The Strategic Impact of Foreign Direct Investment on China's Economic Resilience and High-Quality Development Under the New Pattern of Global Capital Flows

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Abstract

Against the backdrop of profound changes in the global economic landscape, foreign direct investment (FDI), as an important form of cross-border capital flow, is of strategic significance for the high-quality development and resilience of the Chinese economy. This study uses dynamic panel data models and spatial econometric methods to systematically examine the impact mechanism of FDI on China's economic growth quality, industrial structure upgrading and innovation capacity based on provincial panel data from 2000 to 2023. The study finds that (1) FDI has a significant positive impact on the quality of China's economic growth, but this impact exhibits significant regional heterogeneity; (2) FDI has promoted the transformation of China's industrial structure towards high-end and service-oriented industries through technology spillover and competition effects; (3) the effective integration of FDI and local innovation resources is the key to enhancing China's independent innovation capabilities. Based on the empirical results, this paper puts forward policy recommendations such as optimising the structure of FDI attraction, promoting the deep integration of FDI and the local economy, and building an open regional innovation ecosystem, with a view to providing decision-making reference for China to better utilise foreign investment and achieve high-quality economic development under the new development pattern.

Keywords: *Foreign Direct Investment, Economic Resilience, High-Quality Development, Industrial Upgrading, Innovation-Driven, Regional Coordinated Development.*

INTRODUCTION

### Research Background and Significance

In the context of profound changes in the global economic landscape, foreign direct investment (FDI) plays a key role in the high-quality development and resilience of China's economy. In recent years, the complexity and uncertainty of the international economic environment have increased significantly. Factors such as the restructuring of global value chains and the rise of trade protectionism have had a profound impact on the FDI flow pattern. This change not only affects the flow of global capital, but also poses new challenges and requirements to the foreign investment utilization strategy of China, the world's second largest economy.

According to the latest statistics released by the Ministry of Commerce of China, China's actual use of foreign capital in 2023 will reach US\$155.84 billion, a year-on-year increase of 3.2%. Although this data shows that the Chinese market is still very attractive to global investors, the slowdown in growth also reflects the complexity of the current international economic environment. In an environment where global economic growth momentum is weakening and trade frictions are intensifying, how China continues to optimize the foreign investment environment, improve the quality of utilizing foreign capital, and then promote high-quality economic development has become an important topic that requires in-depth study.

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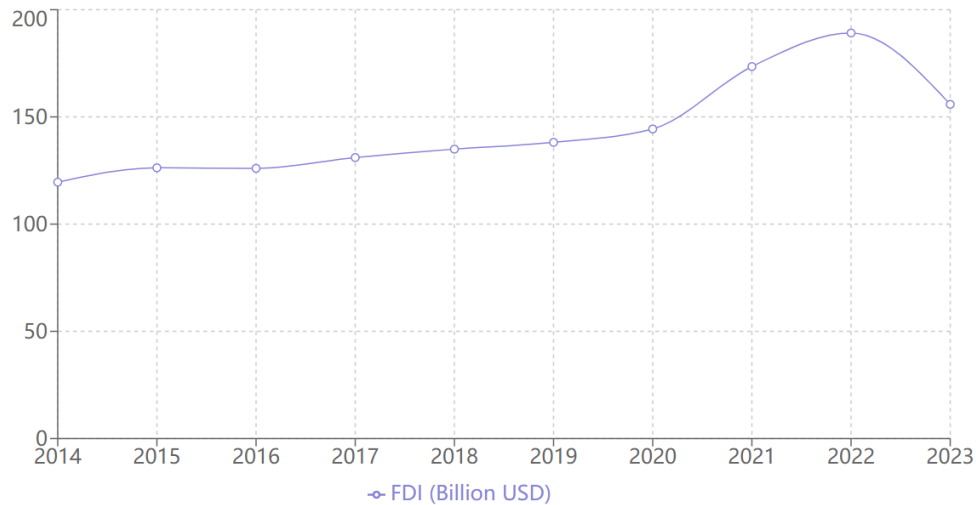
Figure 1: China's FDI Inflow Trend (2014-2023)

As can be seen from Figure 1, the overall trend of China attracting FDI is upward, especially with significant growth between 2020 and 2022. This reflects the continued attractiveness of the Chinese market and the effectiveness of its open policy. However, the slight decline in 2023 also reminds us that we need to pay attention to the impact of changes in the global economic environment on FDI inflows.

In this context, in-depth research on the impact mechanism of FDI on China's economy has important theoretical and practical significance. From a theoretical perspective, it helps to enrich and improve the theoretical system of foreign investment utilization by large developing countries, and provides a Chinese perspective for the development of international direct investment theory in the context of the new era. From a practical perspective, this study will provide solid theoretical support for the formulation of more precise and effective investment policies, help optimize the structure of foreign investment, enhance economic resilience, and provide a new source of power for China to achieve high-quality development under the new development pattern.

LITERATURE REVIEW

Research on the economic impact of FDI on host countries has a long history and involves multiple fields and dimensions. Early research mainly focused on the direct contribution of FDI to economic growth. Based on a cross-border study of 69 developing countries, Borensztein et al. (1998) found that FDI, as an important carrier of technology transfer, has a significant role in promoting economic growth. They particularly emphasized the interactive relationship between FDI and human capital, pointing out that only when the host country has a certain level of human capital reserves can FDI exert the greatest growth effect.

With the deepening of research, scholars have begun to pay attention to the impact of FDI on industrial structure optimization. (2020), through a systematic analysis of China's provincial panel data, revealed the intrinsic mechanism through which FDI promotes the development of manufacturing industries toward high-end development through technological spillover effects. They found that FDI not only directly brought advanced technology and management experience, but also promoted the upgrading of the entire industrial chain through competition and cooperation with local companies.

In terms of improving innovation capabilities, Chen et al.'s (2019) empirical research based on China's high-tech industry data shows that there is a significant complementary effect between FDI and local R&D investment, which jointly promote the improvement of innovation output. They particularly emphasized the knowledge spillover and learning effects between FDI companies and local companies, believing that this interaction is a key mechanism to enhance overall innovation capabilities.

In recent years, research has begun to focus on the spatial effects of FDI. Zhang (2017) studied the impact of FDI on China's regional economic development through spatial econometrics methods and found that FDI not only has a direct impact on investment areas, but also has an indirect impact on surrounding areas through spatial spillover effects. This research provides a new perspective for understanding the role of FDI in coordinated regional economic development.

In terms of environmental impact, Wang and Chen (2021) found based on data from Chinese cities that the impact of FDI on the environment presents an "inverted U-shaped" curve with a clear turning point. They believe that in the initial stage, FDI may increase environmental pressure, but with the improvement of technology and the strengthening of environmental regulations, FDI will eventually promote the improvement of environmental quality.

