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WHEN LINDER MEETS HIRSCHMAN: INTER-INDUSTRY LINKAGES AND GLOBAL VALUE CHAINS IN BUSINESS SERVICES

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Abstract

The scholarship on Global Value Chains is very recently recognising the increasing importance of fragmentation of production that involves services ? and in particular business services ? offshoring. A predominant stand by scholars emerges in this embryonic domain (Blinder, 2006; Gereffi and Fernandez-Stark, 2010; Ventura, 2014): participation in GVC in business services might be considered a sort of ?third unbundling? of internationalisation of production, which opens up new opportunities for catching up in transition and developing countries. What are the theoretical and empirical bases for such a claim? Do these apply to both developed and developing contexts? Is the occurrence of ?a flat world? (Friedman, 2005) ultimately responsible for a global sectoral structural change involving services? This paper puts forward the conjecture that factor endowments and costs are not the only driver for the emergence of service GVCs and that the specific domestic Hirschman-linked specialisation are of great importance. We empirically test this conjecture on the basis of the WIOD data in a GMM framework. We then draw implications in terms of industrial policy for developing countries on the importance of developing domestic specialisation in business services before joining GVCs as a catching-up strategy.

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ABSTRACT

The scholarship on Global Value Chains is very recently recognising the increasing importance of fragmentation of production that involves services – and in particular business services – offshoring. A predominant stand by scholars emerges in this embryonic domain (Blinder, 2006; Gereffi and Fernandez-Stark, 2010; Ventura, 2014): participation in GVC in business services might be considered a sort of ‘third unbundling’ of internationalisation of production, which opens up new opportunities for catching up in transition and developing countries. What are the theoretical and empirical bases for such a claim? Do these apply to both developed and developing contexts? Is the occurrence of “a flat world” (Friedman, 2005) ultimately responsible for a global sectoral structural change involving services? This paper puts forward the conjecture that factor endowments and costs are not the only driver for the emergence of service GVCs and that the specific domestic Hirschman-linked specialisation are of great importance. We empirically test this conjecture on the basis of the WIOD data in a GMM framework. We then draw implications in terms of industrial policy for developing countries on the importance of developing domestic specialisation in business services before joining GVCs as a catching-up strategy.

KEYWORDS: BUSINESS SERVICES; GLOBAL VALUE CHAINS; HIRSCHMAN LINKAGES; DEVELOPMENT.

JEL CODES: F63; L16; L80; O14.

1. Introduction

International trade scholars are increasingly aware that the unit of analysis of traditional trade theory is changing, from *products* to *tasks* (Grossman and Rossi-Hansberg, 2006, 2008 and 2012; Costinot and Vogel, 2013; Baldwin and Robert-Nicoud, 2014) and the volume and geographical spread of traded tasks are increasing. International fragmentation of production, which implies that countries specialise and trade along portions of the value chain, is a relatively recent phenomenon, involving *offshoring* and *globalisation of value chains* (for recent reviews, see Kaplinsky, 2013; OECD, 2013; Timmer et al., 2013). As put by Baldwin (2011), this process has led to a ‘second unbundling’ of globalisation, transformed the terms of international competition and shifted the barycentre of world’s global headquarters and peripheries (see also Baldwin and López-Gonzalez, 2014).

As it often occurs in the discipline, academic interest in a new phenomenon sparks fierce debates on its determinants and effects. Analysis of the emergence of global value chains (GVCs henceforth) within the landscape of theories of international trade makes no exception. Concerns of scholars spread from the determinants of GVC (Costinot and Vogel, 2013; OECD, 2015) to their effects on labour markets and wages in participating countries (Feenstra and Hanson, 1996; Grossman and Rossi-Hansberg, 2006; Antràs et al., 2006; Timmer et al., 2013; Acemoglu et al., 2014) to the implications in terms of GVCs governance asymmetries between developed and developing countries (Kaplinsky, 2000 and 2013; Gereffi et al., 2005; Schmitz and Strombach, 2009), often with opposite stands when it comes to – for instance – the role of GVCs for the purpose of catching up and development.

Within these debates, the scholarship has so far paid little attention to the increasing importance of fragmentation of production that involves services offshoring. Services have always been considered as non-tradable and generally overlooked in traditional trade statistics (Jones and Kierzkowski, 1990). However, a predominant stand is emerging in this embryonic domain. Participation in GVC in business services is being considered as opening up new opportunities for catching up in transition and developing countries (Blinder, 2006; Gereffi and Fernandez-Stark, 2010, Lema, 2010; Ventura, 2012; Hernandez et al., 2014).

This paper aims to contribute theoretically and empirically to this debate, from a three-fold novel perspective.

First, after briefly reviewing the theoretical and empirical literature on GVCs, particularly on service offshoring, we revert to two alternative voices often neglected in these circles, those of Hirschman (1958) and Linder (1961). In particular, we reprise the theoretical stands by Hirschman and (a modified version of) the Linder Thesis, and consider them jointly to explain the propensity to participate in services offshoring and GVCs, as a competitive explanation with respect to the traditional determinants of cost and factor endowments, that are the backbone of trade theories. Building on the results of our previous work (Meliciani and Savona, 2014), and taking stock of the literature on the economics of services, we claim that the higher the domestic specialisation in ‘Business Services (BS henceforth) Hirschman linked’ industries¹, that are the sectors with the highest intermediate demand of services, the higher the propensity to participate in BS GVCs directly and indirectly, in line with what Linder claimed to be the case for the composition of final domestic demand favouring trade in similar sectors.

Second, we test these conjectures using the World Input Output Data, which we draw upon to construct indicators of GVCs in services, based on Koopman et al., (2010). In addition, we do so within GMM econometric framework, using a pseudo-spatial specification which takes into account the role of specialisation in Hirschman linked industries in the distance-weighted trade partners countries, which represents a further novel contribution of this paper.

Third, we challenge the dominant discourse on the opportunity to favour GVC in BS as a development strategy (see Gereffi and Fernandez-Stark, 2010, and more in general Antràs et al., 2006; Costinot and Vogel, 2013; Grossman and Rossi-Hansberg, 2008, 2012) by claiming that in the absence of a strong domestic presence of Hirschman linked manufacturing industries to BS, it is unlikely that a (developing) country would build a GVC in these sectors from scratch, or upgrade existing low value added services and develop competitive BS to join existing GVCs. We therefore suggest some caution when considering GVC in services as the new panacea for transition countries’ sectoral and technological upgrading.

In doing so, we consider the competing view that GVCs present new opportunities for specialisation without the need of building a service value chain from scratch (Baldwin, 2011, Baldwin and López-Gonzalez, 2014). This implies that Hirschman linkages may increasingly arise *across national boundaries* and therefore lead to participation in BS GVCs, as a result of closeness to ‘headquarters’ nations and regardless the domestic sectoral structure. Reappraising these alternative views is important as they might have different implications in terms of industrial policy, whereby a

¹In Meliciani and Savona (2014) we specifically focus on manufacturing industries with high intermediate demand for services. While we adopt and extend the same framework in this paper, we plan in our research agenda to look at other sets of Hirschman linked industries, like Natural Resources industries.

trade-off between favouring participation in GVCs *versus* industry-wide, domestic industrial policy might arise (Kamiya, 2014).

The remaining of the paper is structured as follows: next section reviews the relevant theoretical and empirical literature and lays out our main argument in the form of testable research hypothesis. Section 3 details the methodology, particularly the indicators that we construct on the basis of the WIOD (World Input Output Tables) data with respect to extant measurements of value chains in the literature. We then discuss econometric results in Section 5 and briefly conclude in Section 6.

2. Trends and theories of GVC in services

2.1 The different phases and geographies of globalization of production

A stream of contributions has tried to empirically account for the emergence of GVCs and the changing nature of trade in the 21st century. Some of these fall squarely within the mainstream trade theory, starting from the assumption that falling transport and communication costs have been responsible for the increased fragmentation of production across national borders. Baldwin (2011) has argued that globalization went through two distinct phases, entailing different processes of fragmentation of production. A ‘first unbundling’, up until the mid-1980s, was mainly determined by plummeting *transportation* costs and involved competition in sectors, where the whole of the supply chain remained *within the national borders*. What caused the “second unbundling”, starting after 1985, was the dramatic drop of *Information and Communication Technology* (ICT) costs, which reinforced the virtual effects started by transport costs and fuelled *offshoring*.

