

Artificial Intelligence-based Assessment of Regional Economic Cooperation Mechanisms and Benefits under the Belt and Road Strategy

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ABSTRACT

The proposal of “Belt and Road” has helped these countries along the route to stimulate the development vitality and cooperation potential of their respective domains, which fits well with their common needs and opens a new window of opportunity for their complementary advantages and open development. This paper improves the construction of the new regional cooperation mechanism of the Belt and Road from three aspects: power mechanism, coordination mechanism, benefit distribution mechanism and compensation mechanism. The double difference method is utilized to assess the economic benefits generated under the Belt and Road regional economic cooperation mechanism. The assessment results show that the country with the highest import and export trade dependence of China is New Zealand, which reaches 18.5611, and as the dominant country of the Belt and Road, China's two-way investment in other countries has the highest scale of \$124,705.9 million, but the index of investment closeness is -1, which indicates that the capital flow between the two sides is mainly a unidirectional investment from China to other countries.

Keywords: Dynamic mechanism, double difference method, Belt and Road strategy, cooperation mechanism, economic benefit assessment

1. Introduction

In the contemporary era of globalization and rapid technological development, economic cooperation and regional integration have become important forces driving world development. This trend has become more pronounced, especially in the context of the Belt and Road Initiative. The Belt and Road Initiative was proposed by China in 2013, aiming to promote economic prosperity and

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regional cooperation among countries along the route by enhancing infrastructure construction, trade cooperation and cultural exchanges among Asia, Europe and Africa [1-2]. As a cross-border economic cooperation model, it not only redefines the global economic pattern, but also presents new development opportunities and challenges [3-4]. With the rapid development of the Internet, big data, artificial intelligence and other technologies, the digital economy has become an important driving force for global economic growth, which not only changes the operation of traditional industries, but also promotes the generation of new industrial forms.

In the digital economy, information and data, as core assets, have a significant impact on the efficiency and quality of economic activities [5]. Its characteristics include the reduction of marginal costs, the nonlinear growth of economic activities, and the enhancement of network effects, which together drive the improvement of production efficiency and the emergence of new business models [6-7]. The development of digital economy is driven by factors such as technological innovation, policy environment, market demand and social acceptance, and has become an important driving force for global economic growth, with disruptive impact on traditional industries and market structure [8-11]. In the context of the Belt and Road Initiative, the integration of data and information in the digital economy through emerging technologies such as artificial intelligence to make digital services more convenient and personalized can provide a new impetus for the digital economy, optimize enterprise decision-making and business processes, and change the structure of the labor market [12-16]. It can also enable countries along the route to participate more effectively in the global market through digital platforms and tools, realize technology and knowledge sharing, and promote regional economic growth and integration [17-19]. Overall, the development of the global digital economy is reshaping the world's economic landscape and development path, demonstrating unprecedented speed and scale.

This paper puts forward the idea of constructing regional economic cooperation mechanism under the Belt and Road strategy by combining power, coordination, benefit distribution and compensation mechanism. Based on the construction idea, the new regional cooperation mechanism of the Belt and Road is constructed from the three aspects of playing the basic role of FTAs, the demonstration role of economic corridors and the role of infrastructure connectivity. Through the empirical analysis, we analyze the relevant contents of the interest game of the main participants of the Belt and Road economic cooperation, and explore the trade dependence and investment closeness of the Belt and Road trading partners in turn. The double difference method is utilized to assess the economic benefits of the countries along the Belt and Road strategy. This paper analyzes the benefits of the Belt and Road strategy by using the mechanism of regional economic cooperation in order to make a judgment on the future trend of the Belt and Road.

2. Mechanisms for regional economic cooperation under the “Belt and Road” strategy

2.1. Ideas for building regional economic cooperation mechanisms under the Belt and Road Initiative

2.1.1. Power mechanisms. First, the local government evaluation index system will incorporate indicators related to the promotion of regional cooperation, and build a long-term mechanism for regional cooperation. Change the local officials' assessment to GDP as the core indicator, establish a more comprehensive indicator system, incorporating livelihood projects, public services, environment and ecology related content.

Second, promote the reform of the fiscal and taxation system. Reasonably delineate the financial and administrative powers of the central and local governments, increase the tilt of local financial powers, and explore systematic reform programs to solve the problem of transitioning from construction-oriented finance to public service-oriented finance. Reduce local government

intervention in business decision-making, and expand the fiscal budget, shifting it to infrastructure and other matters that “open the way” for market mechanisms.

Third, the central government should centralize the coordination of major cross-regional projects that neither local governments nor market mechanisms are capable of solving. Improving key infrastructure, such as waterway management and the construction of high-speed rail along the river, will reduce the cost of factor flows within the region, promote the “manifestation” of cooperation potential, further expand the space for regional economic cooperation, and enhance the impetus for intraregional economic cooperation.

