

LATIN AMERICA AND CHINA: MUTUAL BENEFITS OR DEPENDENCY? AN APPROACH OF COMPUTABLE GENERAL EQUILIBRIUM FOR SELECTED COUNTRIES¹

Damares Lopes Afonso²
Suzana Quinet de Andrade Bastos³
Fernando Salgueiro Perobelli⁴

Área ANPEC: 7 – Economia Internacional

ABSTRACT

This paper's objective is to contribute to the debate on relations between China and Latin America (LA). The question is whether the trade agreements between these regions are complementary or if they strengthen the dependence of Latin America on the international scene. For this purpose we aim to observe the impacts of China's growth in LA countries through the Computable General Equilibrium model (CGE). The Chinese growth has been simulated through an expansion of China's capital stock, as has occurred over the past few decades. The results point to a pattern of reprimarization of the export agenda and decline in the industrial activity of the selected countries of the LA, mainly in the sectors of high technological intensity. In addition, there is an increase in welfare in the LA, mainly due to gains in the terms of trade (commodity boom).

Keywords: Latin America (LA). China. Trade relations. Computable General Equilibrium (CGE).

Código JEL: F14, F17, D58.

RESUMO

O presente trabalho pretende contribuir para o debate a respeito das relações entre China e América Latina (AL), a questão que se coloca é se os acordos comerciais entre essas regiões são mutuamente benéficos ou se reforçam a dependência da AL no cenário internacional. Para isto objetiva-se observar os impactos do crescimento da China nos países da AL através do modelo de equilíbrio geral computável. O crescimento chinês foi simulado através de uma expansão do estoque de capital deste país, tal como ocorreu ao longo das últimas décadas. Os resultados apontam para um padrão de reprimarização da pauta exportadora e queda na atividade industrial dos países selecionados da AL, principalmente nos setores de alta densidade tecnológica. Além disso, observa-se o aumento de bem-estar na AL principalmente por ganhos nos termos de troca (*boom das commodities*).

Palavras-chaves: América Latina (AL); China; Relações comerciais; Equilíbrio Geral Computável (EGC).

Código JEL: F17, F47, O10.

1. INTRODUCTION

China is one of the main trading partners of Latin America (LA). Trade relations between these regions are “strategic”, since LA has abundant natural resources that are essential to Chinese industries such as soybeans, iron ore and oil. In contrast, LA represents a large consumer market for Chinese products, which are characterized by manufactured goods.

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² Mestranda no Programa de Pós-Graduação em Economia da Universidade Federal de Juiz de Fora (PPGE/UFJF) e pesquisadora do Laboratório de Análises Territoriais e Setoriais (LATES).

³ Professora no PPGE/UFJF e pesquisadora do LATES, CNPQ e FAPEMIG.

⁴ Professor no PPGE/UFJF e pesquisador do LATES, CNPQ e FAPEMIG.

Beside trade flows, China has been intensifying its diplomatic and political relations with governments of Latin American countries. "Win-win" expressions are used by Chinese representatives to highlight the mutual benefits in relations between China and LA.

In 2008 China launched the so-called first White Paper on Latin America and the Caribbean, and in 2016 the second one. Both documents highlight where there could be considerable cooperation among these regions, such as greater political proximity, intensification of bilateral trade, investment in productive infrastructure, financial support, social support and exchanges, cultural, international cooperation, peace and security agreements (China, 2016).

Chinese investments in the LA are based on participation in public services concessions (energy, telecommunications and transportation) and direct investments based on financing projects to consolidate road, rail and mineral resources (Silveira, 2017).

However, the question is whether the trade and investment agreements of these regions are mutually beneficial or if strengthen the dependence of Latin America on the international scene, considering that LA is a region characterized by exporting primary goods and technologically dependent from the foreign market since the beginnings of its colonization (Bázquez-Lidoy, Rodríguez and Santiso, 2006, Jenkins, Peters and Moreira, 2008, Ferchen, 2011, Cintra, 2013, Kim and Lee, 2014 and Silveira, 2017).

To contribute to this debate, this paper seeks to analyze the interdependence structure of trade relations between selected LA countries- Argentina, Bolivia, Brazil, Chile, China, Colombia, Costa Rica, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela- and China through a Computable General Equilibrium (CGE) approach using the Global Trade Analysis Project (GTAP), version 9.0, with 2011 how reference year.

The empirical strategy is to simulate the effect of the growth of the Chinese economy by expanding its capital stock by 10%, which corresponds to the average annual growth of its capital stock in recent decades, according to Penn World Table 9.0. The aim is to evaluate the impact of the growth of the Chinese economy in the sectorial production, exports and imports and on welfare variation in the selected countries of the LA and in China itself.

In addition to this introduction, this paper presents a brief review of the relationship between LA and China in the second section, the third section presents a description of the database and the GTAP model, the fourth brings the results of the model, and finally, the fifth section brings the final considerations.

2. CHINESE ECONOMIC GROWTH AND ITS IMPACT IN LATIN AMERICA

China has undergone considerable changes in its economic and social structure, especially since the 1990s. Chinese industrial development is the result of planning, the famous phrase of the ruler Deng Xiaoping in 1978 "it does not matter whether the cat is white or black, provided he takes the mouse", illustrates the Chinese economy, which, in a parallel among a centralized economy and a market economy, is now the world's second largest economy in terms of production (Cintra, 2013).

