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Cluster Commercial Credit and Total Factor Productivity of the Manufacturing Sector

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Abstract: The study estimates the impact of cluster commercial credit on manufacturing total factor productivity from the perspective of county-level clusters. The data were collected from 1998 to 2015 from the Chinese Industrial Enterprise Database. Various econometrics methods were used to approach the study objectives. The study found that cluster commercial credit can significantly increase the total factor productivity of manufacturing. Through the analysis of the theoretical mechanism, it was found that improving the level of innovation and improving the efficiency of the capital allocation are important ways for cluster commercial credit to positively promote the total factor productivity of the manufacturing sector. The analysis of heterogeneity found that cluster commercial credit promoted the total factor productivity of state-owned enterprises, large-scale enterprises, capital-intensive industries, high-tech industries, and enterprises in coastal areas to a great extent. By constructing a quasi-natural experiment, using the method of multi-period double difference and PSM-DID to solve the problem of cluster commercial credit endogeneity, it passed the parallel trend, placebo, and other tests. Finally, this article further describes the relationship between corporate commercial credit and corporate total factor productivity from the enterprise-to-enterprise level and found that the use of commercial credit by enterprises has a significant and positive role in promoting corporate total factor productivity. The research results of this paper provide a reference for promoting the high-quality development of the country's economy from the perspective of informal finance.

Keywords: commercial credit; cluster; total factor productivity; economic development quality

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1. Introduction

Improving total factor productivity (TFP) is an important driving force for China's economic growth. Especially for China's economy, which is moving towards high-quality development, the improvement of total factor productivity is of great practical significance. As a major part of a country's economy, manufacturing is the foundation of a country's prosperity and strength. Total factor productivity of the manufacturing sector is a strong strategy to drive the economic development and competitiveness of China. Total factor productivity is a measure of the productivity growth of pure technological progress excluding all the tangible factors of production in the neoclassical economic growth theory. In the existing literature, a large number of scholars have carried out research on total factor productivity. The research on financial factors and total factor productivity mainly focuses on innovation [1], financial friction [2], intangible capital [3], financing [4], etc.; however, there are few researches that directly examine the effect of commercial credit on total factor productivity. Shi and Zhang (2010) used the data of 176 listed companies in China from 1999 to 2006 to investigate the impact of commercial credit on production efficiency and believed that commercial credit could improve enterprises' scale efficiency by reducing

their financing constraints [5]. Zhang and Zhang (2019) analyzed the data of industrial enterprises and found that commercial credit plays a significant role in promoting the total factor productivity for non-state-owned enterprises with strong financing constraints [6]. A few of the existing research literature reviews are concerned with commercial credit indirectly associated enterprises within the cluster; however, they have ignored the Chinese economy, especially the eastern coastal areas of the typical cluster development model, while very few of the literature are from the perspective of a cluster commercial credit investigation of the manufacturing total factor productivity. The impact of cluster commercial credit on the manufacturing industry's total factor productivity is crucial.

Cluster commercial credit refers to loans, such as accounts receivable, between enterprises in the cluster (or between enterprises in the cluster and enterprises outside the cluster). By virtue of the advantages of geographical proximity, the trust foundation established by close transactions, and the overall credit advantage of the cluster, enterprises in the cluster conduct more frequent commercial credit activities with enterprises in and outside the cluster. Cluster commercial credit is prevalent in China and in other countries or regions [7]. According to the competitive hypothesis theory of commercial credit, the provision of commercial credit by enterprises can be used as a kind of price concession, and the provision of commercial credit in clusters can improve the competitiveness of enterprises in the cluster through price advantages, thereby increasing the sales revenue and capital inflow of enterprises. Funds are used for R&D investment, which improves the innovation level of enterprises, and the improvement of the innovation level promotes the total factor productivity of manufacturing enterprises [1]. In addition, the provision of cluster commercial credit can transmit benign signals to financial intermediaries that their operating conditions and financial conditions are good, it can alleviate information asymmetry, and make it easier to obtain external financing from financial institutions, which can then alleviate the problem of insufficient corporate investment to a certain extent. It also accepts the supervision of financial institutions, thereby inhibiting blind and excessive investment behavior and improving the efficiency of the capital allocation of enterprises. The improvement of capital allocation efficiency has promoted the total factor productivity of manufacturing enterprises [8]. Therefore, cluster commercial credit can promote the total factor productivity of manufacturing enterprises by improving the innovation level and capital allocation efficiency of enterprises.

Then, can clustered commercial credit become an effective financial channel to improve the total factor productivity of manufacturing enterprises? How do different external environments affect the relationship between cluster commercial credit and manufacturing total factor productivity? By observing China, the largest developing and transforming economy, this paper explores the relationship between clustered commercial credit and the TFP of manufacturing enterprises, providing a new perspective for understanding the growth mechanism of Chinese enterprises under the financial system dominated by state-owned banks. By studying cluster commercial credit, we can explain how Chinese enterprises achieve rapid growth under the background of an underdeveloped financial market from the perspective of informal finance. We used the data of the China Industrial Enterprise Database (1998–2015) to refine the clusters to the county level, for an in-depth exploration of the internal theoretical channels through which cluster commercial credit affects the total factor productivity of the manufacturing industry at the micro-level:

- The appropriate regional level for cluster commercial credit research should be the smaller regional units. This article selects the county as the regional unit based on the following considerations. First, the development of China's regional economy is inseparable from the role of local governments, and the role of county-level governments is particularly obvious; second, from the perspective of cluster commercial credit, the main carriers are enterprises, and at the county-level, the number of successful enterprises in the economy is not too large. This article chooses a county-level economy due to the fact that each county contains fewer enterprises. The choice of a county as a regional unit makes the research data in this article as detailed as possible, so that the

commercial credit of the cluster can be more detailed and accurately reflect the cluster situation. Judging from the literature we have observed, this is the smallest choice of regional units in the current domestic literature of this type. Another representative document that supports the selection of regional units in this article is the literature of Ma and Zhang [9]. The article found cluster commercial credit has significantly promoted the export expansion of enterprises.

Moreover, we examined the heterogeneous differences in the influence of cluster commercial credit on the total factor productivity of the manufacturing industry. In the treatment of endogenous issues, we constructed a quasi-natural experiment and used multi-period DID and PSM-DID to investigate the benchmark results [9]. Finally, not only will cluster commercial credit affect the TFP as a whole but also the use of commercial credit by enterprises will affect TFP. In view of this, we examined the impact of corporate commercial credit on TFP from the perspective of enterprises. The economic scale of a region may have a significant and positive impact on the total factor productivity of enterprises in the region. Therefore, we controlled the county-level economic scale in the regression. Cluster commercial credit specifically includes the mutual commercial credit transactions between enterprises in the cluster or the commercial credit transactions between different clusters. Considering that the commercial credit between enterprises in the cluster is not easy to measure, this paper uses the ratio of the sum of accounts receivable in the cluster to the sum of output as a robustness test to make up for the shortcomings. It should also be noted that commercial credit is divided into the acquisition of commercial credit and the provision of commercial credit. The cluster commercial credit in this paper is expressed by the logarithm of the total accounts receivable of enterprises in the county-level cluster. The cluster commercial credit mentioned in this article refers to the provision of cluster commercial credit.

