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productivity in Latin America**

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Opening and Linking up: Firms, Global Value Chains and Productivity in Latin America

Pierluigi Montalbano* Silvia Nenci* Carlo Pietrobelli§

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Abstract

This work explores the relationship between exports, Global Value Chains' (GVCs) participation and position, and firms' productivity. To this aim, we combine the most recent World Bank Enterprise Survey in Latin American and Caribbean (LAC) countries with the OECD-WTO trade in value added data. To explore the above relationship we adopt an extended version of the standard Cobb-Douglas output function including indicators of export performance and GVCs. We control for heterogeneity among firms (by country, region, and industry), sample selection, firms' characteristics and reverse causality. Our empirical outcomes confirm the presence of a positive relationship between participation in international activities and firm performance. They also show that both participation in GVCs and position within GVCs matter. These findings have strong policy implications and may help policymakers in choosing the best policy options to enhance the link between GVCs integration and firms' productivity.

Keywords: Firm productivity; Exports; Trade in Value added; Global Value Chains; learning by supplying.

JEL: F14; F61; D24; L22; O54

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1. Introduction

One of the key issues in the current empirical debate on the determinants of firm performance is the role of firm engagement in international activities. Since the seminal work of Melitz (2003), scholars have been studying the relationship between firms' competitiveness and export performance. This issue now revives thanks to the attention economists are drawing to the link between international trade and Global Value Chains (GVCs) (Grossman and Rossi-Hansberg, 2008; Baldwin, 2013, 2014; Antràs et al. 2012; Costinot et al., 2013; Baldwin and Venables, 2013; Baldwin and Lopez-Gonzalez, 2015). The concept of GVCs (Porter, 1985; Bair, 2005; Gereffi, 1994) has been successful in capturing some specific characteristics of the world economy, such as the increasing international fragmentation of production and the specialisation of countries in tasks and functions rather than products (De Backer and Miroudot, 2014). In related but often separate schools of thought, international business and development scholars have increasingly debated how emerging market firms might benefit from competing in GVCs in their home countries (Alcacer and Oxley, 2014; Meyer and Sinani, 2011), exploring the scope and extent of "learning by supplying", and the role of GVC "governance" in making this process possible (Humphrey and Schmitz, 2002, Pietrobelli and Rabellotti, 2007). Furthermore, with the second unbundling revolution (Baldwin, 2014), the issue of participation and position of firms along the value chain assumes a special relevance.

This work explores the relationship between exports, GVCs' participation and position, and firms' productivity. GVC participation is measured as both backward integration (i.e., the use of foreign inputs for exports) and forward integration (i.e., the supply of domestic inputs for other countries' exports) whereas GVC position is measured as the position of a country/industry in vertically fragmented production, upstream or downstream. The added value of our study is threefold: i) first, we provide new empirical evidence to the theoretical debate on the influence of GVC participation and position on firms' productivity that is relevant for a variety of schools of thought; ii) second, we propose a sound macro-micro synthesis by bridging the new Trade in Value Added (TiVA) dataset by the Organisation for Economic Co-operation and Development (OECD) and the World Trade Organization (WTO) with the firm level data provided by the World Bank Enterprise Survey (WBES); iii) third, we carry out the first comprehensive empirical analysis for the LAC region of the relationship between firms' involvement in GVCs and their performance. To this end, we apply, in an inter-disciplinary setting, insights from existing theory in related areas and provide sound empirical evidence that enhances our understanding on the role of GVCs and lead-supplier relationships for productivity and upgrading.

Recent economic research shows that despite years of rising factor accumulation, slow productivity growth is at the root of LAC's weak overall performance (Fernández-Arias 2014; Crespi et al. 2014; Pagés 2010). While most of the studies look at the issue by estimating aggregate production

functions, more recent research highlights the significance of the firm-level efficiency gains that result from firm-specific characteristics, including improvements in management, internal organisation, strategies, or technological capabilities as reactions to market incentives and firm-level strategies (Grazzi and Pietrobelli, 2016). In this respect, participation in international trade and production networks may offer a powerful source of learning to local firms. However, as already underlined, there is no consensus in the literature on the existence of such effects and the factors that influence them. Controlling for heterogeneity among firms, sample selection, firms' characteristics and reverse causality by using sound econometric techniques, our empirical outcomes confirm a positive relationship between participation in international activities and productivity for our sample of LAC firms. Moreover, focusing on the three big LAC countries (Argentina, Chile, and Mexico) for which data are available and on manufacturing industries, we further show that also the extent of involvement in GVCs matters, as highlighted by the relevant literature. More specifically, our results point out that, controlling for country fixed effects, firms operating in industries positioned more upstream in GVCs are, on average and *ceteris paribus*, more productive than those operating in industries more downstream.

This empirical evidence reinforces the “learning by supplying” hypothesis emphasised by the theoretical literature. Thus, it forces us to reformulate policy priorities in this light in the domain of trade and industrial policies. First, differently from the standard narrative which focuses mainly on gross exports' performance, trade policy should consider that access to imports is an essential component of value added exports. This implies broadening the scope of tariff and non-tariff trade policies, including softening barriers to imports to facilitate access to world-class inputs. Second, to cope with LAC's weak productivity performance integration into GVCs should be promoted, and especially upstream integration that implies producing quality inputs for other countries' productions and exports. This requires efforts to enhance firms' ability to meet international quality, legal, labour, health, safety, and environmental, standards (Pietrobelli and Staritz, 2013 and 2017) to effectively exploit the opportunities to “learn by supplying” highlighted by the international business literature (Alcacer and Oxley, 2014).

Our study is organised as follows: Section 2 reviews the literature on firm productivity and export performance, and on how emerging market firms may benefit from competing in GVCs and from foreign direct investment; Section 3 describes how to trace a country-industry's value-added production as well as its level of integration in global markets. Section 4 reports some stylised facts about the main characteristics of LAC firms related to internationalisation and the relevant GVC indicators. Section 5 presents the empirical analysis; Section 6 concludes.

2. Review of the literature

In this work, we connect various literatures related to the themes of GVCs and firms' productivity with an inter-disciplinary approach. Specifically, we first delve into the critical debate of the international trade and industrial economics literature about the "self-selection" and the "learning by exporting" hypotheses. Then, we deal with the "learning by supplying" hypothesis underlined by international business and development scholars and finally we highlight the new empirical evidence emerging from the use of the new data for trade in value added (i.e., value that is added by countries/industries in producing goods and services) in developing countries.

Regarding the international trade and industrial economics literature, two main explanations have been put forward to analyse export productivity premia: "self-selection" and "learning by exporting". Self-selection means that only the more productive firms can afford the extra costs of exporting. The range of extra costs include transportation costs, distribution or marketing costs, personnel with skill to manage foreign networks, or production costs in modifying current domestic products for foreign consumption (Wagner, 2012). These costs tend to discourage less productive firms from international linkages; therefore, firms generally self-select to participate in global markets. Melitz (2003) has been the theoretical benchmark for the above selection mechanism, while the pioneering empirical work by Bernard and Jensen (1999) on U.S. firms has been followed by many scholars (see, *inter alia*, Clerides et al., 1998; Alvarez and López, 2005; Hayakawa et al., 2012; Eliasson et al., 2012; and López (2005), Greenaway and Kneller (2007), Wagner (2007; 2012) and Singh (2010) for surveys on the same topic). The other explanation, learning by exporting, means that exporters are exposed to knowledge flows and spillover, technology transfers, technical assistance and to more intense competition in international markets, which lead to significant performance improvements. This "learning-by-exporting" hypothesis has spurred a large number of empirical studies that seek to assess the causal effect of exporting at the firm level (see, *inter alia*, Grossman and Helpman, 1991; Bernard and Jensen, 1995, 1999; Clerides et al., 1998; Bernard et al., 2003; Verhoogen, 2007; Fafchamps et al., 2008). Unfortunately, there is no consensus among scholars on whether such a learning effect exists or the specific factors that may be behind it. Most importantly, the direction of causality between openness and firm performance is controversial (Greenaway and Kneller, 2007).¹ Several studies found a significant positive effect of the export experience on firm productivity (see, *inter alia*, Girma et al., 2004 for U.K. firms; Van Biesebroeck, 2005 for sub-Sahara African countries; Fernandez and Isgut, 2005 for Colombia; Alvarez and López, 2005 for Chile; De Loecker, 2007 for Slovenia; Lileeva and Trefler, 2007 and Serti and Tomasi, 2008 for Italy; Park et al., 2010 for China),

¹ De Loecker (2010) states that current methods used to test for learning-by-exporting are biased towards rejecting the hypothesis of positive effects of exports on productivity.

with, an impact of exporting on productivity stronger in developing than developed economies (Martins and Yang, 2009). In contrast, Wagner (2012) underlines that a large number of empirical studies show that future exporters and importers are more productive than future non-exporters and non-importers. Hence, the debate is open and there is no clear-cut evidence in favour of one of the possible interpretations.

