

Research on the Capacity Cooperation between China and Other BRICS Countries -A Study Based on the Analysis of International Competitiveness of Industries

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Abstract: The Ninth BRICS Leaders Meeting pointed out that, capacity cooperation is the key cooperation area for the five countries in the future. This paper finds that BRICS countries have diversified resource endowments, industrial advantages and economic development models, which provide complementation and development space for capacity cooperation. Moreover, BRICS countries have broad common interests and a good foundation for achieving common prosperity. Therefore, the capacity cooperation between China and other BRICS countries should be carried out on the basis of each country's comparative advantages, basic conditions and the actual needs of economic development. This paper also analyzes the international competitiveness of industries in BRICS countries from the perspective of RCA and TC, and illustrates international competitive industries of each country, so as to make the cooperation between China and other BRICS countries more effective and pertinent.

1. Introduction

From 2009 to 2017, the BRICS Summit has held nine sessions; the cooperation scope has become increasingly extensive. However, the most important issue is always the cooperation in economic, financial and development fields. Capacity cooperation is one of the core contents in economic cooperation. With the development of BRICS cooperation mechanism, the importance of capacity cooperation is becoming more and more prominent. At present, China is in the situation of industrial upgrading and overcapacity; industry export is inevitable. Meanwhile, other BRICS countries need to undertake dominant industries in the road of industrialization. Thence, there are the supply and demand conditions for bilateral capacity cooperation.

International capacity cooperation refers to international industrial investment cooperation focusing on the construction and transferring of productive capacity, and aiming to promote mutual benefit and to achieve the win-win result. International capacity cooperation takes enterprises as the main body, follows the principle of market-oriented, focuses on developing manufacturing industry and infrastructure, as well as exploiting energy resources, and mainly adopts the methods of direct investment, contract engineering, equipment trade and technical cooperation.

2. Basic Economic Conditions for BRICS Capacity Cooperation

Members of BRICS include the top four developing economies and the largest economy in the African continent; all of them are influential regional powers. The total economic volume and population of the five countries are huge; their resources endowments and industrial layouts have distinctive characteristics. The economic complementarity of the five countries is strong, which provides a good economic basis for the mutual capacity cooperation.

2.1 The vitality of economic growth varies

The unbalanced economic development of the five countries provides new space for mutual capacity cooperation. After 2010, there are significant differences in the GDP growth rates of BRICS.

The economic growth rate of China and India are relatively fast, basically keeping at 6%-8%, with the fastest growth rate exceeding 10%. This shows that China and India have good markets and development momentum. The growth rates of Brazil and Russia show a significant downward trend, with even negative growth in the last two years, indicating that the two countries have insufficient momentum for development; their economic vitality are significantly decreasing. At the same time, the growth of Brazil and Russia fluctuates greatly. Brazil's economic growth fluctuates and decreases the most, reaching 7.53% in 2010, and decreasing to -3.77% and -3.59% respectively in 2015 and 2016. South Africa's economic growth rate is the lowest among the five countries, stabilizing between 0.28% and 3.28%. Its economic development is lacking vitality; the potential needs to be further tapped.

2.2 Gradient of industrial structure

Industrial structure is an important part in economic structure; it is closely related to trade and investment. The five countries focus on developing different industries, which provide them a large space for industrial cooperation. As can be seen from Figure 1, in 2016, the tertiary industry accounted for more than 60% of GDP in Brazil, Russia and South Africa; their industrial structures reached or approached the level of developed countries, higher than that of China and India. China's service sector accounted for only 51.6% of the total, while the industrial sector accounted for 39.8%. India has a similar industrial structure. Its service sector accounted for 53.7%, slightly higher than that of China, but the agricultural sector accounted for much higher proportion than other four countries. Compared with other four countries, China's processing and manufacturing industry has outstanding advantages, so China and other four countries have strong complementary industrial structures. In India, information service industry is their advantage industry with high developed levels; the industrial structure of India is quite different from that of other four countries. Russia and India, China and South Africa have strong agricultural complementarities; Russia and China have comparative advantages in energy.

