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Fiscal Decentralization, Regional Innovation and Industrial Structure Distortions in China

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Abstract: The current industrial structure in China must be adjusted to create a new development pattern and promote high-quality economic development. Based on theoretical analysis and provincial panel data from 2008 to 2018, we empirically analyzed the impact of fiscal decentralization and regional innovation on industrial structure distortion. The results showed that fiscal decentralization has hindered the evolution of the industrial structure in the desired direction but has promoted regional innovation and thus effectively alleviated the distortion of the industrial structure. Regional investigation showed regional differences between the effect of fiscal decentralization on industrial structure distortion and the mediating effect of regional innovation. In the eastern and central regions, fiscal decentralization was not conducive to improving the degree of industrial structure distortion. Still, it could reduce the degree of industrial structure distortion by enhancing the indirect effect of regional innovation, whereas this indirect effect was not significant in the western region. We provide some policy suggestions to promote the coordinated development of the industrial structure.

Keywords: regional innovation; fiscal decentralization; industrial structure upgrading; regional heterogeneity

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1. Introduction

In the forty years since the reform and opening up, China has achieved remarkable economic growth. It is now the second-largest economy, and its national strength has steadily improved. Economic development has shifted from a high-speed growth stage to a high-quality one. In this new period and stage, accelerating the optimization and adjustment of the industrial structure is the key to changing the mode of economic development. Continuous optimization is crucial to improving the quality of regional and national economic growth [1]. However, while upgrading China's industrial structure, the problem remains of the distortion of the industrial structure caused by market monopoly, mismatch of capital and labor resources, and mismatch of the policy and market systems, which have resulted in the considerable waste of resources and loss of efficiency. The distortion of the industrial structure is the opposite of a reasonable industrial structure, and this distortion means that the production factors are not fully used and are not effectively allocated. The distortion of the industrial structure is not conducive to obtaining structural dividends, which seriously restricts the transformation of China's economic structure and its high-quality economic development.

Local governments work as the visible component that substantially impacts industrial structure adjustment. Tax reforms based on the principle of delegating power and transferring profits have reshaped the distribution of power relationships between the central and local governments and determined the mode, efficiency, and level of financial resource allocation, to a large extent [2]. The administrative efficiency of a local government is affected by fiscal institutions based on fiscal decentralization, which considerably impacts the allocation of production factors and the development of the industrial structure. Moreover, with economic development facing severe social and natural resource constraints,

China has implemented innovation-driven development strategies in depth. As the leader of regional innovation, governments play a fundamental and guiding role in improving regional innovation capacity. From the perspective of regional innovation, studying the influence of fiscal decentralization on the distortion of the industrial structure has considerable theoretical and practical value, such as exploring the reform of the characteristics of the Chinese fiscal decentralization system and mechanism and achieving high-quality economic development.

In this study, we measured the variation in the trend in regional industrial structure distortion in China from 2008 to 2018. We re-examined the impact of fiscal decentralization and regional innovation on industrial structure distortion. Compared with the literature, our study provides the following contributions: First, previous studies on how fiscal decentralization affects industrial structure distortion lack theoretical analysis. We explored the effect of fiscal decentralization on industrial structure distortion from the regional aspect. We found that fiscal decentralization is hampering the optimization and adjustment of the existing industrial structure and is aggravating the imbalance in the industrial structure. Second, we studied the indirect effect of regional innovation in the influence of fiscal decentralization on the distortion of the industrial structure, thereby deepening our understanding in this field. Third, we explored the impact of fiscal decentralization on the regional distortion of the industrial structure. Finally, we explained whether the conclusion that fiscal decentralization leads to the deviation in economic development from the expected goal is general and universal.

2. Conceptual Framework

Many scholars have studied China's fiscal decentralization, economic growth, and environmental pollution in recent years. Regarding economic development, Zhang and Gong (2005) found that fiscal decentralization was significantly negatively related to economic growth before the taxation reform. Fiscal decentralization enhanced the coordination ability of governments at all levels and substantially improved economic growth [3]. Ding (2007) used a simple endogenous growth model to study the relationship between fiscal decentralization and economic growth. The findings proved that fiscal decentralization significantly contributed to economic growth [4]. Li et al., (2021) explored the relationship between fiscal decentralization and economic growth through decentralization timing. They found that administrative decentralization could further promote county economic growth if conducted first [5]. Lv et al., (2021) found that the tax distribution system stimulated local economic development through fiscal revenue sharing based on the productive tax base. The intense competition among local governments was also an essential reason for the high-speed economic growth in China [6].

However, some scholars have reached the opposite conclusion. They found that fiscal decentralization affects the efficiency of resource allocation through the elasticity of the commodity, money, and labor markets; market structure; and institutional arrangements; Even the local fiscal expenditure is different from the preferences of residents, which leads to fiscal decentralization inhibiting economic growth [7–11]. Some scholars also found that environmental decentralization was not conducive to reducing carbon emissions, which aggravated environmental pollution [12–16]. Some scholars held the opposite view that fiscal decentralization could prompt local governments to quickly deal with current pollution and avoid the effect of environmental pollution [17–19].

A few studies have has focused on whether fiscal decentralization affects the distortion of the industrial structure and whether the industrial structure can be guided in the expected direction by improving regional innovation. According to Chu and Jian (2014), based on the dual perspectives of gross and structural effects, the tax policy was conducive to industrial adjustment with a restricting effect, and fiscal expenditure policy hindered the upgrading of the industrial structure. Government expenditures on investment and administration were not conducive to adjusting the industrial structure in terms of the structural effect. However, expenditure on education, science, and technology significantly

promoted the upgrading of the industrial structure [20]. Wang and Gao (2018) investigated fiscal decentralization and industrial structure upgrading based on county-level data from 2002 to 2015. They found that the reform of province-administered counties stimulated the vitality of local governments in terms of economic development, and fiscal decentralization promoted the upgrading of the industrial structure. Other scholars also reached different conclusions [1]. Liu et al., (2017) examined the role of fiscal decentralization and financial efficiency in upgrading the industrial structure from the perspective of spatial heterogeneity [21]. Cui and Li (2015) explored the impact of fiscal decentralization on the upgrading of the industrial combination from the fiscal revenue and expenditure viewpoints. They found that fiscal decentralization was not conducive to improving the industrial structure [22]. Finally, Gan et al., (2020) applied the dynamic panel model to test the impact of fiscal decentralization and local governmental behaviors on the transformation and upgrading of the industrial structure. They found that fiscal decentralization did not significantly drive the transformation and upgrading of the industrial structure [23].

