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Master in Economic Development

The impact of Transnational Corporations through their activities across Global Value Chains:

New Evidence for Mexico

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Abstract: This paper analyses the economic impact of Transnational Corporations through their activities across Global Value Chains (GVCs), using Mexico as baseline country. By exploiting the UNCTAD-Eora Global Value Chain database, we conduct an exploratory research methodology. We first unfold the relationship between GVC trade and economic development by disaggregating GVC trade into its two components (Foreign value-added and Indirect value-added). Further, we examine the actual volumes of value-added trade across GVCs in absolute terms by comparing Mexico to other Developed, Emerging and Developing Countries from Latin America. Lastly, we compute Mexico's GVC participation and upstream position indexes in comparison to its major trading partners. Overall, our results suggest that TNCs' activities in Mexico have a detrimental impact over Mexico's economic role and level of economic integration across GVCs. The country's economic role is restricted as a merely net importer of value-added trade, and while GVC participation remains high, its negative upstream position indicates high losses in their production length and a high risk to remain locked in low-value adding activities.

Keywords: Transnational Corporations, Global Value Chains, Developing Countries, Mexico

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1 Introduction

In the contemporary global economic system of the 21st century, insufficient global market regulations are known to be at the core of the ever-greater divergence between developed and developing countries. According to previous research, developed countries mostly located in the northern hemisphere, control around 80 percent of the income earned anywhere in the world. Hereof, Transnational Corporations mostly headquartered in the developed world, are commonly-known to owned and control approximately 33 percent of the world's productive assets and some 75 percent of global trade in manufacturing, commodities and services (Mimiko, 2012 p.106f.). The appearence of Transnational Corporations (henceforth 'TNCs') on the world stage, has been heavily debated within the media, policy surroundings and scientific research. As the most crucial economic actor, TNCs are not only responsible for shaping international power imbalances, but are a common ground to the unequal distribution of wealth, outflow of capital, bribery and tax evasion. This, is often attributed to the growing size in financial power of some of the largest corporations in the world. (Gilpin, 2000 p. 66, 163; Gallas et al., 2015; May, 2017; Cadestin et al., 2018; OECD, 2018a; Narula, 2018).

By way of illustration, **Table 1** shows an excerpt of the global top 100 economic actors by total revenues for the year 2016, which comprised a total of 29 countries and 71 TNCs. Admittedly, while the very apex is vastly dominated by countries, TNCs such as Walmart, remarkably surpassed the state revenues of Spain and Australia. Followed by State Grid and China Nat. Petroleum for instance, who surpassed the state revenues of countries such as the Netherlands, South Korea and Sweden respectively (Babic et al., 2017).

Table 1: The Global Top 20 Countries and TNCs by total revenues, year 2016

Rank	Country / Corporation	Revenues (USD bn)	Rank	Country / Corporation	Revenues (USD bn)
1	United States	3363	11	Spain	461
2	China	2465	12	Australia	421
3	Japan	1696	13	State Grid (CN)	330
4	Germany	1507	14	Netherlands	323
5	France	1288	15	South Korea	304
6	United Kingdom	996	16	China Nat. Petroleum (CN)	299
7	Italy	843	17	Sinopec Group (CN)	294
8	Brazil	632	18	Royal Dutch Shell (NL/GB)	272
9	Canada	592	19	Sweden	248
10	Walmart (U.S)	482	20	ExxonMobile (U.S)	246

Sources: adapted from (Babic et al., 2017). - See Appendix A for further details.

By definition, TNCs are corporations/firms or enterprises with the ability to operate across countries through direct business activities and with ownership of assets located abroad. Their capabilities to control, manage and develop strategies across and above national frontiers – sometimes via the setting up of foreign affiliates – differentiates them from any other actor in the economic system (Ietto-Gillies, 2012 p. 11).

Especially, after the end of the Cold War, the rapid process of globalization as well as the new advancements in ICT (Information and Communiation Technology) have given rise to a new era of global competition and trade. As TNCs have been slicing up their supply chains in search of capable and low-cost suppliers across countries, global offshore production since the 1990s has accelerated dramatically. This process of 'supply chains going global' and referred to as Global Value Chains, has led to a fundamental shift in from what had been 'trade in goods' to 'trade in value-added' and 'trade in tasks'. Today, not only more intermediate goods are traded across borders, but also an exponentially number of parts and components are imported for the use in exports (Gereffi & Lee, 2012). Although, the economic consequences of global trade have been extensively studied in both the theoretical and empirical literature, the impact of TNCs through their activities across Global Value Chains remains less-explored. Particularly within the context of developing countries, the literature offers some evidence for the positive relationship between Global Value Chain participation and economic development. Often including economic benefits of higher GDP per capita, opportunities for industrial upgrading and employment creation, among many others. Hereby, the role of TNCs' activities is instrumental, since countries receiving higher foreign direct investments tend to have a higher GVC participation, potentially benefiting the most from trade in value-added terms (UNCTAD, 2013a; Del Prete et al., 2018; Raei et al., 2019).

In Latin America, TNC investments and offshoring have been heavily concentrated within the manufacturing and retail industry and led by countries such as Mexico and Brazil. Especially in the case of Mexico, the emergence of Global Value Chains has been responsible for the country becoming the second largest exporter of processing goods in the world. Alone between 2005 and 2015, Mexico's export orientation in manufacturing increased considerably from about 30 percent to nearly 45 percent. Yet, little is known about how Global Value Chains – that are control and managed by TNCs – are reshaping the export competitiveness of local industries, the composition of gross exports and the economic role and global trade integration of Mexico (Chandler & Mazlish, 2005; Koopman et al., 2014; BEA, 2018; OECD, 2018b).

For the convenience of the reader, this paper is divided into a total of 6 chapters and organized as follows: (I) an introduction of the scholarly contribution and research gap will be provided. Followed by (II) the literature review, including an overview of the historical emergence of TNCs and the major strands of literature. Then chapter (III) first discusses the UNCTAD-Eora Global Value Chain database and the process of data construction and continue second, with the specification of the methodology implemented. In chapter (IV) we proceed with the empirical analysis, (V) followed by the research results. Finally, in chapter (VI) we conclude with policy and future research implications.

1.1 Scholarly Contribution and Research Gap

Despite the acclaimed importance of TNCs as central and influential actors in today's globalized economy, empirical evidence on the role and economic impact of TNCs' activities in developing countries is rather scarce, often incomplete and shows an alarming publication bias towards positive spillover effects. Such as engines for technology transfer, structural transformation and poverty alleviation (Cadestin et al., 2018; Demena & van Bergeijk, 2017; Narula & Pineli, 2019; van Tulder, 2010 p. 151).

The nexus between TNCs as a double-edged sword for economic development, came to the forefront of development policy due to the revelations of the United Nations' report: 'Multinational Corporations in World Development' (1973). Since then, despite the well-known consensus that TNCs have the capacity to instigate not only positive but also negative structural changes, numerous developing countries have opted for granting generous trade incentives. In this context, it has been the export-oriented industrialization strategy of many governments including Mexico, which has led to free trade agreements, in the hope of attracting large sums of foreign capital and intensify their global economic integration. Most certainly, this is also the result of much academic literature which has…[deemphasised the other 'effects' of TNC activity, implicitly assuming that TNCs are almost always beneficial for development] (May, 2017; Narula & Pineli, 2019). Traditionally, Foreign Direct Investment (henceforth 'FDI') data has been predominantly used as a measure to frame the impact of TNCs' economic activities in host countries. However, there is an increasing body of literature reflecting how FDI statistics are indeed a biased measure. Primarily, because they provide information on cross-border capital flows, which does not account for capital that may be potentially sent to other countries. In many cases, FDI inflows go in and out of countries before reaching their final destination and without contributing to the economy who initially received those transfers (Beugelsdijk et al., 2010; Leino & Ali-Yrkkö, 2014; Blanchard & Acalin, 2016).

Since the removal of geographical trade barriers and China's integration into the global economy, growth processes in global trade have accelerated to a greater extent. Notably, increasing FDI and offshore production activities, have allowed TNCs to re-structure their production operations across Global Value Chains (GVCs). That is; the complex trend to unbundle the production process of a company through the allocation of different production stages across multiple countries. Often, enabling TNCs to take advantage of diverse factor costs (Grossman & Rossi-Hansberg, 2008; Cadestin et al., 2018; OECD, 2018a).
According to the most recent OECD report (2018), in the last two decades, this relatively new global production fragmentation arrangement has drastically changed the nature of trade in the 21st century, increasing the difficulty to trace activities of TNCs and their foreign affiliates. Therefore, measuring the impact of TNCs' activities through the use of FDI data, has evolved within the context of GVCs and the back-and-forth aspect of cross-border production, into the absence of any clear evidence (Cadestin et al., 2018; Gereffi & Lee, 2012).

In this respect, the scholarly contribution of this paper is twofold. First, in alignment with the latest OECD propositions (2018) for tracing the economic impact of TNCs' activities, this paper aims to add empirical evidence through trade statistics in value-added terms. As an attempt to extend the scholarly development narrative around the economic impact of TNCs' activities in developing countries and more precisely, using Mexico as our baseline country (Cadestin et al., 2018). Second, acknowledging the research gap and publication bias which revolves around the positive impact of TNCs for developing countries (and in our case Mexico), by analysing the composition of Global Value Chains, we unfold at the macro-level relevant insights. Foremost, on how international production activities of TNCs control and shape the economic role as well as the level of global trade integration of Mexico. Lastly, analysing the economic impact of TNCs through their activities across Global Value Chains for the Mexican case, has relevant scholarly implications. To mention a few: Mexico's trade policies are one of the most open in the world, consequently the country has become a major receiver of foreign direct investments and is a frequent destination for the establishment of new TNC's business operations (Koopman et al., 2014; Blair, 2017; NAPS, 2019).

Table 2 (on the following page) illustrates an excerpt from the world's top 100 non-financial TNCs with operation facilities in Mexico, ranked by foreign assets for the year 2018. Clearly, the majority operate within the automobile industry, and includes TNCs such as Toyota, Volkswagen, Daimler AG, Ford and many others. But also, Siemens, Johnson & Johnson, ExxonMobil Corporation and Airbus SE are among those with operation facilities in Mexico. Notably, they all operate predominantly along economic industries of low-skill manufacturing, such as the automobile, but also electronics, apparel and food industry, as well as in extractive sectors within the petroleum refining industry. All in all, this preliminary evidence suggests that TNCs' activities in Mexico have been mainly responsible for positioning the country as one of the world's major exporters of manufacturing goods (Djankov et al., 2018; Chandler & Mazlish, 2005 p. 70; Gomis & Carrillo, 2016; NAPS, 2019).

In concrete, this paper aims to answer the following research question:

- *What is the economic impact of Transnational Corporations over developing countries (Mexico) through their activities across Global Value Chains?*

Based on the literature we derived one sub-question:

- *What is the relationship between GVC trade and Economic Development?*

Table 2: The World's Top 100 non-financial TNCs ranked by foreign assets, with operation facilities in Mexico, 2018

Rank	Transnational Corporation	Home Economy	Industry	Assets		Employment	
				Foreign	Total	Foreign	Total
2	Toyota Motor	Japan	Motor Vehicles	300383	468872	236479	369124
6	Volkswagen AG	Germany	Motor Vehicles	224190	524566	365000	656000
8	Chevron Corp.	U. S	Petroleum Refining	181006	253863	34652	48600
9	Daimler AG	Germany	Motor Vehicles	169114	322439	124020	298683
10	ExxonMobil	U. S	Petroleum Refining	168053	346196	34465	71000
14	Honda Motor Co.	Japan	Motor Vehicles	143279	184338	147219	211915
16	General Electric	U. S	Industrial/ Commercial Machinery	134636	309129	186000	283000
17	Siemens	Germany	Industrial/ Commercial Machinery	133890	160799	136440	379000
22	Nestle AG	Switzerland	Food/ Beverages	120407	139215	298334	308000
25	Johnson& Johnson	U. S	Pharmaceutical	1158370	152954	10115	135100
43	Ford Motor Company	U. S	Motor Vehicles	79978	256540	99000	199000
50	Airbus SE	France	Aircraft	71735	131896	72700	133671
63	Walmart	U. S	Retail trade	59552	219295	700000	2200000
69	Renault SA	France	Motor Vehicles	55239	131664	134399	183002
96	General Motors	U. S	Motor Vehicles	43266	227339	70000	173000

Sources: Adapted from (UNCTAD, 2018; Gomis & Carrillo, 2016; NAPS, 2019)

2 Literature Review

In this Chapter, we will proceed with an overview of the existing literature on TNCs, including a short introduction on the historical emergence of TNCs and finalizing with the major strands of literature that attempt to measure the economic impact of TNCs' activities across countries.

