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CHINA-MEXICO-THE USA TRADE TRIANGULATION PRACTICES UP TO THE SIGNING OF USMCA[1]

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Abstract: The main question that arises when observing the behavior of Mexico-China- the USA trade relations is whether the obvious statistical association that at the general level exists between Mexico's imports from China and Mexico's exports to the USA can be substantiated at higher levels of disaggregation. To face the challenge, the analysis is carried out with the two most representative groups of manufacturing products traded between the three countries: Groups 84 and 85 of the Harmonized Trade System (HTS). The results show that it is feasible to consider that for a considerable number of products disaggregated at the highest possible level, which is *item* (6-digit HTS), Mexico could have behaved up to 2017 as a liaison country: It acquired industrial inputs from China and used them to elaborate final products to be sold in the USA market. That is to say that at least a part of China's bilateral trade with the USA -the highest between two countries in the world up to 2017- would be carried out through a triangulation process in which Mexico acted as a processing country. Of course, it cannot be discarded that some final products that Mexico imported from China were straight exported to the USA market.

Keywords: Trade flows, bilateral and trilateral trade, commercial partners, commercial deficit.
JEL Classification: F10, F14, O10

Introduction

Given its productive capacity, China has been quite successful to penetrate manufacturing markets around the world due to its low production costs, its large resources endowment and its fast technological development. The absence of trade agreements with its major buyers, notably the United States of America (USA), has been supplemented by mechanisms which allow it to place its large variety of exports, and go since the direct payment of the tariff, complying with the appropriate standard established by the World Trade Organization (WTO), to triangulation and even smuggling.

As the USA is the main importer of Chinese products, with a high bilateral commercial deficit (for every dollar it sold in 2017, it acquired from that country 3.4 dollars, notwithstanding the tariff restriction), it is possible to expect that a part of Chinese manufacturing exports to the USA also seek to arrive through non-standard routes. For example, they may cross other countries, either in the form of finished goods or as supplies to elaborate final products. Either case means profits for commercializing companies and also the possibility of incorporating added value in the intermediary countries. Mexico is an excellent option to the latter case for three reasons: i) it shares a more than 3 thousand kilometer border with the USA, ii) it has been a member of the North American Free Trade Agreement (NAFTA), that in 2020 becomes the USA-México-Canada Agreement (USMCA) with zero intra-regional tariffs, and iii) it has developed a manufacturing industry with a high

[1] This work benefited from the comments received in four academic encounters it was presented in, organized by the following institutions: IPN Higher School of Physics and Mathematics (June 2018); MA in International Relations, UAM-Xochimilco (October 2018), Area of Economic Theory, Department of Economics, UAM-Iztapalapa (November 2018), and School of International Business, University of The Pedregal (May 2019). The first encounter was also covered by the Social Economics PhD student Ana Elena González Guzman, who kindly managed and processed the data.

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degree of regional integration: An intra-industrial Grubel and Lloyd index over 45% (Gutiérrez-R, 2017b).

In this regard, the paper seeks to prove that an important degree of triangulation on China-Mexico-the USA trade relations exists. To do this, the analysis proceeds as follows. In section 1, The background, the convergence of the Mexican manufacturing industry with that of the USA is analyzed via the operation of NAFTA, and that of China with both countries, albeit more distant, particularly after entering the WTO. In section 2 the structure and composition of North American and Chinese exports at different levels of aggregation, based on the Harmonized Trade System (HTS) as presented by the World Integrated Trade Solutions (WITS) is observed. In section 3, the composition of Mexico's exports to the USA and China is presented. Section 4 presents the quantitative evidence of China-Mexico-the USA commercial triangulation at the most detailed level of the two most representative groups of manufacturing products traded between the three countries: Group 84, "Equipment and parts for electrical machinery, recorders and related articles", and 85, "Nuclear reactors, boilers, machinery, equipment and their parts". Section 5 provides the results of the econometric tests, indispensable to evaluate the hypothesis of the relation exiting between Mexico's imports from China and Mexico's exports to the USA. Section 6 dedicates some room to explain how the USMCA changes some important rules of the North American integration which become rather difficult to fulfill to Mexico. Finally, the conclusions are presented.

1. Background

On January the 1st, 1994, the NAFTA entered into operation. Since then, Mexico has consolidated itself as a strong manufacturing exporter and as the third largest USA trading partner up to 2016. Between 1995 and 2000, NAFTA was a key factor in the recovery of the economy: following the deep recession of 1994-1995 (*the tequila crisis*) and its short-term consequences, Mexico's rate of growth picked to over 5%. In line with the proposal for the Manufacturing Export Promotion (MEP) model, the axis of the economy shifted from the domestic to the external market, and the country became the first exporter to the USA of quite a number of textiles, clothing and electronic products (Blanco, 1994).

In December 2001, China entered the WTO and the structure of regional trade changed: not only did USA manufacturing imports to China increase, displacing many Mexican industrial branches, but Mexican imports of Chinese manufactures also began to increase to surprising rates, both for final and intermediate consumption. From that time on, China became Mexico's second trading partner (Gutierrez-Rodríguez, 2017a).

In foreign trade, the changes are surprising: just in 2014, several research centers in Mexico had focused on evaluating the first 20 years of NAFTA and did not hide their pessimism regarding the dependence that the treaty had imposed on the country not only in the commercial field , but also in the fiscal, monetary and exchange ones (Romero-Tellaeche, 2014). Reference was even made to Rodrik's trilemma, in which three national objectives are confronted: economic integration, national sovereignty and political democracy, and it is established that they are mutually incompatible; that is, countries can combine two, but it is impossible for all three to operate fully and simultaneously. On the one hand, it is possible to be an economically globalized country and have acceptable levels of political democracy but lack national sovereignty. On the other, national sovereignty and political democracy can be fully preserved, but staying out of globalization. Finally, a country can adhere to globalization and maintain national autonomy, while sacrificing political democracy (Rodrik, 2007). Obviously, Mexico fulfills the first option, as it has been demonstrated many times, and corroborated by the acceptance of the cross-border anti-immigration rules imposed by the USA in mid-2019 in exchange for Mexican exports to that country not being taxed with up to 25% tariffs.

It has been demonstrated that many studies related to the expected macroeconomic performance and industrial integration of México-the USA carried out between 1990-1993 to support the signing of NAFTA, were based on general, partial, and economic macroeconomic equilibrium models and intra-industrial trade calculations that were either not rigorously carried out or guided by a certain type of forecasts. Politically, in 2016 Mr. Trump started a campaign of attacks on multilateralism when he was nominated for the 2017-2020 USA presidency, being this re-escalated as soon as he became the president. Its initial disappointment was with NAFTA, in particular with

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Mexico; then became the European Union, with which an eventual bilateral agreement was no longer signed; then appeared Canada, and finally China.

Mexico's dependence on NAFTA continues to be of such magnitude, as well as the absence of commercial and development options, that the criticisms of the treaty during the evaluation of its first 20 years soon vanished. Such critics even became a silent acceptance. Proof of this are the results of the negotiation during 2018-2019 of USMCA, and the subsequent acceptance of the regional anti-immigration offensive contrary to the country's foreign policy principles already mentioned.

In the negotiation process the USA made clear that the three countries of North America should bar their markets to China's long-term practice of accessing the USA market through Mexico. This became established on Chapter 4 of the USMCA, Rules of origin, stating that the regional content of automobile production must increase from 62.5% to 75% during the three years following its commissioning. Chinese inputs will also face difficulties in maintaining their level of participation in key industries of finished products in Mexico such as electrical and electronic equipment, in which exports from that country to the USA are second in importance, after those of the Automotive industry and auto parts.

Up to now, the elements available to prove the existence of triangulation in the China-Mexico-USA trade are limited, at least at a disaggregated level, although its existence is recognized by both the USA and Chinese authorities. At the company level, an approach could be attempted; however, it is practically impossible to interview the production managers of the thousands of manufacturing companies that are linked to the main exporters of products to the USA, and even if this was possible, the answers may not be reliable. Therefore, the exercise presented here reaches in general the most detailed level of disaggregation allowed by the HTS.

2. North America and Chinese total exports

The main elements of the four countries' merchandise trade are their consumption amount, their dynamics from the implementation of NAFTA on and the entry of China into the WTO, as well as the USA's considerable trade deficit with each of them. As it is clear from Chart 1, on the one hand the USA imports to the other three countries reached 1 trillion 1,146 million dollars in 2017, 7.4% of worldwide imports in that year. On the other, the USA merchandise imports to Mexico grew 4.2 times between 1996 and 2017; those from Canada grew 1.8 times, and those originating in China 5.3 times only between 2000 and 2017. Third, the USA deficit with the three countries reached the figure of 476 billion dollars, originated in 78% from China. Mexico shows an interesting duality: on the one side, it has a surplus of 115.6 billion dollars with the US, and on the other a deficit of 62.3 billion dollars with China.

Chart 1. Total merchandise imports between the NAFTA countries and China, 1996-2017
Thousand dollars

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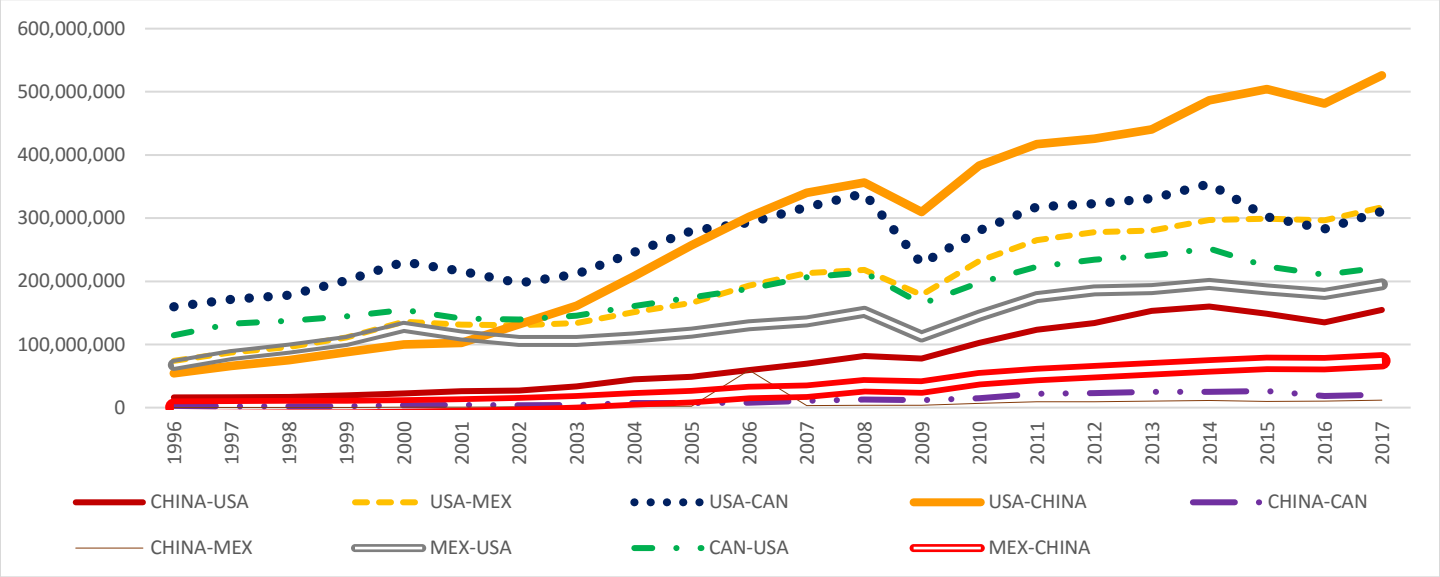

