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Structural Changes in Comparative Advantages of the BRICS

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Abstract

This article discusses the structural changes that have taken place in the five emerging markets forming the BRICS grouping during the last two decades. The comparative advantages or disadvantages of the five economies are identified using revealed symmetric comparative advantage index. The long-run shifts in the comparative advantages and disadvantages are further analysed across the BRICS countries. The results show a continuous shift from primary manufacturing and from production of merchandise with low added value, to more sophisticated goods.

Keywords: BRICS countries; comparative advantage; international trade; SITC, structural analysis.

1. Introduction

Since 2001, when economic expert of the investment bank Goldman Sachs, Jim O’Neill (2011) coined the acronym BRIC for the first time, the most rapidly developing countries of the world, Brazil, Russia, India, China, and since 2011 also South Africa, have experienced a dramatic development which can be hardly described as stable or fluent (Kocourek 2014). From more or less a journalistic marketing label with indistinctive common economic content of the potentially most successful emerging markets, the BRICS grouping has been continuously forming itself into one of the most important player in the global policy and economy. Together they represent a quarter of the world area, 40 % of the world population, 20 % of global GDP, and 16 % the world international trade in goods and services. All the BRICS members are connected by the disappointment from being permanently marginalized within the system of international relations and by their endeavour to transform it (especially the UN Security Council, but also the World

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Bank Group and the International Monetary Fund) or to rebuild it from the ground (founding a joint development bank, creating a reserve fund for mutual support of the national currencies, planning a monetary union) (Roşu-Hamzescu – Roşu-Hamzescu 2011).

Nevertheless, the relations among the BRICS countries are not the very smooth ones. In fact, the countries represent quite divergent attitudes to and opinions on a number of issues (be it the civil war in Syria, the global climate change, the territorial ruptures between China and India, the fear of South Africa from growing impact of China in the “Black Continent”, Chinese economic and political expansion to Middle East and eastern Russia, Russian expansion to Ukraine, or growing competition on the global commodity markets).

The aim of this article is to shed some light on the structural changes that have taken place in these five emerging markets during the last two decades and to discuss the consequences of these changes for the grouping as a whole and for its members. The individual comparative advantages or disadvantages of the five economies are identified within the 255 classes of merchandise they export. The long-run (period 1995–2013) shifts and changes in these comparative advantages/disadvantages are described and further analysed across the five countries. Similarly to Cui and Syed (2007) or to Kojima (2000), the results of this paper show a continuous shift from primary manufacturing and from production of merchandise with low added value, to more sophisticated goods. The whole group of the BRICS is gaining new competitive advantages mainly in the sector of machinery and transport equipment, but also in some others. The position of individual countries has been transforming significantly as well. Especially India has shown a rather profound restructuring of its sector export orientation over the last 19 years. China as a competitive superpower is gaining and consolidating the export positions mainly in the chemical industry (together with Russia), manufacturing, consumer goods, and of course machinery and transport equipment (together with India).

2. Methods

The research method of this paper is based on the methodology of revealed comparative advantage (RCA) developed by Béla Balassa (1965). It measures a country’s export of a particular commodity in relation to its total exports and to the corresponding export performance of a set of countries. In other words, the RCA is able to identify the sectors or commodities, with which the exporters of a particular country are more successful than the exporters from other countries.

\[
RCA_{i,C}^t = \frac{X_{i,C}^C}{\sum \frac{X_{i,G}^C}{X_{i,t}^G}},
\]

where \(C\) is a country, \(G\) is a group of countries, \(i\) is a particular group or class of commodities according to SITC (rev. 3), \(t\) is a period of time.

A problem with the Balassa RCA is that its value is asymmetric: it varies from one to infinity for products in which the country has a revealed comparative advantage, but only from zero to one for commodities with a revealed comparative disadvantage. Resulting from Grupp (1994), Dalum et al. (1998) proposed a revealed symmetric comparative advantage index (RSCA) to alleviate the skewness problem as follows:

\[
RSCA_{i,C}^t = \frac{RCA_{i,C}^t - 1}{RCA_{i,C}^t + 1}.
\]

The closer to \(+1\) the results of RSCA get, the more significant are the comparative advantage they indicate, while the more they are converging to \(-1\), the more substantial are the comparative disadvantages.
There has been an intensive debate on the explanatory power and unbiasedness of the \( RCA \) and \( RSCA \). Berkowitz et al. (2006), Chor (2008) as well as Barattieri (2014) search for the sources of comparative advantages and demonstrate how transport cost, transaction cost or trade cost bias the results of the comparative advantage analyses. Siggel (2006) shows the distinction between competitiveness and comparative advantage, but admits the two theoretical concepts have in fact many common shapes and features. Moenius (2006) proves \( RSCA \) is an adequate measures of comparative advantage, although it does not have a significant predictive power. Pingyao and Jingyun (2012) perform the \( RSCA \) analysis to identify the growth potential of merchandise trade among the BRICS and build further analytical instruments on the platform of \( RSCA \). Wanling and Xiaohui (2013) use the \( RSCA \) to detect the problems in bilateral relations between BRICS countries.