The 1994 Tax-Share Reform clarified the scope of governance and finance between the central and local governments, and fiscal decentralization gave local governments some autonomy after the reform. It also encouraged local governments to pursue benefit maximization, which triggered fierce competition among local governments and promoted rapid economic growth in China. However, the competition between local governments aroused by fiscal decentralization had both advantages and drawbacks. On the one hand, it promoted the optimal configuration of resources and provided positive incentives for the local industrial structure adjustment and economic development through improving marketization, human capital, and infrastructure. On the other hand, severe governmental intervention, investment preference, market protectionism, and redundant construction led to factor distortion and the mismatch of financial resources, adversely affecting the adjustment of regional industrial structures and economic development (Figure 1).

The Chinese-style institution of fiscal decentralization, which consists of political centralization and economic decentralization, led to competition among local governments. Under the pressure of political promotion, local governments are motivated to stimulate the economy. In the meantime, the administrative decentralization of central governments offers local governments the absolute authority over economic development, and the dual incentives of finance and politics have driven the rapid growth of the local economy [24,25]. Local governments strive to create a favorable market environment that can attract production-promoting factors and promote the continuous improvement in local infrastructure and public goods supply [26–28]. Therefore, fiscal decentralization has the power to encourage market reform and economic development. With the enhancement in the marketization, characterized by the increase in the share of nonpublic enterprises, the budget constraint hardening of public enterprises, and governmental deregulation, enterprises are guided to pursue profit maximization.

Next, encouraging changes in enterprise behavior will lead to enterprise reconstruction and improve the efficiency of inter-industry capital allocation, which can optimize regional industrial structures [1]. A mature and perfect market plays a price regulation role to eliminate the low-benefit economic sectors, which can further develop industries with strong competitiveness. During this process, production factors are transferred from low- to high-efficiency sectors, and social resources can be rationally allocated to improve the efficiency of capital allocation and reduce the misplacement of factors. In addition, as a visible entity, local governments can promote the development of the industrial structure in an expected direction by formulating industrial policies to compensate for the defects in the market mechanism and restrict and prevent the occurrence of improper actions [29]. Economic decentralization under political centralization provides a positive incentive for local governments. It substantially promotes local development, including improving the infrastructure, accelerating factor flow and knowledge spillover, effectively reducing transportation costs and friction costs of factor flow, and accelerating the correction of

the unbalanced state of the industrial structure. Hence, the higher the degree of fiscal decentralization, the lower the degree of industrial structure distortion.

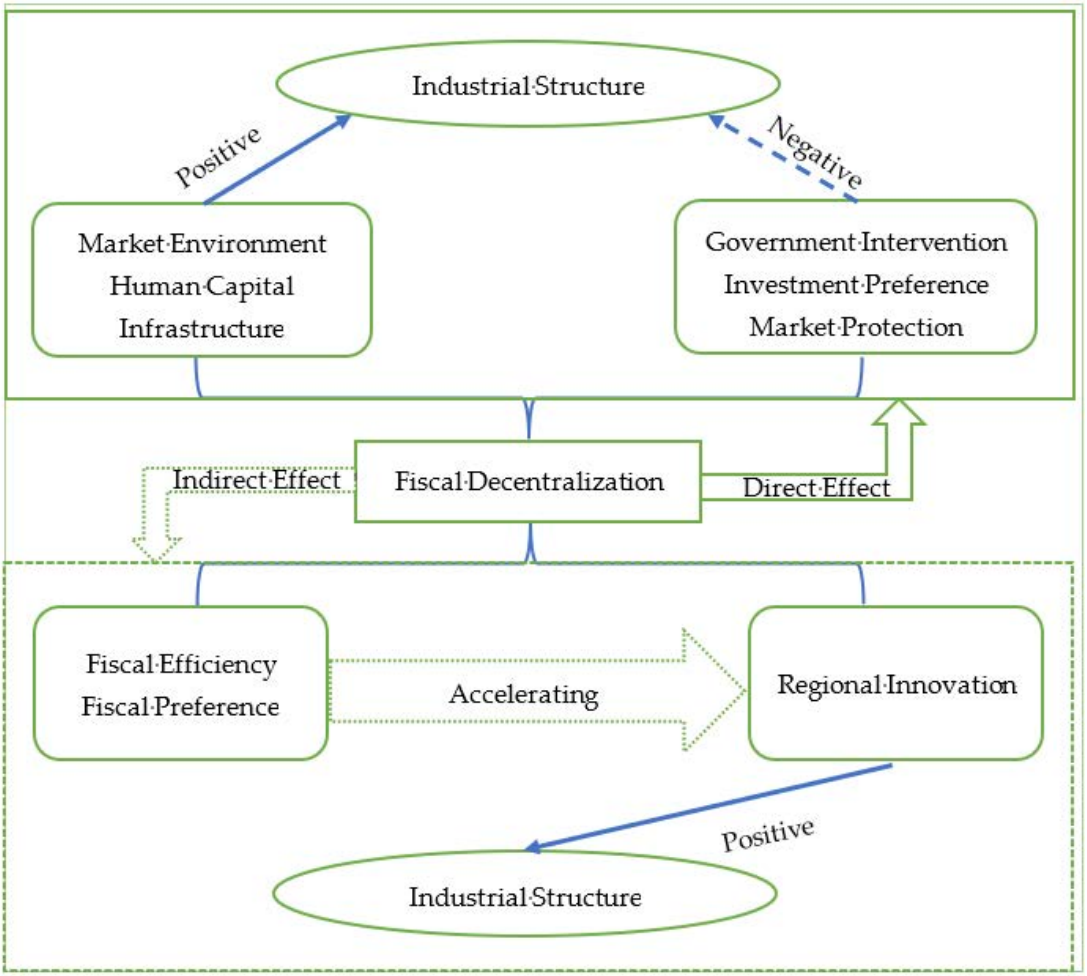

Figure 1. Influence of fiscal decentralization and regional innovation on industrial structure.

However, some scholars found that the Chinese-style fiscal decentralization has aggravated the imbalance in the industrial structure [20,23,30,31]. Under the pressure of political performance evaluation and the desire for political promotion, local governments have been incentivized to pursue elements with liquidity, such as capital, so they actively conduct merchant promotion and investment attraction activities. However, attracting investment while ignoring the constraints of local resources, demographic features, and industrial structure may damage the efficiency of resource allocation. Moreover, long-term governmental intervention in economic activities is not conducive to the survival of the fittest mechanism, weakening the positive role of marketization in developing the industrial structure, leading to the deviation in economic development from the expected industrial structure goal. The orientation, focus, and scale of government investment also determine the speed and result of industrial development [20]. Generally, local governments tend toward the real estate industry given its high taxes and high production, which leads to the influx of production factors into the real estate industry, hindering the development of other industries and leading to the imbalance in development between the different industries. In addition, market protectionism may exist in the local governments pursuing fiscal revenue maximization, which is not beneficial for the entire flow of production factors.

