

## Analysis of agricultural trade potential between Latin America and Asia\*

Shi Peiran

**Abstract:** Based on the framework of the extended gravity model, this article analyzes the agricultural product trade potential of Latin American and Asian countries since the 21st century. Based on the agricultural export data of 31 Latin American countries to Asia from 2001 to 2018 in the WITS database, this article draws the following conclusions: Asia has become the largest agricultural trade export destination in Latin America. Although Latin America's total agricultural exports to Asia continue to increase, there are great differences between sub-regions. Some Caribbean countries and Chinese and Latin American countries have not yet achieved agricultural trade. Overall, Latin America and Asia has huge trade potential in the field of agricultural product trade. Latin American countries have the greatest export potential to Central and South Asian markets, but they also face the highest trade barriers. The long geographical distance between the two sides is no longer the main obstacle to bilateral agricultural trade. Excellent products infrastructure construction, good systems and the degree of participation in globalization, especially the economic development level of the importing country, are the main factors that determine the potential of bilateral trade. Asian countries represented by China have great achievements in infrastructure, e-commerce, international logistics and other fields. Achievements and accumulated experience prove that Asian and Latin American countries can improve trade infrastructure and logistics systems through cooperation. The resulting reduction in trade costs can also bring greater trade benefits to both parties.

**Keywords:** agricultural product trade gravity model trade potential trade cost

关键词

About the author: Shi Peiran, Ph.D. in Economics, Assistant Researcher, Institute of Latin America, Chinese

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Since the 21st century, with the continuous improvement of the level of globalization and the rapid development of the vast emerging economies in Asia, With rapid development, the economic ties between Latin America and the Caribbean (hereinafter referred to as "Latin America") and Asia have reached to an unprecedented extent. Bilateral trade relations can be said to be the vane and cornerstone of economic relations between Asia and Latin America. In 2001, Asia accounted for approximately 10% of Latin America's total trade. By 2019, this figure was close to 30%. The total trade volume of Yala is nearly 600 billion US dollars. In the existing trade structure, agricultural products and minerals Resource products represented by commodities are Latin America's main export products to Asia, while Asia's exports to Latin America Mainly manufactured products. Asia has long maintained a trade surplus with Latin America.

Latin America has been suffering from trade deficits for a long time and its export structure is highly "primary product-oriented". How to improve exports? It is currently very important to further diversify export products and increase the added value of export products on the premise of reducing the total amount. The key trade demands of Latin American countries. Emerging Asian markets undoubtedly have great potential. Latin America The sharp increase in the total trade volume between countries and China is certainly an important reason for the growth of Yala trade, but other Asian The country's contribution to the growth of Latin American trade, especially export trade, cannot be underestimated. According to the Inter-American Development Bank According to statistics, from 2000 to 2018, the average annual growth rate of Latin American exports to China was 20.4%. Degree is 19.1%, For ASEAN countries it is 13.7%, For South Korea it is 118%, For Japan, it is 59%, are higher than the 53% for the rest of the world.

The importance of Asia and Latin America to each other is two-way. Asia has long had a trade surplus with Latin America. However, in the field of agricultural product trade, Asia has been running a trade deficit with Latin America for many years. In recent years, Asia has become the largest export destination for agricultural products in Latin America, and agricultural products have also become the largest export destination for agricultural products from Latin American countries to Asia. Asia's main export product, especially with the continuous improvement of Asia's per capita GDP level and the subsequent With the consumption upgrade, the demand for Latin American agricultural products, especially high value-added agricultural products, will further increase. Latin America, as an important global exporter of agricultural products, and as an important global exporter and importer of agricultural products Whether and how much potential Asia has in exporting agricultural products is the purpose of this article. Key points. In previous studies on the economic and trade relations between Asia and Latin America, studies from a comparative perspective are common, such as For example, discuss the impact of Asia's development experience on Latin America, or the impact of Latin America's protectionist trade policies on Asia.

Asia discussed in this article includes the 10 ASEAN countries (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, and the Philippines). Philippines, Singapore, Thailand and Vietnam), 3 East Asian countries (China, Japan and South Korea), 6 Central Asian countries (Turkmenistan, Uzbekistan) Tanzania, Kyrgyzstan, Tajikistan, Kazakhstan and Mongolia), seven countries in South Asia (Sri Lanka, Maldives, Pakistan, (India, Bangladesh, Nepal and Bhutan), a total of 28 countries and regions. In other words, the territory and related data of Asia in this article are except It has included Asian countries and regions outside West Asia (i.e., the traditional MENA region). The trade factors between North Korea and Taiwan, China, both located in East Asia, The issue of data availability is not discussed in this article.