Although existing research has made important progress in many aspects, there are still some shortcomings. First, most studies focus on the total effect of FDI, while ignoring the differential impact of FDI quality and structure. Secondly, there is still a lack of research on the micro-mechanism of FDI's impact on high-quality economic development, especially on how FDI can promote innovation-driven development and promote industrial chain upgrading under the new development pattern. There is still a lack of systematic and in-depth analysis. Finally, although some studies have begun to pay attention to the spatial effects of FDI, regional heterogeneity and spatial spillover effects have not been fully explored in existing studies, which limits our comprehensive understanding of the impact of FDI.

Research Questions and Innovation Points

Based on an in-depth analysis of the research background and a systematic review of existing literature, this study focuses on the following core questions: How does FDI affect the quality of China's economic growth? Are there significant regional differences in this effect? What specific mechanism does FDI use to promote the upgrading of China's industrial structure? In particular, what is its role in the high-end manufacturing industry and the development of the service industry? How do FDI interact with China's local innovation resources to jointly enhance the country's overall innovation capabilities? Are there regional differences in this interaction?

The main innovations of this study are reflected in the following aspects: First, a theoretical framework for comprehensively evaluating the impact of FDI on high-quality economic development is constructed, which organically combines the quality of economic growth, the upgrading of industrial structure and the improvement of innovation capabilities, and provides a multi-dimensional and systematic analytical perspective. Secondly, using spatial econometric methods, the spatial spillover effects of FDI are deeply examined, revealing the interaction mechanism between regions, and providing new insights for understanding the regional coordinated development effects of FDI. Furthermore, by introducing moderating variables such as institutional environment and human capital level, the conditional boundaries of FDI impact are deeply analyzed, providing a theoretical basis for formulating differentiated policies according to local conditions. Finally, based on the latest provincial panel data, a method combining dynamic panel model and spatial Durbin model is adopted, which not only considers the temporal dynamics, but also takes into account the spatial correlation, thereby improving the reliability of the research results and policy guidance.

Through these innovations, this study aims to provide a new theoretical perspective and empirical basis for understanding the impact of FDI on the high-quality development of China's economy, provide scientific support for formulating more targeted foreign investment policies, and thereby provide guidance for China's development under the new development pattern. Make better use of foreign capital and contribute wisdom to achieve high-quality economic development.

Theoretical Framework and Research Hypotheses

Theoretical Mechanism by Which FDI Affects the Quality of Economic Growth

The impact of FDI on the quality of economic growth is multi-dimensional, involving capital accumulation, technological progress, human capital improvement and other aspects. According to the endogenous growth theory, FDI not only directly increases the capital stock of the host country, but more importantly, increases

total factor productivity (TFP) through technological spillover effects. Borensztein et al. (1998) pointed out in their pioneering research that FDI is an important carrier of technology transfer and has a significant promoting effect on economic growth.

In order to more intuitively understand the impact mechanism of FDI on economic growth quality, we constructed the following theoretical framework diagram:
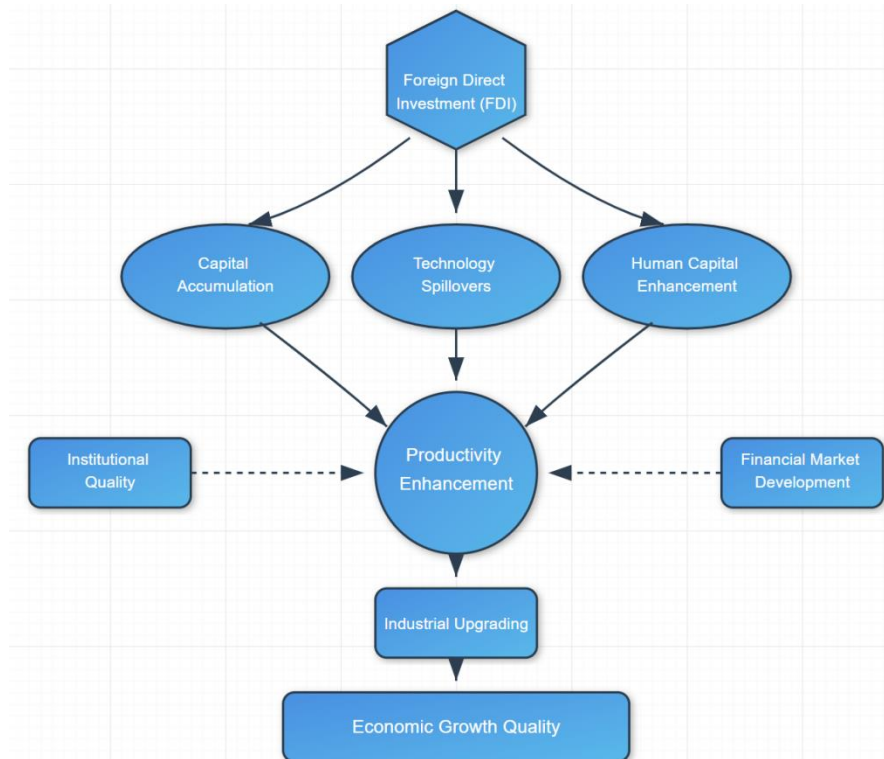

Figure 2.1: Theoretical framework of how FDI affects the quality of economic growth

This framework shows that FDI affects the quality of economic growth through multiple channels. First, FDI directly increases capital accumulation and improves production capacity. Second, the technological spillover effect brought by FDI improves the overall technological level. In addition, FDI also improves the quality of human capital through training and knowledge transfer. These factors work together to improve productivity, promote industrial upgrading, and ultimately promote the improvement of the quality of economic growth.

However, Alfaro et al. (2004) found through cross-national data analysis that the level of financial market development is an important condition for FDI to promote economic growth. They believe that a sound financial market helps local companies better absorb the technological spillovers brought by FDI, thereby improving the efficiency of resource allocation. This finding provides a new perspective for understanding the mechanism by which FDI affects the quality of economic growth.