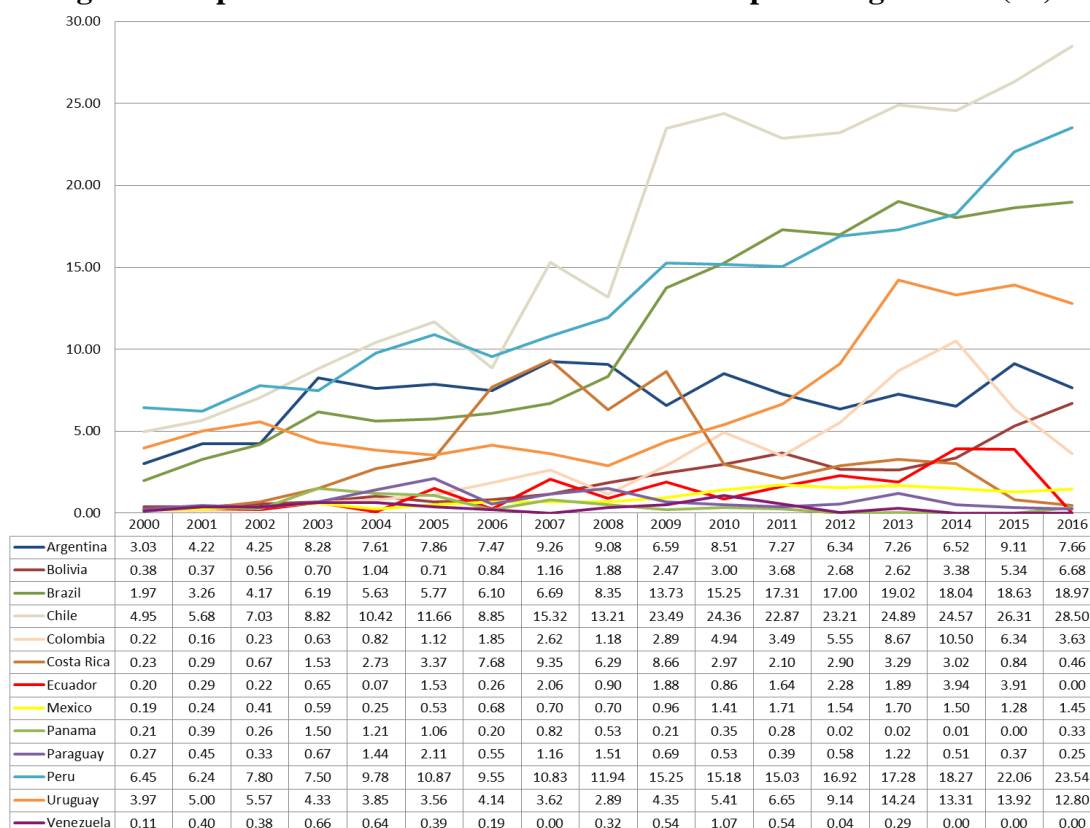
From the structural point of view, a number of factors responsible for Chinese success are highlighted, such as the establishment of Special Economic Zones, which consisted in the creation of strategically concentrated clusters near Hong Kong to attract foreign investments as well as positive spillovers, gradual opening of China's trade, intellectual appropriation of production techniques, government investment in science and technology, and other incentives (Nonnenberg, 2010).

The increase in China's productive capacity was based on an "extensive factor of production" model, ie the widespread use of cheap labor and growth in investment. China grew mainly through high capital plant investment, gross fixed capital formation increased from 29% to 42% of GDP over the period 1980 to 2010 (Beim, 2011).

In this context of expansion, China has enlarged its trade and financial relations with several countries, including the Latin American ones. Trade relations between LA and China began to grow in 2002, with China joining the World Trade Organization (WTO) and intensified in 2004 with Hu Jintao's visit to LA in which trade and investment agreements were signed (Medeiros and Cintra, 2015).

In the period between 2000 to 2016, it is possible to observe heterogeneities in the share of exports from the selected countries from LA to China. There are Latin American countries that do not have a definite trajectory of growth of their exports, like Colombia, Panama, Paraguay and Venezuela. Chile, Peru, and Brazil stand out for their significant increase in this post-crisis participation of 2008 (Figure 1).

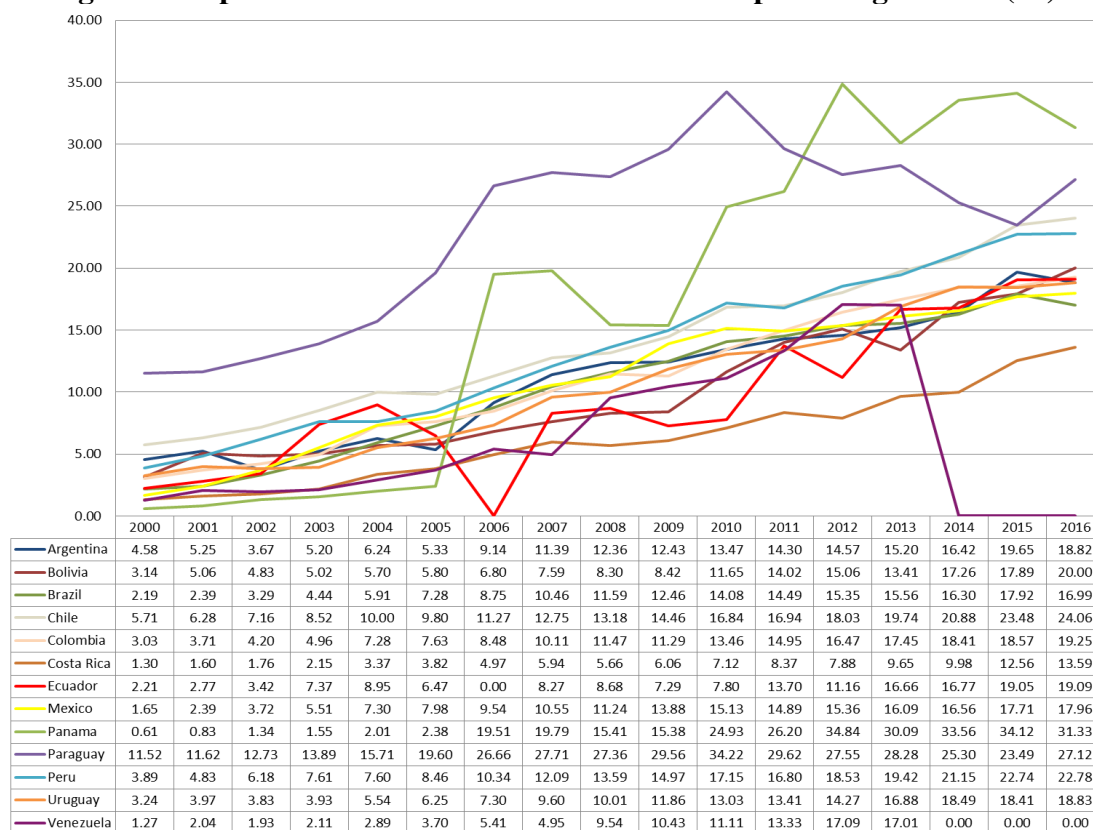
Figure 1. Exports from LA to China in 2000-2016 - percentage values (%)



Source: Own elaboration based on data from the United Nations Comtrade Database - UN Comtrade, 2018.

Figure 2 shows that the selected LA countries show a growth trend of imports from China over the period 2000-2016. With the exception of Costa Rica, most countries presented in 2016 more than 16% of their imports from China. It is noted that China has a larger share of the total imported by the selected countries of the LA compared to yours exports.