Abstract: This article discusses the economic and trade relations between Latin America and Asia in the 21st century. It analyzes the rapid development of economic ties and the impact of globalization. The article highlights the importance of diversifying export products and increasing their value. It also discusses the trade surplus of Asia and the trade deficit of Latin America in agricultural products. The article concludes that the relationship between Asia and Latin America is two-way and that there is significant potential for future trade growth.

Some studies regard major countries in Latin America and Asia as competitors in the global trade market and discuss comparative advantages and competitiveness. However, with the continuous development of Latin American and Latin American economic and trade relations, especially the rapid development of China's economy, Latin American scholars and research institutions represented by the Economic Commission for Latin America and the Caribbean have noticed the importance of Asia, especially China, in the export of Latin American products, and have launched a series of special studies focusing on China-Latin America and Asia-Latin America economic and trade relations. Overall, with the continuous rapid development of the Asian economy and the continuous decline of the Latin American economy in the past decade, the trade competition between Asian and Latin American countries is no longer the focus of academic circles. Recent research focuses more on the complementarity between the two places, but there is a general conclusion that there is still trade potential between the two places that needs to be further explored.

However, in the existing literature, more attention is paid to the trade potential between large countries in Asia and Latin America, and less attention is paid to the possibility of improving trade potential between small and medium-sized countries in the two places. However, in the context of the current volatile global trade situation, the economic development level of Latin America has been lower than the global average for many years. The importance of distant Asia in its global trade pattern is increasing day by day. Compared with its traditional trading partners such as the United States and Europe, the Asian market is in the ascendant. At the same time, Latin American agricultural products have also played an increasingly complementary role in the trade and consumption of agricultural products in emerging Asian countries, including China. Even though Latin America and Asia compete in the field of manufactured products, in the field of agricultural products, Latin America is increasingly important to Asia. Therefore, in this article, the author will use the extended gravity model to quantitatively analyze the export potential of agricultural products from Latin American countries to Asian countries. The results of the econometric model confirm that there is generally a huge trade potential between Latin America and Asia, and it is far away. The negative impact of geographical distance on bilateral trade is also reducing. In the existing trade of agricultural products in Asia and Latin America, Asian countries have different import potentials. Some Latin American countries, represented by Caribbean island countries, have not yet realized the import of agricultural products from some landlocked Asian countries. Exports, but some regional powers in Asia have the ability and willingness to further expand imports of Latin American agricultural products. In addition to quantifying Latin American

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In addition to the agricultural product trade potential of Asian countries, this article also systematically sorts out the characteristics and trends of agricultural product trade in Asia and Latin America since the 21st century, and once again proves at the empirical level that the Poisson pseudo-maximum likelihood estimation method (PPML) can provide stable and unbiased estimation results when there is a large amount of zero trade volume

data. The first part of this article introduces the overview and characteristics of Latin American agricultural trade since the 21st century. The second part is the setting of the gravity model, estimation results and calculation based on the econometric model. Latin American agricultural products export potential index to Asia. The last part is suggestions and conclusions.

### Overview and characteristics of Latin American agricultural trade since the beginning of the 21st century

Latin America is an important export destination for agricultural products in the world. In 2018, the global agricultural goods trade (hereinafter referred to as "trade") totaled 3442.02 billion U.S. dollars, of which the export value was 1708.05 billion U.S. dollars and the import value was 1733.97 billion U.S. dollars. Latin America's contribution It accounted for 1383% of the total exports of agricultural products (US\$236.218 billion) and 456% of the total imports (US\$7911.8 billion). For a long time, agricultural products from Latin America accounted for more than 10% of global agricultural exports, which is much higher. All in all, the average share of global agricultural imports is about 5%.

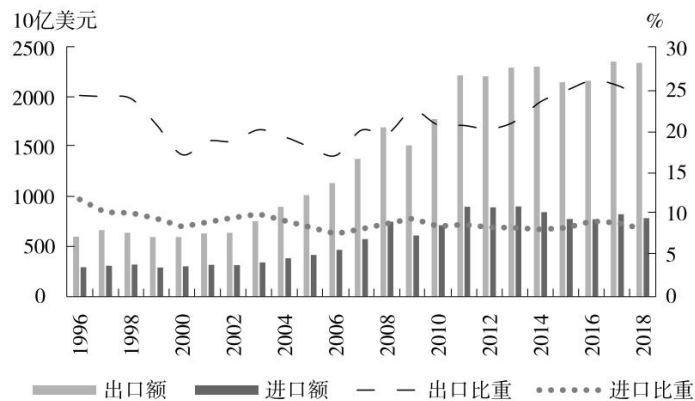


Figure 1 Overview of Latin American agricultural product trade (2001-2018)

Note: The reporting party is 33

countries in Latin America. Data source: Calculated based on WITS database data. <https://wits.worldbank.org/> [2019 - 12 - 05]

The "agricultural products" discussed in this article are related trade under SITC Rev 3 classifications 0, 1, 2-27, 2-28 and Chapter 4

Total value of product

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Latin American agricultural product trade has shown the following characteristics in the 21st century.