2.1 Transnational Corporations in World History

Historians often trace the origins of TNCs back to the mercantilist age of the seventeenth and eighteenth centuries, and the colonising ventures of European conquest as the medieval predecessors of today's modern TNCs (Gilpin, 2001 p. 42f.; Dunning & Lundan, 2008 p. 146; Cadestin et al., 2018). Among others, the 'British East India Trading Company' chartered in 1600, the 'Dutch East India Company' in 1602 and the 'Royal African Company' chartered in 1672 – just to mention a few – correspond to a group of TNCs pioneers who were vastly involved in major wholesale trading activities, foreign value-added activities and territorial acquisitions (Dunning & Lundan, 2008 p. 148; Gilpin, 2001 p. 43).

As stated by Stephen Hymer – the father of organizational theory of Transnational Corporations:

> …[the activities of these international merchants, miners and planters, laid the groundwork for the Industrial Revolution by concentrating capital in the Metropolitan centre] (Hymer, 1971 p. 115f.)

Over time, the emergence of contemporary TNCs as we know today, originates in the late nineteenth century. The most recent OECD publication on 'Multinational Enterprises and Global Value Chains' (2018), indicates that some of the most distinctive features of modern TNCs derives from a combination of cheaper and better storage and transportation capacities, the production of new capital-intensive methods and the largely intensified expansion of industrial capitalism. Not surprisingly, after World War II, the exploding demand for more natural resources, such as petroleum, minerals and agriculture products, among others, resulted in the ever-greater economic outward investments by TNCs (Cadestin et al., 2018).
Since the end of the Cold War, it has been the rapid process of economic globalization – the removal of barriers to free trade and the closer integration of national economies – in addition to rapid advancements in Information and Communication Technologies (ICT), the main contributing factors responsible for the greater intensification of TNCs' activities. As their new operating facitilies around the globe became substantially easier to manage and coordinate (Stiglitz, 2002 p. xi; Cadestin et al., 2018).

Despite the long history of global interconnectedness, trade interdependency and the acclaimed importance of TNCs as a major economic actor, it was only during the mid-1970s, when scholarly research began to focus on the impact and implications of TNCs on most host economies. In sum, the political and economic influence of large TNCs on host countries became especially obvious as abuses of power via dubious means during the Cold War became internationally evident across various developing countries. And more specifically, through the revelations of the Church Committee and the release of the so called 'Covert Action in Chile: 1963 - 1973' report (Braithwaite & Drahos, 2000 p. 191ff.). Ultimately, the first major assessment on the implications and impact of TNCs started to uncover through the release of the aforementioned report, which exposed how the US-based Multinational Corporation, namely the *'International Telephone and Telegraph Company'* (henceforth, ITT) actively helped the Nixon Administration to destabilize – including the use of financial funding and propaganda campaigns via television shows, business newspapers, in addition to predictions of economic collapse via newsletter mailings to journalists, academicians and politicians – the democratically elected presidency of socialist Salvador Allende in Chile throughout the 1960s and 1970s. If anything, the 'Covert Action in Chile' report enumerated a series of intertwined actions between US political interests in terms of political containment of the spread of socialism in Latin America and, in terms of economic interests of the ITT, as an intent to prevent the expropriation of the company's Chilean holdings during Allende's presidency (May, 2017; Braithwaite & Drahos, 2000 p. 191ff.; Church et al., 1975).

In 1974, international repercussions of the detrimental abuses of power by TNCs in developing countries, led the United Nations Economic and Social Council (ECOSOC) to appoint a group of eminent scholars to…[examine the role of TNCs in the international economy, their impact on development, and the implications for international regulation](May, 2017). As a result, the final report published as *Multinational Corporations in World Development* (henceforth, MCWD) became one of the most comprehensive academic publications concerning TNCs' activities, framing recommendations for international action and covering the potential impact of TNCs for international relations. In general, the aim of the MCWD report was to focus on the complexity and controversy surrounded by TNCs and distinguishing between economic activities that are either valuable for economic development, in contrast to certain activities, which prove only beneficial to the interests of TNCs. Further, the report recognized the nature of TNCs as oligopolistic, with the ability to influence market prices across host countries and responsible for around a fifth of the world value added throughout the 1970s. Lastly, the report critically concluded that most of foreign direct investments were either connected to gains for better access to low-cost manufacturing or to exploit certain raw materials for further economic advantages (ECOSOC, 1974; May, 2017).

2.2 Measuring the Impact of Transnational Corporations

After the MCWD publication, different strands of literature emerged with the aim to analyse the implications of TNCs investments and its economic impact for host and home countries. Commonly, the three major strands in the literature revolve around: I) making distinctions about the organizational strategies of TNCs in terms of their involvement on vertical (efficiency-seeking) and horizontal (market-seeking) investment activities; II) assessing the economic impact of TNCs based on the balance of payments and structure of trade; and finally, III) some academicians completely eschew measurements on the balance of payments, due to the common inaccuracy in assessing and identifying opportunity costs, and rather focus on differences in performances of TNCs, comparisons on external transactions between TNCs and local companies and finally, some conduct estimations between outward or inward direct investments, among others (Beugelsdijk et al., 2008; Badinger & Egger, 2010; Dunning & Lundan, 2008 p. 463, 465f.).

In alignment with scholarly consensus, since macroeconomic policies of governments are the key factor which determines the trade balance of a country rather than actions taken by any enterprise, firm or corporation, the first and third strand of literature usually captures at best, the impact of TNCs' activities. Often, the recurring methodology is based on estimations of TNC contributions to local technological developments (productivity spillovers) and measurements on the effects of foreign investments in the trade composition. The latter, usually means to assess the relationship between outward or inward direct investments, as well as to take into consideration one or several components in the balance of payments of a particular country (Cadestin et al., 2018 ; Dunning & Lundan, 2008 p. 464f.).
An early exponent of this methodology was Bergsten et al. (1978) for instance, who analysed the macroeconomic effects of US multinationals foreign trade and direct investments on the balance of payments by matching foreign trade performance of several US manufacturing sectors to various industrial characteristics. Then, for each manufacturing sector contingency tables were made together with the degree of outward investment, followed by cross-sectional regressions in order to relate US imports and exports to the investment behaviour of US enterprises. All in all, the study showed that in manufacturing sectors with minimal foreign investment, a tendency for the expansion of US outward investment and exports was likely to occur and often derived from the acquired competitive advantages over domestic competition (Bergsten et al., 1978 p. 233-248). Following Bergsten et al. (1978), literature on TNCs has predominantly focussed on measuring the impact of TNCs for developed countries. For instance, Fontagné and Pajot (2001) conducted an analysis on bilateral trade in order to investigate the potential impact of TNCs' activities on UK trade, and later derived comparisons with the French and American trade experiences, respectively. By using separate panels of industries and partner countries, the authors found that while inward investment in France and the United States was associated with the deterioration in the balance of trade and foremost due to increases on the level of imports; in the case of the United Kingdom, the effects of inward investments in certain industries were significantly positive on the level of exports.

This positive impact however, depend on the investing TNC and the particular industry of inward investment. Overall, the study especially emphasized the great influence of TNCs over employment opportunities and the variations on the effects of imports and exports, depending on the investing industry (Fontagné & Pajot, 2001 p. 23, 240ff.).
Further, scholar Ruane (2004) analysed the role of TNCs and foreign direct investments in the economic development process of Irland. Primarily, the author identified new greenfield investments by TNCs in the manufacturing sector, as particularly beneficial for Irland's growth process and responsible for the expansion and diversification of the domestic manufacturing sector. Between 1960 and 1999, TNC's greenfield investments contributed to the steadily growth of highly sophisticated sectors (high-tech sectors). Consequently, it contributed to the economic upgrade of Irland's economy, in terms of less traditional food processing and low-skill manufacturing trade. Also, as scholar Ruane (2004) emphasizes, TNCs were responsible for approximately 85 percent of net output within the domestic manufacturing sector in Irland for each of the 17 industrial sectors analyzed. Besides, it was the main actor behind 49 percent of total manufacturing employment in 1999. In conclusion, the impact of TNCs' activities were found to have a positive effect on the balance of payments of Ireland, as the importance of foreign direct investments, in terms of changes in the sectoral composition of the economy became evident. The author concluded, that the positive spillover effects of TNCs, concentrated in the high-tech sectors, created local linkages for further employment and additional sales for local companies, amply helping Ireland's economy to successfully developed their high-tech export-based manufacturing industries (Ruane, 2004 p. 134-165).

In the case of developing countries, scholars Wei and Liu (2001) on the other hand, investigated the trade composition of China by using a panel data set to analyse the determinants and impact of TNCs foreign direct investment on productivity spillovers, regional convergence and regional distribution. The results confirmed the positive impact of TNCs' activities in China due to transfers of low and intermediate technologies and the promotion of foreign trade, mostly through joint ventures, generally exerting a positive overall effect on China's economic growth (Yingqi Wei, 2002, Wei and Liu 2001). Similarily, Rasiah (2004) conducted an analysis on the effects of TNCs affiliates for the case of Indonesia and found evidence for a higher propensity in exports and productivity levels for the electronics, auto parts and garment sectors. Positive spillover effects were also identified as they continue to influence the balance of payments of Indonesia's economy in terms of increased production of local companies (Rasiah, 2004). However, in stark contrast to the case of Indonesia, Rasiah and Gachino (2004) found the reverse effect in the case of Kenya's economy. Both scholars investigated the differences in the levels of technological intensity and export performance between TNCs and local companies for the textile, metal engineering and food and beverage industries. By conducting a series of t-tests, the authors estimated the relationship between labour productivity and export intensity. In conclusion, it became evident that Kenya's manufacturing sector was strongly dominated by TNCs, who accounted for more than 60 percent of Kenya's fixed capital ownership, in addition to manufacturing exports exceeding 50 percent. The study also revealed that TNCs were generally more export-intensive and productive in contrast to local companies, with also higher labour productivity. In all three aforementioned sectors, TNCs recorded higher technology intensity compared to local companies.

In general, the results demonstrated that despite the higher productivity, export intensity and overall advanced technology of TNCs, their activities did not stimulate any positive spillover effects for domestic companies or improved the economic integration of domestic companies in the global market (Rasiah & Gachino, 2004).
In the case of Latin America, similarly to various research, there is a tendency in the literature to mainly focus on the positive productivity spillover effects of TNCs for the overall economy of particular countries (Görg & Strobl, 2001; Hiratuka, 2008; Meyer & Sinani, 2009). More especifically, for the Mexican case, scholars Görg and Strobl (2001) identified in their meta-analysis a strong publication bias towards positive productivity effects, among several studies. An early influential scholar on the positive spillover effects of TNCs in Mexico, has been Blomström (1983, 1986, 1994) who conducted a series of analysis for the estimation of productiviy spillovers within Mexican manufacturing industries (Blomström & Persson, 1983; Blomström, 1986; Blomström & Wolff, 1994). For instance, Blomström and Persson (1983) estimated the positive spillover effects of TNCs in terms of technical efficiency for Mexican companies in the manufacturing sector. The authors used labour productivity as a measure for technical efficiency in order to relate the impact of technical efficiency to the scale of production, capital intensity and labour quality of Mexican domestic manufacturing. Lastly, both scholars conclude according to final evidence, that TNCs' activities in Mexico contributed to domestic companies, as the relationship between the presence of TNCs and local generation of technology was confirmed (Blomström & Persson, 1983).

