Research on the Driving Effect of 'the Belt and Road' Strategy on the Development of China's Economic and Capital Strategic Resources Based on LMDI Decomposition Method

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Abstract—This paper decomposes the development of national economic and capital strategic resources according to the indicators related to 'The Belt and Road' strategy, using the LMDI decomposition method and Stata software, and uses the method of dividing the annual difference by the total value to quantify the contribution based on Professor Men Honghua's national strategic resource classification system. This article assesses the driving impact of 'The Belt and Road' strategy on the development of China's economic and capital strategic resources, as well as making some recommendations for future development.

Keywords-component; 'The Belt and Road 'strategy; Strategic resources; LMDI decomposition method

1 INTRODUCTION

As a top-level Cooperation Initiative launched by China and extending to the world, the 'The Belt and Road' strategy has a global relevance network that extends beyond the region. As of June 23, 2021, China had signed cooperation documents with 206 countries and 32 international organizations under the 'The Belt and Road' initiative. [1] The overall development of 'The Belt and Road' has also played a significant role in promoting and developing China's various strategic resources. We can clearly see the strategy's smooth implementation and the future opportunities for further optimization and growth of China's synthetic national power.

In the academic field, Yuan Xintao (2015) [2] specifically analyzed 'The Belt and Road' strategy, and potential challenges and development directions were discussed. Lin Lefen and Wang Shaonan (2015) [3] proposed an extension path from the strategic linkage of foreign trade to RMB internationalization by combining 'The Belt and Road' strategic construction and the empirical research results of the System GMM model; Wang Guijun and Lu Xiaoxiao (2019) [4] used the double difference method (did) to analyze the action path of the strategy on the upgrading of Chinese enterprises based on the quasi natural experiment proposed by 'The Belt and Road' strategy.

In this paper, we creatively combine the national strategic resource index with LMDI decomposition method, and analyze the role of various factors on the development of strategic resources in an intuitive and quantitative way. The specific process is as follows

2 ESTABLISHMENT OF THE MODEL OF 'THE BELT AND ROAD' INTERNATIONAL STRATEGY DRIVEN BY NATIONAL STRATEGIC RESOURCES BY TYPE

Men Honghua (2017) classified strategic resources into eight categories. The utility created during the operation of 'The Belt and Road' strategy is studied, as is its influence on the two modules of economic resources and capital resources, to construct a study of the boosting effect of 'The Belt and Road' strategy. [5]

2.1 Construction of LMDI model for boosting national economic resources by 'The Belt and Road' strategy

By partitioning the research object, Ang (1998) devised the factor decomposition technique for determining the influence of various factors on the research object. It is mostly classified as AMDI and LMDI. The latter produces no residual terms during the decomposition process, making it more ideal for decomposition of influencing factors.

2.1.1 Variable selection

The impact of 'The Belt and Road' strategy on economic resources is mainly reflected in important indicators related to national comprehensive strength, such as gross national income, total import and export trade of 'The Belt and Road' strategy, total import and export trade of Chinese goods, etc.

In the model construction, 'G' denotes gross national revenue, 'C' denotes 'The Belt and Road's total strategic import and export commerce, and 'T' denotes Chinese commodities' total import and export trade.

Then the 'The Belt and Road' strategy's development intensity is defined as GOC and the weight of 'The Belt and Road' strategic commerce is defined as COT.

• GOC denotes the 'The Belt and Road' strategy's development intensity. Divide gross national income by strategy X's total import and export commerce.

• COT denotes weight of 'The Belt and Road' strategic commerce, calculated by dividing the entire value of 'The Belt and Road' strategic import and export trade by the total value of China's commodity import and export trade, and so represents the share of 'The Belt and Road' strategic trade in international trade.

This study mainly uses LMDI decomposition model to analyze the impact of different factors on gross national income. The corresponding model is as follows.