With the independence of the local economy produced by fiscally decentralized institutions, local governments are inclined to fragment the economy and divide the market, thereby hindering the free flow of production factors among regions. In the meantime,

supporting the development of local industries with explicit or implicit preferential policies issued by local governments to support local industrial development also intensifies the distortion of the industrial structure [23]. In addition, owing to the tenure system of local officials and the practice of long-distance exchange under the fiscal decentralization system, local government officials focus more on short-term benefits and ignore the long-term goals of economic growth. As a result, a series of detrimental behaviors, such as repeated construction and achievement projects, have partly lost economic efficiency, which is harmful to the harmonious development of the industrial structure [30,31]. Based on the above analysis, the fiscal decentralization system may have led to investment competition and preference among local governments [32]. It has further resulted in the mismatch of resources, market protectionism, repetitive construction, and other loss of resource allocation efficiency, which hinder the optimization and adjustment of the existing industrial structure and intensify imbalance in the new industrial structure.

The above analysis reflects the direct impact of fiscal decentralization on the distortion of the industrial structure. In addition, fiscal decentralization can indirectly impact the development of the industrial structure by influencing regional innovation. Fiscal decentralization can improve regional innovation from two aspects: First, from the perspective of local government fiscal expenditure efficiency, the provincial government has more time and budget for collecting and sorting information to produce a clear plan about how to improve strengths and complement weaknesses in regional economic development. Through the flexible and efficient allocation of financial capital, fiscal decentralization can increase governmental administrative efficiency and quality by improving the financial resource allocation efficiency, thereby significantly improving regional innovation by providing appropriate public goods and services [33,34]. Fiscal decentralization can help local governments to manage the science and technology innovation expenditure, including supervising and evaluating its efficiency, quickly adjusting its intensity, and improving its allocation efficiency, which can enhance the promotion effect of fiscal decentralization on regional innovation. Fiscal decentralization positively impacts regional innovation and development by improving government operation efficiency [35–37]. Second, from the perspective of fiscal decentralization affecting fiscal expenditure preference, fiscal expenditure can improve infrastructure conditions and the environment for scientific and technological innovation, which is essential for local governments to promote regional economic growth. After local governments realize its importance, they continuously increase financial expenditure to improve the regional science and technology innovation ability [38–41]. Therefore, local governments, under fiscal decentralization, have incentives to improve the regional innovation environment by increasing the expenditure on science and technology. This means they can promote regional innovation and development by changing governmental expenditure preferences. Regional innovation is an intrinsic force influencing the industrial structure. The development of innovative technology improves labor productivity and reduces costs by improving the regional investment structure and demand structure, which in turn promotes the development of the regional industrial structure. Based on this analysis, fiscal decentralization can promote regional innovation and development by improving the efficiency of fiscal expenditure and influencing the allocation of fiscal expenditure, thus promoting the development of the industrial structure in the expected direction.

3. Methods

3.1. Model Setting

We first set the benchmark model form as shown in (1) to test the comprehensive impact of fiscal decentralization on industrial structure distortion:

$$DIS_{it} = \beta_0 + \beta_1 FD_{it} + \beta_2 TD_{it} + \beta_3 FDI_{it} + \beta_4 FIS_{it} + \beta_5 PGDP_{it-1} + \beta_6 HC_{it} + \varepsilon_{it} \quad (1)$$

where DIS is the degree of industrial structure distortion; FD is fiscal decentralization; TD is the level of opening-up, meaning the regional open environment; FDI is foreign direct

investment, meaning the regional foreign investment environment; FIS is financial scale, meaning regional financial support environment; $PGDP$ is the level of economic development, meaning regional macroeconomic environment; HC is human capital, meaning regional human resources; $\beta_i (i = 1, \cdots, 6)$ is the regression coefficient; ε_{it} is the error term.

We adopted the intermediary effect model to test whether fiscal decentralization indirectly affects the distortion of the industrial structure through regional innovation. First, we tested the influence of fiscal decentralization on regional innovation by taking regional innovation as the explained variable and fiscal decentralization as the explanatory variable. Second, we tested the effect of regional innovation on industrial structure distortion by taking industrial structure distortion as the explained variable and regional innovation as the explanatory variable. According to the above ideas, we set up the intermediary effect model as shown in Equations (2) and (3).

$$RI_{it} = \gamma_0 + \gamma_1 FD_{it} + \gamma_2 FIS_{it} + \gamma_3 PGDP_{it-1} + \gamma_4 HC_{it} + \varepsilon_{it} \quad (2)$$

$$DIS_{it} = \alpha_0 + \alpha_1 RI_{it} + \alpha_2 TD_{it} + \alpha_3 FDI_{it} + \alpha_4 PGDP_{it-1} + \alpha_5 HC_{it} + \varepsilon_{it} \quad (3)$$

where RI is the degree of regional innovation. If fiscal decentralization affects regional innovation, then it affects the industrial structure distortion, and the coefficient of γ_1 and α_1 will be significant. If the sign of $\gamma_1 \alpha_1$ is opposite to that of β_1, the intermediary effect of fiscal decentralization on regional innovation and then on industrial structure distortion is $\gamma_1 \alpha_1$. If the sign of $\gamma_1 \alpha_1$ is consistent with that β_1, the divergence effect of fiscal decentralization on the distortion of the industrial structure by influencing regional innovation is $\gamma_1 \alpha_1$, which means the indirect effect of regional innovation, to some extent, masks the real impact efficiency of fiscal decentralization on the distortion of the industrial structure.

To test whether the intermediary effect of regional innovation is complete, in other words, whether the influence of fiscal decentralization on the distortion of the industrial structure is still significant after controlling the indirect effect of regional innovation, we further constructed the following regression model:

$$DIS_{it} = \varphi_0 + \varphi_1 FD_{it} + \varphi_2 RI + \varphi_3 TD_{it} + \varphi_4 FDI_{it} + \varphi_5 FIS_{it} + \varphi_6 PGDP_{it-1} + \varphi_7 HC_{it} + \varepsilon_{it} \quad (4)$$

If fiscal decentralization directly impacts the distortion of the industrial structure and indirectly affects it by influencing the regional innovation of the government, both φ_1 and φ_2 should pass the significance test. Under the premise of controlling the direct impact of fiscal decentralization on the distortion of the industrial structure, the indirect effect after adjustment is $\gamma_1 \varphi_2$. However, if the influence of fiscal decentralization on the distortion of the industrial structure is only reflected in the indirect effect of regional innovation, then φ_1 should be insignificant and φ_2 significant. Regional innovation is entirely the intermediary variable.

