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Latin America and China: international trade and economic growth

América Latina y China: comercio internacional y crecimiento económico

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ABSTRACT

In 1990, the participation of China in the global imports of Latin America (LAC) was incipient, while by 2019, China had become the second largest supplier of the region. This paper uses a sample of 14 LAC countries, estimates the effects of imports from China on each LAC country's economic growth, and verifies if these effects are evidenced in these countries' non-exporting or exporting sectors. This study proposes a Seemingly-Unrelated-Regressions (SUR) system for each sector. Results show that before China entered into World Trade Organization (WTO), LAC imports from China positively affected the economic growth of some LAC countries. However, beneficiary countries increased after China´s adhesion to WTO. Imports from China drive the economic growth of the non-exporting sectors of Argentina, Costa Rica, Ecuador, and El Salvador, the exporting sector of the Dominican Republic, and both sectors of Brazil, Chile, Colombia, Peru, Uruguay, and Venezuela. Except for the Dominican Republic, the countries whose export sectors benefit from China's imports are primary exporting countries. Adverse or null effects are estimated for the rest of the countries.

Keywords: China; Latin America; import-led growth.
JEL Classification: F14; F43; F60; F62; C32.

RESUMEN

En 1990 la participación de China en las importaciones globales de América Latina (ALC) era incipiente, mientras que para 2019 China se había convertido en el segundo proveedor de la región. Este documento utiliza una muestra de 14 países

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de ALC, estima los efectos de las importaciones de China en el crecimiento económico de cada país de ALC y verifica si estos efectos se evidencian en los sectores no exportadores o exportadores de estos países. Estimamos un sistema de regresiones aparentemente no relacionadas (SUR) para cada sector. Los resultados muestran que antes de que China ingresara a la Organización Mundial del Comercio (OMC), las importaciones de ALC desde China afectaron positivamente el crecimiento económico de algunos países de ALC. Sin embargo, el número de países beneficiarios aumentó tras la adhesión de China a la OMC. Las importaciones desde China impulsan el crecimiento económico de los sectores no exportadores de Argentina, Costa Rica, Ecuador y El Salvador, el sector exportador de República Dominicana y ambos sectores de Brasil, Chile, Colombia, Perú, Uruguay y Venezuela. Con excepción de la República Dominicana, los países cuyos sectores exportadores se benefician de las importaciones de China son países primarios exportadores. Se estiman efectos adversos o nulos para el resto de los países.
Palabras clave: China; América Latina; crecimiento impulsado por importaciones.
Clasificación JEL: F14; F43; F60; F62; C32.

INTRODUCTION

Just a few years before the start of the covid 19 pandemic, between 2001 and 2019, Latin American (LAC) imports from China increased at an average annual rate of 15.98%. In 2019, imports from China represented 59.82% of the total trade between that country and LAC (UN COMTRADE, 2021). Also, in the same year, 71.0% of LAC imports from China were composed of factors of production (intermediate goods and capital goods), followed by consumer goods (WITS, 2021).

The import-led growth (ILG) hypothesis argues that imports stimulate economic growth through technology and knowledge transfer from more industrialized economies (Mishra, Sharma, & Smyth, 2010; Rani & Kumar, 2018; Roquez-Diaz & Escot, 2018). Also, imports can induce competitiveness in the domestic market and stimulate the consumption of the population by the access to goods cheaper (Ahn and Duval, 2017; Hayakawa, 2019)

Although China has become the second largest supplier to Latin America after the United States (WITS, 2021), the literature has been limited to analyzing the export-led growth (ELG) hypothesis of LAC exports to China (Feal, 2015; Vianna, 2016; Murakami and Hernández, 2018; Hou, 2019; Arteaga, Cardozo and Diniz, 2020) without considering the effects of imports from China on the economic growth of LAC countries. In Murakami and Hernández (2018), economic growth is explained by the ratio of export growth to the income elasticity of import demand.

Awokuse (2008), Mishra et al. (2010), and Rani and Kumar (2018) warn that analyzing the ELG hypothesis without considering the effects of imports (or vice versa) may bring problems of omitted variable bias. Studying the ILG and ELG hypotheses simultaneously allows us to verify what is the dominant effect on economic growth.

Within the literature, Timini and Sánchez-Albornoz (2019) is the only study that simultaneously analyzes the ILG and ELG hypotheses of the trade with China for the LAC region. They use a panel of 16 Latin American countries and find that both hypotheses are supported. However, León (2006) and Ortiz, Gonzalez, and Sánchez (2019) warn that the analysis of the impact of China on the economic growth of LAC should consider the existing asymmetries in the bilateral relations between China and each LAC country. Therefore, any study of this nature should avoid generalizations and aggregate analysis.

The literature lacks studies that analyze the effects of imports from China on the economic growth of each LAC country. In addition, it is necessary to know if these effects are evident in the domestic sector, the sectors destined for exports, or both. Therefore, this article aims to answer three questions. First, what are the effects of imports from China on the economic growth of each LAC country? Second, are these effects evident in each LAC country's non-exporting or exporting sectors? Finally, what are the effects of Chinese imports from LAC on China's economic growth?

This paper divides economic growth into the non-exporting and exporting sectors. To achieve the objectives of this article, the proposed empirical model defines the impact on the economic growth of China and each Latin American country in terms of capital, the terms of trade, the flow of traded goods between CHN-LAC, and each partner's share in global imports from the United States. Information is available for China and 14 LAC countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Mexico, Peru, Uruguay, and Venezuela, between 1992 - 2019. This study addresses pre-pandemic data to avoid the abrupt impact of COVID-19 on the observed international trade trends due to the increase in the logistic costs and the disruption of the input supply chains.

Also, to avoid the potential aggregation bias obtained when empirically treating Latin American countries by panel methods (Zellner, 1962; Bacon, 1974; Lederman, Olarreaga, and Soloaga, 2009; Devadason, Chandran, and Mubarik, 2017), the empirical model is a Seemingly Unrelated Regressions (SUR) model. This model defines a system of 15 equations where the first corresponds to China and the rest to each of the 14 Latin American countries. The system presents contemporary dependence between the residuals of pairs of equations; this indicates a certain degree of interdependence between the countries that should not be ignored, according to Theil (1971) and Fiebig (2003). The application of the SUR method requires the existence of contemporaneous dependence between the study units. This estimation method integrates the variance-covariance matrix of the residuals of pairs of equations and the degrees of freedom of the entire system of equations to obtain efficiency gains (Zellner, 1962; Bacon, 1974; Greene, 1997; Wooldridge, 2002).

The results show that LAC imports from China generate heterogeneous effects across LAC countries for the period following China's accession to the WTO. Imports from China stimulate the economic growth of the non-exporting sectors of Argentina, Costa Rica, Ecuador, and El Salvador, the exporting sector of the Dominican Republic, and both sectors of Brazil, Chile, Colombia, Peru, Uruguay, and Venezuela. In addition, the results show mixed effects for Bolivia; in this country, imports from China hurt the economic growth of non-export sectors but benefit the export sector. In Honduras and Mexico, imports from China produce null effects on economic growth. On the other hand, the results suggest that Chinese imports from LAC do not affect China's economic growth.

This work provides new contributions to the literature by showing that imports from China induce economic growth in some LAC countries through different mechanisms: hold the domestic sector, support the production units destined for exports, or both. Also, compared with the contributions of the effects of exports on economic growth, imports from China play a relevant role in driving economic growth.

The rest of the document is organized into five sections as follows. The first section describes the literature review. The second section presents the data. The third section explains the methodology and empirical strategy. The fourth section shows the results and discussions of the methodology. The last section concludes with the implications of the results.

I. LITERATURE REVIEW

The import-led growth (ILG) hypothesis argues that imports positively affect economic growth by expanding production capacity and improving the productivity levels of local units (Seabra and Galimberti, 2012; Sannassee, Seetanah, and Jugessur, 2014; Abreha, 2019). Hayakawa (2019) warms that imports can improve consumers' welfare through access to cheaper goods. Kim, Lim, and Park (2007) and Ahn and Duval (2017) indicate that imports of consumer goods stimulate competitiveness with local production and induce initiatives to improve the production processes and products. In addition, Keller (2000) and Ahn and Duval (2017) argue that importing intermediate and capital goods induces learning processes and drives innovation in production units. Other authors argument that trading

partners assimilate the technological advance of their peers through the imports of their goods (Mishra et al., 2010; Rani and Kumar, 2018; Roquez-Diaz and Escot, 2018; Abreha, 2019). Cheaper goods or production factors, adoption of new technologies and knowledge, and technical changes in local economies to enhance competitiveness vis-á-vis imported goods lead to productivity and economic growth.

Nevertheless, Priede (2012) and Cisneros-Acevedo (2022) indicate that imports can generate the substitution effect of local production by imported goods, inhibiting economic growth. Also, Ahn and Duval (2017) and Autor, Dorn, and Hanson (2013, 2016) warn about mixed effects attributed to imports. The authors explain that imports can generate gains in terms of productivity in some sectors and losses in employment and wages in other sectors exposed to competition with imports goods. These arguments lead to the possible benefits and costs obtained through imports.

As warm by Awokuse (2008), Mishra et al. (2010), and Rani and Kumar (2018), the analysis of the effects of trade on economic growth must consider both imports and exports. Ignoring some of the two can lead to problems of omitted relevant variables.

According to the export-led growth (ELG) hypothesis, exports impact the Gross Domestic Product (GDP) through two channels: national income accounting identity and productivity. The first channel, via national income accounting identity, corresponds to increases in aggregate demand for local production resulting from export expansion as a fraction of the GDP. About the last channel, via productivity, Awokuse (2008), Chandra (2010), and Sannassee et al. (2014) argue that gains from economies of scale exist when export expansion occurs in sectors with revealed comparative advantages; consequently, it induces increases in productivity levels. Leow (2004) and Seabra and Galimberti (2012) explain that expanding exports motivates producers to improve production processes through specialization in export sectors redirecting resources to more efficient sectors and attracting investment projects.

Lall (2000), Gani (2009), and Oreiro and Feijó (2010) point out that the expansion of exports in the manufacturing sector promotes the extension of value chains and produces spillover effects to the rest of the sectors of the economy. In contrast, due to their low technological complexity, commodities have limited capacity to disseminate technical progress.

In Latin America, commodities represent more than 70% of total exports destined for China (UN COMTRADE, 2021). The abundance of natural resources in the region has attracted Chinese investment projects in the energy, infrastructure, and mining sectors to facility the extraction and transportation of commodities (Gallagher and Myers, 2021). Gallagher and Porzecanski (2008), Jenkins (2010), and Arteaga et al. (2020) warn about the risks of intensification of the primary character of export portfolios of the region as exports to China expand. On the other hand, more than 85% of imports from China are made up of manufactured goods, especially production factors (UN COMTRADE, 2021). This composition contributes to acquiring technologies or inputs cheaper in the region. In this way, the trade relationship between Latin America and China is based on exchanging Latin American commodities for manufactured goods from China.