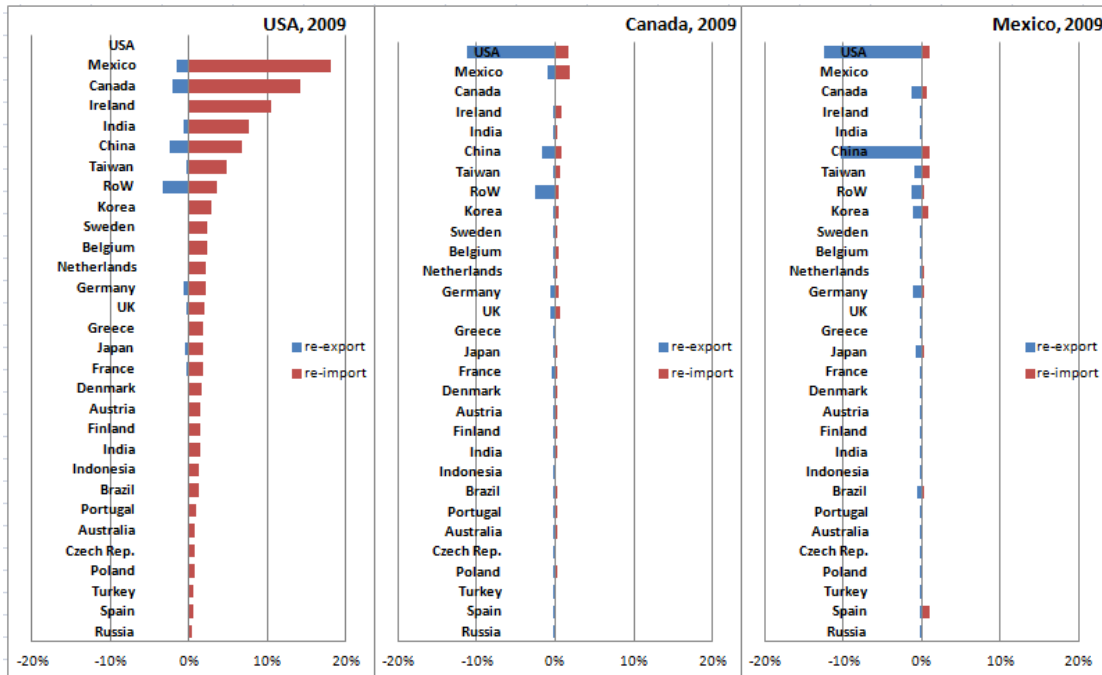
It is this second unbundling that shifted the nature of international competition towards *stages of productions* rather than *products* and favoured the spatial concentration of ‘factory economies’, i.e. developing countries that specialize in the low-tech phases of production chains, around industrialized/developed countries such as US, Japan and Germany, the ‘head-quarters’ centers. Falling costs have mattered therefore in different ways, first for disagglomeration of production and value chains *within* national borders, then for international fragmentation of production and value chains *across* countries (see also Krugman and Venables, 1995). Importantly, it is argued that closeness to ‘head-quarters’ mattered particularly as it favoured the first industrialization of developing countries in the form of *participation* in existing GVCs (rather than *building* them from scratch) (Baldwin, 2011; Baldwin and López-Gonzalez, 2014).

In this context, developing countries start to function as neighbouring ‘factory’ economies, specialising in the low-skilled (manufactured) portion of the value chain where the high-skilled

segments remain within the boundaries of the “headquarter country”. This has been claimed to be a unique occasion for many countries, which were able to industrialise for the first time at virtually a fraction of the time-span that developed countries took to take off (Baldwin, 2011). For instance, countries such as Mexico, close to the US; China, close to Japan; Poland and Turkey, close to Germany, all have increased their participation in GVCs thanks to their closeness to ‘headquarters’.

We actually observe a very interesting pattern of forward and backward linkages between these HQ-factory networks: broadly, Figure 1 below shows, in red, the selling of intermediates to the listed country, and in blue the buying of intermediates from the listed country (we use the negative side of the horizontal axis just to highlight differences not because there are negative sales).² In 'Factory North America' we see that the US has a very diverse set of sales of intermediates but that the neighbouring Mexico predominantly buys from the US. So the patterns of specialisation between these is that Mexico buys intermediates from the US, assembles them into final products and then exports them to American consumers.

Figure 1 – Markets for intermediates across countries, 2009



Source: Baldwin and Lopez-Gonzalez (2014)

These observations beg the question on whether it is proximity to a large HQ economy that matters or whether there is need to develop own capacity internally before, in the form of domestic structure specialised in high BS users sectors.

Overall, as Baldwin (2011, p. 33) puts it:

“The 2nd unbundling made industrialization less meaningful. Before the 2nd unbundling a nation had to have a deep and wide industrial base before it could export, e.g. car engines. Exporting engines was a sign of victory. Now it is a sign that the nation is located in a particular segment of an international value chain”. And, indeed, we would argue, it would most likely be located in one of the “factory economies”.

This evidence has also raised concerns within a different stream of scholarship, interested in the distribution of benefits along the value chains and the income polarisation effects observed as a consequence of value chain globalisation. Kaplinsky (2000), for instance, points to the sources of inequality linked to the spatial distribution of production activities between what we have labelled above as ‘headquarters’ and ‘factory’ economies. It is true, Kaplinsky argues, that being left out by GVCs represents a losing situation. However, the countries that are most likely to ‘lose’ from the globalisation game are also those that do join and keep participating to GVCs at costly conditions. Many of these gain asymmetries are attributable to issues of *governance* (Kaplinsky, 2000; Gereffi et al., 2005). Processes of governance entail *“the role of coordination and the complementary role of identifying dynamic rent opportunities and apportioning roles to key players”* (Kaplinsky, 2000, p. 124).

More in general, it would be important to be aware of the inevitable nexus between being headquarter versus factory economy, the dynamics of rent appropriation along different portions of the value chain and the consequent power structure asymmetries between the actors involved. It is in the dynamics of this nexus that different development scenarios might arise for developing countries, whereby the chance to “kick away the ladder” (Chang, 2003) would most likely be linked to opportunities of technological, economic and social upgrading along phases of the value chain with associate redistribution of rents (Kaplinsky, 2000; Schmitz and Strambach, 2009). This debate needs generalizable, cross-country empirical evidence on the extent of these phenomena, to give content and dimension to the ‘upgrading’ process and derive sound implications in terms of industrial policy. Surely one way to provide generalizable evidence is to go beyond the almost exclusive focus on manufacturing value chains and take into account that the international fragmentation of production is increasingly involving services offshoring.

2.2 A 'third globalisation unbundling'? Evidences on GVCs in services

Both first and second 'unbundling' of globalization refer to manufacturing value chains. However, what is emerging most lately in the GVC literature is the 'servicification' of manufacturing, i.e. the increase in the service content of exports (Komerzcollegium, 2011; Gereffi and Fernandez-Stark, 2010, Hernández, 2014b). For example, CARIS (2014) find that the EU's value added that is used by China to produce exports is mainly in the service sectors, where China is basically engaged in the manufacturing elements of the value chain, particularly in low-skill activities.

The importance of services in general, and business services in particular, is made evident by the significance of these when counted in terms of value added rather than traditional exports as shown in Figures 2 and 3 below. Moreover, amongst the service sectors, it is indeed business services (BS) that have witnessed a steep growth in terms of value added in exports.

There are two key findings, worth highlighting here. The first is the concentration of suppliers of intermediate business services across 'Headquarter economies' such as the US, Germany, the UK as shown in Figure 4 below. The entries mark the value of the row nation sales of BS to the column nation divided by global trade in intermediate business services. The matrix lends support to the idea of a spatial concentration in business services across 'headquarter' economies.

Figure 2 - Share of Gross Exports by Category

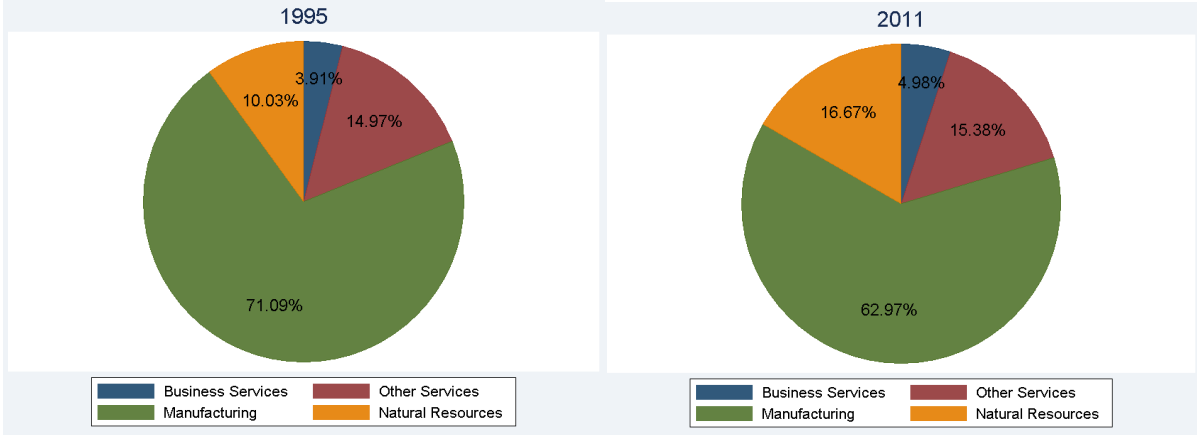
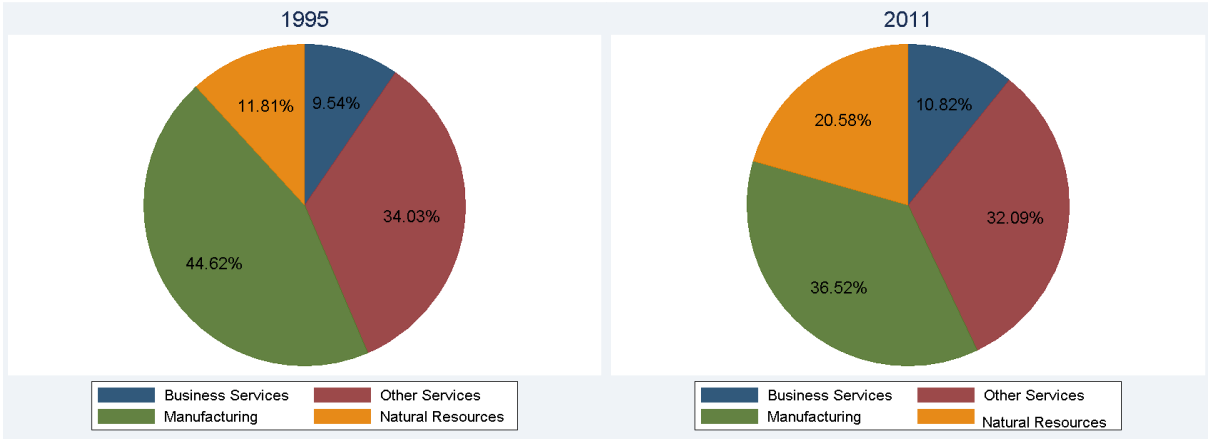


Figure 3 - Share of Value Added by category



Source: Own calculations using WIOD

Note: Gross exports show direct exports across selected sectors. Value added figures show the contribution of each sector towards the creation of these gross exports.