3.2. Measurement of Industrial Structure Distortion

Individual industries or market distortions can be measured as the difference between the price of goods and services and their marginal cost, which means the gap between the marginal rate of substitution in consumption and the marginal rate of conversion in production. Based on the analysis, many factors produce this gap, such as import value and tariffs, rent-seeking caused by monopoly and government management, and incomplete information. In perfectly competitive markets, the prices of goods and services equal their marginal costs, so the economic distortion rate is zero. Here, we focused on the distortion of the industrial structure. Under free mobility, labor productivity is equal among sectors, so each sector's output and employment shares are equal. Based on this, we applied the industrial structure distortion measurement method proposed by Ando and Nassar (2017) [42]. We measured the distortion of the industrial structure by the Euclidean distance between employment and output share.

Assuming a state has N economic sectors, VE_i and L_i are the added value and employment of the sectors, respectively. Ando and Nassar (2017) defined the Euclidean distance between employment share and added value as follows:

$$d_i = \frac{L_i}{\sum_m L_m} - \frac{VE_i}{\sum_m VE_m}, d = \sqrt{\sum_i d_i^2} \quad (5)$$

where d_i denotes the Euclidean distance between employment share and added value in sector i, and d denotes the Euclidean distance of the economy as a whole. If the distance d is equal to 0, the labor productivity of all sectors is identical, namely:

$$\frac{L_i}{\sum_m L_m} = \frac{VE_i}{\sum_m VE_m} \forall_i \Leftrightarrow p_i = \frac{VE_i}{L_i} = p = \frac{\sum_m VE_m}{\sum_m L_m} \forall_i \quad (6)$$

where p_i is the labor production rate of sector i, and the p is the economy's labor productivity as a whole.

Distance d provides information about the difference in labor productivity between sectors. With free entry and exit, labor flows from low- to high-productivity sectors due to external incentives until the distance d tends to zero. Therefore, d is the overall industrial distortion degree of an economy. The larger the d, the higher is the degree of industrial structure distortion. d_i means the distortion degree of the sector: $d_i > 0$ indicates means that too much labor is involved in sector i, and vice versa.

3.3. Setting Explanatory Variables and Control Variables

The core explanatory variable in this study was fiscal decentralization, that is, the ability of local governments to independently allocate financial resources. The higher the degree of devolution, the stronger the fiscal autonomy of local governments. We divided fiscal decentralization into fiscal expenditure and revenue decentralization. We applied the ratio of the per capita fiscal expenditure at the local level to the sum of the per capita fiscal expenditure at the central level to measure the degree of fiscal expenditure decentralization. We applied the ratio of the per capita fiscal revenue at the local level to the sum of the per capita fiscal revenue at the central level to measure the degree of fiscal revenue decentralization.

The intermediary variable in this study was regional innovation (*RI*), which we measured using the number of patent applications granted. The control variables were opening-up (*TD*), foreign direct investment (*FDI*), financial scale (*FIS*), economic development level (*PGDP*), and human capital (*HC*). Specifically, we considered the level of opening up as the ratio of the total import and export to regional GDP; foreign direct investment as the real per capita use of foreign investment; the financial scale as the ratio of the added value of the financial sector to regional GDP; economic development level as the lag issue of per capita GDP; and human capital as the regional average salary. We obtained the panel data for 31 Chinese provinces from 2008 to 2018 from the WIEGO statistical database, the China Statistical Yearbook, and provincial statistical yearbooks. Based on the different levels of economic development, the National Bureau of Statistics (NBS) divides mainland China into three major regions: east, central, and west. The east region includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi, and Hainan (12 provinces and cities). The central region includes Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan (9 provinces). The west region includes Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Ningxia, Qinghai, and Xinjiang (10 provinces and cities). Table 1 reports the statistical descriptions of all variables.

Table 1. Statistical description of variables.

Variable	Description	Mean	SD	Min	Max
DIS	Industrial structure distortion index	0.3542	0.1566	0.0332	0.7738
EFD	Fiscal expenditure decentralization	0.8405	0.0529	0.6977	0.9368
IFD	Fiscal revenue decentralization	0.4969	0.1317	0.2629	0.8291
TD	Degree of opening-up	0.3061	0.3463	0.0175	1.6700
FDI	Foreign direct investment	14.5556	1.6379	7.9900	16.9322
RI	Regional innovation	9.5098	1.5538	5.4027	13.0775
FIS	Financial scale	0.0615	0.3003	0.1754	0.1797
PGDP	Economic development level	1.5673	0.8104	0.4041	4.9746
HC	Human capital	10.7112	0.4271	9.8061	11.8898

4. Results and Discussion

4.1. Industrial Structure Distortion Index

In this study, we measured the industrial structure distortion index for 31 provinces and municipalities in mainland China from 2007 to 2018 using data on the output value and employment share of three industries. Due to space limitation, the industrial structure distortion index for each of the 31 provinces and cities is not described in this paper, but only for 2007 and 2018 (Figure 2). Figure 2 shows that compared with 2007, the industrial structure distortion index of all provinces and cities in 2018 had decreased to different degrees. In addition, regardless of 2007 or 2018, the provinces and cities in the eastern coastal region had a lower industrial structure distortion index and those in the western region, thus demonstrating large differences in the degree of industrial structure distortion between regions.

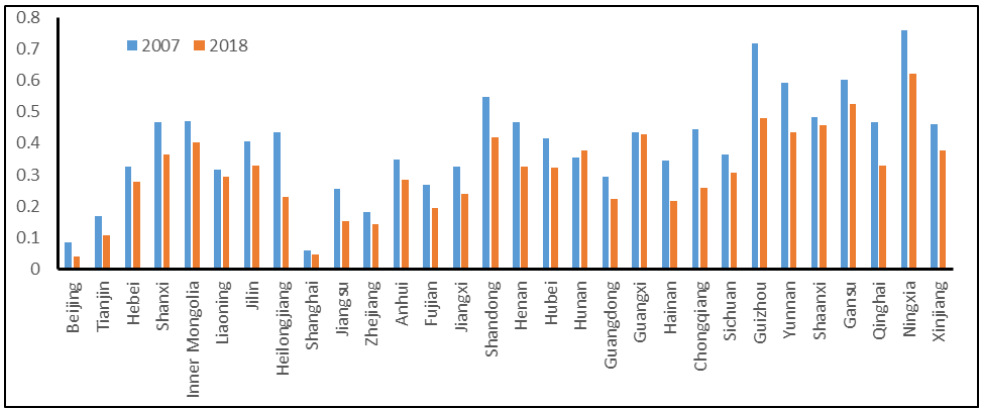

Figure 2. Regional industrial structure distortion index.

