Research Article

Bank Competition, Combination of Industry and Finance, and Enterprise Innovation: Evidence from China

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Bank competition promotes enterprises to obtain credit funds through market mechanisms, and a combination of industry and finance (CIF) has an important influence on establishing bank-enterprise relationship. Based on data of 2,245 manufacturing enterprises and branches of commercial banks in China from 2007 to 2019, this research establishes a moderated mediation model to verify whether CIF has a moderating effect on bank competition on enterprise innovation. The results are as follows. First, bank competition can both directly and indirectly promote enterprise innovation by alleviating financing constraints. Second, CIF has no moderating effect on the direct effect of bank competition on enterprise innovation but has a negative moderating effect on the first half of mediating effect.

1. Introduction

The prosperity of a country is inseparable from a strong manufacturing industry. Innovation is the core driving force for the development of the manufacturing industry, innovation input intensity is one of the important factors affecting independent innovation, and it is an important strategic decision that affects the survival and development of enterprises [1]. Bank credit provides significant financial resource support for corporate innovation [2]. With the increase in the number of banks, bank competition continues to increase. At present, the competition pattern of the global banking industry presents a new pattern of competition in the contemporary global banking industry with China, the United States, and Europe [3]. Bank competition has expanded the amount of funds in the market, reducing information asymmetry [4], simplifying the financing process [5], and reducing financing costs [6–8]. It is conducive to solve the financing problem of enterprise innovation [2, 9]. At the same time, from the perspective of international experience, industrial capital and financial capital will inevitably merge with the development of the market economy [1]. Combination of industry and finance (CIF) refers to the enterprises actively establishing long-term cooperative relationships with banks through participating banks. CIF provides another way for enterprises to obtain credit funds. CIF depends on the equity relationship between banks and enterprises to carry out credit transactions. More than 80% of the world’s top 500 companies integrate CIF [10]. Studies by scholars from various countries have shown that CIF reduces information asymmetry through corporate equity participation in banks and other methods, which is conducive for the acquisition of innovation funds [11, 12].

BC and CIF provide cash for enterprise innovation through different transaction mechanisms. The former relies on the market mechanism, while the latter relies on the relationship between banks and enterprises to facilitate credit transactions. Both of which provide funding sources for innovation activities. However, while CIF reduces information asymmetry between banks and enterprises, will it promote bank-enterprise credit business, or squeeze out the original credit business? Are there any new changes in the above relationship when faced with differences in property rights, external financing dependence, and marketization? The purpose of this paper was to discuss the role of CIF on the relationship between bank competition and enterprise innovation. China provides a unique background for
examining this issue. First, while the capital market develops rapidly, debt financing is still the main source of enterprise financing in China [13]. People’s Bank of China shows that RMB loans issued to the real economy accounted for 60.2% of the total amount of social financing in 2020 [14]. Second, the traditional global bank competition pattern dominated by the United States and Europe has changed; it has shifted from west to east, and the status of China’s banking industry has improved [15]. China’s banking industry of global competitiveness balanced development. It can reflect the consequences of bank competition objectively [3]. Statistics from China Banking Regulatory Commission (CBRC) show that the number of banking financial institutions in China increased to 4,604 in 2020 [16]. Third, as a major manufacturing country in the world, China has many enterprise samples, which increase the accuracy of the results. Fourth, CIF has a history of 20 years of development in China. In recent years, with the deepening of financial reform, the development of the capital market, and the support of national policies, China’s CIF has developed rapidly. Represented by central enterprises, large-scale enterprise groups have implemented the strategy of CIF in various forms [10].

Bank credit is an important financing channel for enterprise innovation [2]. Debt financing can provide advantages of high-tech entrepreneurs to claim the income of innovation, so enterprises prefer debt financing for innovation [17]. Moreover, the number of banks increased, thereby improving the scale and availability of funds. It triggers competition among banks. Bank competition refers to types of banks and increase in their number in a limited market [18], resulting in competition among banks for obtaining customers [19]. Bank competition prompts many banks to reduce loan interest rates [20], and it eases the financing constraint of enterprises [4, 21].

Enterprise innovation requires capital investment. It is significant in exploring the determinants of innovation, because it plays an important role in increasing enterprise competitiveness and promoting economic growth [17]. In the bank-dominated financial market, bank credit support will have a significant impact on enterprise innovation and economic development [13, 22]. However, in general, manufacturing is facing bank credit financing constraints. Financing constraints have an inhibitory effect on enterprise innovation [23]. Manufacturing requires a lot of financial support for its innovation and development. Information asymmetry between banks and enterprises has led banks to be more willing to target low-risk state-owned enterprises, and it takes over 80% of the funds [24]. At the same time, innovation activities are uncertain, high risk, and long period, which can lead to adverse selection and moral hazards. Innovation is more susceptible to financing constraints [25, 26]. Therefore, banks are unwilling to provide loans to support enterprise innovation activities [22, 27]. Manufacturing is facing difficulties and high financing costs [1, 28], and financing constraints will affect innovation seriously [29].

In order to alleviate financing constraints, more and more enterprises have begun to broaden sources of funds through the combination of industry and finance. Combination of industry and finance (CIF) refers to the enterprises establishing long-term cooperative relationships with banks through shareholding banks. Compared with the enterprises that do not participate in CIF, the enterprises that participate in CIF have more opportunity to obtain credit funds. CIF not only improves information transparency between banks and companies [4] but also reduces transaction costs and management costs [18]. Thus, the innovation enthusiasm of enterprises can be improved [30].

The competitive effect is an important mechanism to ease the financing constraints and improve their innovation level, and the information effect is a significant mechanism. At present, scholars are researching one of the effect mechanisms of bank competition or CIF on enterprise innovation. Some scholars study the relationship between bank competition and innovation. Cai and Dong [31] find that a higher degree of bank competition will bring more innovation activities. Amore [2], Chava et al. [32] found that the deregulation of banks in the United States promoted technological innovation. He and Wu [33] and Zhang et al. [34] found bank competition could alleviate financing constraints and improve innovation ability. Scholars also study the relationship between CIF and innovation. Tang and Wu [35] found bank competition promotes R&D activities through the increase of scale, property rights, and monitoring capabilities. Ma et al. [36] found that when CIF degree is low, the improvement of financing constraints is not obvious. Research has shown that CIF reduces the degree of information asymmetry, and forms a stable relationship-based financing, and it is easier to obtain related loans [4, 37].

However, few scholars have discussed the relationship between bank competition and CIF, and the research results are still controversial. Some scholars believe that there is a substitution effect between bank competition and relational credit [24, 30]. Petersen and Rajan [38] found that bank competition prompts banks to seek high-quality customers and reduce relational loans. However, Boot and Thakor [39] found that bank competition could increase the number of relational loans. As for the influence of CIF, Liu and Jiang [24] discussed the influence of bank equity connection and bank competition on financing constraints of private enterprises, and believed that they have an alternative relationship in alleviating financing constraints. Wu et al. [22] use private enterprises to study the relationship between bank competition and credit financing based on the bank-enterprise partnership established by equity, and find that bank competition will weaken the influence by the bank-enterprise relationship in promoting R&D. Few scholars have explored the impact of CIF on bank competition. Therefore, the main works of this study are: first, explore the direct and indirect effects of bank competition on enterprise innovation. Second, analyze whether CIF has a moderating effect in bank competition and enterprise innovation. Third, this study further examines the differences in the impact of bank competition on innovation in different situations, including enterprise property rights, external financing dependence, and marketization.
Compared with existing research, the main contributions of this paper are as follows. First, it enriches the literature on the relationship between bank competition and CIF in influencing enterprise innovation. This study introduces CIF as a moderating variable for the first time, and constructs a moderated mediation model, which is more conducive to explore whether CIF has a moderating effect on the two paths of bank competition and enterprise innovation. Secondly, this paper contains 17,069 research samples of Chinese manufacturing enterprises. By dividing the competition degree of commercial banks according to the provinces, a large amount of data can help us to obtain robust conclusions. At the same time, we also perform robustness checks in three ways. Third, further research on enterprise’s property rights nature, external financing dependence degree, and marketization is conducive for providing practical reference for different enterprises.