Following separate but related strands of literature, for over 20 years international business as well as development scholars have increasingly debated how competition in GVCs and proximity to FDI may benefit firms in emerging economies (Alcacer and Oxley, 2014; Meyer and Sinani, 2009, Gereffi et al., 2001 and 2005). Thus, Alcacer and Oxley (2014) develop a theory of “learning by supplying” and question what factors contribute to strengthen suppliers’ ability to build technological and market capabilities, and if it matters to whom the firm supplies and what kind of involvement it has. Such mechanisms may involve knowledge sharing between customers and suppliers, particularly in the auto industry and other complex manufacturing industries (MacDuffie and Helper, 1997, Sako, 2004). Participation in GVCs is supposed to improve the performance of firms in several additional ways, while providing them with opportunities to obtain managerial expertise, technical knowledge, innovation channels and new markets, and to allow a more efficient transfer of resources, thereby enhancing their productivity (see, inter alia, Gereffi, 1999; Wynarczyk and Watson, 2005; Pietrobelli and Rabellotti, 2007; Wollesenbet et al., 2012; Theyel, 2013; Giovannetti et al., 2015; Agostino et al. 2015). In this regard, the analysis of the recent Chinese experience of fast upgrading and industrialisation has provided a testing ground of several theories of the learning opportunities offered by GVCs. Thus, frequent examples have been reported of “Foreign MNCs radically altering their commitments to the Chinese market by developing more capacious engineering, design, and organisational capabilities and practices in their subsidiary operations.” (Herrigel et al., 2013, p.123). An additional layer of analysis is proposed by Corredora and McDermott (2014), who go beyond the firm-level to encompass the organisational and institutional context, as they argue that the focus on firm-level factors specific to the value chain can obscure how the organisational and institutional context in emerging markets can impede or enable broad base supplier upgrading in critical ways. In their words, institutions acting as “knowledge bridges”, helping local firms tap into diverse applied experiential knowledge are essential in emerging economies. However, even if firms manage to develop strong technological capabilities in GVCs, they may nonetheless find themselves locked into a subordinate role, thwarting ambitions to move up the value curve (Corredora and McDermott, 2014). The “governance” of the GVC may be especially unfavourable to local firms’ upgrading, especially of a “functional” kind, as shown by Humphrey and Schmitz (2002) and Giuliani et al. (2005). Therefore, the process of generating externalities from GVCs for local firms and sparking and nurturing their own learning and innovation processes is far from automatic and strongly affected not only by firm-level (both lead-

firms and their suppliers) behaviour and strategy, but also by the governance of the GVC and by the institutional context prevailing (Pietrobelli and Rabellotti, 2011).

Recently, thanks to the availability of new data for trade in value added, an increasing number of empirical works have addressed the key issue of firms' GVC participation and position in developing countries (Kowalski et al., 2015; Greenville et al., 2016; Taglioni and Winkler, 2016; Balié et al., 2017). The widespread consensus is that by assimilating off-shored links of the supply chain, developing countries can industrialise more rapidly without waiting to build the deep industrial base formerly required and without having to provide all the upstream capabilities (IMF, 2015). Countries can exploit their comparative advantages in specific niches/segments of GVCs led and organised by firms from other countries. They can specialise in specific tasks and functions.

3. Trade data and GVC indicators

Recently, a new literature measuring trade flows in the context of fragmentation of world production and tracing the value added of a country-industry's trade flows has emerged.² It combines input-output tables with bilateral trade statistics and proposes new indicators (see, *inter alia*, Hummels et al., 2001; Johnson and Noguera, 2012a,b; Miroudot and Ragoussis, 2009; Koopman et al., 2011; 2014; Wang et al., 2013; De La Cruz et al., 2011; Stehrer, 2013; Cattaneo et al., 2013).

Following these new empirical efforts, in this study we use data from the OECD-WTO TiVA database, that presents clear advantages with respect to possible alternatives:³ i) it is derived from official national input-output tables (linked together using bilateral trade statistics in goods by industry and end-use category); ii) it provides ready to use statistics and trade in value added indicators for the most important LAC countries.⁴

The TiVA indicators are based on the decomposition method of the value added embodied in national gross exports proposed by Koopman et al. (2011) (see the Appendix for additional details). By combining these value-added components it is possible to assess both the level of participation and whether a country (or industry) is located upstream or downstream in the global value chain.

² Value added reflects the value that is added by industries in producing goods and services. It is equivalent to the difference between industry output and the sum of its intermediate inputs. Looking at trade from a value added perspective better reveals how upstream domestic industries contribute to exports, as well as how much (and how) firms participate in GVCs (OECD-WTO, 2012).

³ Such as the World Input-Output Database (WIOD), the Global Trade Analysis Project (GTAP) and the EORA-MRIO database

⁴ The TiVA version we use in this work provides 39 indicators for 57 countries (34 OECD countries plus 23 other economies, including Argentina, Brazil, China, India, Indonesia, the Russian Federation, and South Africa) with a breakdown into 18 industries. Like for the WBES, the industry classification is based on the ISIC Rev. 3.1.

Specifically, in our empirical analysis we use the *GVC participation index*. It takes into account the indirect domestic value added embodied in intermediate exports (IVA) - as a proxy of forward integration - and the foreign value-added embodied in gross exports (FVA) - as a proxy of backward integration - to summarise the importance of global production chains in country (or industry) exports. The higher (or lower) the value of the index, the larger (or smaller) is the participation of a country in GVCs. It is worth noting that a high IVA component shows the importance of domestic production in GVCs, while a high FVA component reveals that the country/industry is deeply embedded in global value chains GVCs but only captures a small part of the value added

To complete information on international integration into global markets, we use also the *GVC position indicator*. This second index characterises the position of a country (or industry) exporters in GVCs by measuring the level of involvement of this country (or industry) in vertically fragmented production. It is determined by the extent to which the country (or industry) is upstream or downstream in the GVCs, depending on its specialisation (Koopman et al., 2011). A country lies upstream either if it produces inputs and raw materials for others, or provides manufactured intermediates or both; a country lies downstream if it uses a large portion of intermediates from other countries to produce final goods for export (i.e., it is a downstream processor or assembler adding inputs and value toward the end of the production process). The GVC position indicator is given by the ratio of the IVA exports and the FVA exports. Since at the global level IVA and FVA equal each other, at the country level, the average IVA/FVA ratio is equal to 1. Therefore, a ratio larger than 1 indicates the country lies upstream, while a ratio lower than 1 means the country lies downstream in the GVCs.⁵ Since two countries can have identical GVC position index values in a given sector but very different degrees of GVC participation, it is important to look at both of these indicators to have a correct picture of the degree of integration of a country (or industry) in GVCs (Koopman et al., 2011).

As the aim of this study is to provide a micro empirical analysis of the relationship between firms productivity and their export performance and GVC participation and position, we match the TiVA data at country-industry level with the last wave of the WBES firm level data for Latin American countries, which includes for the first time the Caribbean economies (thus providing a comprehensive dataset with 12,146 firms distributed across 30 LAC countries).⁶ The WBES provides information on the characteristics of firms across various dimensions, including size, ownership, trading status, and performances. Firm level data offer crucial information for

⁵ We note a caveat in this decomposition at the industry level. While the value-added embedded in a given imported intermediate could travel across many sectors before it is exported, the adopted decomposition traces only the direct and indirect effects.

⁶ Specifically, we match the TiVA GVCs indicators computed for 2009 with the characteristics of firms available in the LAC WBES survey for 2010 that refer to the last completed fiscal year (2009).

understanding the drivers of competitiveness, that aggregate data often miss (Hayakawa et al., 2012, Grazzi and Pietrobelli, 2016, chapter 1). In particular, the micro dimension provides the necessary tool to analyse determinants of productivity, its distribution within and across sectors, and the relationship with exports.⁷

4. Stylised facts on LAC international linkages

Table 1 presents information about firms' international linkages (exports, imports, and foreign ownership) for the whole LAC sample of WBES (2010) by country. About 17% of these firms declare themselves to be exporters whereas about 13% of them declare to be foreign-owned firms. It is worth noting that only about 35% of foreign owned firms declare to be also exporters.⁸ It is also noteworthy the larger percentage of importing firms, around 34% of the overall sample, whereas only about 10% of the overall firms in the overall sample declare to be both exporter and importer.

A richer picture of the current international linkages and backward and forward integration can be provided for the countries for which TiVA data are available for the same fiscal year: Argentina, Brazil, Chile, and Mexico.⁹ To this end, Figure 1 presents the international comparison of the aggregate value added decomposition for the four big LACs and for some selected industrialised, emerging, developing/transition economies.¹⁰

⁷ The limitations of the WBES firm-level data have been acknowledged in the literature: for example their being confined to the formal economy, their focus on manufacturing firms and their variables levels of representativeness (Grazzi and Pietrobelli, 2016)

⁸ Only direct exporters with direct exports above 10% of annual total sales are considered exporters, whereas only firms with 10% of ownership held by private foreign investors are considered foreign owned.

⁹ Note that in this descriptive analysis we use the firm-level data from the 2010 WBES survey for Argentina, Chile, and Mexico since the information collected in the surveys refers to characteristics of the firm to the last completed fiscal year (2009), and the 2009 WBES survey from Brazil.

¹⁰ For the industrialised economies, we selected the United States, Japan, and Germany; for the emerging economies, we selected China, India, and South Korea; and for the developing/transitioning economies, we selected Poland, Turkey, and South Africa.

Table 1 The LAC Sample: Exporting, Importing, and Foreign-Owned Firms by Country (2010)