2.1.2 Model construction

After variable selection, according to the theory, the model is established as follows:

$$G = \frac{G}{C} \times \frac{C}{T} \times T = GOC \times COT \times T \tag{1}$$

The change in GNI from year $t\text{-}1 \left(G^{t-1}\right)$ to year $t\left(G^{t}\right)$ may be stated as follows using equation (1):

$$\frac{G^t}{G^{t-1}} = \frac{GOC^t}{GOC^{t-1}} \cdot \frac{COT^t}{COT^{t-1}} \cdot \frac{T^t}{T^{t-1}} \tag{2}$$

According to equation (2), the following is the gross national income model using the natural logarithm transformation:

$$\Delta G^{t,t-1} = G^t - G^{t-1} = \lambda^t \ln\left(\frac{GOC^t}{GOC^{t-1}}\right) + \lambda^t \ln\left(\frac{COT^t}{COT^{t-1}}\right) + \lambda^t \ln\left(\frac{T^t}{T^{t-1}}\right) \tag{3}$$

$\lambda^t = (G^t - G^{t-1}) / (\ln(G^t) - \ln(G^{t-1}))$ is the result of the weights assigned to each variable in equation (3), gross national income may be split into changes induced by GOC, COT, and T. By dividing both ends of equation (2) by (G^{t-1}) one can determine the contribution of the three components to the quantity of foreign direct investment.

2.2 Construction of LMDI model for boosting national capital resources by 'The Belt and Road' strategy

2.2.1 Variable selection

Domestic and international investment modules comprise the bulk of national capital resources. Given that 'The Belt and Road' strategy is centered on foreign investment and economic trade, we depend on increased foreign investment to create an LMDI model linking 'The Belt and Road' strategy promotion to the growth of national strategic resources. The amount of foreign direct investment and the contract value of contracted projects in countries following 'The Belt and Road' strategy, China's investment in countries following 'The Belt and Road' strategy, the amount of actually utilized foreign capital, and net foreign direct investment are used to complete the model of foreign investment growth.

In the model construction, 'T' denotes actual foreign direct investment, 'N' denotes the revenue generated by foreign contracted projects, 'Q' denotes the contract value of foreign contracted projects, 'S' denotes China's non-financial investment in countries pursuing 'The Belt and Road' strategy, and 'A' denotes net foreign direct investment.

Then the ' index for 'The Belt and Road' strategy projects is defined as ION, the completion rate of foreign contracted projects is defined as NOQ, the income weight assigned to 'The Belt and Road' strategy projects is defined as QOS and the 'The Belt and Road' strategy investment focus weight is defined as SOA.

• ION is the introduction index for 'The Belt and Road' strategy projects, calculated by dividing foreign direct investment by the contract value of projects negotiated with nations along the 'The Belt and Road' strategy, indicating the relevance of project contracting revenue in the growth of foreign investment.

• NOQ is the completion rate of foreign contracted projects, which is calculated by dividing the turnover of foreign contracted projects by the contract value of foreign contracted projects.

• QOS is the income weight assigned to 'The Belt and Road' strategy projects, calculated by dividing the contracted project value of countries along the 'The Belt and Road' strategy by China's non-financial investment in those countries.

- SOA is the 'The Belt and Road' strategy investment focus weight, which is calculated by dividing China's non-financial investment in nations along the "strategy X" by net foreign direct investment, therefore indicating foreign investment's concentration.

2.2.2 Model construction

After variable selection, according to the theory, the model is established as follows:

$$I=\frac{I}{N}\times\frac{N}{Q}\times\frac{Q}{S}\times\frac{S}{A}\times A = ION\times NOQ\times QOS\times SOA\times A \tag{4}$$