The remainder of the paper is organized as follows: Section 2 is “hypothesis.” It is present theoretical framework and research hypothesis. Section 3 is “models and data.” It describes the data, variables, and models. Section 4 is “results and discussion,” which presents the empirical results of the basic models, robustness tests, and moderated mediation model. Section 5 is “extended analysis.” It discusses the moderated mediation effect of CIF on property rights, external financing dependence, and regional marketization. Section 6 is “conclusion and policy implications.”

2. Hypothesis

2.1. Direct Effect of Bank Competition on Enterprise Innovation. Due to information asymmetry, banks have few supports for high-risk projects of enterprise innovation, and it limits the innovation speed of enterprises [40]. If there are only a few banks in the market, banks will avoid innovation projects [18]. On the contrary, competition enhances the enthusiasm of banks to obtain enterprise’s information, and increase the transparency of information between banks and enterprises [41]. Moreover, bank competition urges banks to expand the customer range actively, which not only affects the willingness of banks to take risks [42] but also changes the risk appetite of some banks [18]. The possibility of enterprises obtaining innovation funds will increase.

In addition to stock market availability, the availability of venture capital, corporate governance, stock liquidity, China Construction Bank, and financing constraint [3, 17], market competition is also a key factor affecting enterprise innovation [43]. At present, scholars have studied the relationship between bank competition and enterprise innovation for each country. After the deregulation of American interstate banks, bank financing of enterprise innovation projects increased [2]. The lack of French bank credit significantly reduced the probability of companies participating in innovation [23]. Chinese companies have funds to invest in innovation fields [44]. Ayyagari used transnational data to conduct research and found that more credit supply increased the financing availability of enterprises, thereby significantly improving the level of enterprise innovation [9]. Kerr and Nanda pointed out that the bank competition brought about by deregulation can help encourage many entrepreneurial and enterprises to flourish. Intensified bank competition has also forced banks to expand their business scope and assume higher risks [45]. Some innovative projects have also directly become the objects of bank financing. Based on the above discussion, bank competition promotes innovation investment of enterprises [46]. First, we established the following hypothesis:

Hypothesis 1. Bank competition is conducive to enterprise innovation.

2.2. Indirect Effect of Bank Competition on Enterprise Innovation. The influence of bank competition on financing constraints has been fully discussed, and there are two different viewpoints: Market power hypothesis and information hypothesis. Market power hypothesis holds that the fewer number of banks, the higher the concentration of banks, the stronger the market power. Increased market power will lead to a reduction in credit supply and an increase in financing costs, thereby exacerbating financing difficulties [42, 47, 48]. Information-based hypothesis believes that the enhancement of market power gives banks the motivation to establish cooperation with enterprises, thereby reducing information asymmetry and agency costs, and alleviating the financing constraints of enterprises effectively in the capital market [38, 49–52]. Researchers have found that bank monopoly will reduce enterprises’ financing ability [46, 49], which has a negative impact on enterprise financing [53]. However, bank competition will lower threshold and cost. It eases the financing constraints [21] and promotes innovation activities to occur. Due to the long-term strict access control on the banking industry in China, the phenomenon of credit discrimination is obvious, and the long-term relationship between banks and enterprises based on the information hypothesis is not valid [33]. Therefore, most scholars believe that bank competition has a positive impact on enterprise financing [22].

Bank competition alleviates financing constraints mainly by increasing the supply, reducing financing costs, and increasing the scale of credit funds. First, based on the competitive strategy, banks will lower the loan threshold and expand the scope of potential customers [5, 19]. It improves financing ability and promotes innovation activities [35]. Second, according to the theory of industrial organization, bank monopoly is related to the ability of banks to control loan interest rate. The increase in the number of banks and relaxation of business operations will reduce financing costs [7, 8]. Third, Bank competition increases the total amount of capital available to firms in credit markets. The availability of credit funds has increased for companies [18]. Therefore, innovation activities can get support in funds. We make the following hypothesis:

Hypothesis 2. Bank competition can promote enterprise innovation by alleviating financing constraints.
2.3. Moderating Effect of CIF on Direct and Indirect Effects. The relationship between banks and enterprises based on lending activities is loose relatively, resulting in the inefficiency of banks to obtain enterprises information. CIF establishes the connection between banks and enterprises through equity investment, then transforms the external lending relationship into the internal property right connection. Therefore, it forms a stable relationship and promotes enterprise innovation effectively [11, 37]. Financial institutions can obtain enterprises’ information more conveniently and offer credit policies of low cost and large quantity [38]. The research on Japanese companies found that relational lending based on bank financing has certain information advantages and positive impact on innovation investment [54]. Tadesse found that entity companies can continuously raise funds from stable financing channels by participating in financial capital, and these funds are sufficient to support innovation activities [55]. Some scholars have found through cross-border and cross-industry research that the improvement of financial development is conducive for the improvement of manufacturing enterprises’ innovation capabilities [56]. CIF broadens financing channels, improves the efficiency of fund acquisition, and provides sufficient financial support for enterprise innovation [12]. In addition, CIF can enhance the reputation of enterprises in the financing market, and help enterprises to obtain more loans for innovation projects [29]. It plays a moderating role in alleviating shortage of innovation investment for manufacturing [57], and promotes innovation investment and various types of enterprise innovation output [58]. Therefore, it is more convenient and efficient to obtain relational credit by CIF to support enterprise innovation, which has a certain crowding-out effect on credit support obtained based on bank competition. Accordingly, we propose Hypothesis 3:

Hypothesis 3. CIF has a negative moderating effect on the direct relationship between bank competition and enterprise innovation.

When an enterprise obtains credit support from a bank with CIF relationships, the financing channels of enterprises based on the property relationship will broaden [59, 60]. The financing cost of the related loans may be reduced, and the enterprises obtain the related loans [61] to reduce the financing pressure [37, 62]. Both bank competition and CIF can increase bank credit, and it will alleviate the financing constraints of enterprises. The difference between them is that bank competition increases the amount of credit funds available to enterprises through the adjustment of market mechanism. While CIF is to establish a stable bank-enterprise relationship network and increase loans, the long-term stable bank-enterprise relationship brought about by CIF may solidify the credit business between enterprises and cooperative banks, partly replacing the credit relationship based on the market mechanism. It may also get credit support from banks based on the expansion of their relationship networks and good reputation in the financing market. Therefore, we put forward the following hypotheses:

Hypothesis 4a. CIF has a positive moderating effect on the first half of the indirect effect of bank competition on enterprise innovation.

Hypothesis 4b. CIF has a negative moderating effect on the first half of the indirect effect of bank competition on enterprise innovation.