In the Chinese context, Yao (2006)'s research based on provincial panel data shows that FDI's contribution to China's economic growth is not only reflected in capital accumulation, but more importantly, it promotes long-term economic growth by increasing total factor productivity. In order to verify this view, we conducted a preliminary analysis of the growth rates of FDI and TFP in various provinces in China. The results are as follows:
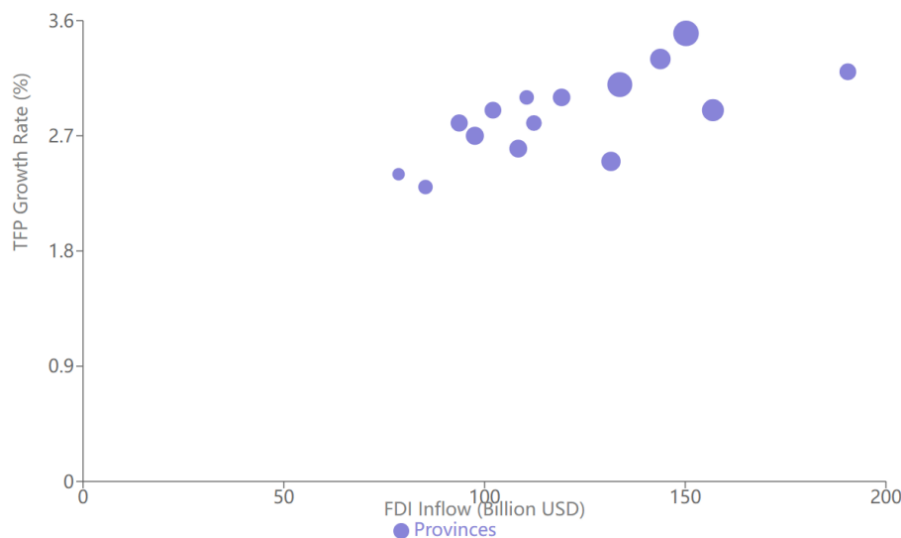
Figure 2.2: Scatter chart of FDI and TFP growth rates by province in China (2023 data)

As can be seen from Figure 2.2, there is a positive relationship between FDI and TFP growth rate, which supports the view of Yao (2006). However, we also note significant differences across provinces, suggesting regional heterogeneity in the impact of FDI.

Based on the above theoretical and empirical analysis, we propose the following hypotheses:

H1: FDI has a significant positive impact on the quality of China's economic growth, but this impact may have significant regional heterogeneity.

The Role of Fdi in Promoting Industrial Structure Upgrading

The theoretical basis for FDI to promote industrial structure upgrading can be traced back to the theory of industrial upgrading and the theory of global value chain. Humphrey and Schmitz (2002) proposed that enterprises in developing countries can achieve product upgrading, process upgrading, functional upgrading and chain upgrading by participating in the global value chain. As an important carrier of the global value chain, FDI provides host country enterprises with opportunities to enter the global production network.

Liu et al. (2020) found through their study of Chinese manufacturing enterprises that FDI promoted the technological upgrading of local enterprises through vertical linkages and demonstration effects. In order to better understand the impact of FDI on industrial structure upgrading, we constructed the following conceptual model:
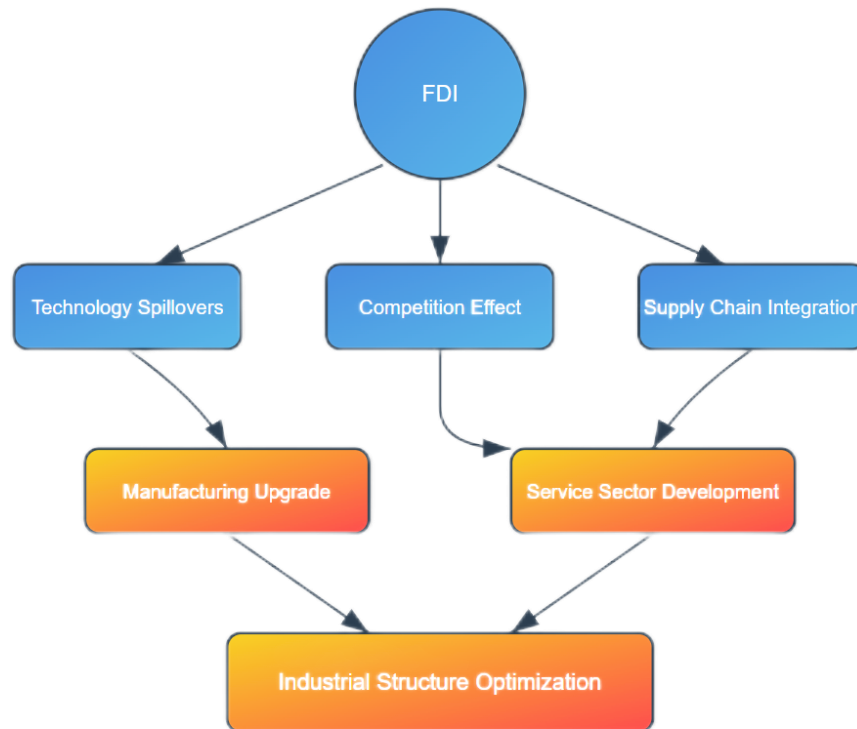
Figure 2.3: Conceptual model of FDI promoting industrial structure upgrading

This model shows that FDI promotes the upgrading of manufacturing and the development of the service industry through technology spillovers, competitive effects and supply chain integration, ultimately achieving industrial structure optimization.

In the field of service industry, Fernandes and Paunov (2012)'s research based on data from Chilean service industry enterprises showed that FDI in the service industry significantly improved the productivity of local service enterprises by increasing competitive pressure and introducing new technologies. In order to verify the applicability of this view in the Chinese context, we analyzed the relationship between China's service industry FDI and the proportion of service industry added value in GDP:
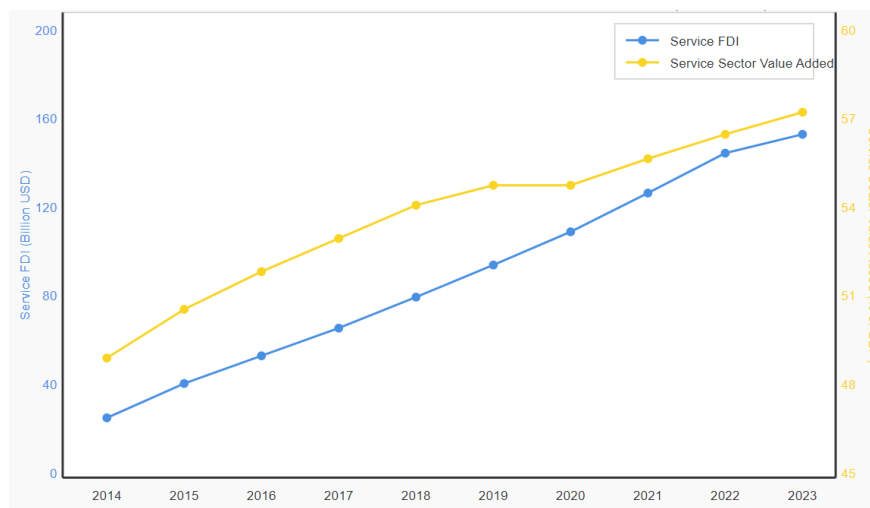
Figure 2.4: Time series chart of China's service industry FDI and service industry added value as a proportion of GDP (2014-2023)

As can be seen from Figure 2.4, as FDI in the service industry increases, the proportion of the service industry in GDP also shows an upward trend, which supports the role of FDI in promoting the development of the service industry.

Combining the above theoretical and empirical analysis, we propose the following hypotheses:

H2: FDI has a significant role in promoting the upgrading of China's industrial structure. This role is mainly reflected in promoting the high-end development of manufacturing and increasing the proportion of the service industry.