First, the export scale of agricultural products continues to expand. Agricultural products are the mainstay of more than half of the countries in the region.

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Second, developing economies have gradually become the main export destinations for Latin American agricultural products. The Asian market

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Third, the types of Latin American agricultural products exported to Asia are highly concentrated, while trade relations are highly differentiated.

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The Asian market has close trade exchanges and profound economic ties. China has become Brazil's largest trading partner and largest importer of agricultural products. In comparison, Mexico's agricultural exports only account for about 6% of its total global exports. For Asia's total exports only account for about 5% of its exports. Due to factors such as long geographical distance, high transaction costs, homogenization of export products, and trade protectionism, there are still limited trade exchanges between some Latin American countries and Asian countries, and some Latin American countries still have limited trade exchanges. The country has not yet started exporting agricultural products to Asian countries. In Latin America, it is mainly Caribbean countries. In Asia, it is mainly Central Asia and some South Asian countries.

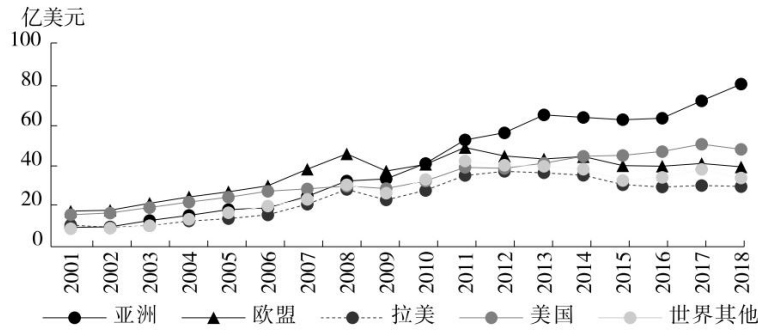


Figure 2 Latin America's agricultural exports to various regions

Data source: Calculated based on WITS database data. <https://wits.worldbank.org/> [2019-12-05]

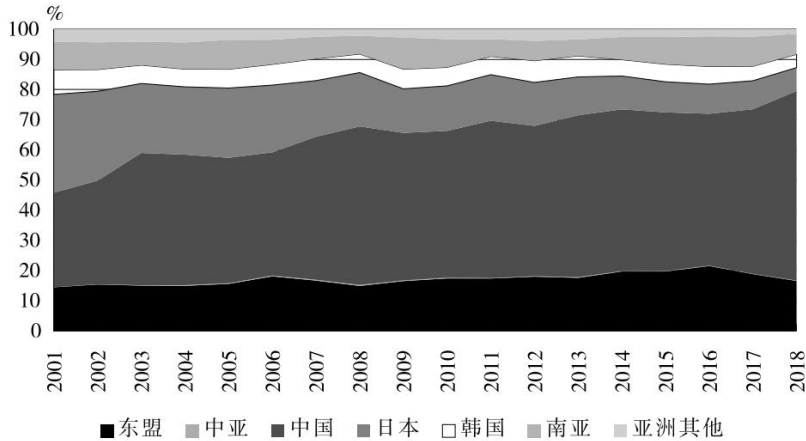


Figure 3 Proportion of agricultural exports to the Asian sub-region (2001-2018)

Data source: Calculated based on WITS database data. <https://wits.worldbank.org/> [2019-12-05]

To sum up, since the beginning of the 21st century, with the global commodity super cycle and the rapid development of emerging economies in Asia, trade between Latin America and Asia has become closer, and the trade volume has increased year by year. In the existing Latin American goods trade, The proportion of agricultural products trade continues to increase, and Asia has become the largest



Whether the exporting party and the importing party own ports and are members of the WTO. If so, then the dummy variable is recorded as 1.

Otherwise, it is recorded as 0.

Based on the availability of data, in the empirical modeling stage, this article excludes the "least developed countries" in Latin America.

Haiti and Venezuela, which have experienced hyperinflation in recent years and have a very low share of agricultural exports. Select

The time period is from 2001 to 2018. The panel data has a total of 15624 (31 × 28 × 18) samples. The model

The data on agricultural exports from Latin America to Asia in the model are from the WITS database, and the nominal GDP is from the World Bank.