Timini and Sánchez-Albornoz (2019) analyze the effect of trade with China on the economic growth of the LAC region, considering both ILG and ELG hypotheses. They use a Solow growth model and apply the generalized moments on a panel composed of Mexico, nine countries of South America (SA), and six Central America from 2001-2015. Their results indicate that ILG and ELG hypotheses are supported. Other studies analyze only the ELG hypothesis; therefore, they obtain a partial analysis of the impacts of trade with China on the economic growth of LAC (Feal, 2015; Vianna, 2016; Hou, 2019; Arteaga *et al*., 2020). These studies apply different regression techniques with panel data on selected Latin American countries, and their results differ.

On the other hand, the literature highlights that the presence of China in Latin-America is not limited to its role as a trading partner; it also exerts effects as a competitor in third markets (López-Córdova, Micco and Molina, 2007; Jenkins, 2010). Gallagher and Porzecanski (2008) and Marchini (2017) point

out that the global export structures of Mexico and China are very similar. Hence, these two countries have a more competitive relationship in the international market for technology-based manufactures. Arteaga et al. (2020) warn that once the United States is Latin America's primary export market, a reduction in Latin American exports to the United States attributed to the effect of competition from China may generate adverse effects on the productive structures of Latin American countries. These adverse effects result from domestic production no longer benefits from economies of scale induced by external demand (Herzer, Nowak-Lehmann, & Siliverstovs., 2006; Dreger & Herzer, 2013). The study by Arteaga et al. (2020) includes the impact of China's penetration into the US market in its model. They found that after 2001, the increased presence of China in the US market generated adverse effects on the economic growth of South American countries (SA).

According to Lederman et al. (2009) and Devadason et al. (2017), differences in factor endowments drive the commercial relationship between China and each LAC country. Other individual factors across LAC countries such as the degree of trade dependence with China, the trade balance with China, the diplomatic dilemma China-Taiwan, geographical location, the technological gap of goods traded with China, the importance of other trading partners, size of economies and, foreign direct investment from China shape the relationship of each LAC country with China (Devadason et al. 2017; Marchini, 2017). In this way, León (2006) and Ortiz et al. (2019) suggest not analyzing China–LAC trade relationship considering Latin America in an aggregate way.

II. DATA

The sample data includes variables for China and 14 LAC countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Mexico, Peru, Uruguay, and Venezuela, with annual information from 1991 - 2019. The sample does not consider the most recent data to avoid including the possible effects and distortions in the trade of the regions related to the COVID-19 pandemic. From the sample, eight countries (Brazil, Mexico, Chile, Peru, Argentina, Colombia, and Venezuela) account for 93.30% of the China – Latin America total trade (UN-COMTRADE, 2021).[1] Hence, the analysis considers 1991–2019, given that the first capital lag values are included in the model.

Gross domestic product (GDP) data comes from the Statistical Databases and Publications of the Economic Commission for Latin America and the Caribbean (ECLAC-STAT, 2021) and the World Bank (World Bank, 2021). Information on exports (EXP) and imports (IMP) are from the United Nations trade statistics databases (UN-COMTRADE, 2021). Data on gross capital formation (K) and terms of trade (TERMS) are as reported in the World Bank (2021). Non-export GDP is obtained by excluding exports to the world from GDP. NonEXP is defined as exports to the world minus exports to trade partner j. COMP_USA is the ratio of US imports from trade partner j to overall US imports; information on US imports comes from UN-COMTRADE (2021). Table 1 shows the descriptive statistics of the sample.

[1] The values of Non-export GDP, NonEXP, K, EXP and IMP are deflated to US$ real terms (base year=2009). The model includes the implicit GDP deflator reported by the International Monetary Fund (IMF, 2021).

Table 1
Trade patterns and macroeconomics: descriptive statistics China and Latin American Countries (LAC) 1991-2019

Row	Variables:	Country i	Trade Partner j	1991 – 2000		2001 – 2019		1991 – 2019	
				Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1	Non-export GDP_{it}	China	-	7,177.00	2,251.37	46,901.09	31,681.03	33,203.13	31,991.36
2		LAC	-	1,331.95	2,133.29	2,061.76	3,438.44	1,810.10	3,068.96
3	$NonEXP_{jit}$	China	LAC	2,805.61	1,269.42	15,943.35	5,793.35	11,413.10	7,904.48
4		LAC	China	201.22	332.58	482.94	791.24	385.80	682.34
5	K_{it}	China	-	3,661.29	1,068.11	27,936.40	16,947.41	19,565.67	17,969.16
6		LAC	-	337.93	532.68	604.34	959.73	512.48	846.25
7	$TERMS_{it}$	China	-	104.01	3.78	87.45	5.17	93.16	9.27
8		LAC	-	96.96	14.01	128.61	60.14	117.70	51.58
9	EXP_{jit}	LAC	China	29.71	11.07	585.68	362.22	393.74	396.08
10	IMP_{jit}	LAC	China	42.93	28.79	969.21	564.84	649.80	637.28
11	$COMP\_USA_{jt}$	-	LAC	0.14	0.02	0.17	0.01	0.16	0.02
12		-	China	0.07	0.01	0.17	0.04	0.14	0.06

Note: Non-export GDP, NonEXP, K, EXP, and IMP variables are expressed in million dollars (in real terms, the base year 2009). Std. Dev. = Standard deviation. LAC = the 14 Latin American countries. The statistics for Latin American countries consider the average values over LAC.
Source: UN COMTRADE (2021).

The gross capital formation had notable increases in China and LAC countries between 1991 – 2000 and 2001 - 2019, emphasizing the first trading partner. In LAC, the terms of trade increased, while in China, it decreased. China's entry into the WTO increased the demand for commodities and expanded manufacturing supply in the international market. Consequently, international commodity prices increased while manufacturers decreased (Andersen et al., 2014; Rabanal and Rabanal, 2016). Most LAC countries have primary export specialization and are high importers of manufactures (except for Mexico and some Central American and Caribbean countries). Therefore, their terms of trade were favored. In China, the opposite effect occurred (Han and Zhang, 2012; Jebran, Iqbal, Bhat, and Ali, 2018).

From 2001 - 2019, LAC exports to China, and LAC imports from China were approximately 20 times higher than in the previous period. The average value of Latinoamerica's participation in global imports of the United States grew from 14% in 1991 - 2000 to 17% in 2001 - 2019. However, the evolution of China's participation in global imports from the United States was more substantial, reaching LAC in 2001 - 2019. For all variables except COMP_USA, there are 435 observations. The variable COMP_USA does not vary by country, so there are 29 observations for each trade partner j.

III. METHODOLOGY

This work seeks three goals. First, to estimate the effects of imports from China on the economic growth of each LAC country. Second, to see whether these effects are evident in each LAC country's non-exporting or exporting sectors. Finally, to determine the effects of Chinese imports from LAC on China's economic growth. The analysis assumes a Cobb-Douglas aggregate production function defining the Gross Domestic Product (GDP). For each country i in time t, GDP depends upon three elements: L denotes the labor, K is the capital, and A expresses the total factor productivity. The coefficients α_{1i} y α_{2i} are the elasticities of the country's production i concerning changes in the levels used for labor and capital, respectively.

$$GDP_{it} = A_{it} L_{it}^{\alpha_{1i}} K_{it}^{\alpha_{2i}}, \quad (1)$$
$$i=1...N,\ t=1\ldots T$$

Following the theoretical model used by Dreger and Herzer (2013), Feal (2015), and Arteaga et al. (2020),[2] total productivity factor function is defined in terms of trade ($TERMS_{it}$) and three variables related to the trade relationship between country i and the trading partner j: country i's exports to trading partner j (EXP_{jit}), country i's imports from trading partner j (IMP_{jit}) and, trading partner j's share of overall US imports ($COMP\_USA_{jt}$).[3] The coefficients α_{3i}, α_{4i}, α_{5i} y α_{6i} are the elasticities of the productivity term of the country i for changes in terms of trade, country i exports to trade partner j, country i imports from trade partner j, and trade partner j's share of US market, respectively.

$$A_{it} = TERMS_{it}^{\alpha_{3i}} EXP_{jit}^{\alpha_{4i}} IMP_{jit}^{\alpha_{5i}} COMP\_USA_{jt}^{\alpha_{6i}} \quad (2)$$
$$i=1...N;\quad j=1\ldots P;\quad i \neq j;\quad t=1\ldots T$$

According to Duguay (2006) and Jawaid and Raza (2012), improvements in terms of trade allow for the acquisition of capital goods, the implementation of investment projects, and specialization into efficient sectors, stimulating increases in productivity levels and generating positive effects on economic growth.[4] The inclusion of EXP_{jit} and IMP_{jit} variables as a determinant of productivity is in line with the theoretical approach of the ELG and ILG hypotheses (Kim et al., 2007; Awokuse, 2008; Chandra, 2010; Seabra and Galimberti, 2012; Sannassee et al., 2014; Ahn and Duval, 2017; Rani and Kumar, 2018; Roquez-Diaz and Escot, 2018; Abreha, 2019). The productivity term includes the $COMP\_USA_{jt}$ variable due to a decrease in external demand attributed to the competition effect, causes local production to operate at low capacity and does not take advantage of economies of scale; these conditions are detrimental to productivity levels (Sannassee et al., 2014; Arteaga et al., 2020). Combining equations (1) and (2) and applying natural logarithm, equation (3) is obtained:

$$n(GDP_{it}) = \alpha_{1i} Ln(L_{it}) + \alpha_{2i} Ln(K_{it}) + \alpha_{3i} Ln(TERMS_{it}) + \alpha_{4i} Ln(EXP_{jit}) \quad (3)$$
$$L + \alpha_{5i} Ln(IMP_{jit}) + \alpha_{6i} Ln(COMP\_USA_{jt})$$
$$i=1...N;\quad j=1\ldots P;\quad i \neq j;\quad t=1\ldots T$$

[2] The works of Dreger and Herzer (2013), Feal (2015) and Arteaga et al. (2020) just consider country i's exports to trade partner j. The last study includes trading partner j's share of overall US imports. The present paper incorporates country i's imports from partner j into the production function.

[3] Trade partner j can be a country or a region. On the other hand, for the country i and its trading partner j, where $i \neq j$, the variable COMP_USA expresses the share of trading partner j in overall U.S. imports. For this reason, this variable does not have the subscript i. However, the coefficient α_{6i} must contain the subscript i because it shows the relationship between country i's productivity term and trading partner j's share of overall U.S. imports.