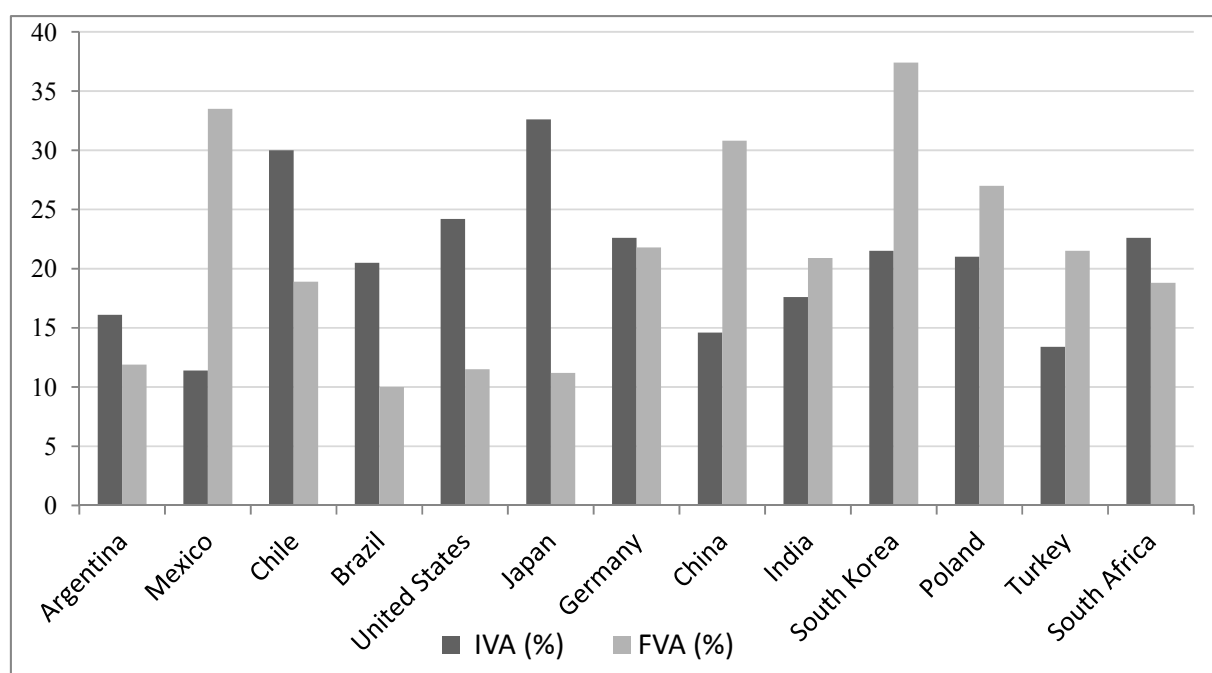
Country	Total Firms	Exporting	Importing	Foreign	Exp & Foreign	Exp & Imp
Antigua & Barbuda	151	29	21	15	3	5
Argentina	1010	276	441	130	78	162
Bahamas	148	21	28	33	10	6
Barbados	150	48	60	29	15	33
Belize	149	31	46	19	9	7
Bolivia	340	33	84	45	6	17
Brazil (*)	1792	126	355	68	22	41
Chile	899	150	448	118	55	99
Colombia	845	151	384	77	35	100
Costa Rica	525	94	216	85	39	63
Dominica	150	40	9	35	8	4
Dominican Republic	360	39	87	57	13	28
Ecuador	360	21	84	62	5	13
El Salvador	332	72	87	57	15	47
Grenada	153	10	20	26	2	4
Guatemala	547	119	212	68	23	87
Guyana	162	37	51	41	16	19
Honduras	334	25	86	38	8	15
Jamaica	375	36	81	52	9	16
Mexico	1436	216	526	127	58	137
Nicaragua	320	21	68	36	8	10
Panama	362	10	31	69	5	2
Paraguay	348	37	82	38	13	20
Peru	882	203	455	100	45	124
St. Kitts & Nevis	150	26	28	31	8	11
Saint Lucia	150	51	31	28	13	11
St. Vincent & the Grenadines	154	26	36	24	9	12
Suriname	152	19	36	9	2	5
Trinidad and Tobago	366	61	88	47	14	33
Uruguay	585	110	261	63	25	67
Venezuela	251	1	41	27	—	—
Total	13938	2139	4483	1654	571	1198
		0.15	0.32	0.12	0.35	0.09

Source: WBES 2010 survey (*) survey 2009

Figure 1 shows, first of all, that the LAC countries have a relatively medium-high level of forward integration (IVA) but generally lower backward integration (FVA) than the other countries, with the relevant exception of Mexico. This confirms the relative specialisation of LAC countries within GVCs in primary good exports (Blyde, 2014). LAC countries also show heterogeneity in their respective trade in value added performances. Specifically, Chile shows the highest IVA value,

suggesting it provides relatively higher domestic added value inputs to other countries' exports. It is followed by Brazil and Argentina, whereas Mexico shows the lowest value, which is in line with its relative specialisation in processing foreign inputs. Conversely, Brazil shows the smallest share of FVA (only 10% of the value added incorporated in the Brazilian exports comes from other countries), whereas Chile and Mexico show a relatively higher level of FVA, suggesting a relevant presence of foreign inputs in their overall exports (note that about 30% of the value of Mexican processing exports comes from abroad). This heterogeneity is associated to some extent with the country dimension (i.e., larger economies tend to have a relatively higher degree of self-sufficiency in producing inputs for exports), but also with differences in the patterns of specialisation: a relative specialisation in producing primary goods requires, on average, less imported inputs than manufacturing them (Cattaneo et al., 2013).

Figure 1. Trade in Value-Added Components: forward (IVA) and backward (FVA) integration (2009)



Source: Authors' calculation based on OECD-WTO TiVA data (extracted in January 2016).

Figure 2 provides the international comparison of both the GVC participation and GVC position indicators. The figure shows that while Chile's GVC participation is substantial, Argentina's and Brazil's are below the selected world counterparts. This empirical evidence is consistent with similar analyses of LAC integration into the global production network (see UNCTAD, 2013; Blyde, 2014).

Insert Figure 2 here - GVC Indicators: International Comparison

On the position within Global Value Chains LAC countries look more upstream than their international counterparts; however, again, there is a degree of heterogeneity. Brazil is the most

upstream in our international comparison (i.e., it provides inputs to other countries' exports) thanks to high indices of upstreamness in mining and quarrying as well as in basic metals and fabricated metal production (see Figure 3). This is of course linked to the comparative advantage of Brazil in natural resources, and may offer opportunities for local firms' learning and upgrading related to the investments in science and technology development related to mining and natural resources. On the opposite side is Mexico, which is located more at the end of GVCs and acts as a final producer, using inputs provided by upstream countries in the form of *maquila* (factory) processing operations (Contreras et al., 2012; De La Cruz et al., 2011; Dussel Peters, 2003).

Figure 2. GVC Indicators: International Comparison

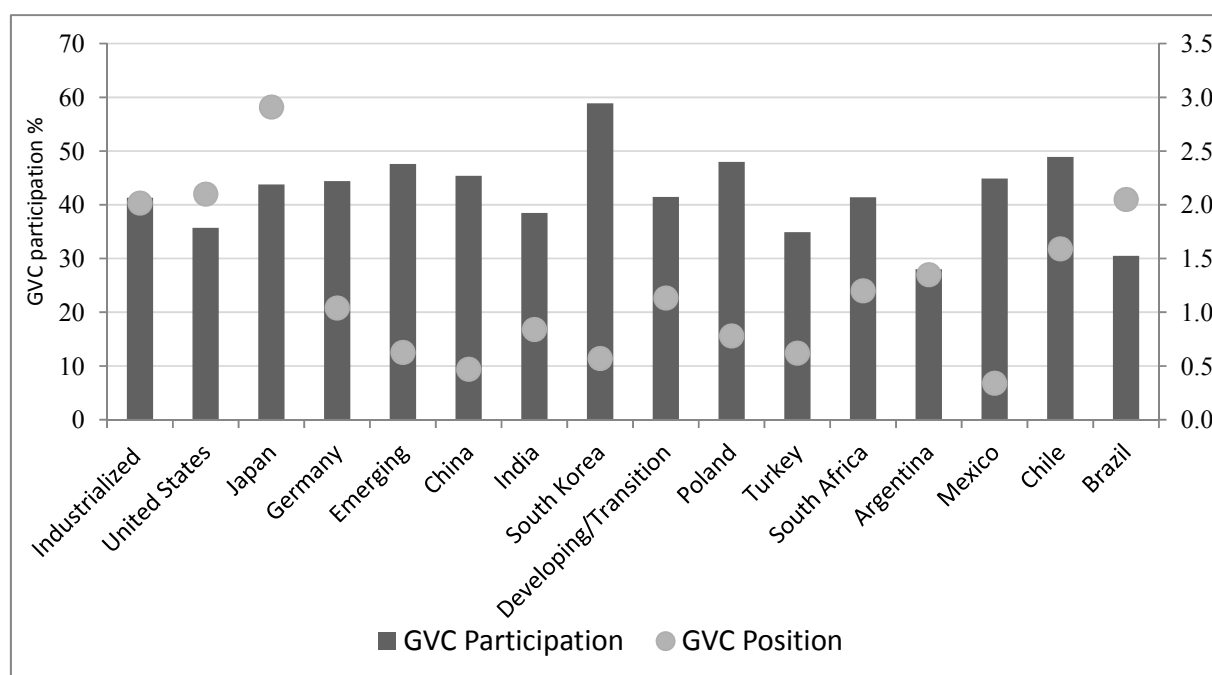
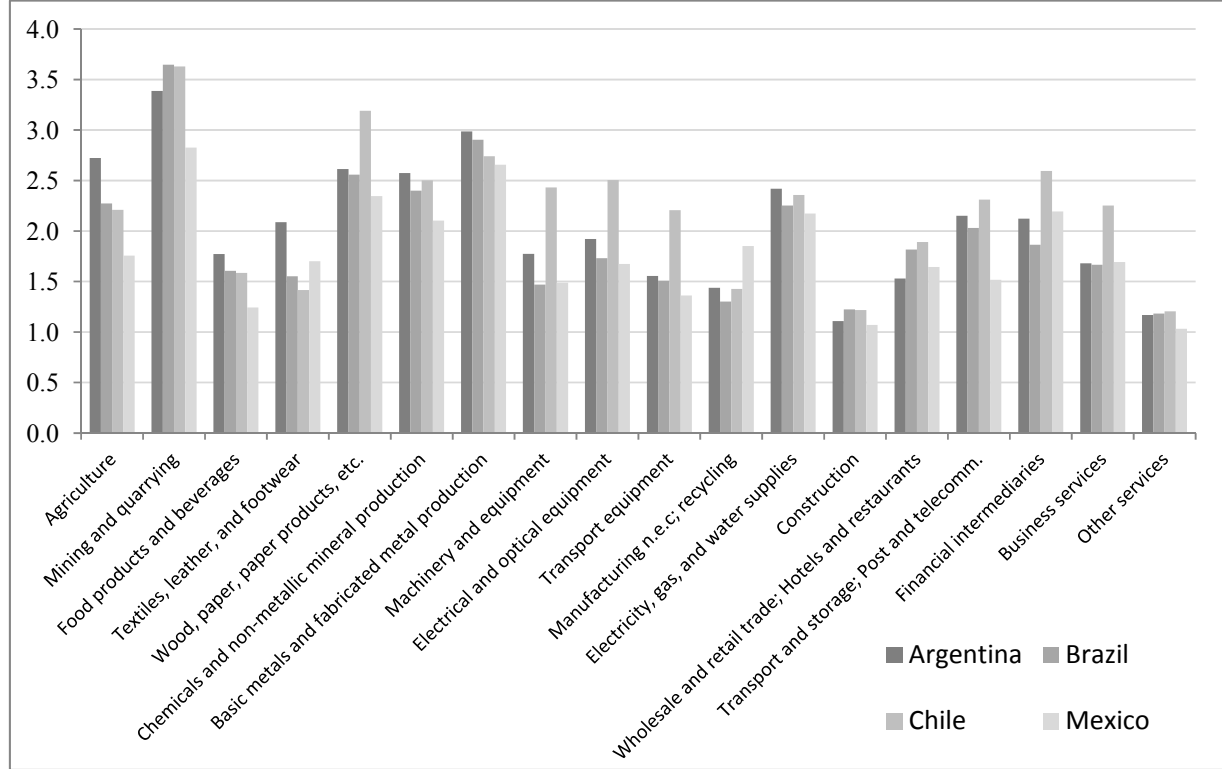