The contribution of the article is given as follows: First of all, from the perspective of research, this article breaks through the traditional analysis framework of corporate commercial credit and corporate productivity from the perspective of clusters. This paper examines the indirect effect of commercial credit on the associated enterprises in the cluster, analyzes the impact of the overall commercial credit of the county-level cluster on the total factor productivity of individual enterprises in the county-level cluster. It also not only enriches and expands the research on the impact of informal finance on the real economy, but it also more accurately describes the interaction between domestic enterprises under the background of relatively lagging financial development and provides new ideas for follow-up theoretical research. Secondly, in terms of research content, this paper systematically sorts out the theoretical mechanism by which cluster business credit affects manufacturing total factor productivity. Cluster business credit promotes manufacturing total factor productivity through channels that improve the innovation level and capital allocation efficiency of enterprises. This breaks through the limitation of the existing literature, which are mostly studies from a single financing perspective. Finally, this article further comprehensively examines the heterogeneous influence of cluster commercial credit on manufacturing total factor productivity from the enterprise, industry, and regional levels. Moreover, through the construction of a quasi-natural experiment, the difference-doubling method accurately identifies the causal effect of cluster commercial credit on the total factor productivity of the manufacturing industry, and a series of test strategies, such as parallel trend testing and placebo testing, ensures the effectiveness of the difference-doubling method estimation. Compared with traditional regression, the conclusion is more reliable.

This paper is arranged as follows: the first section is the introduction, the second section is the literature review, the third section is the theoretical analysis and hypothesis, the fourth section is the data and methods, the fifth section is the estimation results and test, and the sixth section is the conclusion and policy suggestions.

2. Literature Review

2.1. Commercial Credit

Commercial credit refers to short-term financing provided by the supplier (seller enterprise) to the production enterprise (buyer enterprise) in daily credit sales transactions [10]. Specifically, the supplier does not require the production enterprise to pay immediately after providing the goods, instead using a financing method that can postpone payment for some time. Can cluster commercial credit as informal finance promote the total factor productivity of the Chinese manufacturing industry? There is no clear answer to this question from the existing research on commercial credit. As a short-term financing method, commercial credit is an important financing method for enterprises in both developed and developing countries. The research on commercial credit can be roughly divided into three categories. From a macro perspective, we analyzed the impact of monetary policy and commercial credit [11], the relationship between commercial credit and bank credit, etc. [12]. From a meso-level perspective, we examined the impact of the external environment on commercial credit and studied how differences in the financial development level [13], the level of the rule of law, the level of social capital [14], and the level of market competition can affect commercial credit [15]. From a micro perspective, we examined the motivation for commercial credit [16], the determinants of its use [17], and its impact on the real economy [18].

2.2. Total Factor Productivity

Currently, there is a large amount of literature studying the problem of total factor productivity and in recent years, scholars have studied the calculation of total factor productivity. Regarding the calculation of TFP, some scholars have found that the semi-parametric method can better solve the problems of endogeneity and sample selection in traditional measurement methods [19]. Tian et al. studied how to choose the general framework of TFP measurement methods, adopted a variety of measurement methods and the application of statistical tests, compared TFP measurement results from multiple angles, and finally selected the applicable method through statistical tests [20]. Another type of literature focuses on the study of resource allocation efficiency from the perspective of total factor productivity [21]. A large number of studies have proved that the efficiency of resource allocation has an important impact on total factor productivity and economic growth, and resource misallocation will reduce a country's total factor productivity and the speed of economic growth [22]. To promote the sustained and rapid growth of China's economy and achieve high-quality development, it is necessary to improve the efficiency of resource allocation [23]. Finally, some scholars have studied the factors affecting total factor productivity and the impact on the total factor productivity of enterprises has been investigated from the perspectives of international trade [24], policy [25], social capital [26], infrastructure investment, foreign direct investment, and innovation [27].

2.3. Commercial Credit to Total Factor Productivity

There are few studies on business credit and total factor productivity. Shi and Zhang conducted one of the earlier researches in China, but this article only uses the data of 176 listed companies from 1999 to 2006 for analysis, and it should be noted that a small number of research samples are not representative [5]. From the perspective of financing, commercial credit has information advantages over bank borrowing, and external financing costs are lower and more efficient, while the use of commercial credit by enterprises can alleviate the financing constraints of enterprises [28]. For the improvement of the enterprise, total factor productivity requires sufficient funds to smooth the cash flow of the enterprise. Therefore, enterprises use commercial credit to alleviate the financing constraints of the enterprise, thereby improving the total factor productivity of the enterprise [6]; however, this article only considers the mechanism channel of financing. In addition, from the perspective of the period of commercial credit use, some scholars have proposed that long-term commercial credit and short-term commercial credit have different effects on

the total factor productivity of enterprises. In the short term, commercial credit may inhibit the increase in total factor productivity of enterprises through negative competition and coercive effects, while in the long term, it may promote the increase of total factor productivity through financing effects [29], but this article does not conduct an empirical test of the mechanism.

Some studies have examined the impact of the use of commercial credit by enterprises on the total factor productivity of enterprises [6]. Other studies have confirmed the impact of commercial credit clustering on corporate exports [9]; however, limited studies have examined the impact of corporate commercial credit on total factor productivity from the perspective of enterprises and most studies ignored the indirect effects of commercial credit on associated companies in clusters. The influence on the Chinese economy, especially the typical cluster development model in the eastern coastal areas, has not been estimated. Moreover, there is a lack of research on the relationship between cluster commercial credit and manufacturing total factor productivity in the existing literature. Few studies found the internal mechanism of cluster commercial credit on the manufacturing total factor productivity. Therefore, to fill the literature gap, the current study analyzes the internal correlation mechanism of cluster commercial credit affecting manufacturing total factor productivity from the cluster level, and it provides economic research support for China to achieve high-quality economic development from the perspective of informal finance.