Subsequently, scholar Kokko (1994) conducted comparable studies on the impact of foreign direct investments of TNCs for Mexico's economy. His findings indicated that on average, there was a positive long-run effect on technology spillovers in various groups of Mexican manufacturing industries. Lastly concluding, that the reason for some large productivity gaps between local and foreign companies can be traced back to differences in technological capabilities in specific segments of the market. In an additional analysis, scholar Kokko (1996) estimated by using unpublished industry data from Mexican manufacturing, productivity spillovers from market competition between foreign and local companies. The evidence presented revealed that positive spillover effects were not determine by the presence of TNCs alone, but rather was the result of frequent interactions between local and foreign companies (Kokko, 1994; Kokko, 1996). Latterly, scholar Waldkirch (2010) for instance, also investigated the effects of foreign direct investments flows for the Mexican economy since the NAFTA (North American Free Trade Agreement) by using panel data for the manufacturing and non-manufacturing sectors. In his findings, the impact of FDI for Mexico's overall economy indicated a positive effect on industrial productivity, foremost due to US horizontal foreign direct investments (market-seeking) which seemed beneficial not only for increases in productivity but also local wages (Waldkirch, 2010).

Most recent meta-analysis on the economic impact of TNCs still confirms the consistent and long scholarly tradition of publication bias towards productivity spillover effects (Demena & van Bergeijk, 2017). According to scholars Narula and Pineli (2017), this recurring problem within academia arises when...[studies providing the "right" results are more likely to be selected for publication], as they are often guided by preferences of editors and academic journals for results which typically confirm existing theories (Narula, 2018; Narula & Pineli, 2017).

In the case of Mexico, only very few studies have tried to counterbalanced the existing scholarly publication bias and have opted for a more nuanced analysis on the impact of TNCs' activities on Mexico's overall economy (Khawar, 2003; Pacheco-López, 2005; Ibarra & Blecker, 2015; Blair, 2017). Scholar Khawar (2003) for instance, conducted a firm-level study using micro-level data of manufacturing plants in Mexico for the year 1990 and tested for differences in performance between foreign and local companies using factor productivity as dependent variable. In addition, the author also investigated the existence of spillover effects due to the presence and activities of TNCs. Overall, in stark contrast to earlier studies, the final results did not confirm positive spillover effects in Mexico's manufacturing, and rather a strong direct effect on higher productivity levels in foreign companies. Further, the findings also indicate that TNCs are usually not located in high productivity sectors and that the strong direct effect on productivity is due to direct investments within particular economic sectors rather than potential spillovers from technological transfer (Khawar, 2003).
On the other hand, scholar Pacheco-Lopez (2005), analysed the impact of foreign direct investments of TNCs and its relationships with imports and exports in the Mexican economy. By demonstrating the existence of linkages between Mexican imports, exports and foreign investments, the scholar concludes that the bias towards positive spillovers from FDI inflows, has generated generous concessions from the Mexican authorities. This, in order to attract large sums of foreign direct investments from TNCs. However, the ultimately economic impact has been of modest success, since despite the larger promotion of exports generated through the activities of TNCs, it has limitated Mexico's balance of payments as a result of higher imports and the large displacement of local domestic industries. By contrast, TNCs have greatly benefited from their business operations in Mexico, especially since they have gained larger portions of the domestic and international market by displacing local domestic industries (Pacheco-López, 2005).

As presented in **Table 3**, scholarly publication bias has significantly dictated research studies on the impact of TNCs in Mexico. However, the recent awareness of various international institutions such as the UNCTAD and the OECD among others, on the rise and impact of Global Value Chain trade that is controlled and shape by the economic activities of TNCs, have shifted analytical preferences towards Global Value Chain analyses, explicitly measuring the composition of GVC trade and the level of economic integration of countries through calculations of GVC-participation and upstream position, among others (Hummels et al., 2001; UNCTAD, 2013b; Cadestin et al., 2018; Raei et al., 2019).

Table 3: Summary of papers on productivity spillovers of TNCs in Mexico

Author(s)	Country	Year	Data	Aggregation	Results
Blomström (1986)	Mexico	1970/1975	Cross-sectional	Industry	Positive
Blomström and Wolff (1994)	Mexico	1970/1975	Cross-sectional	Industry	Positive
Kokko (1994)	Mexico	1970	Cross-sectional	Industry	Positive
Kokko (1996)	Mexico	1970	Cross-sectional	Industry	Positive
Khawar (2003)	Mexico	1990	Cross-sectional	Firm	Negative
Jordaan (2005)	Mexico	1993	Cross-sectional	Industry	Positive
Pachecho-Lopez (2005)	Mexico	1970-2000	Panel	Industry	Negative
Waldrich (2010)	Mexico	1994-2005	Panel	Ind./Non.Ind.	Positive

Sources: author's own elaboration based on (Görg & Strobl, 2001; Meyer & Sinani, 2009; Demena & van Bergeijk, 2017)

3 Data Construction and Methodology

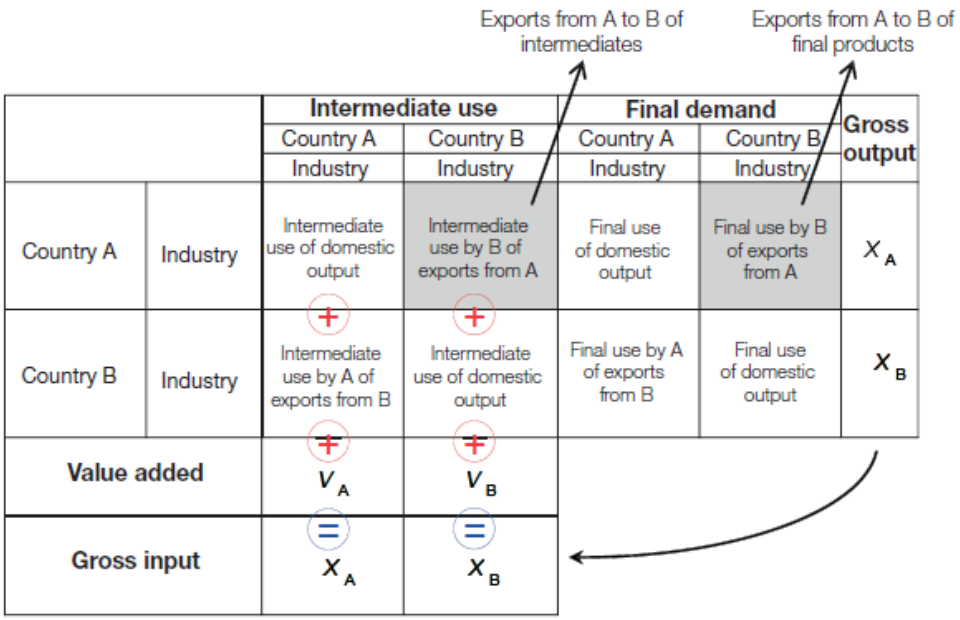
In this Chapter, we will first discuss the UNCTAD-Eora Global Value Chain database and the process of data construction and continue with the specification of the methodology implemented.

3.1 The UNCTAD-Eora Global Value Chain Database

We construct the main database for the application of this study by combining the UNCTAD-Eora Global Value Chain database and the World Bank Development Indicators. The UNCTAD-Eora Global Value Chain database (henceforth, EORA) provides several advantages to map the distribution of value-added in global trade and gives a good foundation for analyzing the patterns of international production. Further, the database is one of many efforts to map Global Value Chains and has a high degree of validation. Including being the main database which supports the GVC analysis in the World Investment Report 2018 (prepared by the UNCTAD) and also been used by the International Monetary Fund and many other researchers. Consequently, it is a useful tool for exploring at the macro-level how activities of TNCs affect and shape the level of economic integration and economic roles of countries across Global Value Chains (UNCTAD, 2015; Aslam et al., 2017; UNCTAD-Eora, 2018).
EORA relies on a wide range of geographic coverage, which includes a time-series at the country/industry level beginning from 1990 to 2018 and covers a total of 190 countries and 26 industries. For the construction of our database we only use the Global Value Chain Indicators dataset, (years 1990 to 2015), the Foreign Value Added by Industry (only available for the year 2015) dataset and finally, the Gross Exports by Country and Sector dataset (years 1990 to 2015). Moreoever, we exclude years beginning from 2016 to 2018, since the values are nowcasted results. The World Bank Development Indicators were used to complement data in terms of GDP per capita, for the same years and countries of relevance (UNCTAD-Eora, 2018). Moreover, the EORA database has been generated through the use of a Multi-Region Input-Output table and computations are based on the widely accepted scholarly procedure described in Koopman's et al. (2012, 2014) for the decomposition of a country's gross exports.

Figure 1 presents a simple example of a Multi-Region Input-Output table, in which each country is assumed to have only one industry. Further, there are usually three main matrices of an Input-Output table, which are: Intermediate goods demand matrix, the final demand matrix and lastly, the value-added or primary inputs matrix. Overall, the database is designed to trace the origin of imported goods and services, in terms of intermediate and final use.

Figure 1: Example of a two-country Input-Output Table



Sources: adopted from (Aslam et al., 2017).

In terms of application, we adopt some of the Global Value Chain measures, that have been already computed and published at the aggregate country-level. These are; Foreign value-added, Indirect value-added, GVC trade (which is simply the sum of Foreign value-added and Indirect value-added) and Value-added exported. To calculate Gross exports, we sum across columns from country x to its 26 industries (See industries in **Table 4**). We also restrict our sample to a total of 30 countries, that are over the course of our empirical analysis to a certain extent aggregated into Developed, Emerging and Developing countries from Latin America, illustrated in **Table 5** on the following page.

Table 4: EORA Industry Classification, Gross Exports

Agriculture	Petroleum, Chemical and Non-Metallic Mineral Products
Construction	Post and Telecommunications
Education, Health and Other Services	Private Households
Electrical and Machinery	Public Administration
Electricity, Gas and Water	Recycling
Finacial Intermediation and Business Activities	Retail Trade
Fishing	Textiles and Wearing Apparel
Food & Beverages	Transport
Hotels and Restaurants	Transport Equipment
Maintenance and Repair	Wholesale Trade
Metal Products	Wood and Paper
Mining and Quarrying	Others
Other Manufacturing	Re-export & Re-import

Table 5: Sample of 30 Countries

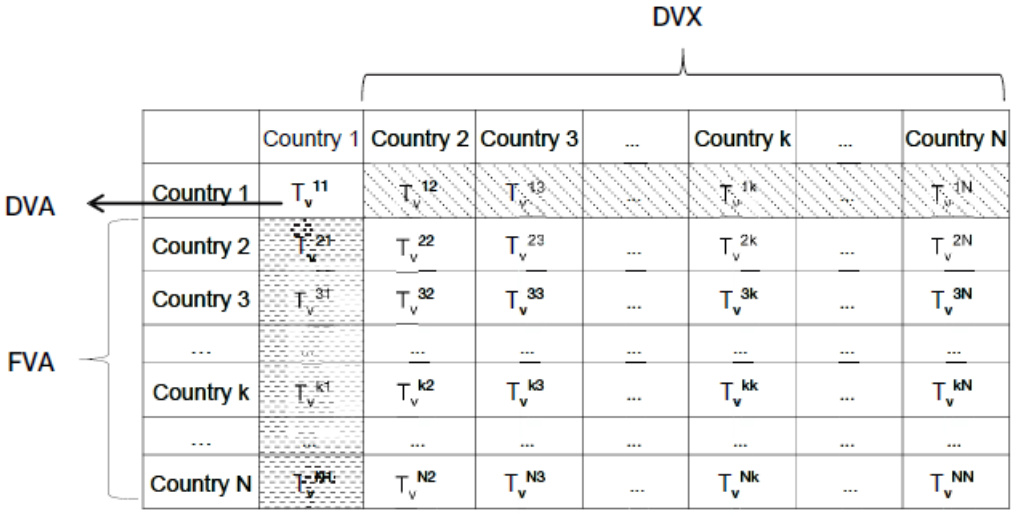
Developing	Emerging	Developed
Argentina	Brazil	Australia
Bolivia	China	Canada
Chile	India	Denmark
Colombia	Mexico	France
El Salvador	Russia	Germany
Guatemala	South Africa	Japan
Honduras		Luxembourg
Nicaragua		Norway
Panama		South Korea
Paraguay		Spain
Peru		Sweden
		UK
		USA

Finally, the dataset 'Foreign Value Added by Industry' used for calculating Mexico's shares of Foreign value-added across its largest and most important exporting industries was restricted up to 11 industries. Mostly due to missing data for several industries, such as was the case for the automobile and car parts industries, and also due to the fact that all data for Mexico was wrong labeled. In the sense that industries are published interchangeably with commodities and some even include wrong industrial descriptions (UNCTAD-Eora, 2018).