Figure 4 – Business Services Value Added in Export (BSVAE)

Business Services VAE 2011																									TOT						
	GBR	DEU	FRA	ITA	NLD	BEL	AUT	POL	CZE	DNK	ESP	PRT	FIN	GRC	IRL	SWE	TUR	BRA	RUS	AUS	IND	IDN	TWN	CHN		JPN	KOR	USA	MEX	CAN	RoW
GBR					1%	1%									4%												0%			1%	9%
DEU	0%		0%		1%	0%					0%				1%									1%			0%			2%	8%
FRA					1%	0%					0%																0%			1%	3%
ITA																														1%	3%
NLD	0%																													1%	3%
BEL					0%																								0%	2%	
AUT																														0%	1%
POL																															1%
CZE																															1%
DNK																															1%
ESP																															1%
PRT																															1%
FIN																															1%
GRC																															1%
IRL																															1%
SWE																															1%
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RUS																															1%
AUS																															1%
IND					0%																										2%
AUS																															2%
IDN																															1%
TWN																															1%
CHN	0%				1%										1%																8%
JPN																															4%
KOR																															2%
USA	1%	0%	0%		2%	1%					0%				5%	0%										1%			1%	3%	18%
MEX																															1%
CAN																															2%
RoW	1%	1%	1%	1%	2%	1%	1%	0%	1%	1%	3%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	3%	1%	9%	1%	0%	1%	1%	1%	2%	
TOT	5%	3%	3%	2%	9%	6%	2%	1%	1%	1%	3%	0%	1%	14%	4%	1%	1%	1%	1%	1%	3%	1%	9%	1%	9%	1%	6%	1%	1%		

2009 Services																									RoW						
	UK	Germany	France	Italy	Netherlands	Belgium	Austria	Poland	Czech R.	Denmark	Spain	Portugal	Finland	Greece	Ireland	Turkey	Sweden	Brazil	Russia	India	Indonesia	Australia	Taiwan	China		Japan	Korea	US	Mexico	Canada	
UK		1%			0%																						2%		0%	0%	
Germany	0%		0%		0%	1%	0%																				0%			1%	
France																											1%			2%	
Italy																											0%			1%	
Netherlands	0%	0%				0%																					1%			1%	
Belgium		1%	0%		1%																						0%			1%	
Austria		0%																												1%	
Poland																															
Czech R.																															
Denmark																															1%
Spain																															0%
Portugal																															
Finland																															
Greece																															
Ireland																															
Turkey																															
Sweden																											0%				1%
Brazil		0%																													
Russia		1%	0%	0%																											0%
India																															
Indonesia																															
Australia																															1%
Taiwan																										0%					
China																															0%
Japan																															6%
Korea																										1%					1%
US	1%	1%	1%	1%	1%	0%								0%			0%									1%	0%		1%	14%	
Mexico															0%												1%				1%
Canada																											1%				0%
RoW		1%		0%	1%		0%				0%												0%		1%	0%	2%				

Overall, developing countries have been the destination of an increasing volume of standardized Information Technology Outsourcing (ITO), including – ranked in terms of value added – infrastructure management activities, software services such as Enterprise Resource Planning (ERP), only most recently also Software and R&D consultancy. The top segments of offshored services are Business Process Outsourcing (BPO) and Knowledge Process Outsourcing (KPO), which are more intensive in high-skilled human capital and knowledge and typically remain within 'headquarter economies', although it has been argued that in most recent years an increasing trade share of these high-skilled activities (or non-routinised tasks) have involved Latin American countries (for a detailed summary of this evidence, see Gereffi and Fernandez-Stark, 2010; Hernández et al., 2014; for a reappraisal of this literature, see Savona, 2015). This process has been attributed to a combination of decreasing IT costs, increasing opportunities for standardization of typical IT functions – that therefore require less high-skill content – and a very recent drive to look for 'talents' (i.e. creative, not necessarily technologically-related high skills) across the whole world, a drive that for the first time does not exclude the participation of developing countries.

The tone of the emerging discourse seems to depict a rosy picture, in terms of developmental opportunities for 'periphery' countries to join services GVCs, and the role of industrial policy to favour this process (Gereffi and Fernandez-Stark, 2010). However, the reflection on service GVCs is still at its embryonic stage, with much empirical evidence still limited to single industries cases. This would call at least for some cautiousness.

For instance, in a recent contribution, Flecker et al., (2013) have raised doubts about the actual benefits of service offshoring for both the headquarter and recipient countries involved, mainly in relation to the labour market's conditions, idiosyncratic to service value chains. They argue that the vertical disintegration of service labour markets and the lengthening of service value chains might exacerbate those aspects of value exploitation linked to knowledge codification and work intensification, which totally relies on the "knowledge ability of service employees" (Flecker et al., 2013). Those countries that have indeed specialized in offshored services, like India, risk to remain stuck within the 'call center' segment of them, with uncertain opportunities for technological and economic upgrading and any form of economic and social gain from the process (Kaplinsky, 2000 and 2013; Schmitz and Strambach, 2009).

Let us reflect upon the conceptual bases of the empirical evidences reviewed above and their implications.

2.3 When Linder meets Hirschman: A reappraisal of services GVCs

The study of the effects of structural change on economic performance of countries has traditionally brought about concerns about de-industrialization processes and the erosion of capital accumulation in advanced countries³. In some cases, positive expectations on knowledge accumulation and leveraging for the rest of the economy, intrinsic in some business services⁴ and the widespread diffusion of ICTs have counter-balanced this view (for a review, see Gallouj and Savona, 2009; Ciarli et al., 2012; Meliciani and Savona, 2014). The empirical evidence on the emergence of KIBS has often coupled with this rhetoric⁵.

When it comes to patterns of structural change in developing countries, involving shifts from agriculture to low-tech industries and services, the empirical evidence is more controversial (Dasgupta and Singh, 2006; Bah, 2011), and rarely takes into account the global dimensions of structural changes, with notable exceptions (McMillan, Rodrik, and Verduzco-Gallo, 2014). Despite this, the theoretical and empirical debates within trade theory and GVCs scholarship seem to suggest that structural change toward business services in the Global South would be desirable, and eased by joining business service GVCs. By simple extension from the existing evidence on developed countries, scholarly work coming, for instance, from the Inter-American Development Bank or the World Bank (Gereffi and Fernandez-Stark, 2010; Ventura Diaz, 2010; Crespi et al., 2014) seems to point to services as the “next generation engine” to ensure catching up and development.

We have seen above that the increasing involvement of services in GVCs can be considered as a sort of “third unbundling”, equivalent in importance to the processes of tertiarisation that have followed industrialisation in developed countries, occurring now on a global scale. For the purpose of identifying the main determinants of the emergence of service GVCs, we put forward three questions and attempt to provide a testable framework that can answer them:

1. Are the determinants of the first two ‘unbundlings’ also crucial in explaining service GVCs?
2. Is the proximity to large ‘headquarter’ economies that matters the most or do countries need to develop their own capacity internally before joining services GVCs?
3. What are the implications in terms of development opportunities?

³A seminal contribution on the topic remains (Kaldor, 1966), followed by Baumol (1967) and Fuchs (1968).

⁴Classical contributions to the opposite stand – i.e. the optimism toward the progress and ‘third industrial revolution’ are Fourastie (1949) and Bell (1976).

⁵More specifically, concerns about tertiarisation have been *cyclical*: a further evidence of this is the very recent “re-assessment” of the benefits of industry – most likely due to the second public outrage following the tarnish consequences of the latest global financial crisis – as reported in the EC 2013 Competitiveness Report “Towards Knowledge-Driven Re-industrialisation” (EU, 2013).

The basic intuition that we attempt to articulate and test below is that in the absence of a strong domestic presence of Hirschman linked industries to BS, it is unlikely that a (developing) country would construct own or join an existing service GVC, let alone upgrade existing low value added services GVC and develop competitive BS⁶. To support this conjecture, we rely on previous work (Meliciani and Savona, 2014) and propose an alternative framework to service GVCs by reviving two seminal classical contributions to the theory of international trade and economic development, respectively those of Staffan Burenstam Linder and Albert Hirschman⁷.

