

# The Impact of FDI on Labor Productivity in China: Evidence from Panel Data 2003-2020——A Study on Fiscal Decentralization as a moderating variable

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**Abstract.** Based on the panel data of China's 30 provinces, autonomous regions, and municipalities (hereinafter referred to as provinces) from 2003 to 2020, this paper empirically analyzes the impact of foreign direct investment (hereinafter referred to as FDI) on labor productivity by constructing a fixed-effects model, and further constructs a model to test the moderating effect of fiscal decentralization on the above two variables. The study shows that: 1) China's FDI has a positive promotion effect on labor productivity. 2) Taking 2008 as the boundary, the effect of China's FDI on labor productivity has significant stage heterogeneity. 3) Fiscal revenue decentralization and fiscal expenditure decentralization both positively regulate the relationship between FDI and labor productivity. Therefore, the Chinese government (as well as the governments of other developing economies around the world) needs to consciously introduce high-quality FDI that is suitable for the country's current development situation and to give local governments the right to select and introduce FDI that is suitable for local development to realize high-quality economic development.

**Keywords:** FDI; labor productivity; fiscal decentralization.

## 1. Introduction

With the globalization of economy, the relationship between the world's major economies is getting closer and closer, and FDI is receiving more and more attention from governments. One of the major questions facing policymakers is: does FDI have more positive than negative effects on social productivity? And through what internal mechanism does it affect the host economy? This paper attempts to answer these questions from the perspective of China. The reason is that China is a developing country with the largest economy, a massive market with potential, and a large inflow of FDI, so the study of China's problems can be a heuristic for policymakers in developing countries all over the world.

China has attracted a large amount of FDI since its reform and opening-up in 1978. The *Global Investment Trends Monitor* published by the United Nations Conference on Trade and Development (UNCTAD, *Global Investment Trends Monitor*. 2021. Geneva.) shows that in 2020, when global FDI fell by one-third, China's FDI increased instead of declining, and surpassed the United States to become the world's largest inflow of FDI, accounting for about 19% of the total amount of FDI in that year. China's attractiveness to foreign investment stems from objective factors such as low labor costs, a large and promising market, stable policy support, etc. The advantages that FDI brings to host countries, especially to developing countries, can be divided into two ways: (1) horizontal technology spillovers within an industry, i.e., technological spillovers of multinational corporations to local firms in the same industry, for example, advanced technology and management; (2) inter-industry vertical technology spillovers, i.e., FDI generates positive productivity spillovers through linkages between Multinational corporations (MNCs for short) and their local suppliers in upstream sectors. However, the disadvantages of FDI for the host country should not be ignored, such as unhealthy business competition with local companies in the industry, negative impact on the local environment, and so on.

In 2021, the Chinese government issued the *Outline of the Fourteenth Five-Year Plan and Visionary Goals for the National Economic and Social Development of the People's Republic of China for the year 2035* (China's government. *Outline of the Fourteenth Five-Year Plan and Visionary Goals for the National Economic and Social Development of the People's Republic of*

China for the year 2035. 2021. Beijing.), which indicated that it would maintain the trend of proactively attracting high-quality foreign investment, and clearly relaxed the restriction of attracting foreign investment, encouraging foreign investment in industries, such as healthcare, education, and the Internet, as well as supporting high-quality MNCs in particular in the modern service industry and high-tech industry, to entry into the Chinese market. This policy aims to utilize FDI to foster the high-quality development of China's economy, and to improve China's manufacturing and service industries, which have low value-added products and lack innovation and core technology.

Since 2000, the aging problem of Chinese society has intensified. According to data from China's Seventh National Population Census, the total working-age population aged 16-59 will decrease by more than 40 million in 2020 compared with 2010. The proportion of the working-age population is also projected to decline. The fading of China's demographic dividend makes it necessary to shift the economic growth mode from labor-intensive to innovation-driven, and to make the improvement of social productivity the top priority of economic development. Moreover, labor productivity is an important performance factor of social productivity, effectively reflecting the overall productivity and capacity of the social working population. Therefore, this paper chooses labor productivity as a measure of social productivity to study the endogenous mechanism of FDI's impact on the social economy.