[4] Yamada (1998), Hye and Siddiqui (2011) and Vianna (2016) also address the terms of trade as a determinant of productivity.

Via national accounting identity, the variable GDP contains the exports to trade partner j; this represents a simultaneity problem in equation 3 (Feder, 1983; Greenaway and Sapsford, 1994). For this reason, the econometric model considers non-export-to-trade-partner-j GDP (GDP_NonEXP_{jit}) as the dependent variable, as applied by Feal (2015) and Arteaga et al. (2020). Excluding the effect of exports to trade partner j via national accounting identity, the impact on the GDP_NonEXP_{jit} variable will indicate whether the expansion of exports to trade partner j influences economic growth via productivity. Likewise, the effect of imports from trade partner j on GDP_NonEXP_{jit} will indicate whether imports from trade partner j drive economic growth via productivity in sectors that do not export to trade partner j.

In addition, Gross Capital Formation accounts include acquisitions of capital goods (European Commission et al., 2009), and part of the imports from trade partner j correspond to the latter category. Therefore, the right side of equation (3) might present a double-counting problem. Additionally, it is possible to have a "two-way causality" between capital and economic growth (Musai & Mehrara, 2013; Uneze, 2013). Hence, the econometric model includes the first lag of capital to correct the potential endogeneity of this variable (Wooldridge, 2003). Substituting GDP for GDP_NonEXP and K_t for K_{t-1}, the econometric model is given by the following equation:

$$Ln(GDP\_NonEXP_{jit}) = \beta_{1i} Ln(L_{it}) + \beta_{2i} Ln(K_{i,t-1}) + \beta_{3i} Ln(TERMS_{it}) + \beta_{4i} Ln(EXP_{jit}) + \beta_{5i} Ln(IMP_{jit}) + \beta_{6i} Ln(COMP\_USA_{jt}) \quad (4)$$
$$i = 1...N; \quad j = 1...P; \quad i \neq j; \quad t = 1...T$$

Regarding the labor pool, this work applies the considerations of Dreger and Herzer (2013), Feal (2015), and Arteaga et al. (2020), which work with the hypothesis that the hours worked are stationary around a deterministic time trend so that the expression $\beta_{1i}Ln(L_{it})$ might be replaced by an individual effect conditioned by time $\lambda_{1i}T_t$. Also, the empirical model includes the fixed effect (β_{0i}) and the error term (ε_{it}). These three adjustments result in equation (5) below.

$$Ln(GDP\_NonEXP_{jit}) = \beta_{0i} + \lambda_{1i}T_t + \beta_{2i} Ln(K_{i,t-1}) + \beta_{3i} Ln(TERMS_{it}) + \beta_{4i} Ln(EXP_{jit}) + \beta_{5i} Ln(IMP_{jit}) + \beta_{6i} Ln(COMP\_USA_{jt}) + \varepsilon_{it} \quad (5)$$
$$i = 1...N; \quad j = 1...P; \quad i \neq j; \quad t = 1...T$$

The variable non-export-to-trade-partner-j GDP (GDP_NonEXP_{jit}) is studied in two components: the non-export sector and the export sector. The non-export sector corresponds to the GDP net of global exports (Non-export GDP_{it}).[5] The export sector comprises the global exports of country i minus its exports to trading partner j ($NonEXP_{jit}$);[6] for example, for i = Mexico and j = China, the $NonEXP_{jit}$ variable includes the global exports of Mexico except its exports to China. In this way, equation (6) results from substituting GDP_NonEXP_{jit} for Non-export GDP_{it} in equation (5), while equation (7) is obtained by replacing GDP_NonEXP_{jit} with $NonEXP_{jit}$ in equation (5).[7]

$$Ln(Non-export\ GDP_{it}) = \Omega_{0i} + \Omega_{1i}T_t + \Omega_{2i} Ln(K_{i,t-1}) + \Omega_{3i} Ln(TERMS_{it}) + \Omega_{4i} Ln(EXP_{jit}) + \Omega_{5i} Ln(IMP_{jit}) + \Omega_{6i} Ln(COMP\_USA_{jt}) + \varepsilon_{it} \quad (6)$$
$$i = 1...N; \quad j = 1...P; \quad i \neq j; \quad t = 1...T$$

[5] Namely, Non-export GDPit is equal to GDP of country i minus its global exports.
[6] NonEXPjit is equal to global exports of country i minus its exports to trade partner j.
[7] Non-export-to-trade-partner-j GDP (GDP_NonEXPjit) must coincide with the sum of GDP net of global exports (Non-export GDPit), and the global exports of country i minus its exports to trading partner j (NonEXPjit).

$$Ln(NonEXP_{jit}) = \varphi_{0i} + \varphi_{1i}T_t + \varphi_{2i}\,Ln(K_{i,t-1}) + \varphi_{3i}\,Ln(TERMS_{it}) + \varphi_{4i}\,Ln(EXP_{jit}) + \varphi_{5i}\,Ln(IMP_{jit}) + \varphi_{6i}\,Ln(COMP\_USA_{jt}) + \varepsilon_{it} \quad (7)$$
$$i = 1...N; \quad j = 1\ldots P; \quad i \neq j; \quad t = 1\ldots T$$

Equation (6) expresses the effects of trade relations between country i and trade partner j on the non-export sector of country i. In contrast, equation (7) explains the impact of trade relations between country i and trade partner j on the export sector of country i. In this way, it is possible to identify whether trade relations between country i and trade partner j stimulate the economic growth of country i via expansion of its non-export sector, stimuli to its export sector, or both (Olarreaga, Sperlich & Trachsel, 2020).

In equation 6, Ω_{2i}, $\Omega_{3i,}$ $\Omega_{4i,}$ $\Omega_{5i,}$ and Ω_{6i} are the elasticities of the non-export GDP_{it} for changes in capital, terms of trade, country i exports to trade partner j, country i imports from trade partner j, and trade partner j's share of US market, respectively. Similarly, in equation 7, φ_{2i}, $\varphi_{3i,}$ $\varphi_{4i,}$ $\varphi_{5i,}$ and φ_{6i} are the elasticities of the $NonEXP_{jit}$ for changes in the respective explanatory variables.

In equation 6, if $\Omega_{4i}>0$ ($\Omega_{5i}>0$), country i exports to trade partner j (country i imports from trade partner j) induces economic growth of the non-export sector of country i. In equation 7, if $\varphi_{4i}>0$ ($\varphi_{5i}>0$), country i exports to trade partner j (country i imports from trade partner j) boosts the economic growth of the export sector of country i. Regarding the variable COMP_USA, in equation (6), if $\Omega_{6i}<0$, the participation of the trade partner j in the US market discourages the economic growth of the non-export sector of country i; analogously applies to equation 7.

To know these effects before and after China's accession to the WTO, a dummy variable is used, identified as WTO_t, equal to "1" for 2001 - 2019 and "0" before that period. The WTO_t variable is iterated with the variables EXP, IMP, and COMP_USA, as shown in equations (8) and (9).

$$Ln(Non-export\ GDP_{it}) = \Omega_{0i} + \Omega_{1i}T_t + \Omega_{2i}\,Ln(K_{i,t-1}) + \Omega_{3i}\,Ln(TERMS_{it}) + ¥_{4i}\,Ln(EXP_{jit}) + £_{4i}\,Ln(EXP_{jit}) \times WTO_t + ¥_{5i}\,Ln(IMP_{jit}) + £_{5i}\,Ln(IMP_{jit}) \times WTO_t + ¥_{6i}\,Ln(COMP\_USA_{jt}) + £_{6i}\,Ln(COMP\_USA_{jt}) \times WTO_t + \varepsilon_{it} \quad (8)$$
$$i = 1...N; \quad j = 1\ldots P; \quad i \neq j; \quad t = 1\ldots T$$

$$Ln(NonEXP_{jit}) = \varphi_{0i} + \varphi_{1i}T_t + \varphi_{2i}\,Ln(K_{i,t-1}) + \varphi_{3i}\,Ln(TERMS_{it}) + \gamma_{4i}\,Ln(EXP_{jit}) + \pi_{4i}\,Ln(EXP_{jit}) \times WTO_t + \gamma_{5i}\,Ln(IMP_{jit}) + \pi_{5i}\,Ln(IMP_{jit}) \times WTO_t + \gamma_{6i}\,Ln\left(COMP_{USA_{jt}}\right) + \pi_{6i}\,Ln(COMP\_USA_{jt}) \times WTO_t + \varepsilon_{it} \quad (9)$$
$$i = 1...N; \quad j = 1\ldots P; \quad i \neq j; \quad t = 1\ldots T$$

In equation (8), if the linear combination test of coefficients [$¥_5$+ $£_5$=0] does not reject the null hypothesis, then the effect of imports from trade partner j on the non-export GDP of country i toward 2001 - 2019 is null. On the contrary, if the hypothesis is rejected, then $¥_5$+ $£_5$ indicates the effect of imports of country i from trading partner j in 2001 – 2019. This criterion applies to the EXP and COMP_USA in equations (8) and (9).

According to equation (8), for i = Argentina and j = China, capital stock and terms of trade of Argentina, Argentina's exports to China, Argentina's imports from China, and China's share of overall US imports explain the non-export GDP of Argentina. It is applied similarly to the rest of the LAC countries. These considerations apply analogously to equation (9). On the other hand, the proposed model also analyzes the impact of trade CHN-LAC on China's economic growth. Thus, for i = China

and j = Latin America (LAC), gross capital formation and terms of trade of China, China's exports to the LAC region, China's imports from the LAC region, and Latin America's share of overall US imports explain the non-export GDP of China.

Unit-root tests show that the data series are integrated of order 1 (Appendix A). After applying the first differences to equations (8) and (9), the Ω_{0i} and φ_{0i} are removed, the labor effects result in an individual country-specific constant, and one more year of observation is eliminated from the sample. Consequently, the model considers the data in the first differences of logarithms for 1992-2019. In equation (10), the coefficients continue to express the elasticities of non-export GDP to the independent variables for each country i (Wooldridge, 2003); this is similarly in equation (11). In this form, the variables express growth rates. In line with Barro (1991, 2003), the model also includes the logarithm of the initial GDP of each country as a determinant of economic growth to control for the relative convergence and initial conditions.