3.2 The KWW Framework of Gross Exports

As previously mentioned, the EORA database has been generated through the use of a Multi-Region Input-Output table based on Koopman, Wang and Wei (2014, KWW) decomposition framework of gross exports (See Chapter 4). Consequently, in alignment with the construction of the EORA database, we conduct an exploratory quantitative-based research by drawing on particularly two major measures (Foreign value-added; Indirect value-added) of the KWW framework. Mostly because at the country-level, Global Value Chains are a proxy for how the vertical specialization (efficiency-seeking) activities of TNCs affect the composition of other country's gross exports as well as shape the different tasks and integration of home and host countries in global trade (Hummels et al., 2001; Koopman et al., 2014; Martínez-Galán & Fontoura, 2019). **Figure 2** presents the extension generated by the EORA database in order to compute the KWW value-added measures of trade (See Appendix B).

Figure 2: Example of the EORA Input-Output Extension of value-added trade



Sources: adopted from (UNCTAD, 2013a).
Notes: DVA = Domestiv value-added; FVA = Foreign value-added; and DVX = Indirect value-added.

The use of this methodology is guided by our research question [*What is the economic impact of Transnational Corporations over developing countries (Mexico) through their activities across Global Value Chains?*] which allows to specify the actual volumes of value-added trade across Global Value Chains and uncovers the distinct patterns of vertical specialization of TNCs. For the implementation of our analysis, we conduct a series of scatterplots to exploit the different patterns and economic relationship of value-added trade for our sample of selected countries, using values in absolute terms. We also used the logarithm of GDP per capita and GVC trade (FVA and DVX) following the general procedure of *modus operandi* within the literature of GVCs (Antràs & Yeaple, 2014; Raei et al., 2019).

Further, we compute the participation index and upstream position of Mexico's gross exports and other selected countries by relying on the KWW computation methodology (Aslam et al., 2017). Lastly, when comparisons between economic groups have been necessary, then our sample of 30 countries followed the country classification methodology of the United Nations (United Nations, 2019). We also include the terminology 'emerging economies' due to comparative purposes and motivated by grouping fast-growing economies (known as BRICS), whose economic size displays a closer approximation to Mexico in contrast to other developing countries from Latin America.

3.3 Limitations

Given the choice of the UNCTAD-Eora database, we identify some limitations in our data for capturing the reality of trade in value-added. It became especially evident for some country outliers such as India, Panama and Luxembourg. The latter two having relatively small and weak regulated economies. This is likely to be the case in analyses at the aggregate-level, where combined data reduces individual-country observations. Moreover, our analysis also presents some limitations in terms of our sample size of countries. Despite the vast data availability of 190 countries in total, we restrict our sample up to a total of 30 countries. Primarily due to assess a better comparison at the country-level for Mexico and other similar grouped economies, but also because of data availability reasons since some countries had 0 values. In addition, the construction of some datasets were wrong labeled for a number of countries including Mexico and missing values for major economic industries greatly limited the sample size of the analysis.

Also, the exploratory nature of this paper has some weaknesses. First, it is not possible to offer final and conclusive answers on the actual economic impact of TNCs over developing countries (Mexico) alone through their activities in value-added trade. While the literature recognizes that TNCs operate directly across Global Value Chains and are known to control and manage the cross-border input and output trade of production through their specific investments, the absence of disclosure of data of individual TNCs and their foreign affiliates, presents a major limitation. Second, our analysis relies mostly on the two measures of Global Value Chains as proxies for categorizing the impact of TNCs offshore activities. However, this comes at the cost of some disadvantages since it is not possible to differentiate between the actual activities of foreign TNCs and local TNCs across exporting industries. Lastly, we are highly aware that the exploratory nature of our analysis may be subject to bias as the implications of GVCs are multifold. Nonetheless, value-added trade across GVCs reflects cross-border flows of inputs and outputs required for final production and demand. Therefore, it provides evidence on how value-added trade across GVCs are shaped by TNCs offshoring activities above national frontiers.

4 Empirical Analysis

In this chapter, we draw on the decomposition measures in Koopman, Wang and Wei's (2014, KWW) framework, in order to analyse what is the economic impact of TNC's vertical specialization in terms of value-added trade and consequences for Mexico's level of economic integration and participation across Global Value Chains.

4.1 The Decomposition Measures of Gross Exports

Traditional global trade comprises the exports of goods and services that were produced in a specific country of origin and absorbed in a destination country. Since the rise of GVCs however, modern global trade no longer functions around domestically produced goods and services competing with 'foreign products', but instead countries now compete globally on economic roles within value chains. Yet, as earlier mentioned, TNCs are known to control and shape the production chain of countries which certainly implies that to a certain extent, they also shape the very economic roles that a growing number of countries are competing for. The recent literature on modern trade often emphasizes the importance of vertical specialization for countries in successfully completing high value-added tasks and sophisticated business functions. In view of the fact that it has become the new reality of global trade and is one of the main indicators giving an accurate picture on the potential catching up processes for developing countries (De Backer & Miroudot, 2014; Antràs & Yeaple, 2014; Raei et al., 2019).
In the early 2000s, scholars Hummels et al. (2001) were one of the first pioneers who acknowledged the integral role played by Transnational Corporations for the increasing changes in global trade patterns and interconnectedness of production processes. Consequently, the authors introduced two major measures to the literature, namely VS and VS1 to capture the so-called 'vertical specialization' of Transnational Corporations. In other words; the production process of importing goods that are used as inputs for a final product that is then exported. This concept highlights not only the operational back-and-forth aspect of sequential production but also emphasizes a production sequence that intertwines at least two country's economies and unveils different economic impacts depending on whether a country's gross exports is primarily composed by foreign inputs or rather indirectly contributes to the foreign inputs used in other country's gross exports (Hummels et al., 2001; Aslam et al., 2017).

Originally, Hummels et al. (2001) denoted VS as a measure to quantify the number of imported intermediates that were used as an input in a country's exports (import perspective). The measure VS1 on the other hand, was introduced to capture the share of a country's exported goods that were used as inputs into the production of another country exports (export perspective). Later, both measures were integrated and further extended in a unified comprehensive framework by KWW (2014), through the application of Input-Output tables, which allows for an even more detailed decomposition of all the components of gross exports.

As shown in **Figure 3,** the KWW framework decomposes gross exports into two main components, which are: Domestic value-added and Foreign value-added. Domestic value added can be further decomposed into Value-added exports and Indirect value-added.

To better understand these measures, we briefly want to review what each component of the gross exports' decomposition captures:

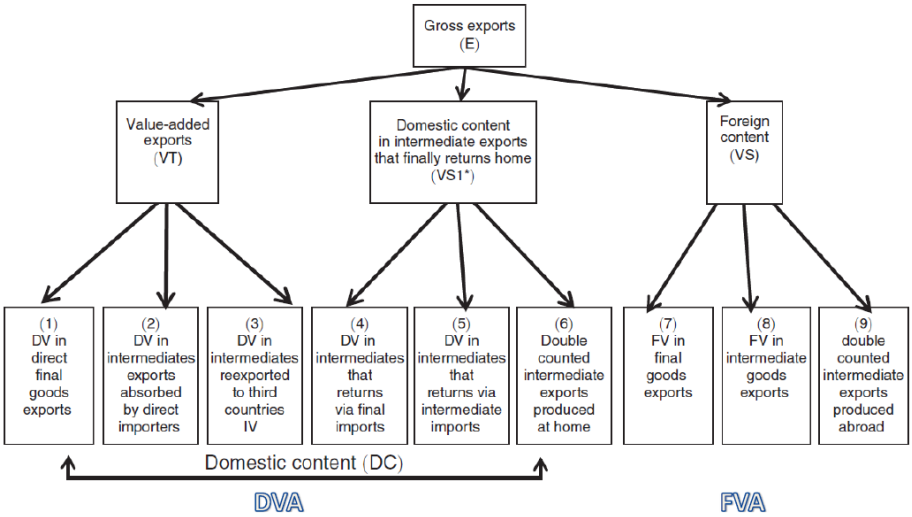
1. The first measure 'Domestic value-added' (**DVA**) captures the total value of a country's exported goods that are being imported and use as inputs by the rest of the world.

2. The second measure 'Foreign value-added' (**FVA**) captures the imported inputs in a country's exports and derives from Hummels et al. (2001) measure VS.

3. The third measure 'Indirect value-added' (**DVX**) refers to a country's indirect exports in terms of intermediate inputs that are sent to a third country embodied as final goods. This measure derives from Hummels et al. (2001) measure VS1.

4. Lastly, the fourth measure 'Value-added exports' (**VA_exp**) measures bilateral trade in terms of value-added that has been produced in sector **s** in source country **i** and later absorbed in destination country **j**.

Figure 3: The KWW Accounting of Gross Exports



Sources: adopted from (Koopman et al., 2014). Notes: (i) VA_exp equals (1)+(2)+(3); (ii) DVA equals (1)+(2)+(3)+(4)+(5)+(6); (iii) FVA equals (7)+(8)+(9); DVX equals (3)+(4)+(5)+(6); (iv) (4) through (9) crosses national borders multiple times and are sources of double counting in official trade statistics.

In this respect, in alignment with our previously discussed methodology, firstly we analyse the vertical specialization measures of TNCs; namely FVA and DVX since these two components of gross exports are according to the active literature precisely the components which captures GVC trade and therefore, the current drivers responsible for shaping a country's participation and value-adding activities across Global Value Chains (Koopman et al., 2014; UNCTAD-Eora, 2018).

To visualize both measures, the KWW (2014) provide the following example:

> ...[The Japanese content in the form of Japanese-made computer chips used in China's export of electronic toys to the United States represents foreign content (FVA) in China's export and it is also simultaneously Japan's indirect exports of its domestic content (DVX) to the US] (Koopman et al., 2014 p. 484).

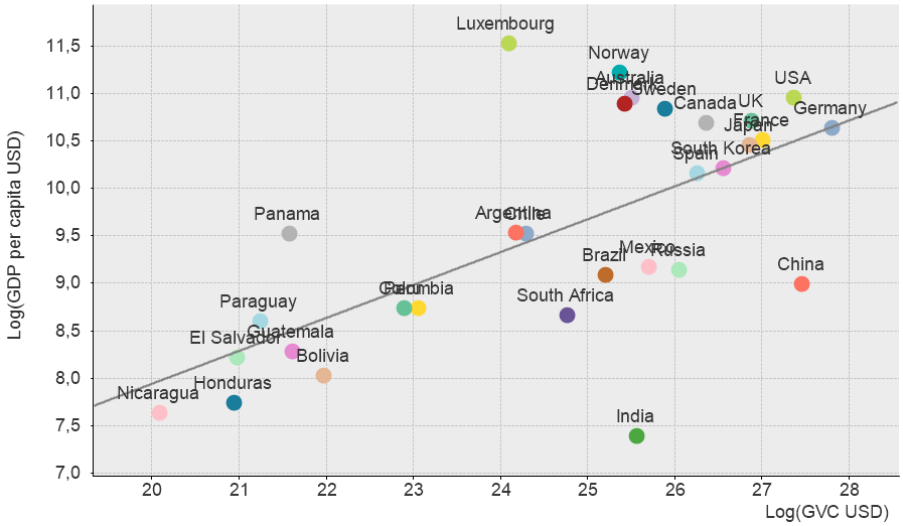
As follows, we will first conduct a series of scatterplots to exploit what is the relationship between Global Value Chain trade (or value-added trade across Global Value Chains) for our sample of selected countries. Then, we will proceed to analyse the composition of Mexico's value-added components in contrast to developed, emerging and developing countries from Latin America. The aim is to obtain a clear depiction on the actual patterns in value-added trade. In the second part of our analysis, we will finalize by calculating Mexico's GVC participation index and upstream position, again, in contrast to selected economies of relevance (Hummels et al., 2001; Antràs & Yeaple, 2014; Del Prete et al., 2018; OECD, 2018a; UNCTAD-Eora, 2018).

4.2 Value-added trade across Global Value Chains

In a seminal analysis of the UNCTAD Division on Investment and Enterprise, the report *'Global Value Chains and Development – Investment and Value Added in the Global Economy'* (2013) concluded that the participation and integration of developing countries across Global Value Chains has a positive correlation to GDP per capita, a measure that is often used to capture the level of a country's standard of living and economic development. Alone in developing countries, it is estimated that value-added trade contributes on average to 28 percent of countries' GDP in contrast to some 18 percent for developed countries (UNCTAD, 2013a).