Both Albert Hirschman (1958) and Staffan Burenstam Linder (1961) represent alternative voices to the mainstream turn that the disciplines of development economics and international trade had taken by the time they produced their seminal contributions (Lundahl, 2006).

In a seminal text on economic development, Hirschman (1958) identifies the structure of sectoral intermediate linkages within regional economies as the main determinant of specialisation and growth polarisation (Hirschman, 1958). According to Hirschman, there are different types of externalities, depending on whether activities are related to one another by forward or backward linkages, i.e. whether certain sectors concentrate where their clients are located or, rather, migrate where new or growing supplier sectors are located. This was a remarkably original stand with respect to the mainstream growth theory based on factor endowments. The development potential of a particular sectoral specialisation and structural change of both regional and national economies had been rarely considered of relevance to make sense of growth polarisation across local and national economies⁸.

The work of Staffan Linder (1961) also emerged as a particularly radical stand against the mainstream trade theory following the Heckscher-Ohlin model. This latter explained foreign trade on the basis of factor endowments differences across countries, so that capital-endowed countries would export capital-intensive goods and reach higher income per capita, with countries relatively labour-endowed would be constrained to specialise in and trade labour-intensive goods. Linder then put forward what it is now known as the “Linder Thesis”, his main contribution to the theory of foreign trade.

⁶In terms of trade-in-task theory, these might harmlessly be associated respectively to “routinized” low-value added services and “non routinized” high value added services, where these latter often overlap with Knowledge Intensive Business Services (KIBS) (quote Consoli et al. new RP paper on taxonomy of tasks and skills) .

⁷While we have no pretense to formalize the framework, we hope that this might stimulate further reflection and research on the topic.

⁸ These intuitions have in some occasions been reprised in the literature (Jones, 1976; see also, more recently, Hausmann et al., 2008), although it is out of the scope of this paper to go more in depth into these.

According to Linder (1961), the Heckscher-Ohlin model was able to explain trade in raw material, though less so trade in manufactured goods. This latter depends on whether a country reaches a certain level of domestic “representative demand” in a particular manufactured good. This benchmark level of domestic demand provides the necessary information from purchasers to producers, which eventually lead them to face competition on the foreign market. Therefore countries with a similar structure of final demand – in turn due to similar per capita income levels - tend to have similar structures of trade specialisation.

A *joint Hirschman-Linder hypothesis* would put back in the picture the importance of the ‘high development’ Hirschman linkages and (a modified version of) the Linder Thesis, referring therefore to both domestic intermediate and final demand and consider them jointly to explain the propensity to enter and remain in services offshoring Global Value Chains (GVC).

As argued above, our belief is that traditional determinants of cost and factor endowments are able to explain less of the recent processes of ‘global structural change’ involving services offshoring. Rather, it might be the structure of domestic intermediate demand for business services and the specialisation in BS Hirschman linked industries, the domestic “representative intermediate demand”, which drive the propensity and the capacity to engage in international value chains in BS, in line with what Linder claimed for final domestic demand.

In what follows we operationalize the joint Hirschman Linder hypothesis by considering traditional variables such as skills, wages and technology, combined with proxies of the domestic of Hirschman-linked manufacturing industries and that of distance-weighted trade partners, to account for the role and spatial distribution of ‘headquarters’ economies. We detail this strategy in next section.

3. Empirical strategy

We synthesize our hypothesis in Equation 1. We take into account the role of technology, human capital and wages to explain countries’ participation in BS GVCs. To these traditional variables, we add our main variables: domestic manufacturing value added in final consumption and domestic BS value added in final consumption. The first variable captures the importance of having a strong domestic manufacturing sector in order to enter global value chains in BS. The second one proxies the presence of strong domestic linkages between BS and other sectors that might favour participation in BS value chains. Both variables test the Linder-Hirschman hypothesis in terms of importance of domestic (intermediate) demand for BS value added in exports.

However, the literature on globalization stresses the fact that in a globalised world domestic demand should matter less and less, as countries operating in global value chains serve global markets. In order to test for this effect, we add to our basic specification manufacturing (or BS) value added in final consumption of distance weighted trade partners. Finally, we take into account the possible existence of sectoral complementarities in participation in global value chains among trade partners by controlling for BS value added in exports of distance weighted trade partners.

Therefore, the general form of the estimated equation is the following:

$$(1) \quad DBSVAE_{it} = \alpha_1 DBSVAE_{i,t-1} + \alpha_2 DBSVAET_{it} + \alpha_3 DDEM_{it} + \alpha_4 DDEMT_{it} + \alpha_5 W_{it} + \alpha_6 HC_{it} + \alpha_7 TECH_{it} + \alpha_i + \alpha_t + v_{it}$$

where $DBSVAE_{it}$ is the BS domestic value added in exports for country i at time t , $DBSVAET$ is BS domestic value added in exports of distance weighted trade partners, $DDEM$ is either domestic manufacturing ($DDEM1$) or domestic BS ($DDEM2$) value in final consumption, $DDEMT$ is either domestic manufacturing or domestic BS value added in final consumption of distance weighted trade partners, W is hourly wages of high skilled workers, HC is the share of direct value added attributed to high skilled labor returns, $TECH$ are patents per capita and Internet users per 100 people, α_i and α_t are country and time period fixed effects. All variables are in logarithms.

In the estimated equation, $DBSVAE_{it}$ is a function of α_i , and so it is $DBSVAE_{i,t-1}$. This makes the Ordinary Least Squares (OLS) estimator biased and inconsistent. The fixed effects (FE) estimator eliminates α_i but will be biased for short time-series since $DBSVAE_{i,t-1}$ will be correlated with the FE-transformed residual by construction. Due to the relatively short time-series of our sample (11 years) we therefore adopt the Arellano-Bond (AB) Generalised Method of Moments (GMM) estimator.

A problem with the original Arellano-Bond estimator is that lagged levels are often poor instruments for first differences, especially for variables that are close to a random walk. Arellano and Bover (1995) described how, if the original equations in levels were added to the system, additional moment conditions could be brought to bear to increase efficiency. In these equations, predetermined and endogenous variables in levels are instrumented with suitable lags of their own first differences. We, therefore, use the system GMM developed by Blundell and Bond (1998) that has been shown to give more reasonable results than first-differenced GMM in the estimation of models with high persistence (Arellano et al. 2001).

The system GMM gives consistent estimates provided that there is no second order serial correlation among the errors, and we report tests for second order autocorrelation. We estimate a robust version of system GMM with heteroscedastic errors and allow our proxies for BS demand to be endogenous.

Data

We use the recently released World Input-Output Database (WIOD - November 2013 release), which covers 40 economies (including all EU-27 countries as well as Australia, Brazil, Canada, China, India, Indonesia, Japan, Korea, Mexico the Russian Federation, Chinese Taipei, Turkey and the US) and a rest of world grouping across 35 sectors (20 of which are services, 11 manufacturing, and 4 primary sectors) and 15 years (yearly from 1995 to 2009). The database has two key components: i) an annual inter-country input-output (ICIO) table; and ii) an accompanying set of Socio Economic Accounts (SEAs).⁹

The ICIO table allows us to track not just the direct linkages within and between countries and sectors but also those that arise indirectly through the growing interconnectedness in trade. The database therefore lends itself to the creation of indicators that capture the extent and nature of GVC participation across different sectors. The SEAs then give us valuable information on the wage bills or indeed the hours worked by labour of different skills within countries which we exploit and combine with indicators of GVC participation so as to test our hypotheses.

We carry out a comparative analysis across several countries at different stages of development to identify whether there are significant differences between developed and transition economies.

Variables

Our choice of indicators is informed by the mushrooming literature on GVCs and is based on ICIO models. The most widely used indicator of GVC participation, and one favoured by the OECD (see OECD, 2013), is the value added content of exports (which we shorten to VAE).¹⁰ It tracks the origin of value added, by country and sector, which is embodied in gross exports generally focusing on the foreign element which is the factor that has witnessed important changes due to the proliferation of GVCs. A variant of this indicator decomposes value added, similarly across countries and sectors, but according to final demand (see Los et al., 2013). Both involve similar

⁹See Timmer (2012). The ICIO has recently been extended to incorporate data till 2011 but the SEAs only go as far as 2009.

¹⁰Based on Hummels et al.'s (2001) vertical specialisation indicator and refined by Koopman et al. (2010).

calculation techniques but the former is solely concerned with exporting activities whereas the latter considers the origin of value added in GDP. The difference is important because domestic final demand and gross export vectors differ significantly. In particular, gross exports are generally dominated by manufacturing sectors that tend to have higher foreign value added contents. In contrast, final demand is dominated by service sectors.

Our interest lies in the determinants of GVC participation in business services. We therefore define our dependent variable as the domestic business service value added in exports (DBSVAE) using the following equation:

$$DBSVAE = V'[I - A]^{-1}EXP$$

Where:

V is an $n \times n$ matrix with n countries ($n = \{1, 2, \dots, 41\}$) and i sectors of activity ($i = \{1, 2, \dots, 35\}$). It is populated with elements $v_{ni} = V_{ni}/Y_{ni}$ capturing the direct value added (V) share of sector i in country n in the output (Y) of the industry across the diagonal (with zeros elsewhere).