Equation (10) is the functional form used to apply the econometric analysis of the impact of trade relations between CHN-LAC on the economic growth of the non-export sector of each of these trading partners; this equation is identified as model 1 as follows:

$$\begin{aligned} \Delta Ln(Non-export\ GDP_{it}) = {} & \Omega_{1i} + \Omega_{2i}\,\Delta Ln\left(K_{i,t-1}\right) + \Omega_{3i}\,\Delta Ln(TERMS_{it}) + \\ & ¥_{4i}\,\Delta Ln\left(EXP_{jit}\right) + £_{4i}\,\Delta Ln\left(EXP_{jit}\right) \times WTO_t + ¥_{5i}\,\Delta Ln\left(IMP_{jit}\right) + \\ & £_{5i}\,\Delta Ln\left(IMP_{jit}\right) \times WTO_t + ¥_{6i}\,\Delta Ln\left(COMP_{USA\,jt}\right) + £_{6i}\,\Delta Ln\left(COMP\_USA_{jt}\right) \times \\ & WTO_t + \Omega_{7i}\,Ln\left(GDP_{i,t=0}\right) + \varepsilon_{it} \\ & i = 1...N; \quad j = 1\ldots P; \quad i \neq j; \quad t = 1\ldots T \end{aligned} \tag{10}$$

Equation (11) allows the analysis of the effects of trade relations between CHN-LAC on the economic growth of the export sector for each of these trading partners. This equation is defined as model 2:

$$\begin{aligned} \Delta Ln\left(NonEXP_{jit}\right) = {} & \varphi_{1i} + \varphi_{2i}\,\Delta Ln\left(K_{i,t-1}\right) + \varphi_{3i}\,\Delta Ln(TERMS_{it}) + \\ & \gamma_{4i}\,\Delta Ln\left(EXP_{jit}\right) + \pi_{4i}\,\Delta Ln\left(EXP_{jit}\right) \times WTO_t + \gamma_{5i}\,\Delta Ln\left(IMP_{jit}\right) + \\ & \pi_{5i}\,\Delta Ln\left(IMP_{jit}\right) \times WTO_t + \gamma_{6i}\,\Delta Ln\left(COMP\_USA_{jt}\right) + \pi_{6i}\,\Delta Ln\left(COMP\_USA_{jt}\right) \times \\ & WTO_t + \varphi_{7i}\,Ln\left(GDP_{i,t=0}\right) + \varepsilon_{it} \\ & i = 1...N; \quad j = 1\ldots P; \quad i \neq j; \quad t = 1\ldots T \end{aligned} \tag{11}$$

The empirical model considers the SUR method to estimate the independent variables' effects on each country's economic growth. According to this method, a system of equations is formulated, where each equation corresponds to one country with T observations. The sample comprises China and 14 LAC countries, each having 28 observations. For models 1 and 2, this study sets up the sample in a system of 15 equations, where each equation corresponds to a country i toward 28 observations. The first equation analyzes the effects of CHN-LAC trade relations on China's economic growth, so equation 1, i = China and j = LAC. Equations 2 through 15 verify the effects of CHN-LAC trade relations on economic growth for each Latin American country; in these equations, i is the Latin American country studied in the corresponding equation, while j is equal to China for equations 2 to 15.[8]

In the SUR method, the estimation is done through Generalized Least Squares (GLS) using the variance-covariance matrix of the system, which includes the existing covariances between pairs of equations. In this way, the coefficients obtained are asymptotically more efficient than those obtained by applying ordinary least squares to each country (Zellner, 1962; Bacon, 1974; Judge, 1988) since the relationships between equations are considered in the estimation. According to Greene (1997), the

[8] Equations 2 to 15, total 14 equations, one equation for each of the 14 Latin American countries considered in this study.

correlation between the residuals of pairs of equations introduces useful information when calculating the variance of the coefficients as the degree of robustness of the estimates grows following the correlation between the residuals of pairs of equations (Adom, 2016). Therefore, the SUR method is suitable in the presence of contemporary dependence between system equations (Zellner, 1962).

Theoretically, this existence of contemporary dependence between equations reveals that the residuals of each equation absorb non-observable factors common between countries and random shocks affecting several countries simultaneously (Theil, 1971; Fiebig, 2003). Among the non-observed factors are economic and political regulations, financial integration between countries, and factors associated with international trade, such as trade agreements, common land borders, intraregional trade, and export specialization (Mohamed and Rault, 2012; Roquez-Diaz and Escot, 2018).

IV. RESULTS AND DISCUSSION

This section presents the effects of imports from China on the economic growth of each LAC country and if these effects are evident in the non-exporting or exporting sectors of each LAC country. In addition, the section shows the effects of Chinese imports from LAC on China's economic growth.

Economic growth is treated in two components. The first corresponds to the non-export sector. That is the country's GDP i minus its total exports (Non-export GDPit). The system of equations of model 1 is the functional form to carry out this analysis. Table 2 shows the estimation and the linear combination tests in Appendix E, F, and G. The second component is the export sector, which comprises the country's total exports of the country i minus those destined for partner j (NonEXPjit). This analysis corresponds to the system of equations of model 2. Table 3 presents these results, and the linear combination tests are in Appendix H, I, and J.

In Tables 2 and 3, columns (1) to (15) correspond to each of the 15 equations of the system. In Table 2, column (1) shows the impact of LAC on China's non-export GDP, and columns (2) to (15) show the effects of China on the non-export GDP of each LAC country, analogous to Table 3.

Durbin's alternative serial correlation test (Appendix B) shows no serial correlation for 1992-2019. Also, the SUR method's application requires that system of equations present contemporary dependence between the error terms; the Breusch-Pagan test (Appendix C) indicates that the system of equations of models 1 and 2 present contemporaneous dependence of 1% significance. The high correlation between pairs of equations of the systems of both models allows for obtaining robustness and efficiency gains in the estimations when using the SUR method (Greene, 1997; Adom, 2016).

Table 2
Effects of China-Latin America trade relations on the non-export sector of each of these trading partners, before and after China's entry into the WTO: 1992-2000 and 2001-2019 (Part 1 of 3)

Dependent Variable: Non-export sector (non-export GDP$_{it}$)

Country (i)		China	Argentina	Bolivia	Brazil	Chile
Trade partner (j)		LATAM	China	China	China	China
Column		(1)	(2)	(3)	(4)	(5)
Independent Variables:						
Capital	$K_{i,t-1}$	0.2797	-0.0690	0.1702 **	0.0421	0.1227 ***
		0.1410	*0.3860*	*0.0160*	*0.4710*	*0.0060*
Terms of Trade Index	$TERMS_{it}$	0.3479	-0.9310 **	-0.4068 ***	1.8532 ***	0.2869 ***
		0.3380	*0.0140*	*0.0010*	*0.0000*	*0.0000*

Exports to trade partner j	EXP_{jit}	-0.2999	*	0.1320		-0.0090		0.2267	***	0.0999	***
		0.0670		*0.1750*		*0.6110*		*0.0010*		*0.0000*	
Exports to trade partner j X WTO	EXP_{jit} X WTO_t	0.4558	**	-0.2677	**	0.1012	*	-0.4390	***	-0.1604	***
		0.0260		*0.0480*		*0.0530*		*0.0000*		*0.0000*	
Imports from trade partner j	IMP_{jit}	0.0750		-0.1812	*	-0.0023		0.0757	*	0.0501	
		0.5230		*0.0890*		*0.9770*		*0.0840*		*0.5660*	
Imports from trade partner j X WTO	IMP_{jit} X WTO_t	-0.0324		0.8157	***	-0.2597	**	0.2660	***	0.2432	**
		0.8540		*0.0000*		*0.0130*		*0.0030*		*0.0160*	
Trade partner j´s share in the imports of the United States	$COMP\_USA_{jt}$	2.1308	**	1.0772	**	-0.6984	**	-0.8272	**	0.4783	*
		0.0030		*0.0280*		*0.0470*		*0.0180*		*0.0700*	
Trade partner j´s share in the imports of the United States X WTO	$COMP\_USA_{jt}$ X WTO_t	-1.6266		-1.6659	***	0.5427		1.0604	***	-0.4803	
		0.1450		*0.0020*		*0.1540*		*0.0090*		*0.1030*	
Initial GDP (1992)	$GDP_{i,t=1992}$	0.0024	*	-0.0005		0.0043	***	-0.0002		-0.0004	
		0.0510		*0.7270*		*0.0010*		*0.8550*		*0.5430*	
Adjusted R-squared		0.6830		0.7691		0.4872		0.7969		0.6583	

Note: System of equations parameters: 420 observations and 285 degrees of freedom. Initial GDP_{1992} is in logarithmic form; the remaining variables are in first logarithmic differences. The superscripts ***, **, and * indicate confidence levels of 1%, 5%, and 10%, respectively. The numbers in italics indicate the p-value of each coefficient. The WTO dummy variable equals zero for 1992-2000 and 1 for 2001-2019. LAC = the 14 Latin American countries. According to the linear combination tests of Appendix E, the variable EXP in the period 2001 - 2019 is significant in Bolivia, Brazil, Chile, Colombia, and Costa Rica. The variable IMP is significant for the same period in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Peru, Uruguay, and Venezuela (Appendix F). For 2001 - 2019, the variable COMP_USA is significant in Argentina, El Salvador, and Uruguay (Appendix G).
Source: Own estimations using UN COMTRADE (2021).

Table 2
Effects of China-Latin America trade relations on the non-export sector of each of these trading partners, before and after China's entry into the WTO: 1992-2000 and 2001-2019 (Part 2 of 3)

Dependent Variable: Non-export sector (non-export GDP_{it})

Country (i)		Colombia	Costa Rica	Dom. Rep.	Ecuador	El Salvador
Trade partner (j)		China	China	China	China	China
Column		(6)	(7)	(8)	(9)	(10)
Independent Variables:						
Capital	$K_{i,t-1}$	0.2196 ***	-0.0830	-0.0041	-0.2106	0.1730 ***
		0.0000	*0.3610*	*0.9690*	*0.1070*	*0.0000*
Terms of Trade Index	$TERMS_{it}$	0.4281 ***	0.0859	0.3465	-0.2810	0.2470 ***
		0.0000	*0.6390*	*0.4550*	*0.2200*	*0.0030*
Exports to trade partner j	EXP_{jit}	-0.0002	-0.0050	0.0034	0.0527	0.0017
		0.9860	*0.4660*	*0.9510*	*0.2250*	*0.7380*
	EXP_{jit} X WTO_t	0.0289	-0.0443 **	0.0001	-0.0429	-0.0104