The WDI database, geographical distance data and a series of dummy variables used to measure bilateral trade costs are all

From the French Center for International Forecasting Research (CEPII) database.

Table 1 Correlation matrix and descriptive statistics of variables

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12
Y1	1											
Y2	0.12	1										
Y3	0.08	0.05	1									
Y4	0.03	0.02	0.01	1								
Y5	0.01	0.01	0.01	0.01	1							
Y6	0.01	0.01	0.01	0.01	0.01	1						
Y7	0.01	0.01	0.01	0.01	0.01	0.01	1					
Y8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1				
Y9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1			
Y10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1		
Y11	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1	
Y12	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1
Mean	6.25	23.46	24.82									
Median	0.00	23.56	24.90									
Standard deviation	7.18											
Minimum value	0.00											
Maximum value	24.37	28.59	30.27									
P												

Note: Y indicates that the P test is significant in the 5% interval.

Data source: Compiled by the author.

Table 1 reports the Pearson correlation coefficients and descriptive statistics between all variables.



The correlation coefficients are lower than 0.5 and the expansion factor (VIF) is generally lower than 3. This indicates that the model is not affected by multiple common linearities. The distance variable (LNDISIJ) during the sample period (LNDISIJ) and the Agricultural Products (LNEX AGR) is 0.20 and significant at the 5% level. This is contrary to the common empirical conclusion that geographical distance is inversely proportional to trade volume in the classical gravity model. However, according to recent empirical research, distance in the classical gravity model theory. The situation that is inversely proportional to trade potential may no longer be valid under specific trade categories. For example, agricultural product trade is directly proportional to the north-south dimensional difference between trade objects, and is inversely proportional to other trade costs. Trade in resource-based products such as oil and mineral products. There are similar findings. A series of studies involving trade data between China (Asia) and Latin America have also verified this: when using bilateral trade data between China and Latin America for extended gravity model estimation, the correlation between distance and trade volume is not significant or even there will be a (significant) positive correlation. Possible explanations for this phenomenon are as follows: Latin America's export products to Asia are highly concentrated. Agricultural products are its main export products to Asia. Asia is also the most geographically distant trading partner of Latin America. Latin American countries. The geographical distance between the two places generally corresponds to Asia, and the north-south distance between the two places is the longest. In the context of declining global shipping prices, the importance of "geographic distance" in some countries in trade costs is declining. At the same time, the latitude difference. The larger the value, the greater the difference in natural and planting conditions between countries, the stronger the complementarity of resource endowments, and the stronger the demand for agricultural product trade. This is also in line with the characteristics and current situation of bilateral trade between Asia and Latin America, and may partially explain the two positive correlations between variables.

In addition, the trade flow is zero during the sample period, and the possible heteroskedasticity in panel data will affect the estimation results of the econometric model. The common least squares (OLS) and Poisson methods in empirical gravity models. The method requires natural logarithmic linearization of the dependent variable, and zero trade

For details, see Cai Xin: «Empirical Study on Factors Affecting Agricultural Products Trade between China and Latin America and Trade Potential Based on Gravity Model», published in «Foreign Economics and Trade», Issue 12, 2012, pp. 17-20, Hu Jing: « Research on the potential of agricultural trade between China and Latin American countries in the context of China-Latin America "1 + 3 + 6" cooperation », published in "World Agriculture", Issue 469, 2018, Pages 94-102, Lv Hongfen, Zheng Yali: «Freedom to China-Chile Gravity Model Analysis of the Trade Effect of Trade Zones», published in "International Trade Issues", Issue 2, 2013, pp. 49-57, Shao Jianchun: "Research on Factors Influencing China's Exports to Latin American Emerging Markets", published in "International Trade Issues" » Issue 6, 2013, Pages 61-68, Shi Peiran: «Latin America under Sino-US trade friction: Discovery and thinking based on trade data», Published in "International Economic and Trade Exploration", Issue 10, 2019, Issue 29 - 50 pages, Zhang Huiqing, Tang Haiyan: «China's export potential: total volume calculation, regional distribution and prospects—an empirical study based on the extended gravity model», published in «International Trade Issues», Issue 1, 2012, Issue 12 - 25 pages

