

ANALYSIS ON SINO-BRAZILIAN TRADE STRUCTURE AND THE IMPACT OF TRADE GROWTH

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ABSTRACT. *On May 24, 2019, Morang, the Brazilian Vice President, pays an official visit to China, the leaders of the two countries express their willingness to further expand cooperation in trade, while opposing unilateralism and trade protectionism. However, as the Sino-Brazilian trade ties grow closer, there has been growing talk on the asymmetrical trade structure between China and Brazil: “China Threatens Brazilian Economy” and “Trade Protectionism”. Therefore, in order to conform to the development trend of the times, and to prove that the outside world’s speech is extremely irrational, the study of this paper is of great importance. First, the trade structure index is selected and measured, and the conclusion is reached that the Sino-Brazilian trade integration is high, the competition complementarity is strong, and the level of intra-industry trade is low. Then, the regression analysis method is used to conclude that Sino-Brazilian trade has a positive effect on the GDP growth of the two countries. Finally, based on the results of the previous analysis, the discussion is carried out. “China Threatens Brazilian Economy” and “Trade Protectionism” are untenable; as the level of intra-industry trade between the two countries increases, China-Brazil trade ties will become closer, etc.*

Keywords: Trade structure, Trade growth, China, Brazil

1. Introduction. Both China and Brazil belong to the BRICS (Brazil, Russia, India, China, South Africa) countries and their economic and trade cooperation has a long history. On May 24, 2019, Morang, the Brazilian Vice President, pays an official visit to China. The leaders of the two countries express their willingness to further consolidate the friendly economic and trade relations.

In the past studies of Sino-Brazilian trade issues, most scholars either simply study the Sino-Brazilian trade structure, or only empirically study the impact of Sino-Brazilian trade on economic growth. In some references, even the entire article discusses the Sino-Brazilian trade friction and lacks empirical analysis. Among scholars who study the Sino-Brazilian trade structure, Oliveira [1], Tai and Lei [2], Dian [3], and Li [4] believe that the complementarity of Sino-Brazilian trade is larger than competition, and the level of intra-industry trade in intermediate goods is relatively high and trade links are close. Among scholars who have empirically analyzed the impact of Sino-Brazilian trade on economic growth, Wu and Wang [5], Ding [6], and Wang et al. [7] believe that Sino-Brazilian trade has a positive effect on the economic growth of the two countries. Among the scholars talking about trade frictions, Yang et al. [8] believe that the asymmetrical trade structure between China and Brazil has caused trade frictions and Brazil should adopt trade protection measures. Min [9] and Yang [10] believe that the asymmetry in the Sino-Brazilian trade structure seriously threatens Brazil’s economic growth.

However, this paper holds that the above problems are closely related and should not be treated separately, and should be summarized or discussed according to the combination

of theory and empirical methods. In this paper, the development of Sino-Brazilian trade and its structural issues are first elaborated, and three trade structure indices are selected and measured. Then, the regression analysis method is used to analyze the impact of Sino-Brazilian trade on the GDP growth of the two countries. Finally, based on the results of the previous analysis, the discussion is carried out. This study not only conforms to the development trend of the times, but also provides a good theoretical basis for proving the extreme unreasonableness of outside speech, and also provides a high application value for solving the practical problems of China and Brazil.

2. Sino-Brazilian Trade Development and Its Structural Problems.

2.1. Definition of trade structure. Trade structure refers to the composition of each commodity in the trade of the goods within a certain period of time. This part analyzes the structure of commodity trade, that is, the composition of various commodities in the trade of the goods within a certain period of time.

2.2. Overview of Sino-Brazilian trade development.

2.2.1. Sino-Brazilian economic and trade development is fast. As can be seen from Figure 1, the trade volume of the two countries shows a slow growth trend from 2010 to 2014, and trade volume decreases between 2015 and 2016. Sino-Brazilian trade is on the whole steadily rising.