The natural logarithm transformation is applied in equation (4) to generate the following model for actual foreign direct investment:

$$\Delta I^{t,t-1} = I^{t}-I^{t-1} = \lambda^{t}\ln\left(\frac{ION^{t}}{ION^{t-1}}\right) + \lambda^{t}\ln\left(\frac{NOQ^{t}}{NOQ^{t-1}}\right)$$
$$+ \lambda^{t}\ln\left(\frac{QOS^{t}}{QOS^{t-1}}\right) + \lambda^{t}\ln\left(\frac{SOA^{t}}{SOA^{t-1}}\right) + \lambda^{t}\ln\left(\frac{A^{t}}{A^{t-1}}\right) \tag{5}$$

$\lambda^{t}=(I^{t}-I^{t-1})/(\ln(I^{t})-\ln(I^{t-1}))$ is the result of the weights assigned to each variable in equation (5), gross national income may be split into changes induced by ION, NOQ, QOS, SOA and A. By dividing both ends of equation (4) by (I^{t-1}) one can determine the contribution of the five components to the quantity of actual foreign direct investment. [6]

2.3 Information of data

2.3.1 Sources of data

Gather and produce statistics based on macronational effective data, utilizing the National Bureau of Statistics' resources to collect the entire income of the Chinese people and the total import and export trade of 'The Belt and Road'. Utilize China's 'The Belt and Road' website and the Ministry of Commerce's official website to collect data on the total import and export of Chinese goods, the amount of foreign direct investment, the contract value of contracted projects in countries along 'The Belt and Road' corridor, and China's response to 'The Belt and Road'.

2.3.2 Data operation

After calculation, the data operation results are listed as follows:

Table 1 Table Type Styles

TI		2015	2016	2017	2018	2019	2020
GOC	OV	12.465	11.880	11.268	10.940	10.613	10.767
	AD	-	0.953	0.948	0.971	0.970	1.014
COT	OV	0.224	0.257	0.265	0.274	0.294	0.291
	AD	-	1.147	1.032	1.034	1.071	0.992
T	OV	2.45503E+13	2.43386E+13	2.78099E+13	3.0501E+13	3.15627E+13	3.21557E+13
	AD	-	0.991	1.143	1.097	1.035	1.019
ION	OV	0.810	0.790	0.780	0.800	0.800	0.930

	AD	-	0.960	0.980	1.030	1.000	1.160
NOQ	OV	0.733	0.653	0.636	0.699	0.664	0.610
	AD	-	0.890	0.970	1.100	0.950	0.920
QOS	OV	14.170	16.790	18.740	15.460	17.300	14.360
	AD	-	1.180	1.100	0.840	1.120	0.830
SOA	OV	0.102	0.074	0.091	0.109	0.110	0.116
	AD	-	0.728	1.225	1.205	1.005	1.054
A	OV	1.45667E+11	1.96149E+11	1.58288E+11	1.43037E+11	1.36908E+11	1.5371E+11
	AD	-	1.347	0.807	0.904	0.957	1.123

Note: in this table, Ti refers to time interval, OV refers to original value, and ad refers to annual director

2.3.3 Test of data

The unit root test of the logarithm of each variable shows that the horizontal values of all variable sequences are unstable, and their first-order differences are stable, which meets the conditions for constructing cointegration equations. Johansen cointegration test shows that there is a unique cointegration relationship.

3 ANALYSIS ON THE EFFECT OF 'THE BELT AND ROAD' INTERNATIONAL STRATEGY ON NATIONAL STRATEGIC RESOURCE DRIVE BY TYPE

3.1 Economic resource-driven impact analysis

The contribution of each indicator in different years and the growth rate of gross national income are given in Figure 1 for the established economic resource-driven model:
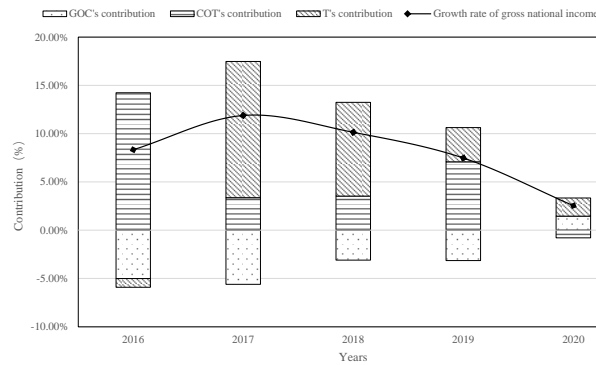