Exports to trade partner j X WTO		*0.1330*	*0.0400*	*0.9999*	*0.3510*	*0.1810*
Imports from trade partner j	IMP_{jit}	0.2695 ***	0.0017	0.0822	-0.0368 **	0.0003
		0.0000	*0.9050*	*0.4990*	*0.0420*	*0.9530*
Imports from trade partner j X WTO	IMP_{jit} X WTO_t	-0.0663	0.2177 ***	0.0114	0.2734 ***	0.0710 **
		0.4300	*0.0020*	*0.9450*	*0.0000*	*0.0110*
Trade partner j´s share in the imports of the United States	$COMP\_USA_{jt}$	-0.5696	0.0688	0.4117	-0.2234	0.4958 ***
		0.1480	*0.8100*	*0.5230*	*0.7720*	*0.0010*
Trade partner j´s share in the imports of the United States X WTO	$COMP\_USA_{jt}$ X WTO_t	0.4548	0.0317	-0.8892	0.7740	-0.2777
		0.2660	*0.9230*	*0.2220*	*0.3300*	*0.1110*
Initial GDP (1992)	$GDP_{i,t=1992}$	-0.0010	0.0022 **	0.0025	0.0004	0.0000
		0.2140	*0.0410*	*0.1380*	*0.8230*	*0.9360*
Adjusted R-squared		0.7101	0.5243	0.2452	0.3128	0.6457

Note: System of equations parameters: 420 observations and 285 degrees of freedom. Initial GDP_{1992} is in logarithmic form; the remaining variables are in first logarithmic differences. The superscripts ***, **, and * indicate confidence levels of 1%, 5%, and 10%, respectively. The numbers in italics indicate the p-value of each coefficient. The WTO dummy variable equals zero for 1992-2000 and 1 for 2001-2019. LAC = the 14 Latin American countries. According to the linear combination tests of Appendix E, the variable EXP in the period 2001 - 2019 is significant in Bolivia, Brazil, Chile, Colombia, and Costa Rica. The variable IMP is significant for the same period in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Peru, Uruguay, and Venezuela (Appendix F). For 2001 - 2019, the variable COMP_USA is significant in Argentina, El Salvador, and Uruguay (Appendix G).
Source: Own estimations using UN COMTRADE (2021).

Table 2
Effects of China - Latin America trade relations on the non-export sector of each of these trading partners, before and after China's entry into the WTO: 1992-2000 and 2001-2019 (Part 3 of 3)

Dependent Variable: Non-export sector (non-export GDP_{it})

Country (i)		Honduras	Mexico	Peru	Uruguay	Venezuela
Trade partner (j)		China	China	China	China	China
Column		(11)	(12)	(13)	(14)	(15)
Independent Variables:						
Capital	$K_{i,t-1}$	0.0279	0.0911	0.1468 ***	0.1394 **	-0.1199
		0.5560	*0.4700*	*0.0040*	*0.0310*	*0.2180*
Terms of Trade Index	$TERMS_{it}$	0.0402	1.7184 ***	0.1005	0.1837	0.0432
		0.3460	*0.0020*	*0.4320*	*0.4150*	*0.7960*
Exports to trade partner j	EXP_{jit}	-0.0599 ***	0.0077	0.1455 ***	0.0558	-0.0613
		0.0000	*0.8790*	*0.0000*	*0.5690*	*0.4010*
Exports to trade partner j X WTO	EXP_{jit} X WTO_t	0.0537 ***	-0.0801	-0.1943 ***	0.0009	-0.0856
		0.0000	*0.2910*	*0.0050*	*0.9940*	*0.4430*
Imports from trade partner j	IMP_{jit}	0.0131	0.3246 **	0.0482	0.1290	0.0047
		0.8240	*0.0280*	*0.1100*	*0.2950*	*0.8660*

Imports from trade partner j X WTO	IMP_{jit} X WTO_t	0.0379 *0.5920*	-0.4063 * *0.0810*	0.1371 ** *0.0380*	0.2124 *0.1010*	0.1757 ** *0.0330*
Trade partner j´s share in the imports of the United States	$COMP\_USA_{jt}$	0.1938 *0.3250*	-0.9037 *0.1940*	-0.2981 *0.2060*	0.3698 *0.4020*	0.5061 *0.5120*
Trade partner j´s share in the imports of the United States X WTO	$COMP\_USA_{jt}$ X WTO_t	-0.0839 *0.7020*	0.8338 *0.2810*	0.2083 *0.4270*	-0.8439 * *0.0760*	-0.4224 *0.6090*
Initial GDP (1992)	$GDP_{i,t=1992}$	0.0016 ** *0.0360*	0.0006 *0.6550*	0.0009 *0.2460*	-0.0007 *0.5310*	0.0034 *0.1250*
Adjusted R-squared		0.7145	0.3469	0.6484	0.7247	0.1698

Note: System of equations parameters: 420 observations and 285 degrees of freedom. Initial GDP_{1992} is in logarithmic form; the remaining variables are in first logarithmic differences. The superscripts ***, **, and * indicate confidence levels of 1%, 5%, and 10%, respectively. The numbers in italics indicate the p-value of each coefficient. The WTO dummy variable equals zero for 1992-2000 and 1 for 2001-2019. LAC = the 14 Latin American countries. According to the linear combination tests of Appendix E, the variable EXP in the period 2001 - 2019 is significant in Bolivia, Brazil, Chile, Colombia, and Costa Rica. The variable IMP is significant for the same period in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Peru, Uruguay, and Venezuela (Appendix F). For 2001 - 2019, the variable COMP_USA is significant in Argentina, El Salvador, and Uruguay (Appendix G).
Source: Own estimations using UN COMTRADE (2021)

Table 3
Effects of China - Latin America trade relations on the export sector of each of these trading partners, before and after China's entry into the WTO: 1992-2000 and 2001-2019 (Part 1 of 3)

Dependent Variable: Export sector ($NonEXP_{jit}$)

Country (i)		China	Argentina	Bolivia	Brazil	Chile
Trade partner (j)		LATAM	China	China	China	China
Column		(1)	(2)	(3)	(4)	(5)
Independent Variables:						
Capital	$K_{i,t-1}$	0.4717 ** *0.0310*	0.1315 *** *0.0000*	0.1066 *0.3610*	-0.1131 *** *0.0010*	0.0816 *0.1980*
Terms of Trade Index	$TERMS_{it}$	-1.2507 *** *0.0030*	1.0249 *** *0.0000*	0.8013 *** *0.0000*	0.6848 *** *0.0000*	0.9864 *** *0.0000*
Exports to trade partner j	EXP_{jit}	0.8020 *** *0.0000*	0.0304 *0.4810*	-0.0085 *0.7570*	0.0599 *0.1490*	0.0569 *0.1540*
Exports to trade partner j X WTO	EXP_{jit} X WTO_t	-0.3842 * *0.0790*	0.1662 *** *0.0070*	-0.0369 *0.6560*	-0.0900 *0.1340*	-0.0979 *0.1380*
Imports from trade partner j	IMP_{jit}	-0.0393 *0.7670*	0.2333 *** *0.0000*	0.0487 *0.6870*	-0.0247 *0.3040*	0.1892 *0.1030*
Imports from trade partner j X WTO	IMP_{jit} X WTO_t	-0.0761 *0.7010*	-0.2121 *** *0.0000*	0.3482 ** *0.0320*	0.4066 *** *0.0000*	0.1396 *0.2870*
Trade partner j´s share in the imports of the United States	$COMP\_USA_{jt}$	-2.1431 *** *0.0080*	0.0608 *0.7910*	0.0207 *0.9670*	0.2267 *0.3570*	-0.0091 *0.9780*

Trade partner j´s share in the imports of the United States X WTO	$COMP\_USA_{jt}$ X WTO_t	-0.1940 *0.8800*	-0.2843 *0.2600*	-0.0255 *0.9630*	-0.2934 *0.2960*	-0.3558 *0.3290*
Initial GDP (1992)	$GDP_{i,t=1992}$	-0.0007 *0.6160*	-0.0004 *0.5940*	0.0006 *0.7630*	-0.0005 *0.4830*	-0.0009 *0.2980*
Adjusted R-squared		0.8036	0.7681	0.5983	0.7897	0.8162

Note: System of equations parameters: 420 observations and 285 degrees of freedom. Initial GDP_{1992} is in logarithmic form; the remaining variables are in first logarithmic differences. $NonEXP_{jit}$ is equal to global exports of country *i* minus its exports to trade partner j. The superscripts ***, **, and * indicate confidence levels of 1%, 5%, and 10%, respectively. The numbers in italics indicate the p-value of each coefficient. The WTO dummy variable equals zero for 1992 - 2000 and 1 for 2001-2019. LAC = the 14 Latin American countries. According to Appendix H, from 2001–2019, the EXP variable was significant in China, Argentina, Costa Rica, Peru, and Venezuela. The IMP variable is significant for the same period in Bolivia, Brazil, Chile, Colombia, Dominican Republic, Peru, Uruguay, and Venezuela (Appendix I). For 2001 - 2019, the COMP_USA variable is significant in China, Chile, El Salvador, and Mexico (Appendix J).
Source: Own estimations using UN COMTRADE (2021).

Table 3
Effects of China - Latin America trade relations on the export sector of each of these trading partners, before and after China's entry into the WTO: 1992-2000 and 2001-2019 (Part 2 of 3)

Dependent Variable: Export sector ($NonEXP_{jit}$)*

Country (i)		Colombia	Costa Rica	Dom. Rep.	Ecuador	El Salvador
Trade partner (j)		China	China	China	China	China
Column		(6)	(7)	(8)	(9)	(10)
Independent Variables:						
Capital	$K_{i,t-1}$	0.1197 *** *0.0060*	0.1542 *0.1730*	-0.2696 *0.2640*	0.0984 *0.1240*	-0.3946 ** *0.0300*
Terms of Trade Index	$TERMS_{it}$	0.9851 *** *0.0000*	-0.2652 *0.2220*	1.2324 *0.2530*	0.9228 *** *0.0000*	-0.4910 *0.1190*
Exports to trade partner j	EXP_{jit}	0.0276 ** *0.0120*	0.0256 *** *0.0020*	0.1246 *0.3680*	0.0844 *** *0.0010*	0.0099 *0.6210*
Exports to trade partner j X WTO	EXP_{jit} X WTO_t	-0.0218 *0.3240*	0.0376 *0.1600*	-0.0541 *0.7440*	-0.0782 *** *0.0020*	0.0110 *0.7110*
Imports from trade partner j	IMP_{jit}	-0.0135 *0.8540*	-0.0013 *0.9430*	-0.4684 *0.1170*	0.0199 ** *0.0390*	0.0339 * *0.0940*
Imports from trade partner j X WTO	IMP_{jit} X WTO_t	0.2207 ** *0.0150*	0.0004 *0.9970*	1.8410 *** *0.0000*	0.0305 *0.3940*	-0.1270 *0.2540*
Trade partner j´s share in the imports of the United States	$COMP\_USA_{jt}$	0.5350 *0.2010*	1.1097 *** *0.0030*	2.4077 *0.1400*	-0.9342 ** *0.0290*	1.1175 *0.1120*
Trade partner j´s share in the imports of the United States X WTO	$COMP\_USA_{jt}$ X WTO_t	-0.7220 * *0.0880*	-1.5247 *** *0.0000*	-3.9753 ** *0.0300*	0.8012 * *0.0650*	-2.0073 ** *0.0110*
Initial GDP (1992)	$GDP_{i,t=1992}$	-0.0009 *0.2610*	0.0011 *0.4040*	-0.0068 *0.1180*	0.0016 * *0.0810*	0.0058 ** *0.0280*

Adjusted R-squared	0.8409	0.4678	0.5832	0.7563	0.2747

Note: System of equations parameters: 420 observations and 285 degrees of freedom. Initial GDP_{1992} is in logarithmic form; the remaining variables are in first logarithmic differences. $NonEXP_{jit}$ is equal to global exports of country *i* minus its exports to trade partner j. The superscripts ***, **, and * indicate confidence levels of 1%, 5%, and 10%, respectively. The numbers in italics indicate the p-value of each coefficient. The WTO dummy variable equals zero for 1992 - 2000 and 1 for 2001-2019. LAC = the 14 Latin American countries. According to Appendix H, from 2001–2019, the EXP variable was significant in China, Argentina, Costa Rica, Peru, and Venezuela. The IMP variable is significant for the same period in Bolivia, Brazil, Chile, Colombia, Dominican Republic, Peru, Uruguay, and Venezuela (Appendix I). For 2001 - 2019, the COMP_USA variable is significant in China, Chile, El Salvador, and Mexico (Appendix J).
Source: Own estimations using UN COMTRADE (2021).