The main reason for external cost of credit financing between enterprises and banks is information asymmetry. CIF establishes a formal property right connection between banks and enterprises, and the reduction of information asymmetry helps enterprises to integrate into the “relationship circle” of the financial industry [62]. According to the synergy theory, industrial capitals and financial capitals belong to different industries, and there is a strong complementarity between their businesses. The integration will produce information synergy [59] and reduce information asymmetry between entities and financial institutions [63]. At the same time, the establishment of bank-enterprise relationship under CIF is helpful for banks to evaluate innovation projects, and it will reduce supervision pressure of banks on loan projects. Thus, banks will be more willing to provide financial support for enterprise innovation [31]. The following hypothesis is proposed:

Hypothesis 4c. CIF has a positive moderating effect on the second half of the indirect effect of bank competition on enterprise innovation.

3. Models and Data

3.1. Data Sources. This study selects enterprises that participate in financial institutions among manufacturing that issued Shanghai or Shenzhen A-share from 2007 to 2019 as the research sample. A-share mainly refers to the common shares issued on the Shanghai Stock Exchange and the Shenzhen Stock Exchange in China.

Initial samples of enterprises were screened in the following order: (1) eliminated samples with missing variable data; (2) the samples only holding shares in insurance, security, and other nonbank financial institutions were excluded; (3) to avoid the influence of outliers on research results, the continuous variables were processed with 1% and 99% Winsorize tail shrinking treatment, respectively. After the above processing, the final sample of this paper contains 2,245 manufacturing enterprises, and 17,069 observed values. The data of manufacturing enterprises come from China Stock Market and Accounting Research (CSMAR) database. In addition, the website of China Banking Regulatory Commission disclosed the data of branches of commercial banks [64].

3.2. Measurement of Variables. The section is about the measurement of all variables in this study. The names of the variables and their measurements are shown in Table 1.

3.2.1. Dependent Variable. Enterprise Innovation (EI). This study focuses on the relationship between credit funds and EI under two different mechanisms: competition mechanism and relationship network. Therefore, the study measures EI
from the perspective of investment. Considering the difference of enterprise asset scale, the ratio of innovation expenditure to initial total assets can not only reflect the intensity of EI but also reflect the importance of EI. If the listed company fails to disclose the innovation expenditure of the current year, the innovation level will be taken as 0 [65].

3.2.2. Independent Variables

(1) Bank Competition (BC). This study selected HHI to measure BC [4]. HHI can reflect the monopoly degree of banking institutions. Since HHI index is a negative index, the larger the value, the higher the monopoly and the lower the competition. HHI times \(-1\) is converted into a proxy variable BC to measure the competition of the bank [66]; as a result, the higher the value, the more BC. Branch\(_m\) is the number of branches of commercial bank \(m\), and Total\(_{Branches}\) is the total number of branches of all banks. The specific measure is as follows:

\[
BC = -\frac{\text{HHI}}{\text{HHI}} = - \frac{\text{HHI}}{\text{HHI}}
\]

When measuring BC, we only retained commercial banks. According to financial license information of banking institutions obtained from the website of China Banking Regulatory Commission, we calculate the number of branches of each bank in each province every year. We can get HHI of the banking industry in this province, and further construct BC.

(2) Financing constraint (FC). Scholars tend to use indexes to measure financing constraint, including KZ index [67], WW index [68], SA index [69], FCP index [70], and so on. Following Kaplan and Zingales [67], we constructed KZ index to measure FC. The calculation method of the index is as follows:

\[
\text{FC} = -1.001909 \times \frac{\text{OCF}}{\text{Asset}} + 3.139193 \times \text{Lev} - 39.3678 \times \frac{\text{Dividends}}{\text{Asset}} - 1.314759 \times \frac{\text{Cash}}{\text{Asset}} + 0.2826389 \times \text{Tobinq}
\]

OCF is the operating net cash flow. Dividends are the stock dividend. Cash is the cash holding level. Lev is financial leverage that measures by asset-liability ratio. Tobinq is the ratio of equity value and net debt value to total assets.

3.2.3. Moderator Variable

(1) Combination of Industry and Finance (CIF). At present, CIF in China are mainly the shares of financial institutions held by enterprises. It means the transition from industrial

| Variable type | Variables | Abbreviation | Measurement |
|--------------|-----------|--------------|-------------|
| Dependent variables | Enterprise innovation | EI | R&D expenditures divided by initial total assets |
| Independent variables | Bank competition | BC | The ratio of the number of branches of commercial banks in each province to the total number of branches of all commercial banks in the province constitutes HHI |
| Mediating variables | Financing constraint | FC | Proportion of shares held by a company in a bank |
| Moderating variables | Combination of industry and finance | CIF | Proportion of shares held by a company in a bank |
| Control variables | Annual return on stock | ROS | The enterprise’s annual stock return rate calculated monthly after the market adjustment from May last year to April of that year |
| Asset-liability ratio | Lev | | Total liabilities divided by total assets |
| Short-term debt changes | CSD | | Increment of short-term debt divided by total assets |
| Enterprise growth | Grow | | The ratio of the increase in business income this year to the total business income of the previous year |
| Rate of return on common stockholders’ equity | ROE | | Ratio of net profit to shareholders’ equity balance |
| Equity financing | RI | | Dummy variable(=1 for firms with additional or rights issues, and 0 otherwise) |
| Enterprise age | Age | | Subtract the year of observation from the year of formation, and then add 1 to take the natural log. |
capital to financial capital. The more shares of financial institutions held by manufacturing enterprises, the higher the degree of CIF, and the greater the financing opportunity of manufacturing enterprises [36]. Therefore, this study selects the proportion of shares held by manufacturing enterprises in commercial banks to measure CIF.

3.2.4. Control Variables. The study selected following control variables: Since EI is related to assets and liabilities, control variables including asset-liability ratio measures financial leverage (Lev), changes in short-term debt (CSD), and return on equity (ROE). In addition, characteristics of equity can also reflect EI, and it includes annual return on stock (ROS) and whether to implement the rights issue (RI).

3.3. Models Construction

3.3.1. Basic Model. The basic model is to study the effect of BC on EI. It further studies whether BC promotes EI by alleviating FC. The study constructs the mediating effect test model based on the research of Wen et al. [71]. The following regression models are used to verify the above assumptions.

\[
EI_{i,t} = \alpha_0 + \alpha_1 BC_{m,t} + \alpha_2 Tobinq_{i,t} + \alpha_3 Levl_{i,t} + \alpha_4 CSD_{i,t} + \alpha_5 Growr_{i,t} + \alpha_6 ROE_{i,t} + \alpha_7 Rl_{i,t} + \epsilon_{i,t},
\]

\[
FC_{i,t} = \beta_0 + \beta_1 BC_{m,t} + \beta_2 Tobinq_{i,t} + \beta_3 ROS_{i,t-1} + \beta_4 Levl_{i,t} + \beta_5 CSD_{i,t} + \beta_6 Growr_{i,t} + \beta_7 ROE_{i,t} + \beta_8 Rl_{i,t} + \beta_9 Age_{i,t} + \epsilon_{i,t},
\]

\[
EI_{i,t} = \gamma_0 + \gamma_1 BC_{m,t} + \gamma_2 FB_{i,t} + \gamma_3 Tobinq_{i,t} + \gamma_4 ROS_{i,t-1} + \gamma_5 Levl_{i,t} + \gamma_6 CSD_{i,t} + \gamma_7 Growr_{i,t} + \gamma_8 ROE_{i,t} + \gamma_9 Rl_{i,t} + \epsilon_{i,t}.
\]

Model (3) is used to verify whether BC has a direct impact on EI. Models (3–5) test the mediating effect of BC influencing EI by FC. If the coefficient \( \alpha_1 \) is significant, it indicates that the direct effect of BC on EI is significant, and H1 is established. If \( \beta_1, \gamma_1, \) and \( \gamma_2 \) are significant, it shows that the indirect effect of BC on EI is significant, meaning that H2 is established.