4.2. Total Effect Analysis

We regressed Equation (1) using fixed-effects models (columns 1 and 3) and random-effects models (columns 2 and 4). Table 2 provides the empirical results of the effects of fiscal expenditure and revenue decentralization on industrial structure distortions. The estimated coefficients of the effect of fiscal expenditure decentralization on industrial structure distortion were significantly positive at the 1% significance level (0.4600 and 0.4582, respectively; fixed-effects model). The estimated coefficients of the effect of fiscal revenue decentralization on industrial structure distortion were significantly positive at least at the 5% significance level (0.1137 and 0.0787, respectively; fixed-effects model).

Table 2. Influence of fiscal decentralization on industrial structure distortion.

Variable	Fiscal Expenditure Decentralization		Fiscal Revenue Decentralization	
	(1)	**(2)**	**(3)**	**(4)**
FD	0.4600 ***	0.4582 ***	0.1137 ***	0.0787 **
	(2.98)	(3.09)	(3.24)	(2.12)
TD	−0.0398 ***	−0.0893 ***	−0.0349 **	−0.0820 **
	(−3.12)	(−2.91)	(−2.28)	(−2.09)
FDI	−0.0063	−0.0092	−0.0039	−0.0068
	(−1.46)	(−1.21)	(−0.51)	(−0.87)
FIS	−0.3010	−0.5579 *	−0.5143	−0.7661 **
	(−1.27)	(−1.83)	(−1.50)	(−2.32)
PGDP	−0.0409 *	−0.0133	−0.0320 **	−0.0036
	(−1.95)	(−0.68)	(−2.12)	(−0.19)
HC	−1.1421 ***	−0.1127 ***	−0.1044 ***	−0.0713 ***
	(−4.52)	(−4.26)	(−3.79)	(−3.11)
Constant	1.5479 ***	1.3514 ***	1.4665 ***	1.2460 ***
	(5.37)	(5.10)	(4.80)	(4.46)
Sample size	360	360	360	360

Note: *t*-statistic provided in parentheses. ***, **, and * indicate that regression coefficient is significant at the 1%, 5%, and 10% levels, respectively.

According to the regression results, fiscal decentralization had a significantly positive impact on the distortion of the industrial structure in the fiscal expenditure and revenue decentralization indicators, which indicated that fiscal decentralization had increased the distortion of the industrial structure. Therefore, fiscal decentralization, characterized by political and economic decentralization, leads to serious government intervention, investment preference, market protectionism, and redundant construction. As a result, financial resources are wasted so that they cannot meet the needs of long-term industrial development. Production factors fail to be allocated as expected, which leads to the loss of production, application, and allocation efficiency, thereby hindering the evolution of industrial structure in the expected direction.

Based on the regression results of control variables, we found that the regression coefficients of the opening-up level were significantly negative in the four models, indicating that upgrading the opening-up level alleviated industrial structure distortion. Next, the regression coefficient of the foreign investment level was negative but not significant, meaning that all regions still need to focus on establishing a suitable business environment to develop the industrial structure. Then, the regression coefficient of the financial scale was negative, and the regression coefficients of the other models, except for those of Models 2 and 4, were insignificant, indicating that the financial environment of all regions still needs to be further improved. We then found that the regression coefficient of the economic development level was negative, and the regression coefficients of the other models, except for those of Models 1 and 3, were insignificant, which meant that improving the economic development level can alleviate the distortion degree of industrial structure. However, the gap in the economic development level between different regions leads to the various developmental levels of the industrial structure in different regions. Finally, the regression coefficient of human capital was significantly negative at the 1% significance level, indicating that improving human capital could significantly promote the development of industrial structure toward equilibrium.

4.3. Indirect Effect Test of Regional Innovation

To test the indirect effect of whether fiscal decentralization influences industrial structure by influencing regional innovation, we first investigated the influence of regional innovation on the distortion of the industrial structure. To determine if regional innovation significantly affects the distortion of the industrial structure, we further explored the influence of fiscal decentralization on regional innovation. High significance would prove the indirect effect of fiscal decentralization through affecting regional innovation and then affecting the distortion of the industrial structure. First, we regressed Equation (3), following the same the estimation method as above. The results are shown in Table 3.

Table 3. Impact of regional innovation on distortion of industrial structure.

Variable	(5)		(6)	
RI	−0.0043 ***	(−2.75)	−0.0039 ***	(−3.02)
TD	−0.0265	(−0.79)	−0.0738	(−1.00)
FDI	−0.0019	(−0.26)	−0.0053	(−0.75)
PGDP	−0.0312	(−1.24)	−0.033	(−0.97)
HC	−0.1016 ***	(−3.10)	−0.0568 *	(−1.81)
Constant	1.4193 ***	(4.62)	1.1419 ***	(3.88)
Sample size	360		360	

Note: ***, and * indicate that regression coefficient is significant at the 1%, and 10% levels, respectively.

When we used the fixed-effects model for estimation, the estimated coefficient of the regional innovation variable was significantly negative at the 1% level (−0.0043); when we estimated the model using the random-effects model, the estimated coefficient of the regional innovation variable was significantly negative at the 1% level (−0.0039). This showed that regional innovation could significantly alleviate industrial structure distortions, i.e., it could drive the industrial structure to a balanced level. This result was in line with expectations because regional innovation is an endogenous force driving industrial structure adjustment and economic growth. Technology introduction or independent innovation can improve labor productivity and accelerate the balanced development of the industrial structure. Moreover, innovation activities can promote the gradual realization of a new dynamic equilibrium in the industrial structure by changing the technology diffusion process and promoting the formation of emerging leading industries [43].

Based on Table 3, we found that regional innovation could effectively alleviate the distortion of the industrial structure. We further investigated the impact of fiscal decentralization on regional innovation by regressing Equation (2) and estimating it with both fixed-effects and random-effects models. The results are shown in Table 4. According to the results in Table 4, regardless of using the fiscal expenditure decentralization index or fiscal revenue decentralization index, fiscal decentralization significantly impacted regional innovation, indicating that fiscal decentralization significantly promoted regional innovation. The result was in line with expectations. Generally, local governments have substantial financial resources, so their influence on local economic development cannot be underestimated. Fiscal decentralization can effectively give play to the information advantages of local governments and ensure policies are more in line with the needs of regional development. In addition, local governments can formulate fiscal incentive policies, such as tax incentives and R&D subsidies for enterprises, to encourage enterprises to increase R&D investment, accelerate the enterprise innovation process, and promote regional innovation, which means fiscal decentralization promotes regional innovation development by changing government expenditure allocation. In addition, the regression results of the control variables showed that the increase in regional innovation on industrial structure distortion was also more significant in regions with high level of economic development and abundant human capital.

Table 4. Impact of fiscal decentralization on regional innovation.