3. Theoretical Analysis and Hypothesis

Cluster business credit can positively promote total factor productivity by improving the innovation level of enterprises. Fisman and Raturi put forward a competing hypothesis theory of commercial credit [17] and the theory holds that when in a buyer's market, customers can easily find alternative suppliers. In this case, supplier companies can use commercial credit as a means of competition and by providing commercial credit as a preferential measure, companies can win from the fierce market competition, and then enhance the market competitiveness of enterprises and increase the sales income and capital inflow of enterprises. Clusters provide a suitable living environment for commercial credit and enterprises in the cluster have more frequent transactions and lower information asymmetry. The provision of cluster business credit can improve the competitiveness of the enterprises in the cluster and the cluster as a whole, increasing the sales revenue of enterprises in the cluster and alleviating the problem of capital constraints [28]. Innovation is an investment-intensive and time-consuming project that requires substantial capital investment from companies [30]. Financial constraints are the main factor that inhibits enterprises' R&D investment [31], which seriously affects the improvement of enterprises' innovation capabilities [32].

Cluster commercial credit can increase the capital inflow and sales income of enterprises and ease the financial constraints of enterprises in the cluster. Enterprises use this part of the funds for technology learning and R&D investment to promote enterprise innovation by strengthening the learning ability, innovation ability, and knowledge of enterprises [33], enhancing the technical components of enterprise products, and improving the level of enterprise innovation, thereby improving the total factor productivity of manufacturing enterprises. Therefore, cluster commercial credit can improve the innovation level of enterprises and promote the total factor productivity of manufacturing.

Cluster commercial credit can positively promote total factor productivity by improving the efficiency of an enterprise's capital allocation. Commercial credit is a credit provided to customers by a business that delays the collection of payments when selling goods and regardless of the country's level of development or the degree of credit constraints imposed on firms, firms generally provide customers with commercial credit [34]. The provision of commercial credit by enterprises can send a signal to financial intermediaries that their operations and financial conditions are healthy, making it easier to obtain external financing from financial institutions [35]. This is because when an enterprise applies for a bank loan, it needs to provide financial information to the bank. The larger the proportion of accounts

receivable, the better the sales of the enterprise. The ability to provide commercial credit to customers also suggests that businesses will have more cash to collect in the future. Such benign signals can enable enterprises to gain the trust of banks and make it easier to obtain external financing from financial institutions such as banks.

Therefore, the provision of cluster commercial credit can send a benign signal of good business and financial conditions to financial intermediaries, alleviate information asymmetry, and make it easier to obtain external financing from financial institutions, which can alleviate the problem of insufficient corporate investment, to a certain extent. In addition, enterprises will also accept the supervision of financial institutions at the same time, thereby inhibiting blind excessive investment behavior, improving the efficiency of the capital allocation of enterprises, and promoting the total factor productivity of enterprises. In addition, according to the competitive hypothesis theory of commercial credit [17], the provision of commercial credit in a cluster can improve the competitiveness of enterprises in the cluster. With the enhancement of market competitiveness, enterprises will pay more attention to investment decisions and avoid excessive investment caused by blind investment. It improves the capital allocation efficiency of enterprises, and the improvement of capital allocation efficiency has a positive effect on the total factor productivity of the manufacturing industry. Therefore, cluster commercial credit can improve the capital allocation efficiency of enterprises and promote the total factor productivity of manufacturing.

Based on the above analysis, this paper proposes the following research hypotheses:

Hypothesis 1 (H1). *Cluster commercial credit can promote manufacturing total factor productivity.*

Hypothesis 2 (H2). *Cluster commercial credit promotes the increase in manufacturing total factor productivity through channels that improve innovation level and capital allocation efficiency.*

4. Materials and Methods

4.1. Data Processing

We used micro data from 1998 to 2015 collected from the China Industrial Enterprise Database to inspect manufacturing companies and proceeded as follows: (1) industries such as "mining industries", and "electricity, gas, and water production and supply industries" were deleted; (2) adjusted the 4-digit code of China Industrial Classification (CIC) [36]; (3) deleted total industrial output value, industrial added value, fixed assets, employees, intermediate product input, industrial sales output value, total assets less than or equal to 0 data, and other data that did not meet the accounting standards [36]; (4) removed the data with less than eight people in the enterprise; (5) deflated the variables, adjusted the industrial added value through the ex-factory price index, adjusted the fixed capital stock through the fixed asset investment price index, and adjusted the intermediate product input through the industrial producer purchase price index using 1998 as the base period; (6) used the LP method to calculate the TFP to supplement the missing industrial added value and intermediate product input from 1998 to 2015. There was no industrial added value in 2001 and 2004 during 1998–2007. The industrial added value = total industrial output value-intermediate input + value-added tax [37] to supplement, and there was no data on intermediate input and industrial added value during 2008 and 2015. Intermediate input = output value × sales cost/sales income − wage payment − depreciation of the year [38]. The industrial value-added = total industrial output value − intermediate input + value-added tax, in which the wage payment and current year's depreciation were supplemented by interpolation, and the total industrial output value = sales revenue-beginning inventory + ending inventory [39] for completion; (7) winsorize the upper and lower 1% quantiles to eliminate the outliers. It is worth noting that the county-level indicators used the province, prefecture, and county codes in the Chinese Industrial Enterprise Database. We refined the clusters to the county level. The commercial credit of the cluster was measured by the sum of the commercial credits of the enterprises in the region.

4.2. Regression Function

This article examines how cluster commercial credit affects the manufacturing enterprise TFP, refines the cluster to the county level, and uses the sum of county-level internal enterprise commercial credit to measure the cluster commercial credit [9]. The basic regression function can be written as follows:

$$TFP_{i,c,t} = \alpha_0 + \alpha_1 credit_{c,t} + \alpha_2 RES_{c,t} + \alpha_3 X_{i,t} + \sum D_i firm_i + \sum D_t year_t + \sum D_c county_c + \sum D_{ht} hylb_h * year_t + \varepsilon_{i,t} \quad (1)$$

where the subscript i is the enterprise, t is the time, c is the cluster at the county level. $TFP_{i,c,t}$ are the TFP of the enterprise i in the c county in year t, and credit c. t is the cluster commercial credit of c county in t year. $RES_{c,t}$ are the regional economic scale of c county in t year, and the county-level output sum of c county in t year. The cluster commercial credit is positively correlated with the regional economic scale to a certain extent. Therefore, the county-level economic scale is added to the basic regression model to control. $X_{i,t}$ are other control variables in this article. This article adds firm fixed effects to control unmeasured individual-level factors and adds year fixed effects to avoid the interference of certain time factors. The cluster commercial credit reflects the overall commercial credit of the county, and the county-level FE or industry × year FE is added to the model to avoid interference from county-level characteristics that vary with the year. "FE" indicates panel fixed effects. ε_{it} are random disturbance terms. α_1 is a variable that we need to pay attention to. It reflects the impact of cluster commercial credit on the level of manufacturing enterprises' total factor productivity. Finally, we took the natural logarithm of the main variables.