Model (6) tests Hypothesis 3, which verifies the relationship between CIF, BC, and EI. If the coefficient \( c_2 \) of cross-term CIF, BC, and EI is significant, it shows that CIF has a moderating effect on the direct effect of BC on EI. At this time, the model of moderated mediation effect may show the influence relationship shown in Figure 1. If \( c_3 \) is significantly negative, it indicates that CIF has a negative moderating effect on the direct effect of the relationship between BC and EI. H3 is established, and otherwise it is not true. If the coefficient \( c_3 \) is not significant, it shows that there is no effect of CIF on the direct effect of BC on EI. The model of moderated mediation effect may show the influence relationship shown in Figure 2. Figure 1 reports the moderated mediation relationship between CIF, BC, and EI, when CIF moderates the direct and mediating effects of BC on EI. Figure 2 reports the moderated mediation relationship between CIF, BC, and EI, when CIF only moderates the mediating effects of BC on EI.

\[
EI_{i,t} = c_0 + c_1 BC_{m,t} + c_2 CIF_{i,t} + c_3 CIF_{i,t} \times BC_{m,t} + \alpha_1 Tobinq_{i,t} + \alpha_2 ROS_{i,t-1} + \alpha_3 Levl_{i,t} + \alpha_4 CSD_{i,t} + \alpha_5 Growr_{i,t} + \alpha_6 ROE_{i,t} + \alpha_7 Rl_{i,t} + \epsilon_{i,t},
\]

\[
FC_{i,t} = a_0 + a_1 BC_{m,t} + a_2 CIF_{i,t} + a_3 Becc_{i,t} \times BC_{m,t} + \beta_1 Tobinq_{i,t} + \beta_2 ROS_{i,t-1} + \beta_3 Levl_{i,t} + \beta_4 CSD_{i,t} + \beta_5 Growr_{i,t} + \beta_6 ROE_{i,t} + \beta_7 Rl_{i,t} + \beta_8 Age_{i,t} + \epsilon_{i,t},
\]

\[
FC_{i,t} = c_0 + c_1 BC_{m,t} + c'_2 CIF_{i,t} + b_1 FC_{i,t} + b_2 CIF_{i,t} \times FC_{i,t} + \gamma_1 Tobinq_{i,t} + \gamma_2 RO S_{i,t-1} + \gamma_3 Levl_{i,t} + \gamma_4 CSD_{i,t} + \gamma_5 Growr_{i,t} + \gamma_6 ROE_{i,t} + \gamma_7 Rl_{i,t} + \epsilon_{i,t}.
\]
The next step is to test whether CIF moderates the mediating effect on the basic model. The mediating effect path of BC to promote EI through alleviating FC can be divided into two stages: BC to FC, and FC to EI. Therefore, in order to verify whether CIF moderates the mediating effect of BC on EI, and whether this moderating effect is positive or negative, it is complete through two regression models. Therefore, build a moderated mediation Model (7) and (8) in order to verify whether CIF moderates the mediating effect on the basic model. The mediating effect affects EI, and the moderated mediation effect exists. If H4 is verified, we can build a moderated mediation Model (7) and (8) to test hypothesis 4, which verifies the relationship between CIF, BC, FC, and EI. If \( a_3 \) of cross-term \( Be_{cd_{it}} \times BC_{mt} \) in Model (7) is significant, and \( b_2 \) of cross-term \( Be_{cd_{it}} \times KZ_{it} \) in Model (8) is significant, it shows that CIF moderates the pre-pathway of the mediating process by which BC affects EI. If \( a_3 \) is significant, \( b_2 \) is not significant. This means that CIF modulates the pre-pathway of the mediating process by which BC affects EI, and the moderated mediation effect exists. If \( a_3 \) is not significant, \( b_2 \) is significant. CIF modulates the post-pathway of the mediating process by which BC affects EI, and there is a moderated mediation effect.

4. Results and Discussion

4.1. Descriptive Analysis. Table 2 reports descriptive statistics for the variables. It can be seen from Table 2 that EI of the sample differs greatly, with a minimum score of 0, a maximum score of 10.4498, which indicates a large difference in CIF among manufacturing. The table reports summary statistics for the sample firm-year observations. Table 1 shows all the variables. This research contains 17,069 firm-year observations between 2007 and 2019. The descriptive statistics are the mean, standard deviation, minimum, and maximum of the key variables.

4.2. Variable Correlation Analysis. According to the preliminary linear correlation analysis of the data of BC and EI, from the scatter chart of BC and EI in Figure 3, we can see that there is a certain correlation between the two variables, and there may be a positive correlation.

This figure reports a scattered map of bank competition (BC) and enterprise innovation (EI).

4.3. Empirical Results

4.3.1. Bank Competition and Enterprise Innovation. Table 3 shows the empirical results of the impact and mechanism of BC on EI. The results of column (1) show the relationship between BC and EI, and the coefficient is significantly positive at the 1% confidence level, which indicates that BC promotes EI, and the increase of BC will significantly promote EI. H1 is verified. The regression results of column (2) show that there is a negative relationship between BC and FC, indicating that BC will reduce FC, and BC will increase the funds that enterprises obtain, thus reducing FC of enterprises. At the same time, column (3) shows the relationship among BC, FC, and EI. It can be seen that the coefficient of BC and FC is significant at the level of 1%. The empirical results of columns (2) and (3) show that BC can promote EI by alleviating FC, and there is an indirect promoting between BC and EI. These results support H2.

The establishment of Hypothesis 1 and Hypothesis 2 indicate that BC can not only directly promote EI but also promote EI by alleviating FC. The competitive effect brought about by BC not only expands the sources of credit funds but also reduces the cost of credit funds. The reduction in financing costs and the increase in the number of loans eased the financing pressure of enterprises, and the competitive effect eased FC and promoted EI. This finding is consistent

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![Figure 1: Moderating variables moderate the mediating and direct effects.](image1.png)

![Figure 2: Moderating variables moderate the mediating effect.](image2.png)

Table 2: Descriptive statistics.

| Variables | N  | Mean  | Std. deviation | Minimum | Maximum |
|-----------|----|-------|----------------|---------|---------|
| EI        | 17069 | 2.0144 | 2.0914 | 0.0000 | 10.4498 |
| BC        | 17069 | –0.0761 | 0.0386 | –0.3616 | –0.0328 |
| FC        | 17069 | 1.6382 | 0.8095 | –0.2207 | 4.4085 |
| CIF       | 17069 | 0.1936 | 1.0632 | 0.0000 | 8.2000 |
| Tobinq    | 17069 | 2.1348 | 1.3493 | 0.9024 | 8.7438 |
| ROS       | 17069 | 0.0820 | 0.4695 | –0.5377 | 2.0067 |
| Lev       | 17069 | 0.4241 | 0.2081 | 0.0546 | 0.9787 |
| CSD       | 17069 | 0.0556 | 0.1418 | –0.2930 | 0.7284 |
| Grow      | 17069 | 0.1750 | 0.3827 | –0.5323 | 2.4124 |
| ROE       | 17069 | 0.0527 | 0.1536 | –0.9499 | 0.3360 |
| RI        | 17069 | 0.1235 | 0.3290 | 0.0000 | 1.0000 |
| Age       | 17069 | 2.7527 | 0.3631 | 1.6094 | 3.4340 |
with the conclusions of Benfratello et al. [46] and Cornaggia et al. [43]. It finds that BC makes some innovative projects directly become the target of bank financing, and BC helps enterprises to innovate.