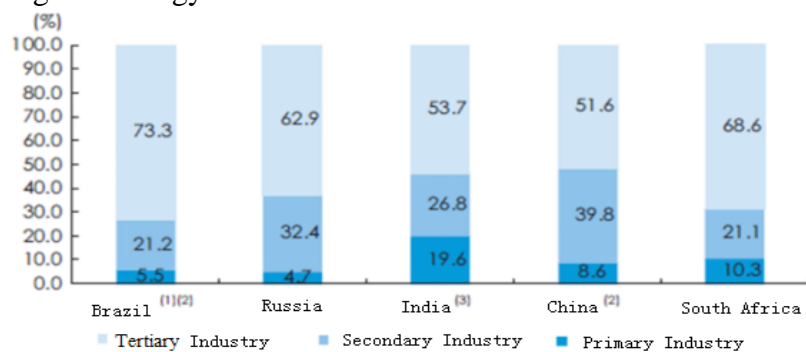


Figure 1. The shares of three main industries in GDP (2016) (%)

2.3 Abundant labor resources

Total population of BRICS countries accounts for 40% of world's population. In 2015, China's total labor force reached 800 million; Brazil reached 110 million; India reached 500 million; Russia reached 75 million while South Africa reached 21 million. The population provides enough labors for BRICS countries in maintaining economic growth. China and India are world's most populous countries; Brazil is the most populous country in Latin America. They have enormous space in expanding labor-intensive industries. These three countries could make up for the long-term shortage of Russian in labor force. In addition, Brazil and South Africa have more unemployed people than other BRICS countries; the demographic dividend needs to be further developed.

2.4 Comprehensive innovation competitiveness of the BRICS

Technology is an important component in factor endowment. Economic development depends more and more on research and development capabilities. Technological innovations in various countries are obviously complementary. China's scientific and technological innovation cooperation

with other BRICS countries includes three aspects: international cooperation in scientific and technological innovative projects, basic and technological cultural exchanges. From 2007 to 2015, the Chinese government has supported 665 bilateral scientific and technological innovative cooperation projects with the other four countries, with the total investment volume of 2.729 billion yuan. The main areas of cooperation are materials, engineering, information and life. China's cooperation with Russia is a paragon of bilateral cooperation, mainly through projects and bases. The main way of cooperation between China India is cultural exchange. China's cooperation with South Africa is mainly through project cooperation; bilateral cooperation with Brazil is not often. Cultural exchanges are still in initial stage.

3. Comprehensive Evaluation on the International Competitiveness of Industries in BRICS Countries

Based on the previous research, this paper analyzes the international competitiveness of BRICS countries from the perspectives of comparative advantages and competitive advantages of industrial international competitiveness. The comparative advantage is illustrated by the Revealed Comparative Advantage Index (RCA), while the competitive advantage is illustrated by the Trade Competitive Advantage Index (Tc).

Comparison of revealed comparative advantage index of various industries. Revealed Comparative Advantage Index (RCA), which is expressed by the ratio of a certain industry's share in one country's export to its share in total world trade, can be used to analyze the comparative advantage of the industry, and then to analyze the country's industrial competitiveness. Generally speaking, if the RCA index is less than 0.8, the competitiveness of this industry is weak; if the index lies between 0.8 and 1.25, the industry is moderately competitive; if the RCA lies between 1.25 and 2.5, the industry is highly competitive; if the value is greater than 2.5, the industry is highly competitive.

This paper calculates the RCA of the top 10 commodities of BRICS countries in 2011 and 2016, and analyzes the comparative advantages of each country according to the results. The data are mainly collected from the United Nations Commodity Trade Statistics Database (UNComtrade); the classification of products is carried out based on criteria of the Standard International Trade Classification, Revision 4.