Figure 2. Imports of LA from China in 2000-2016 - percentage values (%)



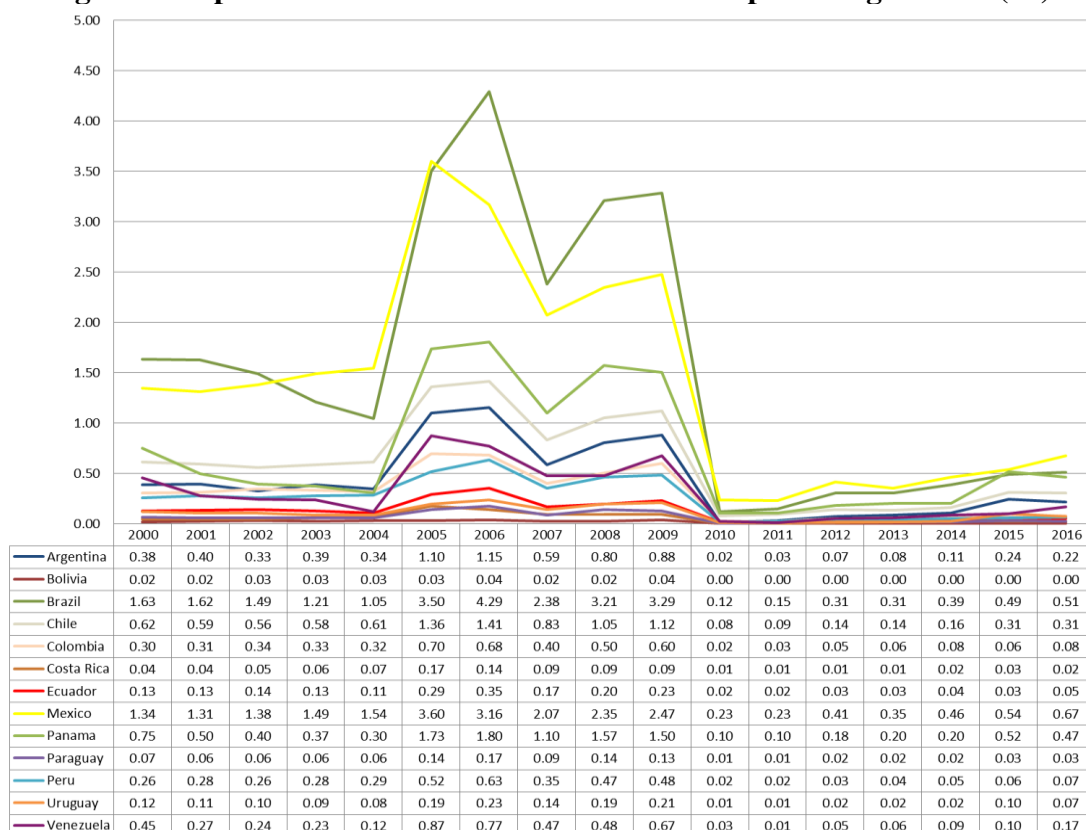
Source: own elaboration based on data from the UN Comtrade, 2018.

China, on the other hand, is less "dependent" of LA in terms of trade flows, as shown in Figures 3 and 4.

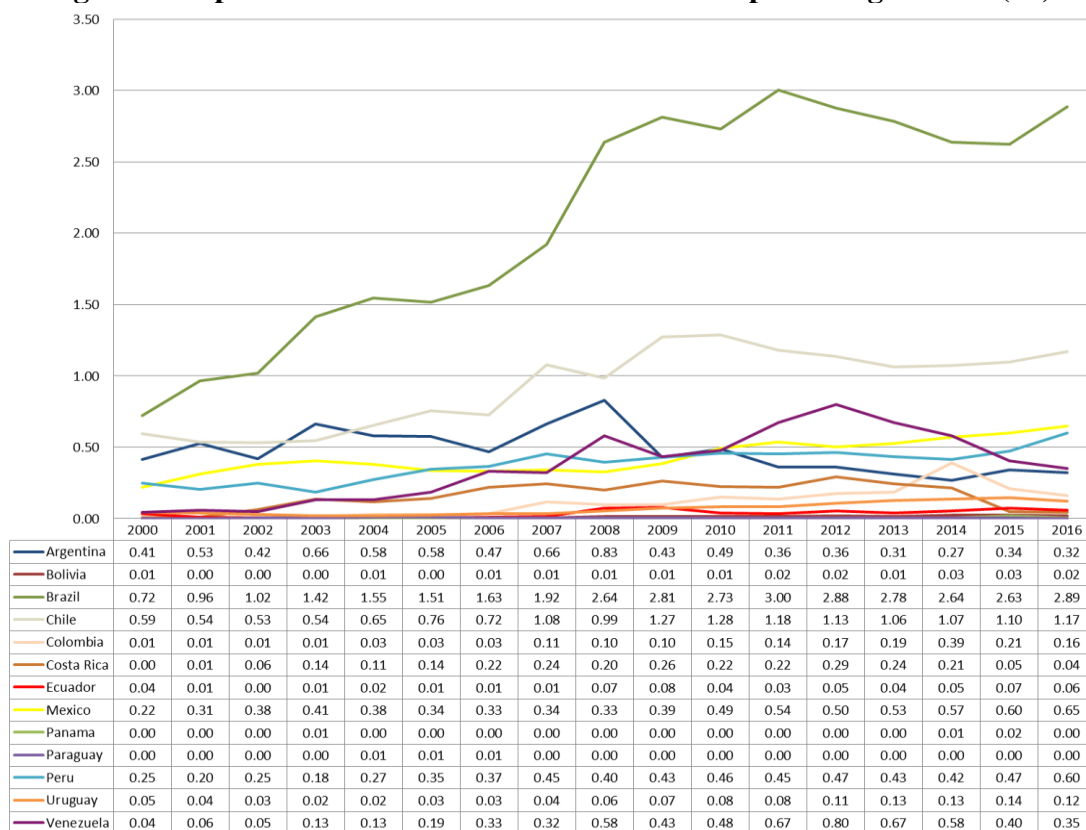
Participations of selected LA countries in the volume exported and imported by China vary between 0% and 4.5%. Regarding the destination of Chinese exports, Brazil, Mexico, Panama, Chile and Argentina stand out. As for the origin of Chinese imports, Brazil and Chile stand out.

There is a reduction in the share of Chinese exports to selected LA countries from 2010, which can be explained by the augment in total exports from China to other countries and not by the loss of importance of Chinese sales to LA once they grew significantly in the post-crisis period of 2008.

Costa Rica stands out for drop sales to China in 2015-2016. This may be linked to Intel's exit from Costa Rica in 2014.