Figure 4, presents on the horizontal axis the logarithm of Global Value Chain trade for a number of selected developed, emerging and developing countries from Latin America, plotted against the logarithm of countries' GDP per capita for the year 2015.
As we can confirm in the scatterplot below, it appears that on average Global Value Chain trade has a positive effect on GDP per capita, however this relationship seems especially strong for a number of selected developing countries from Latin America. Moreover, the regression line in our scatterplot indicates a less best fit of data and unclear relationship for emerging developing economies, such as Mexico, Brazil, Russia, India, South Africa and China as well as for developed countries such as Australia, Norway, Denmark and Sweden.
Also, outliers in our sample size, as it is the case for the small and open economies of Luxembourg and Panama, illustrates some of the GVC data deficiencies on value-added trade pointed out earlier by some scholars. Reflecting to a considerably extent, Transnational Corporation's activities... [to park ownership of global assets in low-tax and weak-regulated countries] (Antràs & Yeaple, 2014; De Backer & Miroudot, 2014).

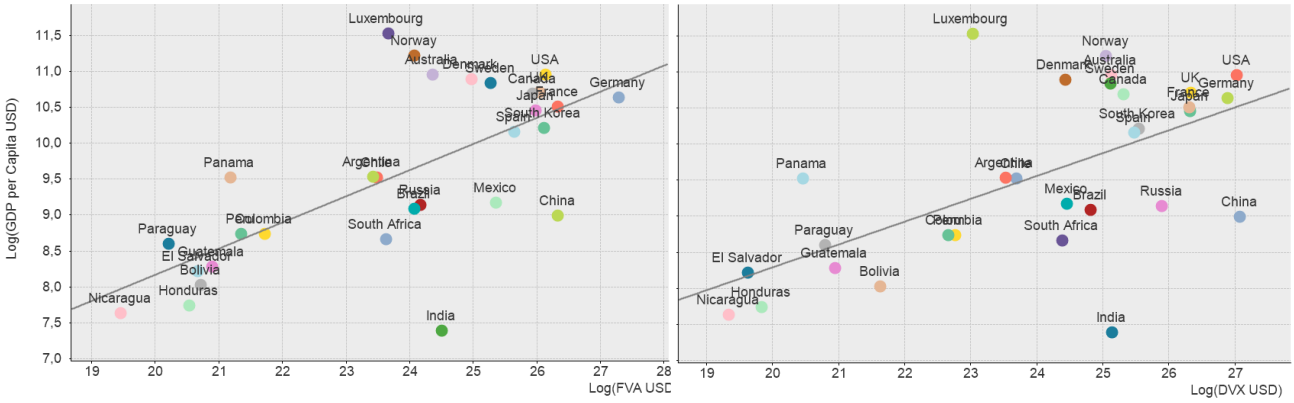
Figure 4: The Relationship of GVC trade on GDP per capita, year 2015



Sources: Author's own elaboration based on (UNCTAD-Eora, 2018; WDI, 2019a)
Note: $R^2 = 0.43056$.

Next, in **Figure 5** we scatterplot the two components of Global Value Chain trade (FVA and DVX) separately, to depict a clear relationship on which of the two components of GVC trade is mostly responsible for driving the positive relationship between GDP per capita and GVC trade.

Figure 5: The Relationship of FVA and DVX trade on GDP per capita, year 2015



Sources: Author's own elaboration based on (UNCTAD-Eora, 2018; WDI, 2019a)
Notes: $R^2 = 0{,}4712$ (for logFVA) and $R^2 = 0{,}3838$ (for logDVX).

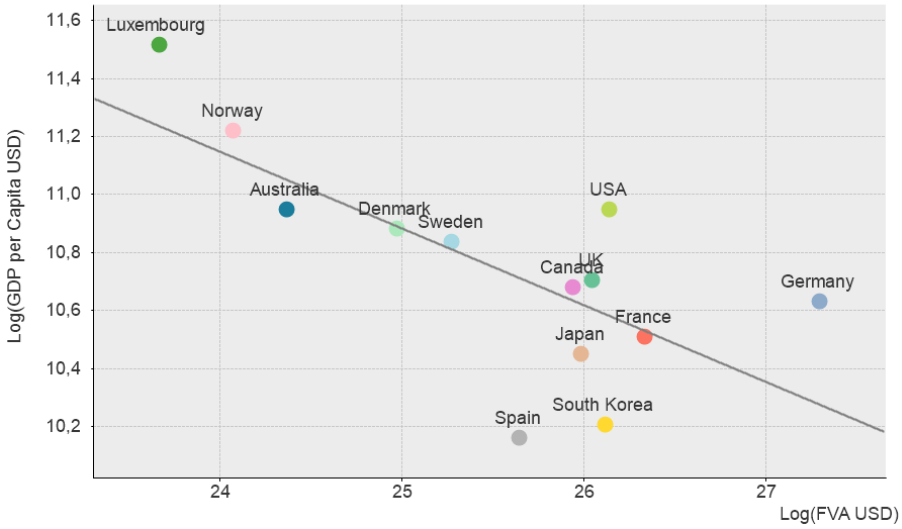
In the literature on GVCs, the components FVA and DVX have various important connotations. First, DVX measures whether a country is typically a net exporter of value-added and therefore, creates forward industrial linkages due to its domestic value added being used as inputs – by industries in other countries that produces services or final goods – for further export to third countries (Javorsek & Camacho, 2015; Martínez-Galán & Fontoura, 2019).

On the other hand, the component FVA has been said to not add to the GDP of countries and measures whether a country is predominantly a net importer of value-added. Subsequently, incorporating more foreign inputs in its own exports. This component is linked to backward industrial linkages because it captures derived demand of TNCs originated from final consumers (Drejer, 2002; Koopman et al., 2014; Del Prete et al., 2018; Martínez-Galán & Fontoura, 2019).

As portrayed in **Figure 5** both components of GVC trade have a positive relationship on the logarithm of GDP per capita, nonetheless the logarithm of FVA appears to have a stronger best fit on GDP per capita, in contrast to DVX. In **Figure 5** it also becomes evident that the logarithm of DVX demonstrates a slightly different pattern for Mexico since the regression line in our scatterplot implies that to some extent, forward industrial linkages are created through the incorporation of intermediate inputs in third countries. Nonetheless, we assume this is potentially a result driven by the inclusion of Canada and the United States in the scatterplot. The strong integration of Mexico into NAFTA (North American Free Trade Agreement) which has lowered trade barriers and reduced input tariffs, has partially benefited Mexico's manufacturing industries in terms of export competitiveness and could be responsible for this preliminary result (Waldkirch, 2010; Hakobyan & McLaren, 2016).

To put our analysis into perspective, we now group our sample size of countries according to the country classification: Developed, Emerging and Developing countries from Latin America. As we want to further exploit what are the implications of the strong positive relationship of FVA on GDP per capita. If we first scatterplot the logarithm of GDP per capita against the logarithm of FVA for developed countries, it becomes evident in **Figure 6** that for developed countries, there is an inverse relationship between the two variables. It appears that the higher the GDP per capita in developed countries, the less are their trade activities across Global Value Chains (and therefore its gross exports) dominated by FVA.

Figure 6: The Relationship of FVA trade on GDP per capita, Developed Countries, year 2015

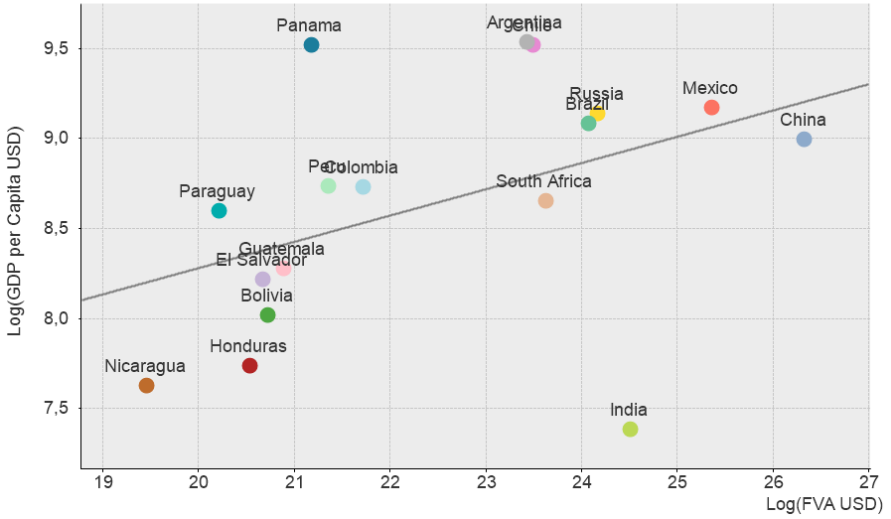


Sources: Author's own elaborations based on (UNCTAD-Eora, 2018; WDI, 2019a)
Note: $R^2 = 0.50596$.

In other words; these relationship can partly confirm scholarly claims of increased financialization of TNCs across Global Value Chains. As some scholars previously argue, generally the home economy of TNCs are governed as financial centers were activities are concentrated at strengthing and appropiating intangible assets of property-claims patents, trademarks, and other sophisticated business, management functions and intermediate services (Serfati, 2008; Fernández, 2015).

In the case of emerging economies and developing countries from Latin America, **Figure 7** indicates that the relationship between GDP per capita and FVA remains positive, suggesting that generally the higher the GDP per capita, the more FVA content dominates their value-added activities and subsequently, their integration across Global Value Chains. This seems to be especially the case for Mexico, China, South Africa, but also for small developing economies such as El Salvador and Guatemala. Nonetheless, our regression line indicates that we have a less-best fit of data for a high number of countries from Latin America. This could be an effect related to the unequal and poor integration of some Latin American countries across GVCs (Ahmad & Primi, 2017).

Figure 7: The relationship of FVA trade on GDP per capita, Emerging and Developing Countries, year 2015

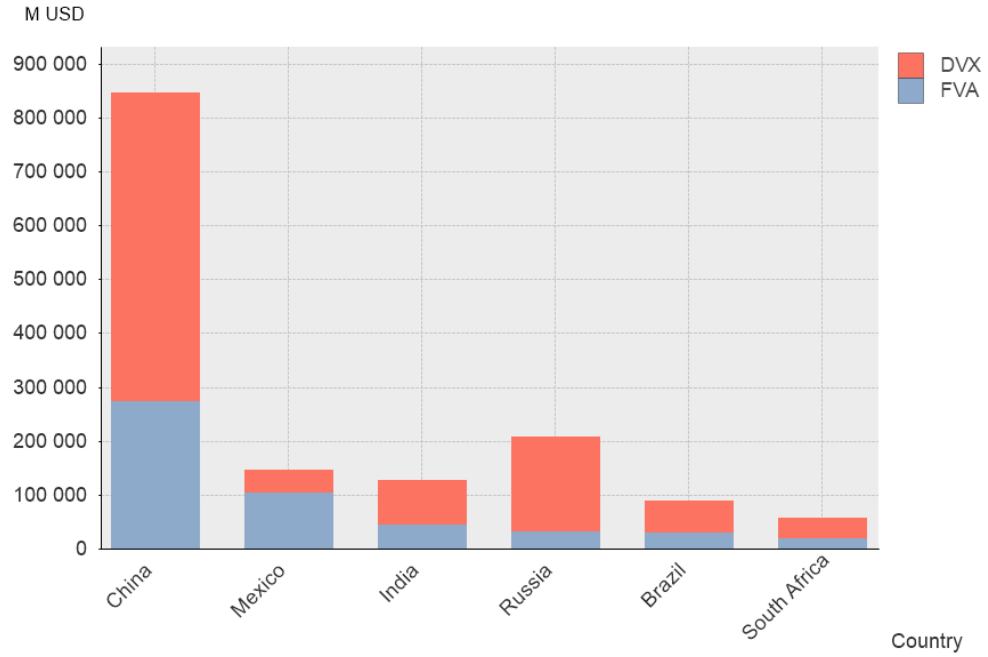


Sources: Author's own elaborations based on (UNCTAD-Eora, 2018; WDI, 2019a)
Note: $R^2 = 0.1923$

In what follows, we will proceed to analyse the composition of Mexico's value-added trade in absolute terms in contrast to developed, emerging and developing countries from Latin America. Again, the aim is to obtain a clear depiction on the actual volumes of value-added trade and the implications of TNC's vertical specialization activities across GVCs.