Variable	Fiscal Expenditure Decentralization		Fiscal Revenue Decentralization	
	(7)	**(8)**	**(9)**	**(10)**
FD	3.9412 ***	3.0542 **	1.9588 ***	1.9960 ***
	(3.24)	(2.45)	(2.74)	(3.02)
FIS	2.5017	0.9644	0.8583	0.3964
	(0.98)	(0.36)	(0.33)	(0.15)
PGDP	0.0702 **	0.1442 **	0.0117 ***	0.0504 **
	(2.54)	(2.03)	(3.22)	(1.98)
HC	1.4186 ***	1.4679 ***	1.6391 ***	1.6164 ***
	(6.84)	(7.74)	(9.25)	(9.79)
Constant	−9.2626 ***	−9.0663 ***	−9.0913 ***	−8.8996 ***
	(−5.75)	(−5.76)	(−5.78)	(−5.88)
Sample size	360	360	360	360

Note: ***, ** indicate that regression coefficient is significant at the 1%, 5% levels, respectively.

Based on the above analysis, we found that although fiscal decentralization was not conducive to alleviating the imbalance in the industrial structure, it significantly improved the level of regional innovation and weakened the adverse impact of fiscal decentralization on the distortion of the industrial structure by giving play to the indirect effects of regional innovation. According to the test results of the fixed-effects mode, we applied the Hausman test to analyze the indirect effects. From the perspective of fiscal expenditure decentralization, we initially determined that the indirect effect of fiscal expenditure decentralization in promoting regional innovation, and thus improving the distortion of the industrial structure, was −0.0169 ($\gamma_1\alpha_1$), which showed a mediating effect rather than a divergent effect. The comprehensive impact of fiscal expenditure decentralization on the distortion of the industrial structure was 0.4600. Therefore, after controlling for the mediating effect of regional innovation, the influence of fiscal expenditure decentralization on industrial structure distortion was 0.4431. The effect of fiscal revenue decentralization promoting regional innovation and improving the distortion of the industrial structure was −0.0076, and the comprehensive effect of fiscal revenue decentralization on the distortion of the industrial structure was 0.1137. After controlling for the intermediary effect of regional innovation, the effect of fiscal revenue decentralization on the distortion of the industrial structure was 0.1061.

4.4. Indirect Effect Retest of Regional Innovation

We applied the fixed-effect and random-effect models to regress Equation (4). The results are shown in Table 5. After controlling for the indirect effect of regional innovation on the industrial structure distortion, the regression coefficient of fiscal revenue decentralization on industry structure distortion was significantly positive at the 1% level. In comparison, the regression coefficient of fiscal expenditure decentralization on industrial structure distortion was significantly positive at the 5% level, further proving the existence of a regional innovation intermediary effect. The intermediary effect value of the adjusted fiscal expenditure decentralization promoting regional innovation and improving the distortion of the industrial structure was −0.0232 ($\gamma_1\varphi_2$). After controlling for the intermediary effect of regional innovation, the impact of the revised fiscal expenditure decentralization on the distortion of the industrial structure was 0.3329. The mediating effect value of adjusted fiscal revenue decentralization in promoting regional innovation and improving the distortion of the industrial structure was −0.0061 ($\gamma_1\varphi_2$). After controlling for the intermediary effect of regional innovation, the impact of the revised fiscal expenditure decentralization on the distortion of the industrial structure was 0.0816.

Table 5. Test results of indirect effects of regional innovation.

Variable	Fiscal Expenditure Decentralization		Fiscal Revenue Decentralization	
	(11)	**(12)**	**(13)**	**(14)**
FD	0.3329 *** (3.08)	0.4797 *** (3.22)	0.0816 ** (1.98)	0.0854 ** (2.01)
RI	−0.0059 *** (−2.88)	−0.0088 *** (−3.11)	−0.0031 *** (−3.41)	−0.0052 ** (−2.51)
TD	−0.0381 (−1.01)	−0.0856 *** (−2.94)	−0.3523 (−1.01)	−0.0815 *** (−3.03)
FDI	−0.0063 (−0.83)	−0.0089 (−1.16)	−0.0039 (−0.51)	−0.0068 (−0.85)
FIS	−0.2835 (−0.84)	−0.5395 * (−1.73)	−0.5157 (−1.49)	−0.7679 ** (−2.30)
PGDP	−0.0419 (−1.70)	0.015 (0.77)	0.0319 (1.30)	0.0035 (0.19)
HC	−0.1341 *** (−3.70)	−0.0998 *** (−2.99)	−0.1062 *** (−3.19)	−0.0621 ** (−1.96)
Constant	1.4966 *** (4.85)	1.2698 *** (4.27)	1.4762 *** (4.59)	1.1927 *** (3.87)
Sample size	360	360	360	360

Note: ***, **, * indicate that regression coefficient is significant at the 1%, 5%, 10% levels, respectively.

4.5. Regional Heterogeneity Analysis

We further divided the whole sample into three subsamples: the eastern, central, and western regions, and conducted the regression to investigate whether the influence of fiscal decentralization on the industrial structure had regional characteristics. We selected the fixed-effect model to estimate Equations (1)–(4), and the estimated results are shown in Tables 6 and 7.

Table 6. Regional influence of fiscal expenditure decentralization on distortion of industrial structure.

Variable	Eastern Region				Central Region				Western Region			
	DIS (15)	**RI (16)**	**DIS (17)**	**DIS (18)**	**DIS (19)**	**RI (20)**	**DIS (21)**	**DIS (22)**	**DIS (23)**	**RI (24)**	**DIS (25)**	**DIS (26)**
FD	0.202 * (1.86)	1.357 *** (3.86)		0.177 ** (−2.16)	0.457 *** (2.76)	6.751 *** (2.60)		0.464 *** (2.81)	0.420 *** (2.87)	0.668 (0.52)		0.412 *** (2.81)
RI			−0.009 ** (−1.99)	−0.004 ** (−2.12)			−0.014 * (−1.87)	−0.005 ** (−2.13)			−0.014 (−1.14)	−0.011 (−0.89)
TD	−0.017 (−1.03)		−0.023 (−1.43)	−0.019 (−1.09)	0.072 (0.71)		0.235 * (1.82)	0.081 (0.79)	0.009 (0.14)		0.077 (1.13)	0.018 (0.27)
FDI	0.013 *** (2.70)		0.010 ** (2.31)	0.012 *** (2.65)	−0.008 (−1.51)		−0.013 * (−1.95)	0.008 (−1.39)	−0.007 (−1.45)		−0.003 (−0.85)	−0.007 (−1.40)
FIS	−0.094 (−0.51)	2.508 (0.61)		−0.089 (−0.48)	2.485 *** (−5.39)	4.276 (0.87)		2.510 *** (−5.44)	−0.025 (−0.07)	6.643 *** (2.86)		0.041 (0.10)
PGDP	0.134 (1.41)	0.118 (0.80)	0.016 * (1.75)	0.136 (1.44)	0.056 ** (2.24)	0.427 (0.88)	0.087 *** (2.77)	0.056 ** (2.26)	−0.023 (−0.63)	0.377 * (1.78)	−0.058 * (−1.74)	−0.022 *** (−3.21)
HC	−0.738 *** (−4.96)	1.131 *** (5.17)	−0.078 *** (−5.08)	−0.069 *** (−4.04)	0.082 ** (−2.20)	0.879 ** (2.24)	−0.165 *** (−5.05)	−0.074 * (−1.82)	−0.104 ** (−2.48)	1.341 *** (5.30)	−0.021 (−0.60)	−0.086 * (−1.86)
Constant	0.985 *** (8.06)	−7.700 *** (−3.94)	0.976 *** (7.60)	0.960 *** (7.21)	1.009 *** (3.42)	−5.963 ** (−2.03)	2.038 *** (6.97)	0.950 *** (3.00)	1.351 *** (4.09)	−7.141 *** (−3.69)	0.931 *** (3.16)	1.250 *** (3.59)
Sample size	132	132	132	132	96	96	96	96	132	132	132	132