The $[I - A]^{-1}$ is the traditional Leontief inverse matrix that captures the inter-linkages within and between sectors across all countries. It is obtained from inverting the product of the subtraction of the technical coefficient matrix (A) with elements $a_{ni} = I_{ni,j}/Y_{ni}$ from the identity matrix (I).

Finally, EXP represents a diagonalised vector of gross exports. The domestic business service element of exports is identified from the individual domestic rows of each country and capture the domestic business service value added that is exported.

Our independent variables aim to capture different domestic and international linkages arising from either manufacturing or business service activities. The domestic demand element differentiates between manufacturing (DDEM1) and business services (DDEM2). Final domestic demand (FD) is calculated taking different elements of the product of the equation below.

$$DDEM = V'[I - A]^{-1}FD$$

The difference between this equation and that of our dependent variable is that we use final demand rather than gross exports. DDEM1 is the sum of the domestic manufacturing rows and therefore captures the manufacturing sector value added whose end use is domestic (where this can include

final consumption by households or government as well as investment (i.e. gross fixed capital formation)). DDEM2 is constructed by taking the domestic business service row.

To capture the potential for international linkages we take the domestic business service value added in exports of foreign countries and weight this by distance to the reporting country - DBSVAET. Finally we do the same but in terms of domestic BS and manufacturing value added in final domestic demand of partner countries.

As controls variable, we use the hourly wage of high-skilled workers which we compute from the SEA's of the WIOD by dividing the wage bill associated to high-skilled labour by the amount of hours worked by high-skill workers.

A glance at pattern of Business Services Value Added in Exports in developed and emerging countries

We employ our indicators to get a picture of potential differences between developed and emerging economies in their patterns of participation to services GVCs and the association between these and their internal and distance-weighted trade-partners specialisation.

For developed countries there seems to be a complementarity between domestic Business Services Value Added in Export (BSVAE) and that of partners (Figures 5 and 6). That is to say that countries with a higher domestic BSVAE share tend to be those closer to larger poles of BSVAE activity, and therefore they cluster together. However this relationship does not hold for emerging economies thereby providing some prima facie evidence that the links between developing a competitive BS sector in emerging economies is not contingent on having strong BS neighbours. In contrast, when we look at the link between domestic BS and domestic linkages (Figure 7) we find that for both developed and emerging countries there is a positive relationship giving credence to the importance of Hirschman linkages.

Figure 5 – Spatial patterns of Business Services Value Added in Export in developed and emerging countries

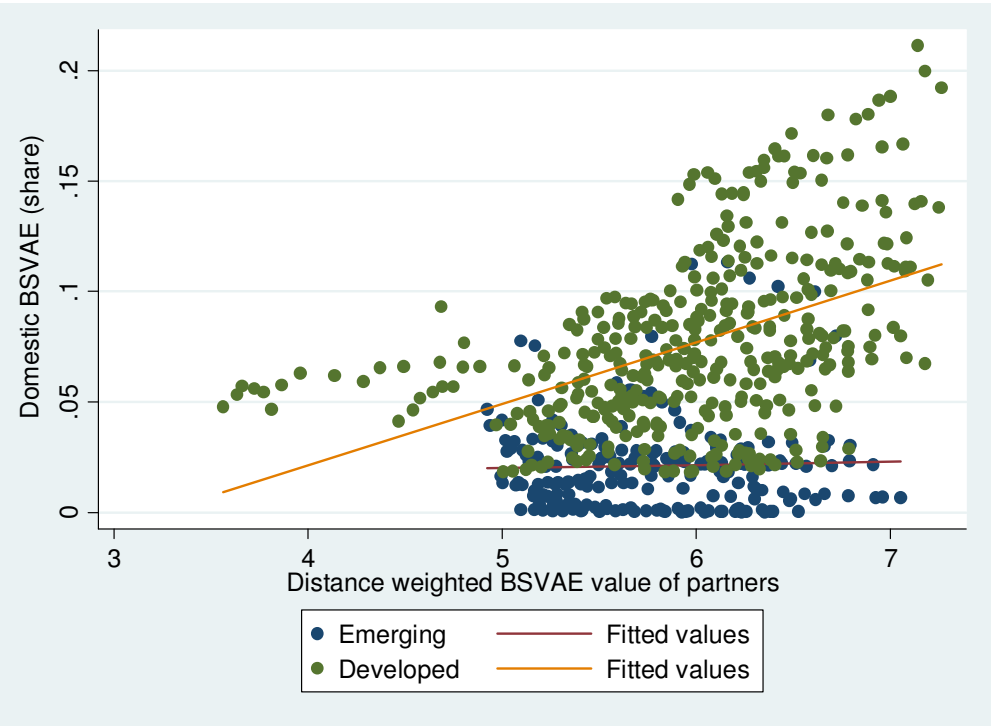
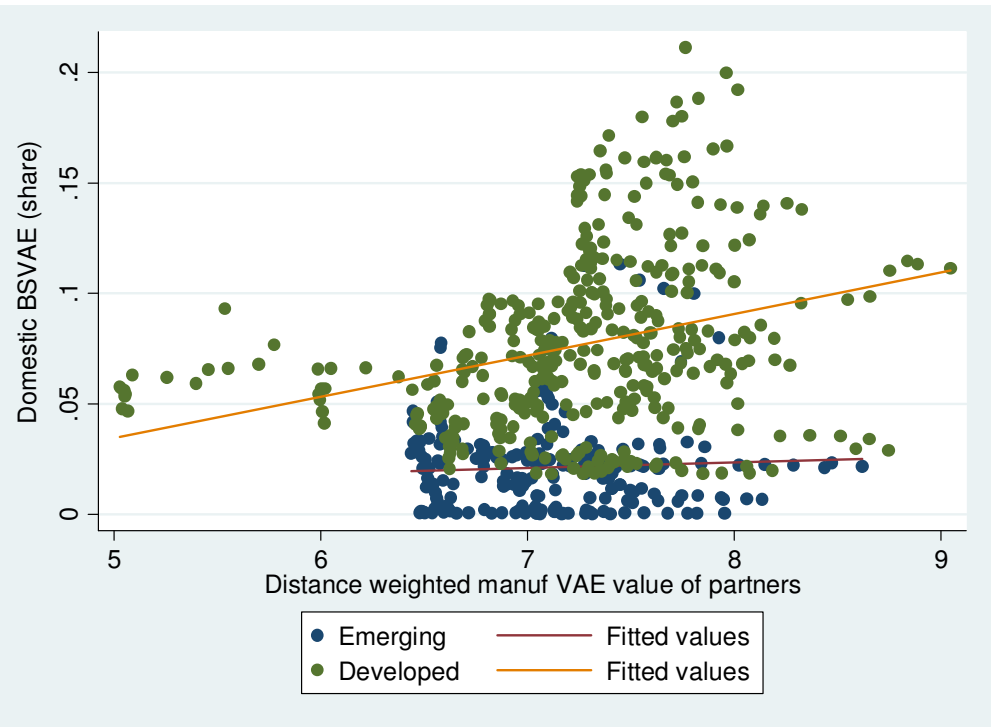
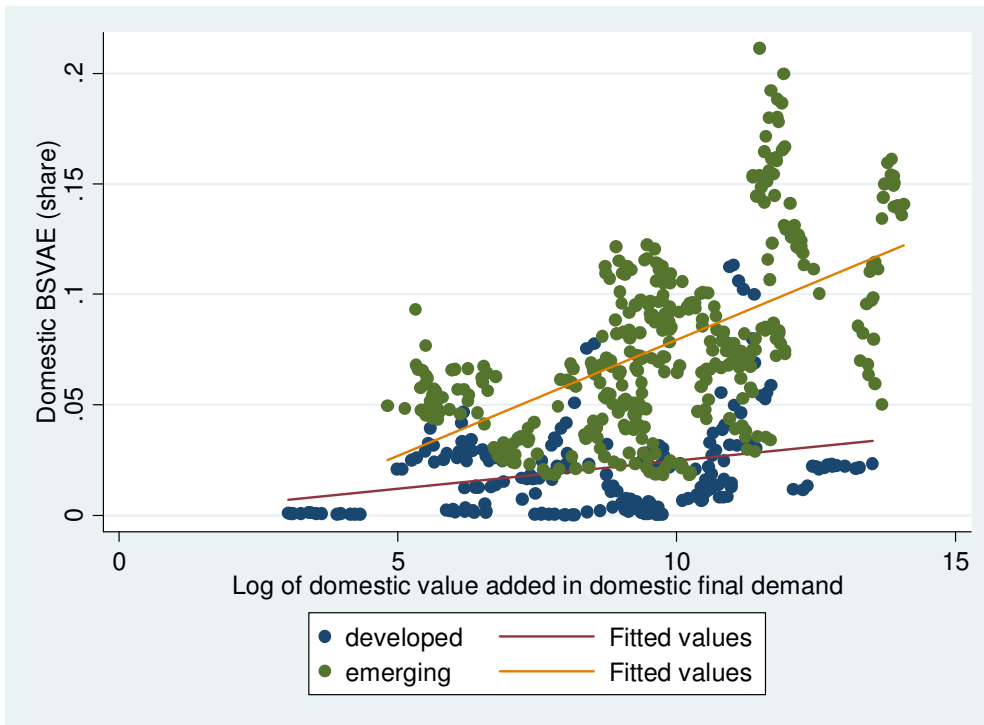