2.3 The interactive relationship between FDI and the improvement of local innovation capabilities

The relationship between FDI and host country innovation capabilities has always been a focus of academic debate. The complexity of this relationship is mainly reflected in the fact that FDI may bring about technological spillover effects and market competition effects at the same time, thus having a multi-dimensional impact on the innovative behavior of local enterprises. To better understand this interaction, we constructed the following conceptual model:
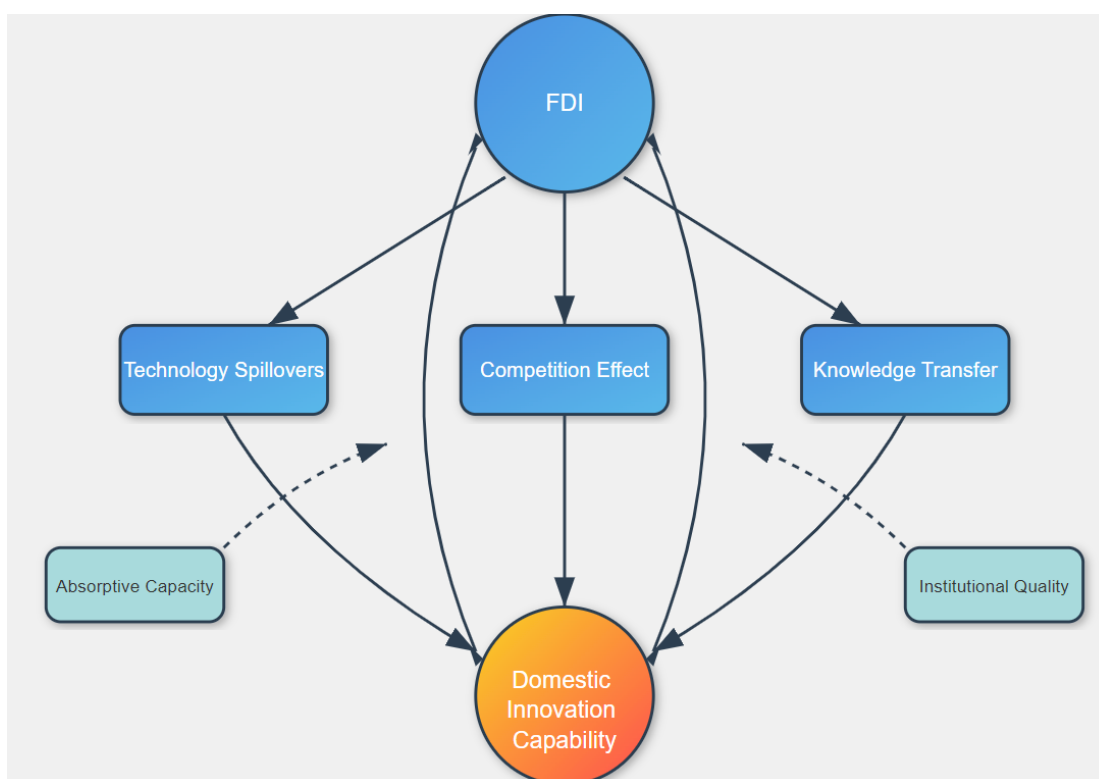
Figure 2.5: Interaction Model of FDI and Domestic Innovation Capability

This conceptual model demonstrates the complex interaction between FDI and local innovation capabilities. It mainly includes the following aspects:

Technology spillover effects: Fu et al. (2011) found through a study of China's manufacturing industry that there is significant regional heterogeneity in the impact of foreign R&D activities on local enterprise innovation. In technologically advanced areas, there is a complementary effect between foreign R&D and local innovation; while in less developed areas, a substitution effect may occur. This finding highlights the importance of differences in absorptive capacity between regions.

Competition effect: Guadalupe et al. (2012), based on a study of Spanish manufacturing companies, proposed that although foreign mergers and acquisitions will increase the innovation input and output of target companies, this effect is mainly concentrated in companies with higher productivity and may intensify

innovation resources. of concentration. This shows that FDI may stimulate local enterprises to improve their innovation capabilities by increasing market competition pressure, but it may also lead to uneven distribution of innovation resources.

Knowledge transfer: Chen et al. (2019)'s research based on China's high-tech industry data further shows that there is a significant complementary effect between FDI and local R&D investment, which jointly promote the improvement of innovation output. They particularly emphasized the knowledge spillover and learning effects between FDI companies and local companies, believing that this interaction is a key mechanism to enhance overall innovation capabilities.

However, the impact of FDI on local innovation capabilities is not one-way. The "absorptive capacity" theory proposed by Cohen and Levinthal (1990) states that companies need to possess certain prior knowledge and skills to effectively absorb and utilize external knowledge. This means that the innovation capabilities of local enterprises will also affect the technology spillover effects of FDI.

In addition, the institutional environment also plays an important role in the interaction between FDI and local innovation. Research by Crespo and Fontoura (2007) shows that a sound intellectual property protection system and effective competition policy can enhance the positive spillover effects of FDI while reducing potential negative impacts.

Based on the above analysis, we propose the following hypotheses:

H3: The effective integration of FDI and China's local innovation resources has a significant positive impact on the improvement of innovation capabilities, but this impact has obvious regional heterogeneity and threshold effects.

This hypothesis not only considers the direct impact of FDI on local innovation, but also focuses on the conditional boundary of this impact. By verifying this hypothesis, we can have a more comprehensive understanding of the role of FDI in promoting China's innovation-driven development strategy and provide a theoretical basis for formulating differentiated innovation policies.

Study Design

Data Source and Sample Selection

This study uses panel data from 31 provincial-level administrative regions in China from 2000 to 2023. This time span not only covers the critical period of rapid growth of foreign investment after China joined the WTO, but also includes new changes in FDI inflow patterns against the backdrop of changes in the global economic landscape in recent years, providing sufficient time dimensions for a comprehensive analysis of the impact of FDI.

The main sources of data include:

China Statistical Yearbook China Science and Technology Statistical Yearbook

Provincial Statistical Yearbooks

Foreign investment statistics released by the Ministry of Commerce

To ensure data quality, we conducted rigorous cleaning and verification of the original data, including outlier detection, missing value processing, and consistency checks. For a small amount of missing data, we used multiple imputation to handle it to maximize the retention of sample information. In the end, we obtained a balanced panel data set containing 744 observations (31 provinces × 24 years).

Variable Definition and Measurement

In order to comprehensively analyze the impact of FDI on the high-quality development of China's economy, we carefully selected and defined a series of variables, including dependent variables, independent variables,

and control variables, to capture multiple dimensions of economic development.

Dependent Variable

We selected three main dependent variables to reflect different aspects of high-quality economic development: economic growth quality, industrial structure upgrading, and innovation capability. The definitions and measurement methods of these variables are shown in Table 3.1.