Note: ***, **, and * indicate that regression coefficient is significant at the 1%, 5%, and 10% levels, respectively.

Table 7. Regional influence of fiscal revenue decentralization on distortion of industrial structure.

Variable	Eastern Region				Central Region				Western Region			
	DIS (27)	**RI (28)**	**DIS (29)**	**DIS (30)**	**DIS (31)**	**RI (32)**	**DIS (33)**	**DIS (34)**	**DIS (35)**	**RI (36)**	**DIS (37)**	**DIS (38)**
FD	0.218 *** (3.26)	1.887 *** (2.63)		0.211 *** (3.04)	0.179 ** (2.21)	3.245 *** (3.05)		0.190 ** (2.29)	0.056 ** (2.15)	0.095 (0.09)		0.065 ** (2.15)
RI			−0.009 ** (−2.12)	−0.003 ** (−2.48)			−0.0149 * (−1.87)	−0.006 *** (−3.23)			−0.014 (−1.14)	−0.014 (−1.11)
TD	−0.008 (−0.49)		−0.027 (−1.43)	−0.009 (−0.54)	0.122 (1.27)		0.235 * (1.82)	0.134 (1.36)	0.077 (1.10)		0.077 (1.13)	0.087 (1.25)
FDI	0.019 *** (3.75)		0.009 ** (2.31)	0.019 *** (3.69)	−0.005 (−0.99)		−0.013 * (−1.95)	−0.005 (−0.87)	−0.003 (−0.69)		−0.003 (−0.85)	−0.003 (−0.62)
FIS	−0.003 (−0.02)	−0.081 (−0.02)		−0.007 (−0.04)	−2.989 *** (−7.45)	−2.767 (−0.43)		−3.019 *** (−7.50)	−0.172 (−0.44)	6.223 *** (2.87)		−0.081 (−0.20)
PGDP	0.015 * (1.70)	0.019 (0.11)	0.163 * (1.75)	−0.015 * (−1.69)	0.023 (1.05)	0.042 (0.10)	0.087 *** (2.77)	0.025 (1.03)	−0.067 * (−1.87)	0.321 (1.44)	−0.058 * (−1.74)	−0.066 * (−1.83)
HC	−0.079 *** (−6.72)	1.591 *** (6.85)	−0.078 *** (−5.08)	−0.074 *** (−4.57)	−0.024 * (−1.90)	1.632 *** (4.21)	−0.165 *** (−5.05)	−0.013 ** (−2.40)	−0.029 *** (−2.76)	1.458 *** (5.92)	−0.021 * (−1.91)	−0.006 *** (−3.28)
Constant	0.866 *** (6.79)	−8.006 *** (−3.73)	0.976 *** (7.60)	0.846 *** (6.20)	0.703 *** (2.73)	−9.059 *** (−2.60)	2.037 *** (6.97)	0.629 ** (2.20)	0.942 *** (2.80)	−7.685 *** (−3.61)	0.931 *** (3.16)	0.809 ** (2.28)
Sample size	132	132	132	132	96	96	96	96	132	132	132	132

Note: ***, **, and * indicate that regression coefficient is significant at the 1%, 5%, and 10% levels, respectively.

Table 6 reports the impact of fiscal expenditure decentralization on the distortion of the industrial structure. In the eastern region, the coefficient of fiscal expenditure decentralization in the industrial structure distortion was significantly positive, indicating that fiscal decentralization has aggravated the distortion. After further investigating the impact of fiscal decentralization on regional innovation, we found that its regression coefficient was significantly positive at the 1% level, indicating that fiscal decentralization promoted regional innovation. Model 17 showed that regional innovation could significantly inhibit the distortion of the industrial structure. Therefore, the comprehensive analysis showed that fiscal decentralization could promote regional innovation and reduce the distortion of the industrial structure through the indirect effect of regional innovation in the eastern region. In the central region, the influence of fiscal decentralization on the distortion of the industrial structure was significantly positive at the 1% level, indicating that fiscal decentralization was not conducive to the balanced development of the industrial structure. The impact of fiscal decentralization on regional innovation was significantly positive at the 1% level, indicating that fiscal decentralization could stimulate the improvement in the level of regional innovation.

The impact of regional innovation on the distortion of the industrial structure was significantly negative at the 10% level, indicating that regional innovation was conducive to correcting the distortion of the industrial structure. To summarize, in the central region, fiscal decentralization weakened the distortion of the industrial structure through the indirect effect of promoting regional innovation in the region. In the western region, the coefficient of fiscal expenditure decentralization in the distortion of the industrial structure was significantly positive, indicating that fiscal decentralization was not beneficial for the balanced development of the industrial structure. Although fiscal decentralization had promoted regional innovation, the regression coefficient was not significant. Furthermore, the coefficient as not significant, even though regional innovation is beneficial for the balanced development of the industrial structure. These findings showed that in the western region, fiscal decentralization had yet to effectively improve the level of regional innovation, thus blocking the indirect effect of fiscal decentralization on reducing the distortion in the industrial structure by promoting regional innovation.

Table 7 reports the impact of fiscal revenue decentralization on the distortion of the industrial structure. According to Table 7, fiscal expenditure decentralization in the eastern

and central regions contradicted the balanced development of the industrial structure. However, fiscal expenditure decentralization indirectly promoted regional innovation and weakened the distortion degree of fiscal revenue decentralization to the industrial structure. In western China, fiscal expenditure decentralization adversely affected reductions in the distortion of the industrial structure. The indirect effect of regional innovation failed to play an important role because fiscal decentralization could not effectively promote regional innovation.