Figure 6 – Spatial patterns of Manufacturing Value Added in Export in developed and emerging countries



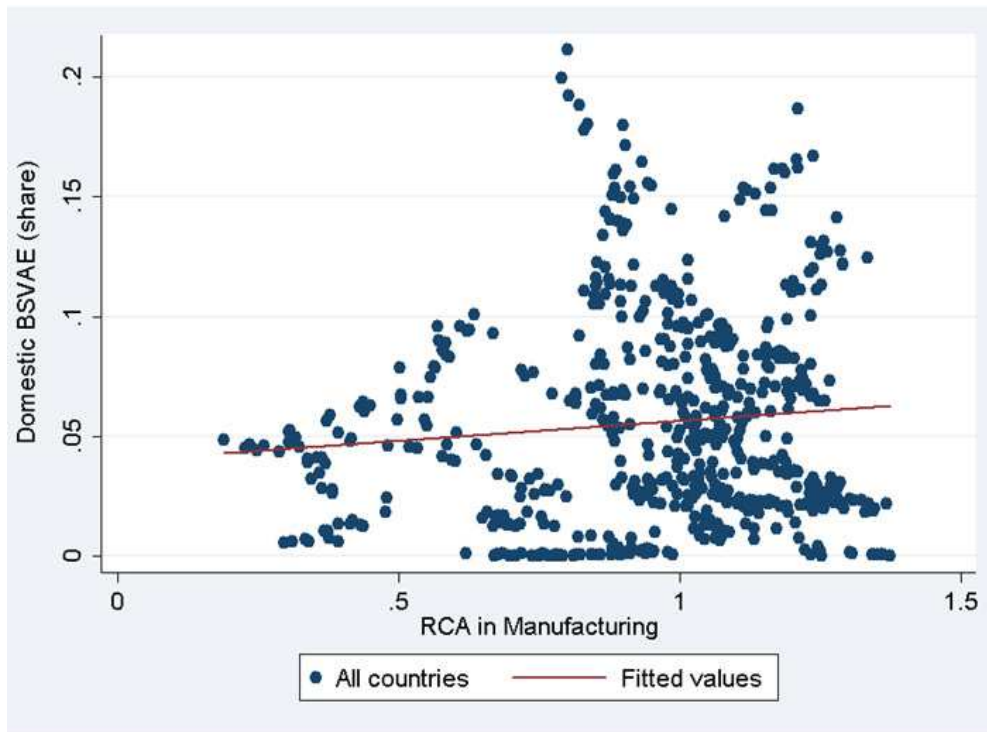
Similarly there seems to be a premium for developed country BSVAE shares where partner manufacturing is concerned, though the relationship with respect to domestic consumption of manufacturing is positive for both (Figure 7).

Figure 7 – Spatial patterns of domestic consumption in domestic value added in developed and emerging countries



Also, evidence that RCA in manufacturing (broadly defined) correlates positively with higher use of domestic BS value added in exports.

Figure 8 – Manufacturing RCA and BSVAE in developed and emerging countries



4. Econometric results

We will first look at regression results for the entire sample of countries including both advanced and emerging economies and then compare the results of the estimations based only on emerging countries. Table 1 reports the results of the estimation for the entire sample. We start from the simpler specification in which we include only variables referred to the typical country (specifications a); we then add first manufacturing (or BS) value added in final consumption of distance weighted trade partners (specifications b) and finally also BS value added in final exports of distance weighted trade partners (specifications c). The equation is estimated first including separately manufacturing value added in final consumption (specifications 1) and BS value added in final consumption (specifications 2) and then including both variables in the regression (specifications 3).

Table 1: System GMM estimations of BS value added in exports for advanced and emerging economies

	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)	(1c)	(2c)	(3c)
BS value added in exports lagged	0.758 (8.43)***	0.705 (6.25)***	0.761 (6.93)***	0.642 (10.37)***	0.616 (5.13)***	0.640 (6.55)***	0.606 (8.19)***	0.522 (3.76)***	0.596 (5.02)***
Manufact. VA in final consumption	0.245 (3.24)***		0.168 (2.09)**	0.500 (6.27)***		0.353 (3.68)***	0.497 (6.58)***		0.234 (1.89)*
BS value added in final consumption		0.311 (3.25)***	0.071 (0.54)		0.492 (4.72)***	0.053 (0.43)		0.529 (5.15)***	0.181 (1.06)
Manuf. VA in final cons. partners				-0.721 (-2.95)***		-0.758 (-5.03)***	-0.963 (-5.12)***		0.161 (0.31)
BS VA in final cons. partners					-0.602 (-3.23)***			-1.267 (-4.14)***	-1.303 (-1.87)*
BS VA in exports partners						1.059 (3.16)***	1.026 (2.10)**	1.933 (2.57)**	1.555 (3.01)***
Per capita patents	0.008 (0.33)	0.024 (1.09)	0.034 (1.16)	0.068 (2.07)**	0.039 (1.30)	0.075 (2.33)**	0.051 (1.52)	0.021 (0.77)	0.062 (2.08)**
Hourly wage of high-skilled	0.080 (0.85)	-0.120 (-1.28)	0.023 (0.31)	-0.124 (-0.98)	-0.246 (-2.51)**	-0.207 (-2.93)***	-0.217 (-2.23)**	-0.369 (-3.31)***	-0.133 (-1.61)
Internet users per 100 people	0.021 (0.61)	0.021 (0.49)	0.002 (0.06)	0.085 (2.29)**	0.071 (1.64)	0.020 (0.57)	0.076 (2.15)**	0.064 (1.56)	-0.004 (0.10)
Share of direct VA attributed to high skilled labor returns	0.431 (2.30)**	0.405 (2.51)**	0.293 (1.64)	0.381 (1.91)*	0.393 (2.32)**	0.301 (1.86)*	0.392 (2.00)**	0.363 (1.98)**	0.307 (1.86)*
Constant	0.456 (0.71)	1.124 (1.81)*	0.773 (1.79)*	5.088 (3.54)***	4.990 (3.89)***	0.446 (0.24)	1.306 (0.48)	-1.343 (0.59)	-0.109 (0.06)
Arellano-Bond test for AR(2)	-1.54	-1.79*	-1.53	-1.71*	-1.92*	-1.55	-1.66*	-1.59	-1.31
Number of observations	460	460	460	460	460	460	460	460	460

Note: Year dummies included but not reported. Standard errors are heteroschedasticity robust. *, ** and *** indicate significant at 10, 5 and 1% respectively

The table shows that manufacturing value added in final consumption plays a crucial positive role in explaining BS value added in exports. The same occurs also for BS value added in final consumption, however when the two variables are introduced simultaneously in the specification, this second proxy of intermediate demand loses significance. The results are robust to the inclusion of variables for distance weighted trade partners and show the relevance of domestic intermediate linkages (particularly between BS and manufacturing) as determinants of participation in BS international value chains. This result is consistent with the evidence of the importance of manufacturing demand for regional specialization in BS (Meliciani and Savona, 2014) and for the capability of European regions to attract BS foreign direct investments (Castellani et al. 2014).

A second interesting result is the negative impact of manufacturing and BS value added in final consumption for distance weighted trade partners. This is somehow at odds with the idea that countries can enter global value chains relying on the demand coming from partner countries also in the absence of a domestic intermediate demand. On the contrary, we find that the presence of

neighbor partner countries with high intermediate demand for BS has a displacing effect on one's country BS value added in exports.

However, there appears to be complementarities in BS value added in exports between neighbor partner countries. This signals that neighbor trade partners tend to specialize in similar segments of the value chain, engaging in intra-industry trade¹¹.

Finally, looking at control variables, not surprisingly the most significant factor in explaining BS value added in exports is the availability of high skilled labor. Patents, ICT and labor costs are significant only in some specifications including also variables referred to distance weighted trade partners, signaling the importance of taking into account of the international structure of demand in order to better disentangle the factors affecting countries' capability to enter in BS global value chains.

Table 2 reports the same estimations but focusing only on emerging economies.

¹¹The net effect of intermediate demand coming from partner countries is therefore ambiguous depending on the strength of the direct negative effect and the indirect positive effect (partner countries demand affects positively their BS value added in exports, which in turn positively affects one country's BS value added in exports).