2.1.2. Coordination mechanisms. First, improve the regional cooperation coordination mechanism, set up a coordination organization that transcends administrative divisions and has a high degree of authority, and prepare regional development plans [20]. Drawing on the Beijing-Tianjin-Hebei synergistic development of the coordinating body, strive for the establishment of a leading group at the central level, on the basis of the existing plan and the three sub-regional cooperation, the preparation of the overall development plan of the Silk Road Economic Belt, coordination of industrial division of labor, resources and energy, port functions, ecological protection and so on. At the same time, improve the evaluation mechanism for the implementation of regional cooperation decisions, so as to effectively realize the administrative power to broaden the space for the market mechanism to play its role. Establish a high-level decision-making and consulting organization, and set up an expert committee on cooperation and development of the Silk Road Economic Belt.

Second, build a multi-level cooperation system to ensure the efficiency of the implementation of cooperative decisions. Draw on the results of the systems of Pan-Pearl River Delta regional cooperation, such as the system of joint meetings of chiefs, the working system of the secretariat of the Joint Chief Executives' Meeting, the coordination system of government secretaries-general, the working system of the daily work office, and the system of departmental articulation and implementation, which also includes the two major platforms of the Development Forum and the Cooperation Fair. Combined with the three-level operation of the decision-making level, coordination level and implementation level of the city clusters along the route, as well as the mechanism of combining unity and division, the cooperation mechanism will be designed in a holistic manner and expanded to the entire Silk Road Economic Belt region.

Thirdly, the use of legal means should be emphasized, and innovative local legislation should be tried, similar to that of the United States, which promotes regional economic cooperation and development in the form of bills. Institutionalize the relevant mechanisms, standardize the coordination methods, and fix the key projects of cooperation in the form of legal systems to improve the binding effect on the members of cooperation. Attention should be paid to maintaining the authority of the rules and regulations, and to restraining the arbitrary intervention of the governments of cooperation members in economic cooperation and the use of power by cooperation organizations that deviates from the principle of fairness.

2.1.3. Benefit-sharing and compensation mechanisms. Based on market principles, coordinate the benefit and cost-sharing compensation of regional economic cooperation on the Silk Road Economic Belt, guarantee that each subject of interest can benefit from regional specialization and division of labor, and realize Pareto improvement [21]. At the same time, realize the unification of professional and technical qualification certification and promote the integration of regional services. As soon as possible to realize the establishment of special funds in accordance with certain rules, to achieve the diversification of the fund's support methods, to support the construction of major infrastructure, ecological environmental protection and the docking of industrial transfer in underdeveloped regions, and to expand the scope and amount of counterpart assistance to the western region in the areas of personnel training, medical education and so on.

2.2. *Strategies for building a new regional cooperation mechanism for the Belt and Road Initiative*

2.2.1. Playing a fundamental role in FTAs. With the strengthening of the international economic development region at the present stage, regional economic cooperation has been emphasized. In the future, the integrated development of the economies of East Asia and the Asia-Pacific region, and the construction of the “Belt and Road” regional economic cooperation mechanism are constantly being promoted, which will be conducive to the integrated development of the regional economy and the construction of an interactive and mutually advancing economic system. With the development of the Maritime Silk Road, the construction of the China-ASEAN Free Trade Area will promote regional economic integration and provide a basis for the realization of the goal of peaceful and stable development in the region. Regional economic cooperation in Central Asia is conducive to the realization of cooperative development mechanisms and the promotion of regional economic integration. Therefore, the effective construction of the “Belt and Road” will create opportunities for economic development between China and other regions and countries, strengthen economic exchanges and cooperation between the Central Asian region and play a strategic role in China's external economic development.

2.2.2. Effective demonstration of economic corridors. In the construction of the “Belt and Road” regional economic cooperation mechanism, the rational construction of “economic corridors” should be utilized. The “Belt and Road” runs through a number of countries and regions, forming corresponding “economic corridors” to support the economic development of cities in neighboring regions in the context of economic union. Taking into account the economic development trend of the “Belt and Road”, the “Belt and Road” economic development zone should be fully utilized to open up international economic and trade channels and build economic corridors with regional characteristics. Economic corridors should be constructed in accordance with the different celebrations in different regions, giving full play to the demonstrative role of economic corridors and creating a new model of economic development that is mutually beneficial and harmonious, so as to promote the effective construction of cooperation mechanisms.

2.2.3. Leveraging infrastructure connectivity. In the process of “Belt and Road” economic development, infrastructure connectivity should be ensured. Continuously improve cross-border transportation infrastructure, promote the improvement of the economic network of the “Belt and Road”, and ensure more convenient exchanges and transportation between countries and regions. In the actual construction, the construction of transportation-related infrastructure should be strengthened, and the construction of all aspects of transportation should be continuously improved to achieve the development of multiple levels, which is conducive to the development of nationalization.