Figure 3. Exports from China to LA in 2000-2016 - percentage values (%)

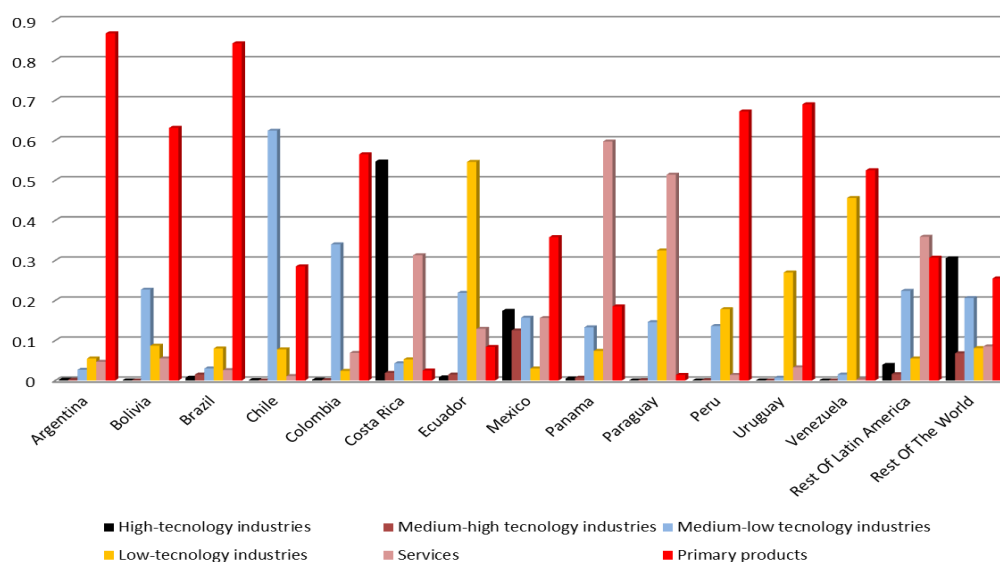
Source: own elaboration based on data from the UN Comtrade, 2018.

Figure 4. Imports of China from LA in 2000-2016 - percentage values (%)

Source: own elaboration based on data from the UN Comtrade, 2018.

In addition to the differences in the amount of exports and imports, there are qualitative differences in the commercial pattern of the LA and China, which reflects a primary export structure of LA, to the detriment of the industrial standard and greater technological content from China, as shown in Figures 5 and 6.

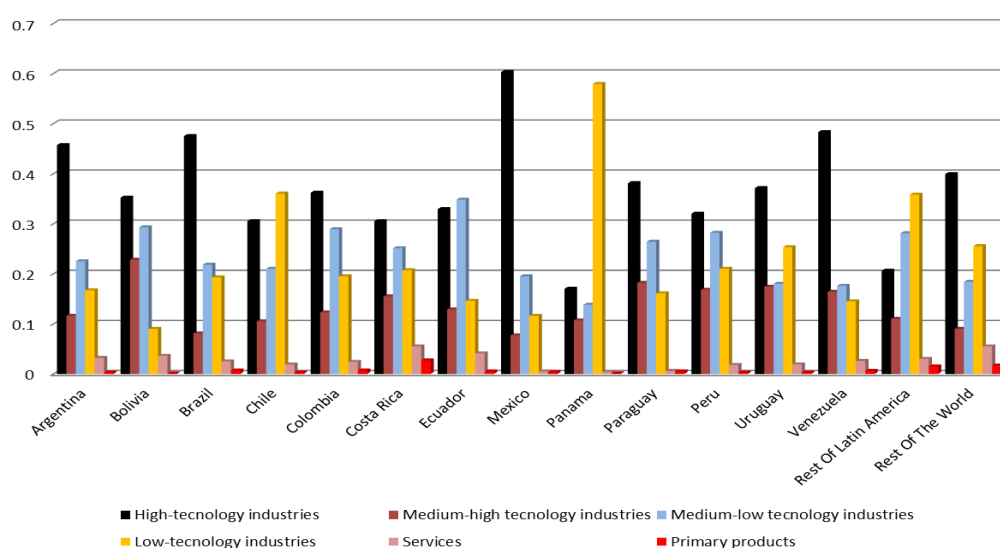
Figure 5. Exports from the LA and rest of the World to China



Source: own elaboration based on GTAP data 9.

It is noteworthy that Latin American countries, with the exception of Costa Rica and Mexico, exhibit a pattern of exports of primary products and of medium/low technology industrial products to China. The primary products correspond to the greater part of the export portion of Argentina, Bolivia, Colombia, Mexico, Peru and Venezuela. Mexico and the rest of the World have a more diversified export agenda with China, presenting parcels of the most distributed exports among the sectors of their economy. Costa Rica is the only country that has most of its exports to China from the high-tech industrial sector in 2011.

Figure 6. Imports of LA and rest of the World from China



Source: own elaboration based on GTAP data 9.

With regard to imports from China, their technological pattern is opposite to exports to China, focusing mainly on industrial segments: high, medium and low technology products. Primary products and services correspond to less than 10% of the imports in the selected countries.

In general, there is a greater commercial dependence of the LA with China than the opposite, as well as an antagonism in the commercial pattern between these regions, which reflects in a primary export structure of the LA in detriment of the pattern of industrial trade and of the greater technologic content of imports from China.

The antagonism in trade relations between LA and China can be explained by the different trajectories of economic growth and external insertion adopted by these two economies, especially since the 1990s (Barbosa, 2011). While China concentrated investments to restructure its productive structure in industrial follow-ups, LA's industrial policies cooled down in this period.

However trade relations between LA and China are controversial. Blázquez-Lidoy, Rodríguez and Santiso (2006) evaluate whether China can be seen as an "angel" or "demon" for emerging economies. In the short term, these authors state that China would have a positive influence on Latin America, especially in commodity-exporting countries, due to the "demand shock", with improved terms of trade and higher exported volumes (commodity boom). The negative short-term effect would be mainly in countries with a competing export and production pattern of Chinese products, such as Mexico, Costa Rica and Brazil. In the long run, though, the authors state that there is an incentive to the reprimarization the production and export agenda the AL, which would lead these economies to become more vulnerable to shocks (recessions and booms) in commodity prices.

Jenkins, Peters and Moreira (2008) also analysed the perspective that trades between LA and China brings winners and losers. In addition, the authors question the thesis that producers and exporters of raw materials, such as South American countries - Argentina, Brazil, Chile and Venezuela - were the "winners" and that Mexico and the Central American countries, specialized in chains of merchandise, were the losers. The authors drew attention to the fact that the bilateral trade nature of LA and China reproduce the core-periphery pattern of the exchange of manufactures for raw materials, in addition to not taking into account the ecological, economic and social sustainability of these relations in the long run.

3. DATABASE AND METHODOLOGY

3.1 Database

The database is provided by the Global Trade Analysis Project (GTAP), a project coordinated by the Department of Agricultural Economics at Purdue University in the Center of Global Trade Analysis. The GTAP has a standard multi-region and multi-sector model of CGE analysis, with 140 regions and 57 commodities. RunGTAP software and version 9 of the GTAP static model, which has 2011 as the reference year, are used.

The 140 regions that make up the GTAP base were aggregated in 16 regions: Argentina, Bolivia, Brazil, Chile, China, Colombia, Costa Rica, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay, Venezuela, rest of Latin America⁵ and rest of the World⁶.

⁵ Rest of South America, Guatemala, Honduras, Nicaragua, El Salvador, rest of Central America and Dominican Republic.