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Adding 1 to the trade volume and then taking the logarithm, or removing the zero trade volume are common processing methods in empirical studies. However, this may lead to sample truncation, leading to deviations in the estimation results. Moreover, in actual situations, the real zero trade The amount itself contains trade information. In order to avoid eliminating zero trade and eliminate estimation bias as much as possible, this article will use the Poisson pseudo-maximum likelihood estimation method (PPML) commonly used in the academic community for model estimation. The PPML method can be used when there is heteroskedasticity in the model. Under the circumstances, unbiased estimation results can still be obtained. Whether in empirical studies or simulation studies involving trade policy, the stability of the PPML estimation method and the correction of heterogeneity have also been affirmed in a large number of empirical studies, especially When there are a large number of zero trade flows and small countries in the sample, the advantages of the PPML estimation method are prominently. The PPML estimation method can also better solve the "distance puzzle" in the gravity model - that is, the distance elasticity remains stable (or continues to grow). In view of the fact that there is a large amount of zero trade volume in agricultural products trade between Asia and Latin America, and the trade objects include nearly half of the Caribbean island countries, the author will use the PPML method to estimate and use OLS Compare the estimation results.

(2) Estimation results

Table 2 is the estimation result of the benchmark gravity model based on formula (1). OLS [1] and OLS [2] are gravity models estimated using OLS respectively. OLS [2] adds country fixed effects (exporters and importers). Square and time fixed effects are controlled to reduce individual heterogeneity. The fixed effects also help to reduce the estimation bias caused by the "multilateral resistance clause". The regression results show that after adding the fixed effect variables, the coefficient of the distance variable is : The positive value of OLS [1] changes to the negative value of OLS [2], which is consistent with the

assumption of the gravity model. PPML [1] - [4] are sequentially without any fixed effect control, and control the time fixed effect.

Y 变量 通常 使用 对数 形式 进行 估计 或 删除 零 贸易 量 以 避免 截断 样本 并 消除 估计 偏差 尽可能 多 的 可能 性 本文 将 使用 泊松 伪 极大 似然 估计 方法 (PPML) 在 学术 界 常用 的 模型 估计 中 使用 泊松 伪 极大 似然 估计 方法 (PPML) 可以在 模型 中 存在 异方差 性 的 情况 下 使用 在 此 种 情况 下 仍然 可以 获得 无偏 估计 结果 无论 在 经验 研究 或 涉及 贸易 政策 的 模拟 研究 中 泊松 伪 极大 似然 估计 方法 的 稳定性 以及 对 异质 性 的 修正 都 在 大 量 经验 研究 中 得到 了 肯定 特别 是 当 样本 中 存 在 大 量 零 贸易 流 和 小 国 家 时 泊松 伪 极大 似然 估计 方法 的 优势 显 而易 见 泊松 伪 极大 似然 估计 方法 还 能 更 好 地 解 决 重力 模型 中 的 "距离 谜题" - 即 距离 弹性 保持 稳定 (或 继续 增长) 鉴于 事实 是 在 亚洲 和 拉丁 美洲 之 间 的 农 产 品 贸易 中 存 在 大 量 零 贸易 量 且 贸易 对象 包 括 近 半 数 的 西 印 度 洋 岛 国 家 本 文 将 使用 泊松 伪 极大 似然 估计 方法 进行 估计 并 使用 OLS 比 较 估计 结果

Y 变量 通常 使用 对数 形式 进行 估计 或 删除 零 贸易 量 以 避免 截断 样本 并 消除 估计 偏差 尽可能 多 的 可能 性 本文 将 使用 泊松 伪 极大 似然 估计 方法 (PPML) 在 学术 界 常用 的 模型 估计 中 使用 泊松 伪 极大 似然 估计 方法 (PPML) 可以在 模型 中 存在 异方差 性 的 情况 下 使用 在 此 种 情况 下 仍然 可以 获得 无偏 估计 结果 无论 在 经验 研究 或 涉及 贸易 政策 的 模拟 研究 中 泊松 伪 极大 似然 估计 方法 的 稳定性 以及 对 异质 性 的 修正 都 在 大 量 经验 研究 中 得到 了 肯定 特别 是 当 样本 中 存 在 大 量 零 贸易 流 和 小 国 家 时 泊松 伪 极大 似然 估计 方法 的 优势 显 而易 见 泊松 伪 极大 似然 估计 方法 还 能 更 好 地 解 决 重力 模型 中 的 "距离 谜题" - 即 距离 弹性 保持 稳定 (或 继续 增长) 鉴于 事实 是 在 亚洲 和 拉丁 美洲 之 间 的 农 产 品 贸易 中 存 在 大 量 零 贸易 量 且 贸易 对象 包 括 近 半 数 的 西 印 度 洋 岛 国 家 本 文 将 使用 泊松 伪 极大 似然 估计 方法 进行 估计 并 使用 OLS 比 较 估计 结果

PPML regression results after response, country fixed effects and time and country fixed effects. When carried out

After controlling for time and country fixed effects, the regression estimated using the OLS method or the PPML method

The results are basically consistent with the theoretical expectations of the gravity model: bilateral trade volume is directly proportional to the importing party's GDP.