Figure 1. Decomposition of the contribution of the growth rate of the gross national income

While the total amount is increasing, the growth rate of gross national income follows a tendency of increasing first and subsequently dropping. Following a brief spike from 8.33% in 2016 to 11.88% in 2017, it began a gradual decline over the next three years, falling to 10.14%, 7.49%,

2.54% in 2018,2019,2020. Although there are epidemic-related issues at play, how to sustain growth stability and continually advance China's modernisation will become a critical problem in the future.

The contribution of the three variables 'The Belt and Road' trade development intensity GOC, 'The Belt and Road' trade weight COT, and China's total commodity import and export trade T to economic resource growth swings in diverse directions during this process. Between 2016 and 2019, the contribution of 'The Belt and Road' to commercial development intensity was -5%, -5.6%, -3.1%, and -3.15%, respectively. On the contrary, the intensity of development had a limited effect on the accumulation of economic resources.

Since 2016, the trade weight of 'The Belt and Road' has been critical in the acquisition of economic resources. From 2016 to 2019, 'The Belt and Road' trade weight contributed 14.24%, 3.37%, 3.54%, and 7.08%, respectively, to the buildup of economic resources. An analysis is used to determine the reasons for the ups and downs. On the one hand, they are based on the conventional shocks encountered during the development of 'The Belt and Road'. On the other hand, in the case of a less favorable trade weight distribution in the early stages, the rational allocation and increasing support over the last 16 years have resulted in a significant contribution. Although the contribution of trade weight was reduced to -0.79% in 2020, based on the circumstances at the time, it can be concluded that the impact of the epidemic forced the national development trade funds to be restructured. Thus, maintaining the normal trade weight will have a limited effect on economic recovery and accumulation.

The growth of China's overall commodities import and export trade demonstrates the benefits received as a result of the country's globalization. After a brief negative contribution of -0.9% in 2016, with China's continued openness to the outside world and expansion of its international trading system, total trade's contribution to economic resource accumulation increased dramatically, from 14.11% in 2017 to 9.7% in 2020. The positive contribution of 1.88% and the continual fall in growth rate are reflected in the bottleneck that China's trade system has steadily experienced. The penetration of the underlying market and the expansion of the scope of the 'The Belt and Road' may represent a significant breakthrough in the future for resolving significant difficulties.

3.2 Capital resource-driven impact analysis

The contribution of various variables throughout time and the growth rate of actual employed foreign capital are depicted in Figure 2.

The growth rate of foreign capital usage fell slightly to -0.21% in 2016, but swiftly rebounded to 4% in 2017 and maintained a high rate of growth of 3%, 2.35%, and 4.51% in the following three years. However, when the worldwide FDI declines by more than 35% in 2020, China has accomplished contrarian growth. As can be observed, China's development of capital resources is remarkable and has enormous potential. Thus, examining the period's content enables the buildup of China's capital resources to be experienced.

'The Belt and Road' project introduces the indicator ION, the completion rate of foreign contracted projects NOQ, the income weight QOS of the 'The Belt and Road', and the investment of 'The Belt and Road' is centered on the weight SOA. Additionally, net foreign direct investment has a rhythm of varying orientations and intensities. From 2016 to 2017, the contribution of 'The

Belt and Road's introduction index was negative, ranging from - 3.62% to - 1.71%. According to the analysis, the infrastructure along the line is not perfect at this stage of 'The Belt and Road', and the expanded project introduction will delay the accumulation of capital resources to some extent due to the large investment, but will show a positive contribution of 2.73% and 0.06% from 2018 to 2019. In 2020, the contribution of foreign engineering construction increased to 15.07%, underscoring the critical nature of engineering construction.

