Has “The Belt and Road” initiative promoted regional economic growth and economic innovation?

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Abstract: The article regards “The Belt and Road” initiative as a quasi-natural experiment. Based on the county panel data from 1999 to 2017, difference-in-differences model (DID) is used to examine the impact of the “The Belt and Road” initiative on regional economic growth and economic innovation. The study found that the “The Belt and Road” initiative can significantly increase the economic growth and innovation of the region. Through the placebo test and the robustness test, it shows good policy uniqueness characteristics. The article further analyzes the heterogeneity of the initiative. The study found that the initiative has more obvious economic growth and innovation in the central region.

1 Introduction

“The Belt and Road” initiative is a long-term and ambitious strategy that can provide sustained momentum for China's economic growth and innovation. Over the past eight years, “The Belt and Road” initiative has continued to increase its international influence from vision to action, from concept to consensus. Some scholars believe that the “Belt and Road” initiative can promote the optimization and upgrading of the industrial structure by resolving excess capacity, and promote the implementation of the “going out” economic strategy, thereby enabling the Chinese economy to participate in the international economy in depth and enhance China's economic competitiveness [1].

The theory of multi-level governance believes that the central government is not the only subject to connect with international actors. Local governments such as provinces and cities are all important promoters of the “The Belt and Road” construction. Domestic node cities have also played a leading role in signing cooperation frameworks, promoting project construction, improving policies and measures, and playing the role of platforms. The role of localities can go beyond the provinces and cities themselves to reach a more macro level. Some scholars have pointed out that the countries along the “The Belt and Road” may have problems such as immature market economy systems and outdated infrastructure such as roads and communications, which pose many threats to investment and business exchanges in various regions of China [1]. The environmental uncertainty caused by these risks will make the impact of the “The Belt and Road” initiative on the economy to a certain extent.

Can the “The Belt and Road” initiative really promote the economic growth and economic innovation of

domestic cities? In addition, whether there are differences in the economic growth and innovation of various regions in the country under the “The Belt and Road” initiative is also of research significance. Due to the obvious imbalance of our country's economic development, the diverse geographical features, resource conditions, and economic foundations of different regions, the “The Belt and Road” strategy has a wide range of radiation, but the strategic positions of various provinces and cities in this important policy are different. There are also differences in the implementation process of this policy.

This article intends to use county-level data from 1999 to 2017 as a research sample, and the “The Belt and Road” initiative as a quasi-natural experiment, using difference-in-differences model to test the impact of the “The Belt and Road” initiative on regional economic growth and economic innovation. The research results show that the “The Belt and Road” initiative has significantly promoted regional GDP growth and the increase in regional innovation capabilities. At the same time, referring to the practice of existing literature, the provinces are divided into east, middle and west respectively to examine the heterogeneity of the influence of the “The Belt and Road” initiative on the region, and the research finds that the initiative has a stronger effect on the economic stimulus of the central region.

2 Model and variables

This paper adopts the DID and takes the proposal of the “The Belt and Road” initiative in 2013 as a quasi-natural experiment to study the impact of the Belt and Road Initiative on regional economic development and fiscal revenue. The specific empirical model is set as follows

$$Y_{it} = \beta PostReform_{it} + \alpha X_{it} + \gamma_i + \lambda_t + \varepsilon_{it} \quad (1)$$

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Among them, Y_{it} represents the logarithm of GDP and fiscal revenue of city i in year t . $PostReform_{it}$ is a dummy variable. When city i has implemented the "The Belt and Road" policy in year t , the value is 1, otherwise it is 0. Two-way fixed effect: γ_i is the fixed effect of the city, and λ_t represents the fixed effect of the year. By controlling the fixed effects of cities, it is possible to control all city characteristics that do not change with time, and eliminate the inherent differences between the treatment group and the control group. By controlling the fixed effect of the year, it is possible to control the trend ε_{it} of the explanatory variable itself as a random disturbance item as the year changes. Here, the standard errors are clustered to the city level, that is, the intra-group correlation is controlled.

Explained variable. Economic literature generally uses (GDP) to reflect the economic development of a region

Explanatory variables. The dummy variable of the implementation year 2013 and the interactive item of whether to implement the "Belt and Road" policy. Based on the "Vision" issued by the State Council and documents, 39 key cities were identified, and Hong Kong, China and Macau, China were excluded. There are 37 cities that actually implement the policy, which are assigned a value of 1, and the remaining cities are assigned a value of 0. Taking 2013 as the year of policy shock, the value is 0 before 2013 and 1 in the future.

Control variables. With reference to relevant literature practices, select primary industry added value, secondary industry added value, fiscal revenue, fiscal expenditure, household savings, household loans, the number of industrial enterprises above designated size, and regional population as control variables.