The primary factors of production are divided into three categories: land, capital, and labor. Labor and capital are movable factors of production, whose mobility is given by an elasticity of constant transformation. The land factor is immobile and is present only in the primary goods production sector.

The sector aggregation of the 57 sectors of the GTAP base is fundamented on the OECD (2011) parameters that defines four categories of technological intensity for industrial products: low, medium-low, medium-high and high technology. In addition, the services sector and the primary goods production sector are analyzed separately. The products corresponding to each sector are presented in Annex 1.

3.2 The Global Trade Analysis Project (GTAP)

CGE models describe all economic activities such as consumption, production, employment, taxes, domestic and foreign trade, and savings. These models involve two equations structures given by countries' social accounting matrices and by the microfoundation economy, in order to characterize and match these matrices among the different agents (Castilho, 1994).

The GTAP model is a multi-region and multisectorial CGE model. The assumptions of the GTAP are perfect competition and constant returns to scale. Figure 7 shows the structure of an economy modeled by GTAP.

At the top of the figure is the "regional household", responsible for capturing and distributing all the expenses and income of the economy, coming from the payment of the firms by the use of production factors (VOA) and the collection of taxes (TAX), and which forming the regional income.

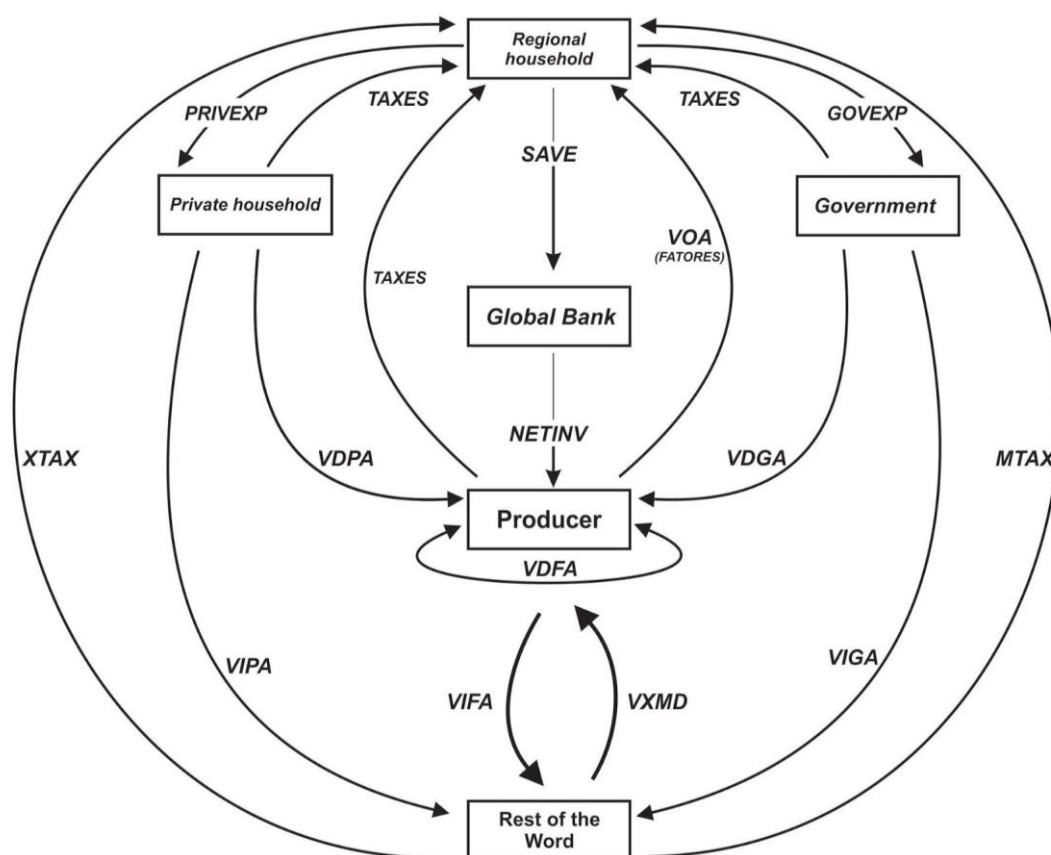
The regional income is distributed to private household (PRIVEXP), government (GOVEXP) and global savings (SAVE), based on the Constant Function of Difference of Elasticity (CDE) non-homothetic utilities functions, flexible to changes in prices and income (Liu et al., 1998).

Another agent is the sector of goods and services production (producer), that agent has its revenues from the sale of its products to private household (VDPA), the government (VDGA), other producers (VDFA) and the rest of the World (VXMD). Besides that, the productive sector is financed by global savings (NETINV). Production sector expenses are

⁶ Australia, New Zealand, rest of Oceania, Hong Kong, Japan, Korea, Mongolia, Taiwan, rest of East Asia, Brunei, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Philippines, Singapore, Thailand, Vietnam, Southeast rest Asia, Bangladesh, India, Nepal, Pakistan, Sri Lanka, rest of South Asia, Canada, United States, rest of North America, Jamaica, Puerto Rico, Trinidad and Tobago, Caribbean, Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Luxembourg, Poland, Slovenia, Portugal, Slovakia, Spain, Sweden, United Kingdom, Switzerland, Norway, rest of the European Union, Albania, Bulgaria, Belarus, Romania, Croatia, Russian Federation, Ukraine, rest of Europe, rest of Europe, Kazakhstan, Kyrgyzstan, rest of the Former Soviet Republics, Armenia, Azerbaijan, Georgia, Bahrain, Go Israel, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Turkey, United Arab Emirates, rest of West Asia, Egypt, Morocco, Tunisia, rest of North Africa, Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Guinea, Nigeria, Senegal, Togo, rest of West Africa, Central Africa, South Central Africa, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Tanzania, Uganda, Zambia, Zimbabwe, rest of East Africa, Botswana, Namibia, South Africa and rest of the World.

used to pay the primary factors for production of land, capital and labor (VOA), for domestic intermediate inputs (VDFA) and imported (VIFA).

Figure 7. Open Multiregional Economy



Source: own elaboration based on Brockmeier (2001).

Firms production functions are modeled by Leontief-type technology, with constant substitution elasticity, both to for the intermediate goods demands (inputs from other industries or from them) and for the "production primary factors (land, capital and labor) (Hertel et al., 2012). Moreover, by separability hypothesis, substitution between intermediate goods and production factors is not allowed.

The bilateral trade for intermediate goods is outlined by the Armington assumption, which guarantees that firms, by minimizing their costs, decide the optimal mix of domestic intermediate goods (VDFA) and imported (VIFA) and only then decide on the origin of the imports.

The external sector of the economy (rest of the World) also interacts with the private household and the government through the purchase of imported goods and services - VIPA and VIGA, respectively.