The theoretical significance of this paper lies in the following: first, under the premise of data completeness and availability guarantee, the latest panel data of thirty Chinese provinces (excluding Hong Kong, Macao, Taiwan, and Tibet) from 2003 to 2020 are used to conclude the positive correlation between FDI and labor productivity; the current articles on the empirical analysis of FDI and productivity use the data before 2010, and there are fewer papers that study the direct impact of FDI on labor productivity in China. Secondly, this paper divides fiscal decentralization into two parts: fiscal expenditure decentralization and fiscal revenue decentralization, explores the effect of FDI on labor productivity based on the moderating effect of the two on FDI, and finds that there is a positive moderating effect of fiscal decentralization in the positive impact of FDI on labor productivity. Thirdly, this paper adopts three methods to suppress endogeneity: the instrumental variable method, taking into account the lag effect, and the method of replacing samples, which largely excludes the interference of endogeneity on the accuracy of research results.

The practical significance of this paper resides in the fact that, against the background of the successive emergence of the uncertainties of anti-globalization, such as the COVID-19 pandemic and China–United States trade war, the study of FDI's effect on China's labor productivity is conducive to providing reference value for the policymakers of all countries, especially developing countries, and is of great significance in actively fostering the process of globalization.

## 2. Literature Review

The law of diminishing marginal returns in economics predicts that FDI will flow more to developing countries where the capital stock is smaller and the marginal returns are higher (Dimelis and Papaioannou, 2009); while many studies show that FDI prefers to flow to host countries that can offer TNCs a greater production cost difference. Countries with the following characteristics are more attractive to FDI: high economic freedom (Dang and Nguyen, 2021), large regional markets and good infrastructure (Cheng and Kwan, 2000), low labor costs (Vijayakumar, Sridharan, and Rao, 2010), and high levels of human capital (Borensztein, Gregorio, and Lee, 1998), etc. A lot of literature has examined how FDI affects the host economy, however the existence of a positive correlation between economic growth and FDI inflows is a less controversial hypothesis at the theoretical level than at the empirical level (de Mello Jr, 1997), and although some scholars have argued that FDI does not have a significant effect on economic growth (Carkovic and Levine, 2005), there is now a consensus among most scholars that FDI has a significant contribution to economic growth at the macro level, Borensztein, Gregorio, and Lee (1998), using 20 years of data from 69 developing countries, argue that FDI serves as a crucial instrument for technology transfer and fosters economic growth primarily

through the stimulation of technological advancement, as opposed to merely augmenting the aggregate capital accumulation within the host economy, while de Mello Jr (1997) argues that FDI stimulates technological progress mainly through capital spillovers and knowledge transfer.

FDI stimulates technological progress, which is largely reflected in productivity improvements, so the impact of FDI on productivity has been widely studied, yet the results are rarely consensual. In the same way as the hypothesis that FDI promotes economic growth, FDI promotes productivity growth is well explained at the theoretical level: Hale and Xu (2016) present a typical model explaining that FDI inflows lead in general to an increase in the productivity of the home country, but also an increase in wage inequality, which is mainly due to the growth in the skill premium. Wang (2010), focusing on the advanced economy of Canada, verifies FDI's positive effect on productivity growth in the manufacturing sector, which is mainly realized through inter-industry vertical linkages. Studies based on Chinese data have basically obtained positive results: Qiu et al. (2009) collected and analyzed industry-level panel data of the manufacturing industry from 2000 to 2005 in China, and concluded that FDI generally positively affects technology spillover on total factor productivity in the manufacturing industry, and is more often brought about by backward linkages to promote technological advancement; Zhao and Zhang (2010), using panel data on Chinese industries for 2001-2006, conclude that the productivity-enhancing effects of FDI on Chinese industries arise mainly through the direct route in labor-intensive industries and more through the spillover route (indirect route) in capital-intensive industries. However, older studies based on many countries have come to the opposite conclusion: de Mello Jr (1999), who chose panel data in 15 OECD and 17 non-OECD countries from 1970 to 1990, argues that although FDI contributes to the growth of the host economy through technological spillovers at the theoretical level, the study suggests that the extent of the contribution relies on the degree of complementarities and substitutability between domestic investment and FDI, and that if this prerequisite is not sufficiently strong, it can harm the productivity of local firms.