This table reports the empirical results of models (3–5) to examine the direct effects and mediating effects of bank competition (BC) and enterprise innovation (EI). FC (financing constraint) is the mediating variable. From Age to RI are control variables, the detailed introductions are in Table 1. Robust standard errors appear in parentheses. ∗∗∗, ∗∗, and ∗ are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

### 4.3.2. Moderated Mediation Effect

Table 4 shows whether CIF moderates direct and indirect effects between BC and EI (BC ⟷ EI). Column (1) shows the direct effect of CIF in BC on EI. Because CIF × BC is not significant, it shows that CIF does not play a significant role in moderating the direct effect between BC and EI, that is, CIF has no moderating effect on the direct path of BC and EI. H3 is valid.

Column (2) and column (3) show the moderating results of the indirect effect of CIF on BC and EI (BC ⟷ FC ⟷ EI). According to the significant judgment criteria in model (7) and model (8), CIF × BC to FC is significantly negative, indicating that CIF moderates the first half of the mediating effect of BC on EI. The moderating effect shows that CIF restrains the impact of BC on EI, H4b is true. At the same time, CIF × FC is not significant, which indicates that CIF does not moderate the latter half of the mediating effect of BC on EI, and H4c is not true. The results of Hypothesis 3 and Hypothesis 4 show that CIF has a significant moderating effect on the first half of the enterprise innovation path that bank competition promotes by easing financing constraints.

This table reports the empirical results of models (6–8) to examine whether a combination of industry and finance (CIF) moderates direct and mediating effects between bank competition (BC) and enterprise innovation (EI). FC is the mediating variable, and CIF is the moderating variable. From Age to RI are control variables, the detailed introductions are in Table 1. Robust standard errors appear in parentheses. ∗∗∗, ∗∗, and ∗ are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

According to the above empirical results, Figure 4 shows the moderated mediation effect involved in this article.

This figure reports the moderated mediation relationship between a combination of industry and finance (CIF), bank competition (BC), and enterprise innovation (EI). FC (financing constraint) is the mediating variable, and CIF is the moderating variable.

### Table 3: Regression results of bank competition, financing constraint, and enterprise innovation.

| Variable | Model (1) | Model (2) | Model (3) |
|----------|-----------|-----------|-----------|
|          | EI (1)    | FC (2)    | EI (3)    |
| BC       | 12.5433*** (2.5007) | −0.1989* (0.1196) | 12.7270*** (2.5504) |
| FC       | 0.1550*** (0.0125) | 0.2888*** (0.0043) | 0.0932*** (0.0329) |
| Age      | −0.0208 (0.0170) | 0.0994*** (0.0191) | −0.0151*** (0.0035) |
| Tobinq   | −0.3954* (0.2036) | 3.5900*** (0.0336) | 0.0924*** (0.0191) |
| ROS      | −0.1356 (0.1002) | 0.0877*** (0.0180) | −0.1079 (0.1012) |
| Lev      | 0.5242*** (0.0596) | −0.1475*** (0.0123) | 0.4649*** (0.0532) |
| CSD      | 0.0606 (0.0880) | −0.0849*** (0.0192) | 0.0229 (0.0878) |
| Grow     | 0.2306*** (0.0374) | −0.0363*** (0.0063) | 0.2158*** (0.0370) |
| ROE      | 0.3050*** (0.2152) | −0.9114*** (0.0416) | 2.8836*** (0.2162) |
| RI       | 0.2306*** (0.0374) | −0.0363*** (0.0063) | 0.2158*** (0.0370) |
| Constant | 0.1550*** (0.0125) | 0.2888*** (0.0043) | 0.0932*** (0.0329) |
| Observations | 17,069   | 17,069   | 17,069   |
| R²       | 0.062     | 0.842    | 0.066    |
| Number of id | 2,245     | 2,245    | 2,245    |

**Figure 3: Scattered map of BC and EI.**

**Figure 4: Moderated mediation effect involving in this article.**
4.4 Robust Tests and Endogenous Tests. In order to enhance the robustness of the conclusions, this study uses methods of variable replacement and lag of independent variables for one period to conduct the following empirical tests:

4.4.1. Variable Replacement. The robustness analysis uses other indicators to measure BC. From the measurement of BC variables by Jiang [7], this study adopts the proportion of the number of branches of top three banks in China to the total number of branches of all banks to measure the bank concentration in the region. The calculation method is as follows:

\[
CR3 = \frac{\text{Branch}_{1\text{th}} + \text{Branch}_{2\text{nd}} + \text{Branch}_{3\text{th}}}{\text{Total\_Branches}}
\]

Among them, \text{Branch}_{1\text{th}}, \text{Branch}_{2\text{nd}}, and \text{Branch}_{3\text{th}} are the sum of the number of institutions of three banks with the largest number of branches in the region, and \text{Total\_Branches} is the number of all branches of banks in the region. Because the value range of variable CR3 is (0–1), and it is a negative index, the greater the value, the lower the BC. In order to observe the influence of BC more intuitively, the negative index of CR3 times −1 is changed into a positive index “BCN” to measure BC, and the robustness test is carried out. From the empirical results shown in Table 5, the original hypothesis is valid.

This table reports the robustness test results of models (3–9). Models (3–5) examine the direct and mediating effects of bank competition (BC) and enterprise innovation (EI). Models (6–8) examine whether a combination of industry and finance (CIF) moderates direct and mediating effects between BC and EI. From Age to RI are control variables, the detailed introductions are in Table 1. Robust standard errors appear in parentheses. ***, **, and * are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

4.4.2. Variable Lag One Stage. BC can promote EI. However, if the region’s innovation degree is high, it can indirectly show that economic development is good, and EI may reverse BC. In order to ensure the robustness of benchmark regression results and rule out the possible reverse causal relationship between BC and EI, we lag BC for one period (BC_1) and regress the explained variables again. From the empirical results shown in Table 6, the original Hypothesis is valid.

This table reports the robustness test results of models (3–8). Models (3–5) examine the direct and mediating effects of bank competition (BC) and enterprise innovation (EI). Models (6–8) examine whether a combination of industry and finance (CIF) moderates direct and mediating effects between BC and EI. From Age to RI are control variables, the detailed introductions are in Table 1. Robust standard errors appear in parentheses. ***, **, and * are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

![Figure 4: CIF moderates the indirect path of BC on EI.](image-url)
Table 5: Regression results of variable substitution.