The model also deals with trade margins and the taxes or subsidies of domestic or foreign production. Exports are valued at Free On Board (FOB) and imports at Cost Insurance Freight (CIF) which include insurance or freight costs, if any. Export (XTAX) and import (MTAX) revenues are also directed to the regional household.

In addition, the GTAP presents a global banking sector, which mediates global savings and trade, leaving no gaps between supply and demand for goods (Hertel and Tsigas, 1997).

The closure of the model, in other words, the choice of the endogenous and exogenous variables is the GTAP standard, in which the capital stock is considered fixed. The model allows variations of investment in the different regions, however, because it is a static model, these investments are not fed back into the economy.

3.3 Empirical Strategy

The strategy is to simulate the growth of the Chinese economy through expanding investments in capital (increase of the total capital stock). Chinese's capital stock growth rate, at 2011 constant prices, was 6% between 1955-1970, 7.5% between 1971-1980, 7.6% between 1981-1990, 9.5% between 1991-2000 and 11.72% from 2001 to 2014.

Chinese's capital stock growth rate between 1981 and 2014 is 9.6% and the empirical strategy is to simulate a 10% (rounded) growth in the China's capital stock by verifying the impacts of this growth in production sector, exports and imports, and in the welfare of selected LA countries and in China itself.

4. RESULTS

The impacts of Chinese growth on sectorial output in the selected countries of LA, China and the rest of the World are presented in Table 1.

Table 1. Variation of sectorial production in the LA countries, China and in the rest of the World

Countries	High-technology industries	Medium-high technology industries	Medium-low technology industries	Low-technology industries	Services	Primary products
Argentina	-1.14	-0.68	-0.50	-0.62	0.12	0.06
Bolivia	-1.53	-0.98	-0.51	-0.23	0.04	0.04
Brazil	-0.77	-0.55	-0.55	-0.46	0.12	0.04
Chile	-2.16	-0.83	-0.74	-0.71	0.14	0.52
China	7.27	5.58	5.23	3.49	3.26	2.57
Colombia	-1.67	-0.82	-0.70	-0.34	0.16	-0.11
Costa Rica	-0.99	0.24	0.45	0.01	0.07	0.52
Ecuador	-1.28	-0.73	-0.30	-0.50	0.12	-0.01
Mexico	-1.37	0.00	-0.07	-0.08	0.09	0.38
Panama	-1.32	-0.59	-0.21	-0.56	0.08	0.08
Paraguay	-1.87	-0.74	0.04	-0.39	0.06	0.01
Peru	-0.55	-0.42	-0.77	-0.23	0.20	0.33
Uruguay	-1.88	-0.95	-0.38	-1.01	0.19	0.15
Venezuela	-1.36	-0.33	-0.63	-0.09	0.14	-0.04
Rest of Latin America	-1.33	-0.28	-0.06	-0.31	0.05	0.27
Rest of The World	-1.19	-0.29	-0.31	-0.23	0.09	0.29

Source: own elaboration from the results.

There is a decay in the production of industrial sectors in the high, medium and low technology segments of Latin American countries and the rest of the world. In addition, the

decrease in production in LA countries is higher in the high-tech sector. The only positive changes in industrial production are in the medium-high, medium-low and low-tech sectors of Costa Rica and in the low-tech sector in Paraguay.

There is also an expansion in the production of the services sector in the countries under analysis. Production of primary products also increased, with the exception of Colombia (-0.11), Ecuador (-0.01) and Venezuela (-0.04), which varied negatively the production in this sector.

In China the expansion in the capital stock led to an enlargement of production in all sectors, especially in the industrial sectors linked to high and medium-high complexity technologies.

From Table 2, it's noticeable that LA's exports varied negatively in the industrial and services segments, given the shock of Chinese capital expansion. With the exception of Costa Rica, that increased its exports in the industrial of medium-high, medium-low technology and in the services sectors and Mexico, which positively varied its low-technology industrial exports and services.

Table 2. Variation of the sectorial exports of the countries of the LA, China and in the rest of the World

Countries	High-technology industries	Medium-high technology industries	Medium-low technology industries	Low-technology industries	Services	Primary products
Argentina	-3.59	-1.53	-1.59	-2.14	-1.33	1.07
Bolivia	-4.41	-1.91	-1.53	-1	-1	0.52
Brazil	-5.27	-2.5	-2.25	-2.91	-1.75	0.73
Chile	-3.34	-1.47	-0.93	-1.58	-0.35	1.61
China	11.16	9.91	6.42	4.64	5.73	-7.55
Colombia	-4.7	-1.93	-1.83	-2.07	-1.44	-0.03
Costa Rica	-1.24	0.32	0.92	-0.07	0.63	1.1
Ecuador	-3.91	-1.46	-1.14	-1.88	-0.57	0.12
Mexico	-1.57	-0.05	0.01	-0.36	0.31	1.06
Panama	-1.26	-0.6	-0.16	-0.1	-0.32	2.13
Paraguay	-3.21	-0.79	-0.91	-1.63	-0.94	-0.03
Peru	-3.58	-1.37	-1.45	-1.45	-0.79	1.42
Uruguay	-4.18	-1.21	-1.36	-2.06	-1.03	0.71
Venezuela	-4.95	-1.96	-1.24	-2.4	-1.06	0.18
Rest of Latin America	-2.4	-0.5	-0.23	-0.69	-0.02	1.08
Rest of The World	-1.92	-0.45	-0.44	-0.61	0.13	1.03

Source: own elaboration from the results.

Mexico has diversified its productive structure over the years and Costa Rica is characterized by the manufacture of computers chips and other electronics, especially after the country started to export to Lenovo, HP and Dell, which maintains their assembly lines in China (Medeiros and Cintra, 2015, Castillo and Neto, 2016). The rest of the World also increased services exports given the increase in China's capital stock.

Primary good's sector's exports, with the exception of Colombia and Paraguay, also varied positively, which refers to a process of reprimarization of the exporting parcel of AL.

In contrast to the LA countries, China has expanded its exports in the industrial sectors, particularly in the high and medium technology sectors. Along with that, Chinese exports of primary goods declined.

Table 3 shows the variation in imports. LA in general showed an increase in imports in the industrial segments, especially in the high technology sector. Costa Rica and Mexico showed a fall in imports from the industrial sectors. A decrease in Latin American primary goods imports can be observe, with the exception of Brazil, Peru and Mexico that augmented importation in this segment.

China, on the other hand, experienced a decline in imports from the high and medium-high technology sectors and an expansion in imports from technological lower-intensity industrial sectors, services and primary products, with emphasis to the increase in imports from the primary sector (7.15).