Table 2: System GMM estimations of BS value added in exports for emerging economies

	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)	(1c)	(2c)	(3c)
BS value added in exports lag 1	0.647 (4.16)***	0.697 (4.61)***	0.738 (4.81)***	0.596 (4.82)***	0.651 (4.24)***	0.703 (5.13)***	0.571 (4.28)***	0.614 (3.48)***	0.665 (4.10)***
BS value added in exports lag 2	0.033 (0.37)	0.004 (0.05)	0.002 (0.01)	0.053 (0.66)	0.009 (0.11)	0.014 (0.14)	0.037 (0.51)	-0.021 (0.27)	-0.012 (0.13)
Manufact. VA in final consumption	0.333 (6.14)***		0.259 (2.96)***	0.428 (7.72)***		0.227 (1.66)*	0.459 (8.03)***		0.222 (1.44)
BS value added in final consumption		0.32 (5.07)***	0.023 (0.17)		0.42 (4.93)***	0.121 (0.8)		0.449 (4.44)***	0.167 (0.87)
Manuf. VA in final cons. partners				-0.409 (1.06)		0.239 (0.41)	-0.973 (2.20)**		0.154 (0.28)
BS VA in final cons. partners					-0.566 (1.71)*	-0.619 (1.12)		-1.36 (2.10)**	-1.295 (1.51)
BS VA in exports partners							1.194 (1.32)	1.676 (1.62)	1.468 (1.41)
Per capita patents	0.053 (1.15)	0.051 (1.42)	0.072 (1.88)*	0.063 (1.26)	0.055 (1.31)	0.088 (2.39)**	0.038 (0.71)	0.04 (0.84)	0.07 (1.91)*
Hourly wage of high-skilled	-0.14 (-1.15)	-0.139 (-1.24)	-0.051 (-0.48)	-0.232 (-2.14)**	-0.213 (-1.66)*	-0.017 (-0.15)	-0.358 (-5.10)***	-0.271 (-1.91)*	-0.104 (-1.26)
Internet users per 100 people	-0.052 (-0.62)	-0.105 (-0.95)	-0.057 (-0.67)	-0.05 (-0.59)	-0.114 (-1.00)	-0.072 (-0.80)	-0.035 (-0.48)	-0.084 (-0.86)	-0.042 (-0.56)
Share of direct VA attributed to high skilled labor returns	0.648 (3.09)***	0.489 (3.28)***	0.496 (4.37)***	0.595 (2.34)**	0.405 (3.06)***	0.36 (3.32)***	0.641 (2.37)**	0.353 (2.39)**	0.314 (2.27)**
Constant	1.122 (3.28)***	2.131 (2.51)**	1.079 (2.78)***	3.473 (1.60)	5.798 (2.22)**	3.011 (2.04)**	0.696 (0.17)	0.578 (0.19)	0.033 (0.01)
Arellano-Bond test for AR(2)	-1.41	-1.65*	-1.32	-1.44	-1.67*	-1.29	-1.41	-1.52	-1.26
Number of observations	163	163	163	163	163	163	163	163	163

Note: Year dummies included but not reported. Standard errors are heteroschedasticity robust. *, ** and *** indicate significant at 10, 5 and 1% respectively

The results on the positive role of domestic and, particularly manufacturing intermediate demand, for BS value added in exports hold also for emerging economies. Similarly, there appears to be a displacing effect by intermediate demand (especially BS value added in consumption) of distance weighted trade partners. The most notable difference between the results obtained for the entire sample and those obtained when focusing only on emerging economies is the lack of significance, for emerging countries, of distance weighted trade partners' BS value added in all specifications. This signals that while neighbor trade partners from advanced countries tend to specialize in similar segments of the value chain, this does not apply to emerging economies. Therefore, for emerging economies, contrary to the common wisdom, is even more important to develop domestic capabilities in sectors that are vertically integrated with BS in order to enter BS global value chains. In the absence of such capabilities, having neighbor partners with high levels of manufacturing (BS) value added in consumption will only have a displacing effect.

Finally, also for emerging economies, the most important factor for increasing BS value added in exports is the availability of a skilled labor force, while patents and high skilled labor remunerations have their expected positive (negative) signs only in some specifications. Surprisingly, Internetpenetration does not appear to discriminate.

We also checked these results by running the same estimations on the manufacturing value added in export (Tables A1 and A2 in Appendix).

5. Concluding remarks

This paper has aimed to add to the recent debate around the development opportunities of joining a service GVC sparked in both academic and policy circles. It has done so from a conceptual and empirical perspective.

Trade theory has moved in the direction of interpreting the emergence of GVC as a change in the object of RCA – now based on *tasks* rather than *products* – while leaving substantially unchanged its determinants, i.e. relative endowment of factors, skills and factors' prices (Antràs et al., 2006; Costinot and Vogel, 2013; Grossman and Rossi-Hansberg, 2008, 2012). From an empirical perspective, factor endowment, skills and relative wages tend to fit with the evidence that some scholars have shown (Baldwin, 2011, Baldwin and López-Gonzalez, 2014): the main driver for a country to participate in (BS) GVCs is the proximity to 'headquarters' nations, which tend to offshore the low segments of services to neighbouring 'factor' economies. This view is consistent with theory and evidences related to the first 'unbundling' of globalisation, the first involving domestic fragmentation of production, the second one related to this occurring at a global scale mainly for manufacturing sectors (Baldwin, 2011).

In parallel, and quite separately, the GVC scholarship produces evidence that tend to support the discourse on the opportunity to favour GVC in BS as a upgrading and development strategy (see Gereffi and Fernandez-Stark, 2010, Hernandez et al., 2014).

This paper has proposed a different framework to explain the emergence of service GVCs, has tested the related conjectures on the basis of TiVA and WIOD data, and drawn different implications in terms of industrial policy, or at least has plead for some cautiousness when considering GVCs in services as a "third unbundling" of globalisation of production.

Taking stock on prior work on structural change, the economics of services and the determinants of specialisation on business services (Ciarli et al., 2012; Meliciani and Savona, 2014), we have

reverted to two alternative voices often neglected in these circles, those of Hirschman (1958) and Linder (1961). In particular, we reprise the theoretical stands by Hirschman and (a modified version of) the Linder Thesis, and consider them jointly to explain the propensity to participate in services offshoring and GVCs. We have claimed and empirically shown that the higher the domestic specialisation in 'Business Services (BS henceforth) Hirschman-linked industries, the higher the propensity to participate in BS GVCs directly and indirectly, in line with what Linder claimed to be the case for the composition of final domestic demand favouring trade in similar sectors.

In particular, our findings show that our joint Hirschman-Linder hypothesis holds for the (WIOD) sample of all countries and, indeed, for the emerging countries only. Most interestingly, when we look at whether the participation in service GVC is driven by the specialisation of close trade partners, we find that this has actually a negative effect, which is at odds with the idea that countries can enter global value chains relying on the demand coming from partner countries regardless their own specialization and specifically the presence of a domestic intermediate demand. This result emerges more clearly for emerging countries, for which it seems that, contrary to the common wisdom, it is even more important to develop domestic capabilities in sectors that are vertically integrated with BS in order to enter BS global value chains.

Overall, we believe that we are in the position of challenging – or at least spark discussion upon – the dominant discourse on the opportunity to favour GVC in BS as a development strategy (see Gereffi and Fernandez-Stark, 2010, and more in general Antràs et al., 2006; Costinot and Vogel, 2013; Grossman and Rossi-Hansberg, 2008, 2012) by claiming that in the absence of a strong domestic presence of Hirschman linked manufacturing industries to BS, it is unlikely that a (developing) country would build a GVC in these sectors from scratch, or upgrade existing low value added services and develop competitive BS to join existing GVCs. We therefore suggest some caution when considering GVC in services as the new panacea for transition countries' sectoral and technological upgrading.

Reappraising these alternative views within the debates on GVC – particularly in services – is important as they might have different implications in terms of industrial policy, whereby a trade-off between favouring participation in GVCs *versus* industry-wide, domestic industrial policy might arise (Kamiya, 2014). This is the key message that some scholars seem to put forward when they look at cases like African countries in contrast to the experience of Latin American countries, where structural changes have brought about gains in productivity but overall loss of employment (McMillan, Rodrik and Verduzco Gallo, 2014).