| Variable          | Model (1) EI (1) | Model (2) EI (2) | Model (3) EI (3) | Model (4) EI (4) | Model (5) EI (5) | Model (6) EI (6) |
|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                   |                  |                  |                  |                  |                  |                  |
| BCN               | 11.7596*** (0.4941) | −0.1989* (0.1132) | 12.0977*** (0.5029) | 11.7663*** (0.4986) | −0.1962* (0.1133) | 12.1215*** (0.5074) |
|                   |                  |                  |                  |                  |                  |                  |
| FC                | −0.6206*** (0.0981) | 0.0099 (0.0183)   | 0.0014 (0.0017)   | 0.0135 (0.0176)   |                  |                  |
| CIF               | 0.0099 (0.0183)   | 0.0014 (0.0017)   | 0.0135 (0.0176)   |                  |                  |                  |
|                   |                  |                  |                  |                  |                  |                  |
| CIF × BCN         |                  |                  |                  | −0.0238 (0.0217)  | −0.0040* (0.0022) |                  |
|                   |                  |                  |                  |                  |                  |                  |
| CIF × FC          |                  |                  |                  |                  | 0.0034 (0.0149)   |                  |
|                   |                  |                  |                  |                  |                  |                  |
| Age               | 0.1810*** (0.0227) |                  |                  |                  |                  |                  |
| Tobinq            | −0.0511*** (0.0159) | 0.2889*** (0.0042) | 0.1281*** (0.0317) | −0.0512*** (0.0159) | 0.2889*** (0.0043) | 0.1285*** (0.0318) |
| ROS               | 0.1331*** (0.0185) | −0.0152*** (0.0035) | 0.1230*** (0.0185) | 0.1326*** (0.0187) | −0.0152*** (0.0035) | 0.1214*** (0.0186) |
| Lev               | −0.3394* (0.1872) | 3.5863*** (0.0334) | 1.9002*** (0.3992) | −0.3388* (0.1872) | 3.5865*** (0.0334) | 1.9009*** (0.3994) |
| CSD               | 0.1025 (0.0936)   | 0.0869*** (0.0180) | 0.1536 (0.0943)   | 0.1021 (0.0936)   | 0.0868*** (0.0180) | 0.1539 (0.0943)   |
| Grow              | 0.5696*** (0.0576) | −0.1476*** (0.0123) | 0.4773*** (0.0511) | 0.5690*** (0.0577) | −0.1477*** (0.0123) | 0.4776*** (0.0511) |
| ROE               | 0.2476*** (0.0837) | −0.0856*** (0.0191) | 0.1939*** (0.0836) | 0.2485*** (0.0835) | −0.0855*** (0.0191) | 0.1919*** (0.0835) |
| RI                | 0.2577*** (0.0364) | −0.0360*** (0.0064) | 0.2022*** (0.0360) | 0.2265*** (0.0364) | −0.0358*** (0.0064) | 0.2021*** (0.0360) |
| Constant          | −4.0208*** (0.2806) | −0.8630*** (0.0360) | −4.4939*** (0.2981) | −4.0272*** (0.2837) | −0.8635*** (0.0364) | −4.5089*** (0.3013) |
|                   |                  |                  |                  |                  |                  |                  |
| Observations      | 17,069           | 17,069           | 17,069           | 17,069           | 17,069           | 17,069           |
| R2                | 0.172            | 0.842            | 0.181            | 0.172            | 0.842            | 0.181            |
| Number of id      | 2,245            | 2,245            | 2,245            | 2,245            | 2,245            | 2,245            |
Table 6: Put variables behind one phase of empirical results.

| Variable   | Model (1) | Model (2) | Model (3) | Model (4) | Model (5) | Model (6) |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|
|            | EI        | FC        | EI        | EI        | FC        | EI        |
| E1         | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
| BC_1       | 11.1571*** (2.3620) | 11.3010*** (2.3944) | 11.1029*** (2.3572) | -0.2135* (0.1184) | -0.4025*** (0.1166) | 11.2433*** (2.3942) |
| BC         | -0.1989* (0.1196) | -0.4018*** (0.1167) | -0.0216 (0.0170) | 0.0020 (0.0018) | -0.0248 (0.0182) |
| CIF        | 0.0216 (0.0170) | 0.0032 (0.0149) | -0.0052*** (0.0015) | -0.0032 (0.0149) | -0.0052*** (0.0015) |
| CIF×BC     | -0.0032 (0.0149) | -0.0052*** (0.0015) | -0.0032 (0.0149) | -0.0052*** (0.0015) | -0.0032 (0.0149) | -0.0052*** (0.0015) |
| CIF×FC     | 0.0165 (0.0171) | 0.0165 (0.0171) | 0.0165 (0.0171) | 0.0165 (0.0171) | 0.0165 (0.0171) | 0.0165 (0.0171) |
| Age        | 0.1550*** (0.0125) | 0.1550*** (0.0125) | 0.1550*** (0.0125) | 0.1550*** (0.0125) | 0.1550*** (0.0125) | 0.1550*** (0.0125) |
| Tobinq     | -0.0029 (0.0175) | 0.2888*** (0.0043) | 0.1109*** (0.0363) | -0.0034 (0.0175) | 0.2888*** (0.0043) | 0.1111*** (0.0363) |
| ROS        | 0.0649*** (0.0202) | -0.0151*** (0.0035) | 0.0567*** (0.0201) | 0.0676*** (0.0204) | -0.0153*** (0.0035) | 0.0593*** (0.0202) |
| Lev        | -0.5147*** (0.2193) | 3.5900*** (0.0336) | 0.9040* (0.4669) | -0.5148** (0.2192) | 3.5986*** (0.0336) | 0.9100* (0.4666) |
| CSD        | -0.2202 (0.1071) | 0.0877*** (0.0180) | -0.1949* (0.1077) | -0.2197** (0.1071) | 0.0874*** (0.0180) | -0.1953* (0.1076) |
| Grow       | 0.5522*** (0.0655) | -0.1475*** (0.0123) | 0.4926*** (0.0588) | 0.5519*** (0.0655) | -0.1475*** (0.0123) | 0.4924*** (0.0589) |
| ROE        | 0.0920 (0.0874) | -0.0849*** (0.0192) | 0.0542 (0.0881) | 0.0958 (0.0873) | -0.0848*** (0.0192) | 0.0568 (0.0879) |
| RI         | 0.1671*** (0.0397) | -0.0363*** (0.0063) | 0.1544*** (0.0394) | 0.1673*** (0.0397) | -0.0362*** (0.0063) | 0.1544*** (0.0394) |
| Constant   | 3.0022*** (0.2101) | -0.9114*** (0.0416) | 2.8441*** (0.2128) | 3.0031*** (0.2091) | -0.9155*** (0.0417) | 2.8422*** (0.2124) |
| Observations | 14,460    | 17,069    | 14,460    | 14,460    | 17,069    | 14,460    |
| R²         | 0.059     | 0.842     | 0.063     | 0.059     | 0.842     | 0.063     |
| Number of id | 2,082    | 2,245     | 2,082     | 2,082     | 2,245     | 2,082     |
4.4.3. Endogenous Control. Endogenous factors will affect the influence of BC on EI. First, due to the differences in enterprise environment, enterprise culture, and other factors, it will have an invisible effect on BC and EI at the same time. Therefore, there may be the problem of missing variables. Second, with the increase of EI, enterprises will attract more banks and other financial institutions to gather in the region, thus increasing BC in the region. This reverse causality may lead to biases in estimates. In order to judge whether there is an endogenous problem in the variable of BC, the DWH (Durbin-Wu-Hausmann) test was conducted. The p value is 0 from the empirical results shown in Table 7, so reject the proposition that BC is exogenous, that is, BC is an endogenous variable.

The instrumental variable method is the way to weak endogenous of BC. According to existing research [34], BC of three provinces closest to GDP as the instrumental variable of BC of the place where the company is located, and we calculate the average amount. The reason for choosing this instrumental variable is that the performance of bank credit financing is different in different regions. In a province, BC can hardly affect bank credit in provinces with similar economic development levels. However, in provinces with similar economic development, there may be some similarities between BC and the model of bank branches [34]. Therefore, the calculation method of instrumental variables is as follows:

$$M_{BC_{mn}} = \left( \frac{\sum_{i=1}^{3} BC_{mn}}{n} \right)$$

Among them, “u” is the province with the closest GDP to province c in year “t,” “n” represents the number, and the value is 3. By the two-stage least square method, and the regression results of the first stage show that F > 10, rejecting the Hypothesis of weak instrumental variables, and the selection of instrumental variables is reasonable. From the significant positive coefficient of the instrumental variable M_BC in Table 8, there is a significant positive relationship between BC in the sample provinces and the average value of BC of the other three provinces closest to GDP, which meets the application conditions of the instrumental variable. The regression results of the second stage of the two-stage least square method show that BC is significantly positive at the level of 1%, indicating that the intensification of BC will promote EI, which is consistent with the previous conclusion, and the regression result is effective.