In the construction of a comprehensive cooperation and development platform, infrastructure connectivity should be ensured. In addition, the construction of energy-based infrastructure should be strengthened, infrastructure cooperation should be enhanced, innovation and research and development of new science and technology should be strengthened, the basis for regional economic cooperation in information technology should be constructed, the interconnection between international regions should be strengthened, the construction of regional projects should be accelerated, and the system of regional economic cooperation under the Belt and Road should be continuously improved, so as to realize the transformation of China's economy and industry and improve the overall competitiveness of China's economy. The regional economic cooperation system of “Belt and Road” will be continuously improved to realize China's economic transformation and enhance the overall competitiveness of China's economy.

2.3. Double Difference Method

Principle of the double difference method: to assess the effect of a policy by controlling for other factors and comparing the difference between the intervention group with the policy intervention and the control group without the policy intervention before and after the policy intervention [22]. However, differences in the timing of the intervention to which the study subjects were subjected in most cases made the traditional double-difference method limited, and as a result, the progressive double-difference model was formed. From 1995 to 2017, 37 countries and China successively established overseas economic and trade cooperation zones, and based on the "phased batch" of cooperation zone establishment, this paper adopts the progressive difference-in-difference method to deeply explore the impact of overseas economic and trade cooperation zones on the economic benefits of countries along the "Belt and Road".

$$Y_{st} = \alpha + \beta D_{st} + \delta X_{st} + A_s + B_t + \varepsilon_{st}, \quad (1)$$

$$s = 1, \dots, 103; t = 1995, \dots, 2017.$$

where Y_{st} is an explanatory variable indicating the gross domestic product (GDP) of country s in year t . D_{st} (dummy variable) indicates whether or not a cooperative zone was established in country s in year t . Control variables X_{st} include: the ratio of total investment in fixed assets to GDP characterizes the level of investment in fixed assets (gd), the ratio of total imports and exports to GDP characterizes the trade dependence (my), the ratio of general government fiscal expenditure to GDP characterizes the degree of government intervention in the economy (zf), and the ratio of final consumption expenditure of the population to GDP characterizes the level of consumption in society (jm). The ratio of primary industry output to GDP characterizes the level of primary industry development (ny), and the ratio of secondary industry output to GDP characterizes the level of secondary industry development (gy). A_s denotes a country dummy to control for the effect of unobservable country characteristics on economic growth over time, B_t denotes a time dummy to control for the effect of large changes in the country and its trend on economic growth over time, and ε_{st} is a random disturbance term.

3. Assessment of mechanisms and benefits of regional economic cooperation under the Belt and Road Strategy

3.1. The Game of Interests and Impacts of the Main Participants in the Belt and Road Economic Cooperation

3.1.1. Belt and Road Economic Cooperation: Game Related to the Interests of the Main Participants. The main participants in the Belt and Road economic cooperation include New Zealand, Peru, Italy, Russia, Spain, Portugal, Ukraine, Hungary, Poland, Panama, Jamaica, Argentina, Chile, Cuba, Montenegro, Austria, Lithuania, Croatia, Luxembourg and other countries. The interest game behind them influences the process of Belt and Road economic cooperation. This paper combs through the progress of regional economic cooperation of these major participants, and analyzes their strategic motives, goals, and ideas for participating in regional economic cooperation. On this basis, the game model of regional economic cooperation constructed in this paper is used to analyze the game of interests of the parties at the height of the Belt and Road strategy, so as to make a judgment on the future trend of the Belt and Road economic cooperation.

The interest game of the main participants of the Belt and Road economic cooperation has a close relationship with the regional economic cooperation strategy it formulates and implements, and each party obtains benefits by participating in the regional economic cooperation under the guidance of the specific regional economic cooperation strategy, in this sense, the interest game of

the main participants of the Belt and Road economic cooperation is in fact the strategic game of each party.

1) Regional economic cooperation frameworks. The formation of a regional economic cooperation framework in a given region is the process by which the dominant countries in the region try to establish a regional economic cooperation framework in which they can exert unique influence. The game of interests among the major participants in Belt and Road economic cooperation is manifested in the struggle for dominance of East Asia and Belt and Road economic cooperation. The U.S., Japan, South Korea, and ASEAN have shown strong interest in dominating East Asia and Belt and Road economic cooperation, and none of them wants the other to dominate East Asia and Belt and Road economic cooperation. India and Australia, on the other hand, are actively involved in the Belt and Road economic cooperation, choosing their own opportunities to act, and in the power struggle among the big powers, they have been able to move from side to side to avoid being marginalized and try to maximize their own national interests. The multiple roles in Belt and Road economic cooperation make the process full of variables.