4.3. Variable Description

4.3.1. Cluster Commercial Credit

The sums of accounts receivable were used to measure the commercial credit of the cluster [9]. In addition, the proportion of accounts receivable was used as a robustness test. The sum of accounts receivable was the sum of accounts receivable of all enterprises in the county-level area, that is, the sum of the commercial credit of enterprises in the area. The proportion of accounts receivable was measured by cluster accounts receivable to the total output of the cluster. This article does not use accounts payable as a variable to measure the commercial credit because the data were severely incomplete between 1999 and 2003. Among them, the sum of accounts receivable measured the commercial credit of the cluster in the main regression, and the proportion of accounts receivable only measured the commercial credit of the cluster when the robustness was exchanged for the explanatory variable measurement method.

4.3.2. Total Factor Productivity

The study measured the TFP of a company through the LP method [40], where the proxy variable was the total of intermediate inputs, and the relevant variables were supplemented and reduced.

4.3.3. Control Variables

Table 1 is the variable definitions. A series of control variables are given in Table 1.

Table 1. Definitions of variables.

Variable Type	Variable Name	Variable Symbol	Definitions of Variables
Explained variable	Total factor productivity	TFP	Calculate total factor productivity using the LP method
Explanatory variables	Cluster Commercial Credit	Credit	The sum of accounts receivable is the sum of accounts receivable of enterprises in the county-level cluster, taking the logarithm
		Credit2	The proportion of accounts receivable is the ratio of the sum of accounts receivable of enterprises in the county-level cluster to the sum of the output of enterprises in the county-level cluster
Control variable	Regional economic scale	RES	The logarithm of the sum of the output of the enterprises in the cluster
	Capital density	Capital	Fixed assets/total assets
	Enterprise size	Size	The logarithm of total assets
	Business age	Age	Observation year minus the establishment year plus 1 and then take the logarithm
	Cash flow	Cash	(Corporate net profit + accumulated depreciation)/total assets
	Sales growth ratio	Sr1	(Sales the current year − Sales last year)/Sales of last year
	Bank credit	Bank	Interest expense paid by the business/total sales

5. Results and Discussion

5.1. Descriptive Statistics and Correlation Analysis

Table 2 reports the basic statistical characteristics and correlation analysis of the main variables. It can be seen from Table 2 that the average value of TFP was 4.982, indicating that the total factor productivity of Chinese manufacturing enterprises was positive and had development potential. The mean value of credit was 14.29, indicating that cluster commercial credit was widely used and played an increasingly important role as a form of informal finance. In addition, the correlation coefficient between TFP and credit was 0.205, indicating that cluster commercial credit can help improve the total factor productivity of Chinese manufacturing enterprises. Finally, through the correlation coefficient, we found that Capital and Bank negatively affected the TFP, and RES, Cash, Size, Age, and Sr1 positively affected the TFP. Of course, the conclusion based on the correlation coefficient was not reliable, and it needed to be verified by the quantitative regression results.

Table 2. Descriptive statistics and correlation analysis.

	Mean	SD	TFP	Credit	RES	Capital	Cash	Size	Age	Sr1	Bank
TFP	4.982	3.174	1								
Credit	14.29	2.182	0.205	1							
RES	16.95	2.061	0.403	0.867	1						
Capital	0.003	0.002	−0.200	−0.242	−0.266	1					
Cash	0.299	0.419	0.210	−0.050	0.032	0.324	1				
Size	9.977	1.502	0.263	0.220	0.220	−0.112	−0.123	1			
Age	2.409	1.607	0.217	0.237	0.324	−0.050	0.094	0.205	1		
Sr1	0.853	3.193	0.062	0.006	0.003	−0.010	0.021	0.190	−0.099	1	
Bank	0.012	0.021	−0.069	−0.088	−0.104	0.047	−0.095	0.185	0.031	−0.047	1

5.2. Benchmark Regression

Table 3 reports the results of cluster commercial credit affecting the manufacturing TFP. Column 1 of Table 3 does not include control variables, only the main explanatory

variables were considered, and the enterprise FE and time FE were considered. Column 2 added the county-level economic scale and other enterprise-level control variables on this basis. Columns 3, 4, and 5 further controlled the industry × year FE, county-level FE, and all four FEs based on column 2. The results show that the estimated coefficients of the core explanatory variable credit were all significantly positive at the 1% level, which indicates that cluster commercial credit had a positive effect on manufacturing TFP. It confirms hypothesis 1 of this article. In addition, it can be found that this conclusion holds regardless of whether the county-level characteristics that change over time are controlled. There are many transactions between enterprises in the cluster and a low level of information asymmetry, which strengthens the degree of trust and commercial credit activities. Through the means of competition and the function of transmitting good signals to the market, cluster commercial credit can increase sales revenue and capital inflow, and more funds can be used for R&D investment to improve the level of innovation. In addition, it can alleviate the problems of insufficient investment and excessive investment, improve the efficiency of capital allocation, promote the total factor productivity of enterprises, and promote economic development through the improvement of the level of innovation and capital allocation efficiency. This is of strategic significance for exploring how to serve the real economy through financial services and achieve high-quality development.

Table 3. Results of benchmark regression.

	(1)	(2)	(3)	(4)	(5)
Credit	0.013 ***	0.032 ***	0.033 ***	0.070 ***	0.071 ***
	(0.004)	(0.011)	(0.010)	(0.013)	(0.012)
Enterprise FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
County-level FE	No	No	No	Yes	Yes
Industry × Year FE	No	No	Yes	No	Yes
N	2,376,138	1,342,262	1,342,108	1,341,762	1,341,596
R^2	0.935	0.939	0.940	0.940	0.941

Credit is an explanatory variable for the calculation of the sum of accounts receivable. Columns (2), (3), (4), (5) in the table controlled the regional economy, capital density, company size, company age, cash flow, sales growth ratio, and bank credit. (1) did not include control variables. To control the size of the article, no report was made. Standard errors are given in parentheses. *** represent the level of significance at 1%. N in the table represents the sample size. R2 represents the fit of the model, and the higher the R2, the better the fit of the model.

5.3. Analysis of Heterogeneity

This section analyzes the heterogeneous impact of cluster commercial credit on manufacturing total factor productivity from three levels: enterprise, industry, and region. The enterprise level is divided into enterprise ownership and enterprise scale. The industry level is divided into industry factor types and industry technology levels. Similarly, the regional level is divided into coastal and inland. The results of the heterogeneous regression are reported in Table 4.