Figure 3 presents the comparison of the GVC position indicator for the four big LAC countries by industry. The indicator used in this figure is obtained from TiVA data, following on Fally (2012) and Antràs et al. (2012). Consistently with the aggregate outcomes, the four LAC countries show relatively high specialisation (i.e., a GVC index higher than 2) in mining and quarrying, wood, paper, paper products, printing and publishing, chemicals and non-metallic mineral products, and basic metals and fabricated metal products. Brazil has the highest index of upstreamness in mining and quarrying (with a GVC index higher than 3.5). With the exception of Mexico, all LAC countries show relative upstream positions also in agriculture, especially Argentina. Concerning services, Chile is positioned more upstream in the value chain in all the services sectors, while Mexico, in line with the result at the aggregate level is, on average, the most downstream, with the exception of financial intermediates.

Figure 3 -Four Big LAC GVC Position Index by industry



5. Empirical Analysis

The aim of our empirical exercise is to investigate whether there is a causal relationship between the degree and the typology (i.e., GVC participation and position) of involvement in international trade and productivity of LAC firms. To this end, we adopt a two-step strategy. First, we test the significance of the relationship between exports and productivity in our sample of LAC firms, by estimating a standard Cobb-Douglas output function. Then, we test a further expanded version of the above relationship including indicators of value added trade as well as the degree and type of industry involvement in GVCs. In all the empirical exercises we control for sample selection, firms' characteristics and reverse causality.

In the first step we adopt the following version of the standard constant returns to scale Cobb-Douglas production function with labour, capital, and knowledge to export performance:

$$\theta_i = \beta_1 + \beta_2 k_i + \beta_3 x_i + \beta_4 z_i + \eta_c + \eta_r + \eta_j + \epsilon_i \quad (1)$$

Where i denotes firms; θ_i is firm labor productivity¹¹, k_i is firm “capital intensity”, x_i is the export variable (a dummy for exporting firms and/or a continuous variable for firm-level values of exports in different specifications), z_i stands for firm-level controls, such as “human capital” (proxied by the percentage of full time workers with bachelor degree on total workers) and “technological innovation”. The latter, as in Farole and Winkler (2014), is a dummy that controls whether firms use technology licensed from a foreign owned company (excluded office software), own internationally recognised quality certification (e.g., ISO), and use own website and/or emails to communicate with clients and suppliers; η_c , η_r and η_j are dummies for country, sub-national region¹² and industry, respectively, to control for bias due to unobserved factors; ε_i is the error term. All variables are in logs except for dummies and percentages. A full description of the variables used in the empirical analysis is provided in Table 1A in the appendix. Because of the presence of some missing values and after cleaning data from possible outliers¹³ and inconsistencies (e.g., dropping firms that reported less than five employees to keep consistency with the sample design) our sample reduced to 4,522 observations, all related to manufacturing production. See Table 2A in the appendix for details of country and sectoral coverage of the reduced sample.

Table 2 shows the POLS and the Probit estimates of the production function depicted in Eq. 1 for our sample of LAC firms. The choice to present also the probit exercise is to test possible non linearities in the relationship between export performance and firm productivity. As a matter of fact, both estimation techniques show very consistent results. Positive and statistically significant coefficients are estimated for the relationship between labour productivity, capital intensity, human capital, and technological innovation which is consistent with the theory. Concerning the key parameters of our analysis, our findings are consistent with the view that exporter firms, on average and *ceteris paribus*, show higher productivity than non-exporters. To look more in depth at firm heterogeneity, we also carried out separate regressions by firm size (distinguishing micro, small, medium, and large firms) and our results remain robust for all size categories. On average and *ceteris paribus*, LAC exporting firms show higher productivity than non-exporting ones.

¹¹ We use here labour productivity as a proxy of firm productivity. We acknowledge this is not the only (and probably also not the best) measure. Unfortunately, the available LAC WBES cross-sectional data set is not suited to calculate other measures (e.g., total factor productivity) using the standard methodologies.

¹² Although data by sub-national regions are not representative of their relative economic relevance, sub-national dummies are included in our analysis to capture additional unobserved heterogeneity across firms.

¹³ We eliminated the observations of the last 5 percentiles of our measure of labour productivity in order to clean it of potential outliers and keep consistency with the hypothesis of normal distribution. Without truncating the outcomes do not change significantly. The results are available upon request.

Table 2 - POLS and Probit estimates

	Dependent Variable: (ln) Labour Productivity					Dependent Variable: Productivity higher than the average==1;0 otherwise					Labour
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
	<i>All Firms</i>	<i>Micro Firms</i>	<i>Small Firms</i>	<i>Medium Firms</i>	<i>Large Firms</i>	<i>All Firms</i>	<i>Micro Firms</i>	<i>Small Firms</i>	<i>Medium Firms</i>	<i>Large Firms</i>	
(ln) K intensity	0.174*** (0.0104)	0.113*** (0.0254)	0.167*** (0.0155)	0.184*** (0.0189)	0.197*** (0.0328)	0.220*** (0.0168)	0.170*** (0.0501)	0.206*** (0.0264)	0.242*** (0.0310)	0.305*** (0.0554)	
Human K	0.00978*** (0.000833)	0.00592*** (0.00216)	0.0112*** (0.00161)	0.0101*** (0.00135)	0.00912*** (0.00195)	0.0122*** (0.00159)	0.0117*** (0.00351)	0.0130*** (0.00272)	0.0126*** (0.00317)	0.0226*** (0.00681)	
Tech.innovation (yes=1)	0.342*** (0.0562)	0.306*** (0.0840)	0.432*** (0.0924)	0.199 (0.147)	0.303** (0.152)	0.359*** (0.0981)	0.512*** (0.154)	0.535*** (0.154)	0.0515 (0.428)	#	
Exporter (yes=1)	0.236*** (0.0299)	0.352*** (0.124)	0.266*** (0.0515)	0.243*** (0.0484)	0.172** (0.0779)	0.249*** (0.0572)	0.253 (0.216)	0.255*** (0.0943)	0.297*** (0.0957)	0.208 (0.203)	
Firm size	0.194*** (0.0167)					0.276*** (0.0282)					
Constant	7.428*** (0.421)	9.326*** (0.347)	7.969*** (0.450)	9.043*** (0.460)	9.041*** (1.285)	-3.943*** (0.904)	-2.213* (1.343)	-3.277*** (0.686)	7.648 .	-2.713** (1.290)	
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	4377	810	1890	1269	408	4377	745	1862	1238	335	
R ²	0.383	0.359	0.354	0.349	0.520						
Pseudo R ²						0.231	0.220	0.187	0.238	0.388	

Notes: * Coefficient is statistically significant at the 10% level; ** at the 5% level; *** at the 1% level; no asterisk means the coefficient is not different from zero with statistical significance. Robust standard errors in parentheses.

means perfect collinearity (in fact, all firms declare to have all the listed technological items)

Table 3 Base Model (sample restricted to exporting firms) (§)

Dependent Variable: (ln) Labour Productivity					
	(1)	(2)	(3)	(4)	(5)
	<i>All Firms</i>	<i>Micro Firms</i>	<i>Small Firms</i>	<i>Medium Firms</i>	<i>Large Firms</i>
(ln) K intensity	0.170*** (0.0179)	0.0981 (0.0721)	0.00864 (0.0330)	0.0961*** (0.0193)	0.152*** (0.0280)
Human K	0.0114*** (0.00152)	0.0202 (0.0197)	0.00579** (0.00268)	0.00402*** (0.00150)	0.00354* (0.00207)
Tech.innovation (yes=1)	0.890*** (0.232)	1.177 (1.352)	0.304 (0.296)	0.129 (0.329)	#
(ln) Export value	0.367*** (0.0160)	0.515*** (0.0670)	0.468*** (0.0279)	0.429*** (0.0221)	0.368*** (0.0385)
Constant	0.430 (0.802)	-2.985 (6.498)	2.972** (1.159)	2.746*** (0.643)	4.891*** (1.401)
<i>selection equation</i>					
Firm size	0.457*** (0.0303)				
Inward FDI	0.542*** (0.0697)	1.000** (0.476)	0.767*** (0.147)	0.622*** (0.106)	0.382** (0.157)
(ln) K intensity	0.0865*** (0.0165)	0.0403 (0.0717)	0.168*** (0.0305)	0.0779*** (0.0271)	0.0745* (0.0410)
(ln) Human K	0.00664*** (0.00142)	0.0180*** (0.00551)	0.0125*** (0.00265)	0.00380+ (0.00235)	0.00129 (0.00375)
Technology	0.754*** (0.169)	1.052*** (0.390)	0.877*** (0.266)	0.374 (0.481)	11.90*** (1.283)
Constant	-9.761*** (0.593)	-0.732 (1.082)	-14.92*** (1.063)	-2.651 (0)	-6.350 (0)
IMR	1.000*** (0.100)	0.655 (1.341)	-0.135 (0.176)	-0.126 (0.155)	0.177 (0.343)
Country dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	4361	806	1880	1267	408
R ²	0.429	0.320	0.481	0.499	0.563
Notes: * Coefficient is statistically significant at the 10% level; ** at the 5% level; *** at the 1% level; no asterisk means the coefficient is not different from zero with statistical significance. Robust standard errors in parentheses. § Micro firms are not considered because of the presence of very few exporting firms. # means perfect collinearity IMR= Inverse Mills Ratio					

We test also the same production function for the subsample of exporting firms by substituting the dummy variable for exports with a continuous variable (i.e., the value of sales exported directly). Of course, in this case, we need first to address the issue of sample selection since the subsample of exporting firms is not random. To this end, we apply an Heckman two-step procedure, i.e., we run prior to the main equation a probit selection equation that takes into account the fact that the

dependent variable is observed only for the sub-sample of exporting firms.¹⁴ Table 3 reports the estimates restricted to the exporting firms and confirms the strong positive relationship between productivity and export performance in our sample of LAC firms.