The basic data comes from the "China County (City) Social and Economic Statistics Yearbook". To ensure that the sample data covers before and after the proposal, the sample year is limited to 1999 to 2017. The research sample covers 30 provinces, municipalities and autonomous regions across the country (except Hong Kong, Macao and Taiwan), and finally a panel data containing 39365 samples has been formed. In order to reduce the influence of outliers, heteroscedasticity and dimension, the data is processed by logarithm.

2.1 Theoretical analysis and research hypothesis

The key cities along the "Belt and Road" have successively promulgated various implementation plans based on their functional advantages and the development positioning in the "Vision". Through the analysis of the implementation plan of local provinces, the author found that most local provinces have launched the "Belt and Road" strategy from the "five links" proposed by the state, and provided key support for China's economic growth from multiple perspectives.

Policy communication is an important guarantee for the construction of "The Belt and Road", and inter-governmental cooperation is strengthened. As of January 2020, China has signed more than 200 cooperation documents for the joint construction of the "Belt and Road" with 138 countries and 30 international organizations. China has signed more than 200 cooperation documents

for the joint construction of "The Belt and Road" with 138 countries and 30 international organizations. "The Belt and Road" initiative has also been incorporated into relevant resolutions or documents of the United Nations General Assembly, the United Nations Security Council, the Asia-Pacific Economic Cooperation, and the Asia-Europe Meeting. Negotiations, signing or upgrading of free trade agreements between China and countries along the route have improved the system and policy environment for the joint construction of "The Belt and Road", and also promoted the improvement of regional economic governance and global economic governance.

The proposal of "The Belt and Road" provides a good opportunity and financial guarantee for infrastructure construction. "The Belt and Road" clearly pointed out that "infrastructure interconnection is a priority area for the construction of the Belt and Road." The total number of China-Europe Express trains exceeds 20,000, connecting more than 20 countries and more than 100 cities. The construction of infrastructure has improved the efficiency of local logistics and is of great value to the free flow of elements and the efficient allocation of resources. Infrastructure construction promotes local economic development by stimulating domestic demand, prospering market circulation and commercial development, and at the same time attracting private capital to settle in.[2]

Investment and trade cooperation is the key content of "The Belt and Road" construction. By solving the problem of facilitation of investment and trade, a good business environment can be built.

Capital financing is an important support for "The Belt and Road" construction. "The Belt and Road" new financing cooperation platform is diversified. The Asian Infrastructure Investment Bank, the BRICS New Development Bank, the Silk Road Fund, and the Multilateral Development and Financing Cooperation Center Fund have become important platforms for financing the "Belt and Road" initiative. As of July 2019, the Multilateral Development Finance Cooperation Center Fund has approved 46 loan projects with 18 members totaling US\$8.5 billion.

People-to-people bonds are the social foundation of "The Belt and Road" initiative. In the past seven years, countries along "The Belt and Road" have carried out various exchanges and cooperation in the fields of culture, education, art, tourism, think tanks, science and technology, environmental protection, and protest cooperation.

In view of this, this article proposes Hypothesis 1: The "Belt and Road" initiative promotes regional GDP growth.

3 Empirical result analysis

3.1 Benchmark regression results-impact on economic development and innovation

According to Table 1, Column (1) returns after controlling the year fixed effect and county fixed effect. From the core explanatory variables, it can be seen that the economic growth of the region after the "The Belt and Road"

initiative was put forward has been significantly improved compared to before the initiative. In columns (1) to (5) in the table, the core explanatory variable $PostReform_{it}$ passed the significance test and the coefficient signs did not change fundamentally during the process of increasing the control variables in sequence. On the whole, the “The Belt and Road” initiative has significantly promoted regional GDP growth and economic innovation.

Table 1 Impact on regional economic development and economic innovation

variables	(1) lngdp	(2) lngdp	(3) lngdp	(4) lngdp	(5) lngdp
x	0.0166 (0.0468)	0.0776*** (0.0216)	0.0658** (0.0254)	0.0557** (0.0257)	0.0507** (0.0238)
lnagri		0.3160*** (0.0207)	0.2636*** (0.0196)	0.2357*** (0.0178)	0.2231*** (0.0175)
lnindus		0.5516*** (0.0123)	0.4180*** (0.0146)	0.3770*** (0.0139)	0.3771*** (0.0161)
lnfisrev			0.1484*** (0.0148)	0.0998*** (0.0134)	0.0897*** (0.0134)
lnfisexp			0.1787*** (0.0216)	0.1052*** (0.0158)	0.1122*** (0.0154)
lnsav				0.1224*** (0.0112)	0.1270*** (0.0119)
lnsav_fin				0.0608*** (0.0093)	0.0574*** (0.0092)
lnfirms					0.0265** (0.0118)
Regional fixed effect	control	control	control	control	control
Year fixed effect	control	control	control	control	control
Constant	11.7583*** (0.0134)	2.5807*** (0.1660)	1.6098*** (0.1242)	1.4053*** (0.1067)	1.3255*** (0.1250)
Observations	32,169	31,898	31,756	31,511	28,994
R-squared	0.8038	0.9635	0.9686	0.9735	0.9713

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.2 Parallel Trend Hypothesis Test

DID is generally used to study the effect of policy changes and external shocks on the research object, and the premise of the parallel trend assumption should be satisfied before use.