4.6. Endogeneity Problem: Based on Three-Stage Least-Squares Approach

From the above, we found that fiscal decentralization affected industrial structure distortion through the indirect effect of regional innovation. However, industrial structure and regional innovation may interact with each other. This could lead to endogeneity problems. To overcome this shortcoming, we constructed a panel of joint cubic equations to explore the effects of fiscal decentralization on industrial structure distortion and the indirect effects of regional innovation. The joint cubic equation system is an important method used to investigate the existence of indirect effects between multiple variables, and it can deal with the complex relationship between multiple variables in a more systematic way. Thus, in this study, we considered two variables, regional innovation and industrial structure distortion, as endogenous variables, and we constructed the joint cubic equation system shown in Equation (7).

$$\begin{cases} RI_{it} = \kappa_0 + \kappa_1 FD_{it} + +\kappa_2 DIS + \kappa_3 FIS_{it} + \kappa_4 PGDP_{it} + \kappa_5 HC_{it} + \varepsilon_{it} \\ DIS_{it} = \lambda_0 + \lambda_1 FD_{it} + \lambda_2 RI + \lambda_3 TD_{it} + \lambda_4 FDI_{it} + \lambda_5 FIS_{it} + \lambda_6 PGDP_{it-1} + \lambda_7 HC_{it} + \varepsilon_{it} \end{cases} \quad (7)$$

In Equation (7), regional innovation and industrial structure distortions are considered as endogenous variables. In the estimation method, we chose three-stage least squares to estimate the equation, and the results are shown in Table 8. Only the regression results of the main variables are provided in Table 8 to save space. The results in Table 8 show that the regression coefficient of industrial structure distortion on regional innovation was significantly negative for both the national and subregional samples. This indicated that regional innovation was more significantly affected by industrial structure distortion, and more industrial structure distortion was not conducive to the improvement in the regional innovation level. From the regression results of fiscal decentralization on industrial structure distortion, we found a positive effect of fiscal decentralization on industrial structure distortion for the whole country, and in the eastern, central, and western regions. From the regression results of fiscal decentralization on regional innovation, we found a significant positive effect of fiscal decentralization on regional innovation in the national, eastern, and central regions; the regression results in the western region were not significant. This finding is consistent with the previous estimation results and proves the robustness of the above findings.

Table 8. Three-stage least-squares estimation considering endogeneity.

Sample	**Full Sample**		**Eastern Region**		**Central Region**		**Western Region**	
Variable	**DIS**	**RI**	**DIS**	**RI**	**DIS**	**RI**	**DIS**	**RI**
DIS		−0.202 *** (−3.01)		−0.135 *** (−3.03)		−0.157 *** (−4.03)		−0.032 ** (−4.03)
EFD	0.271 *** (3.26)	0.421 ** (2.15)	0.176 *** (3.70)	0.267 ** (2.23)	0.165 *** (3.254)	0.432 *** (3.56)	0.047 ** (2.03)	0.075 (1.57)
RI	−0.006 *** (−4.12)		−0.005 *** (−5.10)		−0.012 ** (2.213)		−0.025 (1.43)	
Constant	0.233 *** (4.18)	−1.006 *** (−3.52)	0.521 *** (3.34)	−2.132 *** (−4.63)	0.311 *** (4.36)	0.275 (1.35)	0.431 *** (5.12)	0.324 * (1.74)

Table 8. *Cont.*

Sample	Full Sample		Eastern Region		Central Region		Western Region	
Variable	**DIS**	**RI**	**DIS**	**RI**	**DIS**	**RI**	**DIS**	**RI**
DIS		−0.197 *** (−3.425)		−0.244 *** (−4.15)		−0.136 *** (−3.628)		−0.028 ** (−3.122)
IFD	0.164 *** (3.104)	0.374 ** (2.316)	0.137 *** (3.932)	0.215 ** (2.02)	0.178 *** (3.53)	0.278 *** (3.43)	0.065 ** (2.12)	0.068 (1.58)
RI	−0.011 *** (−5.132)		−0.012 *** (−4.642)		−0.009 ** (2.46)		−0.015 (1.37)	
Constant	0.321 *** (3.58)	−0.864 *** (−4.41)	0.385 *** (3.64)	−1.154 *** (−3.98)	1.043 *** (5.21)	0.432 (1.53)	0.325 ** (2.54)	0.294 * (1.83)

Note: ***, **, and * indicate that regression coefficient is significant at the 1%, 5%, and 10% levels, respectively.

5. Conclusions

We analyzed the internal logic and mechanism of how fiscal decentralization and regional innovation impact the distortion of the industrial structure by calculating the industrial structure distortion index of 31 provinces (cities) in mainland China from 2008 to 2018, except Tibet. Then, we investigated the impact of fiscal decentralization and regional innovation on the distortion of the industrial structure based on a panel model. The findings showed that both fiscal expenditure and final revenue decentralization were not conducive to the evolution of the industrial structure in the same direction, and the former had a significantly stronger impact on industrial structure distortion than the latter. The increase in the regional innovation level significantly promoted the equalization of the industrial structure, and further results showed that fiscal decentralization could significantly improve the level of industrial structure distortion by enhancing the level of regional innovation. According to the results, we found regional differences in the impact of fiscal decentralization on industrial structure distortion and the indirect effect of regional innovation. Fiscal decentralization in the eastern and central regions of China reduced the industrial structure distortion through the indirect effect of regional innovation, while the indirect effect in the western region was insignificant.

Based on the analysis, we devised three policy implications: First, an effective market and competent government should be better integrated by further improving the market system and the rule of law. By establishing a sound, well-organized, and open economic environment for competition, local governments should fully use limited financial resources and guide the rational allocation of factor resources among industries. Second, the reform of the fiscal system should be deepened, preventing resource distortions such as overinvestment, market protectionism, and cheap land supply, and guiding beneficial competitions among local governments. Promoting the rational division of labor and the free flow of resources among regions can effectively guide cross-regional industrial transfer to achieve efficient and coordinated development of the industrial structure. Third, the transfer of high-tech human resources should be guided from the eastern region to the central and western regions; the exchange and cooperation of human resources from the eastern, central, and western regions should be encouraged; the stock of innovative talent in the central and western regions should be expanded; and the exchange and sharing of innovation resources should be advocated, to produce the positive influence of regional innovation on the development of the industrial structure. Finally, local governments can increase expenditure on science and technology to stimulate regional innovation and promote regional innovation efficiency. Standardizing the management of fiscal spending and improving the efficiency of government fiscal expenditure can enhance the efficiency of financial resource allocation to correct any imbalance in the industrial structure.

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