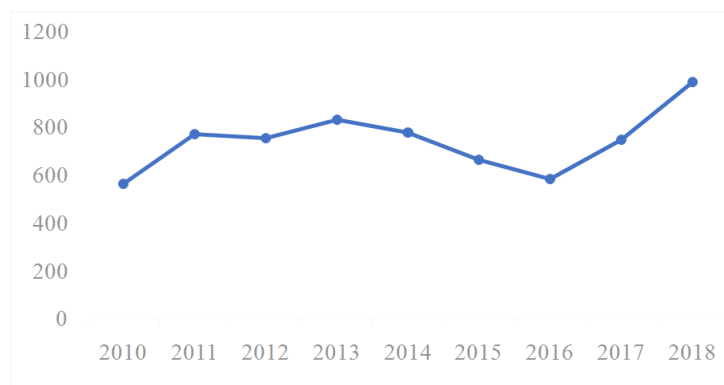
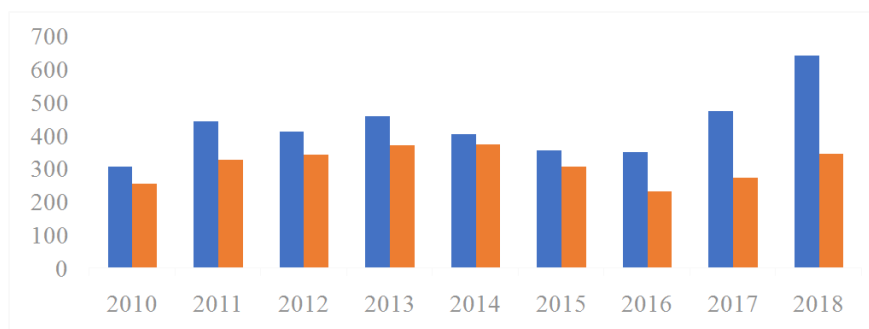


FIGURE 1. Bilateral trade volume between China and Brazil (unit: million US dollars)

2.2.2. China has long been in a trade deficit. As can be seen from Figure 2, Brazil has a trade surplus with China between 2010 and 2018.



Left: Brazil exports to China
Right: China exports to Brazil

FIGURE 2. Trade volume between China and Brazil (unit: million US dollars)

2.3. Asymmetric Sino-Brazilian trade structure.

2.3.1. *Analysis of Sino-Brazilian trade composition from the perspective of HS (the harmonized commodity description coding system) classification.* As can be seen from Table 1, Brazil’s exports to China are mainly in Category 2 and Category 5, namely plant products, minerals and fibre pulp. These goods account for 80.0% of all Brazil’s exports to China.

As can be seen from Table 1, China’s exports to Brazil are mainly in the Category 16, Category 6 and Category 11, namely mechanical and electrical products, chemical products and transportation equipment. These goods account for 68.6% of all China’s exports to Brazil.

TABLE 1. Main commodity components of Brazil’s exports to China and China’s exports to Brazil

Year	Brazil’s exports to China			China’s exports to Brazil				
	Category 2	Category 5	Others	Category 16	Category 6	Category 17	Category 11	Others
2010	23.4%	57.8%	18.8%	53.2%	8.1%	2.3%	8.4%	28.0%
2011	24.8%	56.9%	18.3%	50.5%	9.2%	4.7%	8.9%	26.7%
2012	29.3%	49.1%	21.6%	51.8%	8.8%	3.7%	9.7%	26.0%
2013	37.3%	44.8%	17.9%	51.1%	10.1%	3.7%	9.4%	25.7%
2014	40.9%	40.2%	18.9%	48.3%	11.1%	4.4%	10.2%	26.0%
2015	44.5%	31.3%	24.2%	44.6%	11.5%	7.1%	10.5%	26.3%
2016	41.1%	33.5%	25.4%	47.1%	14.1%	5.7%	9.1%	24.0%
2017	42.9%	38.8%	18.3%	47.8%	14.2%	9.7%	6.7%	21.6%
2018	42.7%	40.9%	16.4%	40.8%	14.2%	13.8%	8.4%	22.8%
Mean	36.3%	43.7%	19.9%	48.3%	11.2%	6.1%	9.1%	25.2%

2.3.2. *Analysis of Sino-Brazilian trade composition from the perspective of SITC (standard international trade classification) classification.* As can be seen from the data in Table 2, in Brazil’s export trade structure to China, it mainly exports primary products.