Table 3
Effects of China - Latin America trade relations on the export sector of each of these trading partners, before and after China's entry into the WTO: 1992-2000 and 2001-2019 (Part 3 of 3)

Dependent Variable: Export sector ($NonEXP_{jit}$)*									
Country (i)		Honduras		Mexico		Peru		Uruguay		Venezuela	
Trade partner (j)		China		China		China		China		China	
Column		(11)		(12)		(13)		(14)		(15)	
Independent Variables:											
Capital	$K_{i,t-1}$	-0.2123		-0.1139		0.0549		-0.1091	*	-0.1221	***
		0.2570		*0.1080*		*0.2680*		*0.0610*		*0.0060*	
Terms of Trade Index	$TERMS_{it}$	-0.1178		0.7010	**	0.8121	***	0.3497	*	0.8927	***
		0.4290		*0.0240*		*0.0000*		*0.0540*		*0.0000*	
Exports to trade partner j	EXP_{jit}	0.0873	***	-0.0239		0.0948	***	0.0732		0.0102	
		0.0030		*0.4080*		*0.0020*		*0.4010*		*0.7470*	
Exports to trade partner j X WTO	EXP_{jit} X WTO_t	-0.0641		0.0673		0.0869		-0.0236		-0.1691	***
		0.1260		*0.1280*		*0.1380*		*0.8210*		*0.0000*	
Imports from trade partner j	IMP_{jit}	0.4271	*	0.1344		0.1055	***	0.2555	**	0.0069	
		0.0760		*0.1110*		*0.0000*		*0.0200*		*0.5820*	
Imports from trade partner j X WTO	IMP_{jit} X WTO_t	-0.2823		0.0085		0.1182	*	0.1787		0.1814	***
		0.3350		*0.9490*		*0.0580*		*0.1240*		*0.0000*	
Trade partner j´s share in the imports of the United States	$COMP\_USA_{jt}$	-0.1478		1.2655	***	0.0460		0.1791		0.6693	**
		0.8630		*0.0030*		*0.8640*		*0.6600*		*0.0330*	
Trade partner j´s share in the imports of the United States X WTO	$COMP\_USA_{jt}$ X WTO_t	-0.2194		-1.8285	***	-0.3097		-0.0555		-0.7044	**
		0.8180		*0.0000*		*0.3010*		*0.8990*		*0.0360*	
Initial GDP (1992)	$GDP_{i,t=1992}$	0.0017		0.0017	*	0.0000		-0.0019	*	-0.0017	*
		0.6020		*0.0590*		*0.9810*		*0.0610*		*0.0590*	

Adjusted R-squared	0.1134	0.7854	0.8188	0.6818	0.8969

Note: System of equations parameters: 420 observations and 285 degrees of freedom. Initial GDP_{1992} is in logarithmic form; the remaining variables are in first logarithmic differences. $NonEXP_{jit}$ is equal to global exports of country *i* minus its exports to trade partner j. The superscripts ***, **, and * indicate confidence levels of 1%, 5%, and 10%, respectively. The numbers in italics indicate the p-value of each coefficient. The WTO dummy variable equals zero for 1992 - 2000 and 1 for 2001-2019. LAC = the 14 Latin American countries. According to Appendix H, from 2001–2019, the EXP variable was significant in China, Argentina, Costa Rica, Peru, and Venezuela. The IMP variable is significant for the same period in Bolivia, Brazil, Chile, Colombia, Dominican Republic, Peru, Uruguay, and Venezuela (Appendix I). For 2001 - 2019, the COMP_USA variable is significant in China, Chile, El Salvador, and Mexico (Appendix J).
Source: Own estimations using UN COMTRADE (2021).

The previous tables present these effects before and after China's accession to the WTO (1992-2000) (2001-2019). For this, the variables of interest interact with a Dummy variable (WTO) equal to 1 for 2001 – 2019 and zero otherwise. Chow's test (Appendix D) shows a structural break in both models in 2001.

Tables 2 and 3 show that capital contributes to the economic growth of China and some Latin American countries. However, this paper shows that the non-export sector has relatively more acute effects. The terms of trade generate adverse effects in China, and Jebran et al. (2018) find similar results. Also, the terms of trade generate adverse effects in the non-exporting sectors of Argentina and Bolivia. In this regard, Jenkins (2010) and Wise (2016) argue that the expansion of Chinese demand for commodities stimulated exports of primary products and the stagnation of exports of manufactures based on natural resources, inducing a retraction of industrial processing units in some South American countries.

The results suggest that for the period 1992 - 2000, imports from China positively affected the economic growth of 7 of the 14 LAC countries of the sample (Tables 2 and 3). Then, after China acceded to the WTO, the number of beneficiary countries increased to 11, and the sectors impacted varied among countries. Regarding the impact of LAC exports to China on the economic growth of LAC countries, the results suggest that the evolution of these effects before and after China's accession to the WTO goes in the opposite direction of that of LAC imports from China. The results suggest that between 1992 – 2000 and 2001 - 2019, the number of LAC beneficiary countries decreased from 6 to 4 while the number of LAC countries with adverse effects increased from 0 to 3 (Tables 2 and 3).

Based on Tables 2 and 3 and appendices E, F, H, and I, Table 4 shows the LAC countries grouped according to their effects on economic growth induced by imports from China and exports to China from 2001 – 2019. It is possible to note the asymmetries in bilateral trade relations between China and each LAC country.

Table 4
Effects of China - Latin America trade relations on LAC economic growth: 2001-2019

Trade flow	Effects	non-export sector	export sector
Imports from China	Positive effects	Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Peru, Uruguay, and Venezuela	Bolivia, Brazil, Chile, Colombia, Dominican Republic, Peru, Uruguay, and Venezuela
	Negative effects	Bolivia	-
Exports to China	Positive effects	Bolivia and Colombia	Argentina, Costa Rica, and Peru
	Negative effects	Brazil, Chile, and Costa Rica	Venezuela

Source: Own estimations based on models 1 and 2 (table 2 and 3, respectively).

According to Table 4, in the period 2001 – 2019, imports from China boost the economic growth of the non-exporting sectors of Argentina, Costa Rica, Ecuador, and El Salvador, the exporting sector of the Dominican Republic, and both sectors of Brazil, Chile, Colombia, Peru, Uruguay, and Venezuela. Based on the literature, it can be inferred that in Argentina, Costa Rica, Ecuador, and El Salvador, imports from China benefit the consumers because of the cheaper access to goods (Hayakawa, 2019). Another potential explanation is that imports from China improve the productivity of non-exportable unit productions through the induced competition between local and imported goods, adoption of new technologies, or cheaper inputs (Kim et al., 2007; Ahn and Duval, 2017; Hayakawa, 2019). In the Dominican Republic, imports from China improve productivity only in the production units destined for exports (Mishra et al., 2010; Rani and Kumar, 2018; Roquez-Diaz and Escot, 2018; Abreha, 2019). In Brazil, Chile, Colombia, Peru, Uruguay, and Venezuela, imports from China contribute to economic growth in both non-exporting and exporting sectors. It is worth mentioning that these countries are essential world suppliers of copper, oil, iron, meat, and soybean (WITS, 2021). In this way, import production factors from China may contribute to the expansion of the primary exporting units.

Argentina is also an important agricultural resource supplier, especially meat and soybean. However, the results show that imports from China are not catalyzing these sectors, as evidenced by his neighboring countries in South America, especially Brazil. According to Sandleris and Wright (2011), Gopinath and Neimen (2014), and Santarcángelo and Padin (2023), the permanents external indebtedness crisis with the growing problems of exchange rate convertibility in Argentina have deteriorated the efficiency of the resources allocation process both across and within economics sectors and have distorted the capital formation path. Based on these arguments, a potential explanation is that the management of constant external restrictions in Argentina does not allow an optimal allocation of production factors imports towards the productive structure of his exports sectors.

In Bolivia, the results show that in 2001 – 2019, imports from China generated mixed effects: adverse effects on its non-export sector and positive effects on its export sector. Ahn and Duval (2017) and Autor et al. (2013, 2016) argue that imports can benefit some sectors and hurt others. In the case of Bolivia, imports of production factors from China may be boosting the primary export sector since Bolivia´s exports are intensive in natural resources. However, the imports destined for the domestic market must generate substitution effects in the sector with a greater sensibility to Chinese competition, as warned by Priede (2012) and Cisneros-Acevedo (2022), potentially attributed to intermediate goods and consumer goods from China.

On the other hand, according to Table 4, this work found that exports destined for China generate positive effects on the economic growth of the non-exporting sectors of Bolivia and Colombia. According to Gallagher and Myers (2021), expanding exports to China has involved the execution of infrastructure, transportation, and energy projects, boosting domestic sector activities, mainly construction activities. Another possible explanation is that in these countries, the incomes received from exports have been addressed to promote the productivity of economic activities related to the domestic sectors, potentially in higher value-added sectors.

In Argentina and Peru, exports to China stimulate the economic growth of their export sectors (table 4). These countries' exports to China were expanded in sectors with comparative advantages in natural resource-intensive goods (UN COMTRADE, 2021, WITS, 2021). In this regard, Awokuse (2008), Chandra (2010), and Sannassee et al. (2014) points out that the expansion of external demand for goods from sectors with revealed comparative advantages allows gains from taking advantage of economies of scale.