In the absence of panel data, our base model cannot avoid further bias due to unobserved characteristics that are correlated with both firm characteristics and productivity. In order to soften this shortcoming, we provide additional empirical estimates by controlling for endogeneity bias in the relationship between firm productivity and exports. To this end, we provide two alternative empirical strategies: the Instrumental Variable regression with the Two-Stage Least-Squares (IV-2SLS) and the Control Function (CF) approach.¹⁵ From the WBES dataset we select additional explanatory firm-level variables that are supposed to be correlated with gross exports but not with domestic productivity and use them as excluded instruments.¹⁶ Unfortunately, these additional variables are not always available and we can provide these controls only for a sub-set of LAC firms.

The outcomes of both the IV-2SLS and CF estimates are reported in Table 4.¹⁷ As can be seen in the first column of the table, the IV outcomes for our sub-sample of LAC firms are still robust,

¹⁴ Since we are fully aware of the selection mechanism, we easily identify selection in exporting by looking at the following exclusion restrictions: firm size and international linkages. This latter is proxied by the presence of foreign ownership (i.e. firm with at least 10% ownership held by private foreign investors). The selection equation estimates are then used to construct a proxy of the nonselection hazard, the so-called "Inverse Mills ratio" (IMR) term, defined as $\lambda_i = \frac{\phi[x_i'\beta]}{\Phi[x_i'\beta]}$ (Wooldridge, 2010). This term is then included in the main equation regression where only the truncated dependent variable is considered to derive the so-called "selection coefficient" (θ_{IMR}). A simple t-test of whether $H_0: \theta_{IMR} = 0$ is a workable test for sample selectivity bias. Note that because the IMR is a non-linear function of the variables included in the first-stage model, then the second-stage equation is identified because of this non-linearity also when there is no "exclusion restriction" (i.e., $Z=X$).

¹⁵ Different from the IV technique, the CF approach controls for the likely endogeneity bias by directly adding the estimated residual of a first stage equation (ρ) into the main regression. This residual is by definition uncorrelated with the endogenous variable and provides an unbiased CF estimator that is generally more precise than the IV estimator (Wooldridge, 2010).

¹⁶ As the main excluded instrument in our analysis we use the following variable: "average time to clear imports from customs (in days)". With respect to other options it is characterised by a sufficient number of observations and proves to be the most relevant instrument for the value of exports. It can be argued that better performing firms are more likely to better prepare trade documents and shipments and thereby spend less time in customs or in getting a license. However, in our case, the weak correlation between firm labour productivity and the above instrument confirms that these trade obstacles are more related to causes that are external to firms (e.g., procedures, institutional efficiency, etc.). Because of the sample selection, the IMR from the selection equation has been also added as excluded instrument in the first stage regression.

¹⁷ Due to space limitations, the first stage estimates are not reported in the table but can be provided by the authors upon request.

significant and consistent with the theory.¹⁸ The CF outcomes reported in the second column of Table 4 show also consistent results.¹⁹ As for the main focus of our empirical analysis, the positive relationship between the values of exports and productivity is still significant, even if, as expected, smaller in magnitude. This shows that this relationship seems not to be driven by reverse causality. The IV and CF robustness' tests conclude the first part of our empirical analysis and are suggestive of a positive causal relationship between exports and productivity for our sample of LAC firms, once controlled for sample selection, firms' characteristics and reverse causality. This empirical outcome is consistent with the literature, showing that exporting firms are, on average and *ceteris paribus*, more productive than non-exporters. This is the background of the second step of our empirical analysis. The latter looks more directly at the effect of firm involvement in GVCs (participation and position) on their productivity.

Table 4. Instrumental Variables 2SLS and CF (sample restricted to exporting firms)

Dependent Variable: (ln) Labour Productivity	(1) H-IV	(2) H-CF
(ln) K intensity	0.134*** (0.0172)	0.136*** (0.0154)
Human K	0.00997*** (0.00125)	0.0109*** (0.00137)
Tech.innovation (yes=1)	0.380** (0.160)	0.448* (0.267)
(ln) Export value	0.0891*** (0.0183)	0.0806*** (0.0196)
ρ		0.0999*** (0.0243)
Constant	8.063*** (0.290)	8.076*** (0.273)
Country dummies	Yes	Yes
Industry dummies	Yes	Yes
Observations	1026	1026
R ²	0.505	0.526
<i>Instruments</i>	2	2
<i>Wooldridge's robust score test (prob>z)</i>	0.08	
<i>Prob > F</i>	0.00	
<i>Minimum eigenvalue statistic</i>	301.68	
<i>Shea's adjusted partial R²</i>	0.305	

Notes: * Coefficient is statistically significant at the 10% level; ** at the 5% level; *** at the 1% level; no asterisk means the coefficient is not different from zero with statistical significance. Bootstrapped standard errors in parentheses.

¹⁸ Concerning the validity of the excluded instruments, the Wooldridge's score test for over-identifying restrictions (robust to heteroscedasticity) does not reject the null hypothesis that our instruments are valid at the 5% significance level and the Angrist-Pischke (AP) F-statistics strongly rejects the null of weak instruments. Furthermore, the Stock and Yogo minimum eigen value statistic is high, and the Shea's adjusted partial R² statistic shows that our instruments add enough information in the first stage equation

¹⁹ Please acknowledge that the residuals in the main equation ρ actually depend on the sampling error in the first stage equation unless ρ is equal to zero.

This further assessment is more challenging and never investigated by the previous literature. To this end, as a preliminary test, we add as a regressor a firm level proxy for GVC participation, namely the percentage of material inputs and supplies of foreign origin. As can be seen in the first column of Table 5 our firm level proxy for GVC participation is also positively and significantly correlated with firm productivity, *ceteris paribus*, once controlling for selection bias and possible reverse causality. This suggests that only looking at the relationship between productivity and exports, as traditionally done in the literature, presents the risk of underestimating the key issue of firms' participation to GVCs (i.e., a risk of omitted variable bias).

Table 5. Instrumental Variables CF with firm level proxy for GVC participation (sample restricted to exporting firms)

Dependent Variable: (ln) Labour Productivity	(1) H-CF	(2) H-CF
(ln) K intensity	0.122*** (0.0149)	0.106*** (0.0258)
Human K	0.0107*** (0.00127)	0.00717***
Tech.innovation (yes=1)	0.431*** (0.158)	(0.00191)
(ln) Export value	0.106*** (0.0147)	0.170*** (0.0216)
ρ	0.106*** (0.0187)	0.0350 (0.0248)
% of foreign inputs	0.00245*** (0.000614)	
(ln) GVC participation		0.122*** (0.0373)
GVC position		0.145** (0.0717)
Constant	7.864*** (0.254)	6.543*** (0.365)
Country dummies	Yes	Yes
Industry dummies	Yes	No
Observations	1320	549
R^2	0.543	0.496
Instruments	2	2

Notes: * Coefficient is statistically significant at the 10% level; ** at the 5% level; *** at the 1% level; no asterisk means the coefficient is not different from zero with statistical significance. Bootstrapped standard errors in parentheses.
The GVC position indicator is computed as follows: $\ln(1+IVA) - \ln(1+FVA)$.

Although the firm level variable used in this exercise can be considered a proxy of firms GVC integration, it does not provide any insights on the foreign value added content of exports and on the related measures of GVC performance in terms of participation/position. To include also this key issue in our empirical analysis, we rely on the GVC participation and position indicators derived from the Koopman et al. (2011)'s decomposition (see section 3). Unfortunately these GVC indices, computed by using the TiVA dataset, are available only at the industry level. To use them in our

empirical analysis we are forced to constrain the coefficients of GVC indicators to be the same across industries. This implies assuming that firm performance in value added trade is heterogeneous across industries but homogeneous within them. We believe this assumption is consistent with the high level of aggregation of TiVA industry data. It is also consistent with detailed investigations at the industry level that show a very low degree of firm heterogeneity across sector functions in the LAC region (Gereffi et al, 2005; Pietrobelli and Rabellotti, 2011). On top of that, we empirically test this assumption by applying a Levine test that confirms, on average, that we can reject the null hypothesis that the “within variances” of the set of firm-level characteristics across industries are equal.²⁰ This strongly supports our approach to extend TiVA data computed at the industry level to the firm-level.

Unfortunately, due to data constraints, we can run the latter empirical estimates only for a restricted sample of exporting firms from the following LAC countries: Argentina, Chile, and Mexico. The second column of Table 5 presents the outcomes of the estimates using the GVCs indices by industries derived from the Koopman et al. (2011) decomposition. The results are fully consistent with our previous empirical exercises: the coefficients of the base model are all significant and show the expected signs, included the value of exports. GVC participation is positively correlated with firms’ productivity. In other words, there appears to be an additional and heterogeneous impact on firm productivity in clustering firms by trade in value added once the causal impact of gross exports and possible selection bias are controlled for. These outcomes suggest that the position of the industry in the GVC matters as well. Hence, firms operating in manufacturing industries that export added value in the form of intermediates used in other countries’ exports tend to be more productive than firms operating in manufacturing industries whose value added comes primarily from imported inputs. It is worth stressing that these outcomes are derived after controlling for countries’ influences, firms’ characteristics, sample selection and reverse causality. The results show the relevance of the “learning by supplying” hypothesis emphasised by the theoretical literature. In other words, GVC integration appears to be associated to a productivity premium that refers to the factors underlined by the international business literature that are associated to GVC integration and that influence firms’ productivity in developing countries (e.g., managerial expertise). Hence, our empirical evidence for the LAC region confirms earlier literature that some opportunities for learning and upgrading from GVC integration appear to be at play.