5.3.1. Enterprise Ownership

Considering the significant differences in the operating behavior of state-owned enterprises and private enterprises, we distinguished the types of enterprise ownership and added the interaction term credit × ownership to the basic regression model 1 for estimation. The value of state-owned enterprises is 1, and the value of private enterprises is 0 [41]. Define the state-owned enterprise as a state-owned enterprise with the sum of state capital, collective capital, and corporate capital accounting for more than 50% of the paid-in capital, and ownership = 1; define a private enterprise with a personal capital accounting for more than 50% of the paid-in capital enterprise, ownership = 0. Column 1 of Table 4 is a heterogeneous regression that distinguishes the nature of enterprise property rights. It can be seen that the coefficient of credit × ownership was positive and significant, and the estimated coefficient of credit was also positive and significant, indicating that cluster

commercial credit had significantly improved the state-owned enterprises and total factor productivity had a greater positive effect on the state-owned enterprises. The possible reason for this is that state-owned enterprises have stronger capital strength, scale advantages, and more mature rules and regulations. Cluster commercial credit can reduce the difficulty of enterprise capital shortage and improve the liquidity of enterprise funds. Compared with private enterprises, state-owned enterprises' capital allocation is more efficient, and more funds will be used for R&D investment and personnel training, which has a greater positive effect on total factor productivity.

Table 4. Results of heterogeneity test.

Variables	(1)	(2)	(3)	(4)	(5)
	Enterprise-Level		Industry-Level		Regional Level
	Enterprise Ownership	Enterprise Size	Industry Factor Type	Industry Technical Level	Coastal Inland
credit	0.061 ***	0.042 ***	0.015	0.068 ***	0.052 ***
	(0.013)	(0.015)	(0.012)	(0.013)	(0.013)
Credit × ownership	0.013 ***				
	(0.004)				
Credit × qyguimo		0.075 ***			
		(0.006)			
Credit × yaosutype			0.050 ***		
			(0.005)		
Credit × technology				0.030 ***	
				(0.005)	
Credit × coast					0.024 **
					(0.010)
N	696,584	836,764	662,385	1,341,762	1,341,762
R^2	0.947	0.943	0.944	0.940	0.940

Credit is an explanatory variable for the calculation of the sum of accounts receivable. In the above table, the company FE, year FE, county-level FE, regional economy, capital density, company size, company age, cash flow, sales growth ratio, and bank credit are under control, and no report is made to control the scale of the article. Standard errors are given in parentheses. *** and ** represent the level of significance at 1% and 5%, respectively.

5.3.2. Enterprise Size

There may be differences in the impact of cluster commercial credit of different enterprise sizes on the total factor productivity of the manufacturing industry. We divided the total assets into three points by year. Large-scale enterprises are defined as the group with the largest value, and the size of the enterprise is represented as 1. A small-scale company is defined as the group with the smallest number, and the scale of the company is expressed as 0. In regression model 1, the cross-term credit × qyguimo is introduced for estimation. Column 2 of Table 4 reports the regression results of different enterprise sizes. The results showed that the coefficients of credit and credit × qyguimo were both significantly positive, indicating that cluster commercial credit had a stronger positive effect on the total factor productivity of large-scale enterprises than small-scale enterprises. On the one hand, there is "scale discrimination" in China's credit market. It is often easier for large-scale enterprises to obtain external financing because large-scale enterprises have more mortgage assets and lower operating risks and can obtain more commercial credit financing. On the other hand, large-scale enterprises have scale advantages and relatively strong financial strength, which can provide more commercial credit. Large-scale enterprises use more cluster commercial credit, which has a greater positive effect on total factor productivity.

5.3.3. Type of Industry Factor

We divided the industry element types into labor-intensive industries and capital-intensive industries. The labor-intensive industries are recorded as 0; the capital-intensive industries are recorded as 1 [42]. Labor-intensive industries include 13 food processing

industries, 14 food manufacturing, 15 beverage manufacturing, 16 tobacco processing industries, 17 textile industries, 22 paper and paper products industries, yaosutype = 0; capital-intensive industries include 25 petroleum processing coking and nuclear fuel processing industries, 31 non-metallic mineral products industries, 32 ferrous metal smelting and rolling processing industries, 33 non-ferrous metal smelting and rolling processing industries, 34 metal product industries, 35 general equipment manufacturing industries, 36 special equipment manufacturing industries, 41 instrumentation and cultural office machinery manufacturing industries, yaosutype = 1. The cross-term credit × yaosutype is added to the regression model 1 for estimation to test the heterogeneous effect of cluster commercial credit on the productivity of enterprises in different types of industries. Column 3 of Table 4 reports the corresponding estimation results. It can be found that cluster commercial credit can promote the TFP of capital-concentrated industries to a greater extent. The reason for this is that labor-intensive industries have relatively less capital investment, and there is less need to raise funds through commercial credit. Therefore, cluster commercial credit has less impact on labor-intensive industries. Capital-intensive industries have more demand for funds, and cluster commercial credit can alleviate the financing difficulties of enterprises, which in turn promotes the productivity of capital-intensive industries to a greater extent.

5.3.4. Industry Technical Level

Considering the possible heterogeneous effects of different industry technology levels, we added the cross-term credit × technology to regression model 1. According to the "High-tech Industry (Manufacturing) Classification" standard, we divided industries into high-tech industries and low-tech industries to construct dummy variables of industry innovation technology. The value of high-tech industries is 1. The value of low-level industries is 0 [43]. According to the "High-tech Industry (Manufacturing) Classification" standard, this includes pharmaceutical manufacturing, aviation, spacecraft and equipment manufacturing, electronic and communication equipment manufacturing, computer and office equipment manufacturing, and medical equipment manufacturing. The six major categories of instrument manufacturing and information chemical manufacturing are defined as high-tech industries, and the rest are low-tech industries.

According to the regression results in column 4 of Table 4, the estimated coefficients of credit and credit × technology were both significantly positive, indicating that cluster commercial credit was conducive to the improvement of the total factor productivity of the enterprises in high-tech industries. The reason for this is that enterprises in high-tech industries often need significant financing to support their innovation and R&D investment in the production and R&D process. Cluster commercial credit can alleviate their financing constraints and allow them to allocate more funds for R&D investment. It is helpful for companies in this type of industry to increase their productivity [44].

5.3.5. Coastal Inland

Referring to the method of Mao and Fang to construct dummy variables for coastal and inland according to the area where the company is located, the value of provinces where the area was coastal is 1, and the value of provinces where the area was inland is 0 [45]. The classification standard refers to the country. According to the vector map data of the Basic Geographic Information Center, the coastal provinces include Beijing, Tianjin, Liaoning, Hebei, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Guangxi, and Hainan provinces. Other provinces are inland provinces. To examine the heterogeneous influence of cluster commercial credit on the total factor productivity of enterprises in different regions, the cross-term credit × coast is added to regression model 1. Column 5 of Table 4 reports the corresponding estimation results. The explanatory variables and cross-terms were both significantly positive, indicating that cluster commercial credit had a greater effect on the productivity of enterprises in coastal areas than in inland areas. On the one hand, the coastal areas are more open and have more frequent transactions, thus, more

companies will use commercial credit to alleviate financing difficulties. On the other hand, the coastal areas have relatively developed economies, and enterprises' management levels and capital use efficiency are higher. Therefore, the enterprises in coastal areas can make better use of cluster commercial credit to increase their productivity.