2) India and Australia are actively integrating into the Belt and Road power system, hoping to get a share of the pie. Since the end of the Cold War, successive Indian Governments have made the realization of a “great power with a voice” a strategic objective. And India needs to realize this ambitious strategic goal in three steps: first, hegemony in South Asia, second, rise in the Belt and Road region, and finally become a world-class power. Currently, India is striving to realize the second step of the goal. 1990s, India began to implement the “eastward policy”. The policy was divided into two phases: the first phase was from the 1990s to the beginning of the 21st century, during which India focused on strengthening economic and trade ties with ASEAN countries. The second phase was from the beginning of the 21st century to 2014, during which India extended its eastward policy to Northeast Asia and the South Pacific and shifted the content of its cooperation from a predominantly economic sphere to one that emphasizes the economic, political, and security spheres. For India, the main actors in the Belt and Road region have an important relationship with its interests in the region, and India has actively developed its relationship with these actors, making full use of the contradictions between them and engaging in parallel diplomacy to the benefit of all parties. India's “eastward policy” aims to expand its influence by strengthening economic ties with countries in Southeast Asia, Northeast Asia and the South Pacific region, and seeks to become a regional power along the Belt and Road, and then seeks to realize the “world's great power”. India has used Southeast Asia as a springboard to enter the Belt and Road region. As a result of this policy, India has strengthened its economic and trade ties with South-East Asian countries. As mentioned earlier, ASEAN's “balance of power” strategy provides an opportunity for India to engage in South-East Asia. With the support of ASEAN, India became a member of the ASEAN Summit.

India has an FTA with ASEAN. Since then, India has also signed FTAs with South Korea and Japan and joined the RCEP negotiations, expanding its market in Northeast Asia and expanding its influence in the region. Along with its entry into East Asia, India is also penetrating the South Pacific region, with an FTA with Australia under negotiation. In 2014, India proposed upgrading its “Eastward Policy” to an “Eastward Action Policy”, aiming to further strengthen its relations with the Belt and Road countries, realize its political, economic and security strategic goals, and integrate itself into the multilateral mechanisms of the Belt and Road region in a more active manner. The aim is to further strengthen relations with the Belt and Road countries to achieve political, economic and security strategic goals, integrate more actively into the multilateral mechanisms of the Belt and Road region, and seek to enhance its influence and voice in the region. It is thus clear that India will continue to mediate between the major Powers in the future and further integrate itself into the system of power through the mechanisms of multilateral cooperation in the region.

Australia has also been actively integrating into Asia in recent years. Australia began to integrate into Asia in the 1970s, and in the 1980s, it proposed “full integration into Asia”. Since the beginning of the 21st century, the strategy of integration into Asia under the “Asian Century” has been pursued. It can thus be seen that Australia's integration into Asia is not a stopgap measure but a long-term strategy. Australia's integration into Asia is mainly based on economic considerations, strengthening economic and trade exchanges with Asian countries, participating in the Belt and Road economic cooperation mechanism as far as possible, and obtaining economic benefits. In addition to actively signing bilateral FTAs with a number of countries, Australia has also joined the East Asia Summit and participated in the RCEP and TPP negotiations. While integrating economically, Australia has not forgotten that it is a “member of the West” and has not relaxed its guard against Asia. Australia is taking advantage of the favorable timing of the United States' “rebalancing” strategy to further consolidate the United States-Australia alliance. Australia expressed its welcome and support for the United States to pay more attention to the region through its “rebalancing” strategy and to balance its relations with the countries in the region. Australia is actively cooperating with the United States in the implementation of its “rebalancing” strategy in the diplomatic, military and economic fields. Diplomatically, assist the United States in preventing and containing China. Militarily, it has strengthened military cooperation with the United States and cooperated with the United States in adjusting its military deployment along the Belt and Road. Economically, actively participate in the U.S.-led TPP negotiations and help the U.S. gain dominance of the Belt and Road economic cooperation, in the hope of maximizing the economic benefits of participating in the Belt and Road economic cooperation.

3) China's economic and trade relations with major economies in the Belt and Road region. China's major trading partners in the Belt and Road region in 2021 are, in order, New Zealand, Peru, Italy, Russia, Spain, Portugal, Ukraine, Hungary, Poland, Panama, Jamaica, Argentina, Chile, Cuba, Montenegro, Austria, Lithuania, Croatia and Luxembourg. Table 1 shows the import and export value between China and the major trading partners of the Belt and Road in 2021. China, as the leading country of the Silk Road Economic Belt, has a total import and export value of US\$121,114.22 million, accounting for 21.2945%, and a trade difference of US\$39,383.14 million.

