



Impacts of Financial Decentralization on China's Innovation

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Abstract. This paper studies the impact of financial decentralization on innovation activities in China based on the perspective of “finance-innovation”. Using the data of China’s industrial enterprises above designated size in 30 provinces from 2000 to 2019, this paper verifies the relationship between financial decentralization and innovation, reach conclusions that: Financial decentralization plays a significant role in promoting China’s innovation ability; Financial decentralization has obvious regional heterogeneity, which has a positive effect on the improvement of innovation ability in the eastern and central regions with high economic development level, and a negative effect in the western regions. Meanwhile, it’s found that the local financial decentralization is more obvious when the industrial structure is more perfect, and the financial decentralization contributes to the improvement of the local industrial structure. In the future, each region should choose the best degree of financial decentralization according to its different financial characteristics, and rationally use it to help local industrial innovation, to promote high-quality economic development.

Keywords: Financial decentralization · Innovation · high-quality economic development · regional development

1 Introduction

The 19th National Congress of the CPC sounded a strong clarion call for accelerating the building of an innovative country, China is moving forward with an innovation-driven strategy. At present and in the future, promoting innovation in institutions, science, technology, and culture is an important background for China’s high-quality economic development. Under this background, it is significant to discuss the institutional background of China’s innovation development.

The financial sector is an important driving force for China’s innovative development. A very important part of China’s economic system is financial decentralization, financial decentralization enables the central government to entrust certain financial power and responsibility to local governments, which enables local governments to obtain strong dominant power over local economy. It is an important starting point for us to understand the financial decentralization that whether to devolve the financial management power to the local or the central government is conducive to the positive innovative development

of a country. Therefore, it is of great significance to explore the relationship between financial decentralization and innovation.

There are two main literatures closely related to this paper, one is the financial decentralization itself. Ding and Fu firstly describes financial decentralization as the allocation of financial resources and regulatory power between the central and local governments [1]. Hong and Hu systematically study financial decentralization and proposes that it includes financial development and innovation right, financial control right and financial supervision right [2]. Meanwhile, it can be divided into two levels, decentralization from the central government to local governments and from the government to the private sector. In addition, Cui puts forward that the essence of financial decentralization lies in delineating the institutional boundary between the government and the market based on the perspective of institutional boundary [9].

The other one is the impact of financial decentralization on various industries. For local governments and the central government, financial decentralization restrains the expansion of local government debt [3]. However, it will increase the risk of inflation and economic overheating, so that the growth rate of local government debt will change against the economic cycle [4]. Perfecting financial decentralization not only requires the government to gradually decentralize to the market on the premise of ensuring the stability of the financial market and avoiding systemic risks, but also requires a clear definition of the respective supervisory authority of the central government and local governments, and a clear definition of the rescue responsibilities of both sides [5]. For enterprises, financial decentralization reduces the investment efficiency of enterprises by affecting bank credit and agency costs, and at the same time causes excessive investment [5]. The influence of financial decentralization on environmental pollution in China shows a positive U-shaped relationship. Moderately deepening financial decentralization can improve environmental quality, while excessive financial decentralization will cause serious environmental pollution problems [6]. Financial decentralization is not conducive to the construction of urbanization within the region, but it has a significant promoting effect on the urbanization of surrounding areas [7]. At the same time, some scholars investigate the nonlinear relationship between financial decentralization and investment consumption ratio. The results show that in the low financial decentralization stage financial decentralization is positively correlated with the ratio of investment and consumption; In the medium financial decentralization stage, the relationship between financial decentralization and investment consumption ratio is uncertain; In the stage of high financial decentralization, financial decentralization is negatively correlated with investment consumption ratio [8].