6. Conclusions

²⁰ The Levine test is similar to the standard Anova test but less sensitive to the violation of normality assumption. The conventional Levine’s test strongly rejects the null hypothesis both when centered at the mean (with $Pr > F = 0.004$) and when centered at the median (with $Pr > F = 0.009$).

In this paper we have addressed two key research questions: i) Are firms characterised by international linkages more productive than firms that are not? ii) Are firms integrated in GVCs even more productive? Our empirical analysis provided a positive answer to both questions together with a richer picture of the relationship between firm performance and country/industry involvement in international production networks in the LAC region. Some of the opportunities for learning and innovation opened by GVCs, and different from exports, appear to be at play in the countries we study in Latin America, as they often involve knowledge exchanges, deeper interactions, and “learning by supplying”.

To obtain this result, we combined the last wave of WBES firm-level data and the OECD–WTO TiVA data to get a comprehensive dataset of firms located in 30 LAC countries. Then, we estimated the relationship between firm international linkages and productivity by using a standard production function extended to international linkages with constant returns to scale Cobb-Douglas technology with labour, capital, and knowledge. We also controlled for heterogeneity among firms (by country, region, and industry), sample selection, firms’ characteristics and reverse causality. Furthermore, for the LAC countries for which TiVA data are available, we ran a final test of the same equation expanded to account for industry GVC participation and position indicators.

Our results confirm a positive causal relationship between international activities and firm performance in the LAC region. Furthermore, they show that the level of involvement in GVCs matters as well. More specifically, our empirical analysis highlights the risk of omitted variable bias for firm level trade analysis in the event of not controlling for the key role of GVC participation and position. The hypothesis that GVC integration offers remarkable potential for relevant knowledge and technology flows and for learning from such exchanges and thereby enhancing productivity is confirmed in our study. Moreover, firms operating in the industries exporting intermediates used in other countries’ exports (upstream in the GVC) tend to be more productive than firms operating in industries whose value-added comes primarily from imported inputs (downstream). This may be explained by the presence of many simple and assembly-type manufacturing activities within the industries that are positioned downstream in GVCs in our sample (e.g. textiles, leather, transport equipment). This empirical outcome reinforces the “learning by supplying” narrative emphasised in the literature, where supplying other often larger or multinational companies offers opportunities for learning and access to knowledge and technology.

Our findings suggest powerful insights for public policies. They force one to rethink the whole approach, and move from considering gross exports to value added exports. This implies, on the one hand, to revise domestic trade policy softening barriers to imports to facilitate access to world-class inputs. On the other hand, to implement more selective industrial policies fostering firms’ ability to effectively exploit the “learning by supplying” opportunities such as improving local firms’ compliance with international quality, legal, labour, health, safety, and environmental standards.

References

- Agostino, M., A. Giunta, J. B. Nugent, D. Scalera, F. Trivieri. 2015. The importance of being a capable supplier: Italian industrial firms in global value chains, *International Small Business Journal*, Vol. 33(7) 708–730, DOI: <https://doi.org/10.1177/0266242613518358>;
- Alcacer, J., and J. Oxley. 2014. Learning by supplying. *Strategic Management Journal*, 35(2), 204–223, DOI: 10.1002/smj.213.
- Alvarez, R., and R. López. 2005. Exporting and performance: Evidence from Chilean plants. *Canadian Journal of Economics* 38(4):1384–400, DOI: 10.1111/j.0008-4085.2005.00329.x.
- Antràs, P., D. Chor, T. Fally, and R. Hillberry. 2012. Measuring the upstreamness of production and trade flows. *American Economic Review* 102(3):412–16, DOI: <https://doi.org/10.1257/aer.102.3.412>.
- Bair, J. 2005. "Global capitalism and commodity chains: Looking back, going forward", *Competition & Change*, Vol. 9, No. 2, pages 153–180, DOI: <https://doi.org/10.1179/102452905X45382>.
- Bair, J., G. Gereffi. 2001. Local clusters in global chains: The causes and consequences of export dynamism in Torreon's blue jeans industry, *World Development* Vol. 29, No. 11, pp. 1885–1903, DOI [http://dx.doi.org/10.1016/S0305-750X\(01\)00075-4](http://dx.doi.org/10.1016/S0305-750X(01)00075-4);
- Baldwin, R. (2013), «Global supply chains: Why they emerged, why they matter, and where they are going» in D. K. Elms and P. Low (eds), *Global value chains in a changing world*, WTO.
- Baldwin, R., and Lopez-Gonzalez, J., 2015. Supply-chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. *The World Economy*, 38(11), 1682–1721, DOI: 10.1111/twec.12189.
- Baldwin, R., and A. Venables. 2013. "Spiders and Snakes: Offshoring and Agglomeration in the Global Economy," *Journal of International Economics*, 90 (2), 245–254, DOI: <http://dx.doi.org/10.1016/j.jinteco.2013.02.005>.
- Baldwin, R. 2014. Trade and Industrialization after Globalization's Second Unbundling: How Building and Joining a Supply Chain Are Different and Why It Matters, in Feenstra R.C and A. M. Taylor (editors) *Globalization in an Age of Crisis: Multilateral Economic Cooperation in the Twenty-First Century*, University of Chicago Press, ISBN: 9780226030753.
- Balié, J., D. Del Prete, E. Magrini, P. Montalbano and S. Nenci. 2017. Agriculture and Food Global Value Chains in Sub-Saharan Africa: Does bilateral trade policy impact on backward and forward participation?. Working Papers Series Sapienza-DiSSE, No. 4/2017. www.diss.uniroma1.it/sites/.../DiSSE_Balieetal_wp4_2017.pdf
- Bazan, L. and L. Navas-Aleman. 2004. The underground revolution in the Sinos Valley: A comparison of upgrading in global and national value-chains. In: Schmitz H (ed.) *Local Enterprises in the Global Economy: Issues of Governance and Upgrading*. Cheltenham: Edward Elgar pp.110–140, ISBN: 978 1 84376 099 3;
- Bernard, A. B., and J. B. Jensen. 1995. Exporters, jobs, and wages in U.S. manufacturing: 1976–1987. *Brookings Papers on Economic Activity. Microeconomics*, 67–119, DOI: 10.2307/2534772.
- Bernard, A. B., and J. B. Jensen. 1999. Exceptional exporter performance: cause, effect, or both? *Journal of International Economics* 47:1–25, [http://dx.doi.org/10.1016/S0022-1996\(98\)00027-0](http://dx.doi.org/10.1016/S0022-1996(98)00027-0).
- Bernard, A., J. Eaton, B. Jensen, and S. Kortum. 2003. Plants and productivity in international trade. *American Economic Review* 93 (4): 1268–90, DOI: <https://doi.org/10.1257/000282803769206296>.
- Blyde, J.S. (Ed.) 2014. Synchronized Factories. Latin America and the Caribbean in the Era of Global Value Chains, Springer, ISBN 978-3-319-09991-0.
- Cattaneo, O., G. Gereffi, S. Miroudot, and D. Taglioni. 2013. Joining, upgrading and being competitive in global value chains: A strategic framework. Policy Research Working Paper 6406. Washington, DC: The World Bank, Available at SSRN: <https://ssrn.com/abstract=2248476>.

- Clerides, S. K., S. Lach, and J. Tybout. 1998. Is learning by exporting important? Micro-dynamic evidence from Colombia, Mexico, and Morocco. *Quarterly Journal of Economics* 113(3):903–47, DOI: <https://doi.org/10.1162/003355398555784>.
- Contreras, O. F., J. Carrillo, and J. Alonso. 2012. Local entrepreneurship within global value chains: A case study in the Mexican automotive industry. *World Development* 40(5):1013–23, DOI: <http://dx.doi.org/10.1016/j.worlddev.2011.11.012>.
- Corredoira R.A. and McDermott G.A., 2014, "Adaptation, bridging and firm upgrading: How non-market institutions and MNCs facilitate knowledge recombination in emerging markets", *Journal of International Business Studies* 45, pp.699–722., DOI: 10.1057/jibs.2014.19.
- Costinot, A., J. Vogel, and S. Wang. 2013. "An Elementary Theory of Global Supply Chains," Review of *Economic Studies*, 80 (1), 109-144, DOI: <https://doi.org/10.1093/restud/rds023>.
- Crespi, G., E. Fernández-Arias, and E. Stein (eds.). 2014. *Rethinking Productive Development: Sound Policies and Institutions for Economic Transformation*. Washington, DC: Palgrave Macmillan for Inter-American Development Bank, ISBN 978-1-137-39399-9.
- De Backer, K. and S. Miroudot, 2014. Mapping Global Value Chains. ECB Working Paper No. 1677. Available at SSRN: <https://ssrn.com/abstract=2436411>.
- De La Cruz, J., R. Koopman, and Z. Wang. 2011. Estimating foreign value-added in Mexico's manufacturing exports. Working Paper No. 2011-04. Washington, DC: U.S. International Trade Commission, <https://www.usitc.gov/publications/332/EC201104A.pdf>.
- De Loecker, J. 2007. Do exports generate higher productivity? Evidence from Slovenia. *Journal of International Economics* 73(1):69–98, DOI: <http://dx.doi.org/10.1016/j.jinteco.2007.03.003>.
- De Loecker, J. 2010. A note on detecting learning by exporting. NBER Working Paper 16548. Cambridge, MA: National Bureau of Economic Research, DOI: 10.3386/w16548.
- Dolan, C. and J. Humphrey. 2000. Governance and trade in fresh vegetables: The impact of UK supermarkets on the African horticulture industry, *Journal of Development Studies* Vol.37, No.2, pp.147–176, DOI: <http://dx.doi.org/10.1080/713600072>.
- Dussel Peters, E. 2003. Ser maquila o no ser maquila, ¿es ésa la pregunta? *Comercio Exterior* 53(4):328–36, <http://revistas.bancomext.gob.mx/rce/magazines/19/4/RCE.pdf>.
- Eliasson, K., Hansson, P., and Lindvert, M., (2012) Do firms learn by exporting or learn to export? Evidence from small and medium-sized enterprises, *Small Business Economics*, 39:453–472, DOI: 10.1007/s11187-010-9314-3.
- Engel, J., 2016. *SACU in Global Value Chains: Measuring GVC integration, position, and performance of Botswana, Lesotho, Namibia, South Africa, and Swaziland*. World Bank: Trade and Competitiveness, <http://documents.worldbank.org/curated/en/702751468187745576/pdf/102987-WP-P149486-Box394848B-PUBLIC-Engel-et-al-SACU-in-GVCs.pdf>.
- Fafchamps, M., S. El Hamine, and A. Zeufack. 2008. Learning to export: Evidence from Moroccan manufacturing. *Journal of African Economies* 17(2):305–55, DOI: <https://doi.org/10.1093/jae/ejm008>.
- Fally, T. 2012. *Production staging: Measurement and facts*. Boulder, CO: University of Colorado, http://are.berkeley.edu/~fally/Papers/Fragmentation_US_Aug_2012.pdf.
- Farole, T., and Winkler, D. (Eds.). (2014). *Making foreign direct investment work for Sub-Saharan Africa: local spillovers and competitiveness in global value chains*. The World Bank, ISBN: 978-1-4648-0126-6.
- Fernandez, A., and A. Isgut. 2005. Learning-by-doing, learning-by-exporting, and productivity: Evidence from Colombia. Policy Research Working Paper 3544. Washington, DC: The World Bank. Available at SSRN: <https://ssrn.com/abstract=695444>