5.4. Analysis of Robustness

The research results of this paper show that cluster commercial credit can significantly promote the total factor productivity of manufacturing enterprises. This analysis was mainly divided into seven steps. First, the calculation of explanatory variables was changed and the accounts receivable ratio was used to measure the explanatory variables. The second step was to change the calculation of explained variables. When calculating the TFP using the LP method, Y was measured by the operating income, and Y in the basic regression was measured by the industrial added value. The rest of the variables for calculating TFP were the same as in the basic regression. Third, the calculation of the control variables was changed, using the logarithm of the number of employees to measure the size of the company. The fourth step concerned the fixed effect of change control to control the fixed effects of enterprises, years, and industries. The fifth, step changed the tailing level. To re-adjust the tailing level of variables to remove abnormal data to a greater extent, we performed a 5% winsorize on the core variables. The sixth step was to change the regression method of 2SLS. Using the sum of the cluster commercial credit in the same province and the sum of cluster commercial credit in the same industry in the same province, and the same year as the two instrumental variables of the cluster commercial credit, the two-stage least squares method was used in the robust model to regress the benchmark model. This article also uses the unidentifiable test, the weak instrumental variable test, and the over-identification test, where the results all passed the test. The seventh step used the sum of cluster commercial credits in the same province and the sum of cluster commercial credits in the same industry in the same province, as well as the same year as the two instrumental variables of the cluster commercial credit. A two-step GMM estimation was carried out, and the unidentifiable test, weak instrumental variable test, and over-identification test were carried out and passed. Table 5 reports the results of the robustness test of the cluster commercial credit to the manufacturing TFP. It can be found that the coefficients of cluster commercial credit were all significantly positive, indicating that the core conclusions of this article have not changed, and the results are still stable.

Table 5. Results of robustness test.

Variables	(1) Credit2	(2) tfp_lp2	(3) Size1	(4) Industry FE, Year FE, Enterprise FE	(5) Winsorize 5%	(6) 2SLS	(7) Two-Step GMM
credit	0.032 ***	0.132 ***	0.035 ***	0.031 ***	0.038 ***	0.339 **	0.346 ***
	(0.011)	(0.006)	(0.011)	(0.011)	(0.011)	(0.170)	(0.071)
N	1,342,262	1,020,992	1,342,262	1,342,259	1,342,262	1,342,262	1,342,727
R^2	0.939	0.806	0.939	0.939	0.939	0.060	0.059

Credit is an explanatory variable for the calculation of the sum of accounts receivable, and credit2 in (1) is an explanatory variable for the calculation of the proportion of accounts receivable. In the regression of the above table, the fixed effects of companies, years, regional economy, capital density, company size, company age, cash flow, sales growth ratio, and bank credit are all controlled. To control the scale of the article, no report is made. (4) controls the enterprise FE, year FE, and industry FE at the same time. Standard errors are given in parentheses. *** and ** represent the level of significance at 1% and 5%, respectively.

5.5. Endogenous Analysis

For the treatment of endogeneity, we first used the cluster variables as the control variables to control the effects of the cluster factors. Secondly, we used multi-period DID and PSM-DID to construct a quasi-natural experiment to test the benchmark results.

5.5.1. Incorporate Cluster Factors into the Regression Equation

The clusters variables were set by the number of enterprises divided by county and year and HHI [9]. HHI is the Herfindahl index, which is measured by the sum of the squares of the ratio of industry assets to total regional assets. The regression results of the cluster factors are given in Table 6. The results showed that the cluster commercial credit could significantly promote the total factor productivity of the manufacturing industry when the number of enterprises in the region and HHI was arbitrarily controlled. The coefficients of the cluster control variables were negative and significant, and the coefficients of other control variables were generally consistent with the coefficients in the previous regression. In summary, the cluster commercial credit significantly promoted the basic regression results of the manufacturing total factor productivity, regardless of whether the cluster variables were controlled.

Table 6. Regression results of cluster factors.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Cluster = Number of Regional Companies				Cluster = HHI				Cluster = Simultaneously Control the Number of Regional Enterprises and HHI			
credit	0.030 *** (0.011)	0.029 *** (0.010)	0.077 *** (0.013)	0.076 *** (0.012)	0.032 *** (0.011)	0.032 *** (0.010)	0.069 *** (0.013)	0.071 *** (0.012)	0.032 *** (0.011)	0.031 *** (0.010)	0.077 *** (0.013)	0.077 *** (0.012)
County-level FE	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Industry × Year FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	1,342,262	1,342,108	1,341,762	1,341,596	1,342,262	1,342,108	1,341,762	1,341,596	1,342,262	1,342,108	1,341,762	1,341,596
R^2	0.939	0.940	0.940	0.941	0.939	0.940	0.940	0.941	0.939	0.940	0.940	0.941

Credit is an explanatory variable for the calculation of the sum of accounts receivable. In the regression of the above table, the fixed effects of companies, years, regional economy, capital density, company size, company age, cash flow, sales growth ratio, and bank credit are all controlled. To control the scale of the article, no report is made. Standard errors are given in parentheses. *** represent the level of significance at 1%.

5.5.2. Establish a Quasi-Natural Experiment and Use a Multi-Period Double-Difference Method to Solve the Endogeneity

We used multi-period DID to construct a quasi-natural experiment, specifically based on whether the company's address had changed at the county level or if the company had moved from one county to another county [9]. A policy shock is defined as a county-level change in the address of a company, and we regarded it as a change in the cluster. We defined a company that changed its county-level address only once during the entire sample period as a treatment group. Enterprises that did not change county-level addresses during the entire sample period were defined as the control group. This could accurately determine the impact of cluster commercial credit on the manufacturing total factor productivity, because in reality, some companies will change county-level addresses multiple times in the same year or change county-level addresses within a short period of time, and then return to their previous addresses in the next year. Two or more county-level address changes occurred during the sample period; however, we only looked at companies whose county-level addresses changed once during the entire sample period. The multi-period DID estimation model is given below:

$$TFP_{i,c,t} = b_1 Treat_i * Post_{i,t} + b_2 credit_{c,t} * Post_{i,t} + b_3 RES_{c,t} + b_4 X_{i,t} + \sum D_i firm_i + \sum D_t year_t + \sum D_c county_c + \sum D_{ht} hylb_h * year_t + \varepsilon_{i,c,t} \quad (2)$$

The standard double-difference model not only includes the interaction term of the policy dummy variable (Treat) and the time dummy variable (Post) but also includes the level terms of the two. This article does not violate this setting. The fixed effects of firm and year in model (2) implicitly control these two separate items. In order to avoid the problem of multicollinearity, this article only adds firm and year fixed effects, and does not add the Treat and Post level items and firm and year fixed effects at the same time.