As can be seen from the data in Table 3, in China’s export trade to Brazil, it mainly exports intermediate goods and capital goods.

TABLE 2. Brazil’s export trade structure to China (unit: million US dollars)

Years	Primary goods	Intermediate goods	Capital goods	Consumer goods	Others
2010	28208	1453	719	56	30
2011	40632	2168	1034	47	40
2012	36882	2393	1390	50	41
2013	42573	2004	728	43	45
2014	37118	2049	548	96	36
2015	31490	2106	1281	34	17
2016	31758	1624	1081	42	38
2017	44117	1841	923	75	20
2018	60725	2602	437	68	32

TABLE 3. China's export trade structure to Brazil (unit: million US dollars)

Years	Primary goods	Intermediate goods	Capital goods	Consumer goods	Others
2010	964	7993	15371	1801	662
2011	1392	10651	19023	1234	689
2012	1296	11129	19932	1367	1003
2013	1403	12557	21355	1454	1237
2014	1262	13519	20632	1532	1278
2015	1213	11136	16668	1621	1467
2016	986	8228	12954	1655	1498
2017	1049	8352	16503	1799	1523
2018	1065	12105	19910	1754	1609

3. Analysis of Calculating Results of Trade Structure Index between China and Brazil.

3.1. **Calculation of Sino-Brazilian bilateral trade integration.** As can be seen from Table 4, there is a high degree of trade integration between China and Brazil. Brazil's trade integration with China is much larger than China's trade integration with Brazil, and the gap is widening.

TABLE 4. Sino-Brazilian bilateral trade integration and its difference

Years	2010	2011	2012	2013	2014	2015	2016	2017	2018
Brazil's trade balance with China	186.8	203.6	223.8	253.8	203.3	234.0	275.3	284.2	297.1
China's trade balance with Brazil	152.7	156.6	187.4	183.5	155.6	166.3	186.6	192.4	188.5
Poor Sino-Brazilian bilateral trade integration	34.1	47.0	46.4	70.3	49.7	67.8	88.7	91.8	108.6

3.2. **Calculated results of Sino-Brazilian trade integration complementarity index.** As can be seen from Table 5, the complementary index of Sino-Brazilian trade competition is very small, which means that the complementarity of the Sino-Brazilian trade is very strong.

TABLE 5. Sino-Brazilian trade integration complementarity index

Years	2010	2011	2012	2013	2014	2015	2016	2017	2018
Sino-Brazilian trade integration complementarity index	0.1125	0.1217	0.1370	0.1013	0.1022	0.1388	0.1260	0.1026	0.0838

3.3. **Calculated results of Sino-Brazilian intra-industry trade index.** As can be seen from Table 6, it can be seen that the measurement result of the GL index (static intra-industry trade index) is similar to the B index (dynamic intra-industry trade index). The middleware industry has the highest level of intra-industry trade. However, overall, the level of intra-industry trade is still low.

TABLE 6. Intra-industry trade index of various commodities in Sino-Brazilian import and export trade

	Years	2010	2011	2012	2013	2014	2015	2016	2017	2018	Mean
GL index	Primary goods	0.066	0.066	0.068	0.064	0.066	0.074	0.060	0.046	0.034	0.061
	Intermediate goods	0.308	0.338	0.354	0.275	0.263	0.318	0.330	0.361	0.354	0.322
	Capital goods	0.089	0.103	0.130	0.066	0.052	0.143	0.154	0.106	0.043	0.098
	Consumer goods	0.060	0.073	0.071	0.057	0.118	0.041	0.049	0.080	0.075	0.069
B index	Primary goods	0.067	0.050	0.037	0.020	0.017	0.028	0.010	0.002	0.002	0.029
	Intermediate goods	0.624	0.640	0.590	0.589	0.486	0.460	0.427	0.337	0.400	0.395
	Capital goods	0.159	0.156	0.179	0.046	0.017	0.056	0.006	0.066	0.009	0.098
	Consumer goods	0.048	0.044	0.077	0.073	0.046	0.063	0.066	0.028	0.021	0.052