Compared with the existing literature, the possible innovations of this paper are as follows. First, the innovation of the research content. The existing studies on the evaluation of financial decentralization lack the innovation research, existing literature has not yet systematically analyzed the relationship between financial decentralization and innovation. From theoretical and empirical perspectives, this paper deeply discusses the impact of financial decentralization on innovation under the background of China. Second, the uniqueness of the research perspective. This paper not only discusses the direct impact of financial decentralization on innovation, but also comprehensively investigates the relationship between financial decentralization and innovation from the perspectives

of endogeneity, heterogeneity, and influence mechanism. Third, the policy reference value of the research findings. Through this study, it is found that financial decentralization can promote innovation, which enlighten local governments to provide better services for enterprises and increase financial support for regional economic innovation and development.

2 Model Building

2.1 Construction of Econometric Model

To explore the relationship between financial decentralization and innovation, this paper constructs the following model:

$$Ino_{it} = a_0 + a_1FD_{it} + Control_{it} + \gamma_i + \mu_t + \varepsilon_{it} \quad (1)$$

Ino is the innovation variable, FD represents financial decentralization, which represents innovation input (RD) and innovation output (Patent) respectively. Control represents a series of Control variables, γ_i and μ_t are province fixed effects and time fixed effects, ε_{it} is a random error term. The subscripts I and t stand for region and time, respectively.

2.2 Variable Description

There are two core explanatory variables in this paper. The first one is the degree of financial decentralization, which is measured by the ratio of the loans of each province to the total loans of the whole country. The second one is innovation index, which mainly includes innovation input and innovation output. In this paper, R&D input of industrial enterprises above scale is used to represent innovation input, and the number of patents represents innovation output.

This paper sets the following control variables: (1) The level of investment. This paper uses the ratio of fixed asset investment to GDP to represent the investment level. (2) Level of infrastructure construction. This paper uses the highway mileage of each province to represent the level of infrastructure construction. (3) Environmental regulation. This paper uses the proportion of industrial pollution control investment in GDP to represent environmental regulation. (4) The degree of government intervention. This paper uses the ratio of fiscal expenditure to GDP to represent the degree of government intervention. (5) Trade factors. This paper uses the ratio of import and export trade finance to GDP to represent trade factors.

2.3 Data Description

This paper cites panel data of 30 provinces from 2000 to 2019, except Tibet, Hong Kong, Macao, and Taiwan. The data mainly come from China Statistical Yearbook, China Financial Yearbook, China Industrial Statistical Yearbook. To avoid spurious regression, eliminate heteroscedasticity and obtain stationary data, this paper processed all data by taking logarithms.

The descriptive statistics of the main variables used in the empirical analysis of this paper are shown in Table 1.

Table 1. Descriptive Statistics of Main Variables (Photo credit: Original)

Variable	Mean	Std. Dec	Min	Max	Obs
patent	12061	27490	5	272616	600
RD	1809860	329910	1356	2310000	600
FD	0.03	0.03	0	0.12	600
Invest	0.63	0.26	0.21	1.48	600
ER	0	0	0	0.01	600
GI	0	0.09	0.07	0.63	600
trade	3088	3858	126.75	17646	600
Infrastructure	114961	75442	4325	337095	600
sgdp	45.37	8.13	16.2	61.5	600
tgdp	42.59	8.95	28.6	83.5	600
loan	1.13	0.92	0.39	5.19	600
Interaction	1.02	0.54	0.50	5.15	600

3 Empirical Results and Discussion

3.1 Full Sample Analysis

Table 2 reports the financial decentralization test results of the impact of China's innovation activities, innovation input and output test results are significantly positive, means that financial decentralization can improve innovation and promote the local government to use resources to carry out innovation activities. Meanwhile, the financial decentralization can also reduce the enterprise research and development costs and increase government support and subsidies for enterprise innovation to further promote enterprise innovation.