Source: World Bank/UNCTAD/UNSD/WTO (2017)

Before joining the WTO, China was the fourth largest trading partner to the USA: The sum of its merchandise exports plus imports to that country accounted for 9% of total merchandise trade with its 10 main trading partners, appearing in Table 1. In 2008, such a participation had risen to 10%, only surpassed by Canada, with 28%. Finally, in 2016 it had already placed first, with 24% of the USA trade with its 10 main partners. So, in the period Canada fell from the first to the second place, and Mexico from the second to the third. The composition based on this last year appears in Chart 2.

Table 1. Top ten USA trading partners based on total trade X+M

Thousand dollars

	2000		**2008**		**2016**	
Order	**Partner**	**Value**	**Partner**	**Value**	**Partner**	**Value**
1	Canada	409086406	Canada	599964243	**China**	**597118090**
2	*Mexico*	249158653	**China**	**427760972**	Canada	549720294
3	Japan	215883399	*Mexico*	369591032	*Mexico*	526463299
4	**China**	**123867045**	Japan	209925181	Japan	198351253
5	Germany	89402537	Germany	154430616	Germany	165431316
6	UK	86108978	UK	113512044	Rep. Korea	114189235
7	Rep. Korea	69626078	Rep. Korea	84629981	UK	110433291
8	France	50892975	France	74835638	France	80387967
9	Malaysia	37389448	Saudi Arabia	69483375	India	69392537
10	Singapore	37373662	Venezuela	65221238	Italy	63313460

Source: World Bank/UNCTAD/UNSD/WTO (2017)

Chart 2. Ten major USA trading partners in 2016 based on total trade X+M

Shares do not consider other countries (%)

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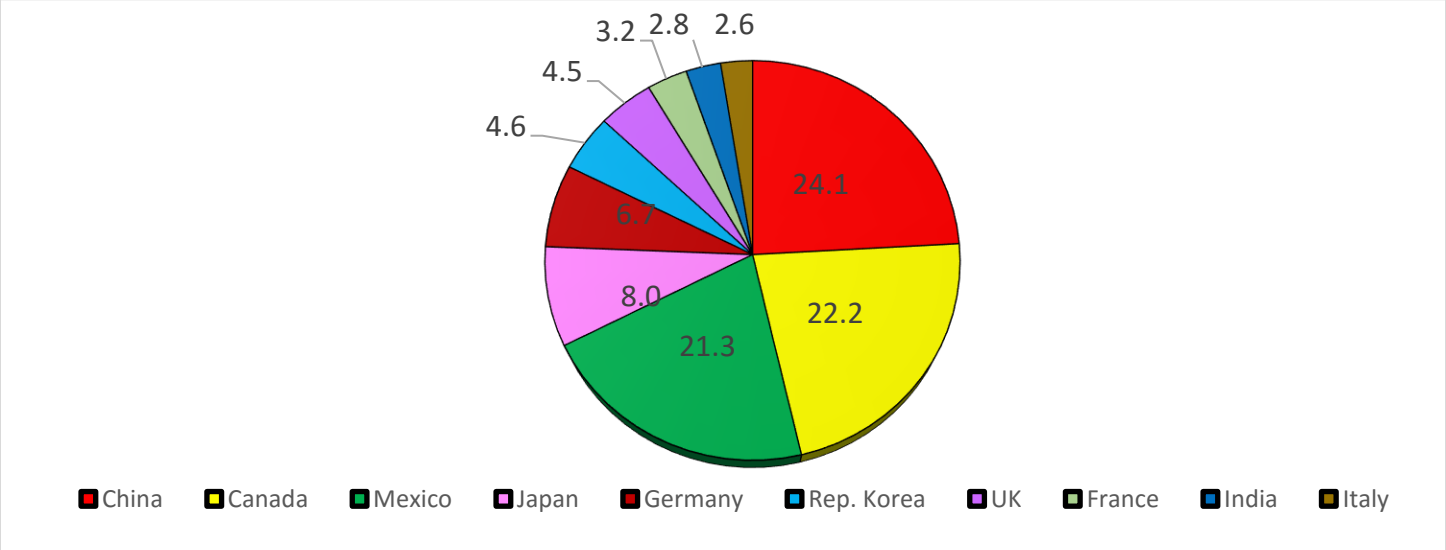

Source: World Bank/UNCTAD/UNSD/WTO (2017)

In the case of Mexico, the USA has been historically its main trading partner; however, participation has declined: 87.5% of the 10 listed partners in 2000; 74.4% in 2008, and 72.7% in 2016. In the process, Canada was relegated from the second to the fourth place and China moved from the sixth to the second place (Table 2). Chart 3 shows that in 2016 its share stood at 11.3%.

Table 2. Mexico's top 10 trading partners based on total trade X+M

Thousand dollars

	2000		**2008**		**2016**	
Order	**Partners**	**Value**	**Partners**	**Value**	**Partners**	**Value**
1	**USA**	**274289565**	**USA**	**385540378**	**USA**	**482926243**
2	*Canada*	7595919	China	36735073	China	74928060
3	Japan	7577996	Japan	18328362	Japan	21522086
4	Germany	7299065	Germany	17603816	*Canada*	20058548
5	Rep. Korea	3983592	*Canada*	16526161	Germany	17827176
6	China	3188011	Rep. Korea	14064893	Rep. Korea	16114490
7	Spain	2974851	Brazil	8549537	Malaysia	8609235
8	Brazil	2491393	Spain	8288740	Brazil	7788841
9	Italy	2103427	Netherlands	6671254	Spain	7736522
10	UK	1945655	Italy	5806450	Italy	6891258

Source: World Bank/UNCTAD/UNSD/WTO (2017)

Chart 3. Ten main trading partners of Mexico in 2016 based on total trade X+M

Shares do not consider other countries (%)

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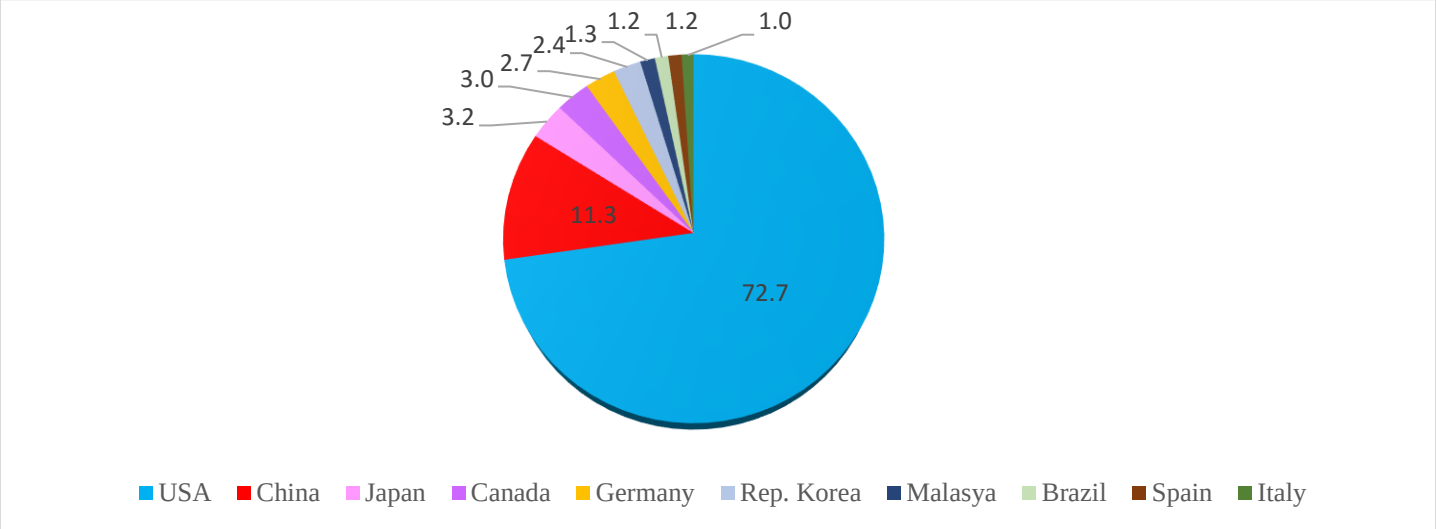

Source: World Bank/UNCTAD/UNSD/WTO (2017)

Mexico's high trade dependence on a single trading partner contrasts with that of China, which has a diversified trade: although its main partner has been since 2008 the USA, its regional trade is exceptionally high, particularly with Japan, Hong Kong (China's autonomous province) and the Republic of Korea (Table 3). As Chart 4 shows, trade with these four countries represents 56.4% of its top 10 partners.

