resulting in missing data for many companies. As the research method of this paper is multiple regression analysis, too much missing data is not conducive to data collection and sample integrity. However, COVID-19 is a popular topic and has great research value in terms of its impact on the economic environment. Therefore, the impact of customer relations on corporate innovation under the influence of COVID-19 could be considered in future research, also by comparing the relationship between the two in different situations before and after the epidemic. This is a gap in this study and provides a direction for future research.

In addition, there are certain limitations in the research methodology of this paper. the main research

method of this paper is multiple regression analysis. The main limitation of the multiple regression method is that this project can take a lot of time. Firstly, when searching for data, it is necessary to measure the suitability of these data for the multiple regression model as many of the data do not meet the requirements of multiple regression, including the sample size chosen which also determines whether the results of multiple regression are significant. Secondly, multiple regression results may not achieve the desired research objectives, i.e. the explanatory variables do not fully reflect the variables being explained. Not only that, multiple regression analysis suffers from multicollinearity, which is due to the exact correlation or high correlation between the independent variables in a linear regression model, making it difficult to estimate the model accurately (Midi, Sarkar, & Rana, 2010). Therefore, it requires constant trial and experimentation to investigate, which will take a lot of time. Perhaps in future research alternative models could be tried for the study. Overall, the results of this paper achieved the purpose of the study and the hypothesis of this paper was well proven. The findings of this paper provide a reference for research in the direction of corporate innovation.

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