Table 1. The import and export of China and the main trading partners of the belt and road

Country/ region	Total import and export/ Hundred million dollars	Proportion /%	Gross export/ Hundred million dollars	Proportion /%	Gross import/ Hundred million dollars	Proportion /%	Trade balance/ Hundred million dollars
China	1211.1422	21.2945	802.4868	26.7854	408.6554	16.1955	393.8314
New Zealand	663.432	11.6154	186.4664	1.3185	476.9656	17.5396	-290.4992
Peru	550.9046	4.4596	315.9588	3.1656	234.9458	8.7169	81.013
Italy	398.9004	1.9157	371.9456	3.1852	26.9548	0.9185	344.9908
Russia	281.2815	1.7851	200.186	2.1968	81.0955	2.4569	119.0905
Spain	270.3041	1.4699	119.6554	1.2648	150.6487	6.4868	-30.9933
Portugal	147.0863	1.3478	67.6348	0.6489	79.4515	2.0485	-11.8167
Ukraine	129.771	1.1878	36.9552	0.3464	92.8158	3.1899	-55.8606
Hungary	125.5642	1.0895	51.9488	0.5593	73.6154	1.9485	-21.6666
Poland	112.624	0.8456	88.9788	0.8466	23.6452	0.9154	65.3336
Panama	107.517	0.7469	84.8985	0.7866	22.6185	0.8491	62.28
Jamaica	102.6008	0.4285	65.6456	0.6152	36.9552	1.0454	28.6904
Argentina	31.7018	0.4096	15.6163	0.1969	16.0855	0.5194	-0.4692

Chile	31.0179	0.2154	25.0991	0.2965	5.9188	0.0518	19.1803
Cuba	37.913	0.1489	18.6485	0.1965	19.2645	0.7498	-0.616
Black hills	10.8118	0.1159	4.1964	0.0549	6.6154	0.6844	-2.419
Austria	5.735	0.0915	5.2698	0.0505	0.4652	0.0049	4.8046
Lithuania	9.2006	0.0578	6.2852	0.0689	2.9154	0.0294	3.3698
Croatia	4.1112	0.0686	3.2948	0.0374	0.8164	0.0086	2.4784

3.1.2. Trade dependence. Figure 1 shows the trade dependence between China and major Belt and Road partners in 2021, China's trading partner with the highest import and export trade dependence is New Zealand, reaching 18.5611, followed by Peru (14.0654), Italy (11.9487), Russia (8.5162), Spain (5.9154), Portugal (5.6185), Ukraine (3.0659), Hungary (2.7158), Poland (2.6269), Panama (2.3485), Jamaica (2.2488), Argentina (2.1699), Chile (0.9785), Cuba (0.8188), Montenegro (0.5165), Austria (0.4996), Lithuania (0.2654), Croatia (0.1998).

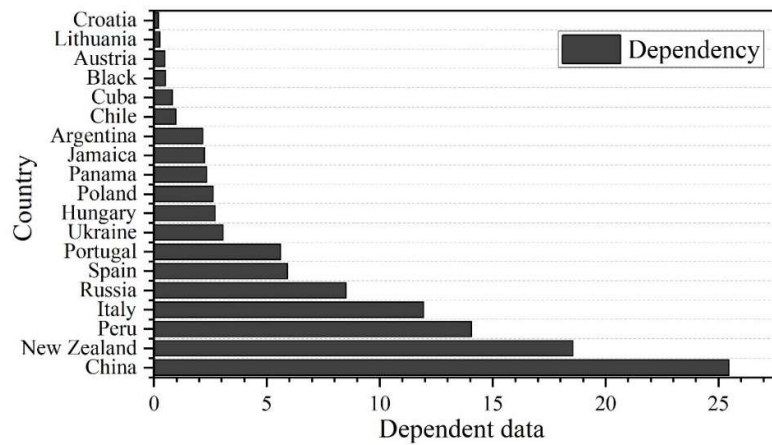


Fig. 1. Trade dependence of one belt and one road partners

3.1.3. Investment Intensity. Figure 2 shows the investment closeness between China and the Belt and Road region, China's two-way investment in other countries is obviously the highest, but the investment closeness index is -1, and the amount of investment is \$124,705.9 million, which indicates that the capital flow between the two sides is mainly one-way investment from China to other countries. In addition, China and New Zealand (367.28, 0.2792), Russia (107.353, 0.235), Italy (18.015, 0.931) and other countries are higher both in terms of the scale of two-way investment and investment closeness.