As we can observe in **Figure 8** on the following page, the majority of emerging economies seem to greatly benefit from value-added trade across GVCs, as higher volumes of DVX trade reveals their economic roles as net exporters of value-added. In fact, an observation that has been already confirmed not only for emerging but also for a great number of developed countries (Ahmad & Primi, 2017).

Figure 8: Foreign and Indirect value-added in Trade, Emerging Economies, year 2015

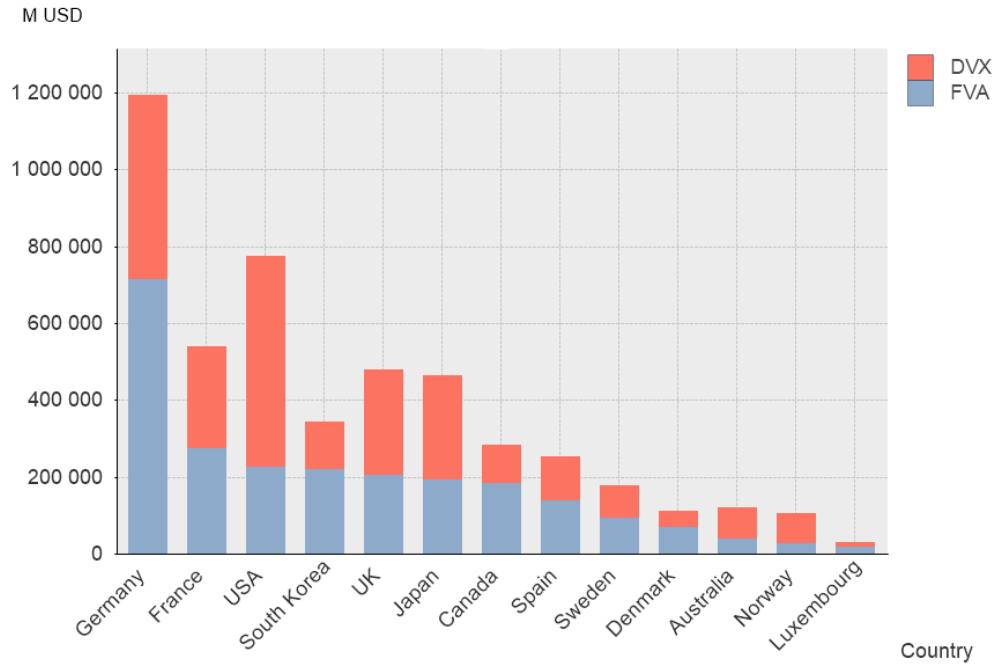


Sources: Author's own elaboration based on (UNCTAD-Eora, 2018)

However, Mexico's volume of value-added trade reveals the complete opposite direction. In absolute terms, Mexico is a substantial net importer of value-added, which accounts for a total of US $103.941 million in Foreign value-added trade, compared to merely US $41.786 million of Indirect value-added trade. In a different perspective, these values correspond to approximately 71 percent of FVA in contrast to some 29 percent of DVX. If we recall the high number of foreign TNCs across Mexico's manufacturing industries (Table 2, page 5) as well as the strong regional economic integration of Mexico into the NAFTA, we can deduce this trend to be the result of derived demand of production generated by TNCs.

By terms of comparison, **Figure 9** illustrates how developed countries such as the United States (71 %), United Kingdom (57 %), Japan (59 %), Australia (68 %) and Norway (73 %) appear to be greatly engaged in economic activities of Indirect value-added trade. However, the opposite is true for Germany, France, South Korea and Canada, for instance. For the former trend, the literature offers some answers especially in respect to the high volumes of Indirect value-added trade in the United States. Particularly, it can be attributed to their role as home economy of the majority of the world's top 500 TNCs and consequently, beneficiating the most from the regional integration of the NAFTA, in stark contrast to Canada and Mexico (Jaworek & Kuzel, 2015; Blair, 2017). However, the nature of high volumes of Foreign value-added trade across countries such as Canada (65 %), South Korea (64 %), Germany (60 %) and France (51 %) have been less-explored. In the case of EU countries, some evidence suggest that this could be the result from intra-euro value-added flows (Amador et al., 2015).

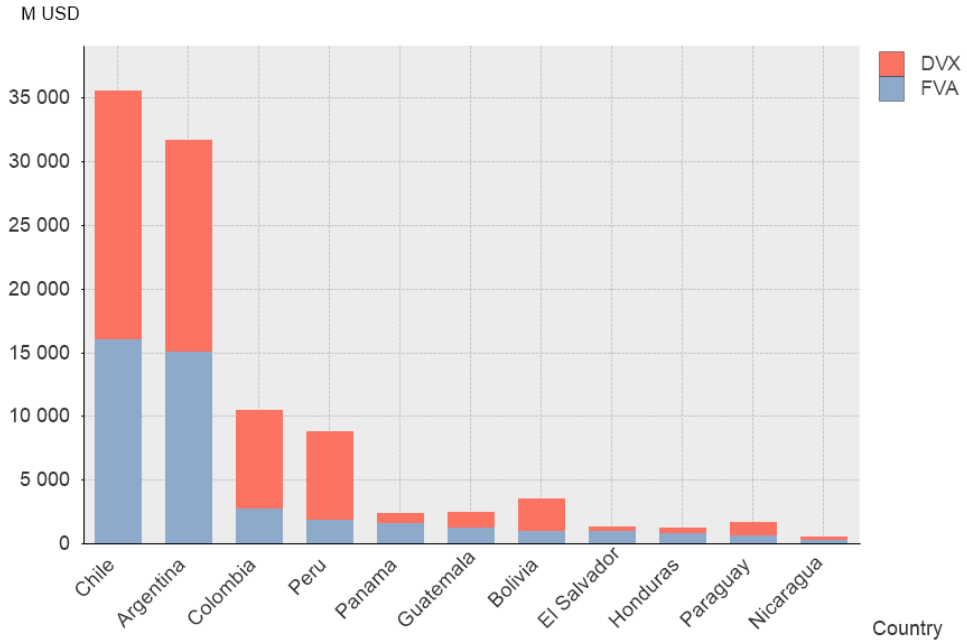
Figure 9: Foreign and Indirect value-added in trade, Developed Countries, year 2015



Sources: Author's own elaboration based on (UNCTAD-Eora, 2018)

Lastly, if we compare the volumes of value-added trade for developing countries from Latin America, **Figure 10** illustrates that value-added trade is extremely modest across the region. As Latin American countries have not been able to successfully integrate into global production networks.

Figure 10: Foreign and Indirect value-added in Trade, Developing Countries, year 2015

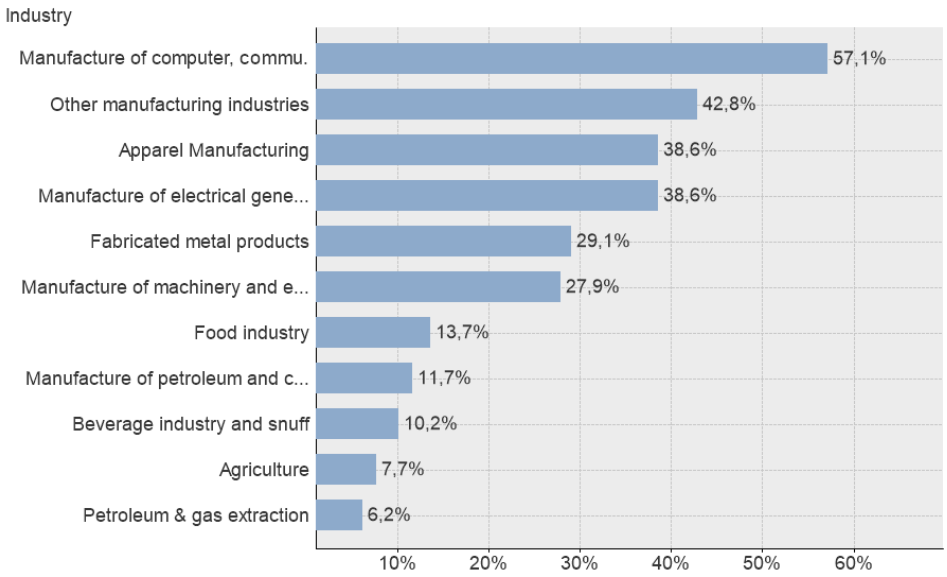


Sources: Author's own elaboration based on (UNCTAD-Eora, 2018)

In absolute volumes, totals of value-added trade across Global Value Chains for countries such as Chile and Argentina corresponds to less than US $40.000 million. In the majority of cases however, value-added trade rarely surpasses absolute volumes of US $5.000 million. Potential explanations for the poor integration of Latin American countries across Global Value Chains have been provided by some scholars, who assessed the strong rule of origins as well as the traditional role of Latin American countries tied to the exploitation of natural resources, the major sources behind this regional trend. To put it differently; as TNCs seek to fragment their production across different countries, the costs of complying with multiple rules of origins restrict their regional operations advantages in terms of factor costs (Blyde, 2014 p. 105f. ; Cadestin et al., 2016).

Shifting towards Mexico, we want to finalize the first section of our empirical analysis by exploiting the nature of the high shares of Foreign value-added content of major exporting industries. Accordingly, **Figure 11** reveals a more detailed examination on Mexico's integration across Global Value Chains. Foreign value-added content for the manufacture of machinery and equipment accounts for almost 30 percent, similar trends can be seen for the fabricated metal products. The highest shares of Foreign value-added content, however, are clearly within the computer, communication and other electronic components industry showing up to 57 percent and followed by the apparel and the electrical generating equipment industries. This evidence reinforces previous results on Mexico's high shares of Foreign value-added content in major exporting industries and their role as merely assemblers of final goods in GVCs. A trend clearly driven by TNCs offshoring that are heavily concentrated in low-skill and low-cost manufacturing industries (Koopman et al., 2014; OECD, 2018b).

Figure 11: FVA content in Mexico's major exporting industries, year 2015



Sources: Author's own elaboration based on (UNCTAD-Eora, 2018)

Lastly, due to absent values in the EORA dataset, **Figure 11** shows some limitations in regard to the Foreign value-added content in Mexico's automobile industry. Nonetheless, acknowledging the considerable number of TNCs offshoring that is heavily concentrated in the automobile industry (recall Table 2), which simultaneously accounts for Mexico's largest and most important exporting industry, we assume similar high shares of Foreign value-added content. This assumption can be further verified through the results of the OECD TiVA (Trade in Value Added) database, reporting the automobile industry (Motor Vehicles) with the second highest shares of Foreign value-added content in Mexico's exports, at 48 percent, and only preceded by the ICT and Electronics industry at 58,4 percent (OECD, 2018b).

4.3 Measuring GVC Participation Index and Upstream Position

In the second part of our analysis, we calculate the GVC participation index and upstream position of Mexico's economy, in contrast to its top five major FDI flows by country of origin. We also include China (as top 10 FDI flows) since in line with the literature both countries are the two most extensive users of processing exports in the world (Koopman et al., 2014; Secretaria de Economia, 2019).

The GVC participation index is a measure indicating the extent to which a country is involved in GVC trade and consequently, how vertically fragmented production processes of TNCs shape the integration of countries in global trade. The measure distinguishes between the use of foreign inputs in exports (Foreign value-added, FVA) and the use of indirect intermediates in a third country exports (Indirect value-added, DVX) (Aslam et al., 2017; Secretaria de Economia, 2019).

The index is expressed as a percentage of gross exports, following the formula:

$$GVC_{participation} = \frac{FVA+DVX}{Gross\ Exports}$$

Also, the larger the participation index, the greater we can expect the level of involvement of a particular country in Global Value Chain trade.

Moreover, the participation index needs to be used in conjunction with the position index. By calculating the position index at the country level, we can delineate additional information on the relatively position of a country in terms of production length and the patterns of integration across GVCs. The literature proposes two measures to assess the specialization patterns of countries. Based on production length we can either calculate the 'upstreamness' or 'downstreamness' indexes. The former measures the average number of stages between production and final consumption, whereas the latter usually measures the length of production and a sector's position in the GVC (Wang et al., 2016).