2.1. Data

The data for the calculations were provided by the United Nations Conference on Trade and Development (UNCTAD) Statistical Division. The data are recorded using SITC (rev. 3) industry classification. They are available for the time period 1995-2013. The three digit level of classification provides more detailed information about the commodity structure of exports (255 classes clustered into 10 major groups – see Appendix A) and offers an opportunity for more accurate conclusions biased to a lesser extent by excessive aggregation. Unfortunately, only the data on merchandise trade are available in the matrix structure, therefore this paper deals solely with the issue of international trade in goods. The international trade in services, no matter how dynamic and important (esp. for India), had to be put aside for now due to lack of reliable data (UNCTAD 2014).

2.2. Analysis

For the analysis, the individual \( RSCA \) for each country (Brazil, Russia, India, China, and South Africa) and then for the whole BRICS grouping has been calculated in each year (1995–2013) and for each of the 255 SITC classes. The export position of each of these subjects was compared to the world’s average (i.e. in the equation (1) the group of countries \( G \) is represented by all the countries of the world). The positive result therefore shows a global comparative advantage, while the negative result indicates a global comparative disadvantage in the particular industry and country.

In the next step, the mean annual pace of change over the 19-year-long period has been estimated using ordinary least square correlation analysis:

\[
\beta_{it}^C = \frac{n \sum_{t=1}^{n} RSCA^C_{it} - \sum_{t=1}^{n} RSCA^C_{i} \sum_{t=1}^{n} t}{n \sum_{t=1}^{n} t^2 - \left( \sum_{t=1}^{n} t \right)^2},
\]

where \( C \) is a country, \( i \) is a particular group or class of commodities according to SITC (rev. 3), \( t \) is a period of time, and \( n \) is a number of years (i.e. 19 years, from 1995 to 2013). The values of \( \beta_{i} \) were tested for statistical significance using T-test against 95% confidence level. Only the statistically significant values of \( \beta_{i} \) were accepted for the following outcomes of the analysis. For better and faster understanding, the initial values of \( RSCA \) in the year 1995 were applied to the horizontal axis, while the estimated annual paces of change (the values of \( \beta_{i} \)) were brought to the vertical axis in the Fig. 1 and in appendices.

3. Results and Findings

The Fig. 1 illustrates the general results for all five emerging markets of BRICS. During the last two decades, an important structural shift has occurred in the BRICS, since the negative values of \( RSCA \) recorded at the beginning of the analysed period (starting position in 1995) are generally connected with positive values of mean annual pace of
development. This indicates a tendency of improving the export positions of BRICS in those sectors, where the countries used to show comparative disadvantage in the mid 90’s. A representative example here is the group 7 consisting of machinery and transport equipment, but to some extent also the group 4 of animal and vegetable oils and fats, the group 5 of chemical products and the group 6 of manufactured goods.

Within the group 6, the BRICS seem to divert from exporting primarily processed raw materials and semiproducts (such as leather, wood, textile yarn, cotton fabrics, lime, cement, pearls, precious stones, ingots or bars of iron and steel, silver, platinum, copper, nickel, aluminium, lead, zinc, tin, etc.) to output with higher added value (such as rubber tyres, paper and paperboard, tulles and ribbons, construction materials, glassware, wires, tubes and pipes, metal containers, household equipment, etc.).

Also such sectors as group 2 and group 3 (crude materials and mineral fuels and lubricants), where the BRICS had an important comparative advantage in 1995 tend to play a smaller role in BRICS exports nowadays resulting in negative mean annual paces of development over the last two decades. This is especially true for oil seeds, synthetic rubber, fuel wood, wood chips and rough wood, pulp, but also for silk, crude fertilizers, stone, iron and other ores, crude animal and vegetable materials, etc. (in group 2) and coal, petroleum oils and petroleum semiproducts and natural gas (in group 3).

Groups 0 and 1 (food and live animals and beverages and tobacco) recorded in most of the subclasses deterioration of comparative advantages (e.g. for meat, fish, vegetables, fruits and nuts, coffee, tea, feeding stuff for animals, or non-alcoholic beverages and manufactured tobacco). This may be caused by growing domestic demand of the BRICS themselves or – of course – by decreasing demand from abroad.

Analysis of the development and changes in individual BRICS economies in particular sectors leads to the following results:

- In group 0 and 1 (see Appendix B, Fig. 2) China and South Africa leave their export positions in favour to Russia. Russian comparative disadvantage from the mid 90’s has been improving since then, while South African and
especially Chinese comparative advantages (but also comparative disadvantages) tend to further deteriorate. Structural shifts in Indian exports indicate in most cases weakening the comparative advantages of 1995 and improving of the comparative disadvantages of 1995 (this certainly applies to fresh fish, meal and flour of wheat, rice, fruits and nuts, vegetables, coffee, tea, spices, feeding stuff for animals, and margarine, where India accounted losses, but also to bovine meat, milk, cream and milk products, butter, birds’ eggs, wheat, barley, maize, cereals, sugar confectionery, cocoa, chocolate, where Indian exporters recorded gains).