The grouping dummy variable in the regression model is Treat, and the setting of the grouping dummy variable is an enterprise that had only one county-level address change is defined as a treatment group, with its value as 1. Companies that had not changed their county-level addresses were defined as the control group, and their value was 0. Post is a time dummy variable in the multi-period DID model. The value of the

year after the county-level address changes is 1; conversely, the value of the year before the county-level address changes is 0. The setting of model 2 refers to the literature of Nunn and Qian [46], b2 is the key coefficient of this article, which reflects the impact of the county-level address change on the basic regression (the degree to which the explanatory variable cluster commercial credit affected the manufacturing TFP). Model 2 is clustered at the enterprise and county levels.

DID needs to have the condition of a parallel trend, and PSM-DID ensures DID has the condition of a parallel trend. In this article, we used the method of k nearest neighbor matching (k = 1) in PSM [9] and used the logit model to carry out propensity score matching. The explanatory variable in PSM is defined as the policy dummy variable, Treat, and PSM is defined as the policy dummy variable, Treat. The explanatory variables were defined as the size of the company, the age of the company, ownership, and productivity. In addition, we performed a corresponding validity test on the PSM regression. Satisfying the overlap conditions and balance assumptions ensured that the matching results better balanced the data. Table 7 reports the DID regression results. It can be found that after the county-level address where the enterprise was located, the cluster commercial credit had a significant positive impact on the manufacturing TFP, which again verifies hypothesis 1 of this article, that is, that cluster commercial credit can significantly improve the TFP of the manufacturing enterprise, thus ensuring the reliability of the above results. The results of the other control variables were very similar to the results of the basic regression.

Table 7. Results of DID regression.

Variables	Not Filtered by PSM				Filtered by PSM			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat × Post	−0.316 ***	−0.316 ***	−0.265 ***	−0.265 **	−0.239 ***	−0.239 *	−0.190 **	−0.190
	(0.062)	(0.116)	(0.062)	(0.106)	(0.082)	(0.142)	(0.087)	(0.131)
Credit × Post	0.021 ***	0.021 ***	0.017 ***	0.017 **	0.017 ***	0.017 *	0.013 **	0.013
	(0.004)	(0.008)	(0.004)	(0.007)	(0.006)	(0.010)	(0.006)	(0.009)
County-level FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	No	No	Yes	Yes	No	No	Yes	Yes
Clustering	Enterprise	County	Enterprise	County	Enterprise	County	Enterprise	County
N	858,363	858,363	858,163	858,163	185,950	185,950	185,438	185,438
R^2	0.957	0.957	0.958	0.958	0.964	0.964	0.967	0.967

Credit is an explanatory variable for the calculation of the sum of accounts receivable. In the above table, corporate fixed effects, year fixed effects, regional economy, capital density, company size, company age, cash flow, sales growth ratio, and bank credit are all controlled. To control the scale of the article, no report is made. Standard errors are given in parentheses. ***, ** and * represent the level of significance at 1%, 5%, and 10%, respectively.

5.5.3. Validity Test of DID

A parallel trend test is one of the important prerequisites for the effectiveness of DID. The PSM-DID mentioned above better solves the problem of parallel trends. The parallel trend here was a robustness test. In the DID regression model, the dummy variables for the three years before, the current year, and the year after the business location change were added, and the results are shown in Figure 1. It can be seen that the estimated coefficients of the years before the policy were not significant, and the estimated coefficients of Treat × Post in the following years were significantly negative. It shows that before the exogenous policy shock, the manufacturing total factor productivity of the treatment group and the control group developed in the same trend. This meets the parallel trend assumption.

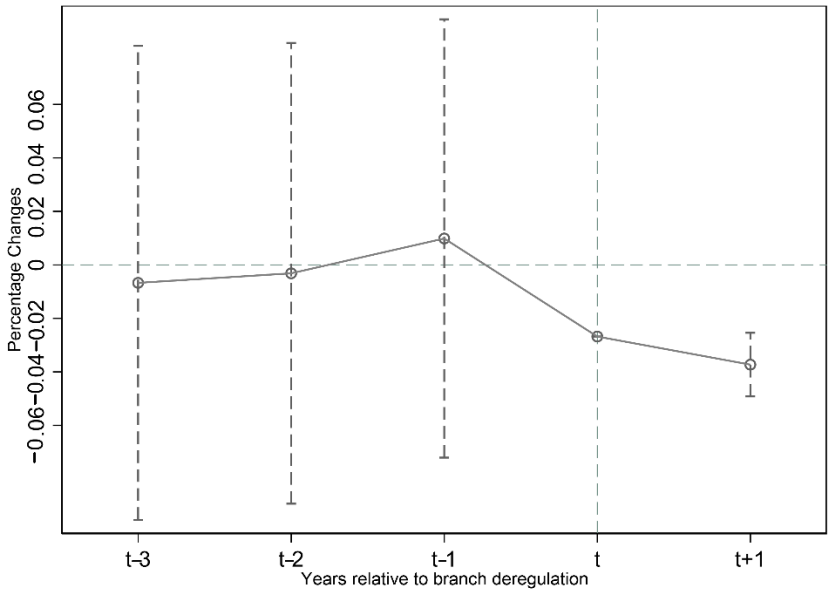

Figure 1. Parallel trend test of DID model.

This article adopts the method of randomly selecting the treatment group and conducting a placebo test. Columns 1 to 4 of Table 8 report the results of the placebo test. The results showed that the estimated coefficients of Treat × Post and Credit × Post were not significant. It showed that in the case of randomly selecting treatment groups, cluster commercial credit did not affect the manufacturing total factor productivity and it confirms the reliability of the previous regression results. Since certain industrial factors will affect the explained variables to a certain extent, this paper incorporates the industry-specific time trend item hylb4i × t into the model for further regression [47]. Columns 5 to 8 of Table 8 report the results of the DID validity test after adding the industry time variable. The coefficient of Credit × Post was positive and significant, which is consistent with the previous regression results.

Table 8. Validity test of DID.

Variables	Placebo				Industry Time Trend			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat × Post	−0.127	−0.127	−0.091	−0.091	−0.265 ***	−0.265 **	−0.265 ***	−0.265 **
	(0.123)	(0.141)	(0.123)	(0.144)	(0.062)	(0.106)	(0.062)	(0.106)
Credit × Post	0.006	0.006	0.004	0.004	0.017 ***	0.017 **	0.017 ***	0.017 **
	(0.008)	(0.010)	(0.008)	(0.010)	(0.004)	(0.007)	(0.004)	(0.007)
County-level FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	No	No	Yes	Yes	No	No	Yes	Yes
Clustering	Enterprise	County	Enterprise	County	Enterprise	County	Enterprise	County
N	858,363	858,363	858,163	858,163	858,163	858,163	858,163	858,163
R^2	0.957	0.957	0.958	0.958	0.958	0.958	0.958	0.958

Credit is an explanatory variable for the calculation of the sum of accounts receivable. In the above table, regression, corporate fixed effects, year fixed effects, regional economy, capital density, company size, company age, cash flow, sales growth ratio, and bank credit are all controlled. To control the scale of the article, no report is made. Standard errors are reported in parentheses. *** and ** represent the level of significance of parameters at 1% and 5%, respectively.