The contribution of foreign contracted projects' completion rates has changed dramatically during the last five years. After contributing - 11.55% in 2016, it grew to - 2.82% and 9.68% in the following two years, before declining to - 5.15% and - 8.69% in the subsequent two years. Similarly, the index with the highest volatility is 'The Belt and Road' strategic income weight, which has a five-year volatility of 16.94%. We can see from the repeated fluctuations of 9.72%, - 18.07%, 11.40%, and - 19.04% that the completion rate of foreign contracted projects contributes positively in years when the international market is relatively volatile, whereas 'The Belt and Road' strategic income weight contributes positively in years when the international market is relatively stable.
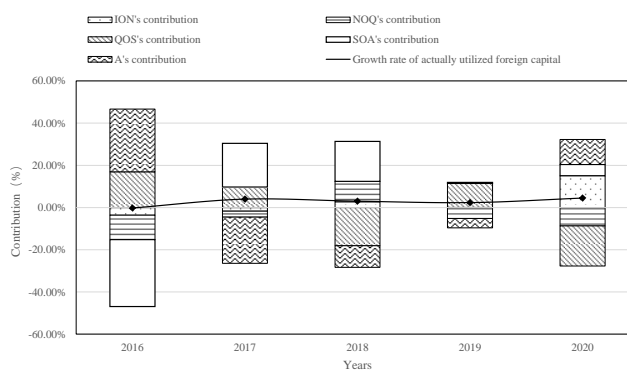

Figure 2.   Decomposition of the contribution of the growth rate of the actually utilized foreign capital

The contribution of 'The Belt and Road' investment focus weight was as low as -31.70% in 2016, but quickly increased to 20.67% a year later, with a contribution adjustment range of more than 50%, and remained at a high of 18.95%, 0.47%, and 5.33% in the following three years. During the market expansion phase of strategy x, an excessive emphasis on capital investment will result in insufficient capital utilization. This will have the opposite effect on capital resource accumulation, but after the establishment of a comprehensive and perfect trading system, the focus of funds will generate significant returns.

After reaching a high of 29.72% in 2016, net foreign direct investment declined for three consecutive years, reaching lows of - 21.87%, - 10.28%, and - 4.43%, and is again recovering. When the worldwide market requires stimulation in 2020, it soon increased to 11.84%. It is projected that during periods of stable markets, net foreign investment will sink more in order to increase penetration. This will have a little effect on capital accumulation, but during years of severe swings, external growth will be highly beneficial to capital accumulation.

4　CONCLUSION

As a consequence of the unique qualities of the aforementioned indicators and the findings of the model analysis, the following proposals for the future development of 'The Belt and Road' are made:

(1) Maintain the 'The Belt and Road' strategy's trade intensity and weight in a reasonable manner, prudently allocate national economic and foreign trade development through a combination of global markets and supply chains, maximize resource-driven empowerment enabled by 'The Belt and Road', enhance the comprehensive economic stability model, and further strengthen 'The Belt and Road' as the cornerstone of development and stability on the path to diversified development.

(2) Continue to advance the reform of opening up to the outside world, identify the original intention of mutual benefit and win-win results, actively develop foreign trade, strengthen foreign economic and trade ties, and pursue 'The Belt and Road' Take advantage of the opportunity to strengthen expansion, deepen peripheral relations of countries along the line, enhance the comprehensive accumulation of various strategic resources, ensure a perfect trade system.

(3) Diversified economic development plan based on the wide market of the 'The Belt and Road' to construct a digital and green economic model and capitalize on new driving factors. Simultaneously, we should plan fairly for the completion of overseas contracted projects depending on market swings, avoid making long-term plans with transient advantages, and plan 'The Belt and Road' macroeconomically. Comprehensive development entails actively establishing cooperative relationships between nations, banding together to address global challenges, and pooling resources to accumulate national strategic assets.

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