Good at Goods, Bad at Services? The Interaction between Trade in Goods and Trade in Services of China

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Abstract

China is the one of the biggest trade entity in the world. From the perspective of trade volume, trade in goods accounts for more than 90% of China's total volume, while trade in services accounts less than 10%, far below the international average of 20%. The export volume of service trade reflects the competitiveness of China's service industry in foreign trade, which shows that China's service industry is still undeveloped yet. We use non-competitive time series input output table and find that the contribution of service industry in foreign trade has been underestimated given the expression that only the proportion of exports is to be measured. First of all, the proportion of service trade has increased significantly in the by the value added accounting. In 2012 the proportion of service trade accounts for 8.5% of the total exports, and this number increases to 11.3% in the form of value added. Second, from the perspective of the relevance of the industry production, of all the domestic value added stimulated by the exports of goods, service sector contributes more than 30%. Therefore, the importance of trade in services is amplified by the large volume of China's goods export.

Keywords: Domestic Value Added, China's export trade, Trade in goods, Trade in services

1. Introduction

In recent years, China's service sector has already accounted for more than 50% of total GDP. However, in a perspective of foreign trade, the strength of the service sector has not been brought out yet. In 2013, trade in goods accounts for almost 90% in the total trade volume whereas trade in services accounts for only 11.5%. China, despite its large trade volume, is still

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weak in service and relatively good at goods production. This trend seems to be strengthened by the fast growing surplus of trade in goods and deficits of trade in services. The growth rate of trade in services is far lower than that of trade in goods, bringing a decrease for the proportion of trade in services in the total trade volume.

In fact, trade in goods and services are more and more inseparable. The import and export of goods rely on the support of transportation, sale and promotion as well as other services; meanwhile, in the production of goods, design, assemble are the important factors involved in the service industry. On the other hand, service trade also need a variety of products and equipment which is supported by the trade in goods. Examples such as the consumption of towel sheets when hotel service is provided and the consumption of cable when communication service is provided. It can be said that trade in goods and services support each other and get a mutual development.

With the growing international fragmentation of production, the production process for products has been separated into different steps that are performed in different countries. International trade is increasingly dominated by trade in parts and components. The domestic value-added (DVA) and other economic gains from the global value chain (GVC) gradually became a focus for academic institutions, governmental agencies, and international organizations, such as WTO, OECD, and the World Bank. Services are often considered the "glue" in GVCs. The increased use of services in manufacturing, both in terms of production processes and sales, has been described as the "servicification" of manufacturing, also termed "servicizing" or "manuservice" (Low, 2013). In value added terms, accounting for services embodied in exported goods, services account for 40% of world trade (Lanz, Maurer. 2015).

With the prevalence of processing trade, any measurement based on aggregate results combining processing exports and other production could have highly overstated China's economic benefits. Therefore, Lau, Chen *et al.* (2006) developed a non-competitive input-output table capturing processing trade for China (known as DPN table), where the input structures are differentiated for the productions of domestic use, processing exports and normal exports, to study China's DVA of exports. This methodology was subsequently adopted, directly or indirectly. Other researchers used this method mainly to work with how much value-addded in China's exports, or some similar and related topics (Koopman et al. 2008; Dean et

al., 2011; Chen et al., 2012).

China is already the world's largest trade country in goods trade, and trade in services is also an important part, especially when service sector is getting more and more important in Chinas' economy. An analyze in the interaction between trade in goods and trade in services will help to develop accurate trade policy to guide the development of manufacturing industry and service industry, and to better promote the economic restructuring.

2. Methodology of measuring DVA in China's exports with the DPN table

Lau, Chen *et al.* (2006) developed a modified input-output framework (the non-competitive input-output table capturing processing trade, also called the DPN table) for China, where the input structures are differentiated for the productions of domestic use, processing trade and normal trade, to study China's DVA of exports. The framework of the DPN table is shown in Table 1:

Table 1. Non-competitive Input-occupancy Output Table Capturing Processing Trade (DPN Table)