Table 3. Variation of sectorial imports from LA countries, China and in the rest of the World

Countries	High-technology industries	Medium-high technology industries	Medium-low technology industries	Low-technology industries	Services	Primary products
Argentina	1.45	0.3	0.41	-0.02	0.61	-0.03
Bolivia	0.67	0.39	0.07	0.05	0.64	-0.4
Brazil	3.3	1.05	1.45	0.73	1.1	0.29
Chile	0.89	0.52	0.89	0.45	0.64	-0.05
China	-0.58	-0.16	0.84	1.84	0.1	7.15
Colombia	1.77	0.58	0.78	0.76	0.95	-0.23
Costa Rica	-0.67	0.06	-0.15	-0.21	-0.19	-0.12
Ecuador	1.32	0.36	0.45	0.3	0.74	-0.22
Mexico	0.13	-0.04	-0.05	-0.2	-0.07	0.02
Panama	0.27	0.14	0.67	0.03	0.38	-0.68
Paraguay	0.39	0.19	0.27	0.07	0.76	-0.5
Peru	1.7	0.8	0.71	0.66	0.72	0.27
Uruguay	1.42	0.1	0.38	0.29	1.03	-0.22
Venezuela	1.55	0.65	0.55	0.91	0.89	-0.09
Rest of Latin America	0.54	0.18	0.03	-0.04	0.12	-0.22
Rest of The World	0.84	0.19	0.32	-0.02	0.14	-0.18

Source: own elaboration from the results.

The welfare variation is calculated from the equivalent variation, representing the change in wealth that would be equivalent to the change in prices, in terms of its impact on well-being (Mas-Collel, 1995). The welfare decomposition effect portrays the shock's impacts on economic contributions, measured in monetary units.

According to Burfisher (2011) the welfare decomposition effect can be divided into six components: a) allocative efficiency effect: showing the excess of each tax, b) endowment effect: due to changes in the quantities of production factor's (eg, the capital) that change the productive capacity of an economy, c) technology effect: due to changes in the productivity of factors and/or intermediate products which change the effective endowments of an economy and its productive capacity, (d) effect on trade in goods produced (terms of trade): due to changes in the rest of the world and in the economy in relation to prices of exported goods and services (fob) and imported goods and services (cif), e) savings-investment effect: due to a change in the price of capital goods in relation to the saving price in the global bank, f)

effects change in preferences: due to changes in private consumption, government actions and savings in national spending.

With the positive shock of 10% in the Chinese capital stock, it is noticeable that the net welfare variation was positive for all countries, except for Costa Rica. Countries' welfare variations are due to the allocation effect, endowment effect, terms of trade effect and investment-savings, as shown in Table 4.

Table 4. Decomposition of welfare (in millionsof dollars)

Countries	Allocation effect	Endowment effect	Terms of trade	Investments-savings	Total
Argentina	214.21	0	363.3	-72.49	505.02
Bolivia	4.03	0	16.37	0.32	20.72
Brazil	899.01	0	1713.98	-102.13	2510.86
Chile	61.3	0	433.64	-56.27	438.68
China	18262.22	153011.13	-29373.98	3376.33	145275.69
Colombia	61.73	0	258.72	-13.66	306.79
Costa Rica	-0.06	0	-8.57	-3.76	-12.39
Ecuador	42.76	0	78.94	1.56	123.27
Mexico	252.03	0	281.33	-96.88	436.48
Panama	18.38	0	81.72	35.51	135.62
Paraguay	15.63	0	27.38	5.34	48.36
Peru	-15.68	0	217.18	-36.09	165.41
Uruguay	43.01	0	51.86	2.31	97.19
Venezuela	90.15	0	363.12	-129.14	324.13
Rest of Latin America	18.17	0	38.81	8.87	65.84
Rest of The World	2563.68	0	25224.98	-2892.45	24896.21

Source: own elaboration from the results.

It's visible that only China has had an effect on factor endowments thanks to the increase in its capital stock. The welfare decomposition effects point to a positive allocation effect in the analyzed regions, with the exception of Peru and Costa Rica.

The effect on terms of trade measures the purchasing power of an economy and is calculated using a proportion between exported goods price's and imported goods prince's. Thus, given that China's increased industrial goods' production and an raised in its demand for primary products (commodity boom), LA countries benefited from trade due to improved terms of trade. The change in the terms of trade was negative for China and Costa Rica which could have was a "competitive" outcome with the Chinese production.

The effect of investment-savings relationship is different between countries and depends on whether the country is a demander or a net supplier of savings.

Overall, the biggest gains in welfare are in China, which received a 10% shock on its capital stock. It is also worth mentioning the welfare rise in Brazil, which has China as its main trading partner (Brazil, 2017).

5. CONCLUSIONS

This paper proposes to empirically observe, through the CGE model, the impacts of China's growth in the selected LA countries and on China itself. Chinese growth was simulated by expanding its occurred country's capital stock by 10% such as it has over the past few decades.

Latin American countries are export mostly of primary products to China, as well as products of low technological intensities. In contrast, Chinese exports to LA consist of products linked to industrial segment, such as high- and medium-technology sectors, in addition to Chinese manufactures of low technological intensity and low cost. The impacts of the Chinese growth simulation show a declivity in the selected LA countries' industrial production and an expansion in the production of primary products and in the service sector of that region.

However, there are exceptions, such as Costa Rica, that escalated in production and exportation of industrial sectors, except in the high technology sector, as well as had a reduction in industrial imports. It's important to accentuate that Intel's exit from Costa Rica in 2014 may have had an impact on the country's commercial relationships.

Mexico is also a particular case of the Latin American general rule, with a decline in medium and low technology industrial imports. The Mexican economy has been experiencing an improvement in its exports in recent years. At the same time that it is undergoing for competition and commercialization with China, Mexico has more intense trade relations with the United States.

Still, the general scenario in LA is worrisome, since in one hand the partnership between China and LA increased the general well-being of these economies throughout the years 2000, with the commodities boom the reality is an indication of deindustrialization in Latin American countries with a decrease in the industrial production share and an increase in the production in the services and primary goods sectors.

On the other hand, China has been increased its industrial production and technological intensity, and is no longer just an exporting economy of cheap manufacturing products, but competing in the high technology segments, including being able to preclude the advance of Latin American production in these segments.

So the question is: mutual benefits or dependence on trade relations between China and LA? LA is a cradle of natural resources, however, the dependence that these countries face in relation to the production of these resources, makes them vulnerable in the international scenario, that is, susceptible to booms and falls in commodity prices. Chinese economic growth and the consequent increase in the demand for commodities by this country stands as a demonstrative of the degree of specialization in the productive and export LA agenda and its fragility to the competition in industrial segments.

If Latin American countries want to build a success story in pursuit of their economic development, they need to rethink their trade relations with China, not forgetting to watch for their internal deficiencies. Investing in quality human capital, infrastructure, seeking technical advance with a planned industrial policy with all segments of society, including the market and the State, are necessary conditions for LA to get out of the bonds of dependence on the international stage.