4. The Impact of Sino-Brazilian Trade Growth.

4.1. **Basic characteristics of sample data.** The data is lost in 2018, and in order to be able to study the impact of Sino-Brazilian trade growth for 10 years, data from 1999 to 2017 is selected by the paper. As can be seen from Figure 3, the volume of trade between China and Brazil and their GDP have steadily increased, and the basic pace is roughly similar. As can be seen from Figure 4, this shows that there is a strong correlation between the volume of Sino-Brazilian trade and the GDP of the two countries.

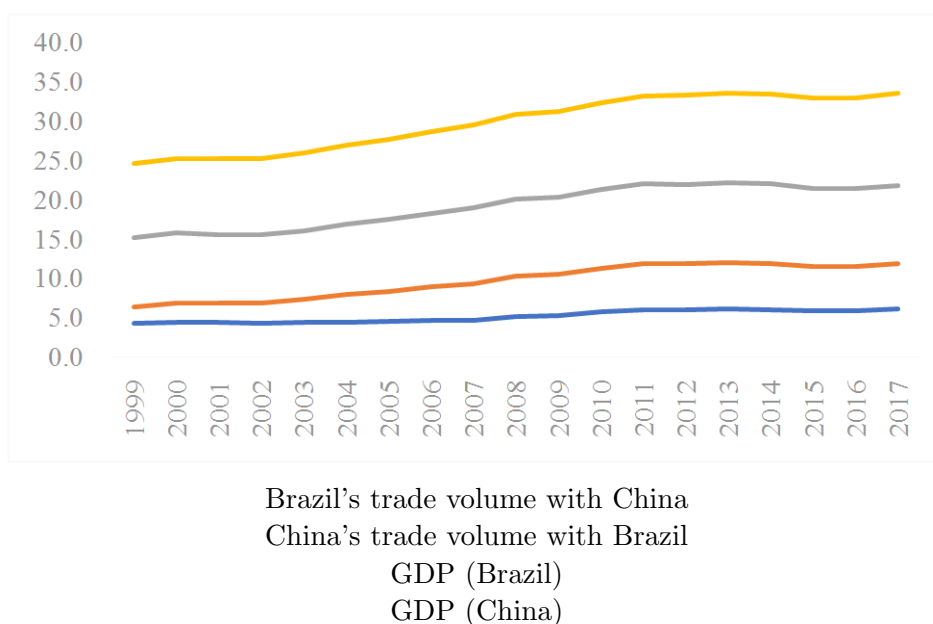


FIGURE 3. Stacked line chart of Sino-Brazilian trade volume and their accumulated GDP (unit: billion US dollars)

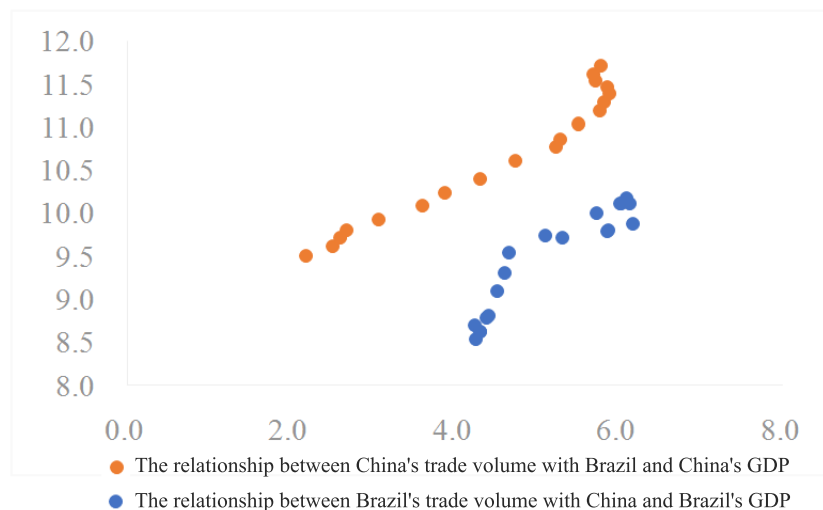


FIGURE 4. Scatter plot of Sino-Brazilian trade volume and their accumulated GDP (unit: billion US dollars)