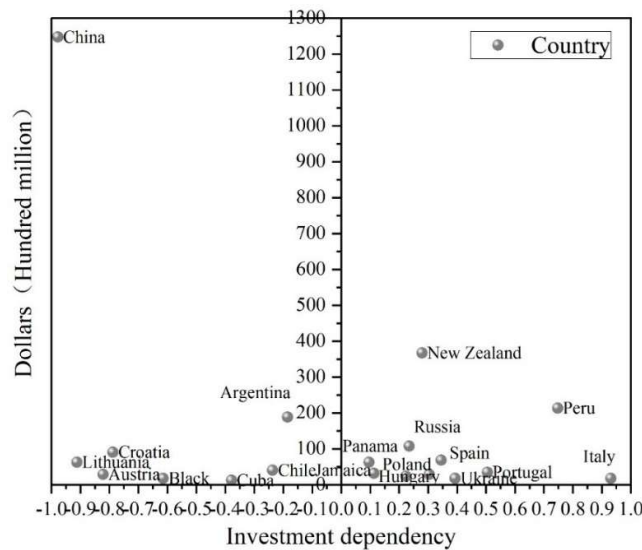


Fig. 2. China's investment in the belt and road region is closely related

3.2. Analysis of Economic Benefits of Countries along the Belt and Road Strategy

3.2.1. Descriptive statistics. Table 2 shows the descriptive analysis of the economic effects of the countries along the Belt and Road, from which it can be seen that the mean value of trade dependence is 57.4818, and the standard deviation is 23.4185, which indicates that the gap between the maximum value and the minimum value is too large, and the difference between the two is 99.8152.

Table 2. Descriptive analysis of economic effects of countries along the belt and road

Variable name	Variable specification	Mean	Standard deviation	Minimum value	Maximum value
Ln(GDP)	Gross domestic product	23.4899	1.9187	19.0688	28.7155
gd	Fixed assets investment level	22.4963	6.6482	0.2952	74.6365
my	Trade dependency	57.4818	23.4185	0	99.8152
zf	Government intervention	15.1392	5.5399	0.9154	47.1399
jm	Social consumption level	65.6852	20.6858	0.2936	74.6185
ny	The development level of the first production industry	13.6185	12.0629	0.0925	60.2398
gy	The development level of the second production industry	26.7588	10.7286	2.0696	74.1285

3.2.2. Correlation analysis. The principle of co-construction of the “Belt and Road” is based on mutual benefit and win-win situation, and the establishment of offshore ETZs takes into account the interests of all parties and seeks to give full play to the potential of all parties rather than depending on the economic performance of the country, thus initially fulfilling the prerequisites for the applicability of the double-difference method. Figure 3 shows the correlation of GDP change before the establishment of the cooperative zone, and to further test whether factors such as the level of economic development influence the selection of countries for the establishment of the cooperative zone, except for the strong correlation of Uzbekistan (0.08759), Vietnam (0.0479), the UAE (0.0333), Arabia (0.0333), and Indonesia (0.000912409), all other None of the countries' average rate of change in GDP is significantly correlated with the establishment of the cooperative zone.

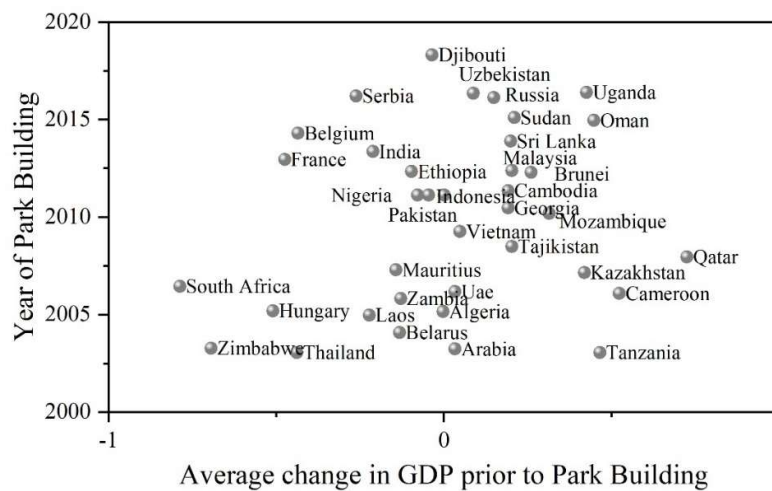


Fig. 3. The cooperation zone establishes the correlation between previous GDP changes

3.2.3. Parallel trend test. Figure 4 shows a parallel trend test, where there should be no systematic differences between the development trends of the countries that established the zone early and those that established it late before the zone was established, or if there are differences, the differences are fixed, i.e., the development trends of the two are the same. In order to test this hypothesis of “parallelism”, the paper divides the establishment of the Zone into four phases over time, and examines the differences in the growth rates of the economies of the countries in the latter phase as if they were the control group of the countries in the former phase. The results show that the average economic growth rates of the intervention group and the control group in each year before the establishment of the Zone follow a very consistent trend, and the average GDP growth rates of the two groups are 0.4207 and 0.34909, respectively, and there is no significant systematic difference between the two groups, and the establishment of the Zone has a better exogenous nature for the countries' economic growth.