Table 1. Revealed comparative advantage index of each industry in BRICS countries in 2011 and 2011

| Category | China | | India | | Russia | | Brazil | | South Africa | |
|----------|-------|------|-------|------|--------|------|--------|------|--------------|------|
| | 2011 | 2016 | 2011 | 2016 | 2011 | 2016 | 2011 | 2016 | 2011 | 2016 |
| 0 | 0.46 | 0.44 | 7.70 | 1.48 | 1.81 | 0.58 | 21.62 | 3.68 | 6.57 | 1.41 |
| 1 | 0.16 | 0.19 | 0.32 | 0.52 | 0.14 | 0.35 | 1.19 | 1.35 | 1.42 | 1.90 |
| 2 | 0.18 | 0.17 | 5.42 | 0.97 | 3.31 | 1.00 | 28.64 | 7.15 | 17.11 | 3.87 |
| 3 | 0.1 | 0.14 | 18.76 | 1.12 | 67.03 | 4.13 | 10.46 | 0.66 | 10.50 | 1.01 |
| 4 | 0.05 | 0.05 | 0.35 | 0.66 | 0.18 | 1.08 | 0.97 | 1.19 | 0.28 | 0.56 |
| 5 | 0.56 | 0.51 | 10.42 | 1.24 | 4.22 | 0.40 | 5.91 | 0.52 | 6.70 | 0.66 |
| 6 | 1.3 | 1.35 | 25.10 | 2.10 | 9.76 | 0.98 | 11.23 | 0.98 | 26.66 | 2.06 |
| 7 | 1.49 | 1.27 | 13.87 | 0.45 | 2.27 | 0.11 | 15.13 | 0.51 | 17.56 | 0.62 |
| 8 | 2.32 | 1.93 | 13.31 | 1.26 | 0.44 | 0.08 | 1.96 | 0.17 | 3.13 | 0.28 |
| 9 | 0.03 | 0.06 | 4.75 | 0.40 | 10.84 | 2.72 | 2.89 | 0.55 | 10.07 | 1.16 |

Data sources: above data are collected from the Uncomtrade database of the United Nations, and the UNCTAD database of the United Nations Conference on Trade and Development.

Table 1 shows that, according to the Standard International Trade Classification (SITC), China has high RCA indexes between 1.25-2.5 in three major categories of products, i.e. manufactured goods (Category 6), machine transport equipment (Category 7) and miscellaneous products (Category 8).

These products are mainly classified as raw materials. This indicates that these three categories of Chinese goods have strong international competitiveness. In cooperation with other BRICS countries through product output and industrial transfer, these products have good advantages and potentials. Russia's RCA index is high only in fossil fuels, lubricants and related raw materials (Category 3). The value is extremely high. In recent years, it has remained around 4. The RCA indexes of other commodities are low. India has high RCA indexes in four major categories of commodities, namely, food and livestock (Category 0), chemicals and related products (Category 5), manufactured goods (Category 6) and miscellaneous products (Category 8), indicating that India has advantages in capacity cooperation in these four categories of commodities. Brazil has very high RCA indexes in the food and livestock (Category 0) and non-edible crude materials (exclude Tobacco) (Category 2). Capacity cooperation through product export is a suitable way. South Africa has relatively or extremely high RCA indexes in raw materials and primary products (Categories 0, 1 and 2). Capacity cooperation through product export is an appropriate method.

Comparison of industrial competitiveness index. The industrial competitiveness can be measured by Trade Competitiveness Index (TC). The formula is $TC_i = (X_i - M_i) / (X_i + M_i)$, in which X_i is the export value of products in industry I; M_i is the import value of products in industry I; TC_i is the competitiveness index of industry I. The value of TC is between - 1 and + 1. The closer a value approximates to + 1, the stronger of industry product competitiveness is; the closer a value approximates to - 1, the weaker of industry product competitiveness is. If the value is close to zero, the product competitiveness of industry is comparable to the international level.