Inversely proportional to geographical distance, both are colonies of a certain country or were once the same country or importing party (Asia)

Having a seaport and being a member of the WTO will help increase total exports. But signing a bilateral regional trade agreement

If the exporting party owns a seaport and is a WTO member, it will have a negative impact on bilateral agricultural trade, which may

It may be because Latin American countries generally have ports, and countries with ports are more willing to provide services to geographically distant countries.

Asian countries export agricultural products with higher added value. At the same time, the free trade agreements signed by Asian and Latin American countries

In trade agreements, agricultural products are generally negotiated individually, and Asian countries impose tariffs and non-contract tariffs on agricultural product imports.

Tariff barriers are relatively high, and the level of agricultural protection is also high. This also makes Latin America's agricultural exports to Asia

It may not be possible to benefit from regional trade agreements in time.

In addition, consistent with the research results of Silva and Tenreyro, using PPML

The coefficients estimated by the OLS method are lower than those estimated by the OLS method. The regression results in this article are also consistent with this conclusion.

Table 2 Benchmark gravity model regression results: full sample

	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$		
$\ln(Y_i)$	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***	$\ln(Y_i Y_j)$ ***	$\ln(Y_i / Y_j)$ ***	$\ln(Y_i)$	$\ln(Y_j)$ ***
$\ln(Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$
Distance	$\ln(Y_i)$ ***	$\ln(Y_j)$ **	$\ln(Y_i Y_j)$ ***	$\ln(Y_i / Y_j)$ ***	$\ln(Y_i)$	$\ln(Y_j)$
$\ln(Y_i)$	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$
Distance	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***	$\ln(Y_i Y_j)$ ***	$\ln(Y_i / Y_j)$ ***	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***
$\ln(Y_i)$	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$
Distance	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***	$\ln(Y_i Y_j)$ ***	$\ln(Y_i / Y_j)$ ***	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***
$\ln(Y_i)$	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$
Distance	$\ln(Y_i)$ ***	$\ln(Y_j)$ **	$\ln(Y_i Y_j)$ ***	$\ln(Y_i / Y_j)$ ***	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***
$\ln(Y_i)$	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$
Distance	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***	$\ln(Y_i Y_j)$ ***	$\ln(Y_i / Y_j)$ ***	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***
$\ln(Y_i)$	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$
Distance	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***	$\ln(Y_i Y_j)$ ***	$\ln(Y_i / Y_j)$ ***	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***
$\ln(Y_i)$	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$
Distance	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***	$\ln(Y_i Y_j)$ ***	$\ln(Y_i / Y_j)$ ***	$\ln(Y_i)$ ***	$\ln(Y_j)$ ***
$\ln(Y_i)$	$\ln(Y_i)$	$\ln(Y_j)$	$\ln(Y_i Y_j)$	$\ln(Y_i / Y_j)$	$\ln(Y_i)$	$\ln(Y_j)$

yyyyyy	y yy	y y yy **	y yy	y yy	y y yy ***	y y yy ***
(yy)	(y yy)	(y yy)	(y yy)	(y yy)	(y yy) (y yy)	
yyyyyy	y yyy	y y yy ***	y yy	y y yyy	y yy ***	y yy ***
(yy)	(y yy)	(y yy)	(y yy)	(y yy)	(y yy) (y yy)	
yyyyyy	y yy	y yy	y y yy	y yy	y y yy ***	y y yy ***
(yy)	(y yy)	(y yy)	(y yy)	(y yy)	(y yy) (y yy)	
yyyyyy	y yy ***	y yyy	y yy ***	y yy ***	y yy ***	y yy ***
(yy)	(y yy)	(y yy)	(y yy)	(y yy)	(y yy) (y yy)	
Time fixed effects no		yes	no	yes	no	yes
Country fixed effects No		yes	no	no	yes	yes
y y	y yy	y yy	y yy	y yy	y yy	y yy
Number of samples	yyyyy	yyyyy	yyyyy	yyyyy	yyyyy	yyyyy

Note: \*\*\*\*, \*\*\*, and \* respectively represent the P test at 1%, 5%, and 10% levels. Data in brackets are heteroskedasticity robust.

Standard error y The regression coefficient of time fixed effects is omitted y

Data source: Compiled and calculated by the author.

(3) Robustness test

In this part, we will use PPML [4] as the benchmark model to stabilize the regression results.

Robustness test. First, to reduce the endogeneity of GDP and export volume, use GDP lagged by one period instead of the current period.