On the other hand, exports to China have adverse effects on the non-exporting sectors of Brazil and Chile (table 4). Like Argentina and Peru, these countries concentrate their exports destined for China in sectors with revealed comparative advantages in goods intensive in natural resources. In this regard, Gallagher and Porzecanski (2008), Jenkins (2010), and Arteaga et al. (2020) warn that countries with an

abundance of natural resources in the face of international price shocks tend to redirect resources from sectors with higher added value and concentrate efforts on primary exporting sectors.

In Venezuela, exports to China negatively affect the economic growth of the Venezuelan export sector (Table 4). The China - Venezuela trade relationship is based on granting loans and financing projects by the first partner, payable with barrels of oil by the second (Kaplan, 2016; Roby, 2020). Venezuela has received 62.2 billion dollars in loans from China, which is 45.37% of the total loans received by Latin America (Gallagher and Myer, 2021). Although Venezuela has 17.5% of world oil reserves (British Petroleum [BP], 2020), its production has decreased by 71.58% from 2007 to 2019 (BP, 2020). Of Venezuela's low amounts of oil exports, part of it is destined to pay loans granted by China.

In Costa Rica, exports to China have positive effects on the growth of its export sector and adverse effects on the non-export sector. Unlike most Latin American countries, Costa Rica's export basket destined for China is specialized in manufacturing due to its comparative advantages revealed in the electronics sector (UN COMTRADE, 2021; WITS, 2021). These characteristics of the export basket allow gains by taking advantage of economies of scale, as noted by Awokuse (2008), Chandra (2010) and, Sannassee et al. (2014) and, spillover effects since the manufacturing sector have the potential to spread technical progress (Lall, 2000; Gani, 2009; Oreiro and Feijó, 2010). However, according to Schmitt and Uribe (2016), Piton (2017), Banegas, Nuñez, and Escobar (2017), it can be argued that the decrease in international prices of manufactures induced resulting from the entry of China to the WTO could have generated pressure on the exchange rate and consequently imbalances in the relative prices of non-exportable goods in Costa Rica.

On the China side, for the period 2001 – 2019, Chinese imports from LAC produced null effects on China's economic growth, while Chinese exports to LAC induced null effects on the non-export sector of China and positive effects on its export sector.

Between LAC exports to China and LAC imports from China, the last one has a greater capacity to generate benefits for the economic growth of China and LAC countries. The technological composition of goods is one possible explanation. LAC imports from China (Chinese exports to LAC) are manufactured goods with specialized content, while LAC exports to China (Chinese imports from LAC) are mainly commodities. The spillover effects induced by exporting technological content manufacturers are achievable in exporting structures such as China Huang and Huang, 2020). In turn, according to the contributions of Rani and Kumar (2018) and Roquez-Diaz and Escot (2018), the benefits derived from the adoption of foreign knowledge and technology can be realized in LAC once this region is a recipient of high-tech manufacturers from China, especially intermediary and capital goods.

Regarding the competition effect, according to Table 3 and the linear combination test in Appendix J, in 1992 - 2000, Chinese goods in the US market positively affected the export sectors of Costa Rica, Mexico, and Venezuela. For the following period, the effect is negative in Chile, El Salvador, and Mexico and null in Costa Rica and Venezuela. It is observed that before China entered the WTO, the expansion of China's participation in global imports from the United States played a complementary role in the economic growth of the export sectors of some Latin American countries. Once China enters the WTO, this complementary effect disappears, and, in the case of Mexico, it becomes a substitution effect. On the other hand, the presence of LAC goods in the US market generates adverse effects on China's export sector before and after China's accession to the WTO.

As a robustness test, a linear combination test was applied for each variable of interest whose null hypothesis is that the coefficients of the Latin American countries are equal (Appendices K and L). The results show evidence that the null hypothesis is rejected and suggests that each Latin American country reacts differently, specifically to China's presence. In addition, the existence of contemporary dependence between countries justifies using the SUR methodology as an econometric strategy to avoid problems of aggregation bias obtained when using panel treatment techniques, as noted by Zellner (1962) and Bacon (1974).

CONCLUSIONS

As of 2001, China's entry into the World Trade Organization increased the supply of Chinese goods in international markets. Consequently, Latin American imports from China have grown drastically since 2001. This paper takes a sample of 14 Latin American countries and responds to three questions: First, what are the effects of imports from China on the economic growth of each LAC country? Second, are these effects evident in each LAC country's non-exporting or exporting sectors? Finally, what are the effects of Chinese imports from LAC on China's economic growth? This analysis was performed during the pre-pandemic period to avoid the structural changes associated with the COVID-19 economic crisis.

The results suggest that in the period before the adhesion of China to the WTO, imports from China boosted the economic growth of some LAC countries. However, after China entered the WTO, the number of LAC countries with positive effects increased. The positive effects attributed to the imports from China in the period 2001 – 2019 are evidenced in the non-exporting sectors of Argentina, Costa Rica, Ecuador, and El Salvador, in the exporting sectors of the Dominican Republic, and both sectors of Brazil, Chile, Colombia, Peru, Uruguay, and Venezuela. That is, imports from China affect Latin American countries in a differentiated way: in some countries, these goods contribute to improving the performance of the domestic sector; in others, they favor production units destined for export, and in Brazil, Chile, Colombia, Peru, Uruguay, and Venezuela imports positively impact in both sectors.

In addition, the results show that during 2001 - 2019, imports from China hurt the non-exporting sector and boosted Bolivia's exporting sector. These results warn that in Bolivia, imports from China generate gains in some sectors and losses in others. Also, for Mexico and Honduras, imports from China do not affect economic growth.

This paper also found that exports to China boost the economic growth of Bolivia, Colombia, Argentina, and Peru. The economies of scale generated in sectors with revealed comparative advantages in commodities and the diversion of export revenues to other domestic sectors may explain these effects. However, the results show that exports to China hurt Brazil, Chile, and Venezuela's economic growth and produced null effects in the Dominican Republic, Ecuador, El Salvador, Honduras, Mexico, and Uruguay. In most Latin American countries, exports to China are concentrated in commodities. Expansion of exports in natural resources-intensive goods in periods of price shocks tends to deepen the primary exporting pattern, leaving aside other dynamic sectors. Also, the primary sector has a low capacity to generate spillover effects toward other economic activities; in this way, it is possible to find null effects on economic growth.

When comparing the results of the effects of LAC imports from China with those found of LAC exports to China, the results show that the benefits on the economic growth of LAC countries caused by trade with China are mainly attributed to imports from China. Imports from China play a determining role in several countries' economic growth since their presence in Latin America as a supplier has been as vertiginous as that of the export market.

Also, the effects of Chinese imports from LAC on China's economic growth are null for 2001-2019. However, in the same period, Chinese exports to LAC positively affect China's economic growth. After China acceded to the WTO, LAC imports from China stimulated economic growth in China and several Latin American countries. One potential explanation is that the benefits attributed to the spillover effects of trade in manufactures are realizable in China as a producer and exporter country and in LAC as a recipient partner of these technologies.

The Latin American imports from China will likely increase as the Belt and Road Initiative (BRI) works are completed. In 2017, China incorporated Latin America into the BRI. This infrastructure project seeks to improve logistics connectivity between China and the rest of the world. China's primary purpose is to facilitate the expansion of Chinese goods in the international market. Consequently, this project

could intensify the exchange of Latin American commodities for Chinese manufactured goods. Latin America must impulse its exports of manufactured goods since these sectors can produce spillover effects and induce value chain formation, driving economic growth.

On the other hand, this paper found that the economic growth of China and LAC are negatively affected by the competitive relationship of both trading partners for the US market. Furthermore, considering the new scenarios induced by the pandemic and the war in Ukraine in the supply chain worldwide is necessary. The United States had shown interest in reducing its transportation and time costs vulnerability. This international setting has driven the relocation of production units under the nearshoring and friendshoring schemes showing that LAC and China also compete in the reception of Direct Foreign Investment.

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Data Availability Statements

The data underlying this article are available in Mendeley Data Repository at
https://data.mendeley.com/datasets/4xzdktg5vw/draft?a=c9178543-dd53-410c-bb55-632f5467b677
DOI: 10.17632/4xzdktg5vw.3

Appendix A
Unit root test for relevant variables

Row	Variables		In levels		In differences	
			Drift	Time trend	Drift	Time trend
1	Non-export GDP	Non-export GDP	-0.6044 *0.2728*	-2.8217 *** *0.0024*	-9.7949 *** *0.0000*	-6.3672 *** *0.0000*
2	Export to the world minus exports to trade partner j	NonEXP	-1.4620 * *0.0719*	-0.1951 *0.4226*	-17.2102 *** *0.0000*	-15.2304 *** *0.0000*
3	Capital	K	-1.3881 * *0.0826*	-2.1405 ** *0.0162*	-11.3640 *** *0.0000*	-7.2523 *** *0.0000*
4	Terms of Trade Index	TERMS	-0.1514 *0.4398*	1.8313 *0.9665*	-11.1243 *** *0.0000*	-7.7272 *** *0.0000*
5	Exports to trade partner j	EXP	-3.7530 *0.0001*	0.8757 *0.8094*	-14.7138 *** *0.0000*	-7.8410 *** *0.0000*
6	Imports from trade partner j	IMP	0.1953 *0.5774*	5.3384 *1.0000*	-12.1332 *** *0.0000*	-6.1421 *** *0.0000*
7	Trade partner j´s share in the imports of the U.S.	COMP_USA (j=China)	-2.2650 ** *0.0162*	-0.6330 *0.9772*	-2.7120 *** *0.0058*	-3.7910 ** *0.0170*
8	Trade partner j´s share in the imports of the U.S.	COMP_USA (j=Latam)	-2.5000 *0.0097*	-2.3360 *0.4140*	-2.9030 *** *0.0037*	-3.3180 * *0.0634*

Note: This work reports unit root tests in panel data using the Levin-Lin-Chun (LLC) test (Baltagi, 2008). The variable COMP_USA for each trade partner j is a time series; the Augmented Dickey-Fuller (ADF) unit root test was used.
Source: Own estimations using UN COMTRADE (2021).