			Intermediate use			Final use					Total output or import
			D	P	N	Consumption	Gross capital formation	Export	Other capital	Total of final use	
Input	Intermediate input of domestic products	D	Z^{DD}	Z^{DP}	Z^{DN}	F^{DC}	F^{DI}	0		F^{D}	X^{D}
		P	0	0	0	0	0	F^{PE}		F^{P}	X^{P}
		N	Z^{ND}	Z^{NP}	Z^{NN}	F^{NC}	F^{NI}	F^{NE}		F^{N}	X^{N}
	Imported products intermediate input		Z^{MD}	Z^{MP}	Z^{MN}	F^{MC}	F^{MI}	0		F^{M}	X^{M}
	Value-added		V^{D}	V^{P}	V^{N}						

	Total input	X^D	X^P	X^N

Note: The superscripts D, P, and N denote the production for domestic use, production for the exports of processing trade and normal trade, respectively.

In the table, X^D, X^P and X^N represent the column vectors of total output of D, P, and N; Z^{DD}, Z^{DP},and Z^{DN} represent products in the production for D as intermediate input by D, P, and N, respectively; Z^{ND}, Z^{NP},and Z^{NN} represent the products of N used as intermediate input by D, P, and N, respectively; Z^{MD}, Z^{MP},and Z^{MN} represent the imported products used as intermediate input by D, P, and N, respectively; F^D, F^P and F^N represent the column vectors of final demand of D, P, and N, respectively; V^D, V^P, and V^N represent the column vectors of value-added for production of D, P, and N, respectively. n is the total number of all sectors in D, P and N.

If we suppose $X=\begin{bmatrix} X^D \\ X^P \\ X^N \end{bmatrix}$, $Z=\begin{bmatrix} Z^{DD} & Z^{DP} & Z^{DN} \\ 0 & 0 & 0 \\ Z^{ND} & Z^{NP} & Z^{NN} \end{bmatrix}$, $F=\begin{bmatrix} F^D \\ F^P \\ F^N \end{bmatrix}$, $V=\begin{bmatrix} V^D \\ V^P \\ V^N \end{bmatrix}$, $M=\begin{bmatrix} Z^{MD} & Z^{MP} & Z^{MN} \end{bmatrix}$, then there are two accounting equations:

$$X = \mu Z + F \tag{1}$$

$$X' = \mu' Z + \mu' M + V' \tag{2}$$

where $\mu' = (1,\ldots,1)$ denotes the summation row vector, a prime is used to indicate transposition.

Define $A=\begin{bmatrix} A_{ij} \end{bmatrix}=\begin{bmatrix} \frac{Z_{ij}}{X_j} \end{bmatrix}=\begin{bmatrix} A^{DD} & A^{DP} & A^{DN} \\ 0 & 0 & 0 \\ A^{ND} & A^{NP} & A^{NN} \end{bmatrix}$ as the matrix of input coefficients, the equation (1) can be written as $X = AX + F$. As same as the standard Leontief model, its solution is given by $X = (I-A)^{-1}F = LF$, where $L \equiv (I-A)^{-1} = (b_{ij})_{n\times n}$ denotes the extended Leontief inverse,

If we define the column vector of value-added coefficients of D, P, and N as A_v,

$A_v^{'} = V^{'}(\hat{X})^{-1} = (A_v^D \quad A_v^P \quad A_v^N)' = (a_{vi})'_{1\times n}$, then we can measure the domestic value-added generated by gross exports (i.e., the DVA of exports) as follows:

$$\mathbf{v} = A_v(I-A)^{-1}E = A_vLE \tag{3}$$

where $E = \begin{bmatrix} 0 \\ F^{PE} \\ F^{NE} \end{bmatrix} = (e_i)_{n\times 1}$ is the column vector of gross exports.

If we want to know the domestic value-added generated by gross exports increased by which specific industries, the vector of value-added coefficients and the vector of gross exports can be diagonalization, namely:

$$\begin{aligned} V &= \hat{A}_v(I-A)^{-1}\hat{E} \\ &= \begin{pmatrix} \hat{A}_v^D & & \\ & \hat{A}_v^P & \\ & & \hat{A}_v^N \end{pmatrix} \begin{pmatrix} (I-A^{DD}) & -A^{DP} & -A^{DN} \\ 0 & I & 0 \\ -A^{ND} & -A^{NP} & (I-A^{NN}) \end{pmatrix}^{-1} \begin{pmatrix} 0 & & \\ & \hat{F}^{PE} & \\ & & \hat{F}^{NE} \end{pmatrix} \\ &= (a_{vi}b_{ij}e_j)_{n\times n} \end{aligned} \tag{4}$$

V is the matrix of domestic value-added generated by gross exports. $a_{vi}b_{ij}e_j$ (elements of the i-th row j-th column in V) represents the domestic value-added in the i-th sector generated by the export of the j-th sector e_j.