However, there are fewer papers that study FDI on labor productivity, with older data and more methodological omissions, and the conclusions are quite different: most scholars agree that FDI positively influences labor productivity; Alam, Arshad, and Rajput (2013) analyze the data of 19 OECD member countries for 1980-2009 and conclude that FDI in the short and long run both caused an increase in labor productivity; Boghea and State (2015) used data from the European Union from 2000-2012 to conclude that FDI has a strong positive link with labor productivity, but did not point out whether there is a causal relationship between the two; Zhu and Liu (2003) used data from 11 provinces in China in 2002 as a sample and verified that FDI has an increasing and promoting effect on labor productivity, however, the study only used the cross-sectional data of some provinces and cities in 2002, which is difficult to eliminate the effect of time trend and ignored the factors that need to be controlled, such as the government support and the construction of infrastructure; Xin, Chen and Xiao (2009) used China's data from 1980-2007 to conclude that FDI has a positive impact on the growth of labor productivity in the manufacturing industry, and also found that the technological effect of FDI has a lagging characteristic, however, the study chose the time series data, and only used time as an analytical factor and did not consider other factors. In contrast, there are also a small number of scholars who believe that FDI has a negative promotional effect on labor productivity. Shang, Fan, and Zhou (2005) use the data from China's industrial sectors in 2002 to analyze that FDI has a weak hindering effect on the technological capability of industries and believe that the technological spillover effect of FDI depends largely on the ability of the host country firms to absorb technology, but their research method is basically the same as that of Zhu and Liu Jinbang's, which is also problematic to a certain extent.

Although there is less literature on the impact of fiscal decentralization as a moderating variable to study the influence of FDI on productivity, many studies have shown that fiscal decentralization under government competition promotes large-scale FDI inflows, and even argued that the growth of FDI is a result of local governments competing by acting as the main body of resource allocation. However, the results of the chain reaction induced by fiscal decentralization by promoting FDI

inflows are conflicting. Yang and Zhang (2011) examine the impact of fiscal decentralization on the technological spillover effect of FDI after China's 1994 tax-sharing reform by using China's provincial panel data from 1995-2006, and find that FDI can significantly increase the level of total factor productivity, but vicious competition brought about by fiscal decentralization hinders such a facilitating effect. Based on provincial panel data from 2005-2016, Liang (2019) concludes that fiscal decentralization's effect on technological innovation is an inverted U-shape, i.e., to a certain extent, enhancing fiscal decentralization can promote technological innovation directly and indirectly through FDI. Dong, Wei, and Xiao (2022) by using unbalanced panel data consisting of 271 cities from 1999-2020 conclude that fiscal decentralization inhibits technological innovation but brings in FDI inflows, thus reversing the inhibitory effect of fiscal decentralization on technological innovation. From an environmental perspective, Li, Qi and Li (2016), using provincial panel data from 2003-2013, conclude that FDI is negatively correlated with green total factor productivity, but the deteriorating effect of FDI on green total factor productivity diminishes as the level of fiscal decentralization increases. However, Deng and Sang (2015) argue that fiscal decentralization induces local governments to adopt competing lowered environmental standards in order to attract FDI in order to maintain their local comparative advantage.