Appendix B
The p-values from Durbin´s alternative test for serial correlation for each equation and model

Row	Country	Models		Row	Country	Models	
		1	2			1	2
(1)	China	0.5674	0.7763	(9)	Ecuador	0.7441	0.1532
(2)	Argentina	0.2991	0.3750	(10)	El Salvador	0.7287	0.8718
(3)	Bolivia	0.7832	0.9905	(11)	Honduras	0.2104	0.7160
(4)	Brazil	0.3151	0.2463	(12)	Mexico	0.4746	0.7532
(5)	Chile	0.0772	0.4239	(13)	Peru	0.8655	0.6976
(6)	Colombia	0.9731	0.6330	(14)	Uruguay	0.5218	0.8072
(7)	Costa Rica	0.1009	0.5885	(15)	Venezuela	0.2811	0.4810
(8)	Dominican Republic	0.3357	0.5540				

Note: This work follows Judge et al. (1980) and use a serial correlation test in first-order AR(1), adequate to quarterly data. According to Wooldridge (2003), serial correlation tests should consider, at most, a 5% level of significance.
Source: Own estimations using UN COMTRADE (2021).

Appendix C
Breusch-Pagan LM test for cross-equation dependence of the systems of equations by model

Breusch-Pagan LM test	Models	
	1	2
χ^2	155.8060 ***	171.935 ***
p-value	0.0010	0.0000

Note: Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).

Appendix D
Chow test for time structural change: (1993–2000) and (2001–2019)

Model	F statistic	df_1	df_2	p-value
1	13.10	6	408	0.0000
2	18.30	6	408	0.0000

Source: Own estimations using UN COMTRADE (2021).

Appendix E
Linear hypothesis tests for the effects of the Exports to trade partner j (EXP) in 2001 – 2019 according to model 1
Null hypothesis $[¥_{4i} + £_{4i} = 0]$ is verified for each country

Row	Country	χ^2 statistic	p-value	Row	Country	χ^2 statistic	p-value
(1)	China	1.15	0.2829	(9)	Ecuador	0.38	0.5378
(2)	Argentina	1.61	0.2039	(10)	El Salvador	2.12	0.1457
(3)	Bolivia	3.30 *	0.0692	(11)	Honduras	0.61	0.4353
(4)	Brazil	5.95 **	0.0147	(12)	Mexico	1.52	0.2180
(5)	Chile	3.11 *	0.0777	(13)	Peru	0.49	0.4853
(6)	Colombia	2.93 *	0.0872	(14)	Uruguay	0.98	0.3216
(7)	Costa Rica	5.96 **	0.0146	(15)	Venezuela	1.97	0.1603
(8)	Dominican Republic	0.01	0.9333				

Note: Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).

Appendix F
Linear hypothesis tests for the effects of the imports from trade partner j (IMP) in 2001 – 2019 according to model 1
The null hypothesis $[¥_{5i} + £_{5i} = 0]$ is verified for each country

Row	Country	χ^2 statistic	p-value	Row	Country	χ^2 statistic	p-value
(1)	China	0.12	0.7272	(9)	Ecuador	10.81 ***	0.0010
(2)	Argentina	132.57 ***	0.0000	(10)	El Salvador	6.66 ***	0.0099
(3)	Bolivia	11.49 ***	0.0007	(11)	Honduras	1.73	0.1888
(4)	Brazil	18.54 ***	0.0000	(12)	Mexico	0.16	0.6901
(5)	Chile	35.60 ***	0.0000	(13)	Peru	9.46 ***	0.0021
(6)	Colombia	13.18 ***	0.0003	(14)	Uruguay	41.45 ***	0.0000
(7)	Costa Rica	10.16 ***	0.0014	(15)	Venezuela	5.50 **	0.0190
(8)	Dominican Republic	0.69	0.4063				

Note: Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).

Appendix G

Linear hypothesis tests for the effects of the trading partner j´s share in the imports of the United States (COMP_USA) in 2001 – 2019 according to model 1

The null hypothesis [$¥_{6i} + £_{6i} = 0$] is verified for each country

Row	Country	χ^2 statistic		p-value	Row	Country	χ^2 statistic		p-value
(1)	China	0.31		0.5747	(9)	Ecuador	1.87		0.1710
(2)	Argentina	2.87	*	0.0902	(10)	El Salvador	3.62	*	0.0571
(3)	Bolivia	0.42		0.5156	(11)	Honduras	0.68		0.4095
(4)	Brazil	1.02		0.3132	(12)	Mexico	0.03		0.8525
(5)	Chile	0.00		0.9902	(13)	Peru	0.37		0.5414
(6)	Colombia	0.39		0.5309	(14)	Uruguay	4.97	**	0.0257
(7)	Costa Rica	0.23		0.6313	(15)	Venezuela	0.03		0.8733
(8)	Dominican Republic	1.49		0.2228					

Note: Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).

Appendix H

Linear hypothesis tests for the effects of the Exports to trade partner j variable (EXP) in 2001 – 2019 according to model 2

The null hypothesis [$\gamma_{4i} + \pi_{4i} = 0$] is verified for each country

Row	Country	χ^2 statistic		p-value	Row	Country	χ^2 statistic		p-value
(1)	China	6.88	***	0.0087	(9)	Ecuador	0.63		0.4280
(2)	Argentina	16.85	***	0.0000	(10)	El Salvador	0.94		0.3325
(3)	Bolivia	0.32		0.5720	(11)	Honduras	0.56		0.4535
(4)	Brazil	0.53		0.4652	(12)	Mexico	1.69		0.1933
(5)	Chile	0.68		0.4106	(13)	Peru	9.79	***	0.0018
(6)	Colombia	0.09		0.7669	(14)	Uruguay	1.16		0.2820
(7)	Costa Rica	6.43	**	0.0112	(15)	Venezuela	11.45	***	0.0007
(8)	Dominican Republic	0.62		0.4300					

Note: Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).

Appendix I

Linear hypothesis tests for the effects of the Imports from trading partner j variable (IMP) in 2001 – 2019 according to model 2

The null hypothesis [$\gamma_{5i} + \pi_{5i} = 0$] is verified for each country

Row	Country	χ^2 statistic		p-value	Row	Country	χ^2 statistic		p-value
(1)	China	0.69		0.4066	(9)	Ecuador	2.16		0.1412
(2)	Argentina	0.71		0.3991	(10)	El Salvador	0.71		0.3984
(3)	Bolivia	11.06	***	0.0009	(11)	Honduras	0.84		0.3608
(4)	Brazil	68.29	***	0.0000	(12)	Mexico	1.57		0.2102
(5)	Chile	24.76	***	0.0000	(13)	Peru	15.92	***	0.0001
(6)	Colombia	11.69	***	0.0006	(14)	Uruguay	76.72	***	0.0000
(7)	Costa Rica	0.00		0.9907	(15)	Venezuela	33.83	***	0.0000
(8)	Dominican Republic	30.49	***	0.0000					

Note: Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).

Appendix J

Linear hypothesis tests for the effects of the trading partner j´s share in the imports of the United States (COMP_USA) in 2001 – 2019 according to model 2

The null hypothesis $[\gamma_{6i} + \pi_{6i} = 0]$ is verified for each country

Row	Country	χ^2 statistic	p-value	Row	Country	χ^2 statistic	p-value
(1)	China	5.05 **	0.0246	(9)	Ecuador	0.39	0.5326
(2)	Argentina	1.84	0.1753	(10)	El Salvador	2.91 *	0.0878
(3)	Bolivia	0.00	0.9891	(11)	Honduras	0.40	0.5259
(4)	Brazil	0.16	0.6893	(12)	Mexico	5.79 **	0.0161
(5)	Chile	3.27 *	0.0705	(13)	Peru	2.18	0.1395
(6)	Colombia	1.13	0.2875	(14)	Uruguay	0.37	0.5426
(7)	Costa Rica	2.23	0.1356	(15)	Venezuela	0.03	0.8714
(8)	Dominican Republic	2.49	0.1148				

Note: Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).

Appendix K

Test for homogeneity of coefficients across Latin American countries according to model 1

Row	Variable		Null hypothesis	Countries (i)	χ^2 statistic	p-value
1	Exports to trade partner j	EXP_{jit}	$¥_{4i} = ¥_4$	For all LAC countries $\forall\ i = 2,...,15$	134.28 ***	0.0000
2	Exports to trade partner j X WTO	EXP_{jit} x WTO_t	$£_{4i} = £_4$		81.10 ***	0.0000
3	Imports from trade partner j	IMP_{jit}	$¥_{5i} = ¥_5$		41.04 ***	0.0001
4	Imports from trade partner j X WTO	IMP_{jit} x WTO_t	$£_{5i} = £_5$		79.89 ***	0.0000
5	Trade partner j´s share in the imports of the United States	$COMP\_USA_{jit}$	$¥_{6i} = ¥_6$		57.01 ***	0.0000
6	Trade partner j´s share in the imports of the United States X WTO	$COMP\_USA_{jit}$ x WTO_t	$£_{6i} = £_6$		45.47 ***	0.0000

Note: The null hypothesis for each variable determines that the coefficients for all Latin American countries are equal, while the alternative hypothesis holds that at least the coefficient for one Latin American country is different. The subscript i = 2 corresponds to Argentina, 3 - Bolivia, 4 - Brazil, 5 - Chile, 6 - Colombia, 7 - Costa Rica, 8 - Dominican Republic, 9 - Ecuador, 10 - El Salvador, 11 - Honduras, 12 - Mexico, 13 - Peru, 14 - Uruguay, and 15 - Venezuela. Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).

Appendix L

Test for homogeneity of coefficients across Latin American countries according to model 2

Row	Variable		Null hypothesis	Countries (i)	χ^2 statistic		p-value
1	Exports to trade partner j	EXP_{jit}	$\gamma_{4i} = \gamma_4$	For all LAC countries	27.65	**	0.0101
2	Exports to trade partner j X WTO	EXP_{jit} x WTO_t	$\pi_{4i} = \pi_4$		41.54	***	0.0001
3	Imports from trade partner j	IMP_{jit}	$\gamma_{5i} = \gamma_5$		48.63	***	0.0000
4	Imports from trade partner j X WTO	IMP_{jit} x WTO_t	$\pi_{5i} = \pi_5$		125.18	***	0.0000
5	Trade partner j´s share in the imports of the United States	$COMP\_USA_{jit}$	$\gamma_{6i} = \gamma_6$	$\forall\ i = 2,...,15$	34.67	***	0.0000
6	Trade partner j´s share in the imports of the United States X WTO	$COMP\_USA_{jit}$ x WTO_t	$\pi_{6i} = \pi_6$		51.41	***	0.0000

Note: The null hypothesis for each variable determines that the coefficients for all Latin American countries are equal, while the alternative hypothesis holds that at least the coefficient for one Latin American country is different. The subscript i = 2 corresponds to Argentina, 3 - Bolivia, 4 - Brazil, 5 - Chile, 6 - Colombia, 7 - Costa Rica, 8 - Dominican Republic, 9 - Ecuador, 10 - El Salvador, 11 - Honduras, 12 - Mexico, 13 - Peru, 14 - Uruguay, and 15 - Venezuela. Superscripts ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively.
Source: Own estimations using UN COMTRADE (2021).