3.2 Sub-sample Analysis

Table 3 reports the test results of the impact of financial decentralization on innovation activities in different regions of China. The whole sample is divided into three sub-samples: eastern, central and western, and conduct sub-sample test. The test results show that financial decentralization has a positive effect on innovation input and output in eastern and central regions, and a negative effect on innovation output in western regions, indicating that financial decentralization has a positive effect on innovation development in eastern and central regions, and a negative effect on innovation development in western regions. Compared with the eastern and central regions, the economic development level of the western region is backward, and the economic quality is relatively poor. Although financial decentralization gives local governments more financial allocation rights, local governments cannot reasonably use financial resources for innovation input, but use more financial resources for economic development, thus inhibiting innovation. The western

Table 2. Test results of financial decentralization on innovation (Photo credit: Original)

Explained variable	R&D	Patent
FD	0.7087*** (8.01)	0.6520*** (5.22)
Infrastructure	-0.0474 (-0.63)	-0.1806* (-1.71)
Invest	0.3103*** (5.72)	0.2794*** (3.65)
ER	0.0561** (2.50)	0.0378 (1.19)
GI	-0.5810*** (-4.71)	0.0049 (0.03)
Trade	0.2148*** (5.09)	0.1683*** (2.83)
Constant	12.0670*** (12.73)	8.7817*** (6.57)
Province fixed effect	Control	Control
Year fixed effect	Control	Control

region can give priority to improving economic level and quality and reducing the degree of financial decentralization. By virtue of good economic level and reasonable industrial structure, the East and central region can make proper use of financial decentralization, which will contribute to regional innovative development and provide economic quality level.

3.3 Mechanism Analysis

To investigate the influence channels of financial decentralization on innovation activities in China. From the perspective of industrial upgrading, the paper puts the interaction term between financial decentralization and industrial upgrading into the test. The test results show that the interaction term between financial decentralization and industrial upgrading is significantly positive, indicating that local financial decentralization with a higher level of industrial structure has a better role in promoting innovation and innovation activities, and a good industrial environment helps to promote financial decentralization to play a better innovation effect (Table 4).

To verify the robustness of the results in this paper, the following three methods are used for robustness testing. The first method is to change the explanatory variables, replace the financial decentralization with the ratio of the per capita loans of each province to the total loans of the country. The test results show that the result of financial decentralization promoting innovation activities has good robustness. The second method is the lag effect, lag all the explanatory variables for one period. The test results are still robust after considering the lag effect. The third method is the instrumental

Table 3. Test results of financial decentralization on innovation by region (Photo credit: Original)

Explained variable	Eastern region		Middle region		Western region	
	R&D	Patent	R&D	Patent	R&D	Patent
FD	1.267*** (9.62)	1.227*** (5.65)	1.039*** (8.65)	0.787*** (3.32)	-0.474** (-2.07)	-1.13*** (-3.7)
Infrastructure	-0.053 (-0.46)	-0.632*** (-3.29)	0.784*** (5.87)	0.175 (0.66)	-0.516*** (-4.66)	0.612*** (4.14)
Invest	0.404*** (5.31)	0.194 (1.55)	0.328*** (3.46)	0.684*** (3.66)	-0.257* (-1.84)	0.536*** (2.87)
ER	0.060** (2.02)	0.023 (0.46)	0.006 (0.17)	0.212*** (3.02)	-0.077* (-1.95)	-0.05 (-0.9)
GI	-0.528** (-2.51)	0.021 (0.06)	-1.38*** (-7.3)	0.695* (1.87)	-0.260 (-1.49)	-0.15 (-0.7)
Trade	0.683*** (5.14)	0.441** (2.02)	0.003 (0.05)	-0.03 (-0.3)	0.1412** (2.01)	0.060 (0.64)
Constant	10.191*** (7.27)	12.993*** (5.63)	3.767** (2.22)	9.870*** (2.95)	11.535*** (7.54)	-7.62*** (-3.73)
Province fixed effect	Control	Control	Control	Control	Control	Control
Year fixed effect	Control	Control	Control	Control	Control	Control

Table 4. Test results of the moderating effect (Photo credit: Original)