REFERENCES

- Barbosa, A. (2011). *China e América Latina na nova divisão internacional do trabalho*. In: Leão, R., Pinto, E., Acioly, L. (Org.). *A China na nova configuração global: impactos políticos e econômicos*. Editora: Ipea.
- Bázquez –Lidoy, J., Rodríguez, J., Santiso, J. (2006). Ángel o demonio? Los efectos del comercio chino en los países de América Latina. *Revista de la CEPAL*, 90.
- Beim, D. (2011). The Future of Chinese Growth. *Discussion Paper N° 69*. Discussion Paper Series APEC Study Center Columbia University. Available in: <<http://www.brasil.gov.br/economia-e-emprego/2017/05/china-e-o-maior-parceiro-comercial-do-brasil-no-mundo>>.
- Brazil. (2017). China é o maior parceiro comercial do Brasil no mundo. Available in: <<http://www.brasil.gov.br/economia-e-emprego/2017/05/china-e-o-maior-parceiro-comercial-do-brasil-no-mundo>>.
- Brockmeier, M. A. (2001). *Graphical Exposition of the GTAP Model*. GTAP Technical Paper No. 8.
- Burfisher, M. E. (2011). *Introduction to Computable General Equilibrium Models*. Cambridge University Press.
- Castilho, M. R. (1994). *Algumas considerações sobre o uso de modelos computáveis de equilíbrio geral como instrumento de análise do setor externo brasileiro*. Rio de Janeiro: Fundação Centro de Estudos do Comércio Exterior – FUNCEX.
- Castillo, M, Neto, A. M. (2016). Premature deindustrialization in Latin America. *United Nations publication*. Santiago.
- China, People's Republic. (2008). *China's Policy Paper on Latin America and the Caribbean*. Available in: <http://webcache.googleusercontent.com/search?q=cache:http://www.gov.cn/english/official/2008-11/05/content_1140347.htm&gws_rd=cr&dcr=0&ei=69h4Ws3iOMmbwgTHmKrQCA>.
- China, People's Republic. (2016). *Documento sobre a Política da China para com a América Latina e o Caribe*. Available in: <<http://br.china-embassy.org/por/szxw/t1418402.htm>>.
- Cintra, M. R. V. P. (2013). *A presença da china na América Latina no século XXI – suas estratégias e o impacto dessa relação para países e setores específicos*. Dissertação (Mestrado) - Programa de Pós-Graduação em Economia Política Internacional da Universidade Federal do Rio de Janeiro. Rio de Janeiro.
- Ferchen, M. (2011). As relações entre China e América Latina: impactos de curta ou longa duração? *Revista de Sociologia e Política*, vol.9, supl. 1 Curitiba.

Hertel, T, Tsigas, M. E. (1997). *Structure of GTAP*. T.W. Hertel (ed.), Global Trade Analysis: Modeling and Applications, Cambridge University Press.

Hertel, T., Tsigas, M., Badri, N. G., Mcdougall, R. (2012). Primary Factor Shares. In: Badri, N. G., Aguiar. A., Mcdougall. R. *Global Trade, Assistance, and Production: The GTAP 8 Data Base*. Chapter 12A, Center for Global Trade Analysis, Purdue University.

Jenkins, R., Peters, E. D., Moreira, M. M. (2008). The impact of China on Latin America and the Caribbean. *World Development*, v. 36, n. 2.

Kim, C-S., Lee, S. (2014). Different Paths of Deindustrialization: Latin American and Southeast Asian Countries from a Comparative Perspective. *Journal Of International And Area Studies* v.1, n. 2, pp.65-81.

Liu, J., Surry, Y., Dimaranan, B., Hertel, T. (1998). CDE Calibration . In: Mcdougall, R., Elbehri, A., Truong, T. P. *Global Trade Assistance and Protection: The GTAP 4 Data Base*, Chapter 21. Center for Global Trade Analysis, Purdue University.

Mas-colell, A. *et al.* (1995). *Microeconomic theory*. New York: Oxford University Press.

Medeiros, C. A, Cintra, M. R. V. (2015). Impacto da ascensão chinesa sobre os países latino-americanos. *Revista de Economia Política*, vol. 35, nº 1 (138), pp. 28-42.

Nonnenberg, M. J. B. (2010). China: estabilidade e crescimento econômico. *Revista de Economia Política*. vol.30, nº2. São Paulo.

OCDE. (2011). ISIC Rev. 3 *technology intensity definition*. OCDE. Available in: <<https://www.oecd.org/sti/ind/48350231.pdf>>

Penn World Table version 9.0. Available in: <<http://www.rug.nl/ggdc/productivity/pwt/>>.

Silveira, L. C. F. U. (2017). Os laços e traçados da China na América Latina. Investimento para integração ou exploração? *9º Congresso Latino-americano de Ciência Política*. Montevidéo.

UN Comtrade. Available in: <<https://comtrade.un.org/data/>>.

ANNEX

Annex 1. Sector aggregation

SECTOR	CODE	PRODUCTS	SECTOR	CODE	PRODUCTS
Primary products	pdr	Raw rice	Medium-low technology industries	p_c	Refined petroleum and coca
	wht	Wheat and rye		nmm	Non-metallic minerals
	gro	Other grains		i_s	Iron and steel
	v_f	Vegetables and fruits		nfm	Non-ferrous metals
	osd	Oily seeds		fmp	Metal products
	c_b	Cane and beet	Medium-high technology industries	crp	Chemicals, rubber & plastics
	pfb	Fibers and vegetables		mvh	Auto-vehicles
	ocr	Other cultures		otn	Other transportation equipment
	ctl	Breeding	High-technology industries	ele	Electronic equipment
	oap	Other animals		ome	Other machinery and equipment
	rmk	Raw milk		omf	Other manufactures
	wol	Other materials of animal products		ely	Electricity
	frs	Forestry, logging and related activities and services	Services	gdt	Gas distribution
	fish	Fishing, hunting, kinetic restocking and related service activities, fishing, fish farming, fishing related service activities		wtr	Water (collection, treatment and distribution)
	coa	coal		cns	Construction
	oil	Oil and related services		tdr	Trade
	gas	Gas and related services		otp	Other types of transport
	omn	Other mining activities		cmn	Communication: post and telecommunication
	cmt	Meat: cattle, sheep, goat, horse		ofi	Financial intermediation
	omt	Other products of meat		isr	Insurance
vol	Vegetable oils	obs		Other business services	
low-technology industries	mil	Dairy products		ros	Recreation and other services
per	Processed rice	osg	Other services (government)		
sgr	Sugar	dwe	Rooms		
ofd	Other foods				
b_t	Farinaceous and similar products				
tex	Beverages and tobacco				
wap	Food & beverage outlets				
lea	Leather				
lum	Wood - sawn and treated wood and cork products				
ppp	Paper and stationery products				

Source: own elaboration based on GTAP data 9.