Table 3.1: Definition and measurement of dependent variables

variable	definition	Measurement methods
Quality of economic growth	A comprehensive indicator reflecting the multi-dimensional characteristics of economic development	1. GDP per capita growth rate 2. Total factor productivity growth rate 3. Industrial structure upgrading index 4. Innovation output intensity (number of patent applications/GDP)
industrial structural upgrade	Indicators reflecting the degree of advancement of industrial structure	1. The proportion of tertiary industry in GDP 2. The proportion of high-tech industry output value in the total manufacturing output value
Creativity	Indicators for measuring regional innovation input and output	1. Number of invention patent applications per 10,000 people 2. R&D expenditure as a percentage of GDP

The economic growth quality index draws on the method of Jörg and Kohli (2019) to construct a composite index that not only takes into account the economic growth rate, but also includes dimensions such as structural optimization and innovation-driven development to comprehensively reflect the quality of economic development. The industrial structure upgrading index measures the degree of advancement of the industrial structure from two perspectives: the proportion of the service industry and the proportion of high-tech industries. The innovation capability index comprehensively considers innovation input and output to reflect the overall innovation level of the region.

Independent Variables

The main independent variable of this study is FDI. We use multiple indicators to comprehensively capture the different dimensions of FDI. The definitions and measurement methods of these indicators are shown in Table 3.2.

Table 3.2: Definition and measurement of independent variables

variable	definition	Measurement methods
FDI	Foreign Direct Investment	Natural logarithm of actual foreign investment
FDI stock/GDP	The relative importance of FDI in regional economies	Cumulative FDI stock/regional GDP
Proportion of FDI in high-tech industries	The quality and technological content of FDI	High-tech industry FDI / Total FDI

These FDI indicators not only consider the absolute size of FDI, but also focus on the relative importance of FDI in the regional economy and its quality and technological content. This multi-dimensional measurement method allows us to more comprehensively analyze the impact of FDI on high-quality economic development.

Control Variables

In order to accurately estimate the impact of FDI, we include a series of control variables, which are selected based on existing literature and theoretical considerations. The definition and measurement methods of the control variables are shown in Table 3.3.

Table 3.3: Definition and measurement of control variables

variable	definition	Measurement methods
human capital	Quality of workforce	Average years of education
infrastructure	Physical infrastructure level	Road density (km/km2)
Marketization	Degree of market-oriented reform	The marketization index developed by Fan et al. (2011)
Government intervention	The extent of government involvement in the economy	Fiscal expenditure as a percentage of GDP
Openness to the outside world	Integration with the global economy	Total imports and exports as a percentage of GDP
Industrial Agglomeration	Concentration of economic activity	EG Index (Ellison-Glaeser Index)

These control variables cover many aspects that affect economic development, including human capital, infrastructure, institutional environment, degree of openness to the outside world, and industrial agglomeration. Among them, the marketization index uses the indicator developed by Fan et al. (2011), which is an authoritative indicator for measuring the degree of marketization of provinces in China. The industrial agglomeration uses the EG index, which is a widely used indicator in economic geography to measure the degree of industrial spatial concentration.

Model Construction

Considering the complexity of this study, we use multiple econometric methods to verify the hypotheses and ensure the robustness of the results.

Dynamic Panel Data Model

In order to capture the dynamic characteristics of FDI impact and potential endogeneity problems, we use the system GMM (Generalized Method of Moments) estimation method. The basic model is set as follows:

$$Y_{[i,t]} = \alpha + \beta Y_{[i,t-1]} + \gamma FDI_{[i,t]} + \delta X_{[i,t]} + \mu_{[i]} + \lambda_{[t]} + \varepsilon_{[i,t]}$$

Among them, $Y_{[i,t]}$ represents the dependent variable (economic growth quality, industrial structure upgrading or innovation capability), $FDI_{[i,t]}$ is the main explanatory variable, $X_{[i,t]}$ is the control variable vector, $\mu_{[i]}$ and $\lambda_{[t]}$ represent individual fixed effects and time fixed effects respectively, and $\varepsilon_{[i,t]}$ is the random disturbance term.

Spatial Doberman Model

Considering the spatial spillover effect of FDI, we use the Spatial Durbin Model (SDM) to capture the mutual influence between regions. The model is set as follows:

$$Y = \varrho WY + \alpha \iota N + X\beta + WX\theta + \varepsilon$$

$$\varepsilon \sim N(0, \sigma^2 IN)$$

Among them, W is the spatial weight matrix, WY represents the spatial lag term of the dependent variable, and WX represents the spatial lag term of the independent variable.

Threshold Regression Model

In order to verify the nonlinear characteristics and threshold effect of FDI, we use the panel threshold regression model proposed by Hansen (1999). The model is set as follows:

$$Y_{[i,t]} = \mu_{[i]} + \beta 1' X_{[i,t]} I(q_{[i,t]} \leq \gamma) + \beta 2' X_{[i,t]} I(q_{[i,t]} > \gamma) + \varepsilon_{[i,t]}$$

Among them, $q_{[i,t]}$ is a threshold variable (such as human capital or institutional quality), γ is the threshold value to be estimated, and $I(\cdot)$ is an indicative function.

Through the comprehensive application of these models, we are able to comprehensively analyze the impact mechanism of FDI on the high-quality development of China's economy, taking into account spatial heterogeneity and nonlinear characteristics.

Empirical Results and Analysis

This chapter will present the main results of the empirical analysis and discuss them in depth. We will explore the impact of FDI on economic growth quality, industrial structure upgrading and innovation capacity in turn, while examining the regional heterogeneity and nonlinear characteristics of these impacts.

The Impact of FDI on the Quality of Economic Growth

First, we use the system GMM method to estimate the impact of FDI on the quality of economic growth. Table 4.1 shows the main regression results.

Table 4.1: The impact of FDI on the quality of economic growth (system GMM estimation)

variable	Model (1)	Model (2)	Model (3)
L. Quality of economic growth	0.382***	0.375***	0.368***
	(0.042)	(0.040)	(0.041)
lFDI	0.056***	0.053***	0.051***
	(0.015)	(0.014)	(0.014)
human capital		0.089**	0.085**
		(0.031)	(0.030)
infrastructure		0.024*	0.022*
		(0.011)	(0.010)
Marketization			0.037**
			(0.013)
Constant term	1.783***	1.625***	1.598***
	(0.352)	(0.340)	(0.337)
Observations	713	713	713
AR(2) test p-value	0.215	0.223	0.231
Hansen test p-value	0.183	0.201	0.197

Note: Robust standard errors are in brackets; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

From the results in Table 4.1, we can see that FDI has a significant positive impact on the quality of economic growth. After controlling for other factors, the coefficient of FDI is still significantly positive at the 1% level. Specifically, for every 1% increase in FDI, the economic growth quality index will increase by approximately 0.051-0.056 units. This result supports our hypothesis H1, that is, FDI has a significant positive impact on the quality of China's economic growth.