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Table A1

L.IndommanufVAE	0.633 (4.00)***	0.788 (4.81)***	0.706 (4.78)***	0.562 (3.87)***	0.777 (4.75)***	0.658 (4.25)***	0.440 (2.74)***	0.678 (3.95)***	0.592 (3.71)***
IndommanufVAC	0.337 (2.56)**		0.375 (3.71)***	0.489 (4.41)***		0.351 (3.66)***	0.505 (4.42)***		0.464 (4.03)***
Inpatcap	0.031 (1.64)	-0.008 (0.33)	0.037 (1.95)*	0.062 (2.67)***	-0.007 (0.28)	0.048 (2.07)**	0.044 (2.07)**	-0.037 (1.27)	0.034 (2.00)**
Inwaw_hs	0.048 (0.57)	-0.001 (0.01)	0.139 (1.95)*	-0.057 (0.56)	-0.012 (0.14)	0.170 (1.74)*	-0.105 (1.20)	0.111 (1.27)	0.069 (0.99)
lninternet_users	0.072 (2.09)**	0.163 (3.00)***	0.047 (1.52)	0.103 (3.70)***	0.165 (3.13)***	0.040 (1.12)	0.000 (0.01)	0.094 (1.95)*	-0.002 (0.06)
Intoths	0.200 (1.75)*	0.013 (0.06)	0.066 (0.47)	0.107 (0.70)	-0.026 (0.14)	-0.021 (0.14)	0.305 (1.81)*	0.048 (0.21)	0.086 (0.51)
year96	-0.061 (0.43)	0.386 (2.68)***	-0.087 (0.74)	-0.018 (0.16)	0.324 (1.76)*	-0.541 (1.66)*	1.141 (2.74)***	0.720 (2.32)**	0.750 (1.84)*
year97	-0.159 (1.05)	0.207 (2.30)**	-0.182 (1.31)	-0.151 (1.23)	0.144 (1.04)	-0.601 (1.79)*	1.010 (2.61)***	0.601 (2.26)**	0.631 (1.72)*
year98	-0.078 (0.88)	0.181 (1.78)*	-0.072 (0.96)	-0.130 (1.43)	0.119 (0.84)	-0.460 (1.95)*	1.040 (2.46)**	0.652 (2.12)**	0.716 (1.91)*
year99	-0.073 (0.87)	0.149 (1.51)	-0.064 (0.96)	-0.116 (1.23)	0.094 (0.67)	-0.405 (1.91)*	1.072 (2.55)**	0.669 (2.14)**	0.750 (2.02)**
year00	-0.057 (0.88)	0.121 (1.69)*	-0.027 (0.55)	-0.135 (1.47)	0.064 (0.56)	-0.340 (1.85)*	0.984 (2.44)**	0.639 (2.21)**	0.716 (2.10)**
year01	-0.054 (0.95)	0.071 (0.86)	-0.023 (0.51)	-0.183 (1.86)*	0.014 (0.11)	-0.309 (2.01)**	0.972 (2.37)**	0.675 (2.07)**	0.715 (2.16)**
year02	-0.090 (1.38)	0.039 (0.62)	-0.056 (1.14)	-0.205 (2.00)**	-0.010 (0.10)	-0.297 (1.93)*	0.870 (2.30)**	0.608 (2.10)**	0.643 (2.14)**
year03	0.060 (1.33)	0.160 (3.44)***	0.095 (3.01)***	-0.045 (0.59)	0.116 (1.42)	-0.122 (1.00)	0.787 (2.64)***	0.581 (2.60)***	0.622 (2.62)***
year04	0.041 (0.93)	0.121 (2.70)***	0.064 (1.90)*	-0.017 (0.29)	0.090 (1.32)	-0.107 (1.05)	0.585 (2.71)***	0.396 (2.61)***	0.455 (2.52)**
year05	-0.037 (0.85)	0.030 (0.85)	-0.004 (0.14)	-0.080 (1.58)	0.006 (0.12)	-0.135 (1.61)	0.425 (2.42)**	0.273 (2.16)**	0.331 (2.35)**
year06	-0.008	0.061	0.022	-0.051	0.045	-0.066	0.289	0.216	0.238

year07	(0.27) 0.027	(2.20)** 0.076	(1.00) 0.041	(1.23) 0.015	(1.06) 0.070	(1.17) -0.007	(2.25)** 0.157	(2.36)** 0.117	(2.31)** 0.137
ln-dom-BSVAC	(1.26)	(5.20)*** 0.220	(2.44)** -0.115	(0.68)	(3.91)*** 0.252	(0.19) -0.020	(3.01)***	(3.65)*** 0.238	(2.85)*** -0.104
ln-dom-manuf-VAC _par		(1.50)	(1.51)	-0.393	(1.81)*	(0.19) 0.385	-1.454	(1.85)*	(1.15) -0.958
ln-dom-BSVAC_pa r				(2.23)**	-0.107	(1.24) -0.698	(3.30)***	-0.797	(2.23)** -0.073
ln-dom-manuf-VAE _par					(0.79)	(1.85)*	2.202	(2.69)*** 1.505	(0.24) 1.563
_cons	0.931 (1.56)	-0.434 (0.41)	0.492 (0.91)	3.355 (2.86)***	0.132 (0.09)	2.613 (1.93)*	(2.84)*** -4.157 (1.48)	(2.40)** -5.533 (1.91)*	(2.68)*** -3.525 (1.59)
<i>N</i>	460	460	460	460	460	460	460	460	460

Table A2

L.IndommanufVAE	0.728 (3.40)***	0.902 (4.61)***	0.774 (3.68)***	0.703 (3.41)***	0.908 (4.62)***	0.771 (3.60)***	0.616 (2.90)***	0.883 (5.28)***	0.701 (3.22)***
L2.IndommanufVAE	-0.114 (1.67)*	-0.182 (2.53)**	-0.120 (1.51)	-0.106 (1.53)	-0.180 (2.51)**	-0.127 (1.46)	-0.129 (2.70)***	-0.199 (3.15)***	-0.132 (1.94)*
IndommanufVAC	0.369 (2.89)***		0.458 (3.94)***	0.430 (3.86)***		0.409 (3.20)***	0.438 (3.52)***		0.474 (3.19)***
Inpatcap	0.041 (1.76)*	0.003 (0.12)	0.035 (1.22)	0.037 (1.58)	0.002 (0.10)	0.043 (1.50)	0.011 (0.48)	-0.012 (0.48)	0.002 (0.06)
Inwaw_hs	0.020 (0.18)	0.106 (0.97)	0.088 (0.84)	-0.022 (0.18)	0.108 (0.99)	0.193 (1.52)	-0.050 (0.48)	0.264 (1.97)**	0.085 (0.97)
Ininternet_users	0.002 (0.05)	-0.014 (0.20)	0.050 (0.76)	-0.001 (0.01)	-0.021 (0.27)	0.022 (0.28)	-0.043 (0.63)	-0.058 (0.57)	-0.021 (0.26)
Intoths	0.208 (1.30)	0.030 (0.16)	0.125 (0.79)	0.185 (1.02)	0.070 (0.36)	-0.001 (0.01)	0.173 (0.88)	0.001 (0.00)	0.080 (0.50)
year97	-0.401 (1.42)	-0.400 (0.89)	-0.201 (0.92)	-0.509 (1.98)**		-0.713 (1.96)**	1.518 (2.08)**		1.318 (1.63)
year98	-0.134 (0.86)	-0.098 (0.48)	0.041 (0.22)	-0.251 (1.57)	0.305 (1.07)	-0.374 (1.60)	1.689 (2.09)**	0.347 (1.20)	1.514 (1.74)*
year99	-0.134 (0.90)	-0.095 (0.50)	0.026 (0.15)	-0.225 (1.56)	0.308 (0.94)	-0.333 (1.62)	1.711 (2.12)**	0.365 (1.08)	1.534 (1.78)*
year00	-0.050 (0.35)	0.015 (0.08)	0.119 (0.98)	-0.144 (1.07)	0.420 (1.35)	-0.191 (1.03)	1.612 (2.20)**	0.437 (1.31)	1.506 (2.01)**
year01	-0.028 (0.23)	0.018 (0.12)	0.097 (0.79)	-0.138 (1.21)	0.423 (1.08)	-0.158 (1.19)	1.634 (2.15)**	0.510 (1.20)	1.512 (1.96)**
year02	-0.051 (0.43)	0.057 (0.46)	0.067 (0.75)	-0.149 (1.26)	0.458 (1.11)	-0.128 (1.01)	1.500 (2.16)**	0.474 (1.09)	1.384 (2.00)**
year03	0.089 (0.94)	0.171 (1.58)	0.156 (2.05)**	0.018 (0.22)	0.570 (1.24)	-0.011 (0.12)	1.308 (2.33)**	0.377 (0.84)	1.211 (2.14)**
year04	0.082 (0.93)	0.145 (1.69)*	0.136 (1.82)*	0.022 (0.28)	0.539 (1.13)	-0.011 (0.12)	0.934 (2.28)**	0.099 (0.24)	0.863 (2.06)**
year05	0.030 (0.43)	0.080 (1.04)	0.071 (1.70)*	-0.019 (0.31)	0.470 (1.00)	-0.031 (0.42)	0.765 (2.38)**	-0.018 (0.04)	0.703 (2.23)**

year06	0.018 (0.32)	0.062 (1.03)	0.031 (0.68)	-0.020 (0.36)	0.449 (0.88)	-0.039 (0.67)	0.513 (2.21)**	-0.176 (0.41)	0.467 (2.02)**
year07	0.023 (0.90)	0.055 (2.79)***	0.018 (0.71)	0.016 (0.62)	0.438 (0.80)	-0.033 (0.81)	0.250 (2.57)**	-0.406 (0.93)	0.214 (2.06)**
lndomBSVAC		0.275 (2.33)**	-0.125 (0.91)		0.256 (2.01)**	-0.061 (0.44)		0.172 (1.59)	-0.116 (0.88)
lnwdommanufVAC _par				-0.255 (1.20)		0.628 (1.76)*	-1.850 (2.49)**		-1.464 (1.55)
lnwdomBSVAC_pa r					0.070 (0.29)	-0.825 (2.04)**		-0.679 (2.63)***	-0.101 (0.28)
year08					0.378 (0.67)			-0.557 (1.24)	
lnwdommanufVAE _par							3.042 (2.33)**	1.860 (3.74)***	2.641 (2.08)**
_cons	1.221 (1.96)**	0.454 (0.39)	0.439 (1.04)	2.668 (2.68)***	-0.257 (0.17)	1.675 (1.32)	-8.303 (1.83)*	-7.574 (3.51)***	-8.124 (1.87)*
N	163	163	163	163	163	163	163	163	163