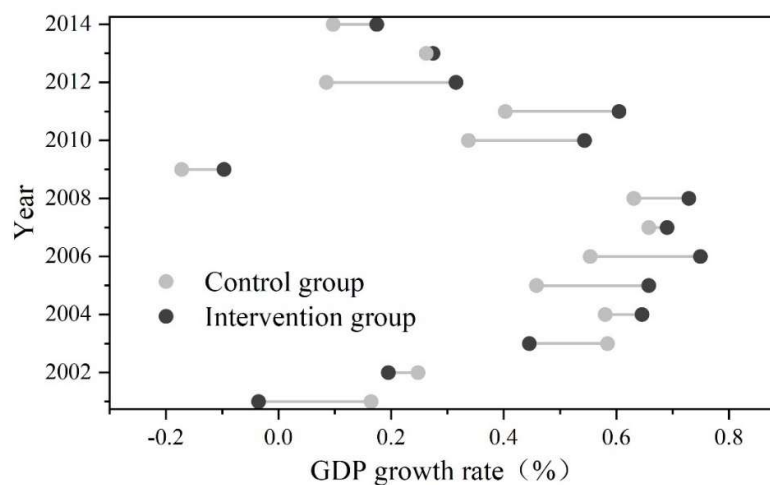


Fig. 4. Parallel trend survey

3.2.4. Establishment of Foreign Economic and Trade Cooperation Zones and national economic growth. Table 3 shows the establishment of FTECZs and national economic growth, and the establishment of FTECZs all contribute significantly to the economic growth of the host country at the 1% level. After strictly controlling for the economic characteristics of each country, the establishment of the zone contributes to the rise of the national economy by 5.94%. Further analysis of the control variables: *gd* and *my* coefficients are significantly positive at 0.0028 and 0.0065,

respectively, indicating that increased investment in fixed assets and the development of international trade are important drivers of economic growth. The ny coefficient is significant at -0.0295, indicating that the countries along the route are in the process of transitioning from a focus on agricultural development to a focus on industrial development, and that the primary sector is not a sustainable driver of economic growth. The significant jm coefficient of -0.0098 may be due to the increased segmentation of domestic markets in the countries along the route, which hinders the integration of domestic markets and leads to the distortion of the allocation of economic resources. The yb coefficient is insignificant, suggesting that government intervention in the countries along the route has little impact on economic growth, possibly stemming from the fact that government unrest in some of the countries along the route has resulted in less government attention to market activities. The coefficient of gy is not significant, which mainly stems from the fact that most of the countries along the routes where the cooperation zones are established are underdeveloped regions, and the level of the secondary industry is not high, which leads to the fact that its contribution to economic growth is not yet significant.

Table 3. Economic and economic growth in foreign economic and trade cooperation zones

/	Y-11	Y-12
Zone(clustered s.e.s)	0.0595***	0.0594***
	(0.0165)	(0.0082)
my		0.0065***
		(0.0012)
ny		-0.0295***
		(0.0049)
gd		0.0028*
		(0.0023)
jm		-0.0098***
		(0.0029)
yb		-0.0089
		(0.0059)
gy		0.0028
		(0.0048)
R2	0.8155	0.9125
R2 with fixed effects only	0.9693	0.9936
Observations	2.3589	2.3545

4. Conclusion

Based on the idea of inter-regional cooperation mechanism, this paper constructs a new type of regional cooperation mechanism for the Belt and Road, and evaluates the mechanism and benefits of regional economic cooperation under the Belt and Road strategy. As the leading country of the Belt and Road strategy, China's import and export trade share is the first among all countries, with a total import and export trade of 1,211.1422, accounting for 21.2945%. The trading partner with the highest import and export trade dependency with China is New Zealand with 18.5611. The scale of two-way investment from China to other countries is obviously the highest, but the investment closeness index is the lowest at -1, with an investment amount of \$124,705.9 million, indicating that capital flows between the two sides are mainly one-way investment from China to other countries. Utilizing the double-difference method, the economic efficiency of the national government is evaluated, and based on the chronological order of the establishment of the cooperation zone, an

intervention group and a control group are established to compare their economic growth rates. The average GDP growth rates of the two groups are 0.4207 and 0.34909 respectively, and the average economic growth rates of the two groups in each year before the establishment of the cooperative zone follow the same trend without obvious systematic differences, and the establishment of the cooperative zone has a superior exogenous nature for the economic growth of each country.