Table 3. China's 10 main trading partners based on total trade X+M

Thousand dollars

	2000		**2008**		**2016**	
Order	**Partners**	**Value**	**Partners**	**Value**	**Partners**	**Value**
1	*Japan*	83163989	**USA**	**334429087**	**USA**	**520797892**
2	**USA**	**74530998**	*Japan*	266732496	H. Kong (China)	303952329
3	H. Kong (China)	53947297	H. Kong (China)	203644880	*Japan*	274939176
4	Rep. Korea	34499769	Rep. Korea	186069911	Rep. Korea	252681635
5	Germany	19686520	Germany	114998881	Germany	151323060
6	Singapore	10820672	Australia	59682397	Australia	108177509
7	United Kingdom	9902575	Feder. Russian	56908612	Viet Nam	98265701
8	Australia	8452884	Malaysia	53556565	Malaysia	86929804
9	Malaysia	8044871	Singapore	52477069	Thailand	75715074
10	Feder. Russian	8003242	India	51844266	United Kingdom	74345523

Source: World Bank/UNCTAD/UNSD/WTO (2017)

Chart 4. China's 10 main trading partners in 2016 based on total trade X+M

Shares do not consider other countries (%)

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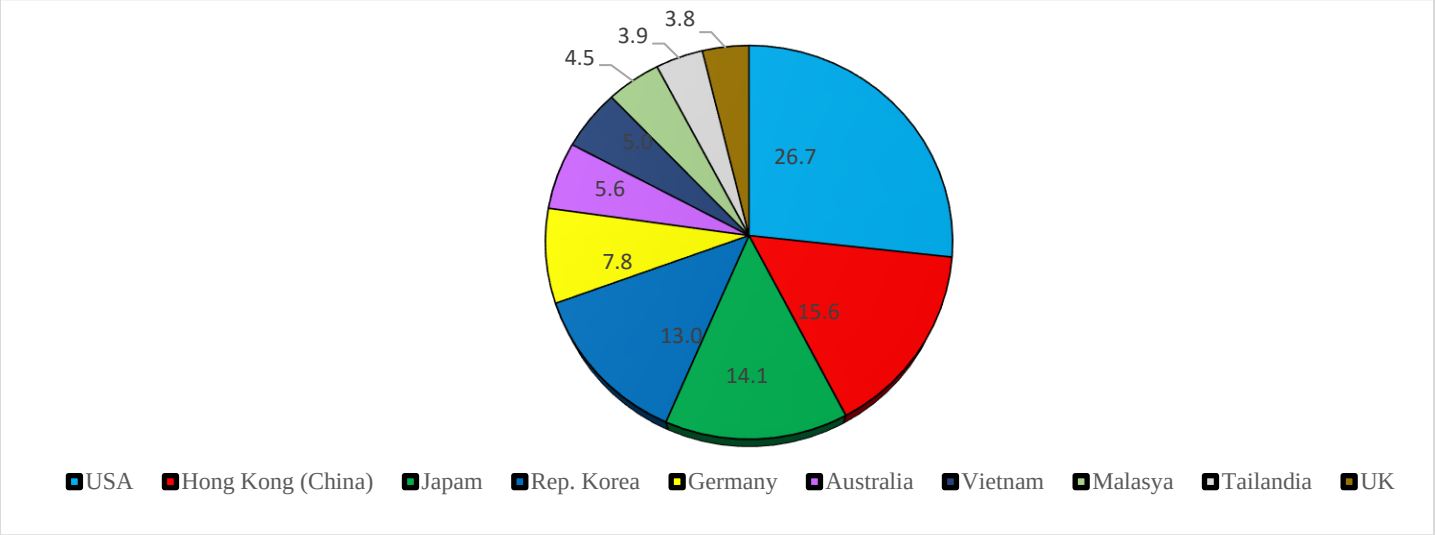


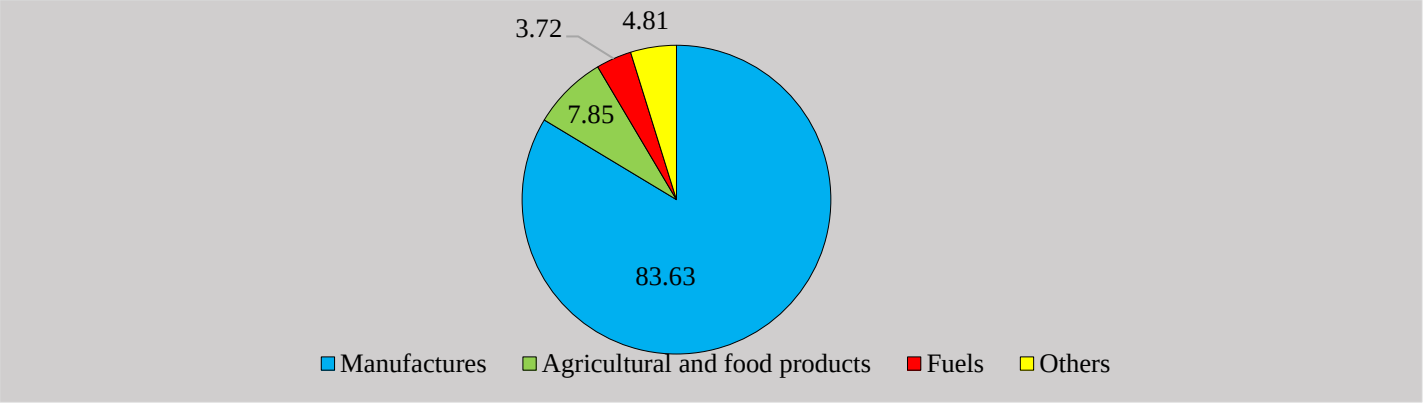
Source: World Bank/UNCTAD/UNSD/WTO (2017)

3. Mexico's export composition

Out of the total exports from Mexico to the USA in 2017, grouped by a 1-digit aggregation equivalent to the *Section* of the Standard International Trade Classification (SITC), 78.1% were manufactures, 10.4% agricultural products and food, almost 5% fuels, and 6.4% other products. This composition is in line with the effort made by the country since the 1980s in favor of the promotion of manufacturing exports.

Chart 5. Composition of total exports from Mexico to the USA in 2017 by Section

Shares of 327.4 billion dollar (%)



Source: World Bank/UNCTAD/UNSD/WTO (2017)

When the composition of exports of the Mexican manufacturing sector to the USA is unfolded, it is observed that the Transport Vehicles Group including rail, parts and accessories, as well as other products, represented more than 30% of the total in 2017. Next, the Electric Machinery Group and its parts, recording equipment, etc. accounted for more than a quarter (in this Group, electronics prevail, particularly in the form of office equipment). In third place appears Nuclear reactors, boilers, machinery, parts of mechanical equipment, etc. (here the machinery, the mechanical equipment and the parts, including those destined to nuclear reactors stand out), with almost 21%.

Chart 6. Composition of manufacturing exports from Mexico to the USA by Division in 2017

Shares of 273.8 billion dollar (%)

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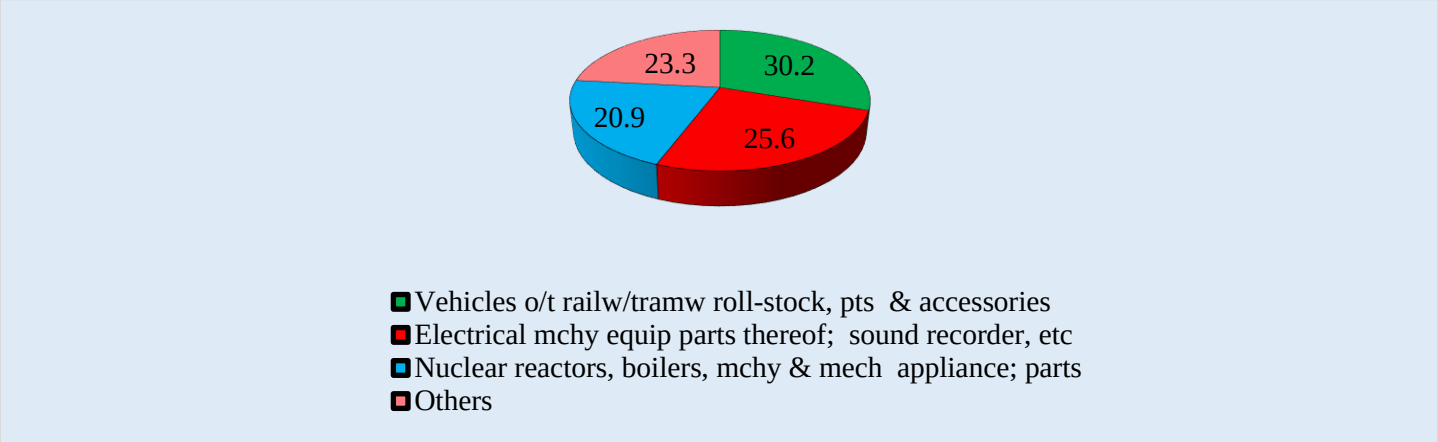
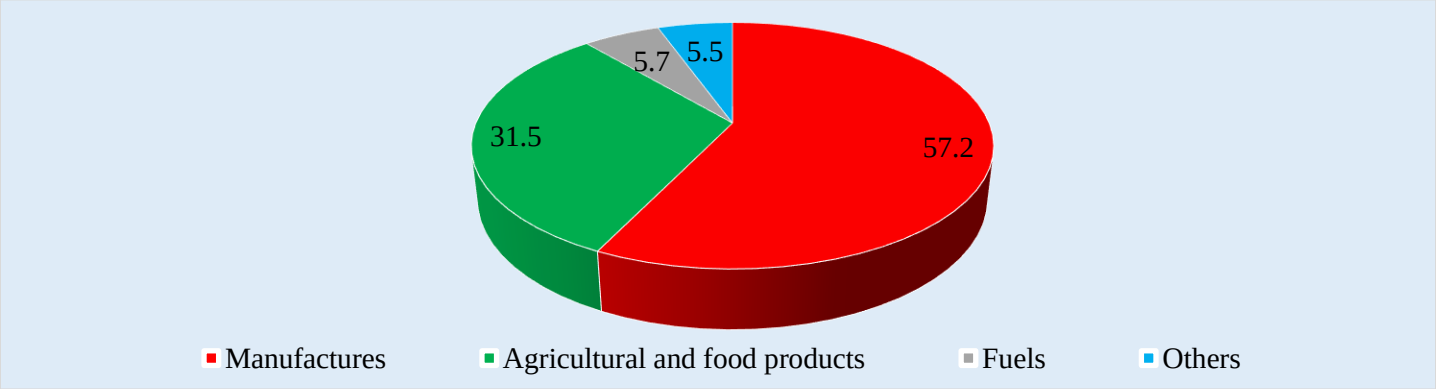


Source: World Bank/UNCTAD/UNSD/WTO (2017)

With regard to Mexican exports to China, manufactured products again dominate (57.2% to the total), although not as high as in the USA case. It is followed in importance by the Group of Agricultural and food products, and that of Fuels. As it is evident, about 40% of Mexican exports to that country are composed by natural products and raw materials, especially minerals.