Secondly, since 2010, the world has experienced a super economic cycle of commodities.

This period has also witnessed the decline of mass commodity trade. With the global subprime mortgage crisis in 2008-2009,

Ended, the majority of Latin American and Asian countries, which are also emerging economies, have also established closer trade exchanges.

Table 3 summarizes the results of the robustness test. The regression results show that in different time periods, PPML

The estimated coefficients are all stable and do not change much.  $\ln Y_{jt}$  and  $\ln Y_{jt-1}$  are both positive in different sample periods.

And it is basically significant at the 1% level, while  $\ln Y_{jt}$  and  $\ln Y_{jt-1}$  are significant in the subsample from 2010 to 2018.

The number is no longer significant or negative (it is also negative in the baseline regression PPML [4]), which shows that in Yala

In agricultural trade, whether Latin American countries have the potential to expand exports to Asia depends more on Asian countries.

countries' economic development level. In other words, as the economic development level of Asian countries improves, Asia's

The demand for agricultural products in the United States will further increase, and the export levels of agricultural products in Latin American countries will affect Latin America's

The final scale of agricultural trade to Asia, but exports to Asia from Latin American countries with higher levels of economic development

The willingness to buy agricultural products will decrease. Although the coefficient of geographical distance ( $\ln Dis_{ij,t}$ ) is negative, the value is generally

ubiquitous-0.5 fluctuates up and down and continues to decline. Considering the actual distance between the two places, this also shows that in Latin America

Between China and Asia, the negative impact of geographical distance on bilateral trade is getting smaller and smaller.

Table 3 Gravity model regression results: Robustness check

	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***	$\ln(Y)$ ***	$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
$\ln(Y)$		$\ln(Y)$	
$\ln(Y)$		$\ln(Y)$ ***	
$\ln(Y)$		$\ln(Y)$	
$\ln(Y)$	$\ln(Y)$ ***		$\ln(Y)$
$\ln(Y)$	$\ln(Y)$		$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***		$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$		$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***	$\ln(Y)$ ***	$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***	$\ln(Y)$ ***	$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***	$\ln(Y)$ ***	$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***	$\ln(Y)$ ***	$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***	$\ln(Y)$ ***	$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***	$\ln(Y)$ ***	$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
$\ln(Y)$	$\ln(Y)$ ***	$\ln(Y)$ ***	$\ln(Y)$ ***
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
sample period	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
Country and time fixed effects	yes	yes	yes
$\ln(Y)$	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$
Number of samples	$\ln(Y)$	$\ln(Y)$	$\ln(Y)$

Note: \*\*\*\*, \*\*\*, and \* respectively represent the P test at 1%, Significant at the 5% and 10% levels. Data in brackets are heteroskedasticity robust.

Standard error  $\ln(Y)$  The regression coefficient of time fixed effects is omitted  $\ln(Y)$

Data source: Compiled and calculated by the author.

(4) Latin America's agricultural export potential to Asia

Finally, we use the estimation results of the model PPML [4] to calculate the export of agricultural products from Latin America to Asia.

Trade potential:

$$P_{agr}^{yy} < \frac{Y_{yy}^{yy}}{Y_{yyyy}^{yy}} / \frac{Y_{yy}^{yy}}{Y_{yyyy}^{yy}} \quad (y)$$

If  $P_{agr}^{yy} < \bar{y}$  then there is trade potential between the two countries. The smaller the value, the higher the degree of trade deficiency.

The greater the potential. Table 4 summarizes the potential index of 31 Latin American countries' agricultural exports to the Asian sub-region. It can be seen that Latin American countries generally have the potential to expand exports to Asia, especially since they have not yet realized their exports to Asia. Caribbean countries that export agricultural products to Asia. China (including Hong Kong), Japan and South Korea are the Asian economies. The three countries with the largest total volume are currently the countries that have most fully exploited the agricultural product trade potential of Yala. Although the trade volume of agricultural products imported by ASEAN countries from Latin America has surpassed that of Japan, the relationship between member countries and Latin America Countries have different degrees of trade closeness. South and Central Asian countries have the lowest trade closeness with Latin America. This is also why countries in South Asia and Central Asia have the lowest trade closeness with Latin America. It is related to the geographical location and economic development level of these two sub-regions. In addition, the Caribbean region and Asia The degree of trade deficiency is generally higher than that of the 17 Latin American countries. The reason for this phenomenon is first of all that the Caribbean Belgian countries are generally located near the Tropic of Cancer and the equator. They belong to the same northern hemisphere as Asian countries and are similar to Asian agricultural products. The complementarity of commodity trade is generally weaker than that of South American countries. Moreover, the economies of Caribbean countries are generally smaller. The scale of agricultural exports to Asia is generally low. Considering the economic and trade volume of Caribbean countries, The cost of conducting trade with Asian countries, especially some landlocked countries in Central Asia and South Asia, is too high, making China The lack of trade in agricultural products from Asian countries in the Lebanese region is particularly acute. But for these countries, Expanding agricultural trade with China, Japan, South Korea, and ASEAN countries not only has huge potential, but also increases with shipping prices. has been lowered, and it also has increasingly higher export feasibility.