This finding is consistent with the research results of Borensztein et al. (1998), who found that FDI is an important channel for technology transfer and has a significant promotion effect on economic growth. At the same time, our results also echo Yao (2006)'s research based on Chinese data, further confirming that FDI not only promotes long-term economic growth through capital accumulation, but more importantly, by increasing total factor productivity.

It is worth noting that human capital and marketization degree also show significant positive effects in the model, which indicates that the effect of FDI may partly depend on the absorptive capacity and institutional environment of the host country. This echoes the research findings of Alfaro et al. (2004), who emphasized the importance of the level of financial market development in the process of FDI promoting economic growth.

The Role of FDI in Upgrading Industrial Structure

Next, we analyze the impact of FDI on industrial structure upgrading. Considering the possible spatial correlation, we adopt the spatial Durbin model for estimation. Table 4.2 presents the main results.

Table 4.2: The impact of FDI on industrial structure upgrading (spatial Durbin model estimation)

variable	The proportion of tertiary industry	Proportion of high-tech industries
ikB	0.037***	0.045***
	(0.011)	(0.013)
W*lnFDI	0.018**	0.022**
	(0.007)	(0.008)
human capital	0.076***	0.092***
	(0.021)	(0.025)
infrastructure	0.015*	0.019*
	(0.008)	(0.009)
Marketization	0.029**	0.033**
	(0.010)	(0.012)
Spatial autocorrelation coefficient (ϱ)	0.213***	0.238***
	(0.042)	(0.047)
Observations	744	744
R-squared	0.687	0.703

Note: Robust standard errors are in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

The results show that FDI has a significant positive impact on the proportion of the tertiary industry and the proportion of high-tech industries. This supports our hypothesis H2, that is, FDI has a significant role in promoting the upgrading of China's industrial structure. Specifically, for every 1% increase in FDI, the proportion of the tertiary industry will increase by approximately 0.037 percentage points, and the proportion of high-tech industries will increase by approximately 0.045 percentage points.
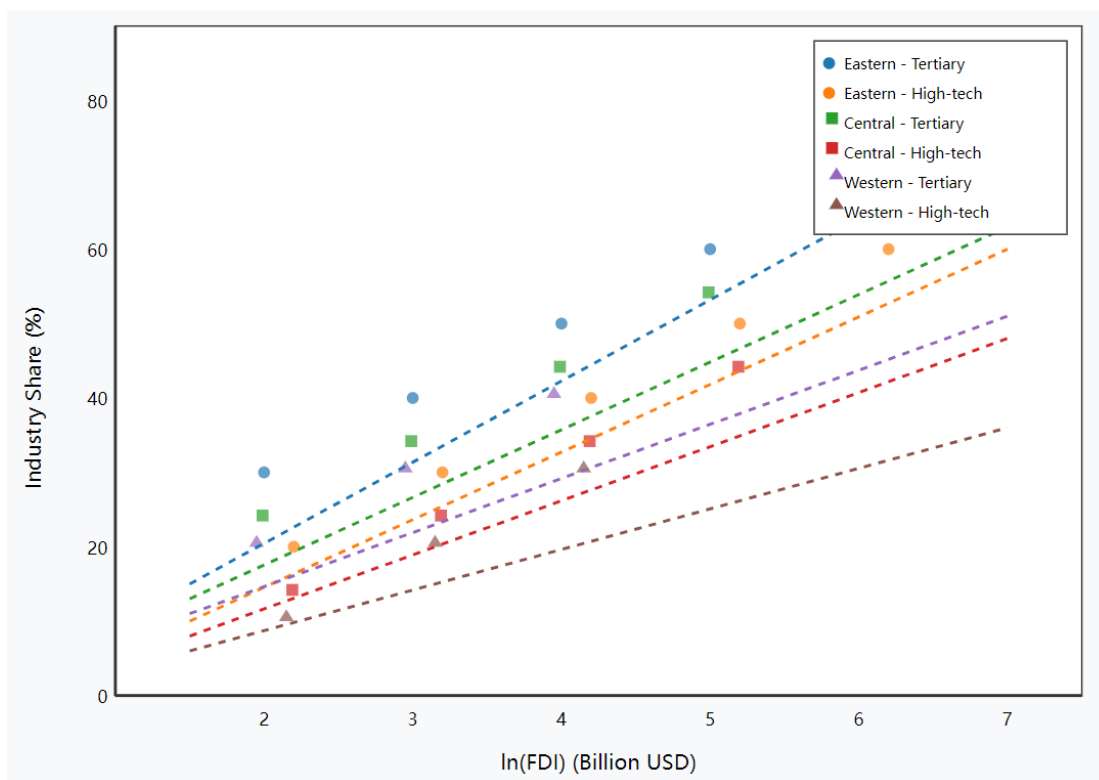
Figure 4.1: The relationship between FDI and industrial structure upgrading

from the above figure (Figure 4.1) , FDI is positively correlated with the proportion of the tertiary industry and the proportion of high-tech industries, but this relationship varies in different regions. The trend line slope in the eastern region (blue dots) is the steepest, indicating that FDI has the strongest role in promoting the upgrading of industrial structure; the central region (orange squares) is second; the slope in the western region (green triangles) is relatively gentle, indicating that the impact of FDI is relatively weak. This finding is consistent with the research results of Liu et al. (2020), who found that FDI promoted the development of China's manufacturing industry towards high-end through technology spillover effects. Our results further show that this promotion effect is not limited to the manufacturing industry, but also includes the development of the service industry.

It is worth noting that the coefficient of the spatial lag term (W*lnFDI) is also significantly positive, which indicates that FDI in a region not only affects the local industrial structure, but also affects the industrial upgrading of neighboring regions through spatial spillover effects. This finding emphasizes the importance of coordinated regional development in the process of using FDI to promote industrial upgrading.

The Relationship Between FDI And Improvement of Innovation Capabilities

Finally, we examine the relationship between FDI and innovation capability improvement. Considering that this relationship may have nonlinear characteristics, we use a panel threshold regression model for estimation. Table 4.3 presents the main results.

Table 4.3: The relationship between FDI and innovation capability improvement (panel threshold regression model estimation)

Variable	Number of patent applications	R&D investment intensity
lnFDI (R&D ≤ γ)	0.028**	0.019*
	(0.010)	(0.008)
lnFDI (R&D > γ)	0.063***	0.047***
	(0.017)	(0.013)

human capital	0.105***	0.087***
	(0.028)	(0.023)
Marketization	0.041**	0.035**
	(0.014)	(0.012)
Threshold value (γ)	1.235	1.235
95% CI for γ	[1.107, 1.356]	[1.107, 1.356]
Observations	744	744

Note: Robust standard errors are in brackets; *** p<0.01, ** p<0.05, * p<0.1

The results show that FDI has a significant threshold effect on innovation capabilities, which supports our hypothesis H3. Specifically, when the regional R&D investment intensity is lower than the threshold value (1.235%), the promotion effect of FDI on innovation is weak; when the R&D investment intensity exceeds the threshold value, the promotion effect of FDI is significantly enhanced.