Chart 7. Composition of Mexican exports to China by Section in 2017

Shares of $6.7 billion dollar (%)



Source: World Bank/UNCTAD/UNSD/WTO (2017)

Among the raw materials, Mexican exports of Copper and related items stand out, with almost 550 thousand dollars in 2017, followed by far by different types of skins, and wood pulp or other cellulose fibers, etc. (Chart 8). This corroborates the importance of the Mexican market for such products, which places the Mexico-China trade in a high proportion in the traditional Heckscher-Ohlin or inter-industrial foreign trade model.

Chart 8. Three main Mexican commodity divisions exported to China 1996-2017

Thousand dollars

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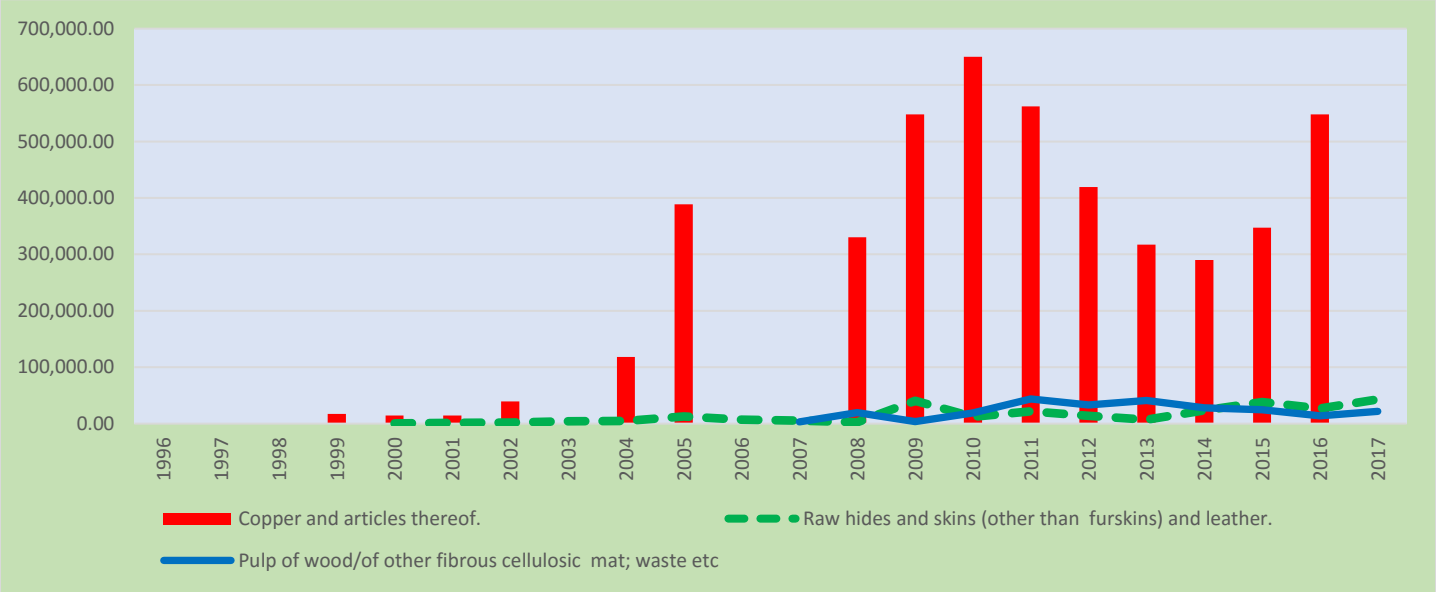
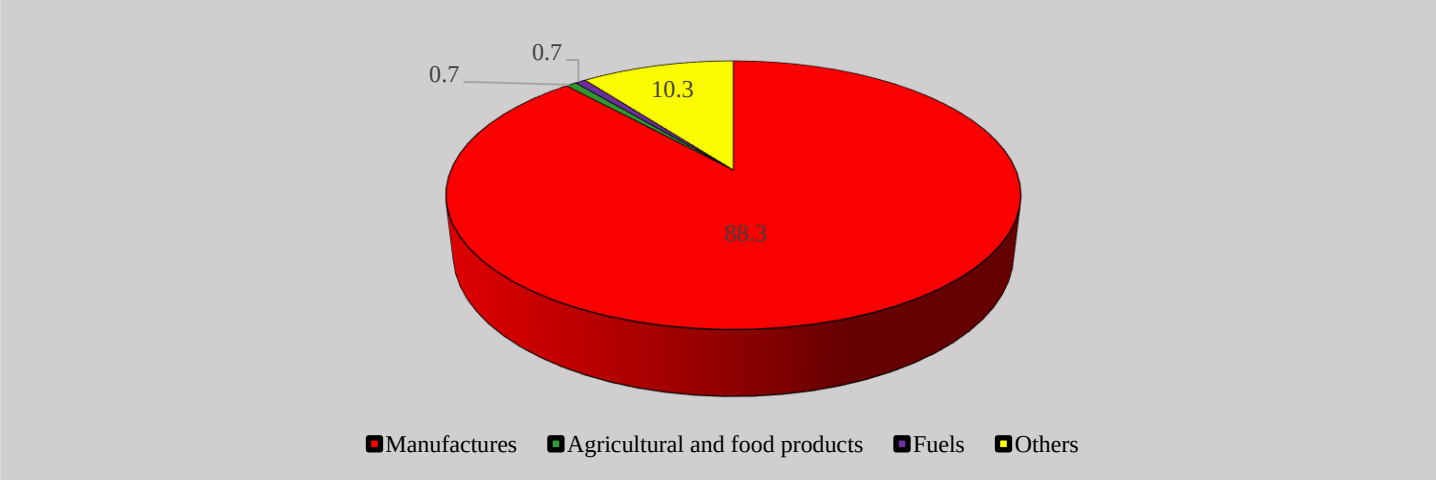


Source: World Bank/UNCTAD/UNSD/WTO (2017)

When analyzing the composition of imports from China, 88.3% are observed to be manufactures, as shown in Chart 9. The remaining 12% is distributed in agricultural and food products, fuels and other products.

Chart 9. Composition of Mexican imports from China by Section in 2017

Sharers of 74.1 million dollars (%)



Source: World Bank/UNCTAD/UNSD/WTO (2017)

By specifying the classification of imports at the *Group* level, it becomes clear that the two main product lines imported from China are Equipment and parts for electrical machinery (in general terms, electronics), with 30.4 million dollars in 2017, and Nuclear reactors, heaters, appliances and their parts, with $16 billion in the same year (Chart 10). The first impression given by this disaggregation is that many final products manufactured with these parts are not consumed in Mexico.

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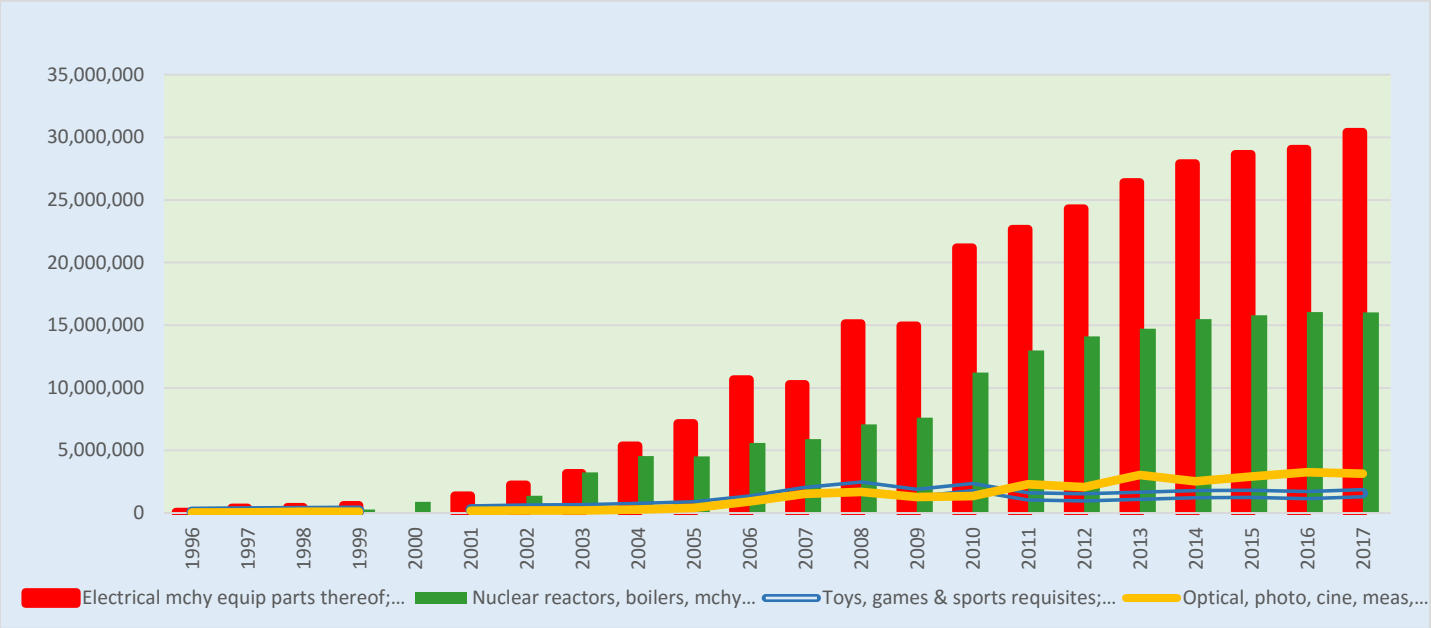
Chart 10. Four main groups of products imported by Mexico from China
Dollars



Source: World Bank/UNCTAD/UNSD/WTO (2017)

4. Evidence of commercial triangulation

In order to narrow the above, Chart 11 presents the evolution during 1996-2017 of two variables: the share of total products imported from China to total exports of goods shipped to the USA, and the share of total manufacturing exports from China to Mexico on Mexico's manufacturing exports to the USA. Surprisingly, both shares follow the same path during the period, from around 1% both total and manufacturing in 1996 to around 23% 2017. In other words, as total exports and manufacturing exports from Mexico to the USA have increased, so have the respective imports of both aggregates from China. This is a general finding that must be substantiated in the following pages.