Table 4 Latin American countries' agricultural export potential index to the Asian sub-region

Exporter	importer					
	ASEAN	Central Asia	China		Japan Korea	South Asia
Argentina	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄
Antigua and Barbuda	̄ ̄̄	̄ ̄̄			̄ ̄̄	̄ ̄̄
Bahamas	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄
Belize	̄ ̄̄		̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄
Bolivia	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄
Brazil	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄
Barbados	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄
Chile	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄	̄ ̄̄

Colombia	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
costa rica	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
cuba	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Dominica	ŷ ŷŷ		ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
dominican	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Ecuador	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Grenada	ŷ ŷŷ				ŷ ŷŷ	ŷ ŷŷ
Guatemala	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Guyana	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Honduras	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
jamaica	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
saint kitts and nevi				ŷ ŷŷ		ŷ ŷŷ
saint lucia			ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Mexico	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Nicaragua	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Panama	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Peru	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Paraguay	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
El Salvador	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Surinam	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Trinidad and Tobago	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Uruguay	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Saint Vincent and the Grenadines 0 07				ŷ ŷŷ		
31 national average	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Average of 17 Latin American countries	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ
Caribbean 14 country average	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ	ŷ ŷŷ

Note: The predicted export data is calculated based on the gravity model in this article. The potential index of each sub-region is a simple combination of the index of each country in the region.

Average value. "China" only calculates the average potential index value of China and Hong Kong, China.

Data source: Compiled and calculated by the author. Latin America's actual export data to Asia (2018) comes from the WIT database.

### Three conclusions and suggestions

This article uses Latin America's agricultural trade export data to Asia from 2001 to 2018, based on the expanded index.

Using a force model, the export potential of agricultural products from Latin America to Asia was studied. The main conclusions of this article are as follows.

First, as trade between Latin America and Asia becomes increasingly close, Asia has become Latin America's largest agricultural product export destination. Although Latin America's total agricultural exports to Asia continue to increase, there are still some Asian countries that are the largest exporters of Latin American agricultural products and even goods. "Blind spots". While the vast Asia has become an export destination that cannot be ignored by Latin America, there are great differences between sub-regions.

Second, the calculation results of the gravity model prove that Latin America and Asia have huge trade potential in the field of agricultural products trade. The geographical distance between the two sides is no longer the main obstacle to bilateral trade. Excellent infrastructure construction, good systems and globalization The degree of participation, especially the level of economic development of the importing country, has become the main factor that

determines the potential of bilateral agricultural trade. Third, in terms of policy recommendations, improve infrastructure construction, strengthen regional integration cooperation, and reduce tariff and non-tariff barriers to agricultural imports. and eliminating domestic protectionist policies will help Asian countries better explore their trade import potential with Latin America (and other regions around the world). As for Latin American countries as exporters, they need to increase production capacity cooperation and determine more Active and open trade policies, strengthening infrastructure construction to increase the speed and scale of agricultural exports, and more proactive marketing to the Asian market will further expand Latin America's advantages in the Asian agricultural import structure.

In the past 20 years, the free trade agreements actively signed by Asian countries have proven the positive effects of reducing trade costs and expanding preferential market access on their economic development. Therefore, it is necessary to expand and upgrade the Asia-Latin America Free Trade Agreement and promote new free trade agreements. The negotiations on the trade agreement will also further benefit both countries. In actively promoting trade facilitation under the WTO system, many Asian and Latin American countries have made important contributions. In the future, the customs departments of Asian and Latin American countries may By establishing regular cooperation and exchange mechanisms, we can communicate on the formulation and application of relevant trade regulations, national-level sanitary and phytosanitary measures, and the elimination of technical trade barriers. We can reach consensus at the specific operational level and remove barriers. Finally, with China as the The achievements and accumulated experience of the Asian countries represented in the fields of infrastructure, e-commerce, and international logistics are obvious to all. Whether it is between Asia and Latin America or within Asian countries, trade infrastructure and logistics systems can be improved through strengthened cooperation. The reduction in trade costs brought about by this can also bring greater trade benefits to both parties.

(Editor Huang Nian)