This table reports the results obtained by the instrumental variable method. EI is enterprise innovation, and BC is bank competition. M_BC is an instrumental variable. FC (financing constraint) is the mediating variable, and CIF (combination of industry and finance) is the moderating variable. From Tobinq to RI are control variables, the detailed introductions are in Table 1. Robust standard errors appear in parentheses. ***, **, and * are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

### Table 7: Existence test of endogenous variables.

| Ho: variables are exogenous | Robust score chi² (1) = 1117.4000 (p < 0.0001) |
|----------------------------|-----------------------------------------------|
| Robust regression $F (117059) = 982.6010 (p < 0.0001)$ |                                             |

5. Extended Analysis: Enterprises Characteristics and Market Environment

5.1. Nature of Property Rights. Different companies have different external financing capabilities [34], which will lead to different economic consequences [73]. Cornaggia et al. found that BC would promote the innovation level of small and medium private enterprises [43]. The size constraints of small and medium private enterprises mean that the available resources and market capabilities are inferior to large enterprises. It is difficult for companies to obtain financing to support innovation projects in the market, and they are forced to abandon good investment projects [74]. There is ownership discrimination in China’s capital markets [75]. State-owned enterprises have easier access to bank loans and better access to financing [36, 76]. However, nonstate-owned enterprises are more vulnerable to credit financing because of their small size and lack of collateral [76]. It will lead to financial institutions raising loan restrictions [77] or being unwilling to provide loans. Therefore, the restrictions of innovative funds for nonstate-owned enterprises are more significant. BC magnifies the role of market mechanism and weakens the recessive advantage of state-owned property rights. Therefore, the stronger the BC, the greater the role of market mechanism, and the stronger the ability of nonstate-owned enterprises to obtain innovative funds.

This paper sets up virtual variables according to the nature of property rights, divides the sample into state-owned enterprises and nonstate-owned enterprises. Then, we take 1 for state-owned enterprises and 0 for nonstate-owned enterprises, and make a regression according to the type of enterprise ownership. As shown in Table 9, columns (1) and (2) show the promoting effect of BC on EI which is significant in state-owned and nonstate-owned enterprises at 1% level. However, the coefficient of the impact of BC on EI in nonstate-owned enterprises is much higher than state-owned enterprises, which shows that the promoting effect of BC on EI is more significant in nonstate-owned enterprises. This is mainly because BC alleviates credit discrimination to a certain extent, and nonstate-owned enterprises are more likely to obtain funds for EI.

This Table 11 reports the results that the direct effect of bank competition (BC) has on enterprise innovation (EI) and the moderating effect of a combination of industry and finance (CIF) has on the direct effect of BC on EI. [Sample includes state-owned and nonstate-owned enterprises]. Robust standard errors appear in parentheses, ***, **, and * are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

Compared with state-owned enterprises, nonstate-owned enterprises have a stronger motivation to obtain funds through CIF [73]. In order to study whether the
5.2. External Financing Dependence. There is a close relationship between BC and external financing dependence of enterprises. If enterprises rely heavily on external financing, they are more affected by BC. The convenient effect of BC has a more significant impact on EI. Therefore, when the external financing dependence degree is different, the impact of BC on EI may be different.

This Table 10 reports the results that the direct effect of bank competition (BC) on EI has on enterprise innovation.
The moderating effect of the combination of industry and finance (CIF) has on the direct effect of bank competition on enterprise innovation. [Sample includes enterprises with high external financing dependence and low external dependence]. Robust standard errors appear in parentheses. *, **, and *** are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

Columns (3) and (4) are the moderated mediation effect of CIF on indirect effects of BC on enterprises with different external dependence degree on external financing. According to empirical results, CIF plays a significant role in enterprises with high external financing dependence. Compared with the enterprises with low external financing dependence, the enterprises with high external financing dependence have greater financial constraints. Credit funds obtained through the loan market are not enough to support innovation needs. Therefore, enterprises have a stronger willingness to build the relationship actively and rely on the relationship network to improve the availability of funds in the credit market. At this time, the impact of internal channel formed by CIF to squeeze out external channel may be more significant.

5.3. Marketization. Due to China’s imbalanced regional economy and differences in geographical location, there are differences in the degree of regional marketization [73]. EI will be different due to the different degree of economic marketization [78]. BC is fierce, and it is easier for enterprises to obtain credit support and develop new technologies and products. However, some scholars believe that the deepening of marketization will aggravate profit nature of funds, invest more money in other commercial areas rather than research and development, and reduce the innovation level [78].

According to the province where the city is located, the samples were divided into two groups: high marketization degree and low marketization degree according to the average value, and samples from different regions are analyzed [34]. From columns (1) and (2) of Table 11, BC has a significant impact on EI in the high market-oriented areas. This may be due to the high market-oriented areas in a relatively perfect institutional environment and standardized disclosure mechanism, and enterprises in this region have lower financing costs in the credit market [73]. The intensification of BC can improve the efficiency of allocation of credit resources [79]. Therefore, BC plays a stronger role in EI through the bank mechanism. Besides, divide marketization degree into the high, medium, and low groups according to the ternary method of marketization index, and performed regression analysis [78]. Columns (3), (4), and (5) show that with the degree of marketization from low to high, the direct effect of BC on EI is gradually significant and enhanced.

This Table 12 reports the results that the direct effect of bank competition (BC) has on enterprise innovation (EI). [Sample includes enterprises with high external financing dependence, medium external dependence and low external dependence]. Robust standard errors appear in parentheses. *, **, and *** are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

In addition, enterprises in less developed areas have a stronger motivation to go deep into the financial network [80]. The development of regional market with low marketization process is not perfect, and the enterprise financing cost and transaction cost are higher, which is more likely to lead to financial distress. Therefore, enterprises pay more attention to application of relevance, and tend to use CIF to improve the investment efficiency [73]. At this time, the role of CIF in areas with low degree of marketization should be higher than that in areas with high degree of marketization. The empirical results of the moderating effect of CIF are shown Table 12. CIF significantly moderates the indirect effect of BC on EI in low market-oriented areas, which is consistent with the previous analysis.
in parentheses.