In the above analysis, the cluster commercial credit was analyzed based on the county level, and the impact of enterprise commercial credit on the total factor productivity of the enterprise was not examined. The cluster commercial credit was the sum of the commercial credit of all enterprises in the cluster. The overall commercial credit of the cluster will affect the enterprise's TFP, but the commercial credit of individual enterprises in the cluster

will also affect the TFP of the enterprise. Therefore, we have carried out research on the business credit of the enterprise and the total factor productivity of the enterprise from the perspective of the enterprise. In the use of commercial credit, companies will not only obtain commercial credit from upstream companies in the production and operation chain but also provide commercial credit financing to downstream companies. Obtaining commercial credit is the logarithm of accounts payable, recorded as AP, and providing commercial credit is the logarithm of the net accounts receivable, recorded as AR. Therefore, we also considered the demand (obtained) and supply (provided) of business credit by enterprises. Table 9 reports the regression results from the enterprise perspective. The estimated coefficients of AP and AR were both significantly positive, indicating that the enterprise's acquisition or provision of commercial credit was beneficial to the improvement of the enterprise's TFP. The regression results of other control variables were similar to the previous results. The research conclusion of this paper is consistent with the research result of Zhang and Zhang (2019), that is, commercial credit can promote the total factor productivity of the manufacturing industry [6]. Enterprises obtaining commercial credit can bring more capital inflows to the enterprise and improve the liquidity of the enterprise's capital. The enterprise can use more funds to improve the learning ability, management ability and knowledge reserve, and to train employees and upgrade equipment, improving the level of innovation, management, and labor efficiency to promote the total factor productivity. Enterprises providing commercial credit can use commercial credit as a means of competition and for the function of transmitting good signals, increasing sales revenue and capital inflow, allocating more funds for R&D investment, and improving the level of innovation. In addition, they can alleviate the problems of under-investment and over-investment and improve the efficiency of the capital allocation. Through the improvement of innovation levels and capital allocation efficiency levels, the total factor productivity of enterprises will be promoted.

Table 9. Regression results from the perspective of corporate.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AP	0.029 ***	0.028 ***	0.032 ***	0.031 ***				
	(0.002)	(0.002)	(0.002)	(0.002)				
AR					0.051 ***	0.053 ***	0.054 ***	0.056 ***
					(0.001)	(0.001)	(0.001)	(0.001)
County-level FE	No	No	Yes	Yes	No	No	Yes	Yes
Industry × Year FE	No	Yes	No	Yes	No	Yes	No	Yes
N	748,951	748,711	748,457	748,190	1,258,619	1,258,364	1,257,649	1,257,382
R^2	0.925	0.927	0.926	0.928	0.941	0.942	0.941	0.943

In the above table, corporate fixed effects, year fixed effects, capital density, company size, company age, cash flow, sales growth ratio, and bank credit are all controlled. To control the size of the article, no report is made. (1),(2),(3),(4) are the explanatory variables for the calculation of accounts payable. (5),(6),(7),(8) are the explanatory variables for the calculation of net accounts receivable. Reports in parentheses are standard errors and clusters of companies. Standard errors are reported in parentheses. *** represent the level of significance of parameters at 1%.

6. Conclusions and Policy Implications

The study estimates the impact of cluster commercial credit on manufacturing total factor productivity and its theoretical mechanism from the perspective of county-level clusters. The data were collected from 1998 to 2015 from the Chinese Industrial Enterprise Database. The study found that cluster commercial credit significantly promoted the total factor productivity of the manufacturing industry, and a series of robustness tests did not change the basic findings. The theoretical mechanism analysis showed that improving the level of innovation and improving the efficiency of capital allocation are important ways that cluster commercial credit promotes manufacturing total factor productivity. The analysis of heterogeneity found that cluster commercial credit has promoted the total factor productivity of state-owned enterprises, large-scale enterprises, capital-intensive industries, high-tech industries, and enterprises in coastal areas to a greater extent. For

the treatment of endogenous problems, we not only considered the influence of regional clusters on the conclusions of this article but also used the PSM-DID method to test the basic regression and ensured the effectiveness of double difference through parallel trend and placebo tests. According to the conclusions of this study on China, many countries in the world should pay attention to the role of informal finance in economic development and encourage the development of commercial credit among enterprises, especially the development of cluster commercial credit, to make full use of the function of providing commercial credit as a means of competition, sending good signals to the market, increasing sales revenue and capital inflow, using more funds for R&D investment, and improving the level of innovation. In addition, it can alleviate the problems of under-investment and over-investment and can improve the efficiency of capital allocation. Through the improvement of the innovation levels and capital allocation efficiency levels, it can promote the total factor productivity of enterprises and can promote economic development.

The study of this paper enriches the theoretical research on informal finance and the development of the real economy, it supplements and develops the research on commercial credit, and has a certain theoretical significance; however, this paper also has some research limitations. It is limited by the availability of data as the data used in this paper are relatively old. This paper argues that future research should pay more attention to the impact of informal finance on the real economy, and that enterprises should focus more on improving the efficiency of capital allocation and innovation levels. In addition, with the development of the internet and digital economy, we should pay attention to the impact of digital finance and supply chain finance on economic development, keep the theoretical research abreast of real economic problems, and constantly enrich and develop existing economic theories.

Moreover, it is found that encouraging enterprises to use commercial credit, giving full play to the role of cluster commercial credit and vigorously developing informal finance can increase the total factor productivity of enterprises in a broader sense. This provides a new perspective for relevant departments to think about how to improve the quality of enterprises and to build a "quality power country". The study proposed the following policy implications. First, relevant government departments should pay attention to the management of informal finance, encourage the development of cluster commercial credit, improve laws and regulations related to commercial credit, and standardize the use of cluster commercial credit. In addition, they should actively guide financial institutions to pay more attention to fairness and science, gradually solve the problem of "credit discrimination", and create a good financial environment. Second, enterprises should make full use of the financing channel of cluster commercial credit, enhance financial information transparency, reduce information asymmetry between buyers and sellers, strengthen the supervision of cluster commercial credit to prevent credit abuse and improper use, improve the awareness of cluster commercial credit risk prevention, and provide a stable guarantee for the production of enterprises.

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