Referring to the processing method of Jacobson et.al (1993)[3], this article uses the event research method to examine the dynamic changes of economic growth in the years before and after the implementation of the One Belt One Road policy.

Specifically, the model is set as follows:

$$Y_{it} = \beta_k \sum_{k=-4}^k D_{t_{i0}+k} + \alpha X_{it} + \gamma_i + \lambda_t + \varepsilon_{it} \quad (2)$$

Among them, $D_{t_{i0}+k}$ represents the event window dummy variable before and after the implementation of the policy, t_{i0} is the year when city i began to implement the One Belt One Road policy, $t_{i0}+k$ refers to the years before and after the policy reform, where the values of k are -3, -2, -1, 0, 1, The missing group is $t \leq -3$ (that is, three years before the reform and beyond). The remaining control variables are similar to the benchmark model, and the standard errors are still clustered to the city level. The results are shown in Table 2.

Table 2 Parallel Trend Test

variables	(1) GDP
tpre3	0.0310 (0.0204)
tpre2	-0.0341 (0.0687)
tpre1	-0.0095 (0.0668)
tpre0	0.0474** (0.0232)
tafter1	0.0527** (0.0254)
Regional fixed effect	control
Year fixed effect	control
Constant	1.3252*** (0.1250)
Observations	28,994
R-squared	0.9713

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4 Heterogeneity analysis

According to the commonly used division method, all provinces are divided into eastern, central, and western regions. Columns (1)—(3) in the table are the impact on economic growth. The regression coefficient and significance of the implemented policies in the central region are greater than those in the eastern and western regions. It shows that the initiative has a stronger pulling effect on the GDP of the central region than the eastern and western regions.

The reason may be that the central region has obvious geographical advantages under the background of the “The Belt and Road”. It can undertake the transfer of manufacturing and high-tech industries in the eastern region while relying on the development of the basic raw material industry base in the western region. The central region’s hub status can be truly reflected.[4] (An Shuwei, 2015)

Table 3 Impact on the economic development and innovation of different regions

	(1) East lngdp	(2) Mid lngdp	(3) West lngdp
x	0.0131 (0.0305)	0.1304*** (0.0468)	0.0150 (0.0240)
lnagri	0.2400*** (0.0317)	0.1630*** (0.0248)	0.3115*** (0.0186)
lnindus	0.3857*** (0.0315)	0.4139*** (0.0286)	0.3646*** (0.0219)
lnfisrev	0.0799*** (0.0255)	0.1242*** (0.0257)	0.0565*** (0.0182)
lnfisexp	0.0725** (0.0322)	0.1232*** (0.0283)	0.0885*** (0.0192)
lnsav	0.1679*** (0.0213)	0.1450*** (0.0199)	0.1024*** (0.0128)
lnsav_fin	0.0629*** (0.0129)	0.0405** (0.0177)	0.0738*** (0.0123)
lnfirms	0.0052 (0.0182)	-0.0047 (0.0138)	0.0197** (0.0087)
Regional fixed effect	control	control	control
Year fixed effect	control	control	control
Constant	1.1433*** (0.2161)	1.1619*** (0.2105)	1.1669*** (0.1824)
Observations	6,012	10,195	10,810
R-squared	0.9754	0.9344	0.9808

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5 Conclusion and Enlightenment

At present, there are few literatures on the economic growth and innovation of the domestic area of the "The Belt and Road" initiative, and more attention is paid to the impact of foreign investment and trade at the national level on the countries along the Belt and Road. Based on the panel data of 284 prefecture-level cities from 1999 to 2017, this paper uses the difference-in-differences model to evaluate the policy effects of the "The Belt and Road" initiative on regional economic growth and economic innovation, and conducts heterogeneity analysis and robustness test.

The research found: (1) The regression results of the DID method showed that the "The Belt and Road" initiative significantly promoted regional economic growth and economic innovation. (2) According to the heterogeneity test, the results showed that the initiative had a stronger effect on the middle region's economy. (3) The "Belt and Road" initiative has promoted foreign direct investment by Chinese companies, which may further improve the level of innovation of Chinese companies through such paths as economies of scale and overseas R&D apportionment [5].

Based on the above conclusions, the following enlightenment is drawn:

Firstly, to promote the construction of the "The Belt and Road", to better coordinate development and security, and to achieve economic integration, development linkage, and sharing of results, it is necessary to promote the innovative development of this platform and continuously tap new economic growth points[6].

Secondly, cities at various levels should make full use of their location and resource advantages and consider regional differences when formulating policies and measures for the "The Belt and Road" initiative.

Last but not the least, through the "Belt and Road", we can integrate foreign resources for our use, and further develop innovative R&D activities by means of R&D resource sharing, strategic technology alliances, and R&D talent cooperation.

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