- Fernández-Arias, E. 2014. Productivity and Factor Accumulation in Latin America and the Caribbean: A Database. Departamento de Investigación, Banco Interamericano de Desarrollo, Washington, DC. Available in: http://www.iadb.org/research/pub_desc.cfm?pub_id=DBA-015.
- Frankel J.A., 2010, The Natural Resource Curse: A Survey, NATIONAL BUREAU OF ECONOMIC RESEARCH NBER Working Paper 15836, DOI: 10.3386/w15836.
- Gereffi G., Humphrey J., Kaplinsky R., Sturgeon T.J., 2001, "Introduction: Globalisation, Value Chains and Development", *IDS Bulletin*, Vol. 32, Issue 3, July, pp. 1–8, DOI 10.1111/j.1759-5436.2001.mp32003001.x.
- Gereffi, G. 1994. "The organization of buyer-driven global commodity chains: how US retailers shape overseas production networks", in G. Gereffi and M. Korzeniewicz (eds), *Commodity Chains and Global Capitalism*, Westport, CT: Praeger, pages 95-122, ISBN 0-275-94573-1.
- Gereffi, G. 1999. International trade and industrial upgrading in the apparel commodity chain. *Journal of International Economics*, 48, 37–70, DOI: [http://dx.doi.org/10.1016/S0022-1996\(98\)00075-0](http://dx.doi.org/10.1016/S0022-1996(98)00075-0).
- Gereffi, G., J. Humphrey, and T. Sturgeon. 2005. The governance of global value chains. *Review of International Political Economy* 12(1):78–104, DOI: <http://dx.doi.org/10.1080/09692290500049805>.
- Giovannetti, G., Marvasi, E., and Sanfilippo, M. 2015. Supply chains and the internationalization of small firms. *Small Business Economics*, 44(4), 845-865, DOI: 10.1007/s11187-014-9625-x.
- Girma, S., D. Greenaway, and R. Kneller. 2004. Does exporting increase productivity? A microeconomic analysis of matched firms. *Review of International Economics* 12(5):855–66, DOI: 10.1111/j.1467-9396.2004.00486.x.
- Giuliani, E., C. Pietrobelli, and R. Rabellotti. 2005. Upgrading in global value chains: Lessons from Latin American clusters, *World Development* Vol.33, No.4, pp. 549–573, <http://dx.doi.org/10.1016/j.worlddev.2005.01.002>;
- Grazzi, M., Pietrobelli, C., and Szirmai, A. (2016). Determinants of Enterprise Performance in Latin America and the Caribbean: What Does the Micro-Evidence Tell Us?. In M. Grazzi and C. Pietrobelli (Eds.) *Firm Innovation and Productivity in Latin America and the Caribbean* (pp. 1-36). Palgrave Macmillan US, ISBN 978-1-349-58151-1.
- Greenaway, D., and R. Kneller. 2007. Firm heterogeneity, exporting and foreign direct investment. *Economic Journal* 117(517):134–61, DOI: 10.1111/j.1468-0297.2007.02018.x.
- Greenville, J., Beaujeu, R., and Kawasaki, K. (2016). "GVC participation in the agriculture and food sectors: draft report". OECD Trade and Agriculture Directorate; TAD/TC/CA/WP(2016)1
- Grossman, G. M., and Rossi-Hansberg, E. 2008. Trading tasks: A simple theory of offshoring. *The American Economic Review*, 98(5), 1978-1997, DOI: <https://doi.org/10.1257/aer.98.5.1978>.
- Grossman, G., and E. Helpman. 1991. *Innovation and Growth in the World Economy*. Cambridge, MA: MIT Press, ISBN: 9780262071369.
- Hayakawa, K., T. Machikita, and F. Kimura. 2012. Globalization and productivity: A survey of firm-level analysis. *Journal of Economic Surveys* 26(2):332–50, DOI: 10.1111/j.1467-6419.2010.00653.x.
- Herrigel, G., Wittke, V., and Voskamp, U. 2013. The process of Chinese manufacturing upgrading: Transitioning from unilateral to recursive mutual learning relations. *Global Strategy Journal*, 3(1): 109–125, DOI: 10.1111/j.2042-5805.2012.01046.x.
- Hummels, D., J. Ishii, and K. Yi. 2001. The nature and growth of vertical specialization in world trade. *Journal of International Economics* 54(1):75–96, DOI: [http://dx.doi.org/10.1016/S0022-1996\(00\)00093-3](http://dx.doi.org/10.1016/S0022-1996(00)00093-3).
- Humphrey, J., and Schmitz, H. 2002. How does insertion in global value chains affect upgrading in industrial clusters? *Regional Studies*, 36(9), 1017–1027, DOI: <http://dx.doi.org/10.1080/0034340022000022198>.
- IMF (2015). *Regional economic outlook*. Sub-Saharan Africa, ISBN-13: 978-1-49832-984-2.

- Johnson, R. C., and G. Noguera. 2012a. Accounting for intermediates: Production sharing and trade in value added. *Journal of International Economics* 86:224–36, DOI: <http://dx.doi.org/10.1016/j.jinteco.2011.10.003>.
- Johnson, R. C., and G. Noguera. 2012b. Fragmentation and trade in value added over four decades. NBER Working paper 18186. Cambridge, MA, DOI: 10.3386/w18186.
- Koopman, R., Z. Wang, and S. J. Wei. 2014. Tracing value-added and double counting in gross exports. *American Economic Review* 104(2):459–94, DOI: <https://doi.org/10.1257/aer.104.2.459>.
- Koopman, R., Z. Wang, and S.-J. Wei, 2011. Give credit where credit is due: Tracing value added in global production chains. NBER Working Paper 16426. Cambridge, MA, DOI: 10.3386/w16426.
- Kowalski, P., Gonzalez, J. L., Ragoussis, A., and Ugarte, C. (2015). Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-Related Policies. OECD Trade Policy Papers, No. 179, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5js33lfw0xxn-en>
- Lileeva, A., and D. Trefler. 2010. Improved Access to Foreign Markets Raises Plant-level Productivity...For Some Plants. *The Quarterly Journal of Economics*, 125(3), 1051-1099, DOI: <https://doi.org/10.1162/qjec.2010.125.3.1051>.
- López, R. 2005. Trade and growth: Reconciling the macroeconomic and microeconomic evidence. *Journal of Economic Surveys* 19(4):623–48, DOI: 10.1111/j.0950-0804.2005.00264.x.
- MacDuffie, J. P., and Helper, S. 2006. Collaboration in supply chains: With and without trust. In C. Heckscher, and P. S. Adler (Eds), *The firm as a collaborative community: Reconstructing trust in the knowledge economy*, pp 417–66, Oxford: Oxford University Press, ISBN13: 9780199286034.
- Martins, P. S., and Y. Yang. 2009. The impact of exporting on firm productivity: A meta-analysis of the learning-by-exporting hypothesis. *Review of World Economics* 145:431–45, DOI: 10.1007/s10290-009-0021-6.
- Melitz, M. 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica* 71(6):1695–725, DOI: 10.1111/1468-0262.00467.
- Meyer, K., and Sinani, E. 2009. When and where does foreign direct investment generate positive spillovers? A meta-analysis. *Journal of International Business Studies*, 40(7): 1075–94, DOI: 10.1057/jibs.2008.111.
- Miroudot, S., and A. Ragoussis. 2009. Vertical trade, trade costs and FDI. Trade Policy Working Paper 89. Paris: OECD, DOI: 10.1787/222111384154.
- Montalbano, P., Nenci, S., Salvatici, L. (2015), Trade, Value Chains and Food Security. Background Paper, *The State of Agricultural Commodity Markets 2015-16*, FAO, <http://www.fao.org/3/a-i5220e.pdf>;
- OECD–WTO. 2012. Trade in value-added: Concepts, methodologies, and challenges. Joint OECD–WTO Note. Washington, DC: OECD–WTO, <http://www.oecd.org/sti/ind/49894138.pdf>.
- Pagés, C. (ed.). 2010. *The Age of Productivity: Transforming Economies from the Bottom Up*. Washington, DC: Palgrave Macmillan for Inter-American Development Bank, ISBN 978-0-230-10761-8.
- Park, A., D. Yang, X. Shi, and Y. Jiang. 2010. Exporting and firm performance: Chinese exporters and the Asian financial crisis. *The Review of Economics and Statistics* 92(4):822–42, DOI: 10.1162/REST_a_00033
- Pietrobelli C. and Staritz C., 2017, "Cadenas Globales de Valor y Políticas de Desarrollo", *Desarrollo Económico*, vol. 56, N° 220 (enero-abril).
- Pietrobelli C. and Staritz C., 2013. "Challenges for Global Value Chain Interventions in Latin America", Inter-American Bank, Technical Note No. IDB-TN-548, May, <http://www.iadb.org/projectDocument.cfm?id=38815216>
- Pietrobelli, C. and Rabellotti, R., 2007. *Upgrading to Compete. Global Value Chains, SMEs and Clusters in Latin America*, Cambridge Ma.: Harvard University Press, ISBN 9781597820325.