### 3. Data and Methodology

#### 3.1. The Models

In this paper, the FDI variable is introduced into the analytical framework of labor productivity improvement, and the basic two-way fixed effects model is:

$$prd_{it} = \alpha_0 + \alpha_1 fdi_{it} + \sum_j \varphi_j X_{jit} + \lambda_i + \mu_t + \varepsilon_{it} \quad (1)$$

Where  $prd_{it}$  represents the labor productivity of province  $i$  in year  $t$ ,  $fdi_{it}$  represents the inflow of FDI into province  $i$  in year  $t$ , The  $X$  vector represents multiple provincial-level control variables that probably affect labor productivity.  $\alpha_0$  Represents the cross-intercept term,  $\alpha_1$  represents the regression coefficient of FDI variable,  $\varphi_j$  and represents the control variable regression coefficient.  $\lambda_i$  Represents province fixed effects,  $\mu_t$  represents year fixed effects,  $\varepsilon_{it}$  is the random disturbance term.

In order to test the fiscal decentralization's moderating effect on FDI to improve labor productivity, this paper further constructs the moderating effect model, adding "fiscal revenue decentralization" and "fiscal expenditure decentralization" as the moderating variables respectively on the basis of equation (1), and adding the interaction terms between these two variables and FDI as follows:

$$prd_{it} = \beta_0 + \beta_1 fdi_{it} + \beta_2 fdi_{it} \times frd_{it} + \beta_3 frd_{it} + \sum_j \phi_j X_{jit} + \lambda_i + \mu_t + \varepsilon_{it} \quad (2)$$

$$prd_{it} = \gamma_0 + \gamma_1 fdi_{it} + \gamma_2 fdi_{it} \times fed_{it} + \gamma_3 fed_{it} + \sum_j \psi_j X_{jit} + \lambda_i + \mu_t + \varepsilon_{it} \quad (3)$$

Where,  $frd_{it}$  and  $fed_{it}$  represent the degree of fiscal revenue decentralization and the degree of political expenditure decentralization of province  $i$  in year  $t$ , respectively, the other variables are defined in the same way as in equation (1). A detailed description of the selection of the variables will be provided below.

#### 3.2. Variables

##### 3.2.1. Core Variables

Explained Variable. Labor productivity is defined as the value of labor created in a unit of time by a unit of labor. Referring to the measurement methods adopted by most scholars such as Sun, Han

and Xu (2013) and Tang (2014), this paper chooses to measure labor productivity through the ratio of real GDP to employment. The real GDP used in this paper is based on the base year of 2003.

Core explanatory variable. This paper chooses the ratio of real utilized foreign capital to GDP to measure FDI inflow. Considering the existence of surplus FDI, in order to more accurately measure the foreign investment that has been put into use, the actual utilization of foreign capital is chosen. The ratio of real utilized foreign capital to GDP is chosen to eliminate the influence of the different economic scales of different provinces on the inflow of FDI.

### 3.2.2. Control Variables

Considering the multiple intervening factors on labor productivity such as policy, culture, and technology, this paper chooses five control variables related to the following five areas: government intervention (gov), infrastructure development (rpc), technology factor (rd), human capital factor (ncs), and industry structure (tip). Among them, government intervention is measured by the ratio of fiscal expenditure to GDP, infrastructure development by road area per capita, technology factor by the ratio of internal R&D expenditure to GDP, human capital factor by the number of students in school, and industrial structure by the share of tertiary industry in GDP. The reason that the above expenditures (fiscal expenditure and internal R&D expenditure) are divided by GDP is to exclude the effect of differences in the size of the economy.

### 3.2.3. Moderating Variables

Fiscal decentralization reflects the degree of local governments' fiscal freedom and is subdivided into revenue and expenditure decentralization as moderating variables respectively. Compared with some literature by Liang (2019) and others, which use very intuitively constructed indicators to measure fiscal decentralization, this paper chooses the ratio of provincial fiscal revenues and expenditures to central fiscal revenues and expenditures to measure the revenue and expenditure decentralization, respectively.