The value of the matrix V in the row direction $R_V = \sum_j (a_{vi}b_{ij}e_j)$ represent the domestic value-added generated in i-th sector by the gross export E.

The value of the matrix V in the column direction $C_V = \sum_i (a_{vi}b_{ij}e_j)$ represent the domestic value-added generated by the gross export e_j of the j-th sector.

3. Empirical analysis

3.1 Trade in goods and trade in services accounted in value added

We usually attribute exports of goods and services simply to a certain sector. For example,

we often see the goods exports as the contribution of manufacturing sector and the service exports as the contribution of service sector. It is then a natural way to attribute the large volume of goods exports to the manufacturing sector and to conclude that we have a strong manufacturing sector and a relatively weak service sector in China. But as the development of service sector in the recent years, the situation should have been changed. So a question raised here: is there something wrong with China's service exports?

There are comprehensive linkages between sectors in the GDP, and it is incomplete to attribute exports of goods and services simply to a certain sector. Both he goods produced and the services provided require the support of other sector to supply the final product. Therefore, it is necessary to decompose the total exports volume by the terms of value added and calculate the contribution that each sectors makes, which is in the forms of trade in goods and services, separately.

We can use the total export volume and the value added that each unit of exports contributes to calculate the trade in goods and trade in services in terms of value added.

Table 2. China's exports in gross and DVA terms (2012, in billion $)

	Gross volume	Total DVA	The DVA contents per $1000 exports
Exports	2239.15	1426.64	637.1
Processing trade	862.67	329.95	382.5
Normal trade	1186.04	934.07	787.6
Services trade	190.44	162.61	853.9

We divide trade into three forms: processing trade, normal trade and services trade. As we calculated the value added contribution of the three trade forms separately, we can see that the value added that processing trade contributes is significantly lower than that of normal trade and services trade; the value added that services trade contributes is significantly higher than the processing trade and normal trade, which are the main forms of trade in goods. In 2012, each $1000 of processing trade export contributes to domestic value added by $382.5, and each $1000 of normal trade export contributes to domestic value added by $787.6. In contrast, each $1000 of services trade export contributes to domestic value added by $853.9 and is the highest in all trade forms. That is because the imports embodied in service exports is less than the

imports embodied in good exports, and more domestic products and labor input are consumed in each unit of service exports. Therefore, when calculated in terms of value added, the proportion that trade in services accounts in total exports will increase.

Furthermore, we divide economic sectors to manufacturing sector, service sector and other sector (sectors other than manufacturing sector and service sector, mainly refers to agriculture, forestry, animal husbandry, fishery and mining) and analyze the domestic value added that export trade contributes to each sector in 2012.

Here we carry on our analysis in two perspectives. First, the export proportion of different sectors in terms of value added. This refers to the total service exports including the direct and indirect service consumed in goods exports and the total goods exports including the direct and indirect goods consumed in service exports. Second, the input proportion of different sectors in terms of value added. This refers to the amount of input of different sectors that needed in the process of produce one unit of goods or services.

Table 3. Decomposition of the DVA in exports（2012, in billion $, %）

		Export proportion				Contribution			
		Manufacturing	Service	Others	Total	Manufacturing	Service	Others	Total
Input	Manufacturing	710.23	49.70	2.61	**762.55**	49.8%	3.5%	0.2%	**53.5%**
	Service	230.10	221.88	1.90	**453.89**	16.1%	15.6%	0.1%	**31.8%**
	Others	172.97	24.54	12.71	**210.22**	12.1%	1.7%	0.9%	**14.7%**
	Total	**1113.31**	**296.12**	**17.23**	**1426.65**	**78.0%**	**20.8%**	**1.2%**	**100%**