- Pietrobelli, C., and R. Rabellotti. 2011. Global value chains meet innovation systems: Are there learning opportunities for developing countries? *World Development* 39(7):1261–69, DOI: <http://dx.doi.org/10.1016/j.worlddev.2010.05.013>.
- Porter, M. 1985. *Competitive Advantage: Creating and Sustaining Superior Performance*, New York: The Free Press, ISBN: 978-0684841465.
- Sako, M. 2004. Supplier development at Honda, Nissan and Toyota: Comparative case studies of organizational capability enhancement. *Industrial and Corporate Change*, 13(2): 281–308, DOI: <https://doi.org/10.1093/icc/dth012>.
- Serti, F., and C. Tomasi. 2008. Self-selection and post-entry effects of exports: Evidence from Italian manufacturing firms. *Review of World Economics* 144(4):660–94, DOI: 10.1007/s10290-008-0165-9.
- Singh, T. 2010. Does international trade cause economic growth? A survey. *The World Economy*, 33(11), 1517–1564, DOI: 10.1111/j.1467-9701.2010.01243.x.
- Stehrer, R. 2013. Accounting relations in bilateral value added trade. Working Paper. Vienna: The Vienna Institute for International Economic Studies (WIIW), <https://wiiw.ac.at/accounting-relations-in-bilateral-value-added-trade-dlp-3021.pdf>.
- Taglioni, D. and D., Winkler, 2016. *Making Global Value Chains Work for Development*. International Bank for Reconstruction and Development / The World Bank. ISBN: 978-1-4648-0157-0
- Theyel, N. 2013. Extending open innovation throughout the value chain by small and medium-sized manufacturers, *International Small Business Journal*, Vol. 31, No. 3, pp. 256-274, DOI: <https://doi.org/10.1177/0266242612458517>;
- UNCTAD. various years. *World Investment Report*. Geneva: UNCTAD, http://unctad.org/en/Pages/DIAE/World%20Investment%20Report/World_Investment_Report.aspx.
- Van Biesebroeck, J. 2005. Exporting raises productivity in Sub-Saharan African manufacturing plants. *Journal of International Economics* 67(2):373–91, DOI: <http://dx.doi.org/10.1016/j.jinteco.2004.12.002>.
- Verhoogen, E. A. 2008. Trade, quality upgrading, and wage inequality in the Mexican manufacturing sector. *The Quarterly Journal of Economics*, 123(2), 489-530., DOI: <https://doi.org/10.1162/qjec.2008.123.2.489>.
- Wagner, J. 2007. Exports and productivity: A survey of the evidence from firm-level data. *World Economy* 30(1):60–82, DOI: 10.1111/j.1467-9701.2007.00872.x.
- Wagner, J. 2012. International trade and firm performance: A survey of empirical studies since 2006. *Review of World Economics*, 148(2), 235–267, DOI: 10.1007/s10290-011-0116-8.
- Wang, Z., Wei, S.-J., and Zhu, K. (2013). Quantifying international production sharing at the bilateral and sector levels. NBER Working Paper 19677, DOI: 10.3386/w19677
- Woldesenbet, K., M. Ram, and T. Jones. 2012. Supplying large firms: The role of entrepreneurial and dynamic capabilities in small businesses, *International Small Business Journal* Vol.30, No.5, pp. 493–512, DOI: <https://doi.org/10.1177/0266242611396390>;
- Wooldridge, J. M. 2010. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press, ISBN: 9780262232586.
- Wynarczyk, P., and Watson, R. 2005. Firm growth and supply chain partnerships: An empirical analysis of UK SME subcontractors. *Small Business Economics*, 24, 39–51, DOI: 10.1007/s11187-005-3095-0.

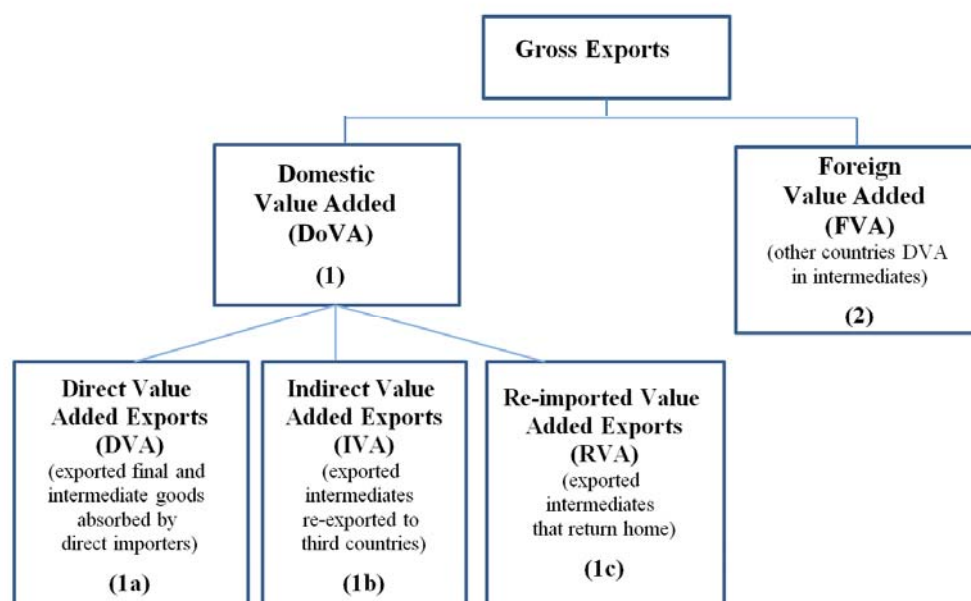
Appendix

According to the methodology proposed by Koopman et al. (2011), gross exports can be decomposed into the following value added components (see Figure 1A):

- *Direct domestic value-added embodied in exports of goods and services (DVA)*, which reflects the direct contribution made by an industry in producing a final or intermediate good or service for export (i.e., value added exported in final goods or in intermediates absorbed by direct importers).
- *Indirect domestic value added embodied in intermediate exports (IVA)*, which reflects the indirect contribution of domestic supplier industries of intermediate goods or services used in the exports of other countries (i.e., value added exported in intermediates re-exported to third countries).
- *Re-imported domestic value added embodied in gross exports (RVA)*, which reflects the domestic value added that was exported in goods and services used to produce the intermediate imports of goods and services used by the industry (i.e., exported intermediates that return home).
- *Foreign value-added embodied in gross exports (FVA)*, which reflects the foreign value added content of intermediate imports embodied in final and intermediate gross exports (i.e., other countries domestic value added in intermediates used in exports).

These terms are complemented by a further component that quantifies the so called “double counting”, i.e., the value of intermediate goods that cross international borders more than once (Koopman et al., 2014). The pure double counted (DC) component reflects the (double counted) values in intermediate goods trade that are originated at home and abroad.

Figure 1A. Gross Export Decomposition in Value Added



Source: Adapted from Koopman et al. (2011).

Table 1A Variables used in the empirical analysis: definition and main descriptive statistics

Variables	Definition	Obs	Mean	CV	Min	Max
(ln) Labor Productivity	(US\$ of 2009) Sales per worker	4422	46,661.49	103.47	133.77	290,552.10
(ln) K intensity (<i>capital intensity</i>)	(US\$ of 2009) Fixed investment per worker	4422	15,785.91	269.69	0.00	1,427,699.00
Human K (<i>human capital</i>)	% of full time permanent workers w/at least a bachelor degree at end of FY09	4422	12.88	131.48	0.00	100.00
Tech.innovation	dummy=1 if firms use technology licensed from a foreign owned company (excluded office software), own internationally recognized quality certification (e.g., ISO), and use own website and/or emails to communicate with clients and suppliers	4422	0.93	26.69	0.00	1.00
Exporter	dummy=1 if direct exports are at least 10% of annual sales	4422	0.23	181.49	0.00	1.00
Exports value	Sales exported directly (million US\$ of 2009))	4422	519.00	0.00	0.01	300,000.00
Firm size	1=Micro (< 10 employees); 2=small (≥ 10 to 50); 3= medium (>50 to 250); 4=large (> 250)	4422	2	38	1	4
Foreign ownership	dummy=1 if at least 10 % of ownership held by private foreign investors	4444	0.11	288.07	0	1
Excluded instrument	Average time to clear imports from customs (days).	643	14.87	133.11	1	210

LAC WBES (2010)

Table 2A - The LAC restricted sample used in the empirical analysis

Country	Firms No.	Country	Firms No.	ISIC activity	Firms No.
Antigua and Barbuda	20	Guyana	58	Basic Metals	610
Argentina	438	Honduras	54	Chemicals & Mine	1021
Bahamas	19	Jamaica	74	Electrical Equip	67
Barbados	44	Mexico	931	Food Products	1051
Belize	60	Nicaragua	64	Machinery	223
Bolivia	31	Panama	25	Other Manufactur	245
Chile	505	Paraguay	67	Textiles & Appar	843
Colombia	476	Peru	477	Transport Equipm	44
Costa Rica	197	St. Kitts & Nevis	14	Wood & Paper	318
Dominica	8	Saint Lucia	46		
Dominican Republic	75	St. Vincent & the Grenadines	37		
Ecuador	84	Suriname	72		
El Salvador	82	Trinidad and Tobago	87		
Grenada	18	Uruguay	162		
Guatemala	197	Total	4422	Total	4422

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