Chart 11. Share of Mexico's total and manufacturing imports from China to the corresponding total and manufacturing exports to the USA (%)

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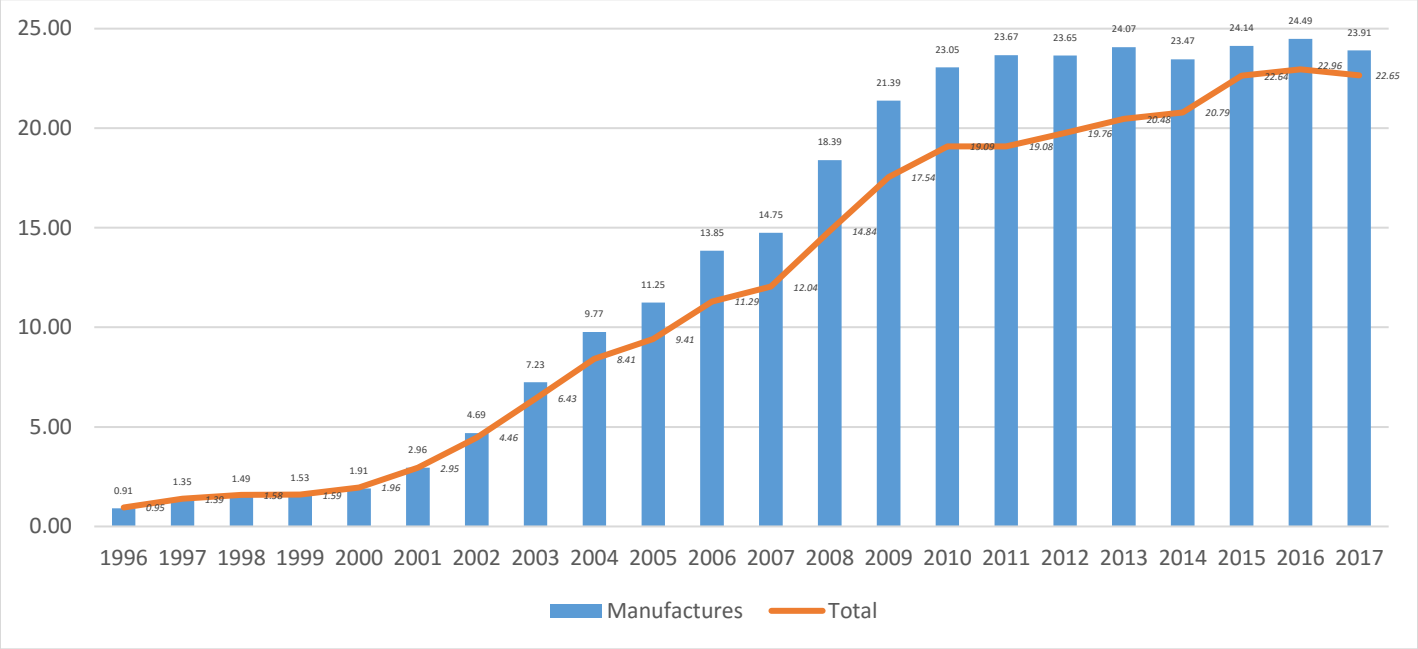

Source: Based on World Bank/UNCTAD/UNSD/WTO (2017)

To begin with, the highest correlations are observed in the Group 84, "Equipment and parts for electrical machinery, recorders and related articles". As presumably most parts and products of this Group imported from China were exported to the USA, the figures on the right side of graph 12 show values ranging from 0.5 to 0.97. In particular, the following stand out: Machines and mechanical devices (0.97); Taps, keys and valves; Turbojets and turboprops, Printing machines, Washing, cleaning and ironing machines, Tanning machines, and Centrifuges and dryers (0.96); Forklifts and other devices for handling and loading, and Refrigerators, freezers and other equipment (0.95); Machinery for harvesting, threshing or packing, and Automatic data processing machines (0.92), Machine tools for different purposes (between 0.23 and 0.88), and Other machinery for agriculture (0.88).

Chart 12. Correlation coefficients between imports from China and exports to the US in the "Equipment and parts for electrical machinery, recorders and related articles" Group, 1996-2017

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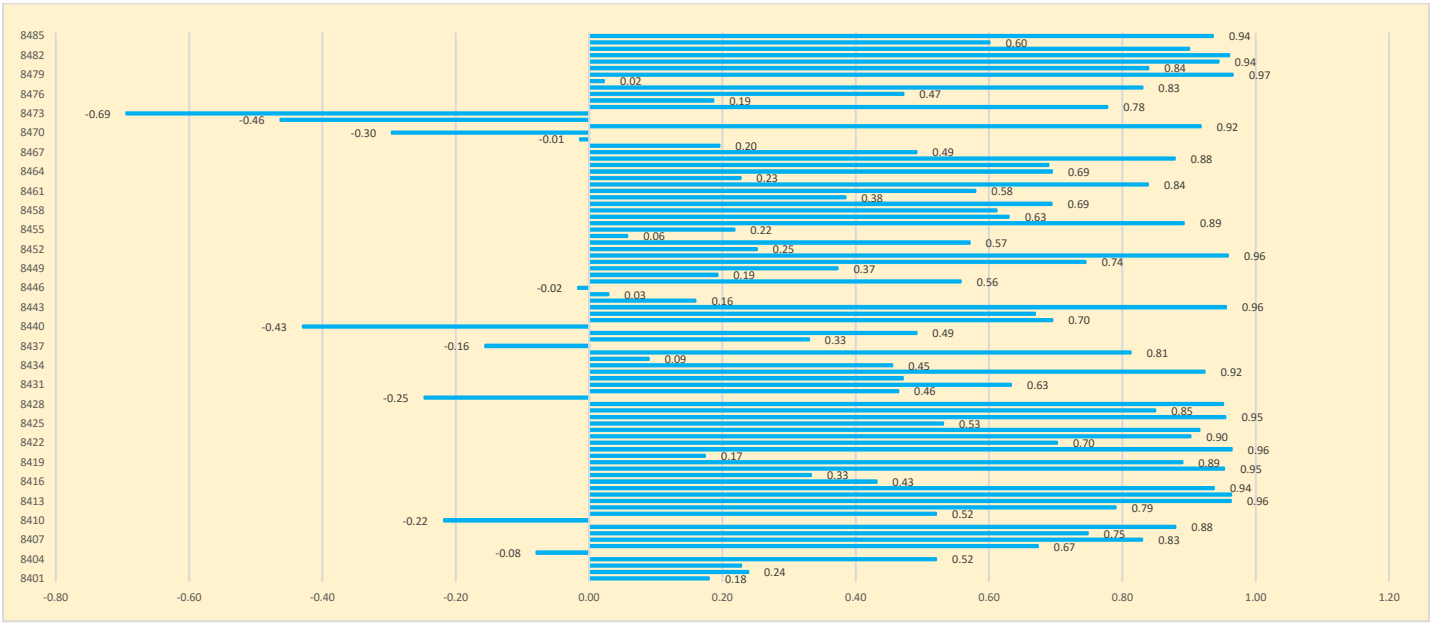
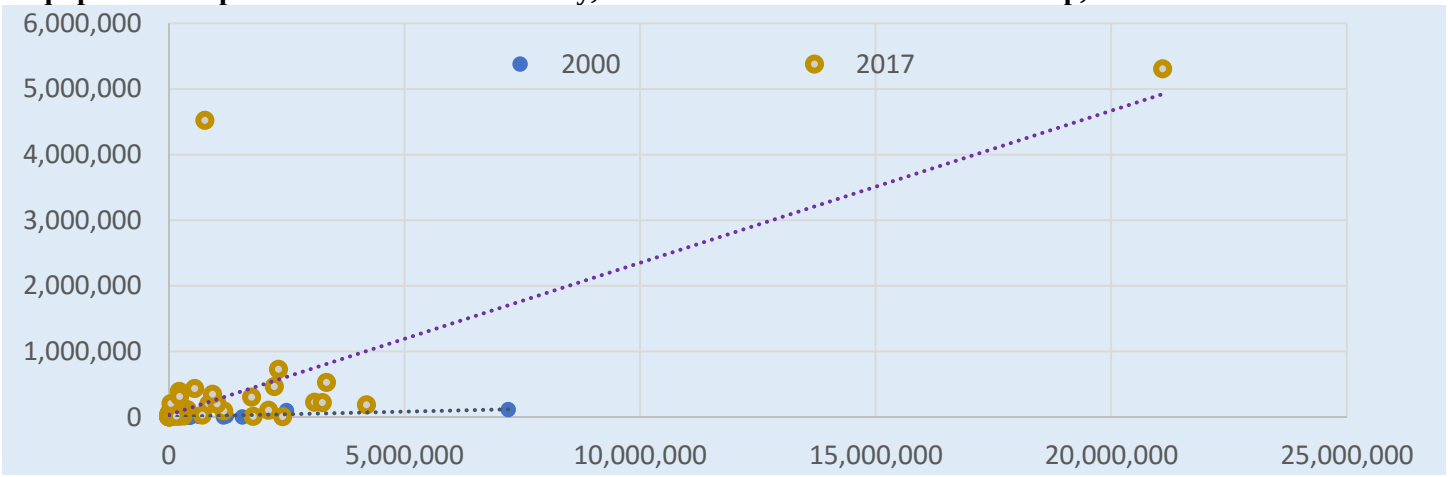


Note: For codes equivalences see Annex 1
Source: Based on World Bank/UNCTAD/UNSD/WTO (2017)

To complement the previous information, static analysis comparing year 2000 (almost a flat line) and 2017 (almost a 45 degrees line) is carried out, to show how the dependence of Mexico's exports to the USA on Mexico's imports from China has grown (Chart 13)

Chart 13. Relationship between Subgroups of imports from China and Subgroups of exports to the USA within the "Equipment and parts for electrical machinery, recorders and related articles" Group, 2000 and 2017



Source: Based on World Bank/UNCTAD/UNSD/WTO (2017)

The second highest correlation coefficients are observed in the Group 85, "Nuclear reactors, boilers, machinery, equipment and their parts". In this, a great deal of the items imported from China presumably were exported to the USA, as suggested by the right side of Chart 14, with the following values standing out: Electrical equipment for ignition (0.94), Electrical equipment, light equipment and electronic equipment (0.90), Radar apparatus (0.88),

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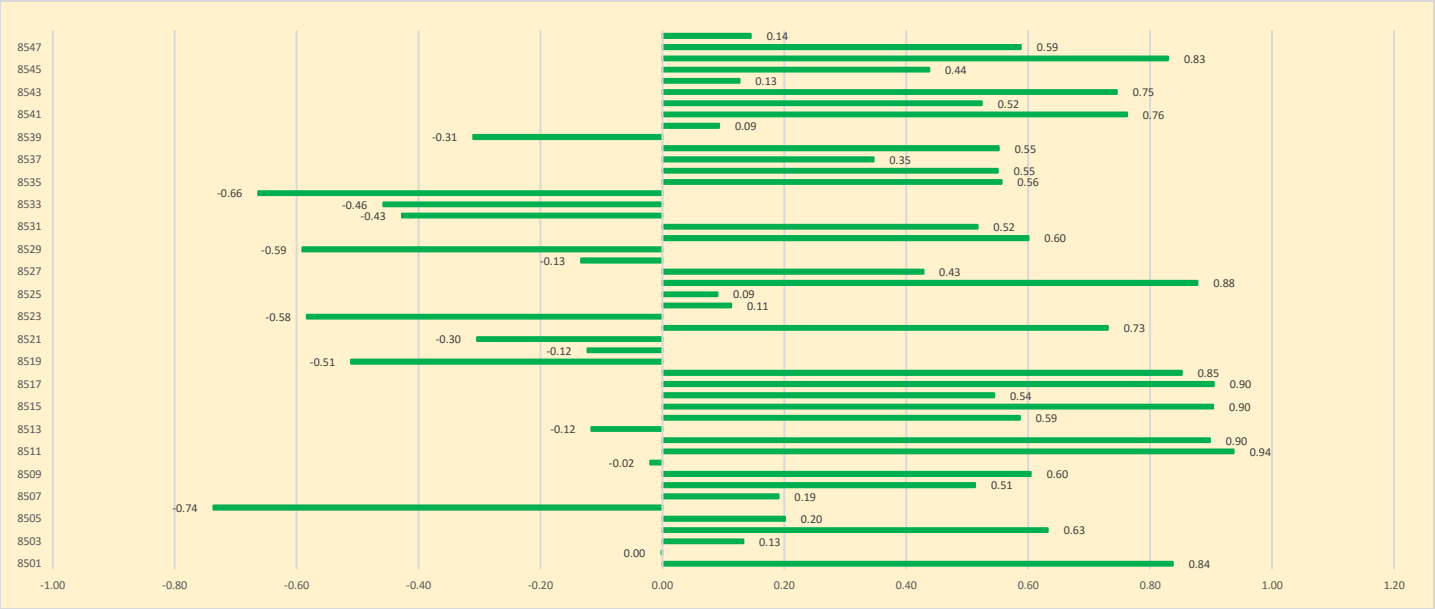
Microphones, supports and speakers (0.85), Electric isolators (0.83), Diodes, transistors and other devises (0.76), Other machines and apparatus (0.74), Parts for reproducing machines (0.73), Electric transformers (0.63), Electric signalization equipment, and Electro domestics (0.60).

Chart 14. Correlation coefficients between imports from China and exports to the USA in the "Nuclear reactors, boilers, machinery, equipment and their parts" Group, 1996-2017



Note: For codes equivalences see Annex 1
Source: Based on World Bank/UNCTAD/UNSD/WTO (2017)

The high correlation coefficients shown, an average obtained throughout the period under study, are best visualized when such a period is compared through two extreme years, 1996 and 2017. In the first one the correlation practically does not exist, as indicated by the semi-horizontal line of Chart 14. By contrast, in the latter the ratio is very high, as indicated by the slope. This suggest that, on average, a large part of the inputs and products imported from China in 2017 corresponding to that Group were exported to the USA.

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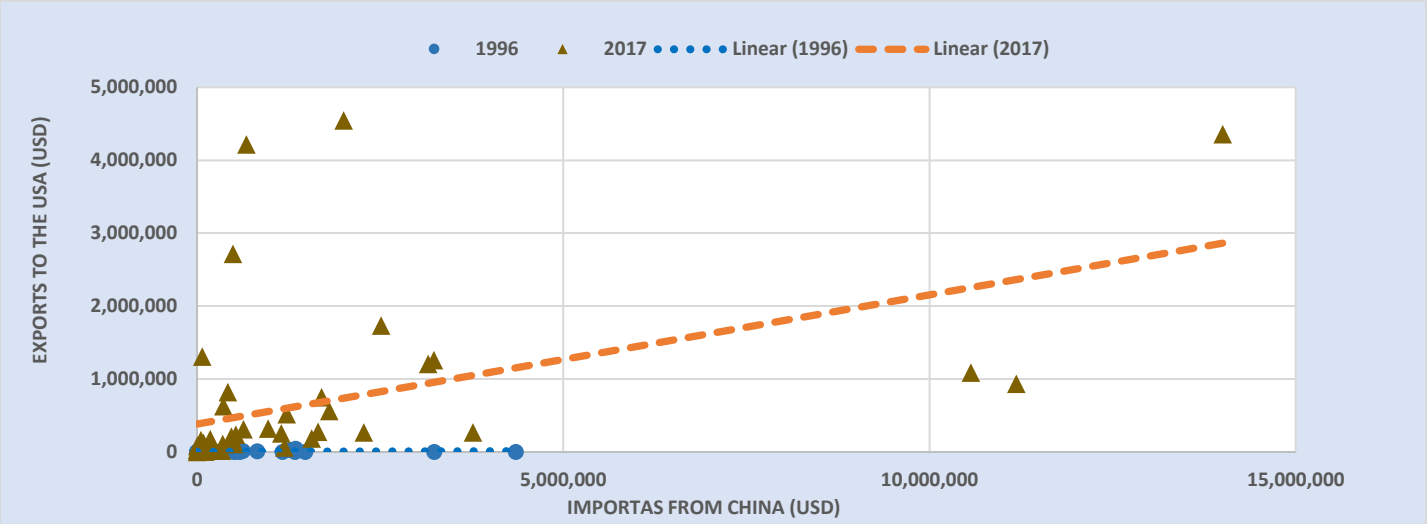
Chart 15. Relationship between Subgroups of imports from China and Subgroups of exports to the USA within the "Nuclear reactors, heaters, machinery, appliances and their parts" Group, 1996 and 2017



Source: Based on World Bank/UNCTAD/UNSD/WTO (2017)

5. Econometric results

In order to unblock the possibility that subgroup-level correlations (4-digit HTS) may not meet the basic econometric tests, the determination coefficients R^2, the P-values (probability) and the regression coefficients of 50 out of 70 items with at least 0.5 values were calculated (the items are defined in appendix 1). Also, the possibility of spurious correlation between the variables was tested. The average values obtained for the hole set were as follows: R^2 = 0. 593; P value = 0.043, and the regression coefficient: 0.257. The first value indicates, as expected, a high level of determination of the independent variable on the dependent one. The second suggests that the explanatory variables cannot be rejected in 95.7% of the cases. The third makes it apparent that, although imports of products from China are not in general the only explanatory variable of Mexico's export to the USA, they hold a great deal of responsibility. As for the spurious test, which is carried out by comparing the Durbin-Watson value (DW) to the R^2 value, the fact that it has succeeded in 72% of the cases analyzed indicates that spurious correlation could be possible only in 28% of the items tested.

To corroborate the fidelity of the dependence of Mexico's exports to the US on Mexico's imports from China, i.e. $X_{m-eu} = f(M_{m-ch})$, the functional form of the equation was established as:

$$\ln X_{m-eutn} = \propto + \ln M_{m-chtn} + u$$

where:
X=exports
M=imports
ln=natural logaritm
m=Mexico
eu=USA
ch=China
t=year
n=item.

In correspondence to a panel model requirement, the Hausman test was applied to determine whether the best fit corresponds to a fixed effects or to a random effects model. The first prevailed. On this basis, a series of logarithmic regressions grouped on yearly panels were carried out over the period 1996-2017 for the Subgroups 84, "Equipment

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and parts for electrical machinery, recorders and related items", and 85, "Nuclear reactors, heaters, machinery, appliances and their parts" (the panels involved 2,336 observations on the whole). Also, the serial correlation and contemporary correlation possibilities where tested, as well as the normality of the residuals.

Once all this was solved, the heteroscedasticity test was carried out and corrected via the robust command. The results appear in the first column of Table 4. In the second column the value of the coefficient is presented, which is always high and grows over time. In the third column appears the probability value (P value), which express that the probability of the expected relation cannot be questioned. Finally, in the fourth column the coefficient of determination (R^2) appears, showing a value that increases over the years.

Table 4. Simple robust regressions by item of cross-sectional panels of the Groups 84, "Equipment and parts for electrical machinery, recorders and related items", and 85, "Nuclear reactors, heaters, machinery, appliances and their parts", based on the HTS, 1996-2017

Functional form of the equation: $\ln X_{m-eutn} = \propto + \ln M_{m-chtn} + u$

Year	Heteroscedasticity test	Coefficient	P-Value	R^2
1996	0.1097	0.4400	0.000	0.205
1997	0.3086	0.5035	0.000	0.310
1998	0.1758	0.5627	0.000	0.310
1999	0.2805	0.6119	0.000	0.383
2000	0.2931	0.5441	0.000	0.280
2001	0.0078	0.6362	0.000	0.411
2002	0.2208	0.7171	0.000	0.426
2003	0.0021	0.6696	0.000	0.456
2004	0.0011	0.7114	0.000	0.509
2005	0.0001	0.6654	0.000	0.489
2006	0.0016	0.7245	0.000	0.493
2007	0.0000	0.7194	0.000	0.457
2008	0.0000	0.9127	0.000	0.573
2009	0.0000	0.8371976	0.000	0.5804
2010	0.0000	0.7846406	0.000	0.5643
2011	0.0000	0.8543632	0.000	0.5572
2012	0.0000	0.942041	0.000	0.6649
2013	0.0000	0.8663819	0.000	0.6183
2014	0.0002	0.7405097	0.000	0.4600
2015	0.0000	0.6631583	0.000	0.4203
2016	0.0000	0.8760395	0.000	0.6290

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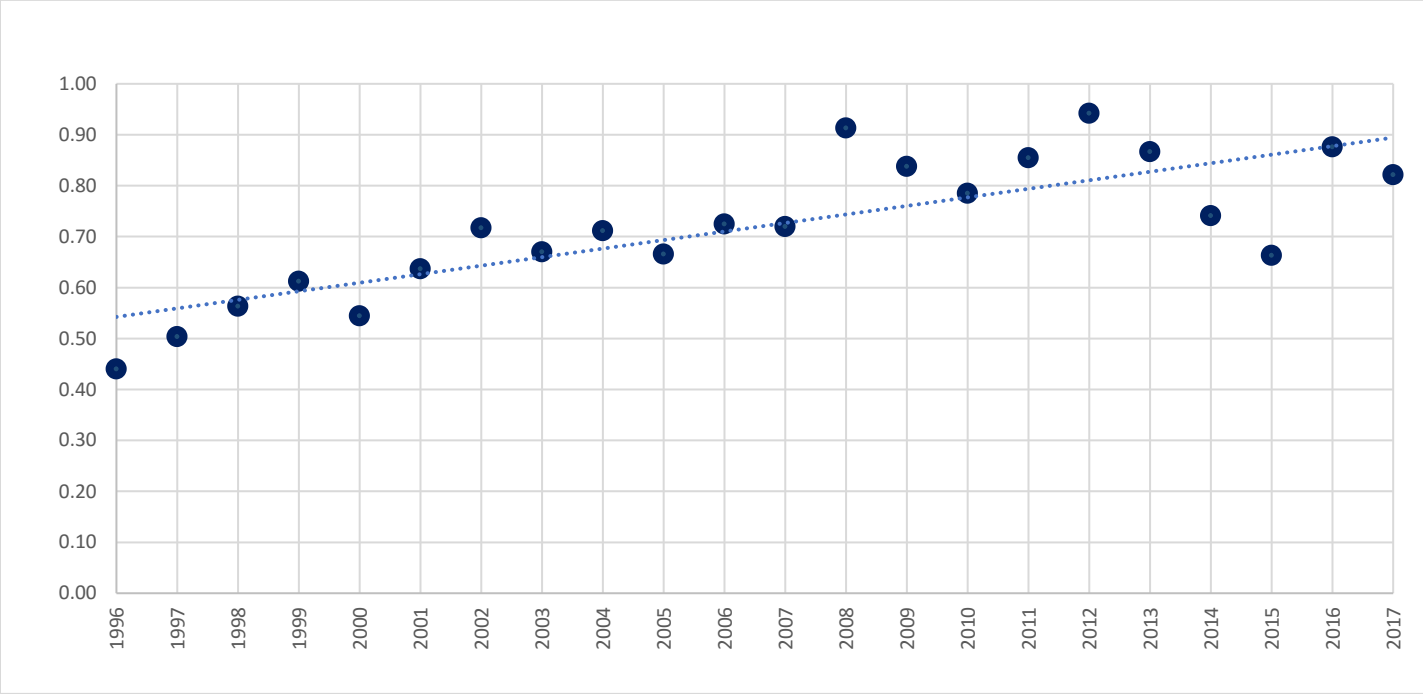
2017	0.0001	0.8213843	0.000	0.5947

Source: *ibid.*

The previous results suggest not only that Mexico's export of item n to the USA in the period of time t ($X_{\text{m-eutn}}$) are highly related to Mexico's imports of the same item in the same period from China ($M_{\text{m-chtn}}$), but also that such a relation has increased over time, as corroborated by the upstream position of the points in Chart 16.

Chart 16. Simple robust regression coefficients of cross-sectional data analysis for the Groups 84, "Equipment and parts for electrical machinery, recorders and related items", and 85, "Nuclear reactors, heaters, machinery, appliances and their parts", based on the HTS, 1996-2017



Source: *ibid.*

6. The USMCA

Negotiations between Mexican, USA and Canadian commercial authorities since the inauguration of Mr. Donald Trump presidency paved the way for him, the president of Mexico and the Prime Minister of Canada to sign the USMCA in November 2018 in Buenos Aires, Argentina, on the frame of the Buenos Aires G-20 Summit. At that moment, Mexico and Canada seemed to establish a solid position regarding their integration to the USA economy, and would even benefit from the imposition of certain tariffs on China. But these criteria were wrong, as the requirements of a minimum regional content of 75% in the rules of origin for the automobile industry within the agreement, and the possibility of imposing tariffs on products highly exported by Mexico such as tomatoes and steel derivatives, and of milk, wood and other derivatives from Canada implied a challenge to both countries and to the region: The vacuum in manufacture supplies was thought by USA authorities will be filled by their country's own inputs at prices higher than those offered by Asian countries, and expected that a great deal of food and natural products imported to satisfy USA consumers would be substituted by local production.

Of course, the USA tariffs of 10%-25% imposed to some 1,500 Chinese products up to August 2019, ranging from technology inputs and products (microprocessors, semiconductors, cell phones, laptops, etc.) to plastics and nuclear reactors, gave Mexico and Canada some

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advantages over China. It was clear that even if it retaliated with tariffs of similar magnitude, their effect on USA exporters would be in value only 29% of the effect infringed on Chinese exporters, given the export differential between the two countries. So, Mexico became in some months of 2019 the first exporter to the USA market. But it is clear that this could be only transitory, as the USA was negotiating a trade agreement with China, still its first partner, which probably will have similar conditions to those of the USMCA. In addition, this agreement seemed to remove the possibility for Mexico to sign a trade agreement with China, as it was wished at that moment by some Mexican authorities.

The situation complicated months later: The Democrats refused to accept the agreement and forced the USA federal government to impose more severe measures to Mexico, particularly in relation to the labor market conditions and the environmental preservation. On extreme circumstances, the former ought to be supervised by foreign observers as Mexico underwent a labor reform during 2018-2019, but the USA and Canadian governments have doubts about its implementation. Also, a minimum wage was imposed to the Mexican sedan-type automotive workers: 16 dollars per hour (d/h), still it has to be accomplished, while the general minimum wage of the country for 2020 was about 0.80 d/h.

The obligations of the USMCA in terms of environmental preservation include prohibitions of some of the most harmful subsidies to fishing, such as those of vessels and operators involved in poaching and illegal fishing. It also protects marine species, such as whales and sea turtles, including the ban on shark fins and a commitment to work together to protect marine habitats. It obliges to improve the effectiveness of customs inspections of shipments that contain wildlife and flora at the ports of entry and ensure the fight against prohibited fishing. Besides, Mexico has to line up to seven multilateral environmental agreements: Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); Montreal Protocol on substances that deplete the ozone layer; International Convention for the Prevention of Pollution from Ships (MARPOL); Ramsar Convention on Wetlands; Convention on Antarctic Marine Living Resources; International Whaling Convention, and Inter-American Tropical Tuna Convention. In addition, an Inter-secretarial Environmental Committee for Monitoring and Application, similar to that of the labor chapter has to be put in place, giving special attention to Mexico City's environment.

The North American Development Bank (NadBank) will be recapitalized to grant concessional loans, as was expected since the NAFTA but was not achieved. The USMCA will have significant additional funds for direct financing and projects. The implementing legislation also authorizes grants under the Mexico-USA Border Water Infrastructure Program and the Trust Fund for Trade Control.

Conclusions

Mexico is a strong exporter of manufactures to the USA market (almost 80% of the total goods exported go that country). Also 57% of Mexico's total exports to China correspond to manufactures. But the trade balance with each country is quite different: with the USA Mexico has a great surplus: for every 10 dollar it exports, their imports absorb some 8 dollars. With China it holds a considerable deficit: for every 10 dollar it imports only 1 dollar is exported. The different signs of these trade practices date back to China's accession to the WTO, when a very dynamic process of purchases of manufacturing goods both in Mexico and in the USA coming from the Asian country began.

To this end, the work has focused in analyzing the two most representative divisions of Mexico's bilateral trade with both countries, 84, "Equipment and parts for electrical machinery, recorders and related items", and 85, "Nuclear reactors, heaters, machinery, appliances and their parts". The results showed that for a considerable number of Subgroups, Mexico could be behaving as a country of liaison: it buys to China intermediate products to incorporate them into the production processes of goods to be exported to the USA, or definitely buys final products to be sold directly to the USA market.

A central aspect of USA logics in forcing the signing of the USMCA was that it will reduce its trade deficit with Mexico while diminishing China's commercial triangulation, especially of manufacturing inputs heading to the USA market through Mexico. But it was not clear how much it will be able to reduce the trade deficit with its three main commercial partners without damaging their international companies' competitiveness, independently

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from which of the three countries they were established on. It was also not clear if, when the aggressive measures were implemented, Mexico would be able to significantly reduce its deficit to China and thus cushion the reduction of the surplus with the USA.

Commercial transactions in North America are mainly carried out by transnational corporations, which implies that if the USA involves Mexico on its commercial war with China, it will affect itself. As a reminder, the tariff theory states that the imposition of tariffs first affects companies that use imported inputs; secondly affect local consumers, who have to pay higher prices, and thirdly the world trade, which slows down. The latter is precisely what has happened since 2013, period during which the growth rate of commercial transactions worldwide has ceased to be higher than that of world's GDP. In the past, it was close to the double, having contributed decisively to the global economic growth.

To the extent that Mexico bases part of its strength as a world-class exporter on low wages and soft environmental control, the new measures taken by the USMCA undoubtedly will undermine it as well as its capacity to capture foreign capital. The results may not be evident in the short run, as the importance of the capital moving from China to other countries (nearshoring and friendshoring) prevails, but as the country tends to adjust slowly, this will become evident in the long term.

Annex 1. Harmonized Trade System items under analysis

8404	Auxiliary plant for use with boilers of heading No. 84.02 or 84.03; condensers for steam or other vapour power units.
8406	Steam turbines and other vapour turbines.
8407	Spark-ignition reciprocating or rotary internal combustion piston engines.
8408	Compression-ignition internal combustion piston engines (diesel or semi-diesel engines).
8409	Parts suitable for use solely or principally with the engines of heading No. 84.07 or 84.08.
8411	Turbo-jets, turbo-propellers and other gas turbines.
8412	Other engines and motors.
8413	Pumps for liquids, whether or not fitted with a measuring device; liquid elevators.
8414	Air or vacuum pumps, air or other gas compressors and fans; ventilating or recycling hoods
8415	Air conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity
8418	Refrigerators, freezers and other refrigerating or freezing equipment, electric or other
8419	Machinery, plant or laboratory equipment, whether or not electrically heated

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8421	Centrifuges, including centrifugal dryers; filtering or purifying machinery and apparatus, for liquids or gases.
8422	Dish washing machines; machinery for cleaning or drying bottles or other containers; machinery for filling, closing, sealing or labelling
8423	Weighing machinery, including weight operated counting or checking machines; weighing machine weights of all kinds.
8424	Mechanical appliances for projecting, dispersing or spraying liquids or powders; fire extinguishers; spray guns and similar appliances
8425	Pulley tackle and hoists other than skip hoists; winches and capstans; jacks.
8426	Ships' derricks; cranes, including cable cranes; mobile lifting frames, straddle carriers and works trucks fitted with a crane.
8427	Fork-lift trucks; other works trucks fitted with lifting or handling equipment.
8428	Other lifting, handling, loading or unloading machinery (for example, lifts, escalators, conveyors, teleferics).
8431	Parts suitable for use solely or principally with the machinery of headings Nos. 84.25 to 84.30.
8433	Harvesting or threshing machinery, including straw or fodder balers; grass or hay mowers; machines for cleaning, sorting or grading eggs, fruit or other
8447	Knitting machines, stitch-bonding machines and machines for making gimped yarn, tulle, lace, embroidery, trimmings, braid or net and machines for tufting.
8450	Household or laundry-type washing machines, including machines which both wash and dry.
8451	Machinery for washing, cleaning, wringing, drying, ironing, pressing, bleaching, dyeing, dressing, finishing, coating textile yarns
8453	Machinery for preparing, tanning or working hides, skins or leather or for making or repairing footwear or other articles of hides, skins or leather
8456	Machine-tools for working any material by removal of material, by laser or other light or photon beam, ultrasonic, electro-discharge, electro-chemical, electron beam, etc
8457	Machining centers, unit construction machines (single station) and multi-station transfer machines, for working metal.

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8458	Lathes (including turning centers) for removing metal.
8459	Machine-tools for drilling, boring, milling, threading or tapping by removing metal, other than lathes of heading No. 84.58.
8461	Machine-tools for planning, shaping, slotting, broaching, gear cutting, gear grinding, etc and other machine-tools working by removing metal or cements
8462	Machine-tools for working metal by forging, hammering or die-stamping; machine-tools for working metal by bending, folding, straightening, flattening, shearing or notching
8464	Machine-tools for working stone, ceramics, concrete, asbestos-cement or like mineral materials or for cold working glass.
8465	Machine-tools for working wood, cork, bone, hard rubber, hard plastics or similar hard materials.
8466	Parts and accessories suitable for use solely or principally with the machines of headings Nos. 84.56 to 84.65, including work or tool holders, self-opening die heads
8471	Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form
8474	Machinery for sorting, screening, separating, washing, crushing, grinding, mixing or kneading earth, stone, ores or other mineral substances, in solid form
8477	Machinery for working rubber or plastics or for the manufacture of products from these materials, not specified or included elsewhere
8479	Machines and mechanical appliances having individual functions, not specified or included elsewhere in this Chapter.
8480	Moulding boxes for metal foundry; mould bases; moulding patterns; moulds for metal, metal carbides, glass, mineral materials, rubber or plastics.
8481	Taps, cocks, valves and similar appliances for pipes, boiler shells, tanks, vats or the like, including pressure-reducing valves and thermostatically controlled valves.
8482	Ball or roller bearings.
8483	Transmission shafts and cranks; bearing housings and plain shaft bearings; gears and gearings; ball or roller screws; gear boxes and other speed changers

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8484	Gaskets and similar joints of metal sheeting combined with other material or of two or more layers of metal; sets or assortments of gaskets and similar joints, dissimilar in composition
8485	Machinery parts, not containing electrical connectors, insulators, coils, contacts or other electrical features, not specified or included elsewhere in this Chapter.
8501	Electric motors and generators (excluding generating sets).
8504	Electrical transformers, static converters (for example, rectifiers) and inductors.
8508	Electro-mechanical tools for working in the hand, with self-contained electric motor.
8509	Electro-mechanical domestic appliances, with self-contained electric motor.
8511	Electrical ignition or starting equipment of a kind used for spark-ignition or compression-ignition internal combustion engines
8512	Electrical lighting or signaling equipment, windscreen wipers, defrosters and demisters, of a kind used for cycles or motor vehicles.
8514	Industrial or laboratory electric furnaces and ovens; other industrial or laboratory induction or dielectric heating equipment.
8515	Electric laser or other light or photon beam, ultrasonic, electron beam, magnetic pulse or plasma arc soldering, etc, whether or not capable of cutting
8516	Electric instantaneous or storage water heaters and immersion heaters; electric space heating apparatus and soil heating apparatus; electro-thermic hair-dressing apparatus
8517	Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones.
8518	Microphones and stands therefor; loudspeakers, whether or not mounted in their enclosures; headphones, earphones and combined microphone/speaker sets; audio-frequency electric amplifiers; electric sound amplifier sets.
8522	Parts and accessories suitable for use solely or principally with the apparatus of headings Nos. 85.19 to 85.21.
8526	Radar apparatus, radio navigational aid apparatus and radio remote control apparatus.
8530	Electrical signalling, safety or traffic control equipment for railways, tramways, roads, inland waterways, parking facilities, port installations or airfields (other than No. 86.08).

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8531	Electric sound or visual signalling apparatus, other than those of heading No. 85.12 or 85.30.
8535	Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (switches, lightning arresters, voltage limiters, etc)
8536	Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (relays, fuses, plugs, sockets, lamp-holders)
8538	Parts suitable for use solely or principally with the apparatus of heading No. 85.35, 85.36 or 85.37.
8541	Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules
8542	Electronic integrated circuits and microassemblies.
8543	Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this Chapter.
8546	Electrical insulators of any material.
8547	Insulating fittings for electrical machines, appliances or equipment, being fittings wholly of insulating material apart from any minor components of metal

Source: World Bank/UNCTAD/UNSD/WTO (2017)

Annex 2. Evaluation of regressions

Simple lineal regression results by item and year, period 1996-2017					
Item	**Coefficient**	**P-Value**	**R^2**	**Durbin-Watson**	**Espurity ($DW < R^2$)**
8404	0.1577439	0.374	0.0612	0.1680788	No
8406	0.0747085	0.148	0.1663	0.7346069	No
8407	0.0443717	0.067	0.1578	0.4211882	No
8408	0.322406	0	0.7869	1.225329	No
8409	0.2138609	0	0.6738	0.8507361	No
8411	0.3310255	0	0.6601	0.6230196	Yes
8412	0.1816969	0	0.5782	0.7670923	No
8413	0.3828823	0	0.9844	2.431485	No

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8414	0.5258387	0	0.9767	1.988033	No
8415	0.1987968	0	0.7117	0.415198	Yes
8418	0.3455682	0	0.9235	0.3952474	Yes
8419	0.2389802	0	0.9168	0.891933	Yes
8421	0.3212561	0	0.8688	1.584958	No
8422	0.2145228	0	0.6645	0.8985343	No
8423	0.8448876	0	0.6346	0.3870493	Yes
8424	0.292194	0	0.9848	2.669252	No
8425	0.2404912	0.001	0.4239	0.8712245	No
8426	0.1724639	0.004	0.3564	2.038228	No
8427	0.3564833	0.006	0.3164	0.4598283	No
8428	0.3698012	0	0.7409	0.4171202	Yes
8431	0.1858221	0	0.8246	1.059264	No
8433	0.2171683	0	0.5803	1.078491	No
8436	0.5050165	0	0.7303	1.683916	No
8441	0.209271	0	0.69	1.483625	No
8442	0.2273926	0.002	0.4097	0.8798048	No
8443	0.5551755	0	0.8108	0.6054818	Yes
8447	0.2064678	0.044	0.1884	1.122728	No
8450	0.5750785	0	0.5312	0.5706737	No
8451	1.919246	0	0.6457	0.9745011	No
8453	0.0637041	0.48	0.0252	1.170531	No
8456	0.5591726	0	0.6938	1.026323	No
8457	0.3278761	0	0.5225	1.593962	No
8458	0.6204397	0	0.4922	1.063779	No
8459	0.4888753	0.006	0.3165	1.5769	No
8461	0.304395	0.028	0.2202	0.7003854	No
8462	0.1375509	0.003	0.3663	0.8468018	No
8464	0.1640807	0.026	0.2245	1.19513	No

8465	1.018684	0	0.6157	0.5642601	Yes
8466	0.2354827	0	0.6625	0.6520998	Yes
8471	0.2866315	0	0.7452	0.3496439	Yes
8474	0.1698493	0	0.5889	0.8550664	No
8477	0.2245092	0	0.6702	1.363373	No
8479	0.2448213	0	0.8832	1.101602	No
8480	0.1589845	0.001	0.4433	0.4379888	Yes
8481	0.2105714	0	0.8376	0.7743597	Yes
8482	0.5485308	0	0.9058	0.4956131	Yes
8483	0.2863796	0	0.9138	0.980138	No
8484	0.2392813	0	0.472	0.7088648	No
8485	0.5039703	0	0.8925	1.984301	No
8501	0.235281	0	0.8632	0.8189141	Yes
8504	0.0972007	0.001	0.4615	0.7772905	No
8508	0.2595205	0	0.7602	1.293837	No
8509	0.1835144	0	0.6354	0.5777753	No
8511	0.241749	0	0.9231	1.831059	No
8512	0.1915691	0	0.8785	0.4879	Yes
8514	0.1803086	0	0.5027	1.99895	No
8515	0.5808664	0	0.9606	1.151635	No
8516	0.1197404	0.003	0.3545	0.5395844	No
8517	0.3979307	0	0.7763	0.691814	Yes
8518	0.220078	0	0.6446	0.5511406	Yes
8522	-0.1042236	0.576	0.0159	1.349737	No
8526	0.4845754	0	0.8212	1.291239	No
8530	0.2547804	0.037	0.1994	0.5137552	No
8531	0.0548011	0.352	0.0435	1.038815	No
8535	0.2775638	0.059	0.167	0.9276747	No
8536	0.0570563	0	0.6837	1.956321	No

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8538	0.2170558	0.004	0.3387	1.569122	No
8541	0.2344064	0	0.6567	0.8517406	No
8542	0.0183302	0.58	0.0156	0.6462621	No
8543	0.3175885	0.008	0.3014	1.163055	No
8546	0.1968257	0.001	0.4203	0.9666879	No
8547	0.409674	0	0.4916	1.526199	No

Dashed items are not valid for the analysis as they are either spurious or have not statistical significance (P-value over 0.05)

Source: World Bank/UNCTAD/UNSD/WTO (2017)

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