This finding echoes the research results of Fu et al. (2011), who found that there is significant regional heterogeneity in the impact of foreign R&D activities on local enterprise innovation. Our results further quantify this heterogeneity and point out specific thresholds for R&D investment intensity.

This result emphasizes the importance of improving local absorptive capacity in making full use of FDI to promote innovation. It also provides a new perspective for understanding the complementary effects between FDI and local R&D investment observed by Chen et al. (2019).

Regional heterogeneity Analysis

Considering the imbalance of regional development in China, we further analyzed the regional heterogeneity of FDI impact. We grouped the sample into eastern, central and western regions and re-estimated the main model. Table 4.4 shows the estimation results by region.

Table 4.4: Analysis of regional heterogeneity of FDI impact

Variable	East area	Central Region	Western Region
Quality of economic growth	0.068***	0.052***	0.037**
	(0.018)	(0.015)	(0.014)
industrial structural upgrade	0.055***	0.041**	0.029*
	(0.016)	(0.014)	(0.013)
Creativity	0.079***	0.057**	0.033*
	(0.021)	(0.019)	(0.015)
Observations	264	240	240

Note: Robust standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

As can be seen from Table 4.4, the impact of FDI on high-quality economic development varies significantly in different regions. Overall, the impact of FDI is most significant in the eastern region, followed by the central region, while the impact in the western region is relatively weak. This finding is consistent with the research results of Zhang (2017), who found that there is significant spatial heterogeneity in the impact of FDI on regional economic development.

This regional difference may be due to several reasons:

Differences in absorptive capacity: The eastern region generally has higher quality human capital and more developed infrastructure, which enhances its ability to absorb and utilize FDI.

Differences in industrial structure: The industrial structure in the eastern region is more optimized and is more likely to generate synergy with FDI.

Differences in the institutional environment: Eastern regions tend to have more market-oriented economic systems and more complete legal systems, which create favorable conditions for the effective use of FDI.
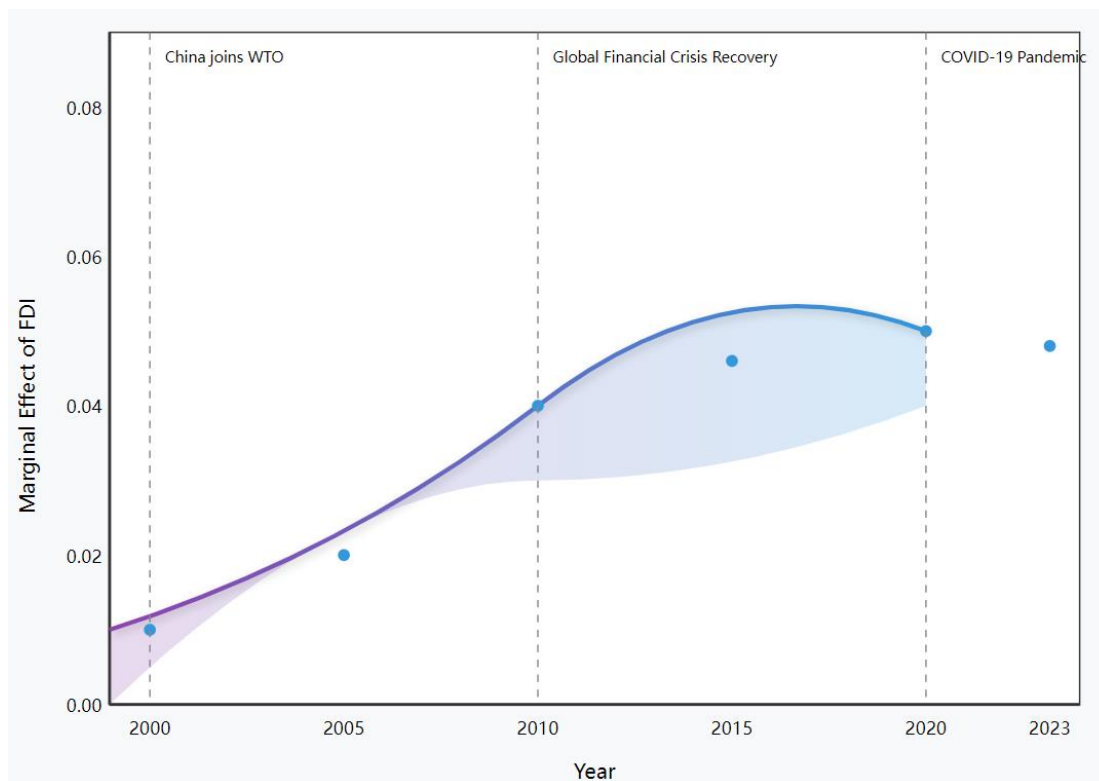
Figure 4.2: Changes over time in the marginal effect of FDI on economic growth quality

from the figure above , the impact of FDI rose rapidly at the beginning of the study period, which may reflect China's significant improvement in its ability to utilize foreign capital after joining the WTO. The impact then leveled off, peaking around 2015, before declining slightly but remaining at a high level. The narrowing of the error bars (representing 95% confidence intervals) suggests that our estimates of the impact of FDI have become more precise over time. This trend may reflect changes in China's economic structure and adjustments to its dependence on foreign investment, and may also be related to changes in the global economic environment. This finding emphasizes the need to consider regional characteristics when formulating FDI policies and provides a basis for formulating differentiated investment strategies for different regions.

Robustness Check

To ensure that our results are robust and reliable, we conducted a series of robustness checks:

Alternative variables: We remeasured the main variables using alternative indicators. For example, when the number of international patent applications is used instead of the total number of patent applications to measure innovation capacity, the results remain consistent.

Lagging effect: Considering that FDI may have a lagging effect, we added the lagged term of FDI in the model. The results show that both the current effect and the lagged effect of FDI are significantly positive, further supporting our main findings.

Endogeneity treatment: In order to further alleviate potential endogeneity problems, we adopt the instrumental variable method. Following the approach of Borensztein et al. (1998), we select the GDP of the FDI source country as the instrumental variable. The 2SLS estimation results are consistent with the main results.

Outlier processing: We used the winsorize method to handle extreme values, and the results did not change substantially.

Subsample analysis: We conducted subsample analysis by time period (such as before and after the financial crisis), and the main conclusions still hold.

The results of these robustness checks further strengthen the credibility of our main findings.

Conclusion and Policy Recommendations

Main Research Conclusions

This study explores the impact of FDI on the high-quality development of China's economy by analyzing panel data from 31 provincial-level administrative regions in China from 2000 to 2023. The study draws the following main conclusions:

First, FDI has a significant positive impact on the quality of China's economic growth. Empirical results show that when FDI increases by 1%, the economic growth quality index increases by approximately 0.051-0.056 units. This finding supports the theoretical expectation that FDI promotes high-quality economic development through multiple channels.