Explained variable	R&D	Patent
FD		
Interaction	0.1054*** (5.06)	0.0496* (1.71)
Infrastructure	0.0071 (0.09)	-0.1266 (-1.18)
Invest	0.3363*** (5.96)	0.3372*** (4.28)
ER	0.0596** (2.56)	0.0481 (1.48)
GI	-0.6134*** (-4.78)	-0.0837 (-0.47)
Trade	0.1594*** (3.64)	0.1290** (2.11)

(continued)

Table 4. (continued)

Explained variable	R&D	Patent
Constant	9.2209*** (10.34)	6.0163*** (4.83)
Province fixed effect	Control	Control
Year fixed effect	Control	Control

Table 5. Robustness test results (Photo credit: Original)

Explained variable	Change variables		Instrumental variable		Lag effect	
	R&D	Patent	R&D	Patent	R&D	Patent
FD			0.587* (1.84)	2.11*** (4.40)	0.72* (8.04)	0.588*** (4.82)
Loan	0.709*** (8.01)	0.652*** (5.22)				
Infrastructure	-0.047 (-0.63)	-0.181* (-1.71)	-0.057 (-0.54)	-0.247 (-1.57)	-0.147* (-1.95)	-0.256** (-2.50)
Invest	0.310*** (5.72)	0.279*** (3.65)	0.314*** (4.24)	0.166 (1.53)	0.321*** (5.67)	0.355*** (4.61)
ER	0.056** (2.50)	0.038 (1.19)	0.054** (1.96)	0.021 (0.57)	0.064*** (2.72)	0.014 (0.44)
GI	-0.581*** (-4.71)	0.005 (0.03)	-0.649*** (-4.01)	0.333 (1.40)	-0.351*** (-2.64)	0.353* (1.95)
Trade	0.215*** (5.09)	0.168** (2.83)	0.218*** (4.21)	0.234*** (2.96)	0.238*** (-2.64)	0.163*** (2.70)
Constant	9.514*** (11.01)	6.433*** (5.28)	10.637*** (5.44)	14.865*** (4.94)	13.683*** (14.27)	10.335*** (7.93)
Weak identification test			52.034	52.034		
Province fixed effect	Control	Control	Control	Control	Control	Control
Year fixed effect	Control	Control	Control	Control	Control	Control

variable method. To overcome the possible endogeneity problem, this paper uses the one-stage lag of financial decentralization as the instrumental variable, and then uses the two-stage least squares method. The test results are very robust. Based on the results of three kinds of robustness tests, it can be concluded that the conclusion of this paper is robust (Table 5).

4 Conclusions

This paper empirically tests the impact of financial decentralization on innovation. The results show that financial decentralization can significantly promote China's innovation capability. And the robustness test verifies that this conclusion is very robust. In addition, financial decentralization has obvious regional heterogeneity, which has a positive effect on the improvement of innovation capacity in eastern and central regions, and a negative effect in western regions. Finally, through the small sample test of the large sample, it is found that the performance of local financial decentralization is more obvious when the industrial structure is better.

According to the research of this paper, we can get the following enlightenment: Financial decentralization is conducive to local industrial innovation. Within the scope of controllable financial risks, appropriate financial decentralization is conducive to promoting enterprise innovation, optimizing resource allocation, and thus improving economic operation efficiency. Meanwhile, we should strengthen the supervision of local governments' use of financial rights, improve the assessment mechanism of local governments, reduce the incentive of local governments to participate in financial competition, and avoid the phenomenon of abusing financial power to excessively intervene in the allocation of financial resources. Each region should choose the best degree of financial decentralization according to its different financial characteristics. The financial environment in the eastern and central regions is relatively good, and the financial decentralization can be better used to promote innovation. The economic development of the western region is relatively backward. In the process of promoting financial decentralization, it is necessary to strengthen guidance, guide financial resources to flow more to innovative areas, prevent local irregularities and excessive actions, and avoid the waste of financial resources allocation. Clarify the main responsibilities and behavioral boundaries of local governments, improve the actual effect of macroeconomic policies from the implementation level, and then improve the local economic level. Local governments should rationally allocate financial resources, stimulate innovation, and make the local economy develop to high quality.

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