From the perspective of export proportion of different sectors in terms of value added, in 2012 exports contributes to domestic GDP by $1426.65 billion in terms of value added, including manufacturing sector's contribution of $1113.32 billion which accounts for 78% and service sector's $296.12 billion which accounts for 20.8%. The proportion that manufacturing sector contributes to domestic GDP in terms of value added is significantly lower than that in terms of total trade volume, whereas the proportion that service sector contributes to domestic GDP in terms of value added is significantly higher than that in terms of total trade volume (8.5% in 2013). There are two reasons for this. First, a large proportion in goods exports is the direct and indirect service consumption that is embodied in goods exports. Second, as we mentioned above, the value added that unit services trade contributes is significantly higher than the processing trade and normal trade, which are the main forms of trade in goods. Therefore, the contribute to domestic GDP by service sector in

terms of value added is much more higher than that in terms of total trade volume.

In 2012, the exports value added of $1426.65 billion involved an input by manufacturing sector of $762.55 billion, and an input by service sector of $453.89 billion. It is an input proportion of 53.5% and 31.8%, respectively. From a perspective of the input proportion of different sectors in terms of value added, the fact that input proportion of service sector is higher than 30% demonstrates the important role that service sector plays in international trade. If we see this merely in terms of total trade volume, which is less than 10%, we have definitely underestimated the contributes that service sector made to China's economy.

3.2 Decompose the goods and service that trade in goods and trade in services consumes

3.2.1 The contribution of service sector in trade in goods

Service supports the whole process of goods production and trade. Here we divide service consumption by goods to direct consumption and indirect consumption.

1) Direct consumption

We take a simple example to illustrate direct consumption in goods exports. Produced goods are transported from the factory to the departing export place and then to the destination country, the commercial transport service is needed in the intermediate process. To be specific, the price gap between products' producer price and the export price (FOB price) is created by service sector for its additional commercial value. Usually we trade goods in its FOB price, so part of the trade value actually goes to service sector. This could be seen as direct consumption of service in the process of goods exports.

The average commercial and transportation value various by different types of goods exports trade modes. According to bureau of statistics, there are 2% of commercial value and 2% of transportation value in processing trade export; and about 2.4% of commercial value and 4.3% of transportation value in normal trade export. Because of the higher tax preferences enjoyed by processing trade and the shorter distance from gathering factories to the coastal port, the cost in commercial service and transport is relatively low.

Because of China's large trade volume, a relatively low commercial service and transport cost

would end up with a relatively high direct service consumption in goods exports. It can be estimated that in 2012 among $862.67 billion of processing trade export, $34.52billion was contributed by service sector directly; and among $1186.04 billion of normal trade export, $79.34 billion was contributed by service sector directly. From this point of view, $113.86 billion of actual service exports was comprised in goods exports. Comparing with the $190.04 billion of direct service exports of 2012, the service exports that is comprised in goods exports accounts for almost 60%.

The value added of commercial services and transport is contributed by service sector which has a higher unit contribution to value added. Therefore, when we calculate the contribution that goods exports made to domestic value added, the direct service consumption comprised in goods exports will contribute a higher domestic value added than the traditional calculation of taking goods exports value added as a whole. By our calculation, direct service consumption comprised in processing trade goods exports contribute to domestic value added by 10% of its total value added contribution; and direct service consumption comprised in normal trade goods exports contribute to domestic value added by 11% of its total value added contribution.

2) Indirect consumption

Trade in goods also indirectly stimulating the output of the service sector including production R&D, assemble, transport and other services. We use the industry correlation in input output table and calculate domestic value added contributed by service sector which is indirectly comprised in goods exports to accurately assess the contribution that service sector made to goods exports in China.

As we did before, we divide economic sectors to manufacturing sector, service sector and other sector. By our calculation, in 2012 among each $1000 of total exports contributes to domestic value added by $640, $225 is contributed by service sector, $321 is contributed by manufacturing sector, and $94 is contributed by other sector. In this way, service sector accounted for 35.2%, although still lower than the manufacturing sector contribution rate of 50.1%, but significantly higher than that of 11.3% in term of the proportion in the total export value. This shows that the contribution of service sector to Chinese foreign trade is implicit in the indirect consumption of goods exports.