For this analysis, we will calculate the upstream position index of Mexico, following the proposed formula of scholar Aslam et al. (2017), which also harmonized with the EORA database. Further, the larger a country's upstream position index, the more value-added they contribute to other countries exports (Koopman et al., 2014; Javorsek & Camacho, 2015; Aslam et al., 2017).

Usually, financial, logistics and business services tend to be upstream industries and high in value-added. However, the link is far less clear in the manufacturing industry (De Backer & Miroudot, 2014; Ahmad & Primi, 2017; Raei et al., 2019).
The position index at the country level is expressed as the log ratio of a country's exported intermediates that have been used in other countries' exports (DVX) to the use of imported intermediates for its own exports (FVA). Following the formula:

$$ln\left(1+\frac{DVX}{Gross\ Exports}\right) - \ln\left(1+\frac{FVA}{Gross\ Exports}\right)$$

The participation index at the country level is represented in **Table 6** for Mexico and its major FDI flows by country of origin. In relative terms, Germany was the economy with the highest measure of value-added embeddedness in GVCs, followed by Spain, Japan and the United States. On the opposite side, Canada, China and Mexico had lower measures of value-added embeddedness in GVCs. The negative position indexes for Mexico, Canada, Germany and Spain, indicates that these countries are predominantly net importers of value-added, with net losses representing 15 %, 11 %, 9% and 4 % of their production length across GVCs, respectively for the year 2015. In relative terms, the United States, China and Japan are the three countries with the highest GVC upstream position.

Table 6: The GVC participation and upstream position indexes, 2015

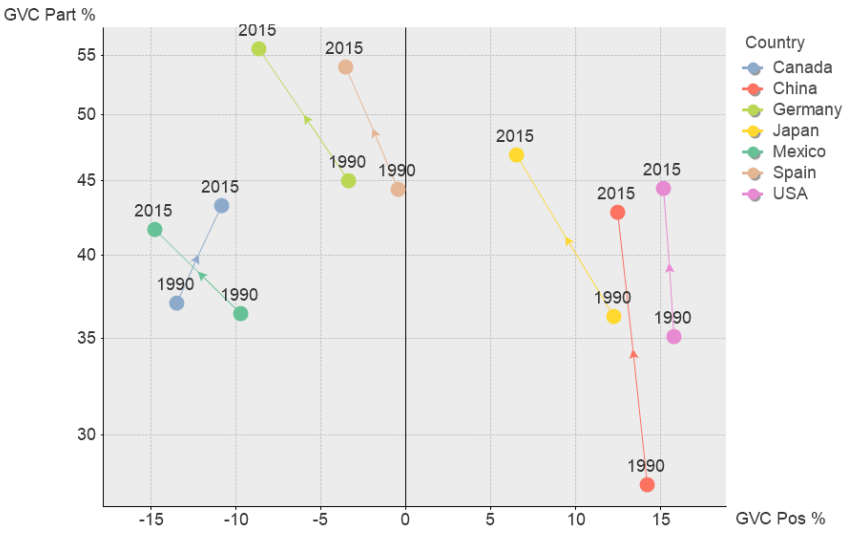
Country	Gross Exports M USD	FVA M USD	DVX M USD	GVC Part %	GVC Pos %
Canada	655.118	184.729	98.769	43	-11
China	1.978.587	273.063	573.490	43	13
Germany	2.151.825	715.129	479.218	56	-9
Japan	990.600	192.370	272.349	47	7
Mexico	349.929	103.941	41.786	42	-15
Spain	471.253	137.529	116.524	54	-4
USA	1.742.379	225.795	549.190	44	15

Sources: Author's own elaborations based on (UNCTAD-Eora, 2018)
Note: See Appendix C for further disclosure.

Figure 12 captures the shifting patterns of GVC participation and upstream position for Mexico and its major FDI flows by country of origin between 1990 and 2015. Each dot representing the GVC participation and position in the different economies.

As we can clearly see, on average the Global Value Chain participation of China, the United States and Japan has been substantially positive. Over time, Canada has also been able to improve their upstream position and increase their participation across GVCs. Noticeable, in the case of Mexico, Germany and Spain, while GVC participation has continued to increase over time, their upstream position however, is shifting negatively. A sign of shorter production lengths and high content of foreign value-added trade. Moreover, if we compare Mexico's patterns of economic integration against its NAFTA partners Canada and the United States, we can confirm that since 1990 Canada and the United States have steadily increased their participation and upstream position in value-added trade, yet the opposite trend appears to govern Mexico's economy.

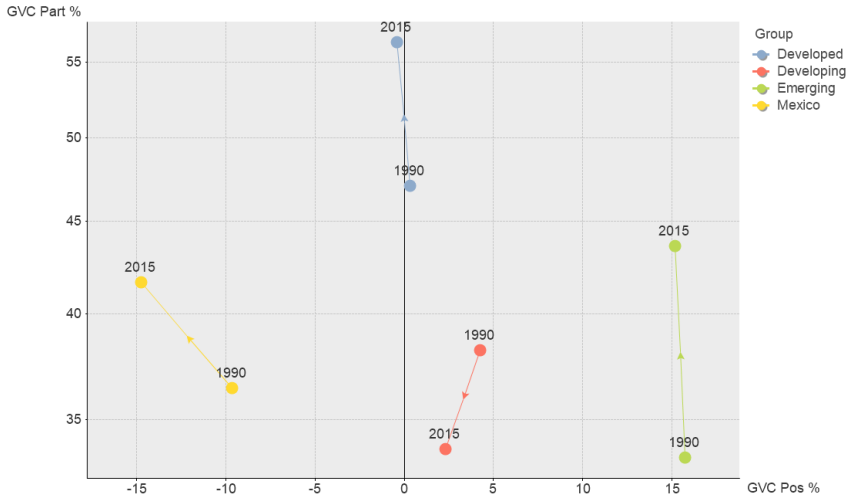
Figure 12: Shifting patterns of GVC participation and upstream position of Mexico and major FDI investors, 1990 - 2015



Sources: Author's own elaboration based on (UNCTAD-Eora, 2018)

By way of illustration, **Figure 13** shows the shifting patterns of GVC participation and upstream position for developed, emerging and developing countries from Latin America, in contrast to Mexico between 1990 and 2015. Emerging and developed countries seem to be the major beneficiaries of GVC trade. On average both economic groups have increased their GVC participation and upstream position. However, Mexico's negative position summerizes their limited role across GVCs as merely importers of Foreign value-added for final demand. Also, the Global Value Chain participation of developing countries from Latin America, has significantly decreased over the last 20 years, confirming the rather modest nature of their integration.

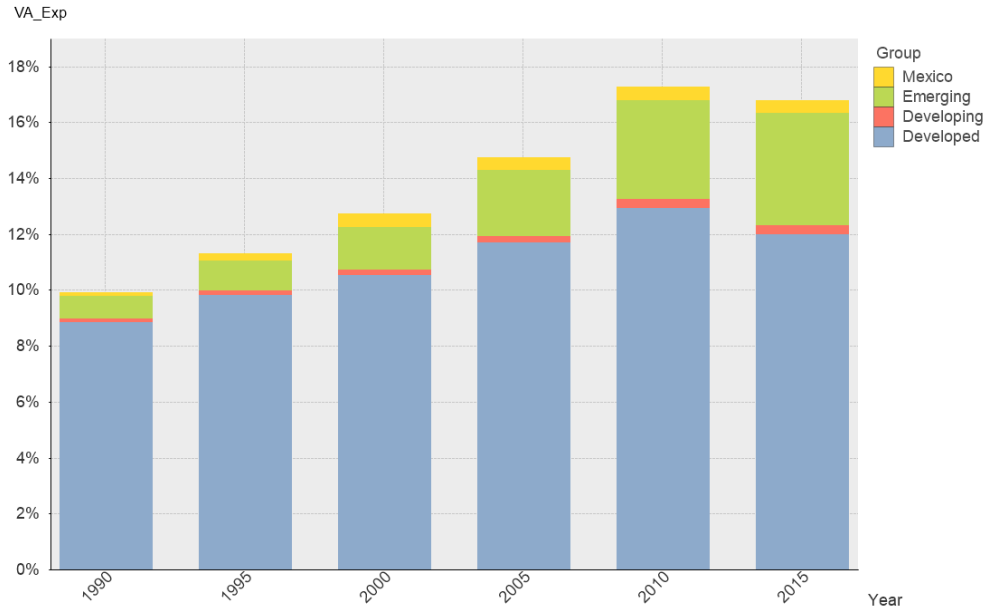
Figure 13: Shifting patterns of GVC Participation and upstream position of Mexico and Economic Groups, 1990 - 2015



Sources: Sources: Author's own elaboration based on (UNCTAD-Eora, 2018; WDI, 2019b).

Finally, if we now turn to Value-added exports, which according to Aslam et al. (2017), captures the income of countries that has been generated through their exporting activities of bilateral trade, **Figure 14** shows Value-added exports over time beginning from 1990 until 2015, as a share of the world's GDP aggregated for developed, emerging and developing countries from Latin America, as well as Mexico.

Figure 14: World Value-added Exports by country and economic groups, 1990 -2015



Sources: Author's own elaboration based on (UNCTAD-Eora, 2018)

In **Figure 14** contributions from developed countries that has been generated through their exporting activities of bilateral trade, have been particularly high throughout the 1990s and 2000s. Nonetheless, increases between 1990 and 2015 have been rather moderate, at 8.85 percent in the year 1990 to 12 percent in 2015. In addition, contributions from emerging countries have been increasing in terms of significance, as Value-added exports grew from around 0.82 percent to 4.01 percent between 1990 and 2015. This trend is clearly driven by China's rising domestic Value-added in exports over the last 20 years (Kee & Tang, 2015). Yet, contributions from developing countries from Latin America have been rather minimal, from 0.12 percent in 1990 to 0.32 in 2015.

Lastly, Mexico's Value-added exports generated through their exporting activities of bilateral trade follows a similar moderate trend as other countries from Latin America, from 0.15 percent in 1990 to 0.47 percent in 2015. This, despite their close and strong economic market integration since the NAFTA.

5 Results

Throughout the implementation of our analysis, this paper could not confirm the acclaimed positive relationship between trade in value-added and GDP per capita across Global Value Chains. In fact, after analysing on separate terms the two different components of GVC trade; which are Foreign value-added and Indirect value-added, it became evident that the positive relationship between GDP per capita and GVC trade is rather driven by the Foreign value-added component of trade. In other words, there is a clear inverse relationship between higher GDP per capita in developed countries and less Foreign value-added content. However, the opposite appears to be true for Mexico, and other emerging and developing countries from Latin America. These findings partly imply that the positive relationship between GDP per capita and trade in value-added across GVCs is rather driven by TNCs' activities of retaining businesses and financial services in their home economies, having higher Indirect value-added trade, while offshoring their manufacturing production to emerging and/or developing countries. Our findings can be supported by scholar Khawar (2003) results, whose research concluded that TNCs' activities in Mexico and other developing countries are usually not located in high productivity sectors (also reflected in the negative upstream position).

Moreover, after analysing the two components of GVC trade in absolute terms, Mexico appears to be the only emerging economy with a strong dependency on Foreign value-added content, whereas the only countries in our sample with a similar trend are Germany, France, Canada and South Korea. These findings are not conclusive, nonetheless acknowledging our previous results, we assume that this measure appears to be driven by low-value-adding activities in Mexico's manufacturing industry, with very limited developmental benefits in terms of forward industrial linkages. This assumption has been further confirmed through our analysis on Mexico's major exporting industries, which discloses high shares of Foreign value-added, for the electronics, computer, and automobile manufacturing industries up to almost 60 percent in some cases. The analysis on Mexico's GVC participation and upstream position in contrast to its major FDI flows by country of origin, indicates that even though Mexico has increased their GVC participation over time, their upstream position has shifted negatively. To put it simply, this is a clear sign of low value-added embeddedness in GVC trade since it illustrates Mexico's net losses of production length of some 15 percent for the year 2015.
In stark contrast, the United States which is Mexico's major trade partner and the home economy of most TNC's offshoring their production activities to Mexico, has the highest GVC upstream position, followed by China and Japan.