- In groups 2, 3, and 4 (see Appendix B, Fig. 3), China and Russia as well as (in majority of cases) South Africa seem to offer their export markets to Brazil, India or other countries. Especially India is facing distinctive structural changes, losing its original comparative advantages (such as oil seeds, stone, sand, gravel, iron and other ores, crude animal materials) and turning the comparative disadvantages into the country’s new export orientation (especially cotton, wool, vegetable textile fibres, synthetic and other man-made fibres, but also sulphur and some other crude minerals).

- In group 5 (see Appendix B, Fig. 4), China is the main winner. Russia is improving its position in metallic salts and other inorganic chemicals, in polymers of styrene and in plastics (tubes, pipes, hoses, monofilaments), but has lost the competitive advantages in alcohols, phenols, radio-actives, as well as explosives. The other three BRICS countries experienced worsening of their comparative position on the global export markets.

- In group 6 and 9 (see Appendix B, Fig. 5), China is gaining the comparative advantages on the expenses of Brazil, Russia, and South Africa. The mixed results for India illustrate again the deep shifts of its export orientation: leaving some of the traditional comparative advantages (rubber tyres, cotton and other woven fabrics, lime, cement, iron and steel bars, and cutlery) and winning the new ones (mainly flat-rolled iron, tubes, pipes and hollow profiles, copper, nickel, lead, and zinc). South Africa only a slight one, but Brazil experienced a large loss of its comparative advantages in non-monetary gold.

- In group 7 (see Appendix B, Fig. 6), mainly Russia recorded further deterioration of its already rather deep comparative disadvantages as well as of its rare comparative advantages. Brazil seems to put its traditional comparative advantages aside to get the new ones (steam turbines, electric plants and power generating machinery, road motor vehicles, aircrafts as well as ships and boats). India and China are strengthening their positions in the markets, where they originally did not have many comparative advantages (for India e.g. tractors, aircrafts, ships and boats, for China steam turbines, civil engineering, textile and leather machinery, metalworking machinery, heating and cooling equipment, pumps and gas compressors, mechanical handling equipment, bearings, non-electric parts of machinery, but especially office machines, automatic data processing machines, television receivers, telecommunication equipment, equipment for distributing electricity, cathode valves and tubes, railway vehicles and ships and boats). South Africa concentrates in its exports only on selected segments of this sector and tries hard to maintain the comparative advantages (basically only in pumps and gas compressors and trailers and semi-trailers) or to get the new ones (only in motor vehicle for transport of goods).

- In group 8 (see Appendix B, Fig. 7) of other miscellaneous products, the results are mixed. Especially China and India have recorded quite significant restructuring even in this sector of international trade. India is losing some of the very typical comparative advantages (footwear, clothing or office and stationery supplies) and gradually gaining a couple of new ones (in the field of meters and counters, works of art and antiques). China is winning in clothing, footwear, optical goods and instruments, furniture and lighting, prefabricated buildings, even musical instruments. One of the rare industries where India is beating China, is cinematography (films, photographic apparatus and equipment).

4. Conclusions

The results of this paper proved a long-run export reorientation of the BRICS from elementary raw materials processing and from low added value production, to more sophisticated merchandise. With some exceptions in Russia and India, the analysis generally confirms the Akamatsu’s flying geese paradigm (Akamatsu 1962), but it brings more detailed and disaggregated findings. It also points out another important issue: The success of Chinese export-oriented policy bears fruits for its economy and society, but also increases competition in a number of sectors. Chinese dominance as well as its size and ambitions have been already causing some fear on the Brazilian, Russian, as well as
African side of BRICS, challenging the very basics of the concept of the BRICS as a sustainable economic entity (Mathur – Dasgupta 2013).

The fact, the BRICS countries are turning more and more to the production of high value added merchandise is probably a consequence of their previous rapid economic growth and development. Arising middle class in their societies magnifies the domestic demand for consumer goods with increasing preference of higher quality. This is considered a strong stabilizing factor for economic performance of these giant markets (Kishore 2013), but it also results in a strong export orientation of the whole economies. The other important driving factor may be represented by the foreign direct investment and also by the changing situation in the developed market economies. Precisely these factors and their importance for restructured the BRICS open a space for further research as they have the potential to provide new arguments to the debate on the future of the BRICS.

Appendix A. Standard International Trade Classification SITC (rev. 3)
Appendix B. Comparative Advantages according to the Group of Goods

Fig. 2. Groups 0 Food and Live Animals and 1 Beverages and Tobacco

Fig. 3. Groups 2 Crude Materials (except Fuels), 3 Mineral Fuels and Lubricants, and 4 Animal and Vegetable Oils and Fats

Fig. 4. Group 5 Chemical Products

Fig. 5. Groups 6 Manufactured Goods and 9 Non-monetary Gold
References