Secondly, FDI has played a positive role in promoting the upgrading of China's industrial structure. Specifically, for every 1% increase in FDI, the proportion of the tertiary industry increases by approximately 0.037 percentage points, and the proportion of high-tech industries increases by approximately 0.045 percentage points. This shows that FDI plays an important role in promoting the development of China's industries toward high-end and service-oriented industries.

The relationship between FDI and local innovation capabilities presents non-linear characteristics and has a significant threshold effect. When the regional R&D investment intensity exceeds the threshold of 1.235%, the promotion effect of FDI on innovation is significantly enhanced. This finding highlights the importance of improving local absorptive capacity in making full use of FDI to promote innovation.

There is obvious regional heterogeneity in the impact of FDI. Overall, the impact of FDI is most significant in the eastern region, followed by the central region, while the impact in the western region is relatively weak. This difference may stem from differences in absorptive capacity, industrial structure and institutional environment between regions.

The impact of FDI shows time dynamics. The study found that the impact of FDI showed an upward trend from 2000 to 2015 and then stabilized. This may reflect the improvement of China's ability to utilize foreign investment, as well as changes in the global economic environment and China's industrial policy.

Finally, the institutional environment plays an important regulatory role in the process of FDI. A good institutional environment can significantly enhance the positive impact of FDI, which emphasizes the importance of improving institutional construction in the process of attracting and utilizing foreign investment.

Policy Recommendations

Based on the above research conclusions, this article puts forward the following policy recommendations:

To optimize the structure of foreign investment introduction , policymakers should focus on attracting foreign investment projects with high technology content and high added value, taking into account the positive role of FDI in upgrading the industrial structure. By formulating targeted industrial policies and incentives, we can guide more foreign investment to flow into strategic emerging industries and modern service industries to promote high-quality economic development. At the same time, attention should be paid to balancing the

introduction of different types of FDI to avoid over-reliance on foreign investment in a specific field.

Strengthen regional coordinated development . In view of the regional heterogeneity of FDI impact, differentiated investment policies should be formulated. For the eastern region, the focus can be on guiding FDI to transfer to higher-end links of the industrial chain; for the central and western regions, efforts should be made to improve the investment environment, upgrade infrastructure and human capital levels to enhance the ability to attract and utilize FDI. In addition, it is possible to consider establishing an inter-regional cooperation mechanism to promote the inter-regional spillover of FDI effects.

To enhance local innovation capabilities , considering the threshold effect between FDI and innovation, policymakers should increase investment in local R&D and improve the quality of human capital. Tax incentives and subsidies can be used to encourage companies to increase R&D investment, while strengthening industry-university-research cooperation to improve the quality of the overall innovation ecosystem. In addition, attention should be paid to cultivating innovative talents and strengthening science and technology education and innovation and entrepreneurship education.

Improve the institutional environment . The research results emphasize the importance of a good institutional environment. We should continue to deepen market-oriented reforms, improve the intellectual property protection system, and optimize the business environment. Especially in the central and western regions, we can consider setting up special economic zones or free trade zones to create a more friendly institutional environment for FDI. At the same time, we should strengthen the rule of law and improve the transparency and predictability of policies.

To promote the deep integration of FDI and the local economy , and to give full play to the spillover effect of FDI, foreign-invested enterprises should be encouraged to establish closer industrial chain links with local enterprises. Through policy guidance, cooperation between foreign-invested enterprises and local suppliers and research institutions can be promoted to promote technology transfer and knowledge diffusion. At the same time, local enterprises are encouraged to improve their own capabilities and enhance their initiative to cooperate with foreign-invested enterprises.

Dynamically adjust FDI policies . Considering the temporal dynamics of FDI impact, a dynamic evaluation and adjustment mechanism for FDI policies should be established. Regularly evaluate the economic contribution of FDI, and timely adjust investment priorities and policy measures to adapt to the ever-changing domestic and international economic environment. This requires the establishment of a sound policy evaluation system and the improvement of policy formulation flexibility.

Strengthen human capital investment . Given the key role of human capital in the FDI effect, more investment should be made in education, especially higher education and vocational and technical education. At the same time, enterprises should be encouraged to carry out on-the-job training to improve the skills and adaptability of the workforce. In addition, attention should be paid to the internationalization of talent training to improve the ability of local talents to keep pace with the international standards.

To promote green FDI , while pursuing economic growth, we should also pay attention to the environmental impact of FDI. We can formulate green FDI guidelines to encourage and guide foreign-invested enterprises to adopt clean production technologies and promote sustainable development. At the same time, we can consider establishing a green FDI evaluation system to incorporate environmental factors into the approval and evaluation process of FDI projects.

Research Limitations and Future Prospects

Although this study systematically analyzes the relationship between FDI and China's high-quality economic development, it still has some limitations:

First, the limitation of data acquisition affects the in-depth discussion of some micro-level issues. For example, it is difficult to obtain comprehensive FDI data at the enterprise level, which limits our detailed analysis of the micro-mechanism of FDI impact.

Secondly, although methods such as system GMM are used to alleviate potential endogeneity problems, it is

still difficult to completely rule out reverse causal effects. This is a common challenge in empirical research, and more effective identification strategies need to be further explored in future research.

Finally, due to data limitations, this study was unable to conduct an in-depth analysis of the possible differential impacts of FDI from different countries of origin and different industries. These heterogeneous characteristics may have an important impact on the effects of FDI and deserve further exploration in future research.

Based on these limitations, future research can be expanded in the following aspects:

Using micro-enterprise data, we can deeply explore the technology spillover mechanism and industrial chain upgrading effect of FDI. This may require combining questionnaire surveys, field interviews and other methods to obtain richer micro data.

Considering the background of global value chain reconstruction, the role of FDI in promoting China's integration into the high-end links of the global value chain should be studied. This requires combining FDI research with global value chain theory, which may involve the collection and analysis of cross-national data.

Combining big data and artificial intelligence technology to develop more accurate FDI quality assessment indicators to support the formulation of precise investment attraction policies. This may require interdisciplinary cooperation and combine knowledge from fields such as economics and computer science.

Explore the interactive relationship between FDI and other development factors (such as digital economy and green development) to provide theoretical and empirical basis for building a new development pattern. This requires expanding the research perspective and combining FDI research with other cutting-edge economic issues.

In summary, this study provides systematic empirical evidence for understanding the impact of FDI on the high-quality development of China's economy and provides a scientific basis for formulating more targeted foreign investment policies. Against the backdrop of profound changes in the global economic landscape, how to better utilize FDI to promote high-quality economic development will continue to be an important topic worthy of continued attention and research. Future research should continue to deepen the understanding of the impact mechanism of FDI and provide more comprehensive and in-depth support for policy making.

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