Table 11: Regression results of marketization degree.

| Variable | Mode (1) | Mode (2) | Mode (3) | Mode (4) | Mode (5) |
|----------|----------|----------|----------|----------|----------|
| BC       | 43.635** (2.0873) | -0.4068 (1.2674) | 45.181** (2.1477) | 29.1406** (5.0858) | -1.779 (1.1146) |
| Tobinq   | -0.0545** (0.0173) | -0.0342 (0.0321) | -0.0565** (0.0193) | -0.0202 (0.0233) | -0.0167 (0.0512) |
| ROS      | 0.1256*** (0.0205) | 0.0340 (0.0431) | 0.1243*** (0.0231) | 0.0656* (0.0364) | 0.0073 (0.0531) |
| Lev      | -0.1727 (0.2141) | -0.3793 (0.3324) | -0.2151 (0.2242) | -0.4713 (0.3746) | 0.0114 (0.3193) |
| CSD      | 0.2619** (0.1114) | -0.5109*** (0.1457) | 0.2513** (0.1111) | -0.2860* (0.1682) | -0.4114* (0.1590) |
| Grow     | 0.6605*** (0.0652) | 0.2396** (0.1047) | 0.6115*** (0.0685) | 0.4596*** (0.1241) | 0.2575* (0.1338) |
| ROE      | 0.3322*** (0.1009) | -0.1331 (0.1069) | 0.3495*** (0.1213) | 0.0718 (0.0931) | -0.1264 (0.1562) |
| RI       | 0.2131*** (0.0397) | 0.2231*** (0.0794) | 0.1995*** (0.0436) | 0.2350*** (0.0846) | 0.0368 (0.0960) |
| Constant | 5.8385*** (0.1772) | 1.1649*** (0.2221) | 5.6820*** (0.1884) | 3.5293*** (0.3928) | 0.6385*** (0.2076) |
| Observations | 13,620 | 3,449 | 11,630 | 3,743 | 1,696 |
| R²        | 0.184 | 0.015 | 0.190 | 0.087 | 0.022 |
| Number of id | 2,127 | 589 | 1,989 | 733 | 326 |

Table 12: Regression results of marketization degree.

| Variable | Model (5) | Model (4) | Model (3) | Model (2) | Model (1) |
|----------|-----------|-----------|-----------|-----------|-----------|
| BC       | -0.3740 (0.4311) | -0.2313* (0.1338) | -0.3502 (0.4054) | -0.0100 (0.8013) | -0.1732 (0.1352) |
| CIF      | 0.0023 (0.0025) | 0.0046 (0.0035) | 0.0040 (0.0026) | -0.0004 (0.0039) | 0.0048 (0.0049) |
| CIF x BC | -0.0041 (0.0054) | -0.0036** (0.0010) | -0.0016 (0.0059) | -0.0092 (0.0067) | -0.0036*** (0.0012) |
| Age      | 0.1688*** (0.0231) | 0.1606*** (0.0300) | 0.1727*** (0.0219) | 0.1180* (0.0481) | 0.1040*** (0.0394) |
| Tobinq   | 0.2945*** (0.0046) | 0.2673*** (0.0089) | 0.2971*** (0.0045) | 0.2795*** (0.0097) | 0.2789*** (0.0126) |
| ROS      | -0.0140*** (0.0007) | -0.0173* (0.0092) | -0.0146*** (0.0041) | -0.0165*** (0.0063) | -0.0247* (0.0141) |
| Lev      | 3.5761*** (0.0414) | 3.5833*** (0.0645) | 3.5991*** (0.0387) | 3.6418*** (0.0746) | 3.5825*** (0.0900) |
| CSD      | 0.0832*** (0.0213) | 0.0900** (0.0350) | 0.0733*** (0.0209) | 0.1891*** (0.0401) | 0.0657 (0.0521) |
| Grow     | -0.1412*** (0.0144) | -0.1719*** (0.0254) | -0.1299*** (0.0153) | -0.1366*** (0.0246) | -0.1690*** (0.0328) |
| ROE      | -0.0899*** (0.0203) | -0.0260 (0.0438) | -0.0971*** (0.0218) | -0.0314 (0.0331) | -0.0417 (0.0675) |
| RI       | -0.0398*** (0.0072) | -0.0189 (0.0120) | -0.0386*** (0.0076) | -0.0197* (0.0109) | -0.0139 (0.0184) |
| Constant | -0.9646*** (0.0911) | -0.7459** (0.0914) | -0.9915* (0.0851) | -0.8187*** (0.1825) | -0.7529*** (0.1211) |
| Observations | 13,620 | 3,449 | 11,630 | 3,743 | 1,696 |
| R²        | 0.184 | 0.015 | 0.190 | 0.087 | 0.022 |
| Number of id | 2,127 | 589 | 1,989 | 733 | 326 |

This Table 12 reports the results that the moderating effect of the combination of industry and finance (CIF) on the direct effect of bank competition (BC) has on enterprise innovation (EI). [Sample includes enterprises with high external financing dependence, medium external dependence and low external dependence]. Robust standard errors appear in parentheses. ***, **, and * are significance at the 1%, 5%, and 10% levels, respectively. The sample period is from 2007 to 2019.

6. Conclusion and Policy Implications

Bank competition supports enterprise innovation by increasing credit through the market mechanism, and CIF increases credit to support enterprise innovation through the relationship network. Based on this, this research establishes a moderated mediation model based on the data of China’s manufacturing industry and bank branches from 2007 to 2019, and studies the moderated mediation effect of CIF on the impact of bank competition on enterprise innovation. The main conclusions are as follows. First, bank competition improves enterprise innovation, and it can improve innovation by alleviating financing constraints. Second, CIF has no moderating effect on the direct effect of bank competition to promote enterprise innovation, but it has a negative moderated mediation effect on the indirect effect of bank competition to promote enterprise innovation. It is reflected in the first path of mediating effect of BC on EI. After a series of robustness tests, the results are still stable. Third, the results show that bank competition plays a greater role in promoting nonstate-owned enterprises and enterprises with a high dependence on external financing. It plays a significant role in promoting enterprise innovation with a high degree of marketization, while the impact of enterprises in areas with low degree of marketization is not significant.

From the perspective of credit fund sources, this paper explores the relationship between bank competition and...
CIF, which indirectly reflects the influence between the competition effect and the information effect. Based on the findings, we draw the following policy implications. First, companies need to view the relationship between competition effects, information effects, and financing constraints carefully. In theory, both the effect of competition or information is beneficial to the financing constraints. However, empirical studies show that the information effect inhibits the positive effect of the competition effect. When making full use of the competitive effect brought about by bank competition to obtain financial resource, the information effect brought by CIF affects its ability to obtain financial resources. Second, nonstate-owned enterprises need to pay more attention to CIF. It is more difficult for these enterprises to use the competition effect to obtain credit funds, so relationship loans are more important. CIF brings more relationship-based credit funds, and play the positive role of CIF. Obtaining credit funds to support enterprise innovation is a problem that nonstate-owned enterprises need to consider. For the companies with high external financing dependence, BC improves the financing ability of enterprises, but CIF weakens the influence. Enterprises with high dependence on external financing should not only consider the role of CIF but also solve the constraints of limited investment in enterprise innovation brought about by the information effect. Fourth, the relationship between bank competition and enterprise innovation is not significant for enterprises located in underdeveloped areas of marketization. At the same time, the motivation of enterprises to integrate into the financial network is stronger, and they need to focus more on the information effect of CIF to obtain credit funds.

Although we have drawn some meaningful conclusions through empirical research, our study has some limitations. First, the sample used in this study is from China. The relationship between bank competition and enterprise innovation may be different in other countries, and the influence of CIF may be different. In the future, it may be very interesting to study the influence of CIF on the relationship between bank competition and enterprise innovation in a nonbank-dominated financial system. Second, the sample enterprises in this study are manufacturing enterprises. There are different demands for innovative funds and financing channels between manufacturing enterprises and enterprises in other industries. The moderated mediation effect of CIF on bank competition and enterprise innovation needs to be verified. Third, with the deepening CIF, whether it will have a different impact on the competitive activities of banks, thus affecting the innovation activities of enterprises need to be further studied.

Data Availability

The data used to support this study are available from the corresponding author upon request, e-mail: dlmutxf@dlmu.edu.cn.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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