Lastly, when measuring the shifting patterns of GVC participation and upstream position by economic groups, emerging and developed economies seem to be major beneficiaries from GVC trade. Both economic groups have increased their GVC participation and upstream position between 1990 and 2015. However, in the case of Mexico the country has not beneficiated at the same rate from GVC trade, while participation continuous to be high, our analysis indicates that their upstream position continuous to deteriorate over time.

How do these findings relate to our research questions? First, when analysing the two main measures of vertical specialization of TNCs across Global Value Chains (recall FVA and DVX), evidence confirms that there are different economic impacts for countries. These impacts depend on whether TNCs offshore their production process for final assembly or decide to retain and add further value to their products through sophisticated services in their home economy. In this respect, our analysis unfolds that Mexico's value-added trade across GVCs is highly driven by Foreign value-added content. On this account, Mexico is strongly integrated in GVCs through the mechanisms of derived demand originated by TNCs. To put it simply; when offshoring production processes take place in Mexico, a larger demand for imported inputs is also generated. Ultimately, inflicting Mexico's economic role as a merely net importer of value-added and implying a highly volatile economy. By contrast, TNCs and their home economies appear to greatly benefit from offshoring activities in Mexico since they have gained not only larger portions of the domestic manufacturing market in Mexico but are predominantly net exporters of value-added trade. This argument is also supported by Pacheco-Lopez (2005), who argued that the promotion of exports in Mexico has limited Mexico's balance of payments especially because of higher imports and the large displacement of domestic industries.

With regards to the relationship between GVC trade and economic development, we found that there is no straightforward answer. We confirmed however, that it largely depends on the economic roles of countries in terms of their specialization in high value-adding production activities and sophisticated tasks. Also, the risk of remaining locked in low value-adding activities appears to be especially reflected in Mexico's participation and negative upstream position across GVCs. Finally, understanding the mechanisms of value-added trade is crucial for closing the gap between the reality of business practices in developing countries and policy implications. For policymakers, the implementation of GVCs analyses are useful to unfold the actual mechanisms through which TNCs' activities shape and control the trajectories of economic integration. As clearly demonstrated, despite Mexico's strong regional economic integration, its economy has not benefited from trade in value-added terms in stark contrast to the United States and Canada.

6 Conclusion

This paper concludes that TNCs' activities in terms of value-added trade, have a detrimental impact over Mexico's economic role and overall level of economic integration in global trade. We reached this conclusion after analysing the composition of value-added trade of Mexico, as well as through calculations on Mexico's GVC participation and upstream position. We identified Mexico's economic role as a considerably net importer of value-added. Whilst GVC participation has increased over the last 25 years, the negative shifting pattern of Mexico's upstream position indicates that Mexico's exports suffer from increasing high shares of Foreign-value added. We argue that this economic trend has been shaped through the vertical specialization of TNCs who retain sophisticated business services and other high value-added activities in their home economy while offshoring low value-added activities to Mexico. These offshoring activities of TNCs, inevitably induce a larger derived demand for imported inputs, which has been consistently the case for Mexico's largest exporting industries (all concentrated within the manufacturing industry).

Yet, we also amply acknowlege the crucial role of macroeconomic policies to avoid the displacement of domestic industries and to counterbalance the high shares of imported inputs necessary for the exports of final demand. Ultimately, it is the key role of the Mexican government to ensure economic policies designed to protect domestic markets from foreign competition and bargaining power of TNCs.
Particularly, this paper contributes to a growing literature which attempts to extend empirical evidence on the economic impact of TNCs across Global Value Chains. In response to a more nuanced scholarly narrative, we used the EORA database to explore the mechanisms and economic consequences of TNCs cross-border production activities in developing countries, using Mexico as our baseline country. Thus, many questions remain unanswered - for instance: What is the economic role and impact of a growing number of Latin American TNCs across GVCs? To which extent are economies with high shares of Foreign value-added volatile? Through which mechanism can countries increase their shares of Indirect value-added across GVCs? Finally, while still a work in progress, the new OECD analytical AMNE database, may provide future studies with the right foundation for more detailed statistics on TNCs economic transactions, in terms of value-added, R&D investments and sales activities. Much future research is needed to reinstate the nexus between TNCs as a double-edged sword for economic development. In the light of new insights on global production activities, future studies may challenge our understanding on modern global trade, and so, existing policy implications.

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8 Appendices

Appendix A

By means of comparison, some scholars argue that the increasing dimensions of the largest corporations have already equalled or maybe even surpassed the size of states. Consequently, the authors compared the revenues of states (mainly taxes collected) with the revenues of corporations, following suggestions by Jeffrey Harrod. This is a crude proxy for power or influence but instructive to the financial scale of states and corporations (Babic et al., 2017).

Table A1: The Global Top 100 countries and Corporations, 2016

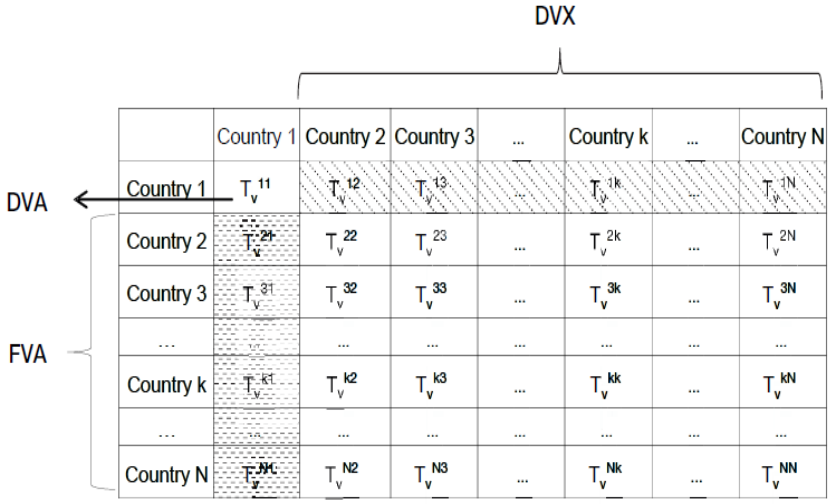
	Country/Corporation	Revenue (USD bn)		Country/Corporation	Revenue (USD bn)
1	United States	3363	51	General Electric (US)	140
2	China	2465	52	CSCEC (CN)	139
3	Japan	1696	53	AmerisourceBergen (US)	136
4	Germany	1507	54	Agricultural Bank of China (CN)	133
5	France	1288	55	Verizon (US)	132
6	United Kingdom	996	56	Chevron (US)	131
7	Italy	843	57	E.ON (DE)	130
8	Brazil	632	58	AXA (FR)	129
9	Canada	595	59	Indonesia	129
10	Walmart (US)	482	60	Finland	128
11	Spain	461	61	Allianz (DE)	123
12	Australia	421	62	Bank of China (CN)	122
13	State Grid (CN)	330	63	Honda Motor (JP)	121
14	Netherlands	323	64	Cargill (US)	120
15	South Korea	304	65	Japan Post Holdings (JP)	119
16	China Nat. Petroleum (CN)	299	66	Costco (US)	116
17	Sinopec Group (CN)	294	67	Argentina	116
18	Royal Dutch Shell (NL/GB)	272	68	BNP Paribas (FR)	112
19	Sweden	248	69	Fannie Mae (US)	111
20	Exxon Mobil (US)	246	70	Ping An Insurance (CN)	110
21	Volkswagen (DE)	237	71	Kroger (US)	109
22	Toyota Motor (JP)	237	72	Société Générale (FR)	108
23	Apple (US)	234	73	Amazon.com (US)	107
24	Belgium	232	74	China Mobile Comm. (CN)	106
25	BP (GB)	226	75	SAIC Motor (CN)	105
26	Mexico	224	76	Walgreens Boots Alliance (US)	104
27	Switzerland	216	77	HP (US)	103
28	Berkshire Hathaway (US)	211	78	Assicurazioni Generali (IT)	103
29	India	200	79	Cardinal Health (US)	103
30	Norway	200	80	BMW (DE)	102
31	McKesson (US)	192	81	Express Scripts Holding (US)	102
32	Russia	187	82	Nissan Motor (JP)	102
33	Austria	187	83	China Life Insurance (CN)	101
34	Turkey	184	84	J.P. Morgan Chase (US)	101
35	Samsung Electronics (KR)	177	85	Koch Industries (US)	100
36	Glencore (CH/JE)	170	86	Gazprom (RU)	99
37	ICBC (CN)	167	87	China Railway Eng. (CN)	99
38	Daimler (DE)	166	88	Petrobras (BR)	97
39	UnitedHealth Group (US)	157	89	Schwarz Group (DE)	97
40	Denmark	157	90	Trafigura Group (NL/SG)	97
41	EXOR Group (IT/NL)	154	91	Nippon Telegraph and Tel. (JP)	96
42	CVS Health (US)	153	92	Boeing (US)	96
43	General Motors (US)	152	93	Venezuela	96
44	Vitol (NL/CH)	152	94	China Railway Constr. (CN)	95
45	Ford Motor (US)	151	95	Microsoft (US)	94
46	China Constr. Bank (CN)	150	96	Bank of America Corp. (US)	93
47	Saudi Arabia	150	97	ENI (IT)	93
48	AT&T (US)	147	98	Greece	93
49	Total (FR)	143	99	Nestlé (CH)	92
50	Hon Hai Precision Ind. (TW)	141	100	Wells Fargo (US)	90

Source: Calculations by the authors based on Forbes, "Fortune Global 500 List 2017", http://fortune.com/global500/; and CIA, "The World Factbook 2017", https://www.cia.gov/library/publications/the-world-factbook/.

Sources: adopted from (Babic et al., 2017)

Appendix B

Figure B2: The T Matrix of the Value-added content of trade, EORA Technical Notes



Sources: adopted from (UNCTAD, 2015)

According to the EORA technical notes, the so called T Matrix is the key Matrix which describes how the value added content in the exports of each country (and industry) is generated (by column) and located (by row) across countries. Consequently, the first column of the matrix expresses the value added contained in the export of country 1. The column is composed of the term *Tv11* and denotes the Domestic Value-Added content of exports of country 1. Moreover, the term *Tvk1* denotes the Foreign Value-Added content of exports of country 1 generated by country k.

Further, the (column) sum of Domestic and Foreign Value-Added, will yield the total exports of country 1. This exercise can be replicated through the other columns of the T Matrix, so that in column 2, we can find the term *Tv22*, which denotes the Domestic Value-Added content of exports of country 2. Also, by reading the T Matrix along the row column and excluding the diagonal term *Tvkk*, we get an indication of how much each country's domestic value-added is in fact contributing as an intermediate input to the gross exports of other countries, in other words; the indirect value-added content (UNCTAD, 2015).

Appendix C

Table C7: The GVC participation and upstream position indexes, 2015

Country	Gross Exports M USD	FVA M USD	DVX M USD	GVC Part %	GVC Pos %
Argentina	90.544	15.080	16.636	35	1
Australia	290.093	38.357	81.993	41	12
Bolivia	10.872	1.002	2.500	32	12
Brazil	247.840	28.694	60.143	36	11
Canada	655.118	184.729	98.769	43	-11
Chile	72.040	16.013	19.518	49	4
China	1.978.587	273.063	573.490	43	13
Colombia	32.237	2.729	7.702	32	13
Denmark	179.744	70.273	41.009	62	-12
El Salvador	4.203	954	337	31	-13
France	967.452	273.087	267.617	56	0
Germany	2.151.825	715.129	479.218	56	-9
Guatemala	8.800	1.190	1.258	28	1
Honduras	4.061	833	414	31	-9
India	317.621	44.371	82.777	40	10
Japan	990.600	192.370	272.349	47	7
Luxembourg	35.053	19.060	10.156	83	-18
Mexico	349.929	103.941	41.786	42	-15
Nicaragua	1.686	282	252	32	-2
Norway	149.122	28.583	75.744	70	24
Panama	7.290	1.588	767	32	-10
Paraguay	7.023	604	1.081	24	6
Peru	19.717	1.887	6.959	45	21
Russia	409.254	31.570	175.968	51	28
South Africa	118.457	18.373	39.143	49	14
South Korea	613.947	220.529	124.448	56	-12
Spain	471.253	137.529	116.524	54	-4
Sweden	287.350	94.738	81.596	61	-4
UK	811.161	204.971	272.660	59	6
USA	1.742.379	225.795	549.190	44	15

Sources: Author's own elaborations based on (UNCTAD-Eora, 2018)