The contribution that service sector made to the domestic value added varies by the trade forms (processing trade, normal trade and services trade). The productions of processing trade are mainly

assembled by imported parts and its use of domestic productions is relatively less than that of normal trade. In 2012, among every $1000 processing trade exports contributions to domestic value added, 29.0% are from service sector, 63.1% are from manufacturing sector, and 7.9% are from other sector. Among every $1000 normal trade exports contributions to domestic value added, 31.6% are from service sector, higher than that in processing trade, 50.7% are from manufacturing sector and 17.7% are from other sector.

By unit goods exports value added, the service sector contribution rates to dominant segments of different trade forms are also different. Overall, as to the export of normal trade, the service sector contribution rate to its segments would be higher than that of processing trade. Take the segments of manufacturing sector as an example, among every $1000 exports contributes to domestic value added contribution of communications equipment, computers and other electronic equipment manufacturing, the contribution from service sector is relatively high, and we can see more than 30% in both processing trade and normal trade. This is because in this segment the goods production process is relatively complex, service sector consumption is more involved. As for segment of oil processing, coking and nuclear fuel production, every $1000 exports contributes to domestic value added comprises less service sector contribution. That is because production in such segment depend more on the manufacturing sector itself or other sector. For processing trade, among the contribution that unit exports made to domestic value added, 97% is from manufacturing sector; whereas for normal trade, the proportions of contribution from manufacturing sector and other sector of unit export value added contribution are 44% and 39%, respectively.

Table 4 The contribution of industries in value-added of China's manufacture exports, by trade type, by sectors, 2012

	DVA per $1000 of processing exports			DVA per $1000 of normal exports		
	Service	Manufacturing	Others	Service	Manufacturing	Others
Manufacture of food products and tobacco processing	12%	61%	28%	18%	38%	43%
Textile goods	16%	69%	15%	20%	57%	23%
Wearing apparel, leather, furs, down and related products	18%	65%	17%	22%	57%	21%
Sawmills and furniture	23%	58%	19%	25%	54%	21%
Paper and products, printing and	22%	67%	11%	25%	59%	15%

record medium reproduction						
Petroleum processing, coking and nuclear fuel processing	1%	97%	2%	17%	44%	39%
Chemicals	6%	90%	4%	26%	55%	19%
Nonmetal mineral products	24%	59%	16%	28%	53%	19%
Metals smelting and pressing	15%	74%	11%	26%	53%	21%
Metal products	8%	87%	4%	28%	58%	14%
Common and special equipment	13%	81%	6%	26%	63%	11%
Transport equipment	20%	73%	7%	27%	63%	10%
Electric equipment and machinery	25%	65%	10%	29%	59%	13%
Telecommunication equipment, computer and other electronic equipment	30%	63%	7%	33%	59%	9%
Instruments, meters, cultural and office machinery	21%	71%	8%	28%	62%	10%
Other manufacturing products	0%	99%	0%	16%	69%	15%

3.2.2 The contribution of manufacturing sector in trade in services

1) Direct consumption

Like goods exports that comprise direct and indirect service exports, service exports comprises direct and indirect goods exports. A simple example is tourism service exports. According to the statistical principle in the present, spending on goods during tourism is included in tourism trade, which is a large part of trade in services. Although counted in service trade, it is actually the value of trade in goods. We define it as direct consumption comprised in trade in services.

According to our estimation, in 2012 of all the service exports 26.3% is the export of tourism services; and of all tourism service exports, 22.3% are achieved by the sales of goods calculated by according foreign exchange. In this case, about 5.9% of exports of trade in services is reflected in the value of the goods.

Similarly, the goods exports that directly contained in the exports of services can be calculated using input output table. According to our estimations, the domestic value added contributed by the goods exports that is directly included in trade in services is 4.5% of total domestic value added. It is not so high, especially compared with that in terms of total trade volume. The reason is that the contribution made by trade in goods to domestic value added is less than that made by trade in services, as we concluded above.