4.2. Regression analysis.

4.2.1. *Theoretical basis.* Adam Smith pointed out in *The Wealth of Nations* that foreign trade is conducive to the growth and development of the national economy, and he has taken the lead in systematically explaining the relationship between international trade and economic development. In the 1930s, D. H. Robertson first proposes that “foreign trade is the engine of economic growth”. Later, western economists further supplement and develop this view.

4.2.2. *Model building.* The Test of Stationarity shows that the data is stable, and because this paper only analyzes the impact of Sino-Brazilian trade volume on the GDP growth of the two countries, it is assumed that other factors have a stable impact on GDP growth. Therefore, it can be analyzed using a simple linear regression model. The establishment of a simple linear regression model is as follows:

$$Y = \alpha + \beta X \quad (1)$$

wherein, Y represents the GDP between China and Brazil, X represents the Sino-Brazilian trade volume, α represents the constant coefficient, and β represents the regression coefficient.

4.2.3. *Analysis of the impact of Brazil's exports to China on Brazil's GDP growth.* The regression equation between “Brazil's exports to China” and “Brazil's GDP growth”:

$$GDP_B = 4722.29791 + 44.44591355EX_B \quad R^2 = 0.859160086 \quad F = 120.64517 \quad (2)$$

(3.92419) (10.18354)

Economic significance: For every \$100 million of Brazil's exports to China, Brazil's GDP value will increase by 44.44591355 billion US dollars.

4.2.4. *Analysis of the impact of China's exports to Brazil on China's GDP growth.* The regression equation between “China's exports to Brazil” and “China's GDP growth”:

$$GDP_C = 13162.2116 + 243.923842EX_C \quad R^2 = 0.87649403 \quad F = 120.64517 \quad (3)$$

(2.720804142) (10.98385951)

Economic significance: For every \$100 million of China's exports to Brazil, China's GDP value will increase by 24.3923842 billion US dollars.

5. Discussion.

5.1. The asymmetric structure of Sino-Brazilian trade is not the result of the influence of China's unilateral policy. Due to its resource endowments, Brazil has an absolute advantage in exporting primary goods to China. Due to the lateness of the Brazilian economic globalization, the degree of economic globalization is low, while China has already been well integrated into the wave of economic globalization. This has led to China's exports to Brazil mainly of highly skilled intermediate goods and capital goods with higher technical content, resulting in a generally low level of intra-industry trade between China and Brazil in various industries.

5.2. Unreasonable "China Threatens Brazilian Economy" and "Trade Protectionism". Due to China's large demand for bulk commodities in Brazil and Brazil's own objective conditions, Brazil's exports to China are mainly primary foods. Therefore, some scholars believe that this mode of trade seriously threatens Brazil's economic development and Brazil should adopt trade protection measures. However, it is this kind of Sino-Brazilian trade that has enabled Brazil to maintain a relatively stable trade surplus status and has brought economic prosperity to Brazil.

5.3. The closer Sino-Brazilian trade relations with the increasing level of intra-industry trade between the two countries. In recent years, the two countries have indeed made efforts for intra-industry trade cooperation, and the results have been outstanding. China has invested nearly \$200 billion since the launch of the Investment Partnership Programme in May 2016 by Brazil, and Brazil expresses its willingness to promote the alignment of its Investment Partnership Programme with the Belt and Road Initiative and expand cooperation in trade, science and technology and innovation.

5.4. The future of Sino-Brazilian trade is being studied in such a way. Today, Sino-Brazilian trade is continuing to be friendly, but some talk is beginning to emerge that is not conducive to continued friendly exchanges between the two countries. Therefore, the future research should be based on the trade structure that can best reflect the Sino-Brazilian trade problems, and multi-dimensional research on China and Brazil trade should be combined with theory and empirical evidence to reach objective conclusions.

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