### 3.2.4. Data Resource

This paper uses panel data from 30 Chinese provinces from 2003 to 2020 for empirical analysis. Because of the large order of magnitude difference between the explained variable and the explanatory variable, and to avoid the problem of heteroskedasticity, this paper varies all the data logarithmically. The data comes from the EPS database, *China Statistical Yearbook*, and *China Statistical Yearbook of Science and Technology*. Table 1 below shows the descriptive statistics of each variable.

**Table 1.** Results of Descriptive Statistics.

| Variable Name              | Notation | Unit                     | Obs | Mean       | Std. dev   | Min    | Max     |
|----------------------------|----------|--------------------------|-----|------------|------------|--------|---------|
| FDI                        | fdi      | 1                        | 540 | 0.0257     | 0.0197     | 0.0001 | 0.1051  |
| Labor Productivity         | prd      | Billions CNY per capita  | 540 | 5.4427     | 3.6501     | 0.6650 | 24.8345 |
| Government Intervention    | gov      | 1                        | 540 | 0.2173     | 0.0978     | 0.0792 | 0.6430  |
| Infrastructure Development | rpc      | Square meters per capita | 540 | 13.7234    | 4.8425     | 4.04   | 26.78   |
| Technology Factor          | rd       | 1                        | 540 | 0.0145     | 0.0109     | 0.0017 | 0.0644  |
| Human Capital Factor       | ncs      | capita                   | 540 | 757590.872 | 492908.954 | 26124  | 2492185 |
| Industrial Structure       | tip      | %                        | 540 | 0.4363     | 0.0959     | 0.286  | 0.839   |

## 4. Empirical Results

### 4.1. Analysis of Baseline Results

Table 2 below displays the results of the baseline regression model. In column (1) of Table 2, only the estimation of the effect of the core explanatory variable, FDI, on the explained variable, labor productivity, is included; in columns (2), (3) and (4) of Table 2, the effects of government intervention,

infrastructure development, technology, human capital, and industrial structure are progressively controlled. From the results in Table 2, it can be concluded that the coefficients of the core explanatory variables of the four groups are significant. It is proved that FDI promotes labor productivity improvement, and the statistical results are in line with the logic of economics and intuitive expectations. The reason may be that FDI will bring a large amount of capital, advanced professional technology and management experience to the host country through intra-industry and inter-industry technology spillover effects, reinforce the healthy competition within the host country's industry, and also bring more opportunities to promote the development of the role of the active economy, especially in the developing countries and regions that are more backward in terms of technology and experience, the effect will be more prominent.

Comparing the uncontrolled result in column (1) with the controlled result in (4), the core explanatory variable's coefficient changes from 0.0234 to 0.0208, both significant at the 1% level. It shows that after the variables are controlled, the positive impact of FDI on labor productivity is weakened. So, to a certain extent, it also indicates that the control variables do have an impact on labor productivity through their impact on FDI. From column (4), we can get that the coefficients of government intervention and technological factors are -0.0922 and -0.0666 respectively, both significant at 5% level, indicating that government intervention and technological development are not conducive to the enhancement of labor productivity. The reason behind this may be that government intervention leads to the misallocation of resources, administrative barriers, and other drawbacks; the higher labor costs in regions with high technological development may lead to an increase in income inequality to the detriment of overall labor productivity growth; besides, there may also be a negative short-term impact due to the lagged effect of technology on labor productivity growth. The coefficients of infrastructure development and human capital factors are 0.2053 and 0.2011, respectively, both significant at 1% level, indicating that high-quality infrastructure and human capital improve labor productivity. The reason behind this may be that the good situation of infrastructure development is conducive to the efficient functioning of productivity; and high-quality human capital will be more inclined to high-value-added outputs, which will contribute to the increase in productivity. However, the coefficient of industrial structure is insignificantly negative, probably because China's industrial structure is relatively backward, and its current development status does not bring about a significant increase in labor productivity.