Table 2. The competitiveness index of the BRICS in 2011 and 2015

| Country | Category | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--------------|----------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| China | 2011 | 0.27 | -0.24 | -0.90 | -0.79 | -0.91 | -0.22 | 0.36 | 0.18 | 0.57 | -0.91 |
| | 2015 | 0.07 | -0.27 | -0.88 | -0.75 | -0.84 | -0.14 | 0.49 | 0.22 | 0.63 | -0.95 |
| India | 2011 | 0.62 | 0.57 | -0.16 | -0.47 | -0.78 | -0.15 | 0.04 | -0.29 | 0.50 | -0.64 |
| | 2015 | 0.48 | 0.44 | -0.40 | -0.54 | -0.82 | -0.13 | 0.10 | -0.30 | 0.45 | -0.71 |
| Brazil | 2011 | 0.73 | 0.67 | 0.85 | -0.22 | 0.41 | -0.47 | 0.05 | -0.38 | -0.47 | 1.00 |
| | 2015 | 0.73 | 0.59 | 0.85 | -0.29 | 0.32 | -0.54 | 0.14 | -0.34 | -0.52 | 1.00 |
| Russia | 2011 | -0.54 | -0.69 | 0.45 | 0.97 | -0.33 | -0.24 | 0.18 | -0.83 | -0.86 | 0.34 |
| | 2015 | -0.22 | -0.43 | 0.27 | 0.97 | 0.24 | -0.16 | 0.32 | -0.61 | -0.58 | 0.85 |
| South Africa | 2011 | 0.17 | 0.30 | 0.76 | -0.30 | -0.57 | -0.20 | 0.46 | -0.31 | -0.44 | 0.28 |
| | 2015 | 0.27 | 0.39 | 0.71 | -0.26 | -0.36 | -0.25 | 0.34 | -0.27 | -0.49 | -0.40 |

Data sources: above data are collected from the Uncomtrade database of the United Nations, and the UNCTAD database of the United Nations Conference on Trade and Development.

Table 2 shows that China has obvious competitive advantages in the 6th, 7th and 8th product categories; India has significant competitive advantages in the 0th, 1st and 8th product categories. Brazil has significant competitive advantages in the 2nd, 4th and 9th product categories, which provide wide complementary space for its trade with China. Russia has significant competitive advantages in the 2nd, 3rd and 9th product categories, which provide wide complementary space for Sino-Russian trade. South Africa's competitive advantage in the second product category is also complementary to China. China and India are competitors in the eighth product category. China and Brazil, as well as China and Russia are more like partners than competitors; China and South Africa have both partners and competitors. To sum up, BRICS countries have both complementarity and differences, which provide favorable conditions for investment cooperation.

4. Policy Proposals to Promote China's Capacity Cooperation with Other BRICS Countries

Based on the analysis of current situation and conditions of capacity cooperation between China and other BRICS countries, this paper finds that BRICS countries have rich natural resources, relatively abundant production factors, as well as different comparative advantages and economic

structures. These conditions provide the foundation for capacity cooperation, but the potentials are not fully utilized. In order to enhance the capacity cooperation between China and other BRICs countries, following policy recommendations are put forward.

First, the development levels of BRICS countries are not balanced. According to the specific characteristics of countries, we should establish a bilateral demand docking model which coordinates the cooperation in complementary industries and avoids competition. The manufacturing advantages of Brazil and Russia are mainly concentrated in resource-intensive industries, while those of India are concentrated in labor-intensive industries. By contrast, China's advantages in technology intensive industry are not processed by these three countries. As far as the industry structure is concerned, Brazil's automobile, steel and petrochemical industries are developing very well. The energy industry in Russia is well developed, so as the space industry. India's software and biomedicine are relatively developed. As Africa's largest energy producer and consumer, South Africa has the highest electricity production capacity in the continent, but the marine industry remains to be developed.

Second, we need to construct overseas industrial cooperation parks and supporting platforms for capacity cooperation. Overseas industrial cooperation parks should be established on the basis of national policies on industrial transfer and investment direction. Governments, parks and enterprises in different countries should cooperate to construct infrastructure and related supporting facilities of parks, in order to promote bilateral industrial cooperation, enhance industrial agglomeration and improve the division of labor in the industrial chain.

Third, we need to give full play to the role of financial support. Capacity cooperation projects usually need large investment and long construction cycles. The financing capacities of enterprises directly determine their investment willing. The BRICS Development Bank is an important symbol of BRICS cooperation. In addition, the public-private partnership (PPP) model can also be used to encourage more private financial institutions and enterprises to participate in these investment projects.

Fourth, we should improve the BRICS international technology transfer mechanism. Through the integration of policies, industries, scientific and technological services, as well as scientific and technological innovation resources, we can carry out scientific and technological exchanges, construct joint laboratories as well as scientific and technological industrial parks, and transfer technologies in different fields, so as to achieve the widely and orderly transfer of scientific and technological innovations among the five countries.

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