2) Indirect consumption

The indirect consumption of goods by trade in services refers to the indirect input of manufacturing sector to the trading services. For example, the bed and bedclothes in the hotel service, the tableware consumed in the food services. The growth of service trade also stimulates the output of other sectors. Here we also decompose the contribution to the domestic value added by trade in services to manufacturing sector, service sector and other sector, see table 5. In the service segment that need for more investment in equipment the manufacturing sector contributes a lot to domestic value added in forms of indirect consumption in the export of services. A good example is the construction segment which contains a 35% contribution by manufacturing in each unit of service exports' contribution to domestic value added. Renting and commercial service contains a 24.9% of contribution by manufacturing in each unit of service exports' contribution to domestic value added. On the contrary, in the segment of finance and insurance, as well as the renting and commercial service, which mainly require for human capital investment, the contribution by manufacturing is 7.5% and 7.6% respectively, comparing to almost 90% of service sector contribution in each unit export contribution to domestic value added.

Table 5. The contribution of industries in value-added of China's service exports, by trade type, by sectors, 2012

	Services	Manufacturing	Others
Construction	52.5%	35.0%	12.5%
Transport and warehousing	69.0%	19.4%	11.6%
Post	74.8%	18.6%	6.6%
Information communication, computer service, and software	79.1%	16.2%	4.7%
Wholesale and retail trade	89.3%	7.5%	3.3%
Accommodations, and eating and drinking places	55.3%	20.3%	24.4%
Finance and insurance	88.9%	7.6%	3.5%
Renting and commercial service	65.7%	24.9%	9.5%

Research and experiment development research	64.4%	23.9%	11.7%
Resident services and other services	71.9%	19.8%	8.3%
Culture, sports, and amusements	69.8%	20.9%	9.3%

From the above calculation results we want to state that even if the exports of services rely much on the service sector, manufacturing and other sectors contribute to the domestic value added in an implicit way that should not be neglect. In 2012, 28.1% of all the domestic value added that is contributed by service exports is actually contributed by none-service sector in both direct and indirect way.

4. Conclusion

China, as a huge trading power in the world, has an amazing amount of trade in goods which accounts for more than 90% of the total trade volume. As a contrast, the amount of trade in services accounts for less than 10% of the total trade volume, far below the international average of 20%. However, trade in services usually boost a much more value added than trade in goods does. Therefore, the proportion of trade volume does not capture the whole picture that trade in services contribute to Chinese economy and usually underestimate it. In this paper we find that if the export value added estimates and service exports proportion of total exports accounted for 11%.

In addition, simply accounting the proportion of trade, whether the proportion of total trade volume or value added is still not enough to thoroughly analyze the total economic contribution that trade make to China. The production of goods and services are related to many sectors, so the exports of both goods and consumes both manufacturing sector and service sector. In addition to the export of goods produced by the manufacturing sector, the export of goods also exports services embodied in the production of goods and service has been exported in an indirect way. The additional service in trade in goods refers to the direct consumption of service in business process or transporting that trade in goods need from factory to the port and the indirect consumption of service in the production of goods including design, assemble, and transport. The additional goods in trade in services refers to the direct trade of goods in the tourism services and the indirect consumption of fixed capital investment and so forth. Because of the large amount of trade in goods, the service that actually exported is highly underestimated. We decompose the goods and service that trade in goods and trade in services consumes and draw a clear picture of total export that each

sector actually contributes.

By our calculation, from a perspective of exports proportion, manufacturing sector and service sector accounts for 78% and 21% separately; from a perspective of input proportion, manufacturing sector and service sector accounts for 60% and 32% separately. It can be seen that the traditional measurement of the proportion of total trade volume underestimated the contribution that service sector made to the whole economy.

Reference

[1] Koopman, R., Wang, Z. and Wei, S.-J. (2008) How much of Chinese exports is really made in China? Assessing domestic value-added when processing trade is pervasive, NBER Working Paper 14109.

[2] Dean, J.M., Fung, K.C. and Wang, Z. (2011) Measuring vertical specialization: The case of China, *Review of International Economics*, 19, 609-625

[3] Chen, X., Cheng, Leonard K., Fung, K.C., Lau, Lawrence J., Sung, Yun-Wing., Zhu, K., Yang, C., Pei, J., and Duan. Y., (2012) Domestic value added and employment generated by Chinese exports: A quantitative estimation, *China Economic Review*, 23, 850–864

[4] