

# The New Triangular Relationship between the US, China, and Latin America: The Case of Trade in the Autoparts-Automobile Global Value Chain (2000–2019)

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## Abstract

During 2000–2019, the autoparts-automobile global value chain (AAGVC) underwent significant structural changes from a number of perspectives: micro, meso, or inter-firm relations, macroeconomic, and territorial shifts. This document will focus on recent trade debates on the “new triangular relationship” between the US–China and Latin America and the Caribbean (LAC), and Mexico, and specifically on trade in the AAGVC during 2000–2019. In addition to the discussion on global value chains (GVCs) and its implications, the document analyses in detail qualitative and quantitative global changes in the AAGVC and specifically in US imports during 2000–2019, highlighting the performance of Mexico and China in trade, tariffs, and transportation costs. Conclusions include a set of future research topics.

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## Keywords

China, Mexico, United States, new triangular relationships, trade, autoparts-automobile global value chain

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## Introduction

During 2000–2019, the autoparts-automobile global value chain (AAGVC) underwent significant structural changes from a number of perspectives: micro, meso or inter-firm relations, macroeconomic, and territorial shifts. Each of these analytical perspectives is justified and necessary for a systemic understanding of the AAGVC.

This document will only focus on recent debates on the “new triangular relationship” between the US–China and Latin America and the Caribbean (LAC), and Mexico specifically, for the case of trade in the AAGVC during 2000–2019; references to other issues of AAGVC such as its industrial organisation and labour issues in the region will be referred through literature, but will not be the focus of this analysis. The period is justified and of interest for several reasons: the period 1994–2000 was a period of intense intra-North American Free Trade Agreement (NAFTA) trade integration until China’s joining of the World Trade Organisation at the end of 2001; the second period begins since then and with important structural changes, as we shall see. China’s integration in to NAFTA and each of its members, however, changed drastically after reaching its climax in 2017; that is, the period 2018–2019 is of particular interest for future scenarios of intra-NAFTA trade integration and its relationship with China. The case study of AAGVC is of relevance, since it is the core and one of the most integrated global value chains (GVCs) within the North American region.

The next section briefly sets the conceptual and industrial organisation background for the analysis. It highlights the importance of GVCs – and beyond the fashion of its use, that is, apparently any commodity is a result of a GVC, as in the generalised example of the iPhone with worldwide segments – and its implications, specifically for the AAGVC, also including a group of relevant products and processes within the AAGVC. This section also refers to a group of recent trends of the AAGVC from a qualitative and quantitative perspective and relevant from a “glocal” (i.e. global and local) perspective to understand the AAGVC in North America and in its relationship with China. Next, the article introduces the concept of “new triangular relationships” in light of the most recent US–China tensions and its effects on third-world countries in LAC such as Mexico, and present the main aggregated trade results between US–China and Mexico, highlighting the relevance of the 2017–2019 period. The third section discusses in detail the most relevant trade shifts in this “new triangular relationship” between China–US–Mexico during 2000–2019, highlighting the most recent 2017–2019 period in the AAGVC and its main segments. The analysis focuses on US imports by country and particularly regarding Mexico and China, including an analysis on tariff rates and transportation cost rates of US imports from a comparative perspective; surprisingly, GVC analysis has so far lacked such a specific examination in trade in general and specifically in the US–China–LAC/Mexico relationship. The Conclusions section presents the main results of all the sections and a set of future research suggestions.

## Brief Conceptual and Empirical Literature Review

A number of qualitative and quantitative issues are relevant for understanding the AAGVC, and significant for the next section concentrating on trade.

From a qualitative perspective, the concept of GVCs is fundamental, acknowledging the important work on global commodity chains and GVC by Gereffi (2014), Gereffi and Korzeniewicz (1994), and Bair (2008); global production networks by Ernst (1995, 2015); and systemic competitiveness by Messner and Meyer-Stamer (Esser et al., 1994), among others. With the explicit intention of including territorial processes (“territorial endogeneity”), Bair and Peters (2006) define GVC as a method of analysis of goods and processes in time and space (“glocal,” as discussed in Altvater and Mahnkopf, 2000) in specific segments of GVC, thus allowing for a powerful methodological tool from a systemic perspective (macro, meso, micro, and territorial topics) in the short, medium, and long run. This method of analysis is particularly fruitful in terms of understanding a specific industrial organisation (also relevant for agriculture and services) from a “glocal” perspective and in a dialogue between academics, public, and private institutions, as well as policy-makers at different territorial levels. GVC, from this perspective, is much more than a description of inter and intra-firm linkages; it is a complex methodological package of analysis that does not allow for macroeconomic “generalisations” and recipes, but rather specific diagnostics and respective policies for goods and processes within segments of GVC for the examined levels of analysis; the territorial point of view is substantial, considering that goods and processes differ substantially in space. The implications for using this method of analysis, from this perspective, are significant: depending on the results of the analysis, for example, territorial specialisation on harnesses or mono-blocks in the AAGVC have significant effects on the inter and intra-firm structure, R&D, production and investment structures, employment and wages, as well as in trade; an overall macroeconomic generalisation regarding the impact of the real exchange rate on the AAGVC, from this perspective, is, in the best of the cases, insufficient, and requires an in-depth meso, micro, and territorial analysis. Instruments for allowing for higher levels of “upgrading” in specific territories – territorial endogeneity – thus depend on the concrete products and processes in time and space (for a detailed conceptual, methodological, and empirical discussion, with contributions by Carrillo, Gereffi, and Ruiz Durán, among others, see: Dussel Peters, 2018).

A number of qualitative trends are essential for understanding specifically the “glocal” developments and dimensions of AAGVC, and in light of the goals of this analysis, that is, the new trade shifts within the US–LAC/Mexico and its relationship with China. First, in the last decades, the tensions between off-shoring and near-shoring have increased substantially in the AAGVC. On the one hand, the process of transferring segments of the AAGVC has been going on since the middle of the twentieth century, and increasingly since the 1980s: competition in terms of prices regarding suppliers, energy, and labour power have become critical factors for understanding this process (Piore, 1984), and Mexico has been one of the main recipients of products and processes of AAGVC since then (Carrillo and García, 2020). Parallely, however, additional specificities of the respective products (such as weight), tariffs, and increasingly political

tensions between the United States (US) and China as well as affecting tariffs in other countries in the European Union, among others, have generated incentives for near-shoring in the US and the European Union for example (McKinsey, 2016; Sturgeon et al., 2008). Mexico, as a member of NAFTA since 1994, as well as of the newly implemented US–Mexico–Canada Agreement (USMCA) since 2020, has been directly affected by these off-shoring and near-shoring processes, as we shall see below (Contreras et al., 2020; Dussel Peters and Ortiz Velásquez, 2016). These off-shoring/near-shoring scenarios will be critical for intra-NAFTA trade integration processes and Mexico's socio-economic development, with a substantial role of the AAGVC.

Second, at the micro and meso level, AAGVC has been profoundly affected by disruptive technologies such as diverse/specific purpose mobility, autonomous driving, electrification, and connectivity (McKinsey, 2016; PWC (Price Water House), 2018), with substantial effects on the original equipment manufacturers (OEMs) within the AAGVC in the next decades; these trends are not only having an impact on currently existing segments of AAGVC, but also creating – and destroying – other segments of AAGVC that will become obsolete in the short, medium, and long run. While these new technologies are having an important effect on the change of the AAGVC and specific segments, it is also true that the share of these new disruptive technologies have so far been relatively small – for example in terms of production and sales – in specific segments of the AAGVC and for countries such as Mexico (Asociación Mexicana de la Industria Automotriz, 2021; Hernández Romo, 2018; Tuman and Erlingsson, 2019). The integration of service technologies and connectivity services – based on on-demand mobility and data-driven services, for example – will generate new markets with an increasing share on total value-added of AAGVC and with a negative impact on the manufacturing segment of AAGVC.

Third, given the massive required investments for these expected trends – particularly regarding diversified mobility and autonomous driving – firms will both compete in specific segments of the AAGVC with each other and co-operate in other segments with specialised partners (such as Apple, Didi, Google, and Uber; McKinsey, 2016: 13–14).

Fourth, the international Covid-19 health crisis and its dramatic socio-economic effects will very probably become additional catalysts and exacerbate the former discussed trends, that is, a process of consolidation and concentration of surviving and newly-formed firms, countries, and respective regions and industrial organisations of suppliers and clients, able to participate in the AAGVC after a drastic fall of demand and supply during several months of 2020 (Ewing, 2020; Muñoz, 2020); investing significantly under these circumstances will generate substantial profits (PWC (Price Water House), 2018: 10–11). The impact in terms of employment has been drastic: plummeting sales and estimated fall in investments, in addition to factory closures have affected 1.1 million of a total of 2.6 million direct automotive manufacturing jobs in the European Union only (International Labour Organization, 2020); Asia and China will continue to increase its share in AAGVC, but with important challenges (DaxueConsulting, 2020; PWC (Price Water House), 2018). Regional and national industrial policies and regulations will play a critical role in the recovery and future of the AAGVC (Rodrik, 2004).

Fifth, few developing countries have integrated in the AAGVC – such as Brazil, China, India, and Mexico – in the segments of manufacturing. Their challenges and competition in specific products and processes of segments of the AAGVC will be substantial, considering that the share of manufacturing in the global AAGVC will probably decline substantially, and as a result of the discussed increasing importance of services in the AAGVC. Competition among these countries and respective industrial organisations will very probably increase importantly, particularly for suppliers and specific segments in autoperparts.

Sixth, in Mexico, the AAGVC accounts for 3.7 per cent of national GDP and 20.2 per cent of manufacturing's GDP, with more than 800,000 direct jobs in 2017 (Instituto Nacional de Estadística y Geografía and Asociación Mexicana de la Industria Automotriz, 2018). The AAGVC has probably been the one that most benefitted GVC as a result of liberalisation strategy and NAFTA, although with relatively few backward and forward linkages in terms of value-added – reflecting the profound limitations of learning processes and of foreign partners as teachers (Dussel Peters et al., 2002) – and with an increasing gap in terms of productivity growth and real wage growth (Bensusán, 2020; Carrillo and García, 2020; Crossa and Ebner, 2020; Dussel Peters, 1995, 2000, 2020a, 2020b).

Seventh, using the GVC methodology has a number of implications, as discussed above. In terms of trade statistics, analysts usually define the AAGVC as chapters 84 (autoperparts) and 87 (automobiles), from a GVC perspective; however, this definition is insufficient – that is, there are hundreds of fractions within the AAGVC that are not included in these chapters but are still part of the AAGVC (Cechimex, 2020). Based on these differences, in what follows, the article provides a more detailed analysis of the AAGVC of the US, China, NAFTA, and Mexico, and specifically its trade patterns.

## **“New Triangular Relationships” in Trade between China–US–Mexico: The Case of the AAGVC**

Increasing US–China tensions since 2017 should be examined from a short-term and long-term perspective, acknowledging recent discussions and scenarios (Foreign Affairs, 2019). From a short-term perspective, there has been an increasing escalation between the Trump Administration and China since the end of 2017 (Dussel Peters, 2019). These tensions have gone far beyond the fashionable debate on the “trade war”: the escalation includes culture (closing Confucius Institutes), investments and the persecution of dozens of Chinese firms (under the issue of “entity lists,” including Huawei, TikTok/ByteDance, and dozens of others during 2019–2020), as well as substantial threats on the financial sector (i.e. impeding US investment firms to include Chinese firms in their portfolio and excluding Chinese firms that do not comply with US accounting regulations; Kroeber, 2020). Closing of diplomatic sites in Houston and Chengdu in July 2020, as well as declarations on Hong Kong, Taiwan, and the South China Sea during 2018–2020 have drastically increased bilateral tensions. The “trade truce” achieved in January of 2020 – and expecting substantial Chinese growth in US imports based on its peak in

2017 – is not realistic, considering drastic declines in US–China trade and the Covid-19 pandemic (Bown, 2020).

From a long-term perspective, China is quickly catching up in technology (from 5 G to high-speed trains, semiconductors, artificial intelligence [AI], and [electric] automobiles, among many other areas of the GVCs), as well as in credit and financial sectors. As a result, there has been a “shift” in the US private sector, which is more critical of China and is contributing to an overall hardening of US public policy vis-à-vis China. There has been less analysis on domestic policy shifts in the US compared to China and the historical equilibrium between its public and private sectors, the former being more critical of China in the twenty-first century and the latter more interested in doing business from trade to investments with and in China. Vice President Mike Pence’s remarks at the end of 2018 acknowledged this “great power competition” and “a new approach to China,” since hope for political change in China in the last decades “has gone unfulfilled” (Pence, 2018). In addition, Pence stressed that China’s economy has continued to grow “at the expense of its competitors, especially America,” resulting in a big trade surplus with the US, and an approach to control “90 per cent of the world’s most advanced industries, including robotics, biotechnology, and artificial intelligence ... Worst of all, Chinese security agencies have masterminded the wholesale theft of American technology – including cutting-edge military blueprints.” China’s military presence, particularly in Asia, is also considered a threat. In the same speech, Pence argued that “America had hoped that economic liberalisation would bring China into greater partnership with us [the US] and with the world. Instead, China has chosen economic aggression, which has in turn emboldened its growing military.” As a result, the US will respond to China’s increasing competition in all those fields including trade, financing, international cooperation, and the military. There is already evidence of this approach. The US created the US International Development Finance Corporation (USIDFC) in 2018. In 2017, the Committee on Foreign Investment in the US presented the Foreign Investment Risk Review Modernization Act (CFIUS), which was approved in 2018 to adopt more restrictive rules for Chinese investments in the US. New export controls also ban foreign scientists and researchers to work in specific US sectors. New rules prohibit sales of US technology firms to China, as well as the sale of third countries’ companies in which US technology accounts for at least 25 per cent of the product value (Wang, 2019a, 2019b). These measures to limit Chinese potential theft in particular sectors affect Chinese citizens and firms and have a massive impact on transactions in other countries such as in LAC, where US technology accounts for more than 25 per cent of the product value. In his recent visit to Chile in April of 2019, Secretary of State Mike Pompeo continued with this line of thought and accused China (and Russia) of spreading “disorder” in LAC and highlighted that Chinese outbound foreign direct investment (OFDI) and financing “often injects corrosive capital into economic bloodstream, giving life to corruption, and eroding good governance.”

Over the last decade, a number of authors (Dussel Peters et al., 2013) have highlighted the concept of “new triangular relationships” from a Latin American and Caribbean (LAC) perspective, that is, acknowledging the historic and socio-economic

relevance of the US in the region, but also the increasing socio-economic presence of China in LAC since the end of the twentieth century in terms of trade, foreign direct investments (FDIs), financing, infrastructure, and even national security and military in particular regions and countries. The increasing relevance of China in the US, Mexico, and the NAFTA region is fundamental (Dussel Peters et al., 2013). It is from this perspective that the concept of “new triangular relationships” arises; that is, from an LAC perspective the US plays a critical socio-economic and historical role, but so does China in the twenty-first century, becoming an important partner – with or without diplomatic ties (Dussel Peters, 2019) at least in terms of trade, financing, OFDIs, and infrastructure projects.

Considering these concepts and general qualitative trends of AAGVC, three aspects are relevant. First, and considering that in the 1960s and 1970s, the US accounted for more than 50 per cent of vehicle production, Table 1 reflects additional recent trends, that is, the drastic fall of US motor vehicle production, and even in absolute terms during 2000–2019, from 21.96 per cent of world production in 2000 to 11.85 per cent in 2019; NAFTA’s share also fell from 30.36 per cent in 2000 to 18.29 per cent in 2019. Parallel to the substantial decrease of US vehicle production, China’s growth is probably as relevant: with an average annual growth rate of 14.2 per cent during 2000–2019, since the second decade of the twenty-first century Chinese vehicle production is larger than NAFTA’s and accounted for 28.02 per cent of world production in 2019. While it is important to acknowledge China’s increasing presence in automobile production, it is at least as relevant to recognise China’s so far minor presence in international trade: in 2019, automobile imports and exports accounted for 4.2 per cent and 3.9 per cent of its total production, respectively (International Trade Administration, 2021; Wang et al., 2015). Mexico accounted for a positive performance for the period, with an average annual growth rate (AAGR) of 3.9 per cent and increasing its global and NAFTA share from 3.32 per cent to 4.34 per cent and from 15.12 per cent to 36.64 per cent for the period, respectively. As a result – and as discussed in the first section – Mexico is becoming an increasingly important country for the US’s AAGVC and vis-à-vis Chinese competition (Dussel Peters, 2017).

Second, and regarding trade statistics, it is important to understand differences in the definition and understanding of the AAGVC, that is, while the Harmonized Tariff System (HTS) includes most of autoparts in chapter 84 and automobiles in chapter 87, which makes the analysis “easier,” the AAGVC could also be understood as a much more complex GVC with activities and products beyond these two chapters. Based on the definition of the AAGVC of the US Office of Transportation and Machinery (OTM; Cechimex, 2020), the AAGVC (including its main segments in autoparts and automobiles, as well as other respective subsegments) presents substantial differences with the aggregation of chapters 84 and 87 (Table 2). The differences in the registration of trade, and specifically for US imports of the AAGVC, are substantial: for the period 2000–2019, the AAGVC defined by the OTM accounts for 69 per cent of chapters 84 and 87, and the autoparts segments reflect the main differences (Table 2). Considering these drastic differences, in what follows the analysis uses the definition of the AAGVC by OTM (Cechimex, 2020).

**Table I. World Motor Vehicle Production (2010–2019) (Units and Percentage).<sup>a</sup>**

	2000		2010		2015		2019		Average annual growth rate 2000–2019
	Units	Percentage	Units	Percentage	Units	Percentage	Units	Percentage	
European Union (27 countries)	17,142,142	29.41	17,057,293	27.62	21,096,325	23.24	17,735,151	19.32	0.2
America	19,775,057	33.92	12,531,425	20.29	20,964,654	23.09	20,102,759	21.90	0.1
NAFTA	17,698,614	30.36	8,760,965	14.18	17,949,038	19.77	16,783,398	18.29	-3
Canada	2,963,830	5.08	1,490,482	2.41	2,283,474	2.52	1,916,585	2.09	-2.3
Mexico	1,934,927	3.32	1,561,052	2.53	3,565,469	3.93	3,986,794	4.34	3.9
United States	12,799,857	21.96	5,709,431	9.24	12,100,095	13.33	10,880,019	11.85	-9
Asia and Oceania	17,928,025	30.75	31,760,155	51.42	47,786,156	52.64	49,266,873	53.68	5.5
China	2,069,069	3.55	13,790,994	22.33	24,503,326	26.99	25,720,665	28.02	14.2
Japan	10,144,347	17.40	7,934,057	12.85	9,278,238	10.22	9,684,298	10.55	-2
Other	3,450,333	5.92	413,451	0.67	933,448	1.03	4,682,078	5.10	1.6
TOTAL	58,295,557	100.00	61,762,324	100.00	90,780,583	100.00	91,786,861	100.00	2.4

Source: Author's elaboration based on Organisation Internationale des Constructeurs d'Automobiles (2020).

<sup>a</sup>Includes all vehicles.



**Table 2. United States: Imports of the AAGVC (USD Million and Respective Percentages).**

	1990	1993	1994	1995	2000	2010	2015	2016	2017	2018	2019	2000–2019
Total US imports	495,242	580,469	663,830	743,505	1,216,888	1,894,105	2,248,811	2,187,600	2,341,963	2,540,806	2,497,531	38,180,468
By chapters (1):												
Autoparts (Chapter 84)	66,624	87,217	105,513	122,600	180,908	247,414	323,073	308,922	341,690	377,999	370,896	5,237,883
Automobiles (Chapter 87)	73,907	84,758	97,018	102,329	163,854	182,710	279,909	280,679	289,903	300,502	305,072	4,404,756
Total AAGVC (Chapters 84 + 87)	140,532	171,975	202,531	224,929	344,763	430,124	602,982	589,601	631,593	678,500	675,968	9,642,638
According to OTM (Cechimex, 2020) (2):												
Autoparts	40,592	48,739	57,840	60,980	93,415	159,908	243,106	238,545	249,561	260,471	256,759	3,477,782
Automobiles	54,368	62,057	71,813	76,057	126,016	129,289	196,696	195,695	199,163	201,495	204,176	3,106,578
Total AAGVC	94,960	110,797	129,653	137,037	219,431	289,197	439,802	438,240	448,724	461,966	460,935	6,584,360
Autoparts (percentage over total US imports)	8.20	8.40	8.71	8.20	7.68	8.44	10.81	10.90	10.66	10.25	10.28	9.11
Automobiles (percentage over total US imports)	10.98	10.69	10.82	10.23	10.36	6.83	8.75	9.13	8.50	7.93	8.18	8.14
Total AAGVC (percentage over total US imports)	19.17	19.09	19.53	18.43	18.03	15.27	19.56	20.03	19.16	18.18	18.46	17.25
(2)/(1) (percentage):												
Autoparts	60.93	55.88	54.82	49.74	51.64	64.63	75.25	77.22	73.04	68.91	69.23	66.40
Automobiles	73.56	73.22	74.02	74.33	76.91	70.76	70.27	71.15	68.70	67.05	66.93	70.53
Total AAGVC	67.57	64.43	64.02	60.92	63.65	67.24	72.94	74.33	71.05	68.09	68.19	68.28

Source: Author's elaboration based on Cechimex (2020).

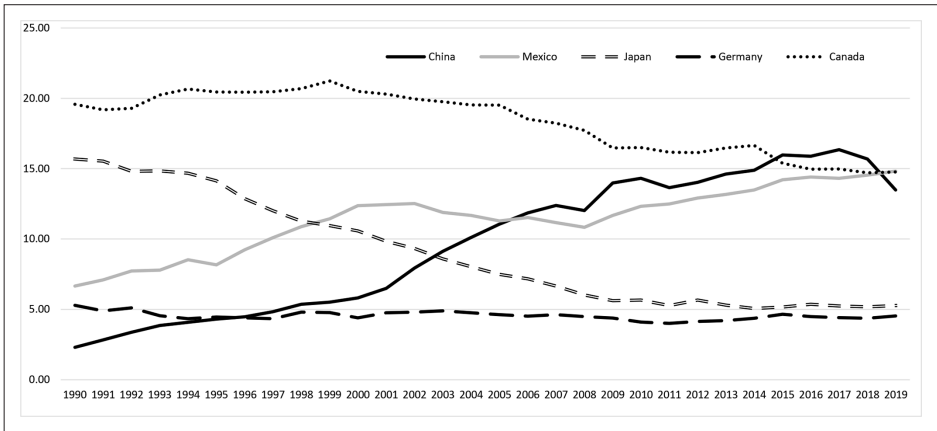
Third, there is an ongoing discussion (Dussel Peters, 2017; Vega Cánovas and Campos Ortiz, 2020) regarding the effective capacity of the US-led AAGVC industrial organisation in NAFTA and its value-added and directly related to debates on the rules of origin in NAFTA, the Trans-Pacific Partnership (TPP), the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), and the USMCA. While it is true that in general the rules of origin for the AAGVC increased from 62.5 per cent to 75 per cent in NAFTA and the USMCA, respectively, it is also relevant to remember that the main firms in NAFTA during TPP requested lowering rules of origin to 53 per cent in 2016 as a result of increasing imported sourcing beyond NAFTA. It will have to be evaluated – depending also on the capacity of monitoring the effective regional value-added – if the USMCA is able to increase the regional content in the medium and long run.

Fourth, given the increasing technological competition and tensions between the US and China, as well as the increasing technological development of the AAGVC – also in terms of electrification and autonomous transportation, supported by highly sophisticated segments in software and hardware linked to electric batteries, semiconductors, and telecommunications, among many other segments, as discussed earlier – it is very probable that the AAGVC will become one of the critical GVCs under US–China competition. As part of this process, it is very probable that the current territorial industrial organisation of the AAGVC will substantially change within North America, particularly already existing segments of the AAGVC and new segments, with profound impacts in their respective territories. The topic goes far beyond the reach of the goals of this article and has received, so far, little attention.

## **Main Trade Trends in the “New Triangular Relationship” between China–US–Mexico in the AAGVC**

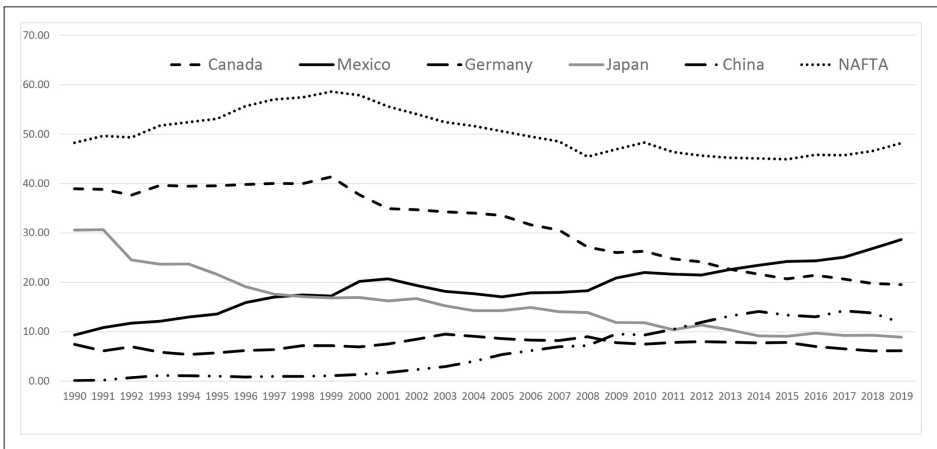
The analysed “trade war” between the US and China since 2017, and specifically with measures and countermeasures – also through tariffs – since 2018 has had an enormous impact on US–China trade since then (China Briefing, 2020). From an aggregated perspective, the main result regarding US trade of goods reflects that China, which became the US’s main trading partner (exports and imports) since 2015 – displacing Canada and Mexico – fell to third place in 2019, and after Mexico and Canada. Particularly US imports from China accounted for a maximum of 21.6 per cent in 2017 and fell to 18.10 per cent in 2019, respectively; only in 2019, US imports and exports from China decreased by –16.2 per cent and –11.3 per cent (Figure 1); that is, the trade deficit of goods of the US with China accounted for its highest level in 2018 (–419.5 billion) and fell to –345.6 billion in 2019. From another perspective, NAFTA’s trade disintegration since 2001 (Dussel Peters, 2020a, 2020b) accounted for a significant recent countertendency as a result of US–China tensions (see the first section on “Literature Review”); Mexico benefitted substantially from these tensions.

The AAGVC, in this context, reflects a number of trends, in general insufficiently analysed and understood in literature regarding the “new triangular relationship” and recent trends of US imports.



**Figure 1.** United States: Trade with Selected Countries (Share over Total).  
Source: Authors' elaboration based on Cechimex (2020).

First, in terms of trade (exports and imports), Figure 2 is relevant for understanding the importance of NAFTA for US trade for the period 1990–2019. As with total US trade (Dussel Peters, 2018), intra-NAFTA trade (i.e. Canada and Mexico) plays a critical role in AAGVC's trade: before the implementation of NAFTA, US trade in AAGVC with Canada and Mexico accounted for levels slightly below 50 per cent of the US's AAGVC, and increased importantly up to 58.60 per cent in 1999 (and its maximum level); since



**Figure 2.** United States: Trade in the AAGVCC for Selected Countries (Share Over Total AAGVC).  
Source: Authors' elaboration based on Cechimex (2020).

then, however, NAFTA's share has fallen substantially and continuously until 2017 (with 45.73 per cent) and have slowly recovered to account for 48.19 per cent in 2019. Relevant is, on the one hand, that the composition of US trade in AAGVC within NAFTA has changed drastically; that is, Canada's share accounted for almost 40 per cent of the US's trade before the implementation of NAFTA and decreased constantly since 1999, achieving 19.52 per cent in 2019. Mexico, on the other hand, benefitted importantly since NAFTA, from levels below 10 per cent of US trade before NAFTA to 22.00 per cent in 2010 to 28.66 per cent in 2019. While Canada's decreasing share has been continuous since 2000, so has been Mexico's growth: in 2015, Mexico became the US's first trading partner in AAGVC. Figure 2 reflects a group of additional tendencies regarding Japan and Germany, but we would like to highlight vis-à-vis China two issues: (1) China's increasing presence in US' trade in the AAGVC, from levels below 1 per cent until 1992 up to 14.2 per cent in 2017; as a result, China became the US's third main trading partner after Canada and Mexico. Since 2014, and particularly as a result of US–China tensions since 2018, China's share fell drastically, and to 11.81 per cent in 2019. (2) Thus, and acknowledging China's important increasing presence in the US's AAGVC trade, even at its height in 2017, it was still far below levels of Canada and particularly Mexico and not yet an important competitor in the US's trade in AAGVC as a whole. As a result of these trends, the US's AAGVC registers the highest trade deficit with Mexico, of USD –92,663 million in 2019, and of USD –56,200 and USD –50,211 with China and Japan, respectively.

Based on these general trade trends, in what follows we concentrate on the characteristics of US imports in AAGVC, and particularly on those originating in Mexico and China. Table 3 highlights the relevance of NAFTA in US imports in the AAGVC for the period 1990–2019, with a group of critical performances. As a whole, NAFTA's share in the US's total AAGVC imports grew substantially up to 1999 (reaching a maximum of 52.26 per cent) and declined since then almost to pre-NAFTA levels, with 43.73 per cent in 2019. Within NAFTA, however, shifts have been dramatic and the Canada–Mexico share completely inverted for the period: in 1993, Canada and Mexico registered 34.30 per cent and 11.00 per cent in US imports of AAGVC, and in 2019 they represented 13.17 per cent and 30.56 per cent, respectively; that is, since 2009, Mexico became the US's major importer of the AAGVC. In addition, China became the US's second major importer since 2014 – and accounting for less than 1 per cent until 1993; as a result of the discussed “trade war,” however, China's share fell drastically, from 17.05 per cent in 2018 to 14.61 per cent in 2019.

In addition, Table 3 also summarises a group of discussions regarding tariff rates and transportation cost rates for the period for the AAGVC. On the one hand, it reflects the substantial benefits of NAFTA in the AAGVC, with a tariff rate of 0.54 per cent in 1993 and of 0.09 per cent in 2018 (and increasing to 0.11 per cent in 2019). These benefits contrast with the Most Favoured Nation (MFA) treatment received by China, with an important falling tendency of its tariff rate (from levels above 5 per cent in the early 1990s to 0.75 per cent in 2017) and the subsequent drastic new tariffs, increasing to 6.74 per cent; that is, in 2019, China paid a tariff rate 61 times higher than NAFTA countries

**Table 3.** United States: Imports, Tariffs, and Transportation Costs by Main Countries of AAGVC (1990–2019).

	1990	1993	1994	2000	2010	2015	2016	2017	2018	2019
<i>Value (USD million):</i>										
NAFTA	36,811	49,830	58,895	111,147	123,073	175,066	178,307	181,754	191,766	195,892
Canada	29,166	37,728	42,973	67,552	56,000	65,563	67,740	64,717	62,471	59,013
Mexico	7,645	12,102	15,922	43,595	67,072	109,503	110,567	117,038	129,294	136,880
Germany	7,978	8,125	8,832	19,465	25,524	40,038	34,074	32,403	30,572	29,182
Japan	31,583	38,064	43,229	50,133	47,948	54,031	57,651	55,927	57,108	53,175
China	97	931	1,579	3,710	33,810	69,727	66,410	76,017	78,773	65,422
Selected countries	82,495	103,091	120,289	203,735	261,952	390,959	387,690	399,781	4,09,962	3,93,961
Rest of the world	3,606	6,893	8,038	14,290	26,124	47,210	48,691	48,039	52,004	53,962
Total	86,101	109,985	128,326	218,025	288,076	438,169	436,381	447,820	461,966	447,923
<i>Percentage:</i>										
NAFTA	42.75	45.31	45.89	50.98	42.72	39.95	40.86	40.59	41.51	43.73
Canada	33.87	34.30	33.49	30.98	19.44	14.96	15.52	14.45	13.52	13.17
Mexico	8.88	11.00	12.41	20.00	23.28	24.99	25.34	26.13	27.99	30.56
Germany	9.27	7.39	6.88	8.93	8.86	9.14	7.81	7.24	6.62	6.51
Japan	36.68	34.61	33.69	22.99	16.64	12.33	13.21	12.49	12.36	11.87
China	0.11	0.85	1.23	1.70	11.74	15.91	15.22	16.97	17.05	14.61
Selected countries	95.81	93.73	93.74	93.45	90.93	89.23	88.84	89.27	88.74	87.95
Rest of the world	4.19	6.27	6.26	6.55	9.07	10.77	11.16	10.73	11.26	12.05
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<i>Tariff rate (percentage over respective imports):</i>										
NAFTA	0.83	0.54	0.39	0.07	0.06	0.09	0.08	0.09	0.09	0.11
Canada	0.31	0.13	0.13	0.04	0.04	0.08	0.06	0.07	0.06	0.08

(Continued)

Table 3. Continued

	1990	1993	1994	2000	2010	2015	2016	2017	2018	2019
Mexico	2.93	1.79	1.13	0.08	0.08	0.10	0.09	0.09	0.10	0.13
Germany	3.04	2.68	2.68	2.41	2.26	2.26	2.28	2.30	2.31	2.33
Japan	2.89	3.36	3.38	2.43	2.48	2.47	2.48	2.42	2.42	2.46
China	14.30	5.15	4.97	1.60	1.89	0.81	0.83	0.75	2.36	6.74
Selected countries	1.84	1.87	1.78	0.99	1.07	0.87	0.86	0.82	1.15	1.95
Rest of the world	3.00	2.60	2.58	1.63	1.34	1.62	1.19	1.28	1.38	1.34
Total	1.87	1.70	1.62	1.04	1.13	1.05	0.94	0.92	1.20	1.81
<i>Transportation cost rate (percentage over respective imports):</i>										
NAFTA	0.97	1.32	1.21	0.75	0.65	0.59	0.59	0.62	0.60	0.55
Canada	1.06	1.25	1.22	0.83	0.66	0.58	0.58	0.57	0.57	0.54
Mexico	0.60	1.52	1.17	0.63	0.64	0.60	0.61	0.64	0.62	0.55
Germany	2.17	2.42	1.94	1.80	1.33	1.54	1.57	1.76	1.61	1.58
Japan	4.69	3.52	3.19	2.77	2.84	2.82	2.10	2.27	2.40	2.45
China	4.90	4.88	4.19	8.46	4.11	2.88	2.80	2.82	4.21	3.60
Selected countries	2.67	2.31	2.07	1.57	1.69	1.53	1.39	1.47	1.77	1.52
Rest of the world	4.07	4.05	4.05	3.58	3.61	2.91	2.81	3.02	3.83	3.31
Total	2.88	2.52	2.32	1.88	2.08	1.84	1.71	1.82	2.23	1.95

Source: Author's elaboration based on Cechimex (2020).

in the AAGVC. In addition, Table 3 reflects that China has been the main source of the US's total tariff rate growth (i.e. for the rest of the countries not selected, the tariff rate fell in 2018–2019). The trends regarding the transportation rate allows for a much deeper analysis in the future; here we highlight: (1) As a result of trade liberalisation of US imports and specifically regarding its tariff rate for the AAGVC throughout the period, transportation cost rates have become increasingly relevant, and in 2017, for example, twice as high as tariff rates (for countries such as Mexico, it has been more than six times higher than tariff rates since 1998). (2) Transportation cost rates for China have been persistently at least four times, in several years up to seven times, higher than for Mexico. As we shall see below, these added costs – tariff and transportation rates – can definitively make a difference in the medium and long run regarding trade and investment decisions with the US, and particularly for specific segments and products of the AAGVC.

Table 4 reflects the enormous richness of this kind of analysis of GVCs and only including trade data. A number of topics regarding the US's imports of the AAGVC – in this case, emphasising the autoparts and automobile segments of Mexico and China – are important, particularly:

1. Independently of the increasing relevance of the AAGVC in US trade, the composition of trade in its two main segments has also shifted importantly: historically, the share of the US's imports of autoparts accounted for less than 50 per cent – until 2007 – and was 55.70 per cent in 2019; as a result of the “trade war,” imports only declined in 2019 in autoparts, while they continued increasing in automobiles. The tariff rate for total US imports has remained relatively constant throughout the period for both segments with the exception of autoparts, increasing from 0.73 per cent in 2017 – its lowest level for the period – to 2.29 per cent in 2019. Transportation cost rates have also remained relatively constant and higher in comparison to tariff rates – representing 143 per cent versus 108 per cent in 1990 and 2019 – and particularly in autoparts: in 2017, transportation costs represented 198 per cent of tariffs and fell to 108 per cent in 2019 as a result of the discussed “trade war.”
2. The Mexican case in the AAGVC is of relevance from a variety of perspectives (Table 4). On the one hand, US imports from Mexico have not only increased drastically, but also its composition: throughout the period, Mexico has continuously increased its share in both segments – autoparts and automobiles – and particularly in automobiles: Mexico's share increased from levels below 6 per cent of the US's AAGVC in the segment of automobiles before NAFTA to 21.38 per cent in 2010 and 34.31 per cent in 2019; the increasing presence in the automobile segment has been significant since 2016. As a result, Mexico has become the main importer of the US in both segments of the AAGVC since 2019. While both segments have been very dynamic, this has been particularly the case for automobiles: historically, the autoparts segment registered less than 40 per cent of US imports from Mexico until 2008–2009, and 50.86 per cent in 2019, for the

**Table 4.** United States: Characteristics of Imports of AAGVC by Segment from Mexico and China.

	1990	1993	1994	2000	2010	2015	2016	2017	2018	2019
<b>Mexico</b>										
<i>Imports (USD million):</i>										
Total	7,645	12,102	15,922	43,595	67,450	109,794	111,019	117,535	129,294	137,707
Autoparts	5,197	8,376	11,135	22,592	39,811	59,142	61,072	61,542	66,030	67,663
Automobiles	2,448	3,727	4,787	21,002	27,639	50,653	49,947	55,994	63,265	70,044
<i>Imports (share over respective US-total):</i>										
Total	8.05	10.92	12.28	19.87	23.32	24.96	25.33	26.19	27.99	29.88
Autoparts	12.80	17.18	19.25	24.18	24.90	24.33	25.60	24.66	25.35	26.35
Automobiles	4.50	6.01	6.67	16.67	21.38	25.75	25.01	28.11	31.40	34.31
<i>Imports (share over Mexico's total):</i>										
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Autoparts	67.98	69.21	69.94	51.82	59.02	53.87	55.01	52.36	51.07	49.14
Automobiles	32.02	30.79	30.06	48.18	40.98	46.13	44.99	47.64	48.93	50.86
<i>Tariff rate (over respective imports)</i>										
Total	2.93	1.79	1.13	0.12	0.08	0.10	0.09	0.10	0.10	0.13
Autoparts	3.01	1.11	1.13	0.15	0.14	0.18	0.16	0.18	0.20	0.25
Automobiles	2.76	3.32	1.12	0.09	0.00	0.00	0.01	0.00	0.00	0.01
<i>Transportation cost rate (over respective imports):</i>										
Total	0.60	1.52	1.17	0.63	0.64	0.60	0.61	0.64	0.62	0.55
Autoparts	0.39	1.05	0.76	0.58	0.87	0.71	0.74	0.78	0.75	0.63
Automobiles	1.03	2.57	2.14	0.69	0.32	0.47	0.44	0.49	0.49	0.49
<b>China</b>										
<i>Imports (USD million):</i>										
Total	318	932	1,579	3,709	33,810	69,727	66,410	76,027	78,773	67,968
Autoparts	318	932	1,577	3,707	33,796	69,614	65,321	74,550	77,158	66,495
Automobiles	0	0	2	1	14	114	1,089	1,477	1,614	1,473

(Continued)



**Table 4. Continued**

	1990	1993	1994	2000	2010	2015	2016	2017	2018	2019
<i>Imports (share over respective US-total):</i>										
Total	0.33	0.84	1.22	1.69	11.69	15.85	15.15	16.94	17.05	14.75
Autoparts	0.78	1.91	2.73	3.97	21.13	28.64	27.38	29.87	29.62	25.90
Automobiles	0.00	0.00	0.00	0.00	0.01	0.06	0.55	0.74	0.80	0.72
<i>Imports (share over China's total):</i>										
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Autoparts	99.99	99.99	99.87	99.97	99.96	99.84	98.36	98.06	97.95	97.83
Automobiles	0.01	0.01	0.13	0.03	0.04	0.16	1.64	1.94	2.05	2.17
<i>Tariff rate (over respective imports):</i>										
Total	4.34	5.15	4.97	1.60	1.89	0.81	0.83	0.76	2.36	6.80
Autoparts	4.34	5.15	4.98	1.60	1.89	0.80	0.80	0.72	2.17	6.58
Automobiles	6.13	2.86	2.50	4.83	7.00	2.47	2.43	2.65	11.53	16.66
<i>Transportation cost rate (over respective imports):</i>										
Total	4.90	4.88	4.19	8.46	4.11	2.88	2.80	2.82	4.21	3.60
Autoparts	4.90	4.88	4.18	8.46	4.11	2.88	2.83	2.73	3.79	3.51
Automobiles	27.58	24.89	4.70	10.47	4.27	3.85	0.83	7.50	24.49	7.65

Source: Author's elaboration based on Cechimex (2020).

first time for the period. Table 4 also shows the deep impact of NAFTA in terms of tariff rate reduction, that is, from 1.79 per cent in 1993 to 0.13 per cent in 2019, and particularly in automobiles (from 3.32 per cent to 0.01 per cent, respectively). In the Mexican case, the transportation cost rate is substantially higher than the tariff rate: in 2018 – and before the tariff rate increment – of 0.62 per cent and 0.10 per cent, respectively, and particularly for the automobile segment where tariff rates for Mexico are close to zero (Table 4).

3. Table 4 presents substantial insights in the “new triangular relationship” in the US imports of AAGVC. On the one hand, it highlights that imports from China in the automobile segment have been particularly dynamic since 2014, but nevertheless are still secondary: the autoparts segment has accounted for more than 97 per cent of US imports from China in AAGVC during the period, and, particularly important, while imports in the Chinese automobile segment accounted for less than 1 per cent until 2019, Chinese imports in autoparts in total US imports in AAGVC became the first importer of the US in 2012 and until 2018: as a result of the analysed “trade war,” Mexico surpassed China’s share (in the Chinese case, falling from 29.62 per cent to 25.90 per cent in 2018 and 2019, respectively). On the other hand, Table 4 shows the enormous impact of the “trade war”: tariff rates in AAGVC in US imports increased from 0.76 per cent in 2017 to 6.80 per cent in 2019 in both segments; compared to Mexico Chinese autoparts and automobiles paid in 2019, a tariff rate 27 and 1,773 times higher, respectively. In addition, historically transportation costs in China have been four to five times higher than Mexico’s before the “trade war.”
4. These recent trends based on the main segments of the AAGVC also allows for much more detailed analysis of the respective hundreds of products and processes of the AAGVC. The issue of the rules of origin within NAFTA and USMCA, which has been largely discussed (Cypher and Crossa, 2019; Dussel Peters, 2000; Vega Cánovas and Campos Ortiz, 2020) appears under a new light: while it is true that the rules of origin matter – in 2017 total US imports of AAGVC paid a tariff rate of 0.92 per cent and doubled in 2019 – they are still minor compared to other costs of the AAGVC such as labour, energy, transportation costs, supplies, and so on. Nevertheless – and considering the recent “trade war” – in 2019, the tariff rate of US imports from China registered 6.58 per cent and 16.66 per cent (*vis-à-vis* tariff rates close to zero for Mexico); that is, while the general argument of the rules of origin as an important cause for protectionism and against Asia might be questioned, a detailed product-level analysis will provide arguments for the relevance of the rules of origin of NAFTA/USMCA in the future and particularly against China.

## Conclusions

The analysis invites to use the concept of “new triangular relationships” in the context of increasing US–China tensions and from an LAC perspective, in this particular case for

Mexico and the AAGVC. As discussed in this article, from an LAC perspective, it is not a matter of acknowledging the historic and socio-economic presence of the US in the region, but rather to recognise China's overall increasing relevance since the end of the twentieth century in terms of trade, FDI, financing, infrastructure, and even national security and military in particular regions and countries (Dussel Peters et al., 2013). In addition, we emphasise the importance and functionality of using the methodology of GVC and include concepts from "systemic competitiveness" (micro, meso, and macro levels of analysis) and explicitly highlight the spatial and territorial perspective ("territorial endogeneity"). As discussed in detail, this method of analysis provides for a powerful methodological socio-economic tool that allows, among other things, for a detailed and concrete dialogue with firms, business organisations, as well as policy-makers with proposals in the short, medium, and long run, including potential upgrading of processes on specific products and processes in time and space.

Specifically for the AAGVC, the document presents a number of quantitative and qualitative issues that are important from a "glocal" perspective and for future scenarios: off-shoring/near-shoring tendencies, the increasing importance of disruptive technologies – but in several cases, such as in Mexico, with minor effects so far – and, in general, the increasing share of services (versus manufacturing) in the AAGVC. These trends have impacted significantly Mexico's GDP and employment, as one of the key GVCs that benefitted since the liberalisation strategy since the end of the 1980s through NAFTA and USMCA.

The second chapter presents the short- and long-run causes for US–China tensions, and particularly since 2017 under the Trump Administration; from this perspective, the "trade war" since 2018 is part of the "big power competition" that could be expected in the future. Given the increasing competition between the US and China, as well as the technological sophistication of the AAGVC and its segments, the AAGVC can very well become a critical GVC in the US/North America–China relationship.

More specifically regarding the AAGVC, the article highlights the strong falling tendency of the US regarding vehicle production from a long-term perspective and specifically since 2000: in 2019, NAFTA's share accounted for 18.29 per cent for world production and of 28.02 per cent for China; this initial analysis based on Table 1 already hints at important shifts in intra-NAFTA production and trade, a topic that is examined in depth in the third chapter. The chapter also indicates an ongoing debate regarding regional rules of origin within NAFTA (and USMCA) and the effective potential of achieving a 75 per cent of regional value-added (and in contrast to proposals by US firms to lower the rules of origin to 53 per cent in TPP). Finally, the article presents one of the implications of using a GVC methodological framework, that is, there are substantial differences in using chapters 84 and 87 as the AAGVC or, rather, the proposal of the OTM, with significant statistical differences (Table 2); the following chapter uses the definition of the AAGVC by the OTM.

The article presents the main structures of US trade and imports in the AAGVC and particularly in the US–China–Mexico new triangular relationship. The general trade structure already reflects topics that will be analysed in detail for US imports: NAFTA's increasing relevance in US trade until 2000–2001 fall since then, with a brief recovery in 2018–2019 as a result of the "trade war"; the strong declining role of Canada's and Mexico's increasing

presence, and, finally, China's rapid integration to the US and NAFTA markets and strong disrapture in 2018–2019 – reaching pre-NAFTA levels – as a result of the imposition of high tariffs. The analysis of the US imports in the AAGVC provides in-depth analysis for the period 1990–2019.

US imports from NAFTA in 2019 was 43.73 per cent, far below its maximum of 52.26 per cent in 1999 and similar to 1993; as relevant is that Mexico became the major importer of the US's AAGVC since 2009, while Canada's role declined continuously throughout the period and China became the US's second most important importer in AAGVC since 2017. Parallely, the impact of US–China tensions has been most relevant in the imports of the AAGVC: the tariff rate for Chinese imports increased from 0.75 per cent in 2017 to 6.74 per cent in 2019 (i.e. in 2019, China paid a tariff rate 61 times higher than Mexico in US imports in 2019), while China's share in US imports in the AAGVC fell from 17.05 per cent in 2018 to 14.61 per cent in 2019.

The “new triangular relationship” in the case of US imports in AAGVC is reflected particularly in the segment of autoparts, considering that Mexico was the main importer of the US in the AAGVC in 2019, and that imports in automobiles from China are secondary: during 1990–2019, US imports in AAGVC from Mexico have increased their share in automobiles, and in addition being the most important partner in autoparts; China, on the other hand, was the US's main importer of autoparts during 2012–2018 and was displaced by Mexico in 2019 as a result of the “trade war” and significantly higher tariff rates: compared to Mexico, Chinese autoparts and automobiles paid a tariff rate 27 and 1,773 times higher in 2019, in addition to transportation cost rates four–five times higher than Mexico.

This case study exemplifies the “new triangular relationship” between the US, China and Mexico. While the presence in the segment of automobiles is so far irrelevant, China plays a substantial role – and was the major US source of its imports – in autoparts; only as a result of the tariff measures by the Trump Administration since 2018, the NAFTA region as a whole was able to increase its intra-regional trade share, and Mexico was the main country that benefitted in 2018–2019, not Canada.

A number of additional research questions result from these preliminary findings. On the one hand, the sustainability and glocal long-run impact of this increasing “decoupling” process i.e., how much further can GVC in the US and China continue this decoupling process without disrupting GVC in respective countries; what are the limits of these profound shifts in trade beyond using existing capacity utilisation? A second research topic refers to the apparently logic result that Mexico – and Vietnam – could benefit massively from US–China tensions, concretely through US – and even Chinese – FDIs. Reality, so far however, does not reflect significant FDI from the US and China to Mexico; authors such as Jung (2020), among many others in China and Mexico, have highlighted this hypothesis, which, so far, has not been reflected in Mexico's FDI. During 2017–2019, Chinese FDI in Mexico fell by –58.1 per cent and still represents less than 1 per cent of Mexico's total FDI, while US FDI also fell by –18.1 per cent. In the case of Chinese FDI in AAGVC, they have been not significant so far (Dussel Peters, 2020a, 2020b) and fell by –23.6 per cent for the Fabrication of Transport Equipment (item 336) for the US during 2017–2019 (Secretaría de Economía, 2020).

As discussed throughout the article, an analysis based on GVC and specifically regarding the AAGVC will allow for a much more detailed understanding of the AAGVC in Mexico, China, and the US in specific products and processes (Sánchez Robles, 2018). The research and policy agenda is, from this perspective, wide and open and invites for future work in these areas and in the China–US–LAC/Mexico relationship.

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