References

- [1] Zeng, L., & Zeng, L. (2021). Conceptual analysis of China's belt and road initiative: A road towards a regional community of common destiny. *Contemporary International law and china's peaceful development*, 305-331.
- [2] Ma, S. (2022). Growth effects of economic integration: New evidence from the Belt and Road Initiative. *Economic Analysis and Policy*, 73, 753-767.
- [3] Guo, H., Liu, J., Qiu, Y., Menenti, M., Chen, F., Uhler, P. F., ... & Liu, J. (2018). The Digital Belt and Road program in support of regional sustainability. *International Journal of Digital Earth*, 11(7), 657-669.
- [4] Hussain, F., Hussain, Z., Khan, M. I., & Imran, A. (2024). The digital rise and its economic implications for China through the Digital Silk Road under the Belt and Road Initiative. *Asian Journal of Comparative Politics*, 9(2), 238-253.
- [5] Zhao, S., Zhang, Y., Iftikhar, H., Ullah, A., Mao, J., & Wang, T. (2022). Dynamic influence of digital and technological advancement on sustainable economic growth in Belt and road initiative (BRI) countries. *Sustainability*, 14(23), 15782.
- [6] Ullah, A., Pinglu, C., Ullah, S., Qaisar, Z. H., & Qian, N. (2022). The dynamic nexus of E-Government, and sustainable development: Moderating role of multi-dimensional regional integration index in Belt and Road partner countries. *Technology in Society*, 68, 101903.
- [7] Nikulina, O. (2020, March). Realization of the concept of the belt and road initiative based on the development of digitalization processes in the field of international trade. In "New Silk Road: Business Cooperation and Prospective of Economic Development"(NSRBCPED 2019) (pp. 795-802). Atlantis Press.
- [8] Dumor, K., & Yao, L. (2019). Estimating China's trade with its partner countries within the Belt and Road Initiative using neural network analysis. *Sustainability*, 11(5), 1449.
- [9] Gao, J., & Yu, X. (2022). Factors affecting the evolution of technical cooperation among "belt and road initiative" countries based on TERGMs and ERGMs. *Sustainability*, 14(3), 1760.
- [10] Zongze, R. (2019). The belt and road initiative is shaping a shared 21st century. *China Int'l Stud.*, 76, 5.
- [11] Liu, H., Tan, K. Y., & Lim, G. (2021). Introduction—Southeast Asia and the belt and road initiative: The political economy of regionalism, trade, and infrastructure. *The Singapore Economic Review*, 66(01), 1-20.
- [12] Hoh, A. (2019). China's belt and road initiative in Central Asia and the Middle East. *Digest of Middle East Studies*, 28(2), 241-276.
- [13] Zhang, J., Zhao, W., Cheng, B., Li, A., Wang, Y., Yang, N., & Tian, Y. (2022). The impact of digital economy on the economic growth and the development strategies in the post-COVID-19 era: evidence from countries along the "Belt and Road". *Frontiers in public health*, 10, 856142.
- [14] Dumor, K., Yao, L., Ainam, J. P., Amouzou, E. K., & Ayivi, W. (2021). Quantitative dynamics effects of belt and road economies trade using structural gravity and neural networks. *Sage Open*, 11(3), 21582440211032662.

- [15] Huang, J., & Li, S. M. (2024). Adaptive strategies and sustainable innovations of Chinese contractors in the Belt and Road Initiative: A social network and supply chain integration perspective. *Sustainability*, 16(20), 8927.
- [16] Dunford, M. (2021). China's Belt and Road Initiative and its implications for global development. *Acta Via Serica*, 6(1), 91-118.
- [17] Shen, H. (2018). Building a digital silk road? Situating the internet in China's belt and road initiative. *International Journal of Communication*, 12, 19.
- [18] Cheng, J., & Zeng, J. (2024). "Digital silk road" as a slogan instead of a grand strategy. *Journal of Contemporary China*, 33(149), 823-838.
- [19] Cheney, C. (2019). China's Digital Silk Road: strategic technological competition and exporting political illiberalism. Council on Foreign Relations, 19.
- [20] Yue Gao,Linyan Bai,Kefa Zhou,Yanfei Kou,Weiting Yuan,Xiaozhen Zhou... & Qing Zhang. (2024). Study on the Coupling Coordination Degree and Driving Mechanism of "Production-Living-Ecological" Space in Ecologically Fragile Areas: A Case Study of the Turpan-Hami Basin. *Sustainability*(20), 9054-9054.
- [21] Parvathy Sobhanan & E. I. Abdul Sathar. (2024). Estimation of Bonferroni Curve and Bonferroni Index of the Pareto Distribution. *Stochastics and Quality Control*(2),119-129.
- [22] Winardi Baskoro,Gde Kasmawan,Made Yuliara,Ketut Putra & Dan Sismanto. (2024). Double- Difference Method for Relocating the Hypocenter of Aftershock Earthquakes in Seririt Singaraja. *Asian Journal of Research and Reviews in Physics*(1),33-40.