**Table 2.** Baseline Results.

|                 | prd(1)               | prd(2)               | prd(3)                | prd(4)                |
|-----------------|----------------------|----------------------|-----------------------|-----------------------|
| fdi             | 0.0234***<br>(2.69)  | 0.0183**<br>(2.37)   | 0.0211***<br>(2.79)   | 0.0208***<br>(2.75)   |
| gov             |                      | -0.1129**<br>(-2.40) | -0.1032**<br>(-2.23)  | -0.0922**<br>(-1.97)  |
| rpc             |                      | 0.2741***<br>(11.24) | 0.2101***<br>(7.78)   | 0.2053***<br>(7.55)   |
| rd              |                      |                      | -0.0677**<br>(-2.53)  | -0.0666**<br>(-2.49)  |
| ncs             |                      |                      | 0.2035***<br>(5.02)   | 0.2011***<br>(4.96)   |
| tip             |                      |                      |                       | -0.0963<br>(-1.47)    |
| time effect     | controlled           | controlled           | controlled            | controlled            |
| regional effect | controlled           | controlled           | controlled            | controlled            |
| constant term   | 0.7538***<br>(19.88) | -0.0747<br>(-0.67)   | -2.7916***<br>(-5.20) | -2.8178***<br>(-5.25) |
| R2              | 0.5052               | 0.4939               | 0.4423                | 0.4246                |
| Obs             | 540                  | 540                  | 540                   | 540                   |

## 4.2. Stage Heterogeneity Analysis

The global financial crisis of 2008 hit the world economy hard. In the context of globalization, the world's economies are closely related to each other, and almost no country can be safe from a black swan event like the financial crisis. China has gradually realized the importance of optimizing the structure of FDI. After the financial crisis, China issued the *Measures for the Administration of Overseas Investment* (China's government. *Measures for the Administration of Overseas Investment*. 2009. Beijing.) To standardize and optimize FDI, and formulated a series of policies on foreign exchange, finance, and insurance to encourage the inflow of high-quality FDI. Therefore, this paper chooses 2008 as the boundary to analyze the stage heterogeneity of the role of FDI on labor productivity, and the findings are depicted in Table 3 below. Column (1) of Table 3 shows the regression results for the panel data of 30 provinces from 2003 to 2007, in which the coefficient of the core variable is insignificantly negative, demonstrating that FDI does not significantly influence the improvement of labor productivity during these five years; and column (2) of Table 3 shows the regression results for the panel data for the period 2008-2020, in which the coefficient of the core variable is 0.0197, significantly positive at the 5% level. The reason behind this might be that after 2008, the Chinese government's policy on foreign investment gradually shifted from focusing on large-scale to focusing on high-quality, optimizing and regulating the structure of foreign investment, and focusing on the flow of high-quality FDI to the country's weaker industries, which makes the productivity-boosting effect of FDI more and more obvious.

**Table 3.** Stage Heterogeneity Regression Results.

|                 | 03-07(1)             | 08-20(2)              |
|-----------------|----------------------|-----------------------|
| fdi             | -0.0089<br>(-0.57)   | 0.0197**<br>(2.45)    |
| gov             | -0.1723**<br>(-2.22) | -0.0946**<br>(-2.02)  |
| rpc             | 0.1048***<br>(4.32)  | 0.0475<br>(1.10)      |
| ed              | -0.0291<br>(-0.86)   | -0.0004<br>(-0.01)    |
| ncs             | 0.0803<br>(1.29)     | 0.2843***<br>(5.56)   |
| tip             | 0.0781<br>(0.98)     | 0.1285*<br>(1.90)     |
| time effect     | controlled           | controlled            |
| regional effect | controlled           | controlled            |
| constant term   | -1.0019<br>(-1.23)   | -2.6347***<br>(-3.94) |
| R2              | 0.1357               | 0.3207                |
| Obs             | 150                  | 390                   |

## 4.3. Moderating Effects Analysis

Table 4 below shows the regression results after adding the moderating variables and the interaction terms between the moderating variables and the core explanatory variables. The results in columns (1) and (2) of Table 4 show that after using revenue decentralization as the moderating variable without and with control variables, respectively. And the results in columns (3) and (4) of Table 4 show that after using fiscal expenditure decentralization as the moderating variable without and with control variables, respectively. From columns (2) and (4), it can be concluded that the core explanatory variables' coefficients, the moderating variables, and the interaction term are all significantly positive at the level of at most 5% after controlling the variables, which indicates that both fiscal revenue and expenditure decentralization positively moderates the relationship between FDI and labor productivity. This may be because fiscal decentralization gives local governments the

power to decide on their own budgets and expenditures, and local governments will have the desire and economic ability to attract high-quality FDI to strengthen their own competitive strength. Besides, the local governments have more information advantages than the central government, and they can decide on the direction and strength of the introduction of FDI in the light of the development situation of the local area, which is also conducive to promoting the technological advancement of the industry, thus increasing labor productivity.

**Table 4.** Moderated Effects Regression Results.

|                 | prd(1)               | prd(2)                | prd(3)               | prd(4)                |
|-----------------|----------------------|-----------------------|----------------------|-----------------------|
| fdi             | 0.1283***<br>(3.42)  | 0.1346***<br>(3.79)   | 0.0798<br>(1.64)     | 0.1032**<br>(2.31)    |
| fdi*frd         | 0.0220***<br>(3.20)  | 0.0225***<br>(3.43)   |                      |                       |
| frd             | 0.2671***<br>(7.04)  | 0.1511***<br>(3.95)   |                      |                       |
| fdi*fed         |                      |                       | 0.0152<br>(1.34)     | 0.0209**<br>(2.00)    |
| fed             |                      |                       | 0.3849***<br>(7.75)  | 0.3171***<br>(5.59)   |
| gov             |                      | -0.1427***<br>(-3.01) |                      | -0.2171***<br>(-4.27) |
| rpc             |                      | 0.2027***<br>(7.56)   |                      | 0.1932***<br>(7.25)   |
| rd              |                      | -0.0460*<br>(-1.66)   |                      | -0.0593**<br>(-2.23)  |
| ncs             |                      | 0.1559***<br>(3.78)   |                      | 0.1062**<br>(2.46)    |
| tip             |                      | -0.0226<br>(-0.33)    |                      | 0.0525<br>(0.75)      |
| time effect     | controlled           | controlled            | controlled           | controlled            |
| regional effect | controlled           | controlled            | controlled           | controlled            |
| constant term   | 1.9794***<br>(11.22) | -1.4503**<br>(-2.34)  | 2.2544***<br>(11.20) | -0.4176<br>(-0.62)    |
| R2              | 0.6303               | 0.5065                | 0.5474               | 0.4944                |
| Obs             | 540                  | 540                   | 540                  | 540                   |

#### 4.4. Robustness Analysis

Based on the baseline results in Table 2, it can be preliminarily concluded that FDI in general has a facilitating effect on the modification of labor productivity, however, the robustness of the benchmark regression results remains to be tested given the possible endogeneity of the explanatory variables and disturbance terms. The paper conducts a series of robustness tests on the basis of column (4) of Table 2. Column (1) in Table 5 shows the results of using one-stage lagged FDI as an instrumental variable followed by two-stage least-square regression. Considering that the impact on labor productivity by FDI may have a lagged effect, i.e., it takes a certain amount of time for FDI inflows into the host country to affect labor productivity, column (2) shows the results of lagging the core explanatory variables by one year. Considering that there are some cities in China with faster development and unique economic status, which may have a certain impact on the overall regression results, column (3) shows the results of replacing the sample, excluding the data of the four municipalities in the original sample, namely Beijing, Shanghai, Tianjin and Chongqing. From the results in three columns of Table 5, the coefficients of the core explanatory variables are all significantly positive at 1% level, which can be inferred that after considering the influence of endogeneity, there still remains a significant positive impact on labor productivity by FDI.

Overall, after three different robustness tests, the benchmark regression results have good credibility.

**Table 5.** Robustness Test Results.

|                 | IV(1)                | Consider Lag Effect(2) | Replacement sample(3) |
|-----------------|----------------------|------------------------|-----------------------|
| FDI             | 0.0258***<br>(3.01)  | 0.0210***<br>(2.72)    | 0.0257***<br>(3.48)   |
| GOV             | -0.0910*<br>(-1.72)  | -0.0873*<br>(-1.85)    | -0.1930***<br>(-3.85) |
| RPC             | 0.1951***<br>(7.10)  | 0.1959***<br>(6.87)    | 0.0808**<br>(1.97)    |
| RD              | -0.0489*<br>(-1.70)  | -0.0454<br>(-1.61)     | -0.0849***<br>(-3.26) |
| NCS             | 0.2048***<br>(4.22)  | 0.2006***<br>(3.78)    | 0.0472<br>(1.13)      |
| TIP             | -0.0638<br>(-0.97)   | -0.0571<br>(-0.86)     | -0.1580**<br>(-2.37)  |
| time effect     | controlled           | controlled             | controlled            |
| regional effect | controlled           | controlled             | controlled            |
| constant term   | -1.5675**<br>(-2.50) | -2.5984***<br>(-4.62)  | -1.0897**<br>(-2.00)  |
| Cragg           | 878.981              |                        |                       |
| R2              | 0.9832               | 0.4088                 | 0.7021                |
| Obs             | 510                  | 510                    | 468                   |

## 5. Discussions

### 5.1. Main Conclusions

The performance of FDI on social productivity of host countries, especially in labor productivity, is remarkable. By analyzing the provincial panel data of China from 2003 to 2020, the impact mechanism of FDI on labor productivity is thoroughly studied. Results can be summarized as the following three points: (1) FDI has a significant positive impact on increasing labor productivity. (2) Taking the world financial crisis in 2008 as the dividing line, there is stage heterogeneity in the positive impact of FDI on labor productivity improvement, with the impact of FDI on labor productivity before 2008 being insignificant, and the improvement of labor productivity being significantly promoted by FDI after 2008. (3) The degree of fiscal decentralization has a significant positive moderating impact on the positive effect of FDI on improving labor productivity, and with the increase of the degree of fiscal decentralization, the promotion effect of FDI on labor productivity becomes more obvious.

### 5.2. Policy Recommendations

(1) Introduce targeted high-quality FDI according to the characteristics of different regions. This study shows that high-quality FDI has a promoting effect on the labor productivity of the host country, and the introduction of more suitable FDI on the basis of the current development situation of the host country can positively regulate the impact of FDI on labor productivity. Therefore, the central government should formulate relevant policies to encourage and support the introduction of high-quality FDI in the weaker industries of the host country, and at the same time, strengthen the information communication and technical exchange between local and local, central and local, and enhance the transparency of policies and information So that the experience of some regions in benefiting from the FDI in a certain industry can be learned by other regions, and ultimately, the economic development of the entire host country can be promoted.

(2) Optimizing fiscal decentralization policies. This study shows that increasing fiscal decentralization can amplify the positive impact of FDI on labor productivity. The central government should further give local governments more autonomy to introduce FDI according to the characteristics of local development, encourage local governments to introduce foreign capital for the

purpose of promoting local economic growth, and improve the efficiency of foreign capital utilization. Besides, the central government should also strengthen supervision to ensure the high quality of locally-introduced FDI, and prevent local governments from being caught in vicious competition for the sake of introducing FDI.

(3) Maximizing the effect of FDI on labor productivity. The impact of FDI on the technological spillover of host countries depends not only on the content of the FDI itself, but also on the technological absorption capacity of host countries' industries. Therefore, it is necessary to strengthen the links between local enterprises and MNCs, especially the technical level of exchanges, and consciously absorb the advanced management experience and high technology introduced by MNCs, and further transform them into productivity. Moreover, countries with high-quality productivity are inclined to attract better-quality FDI, leading to a multinational win-win situation and a virtuous circle.

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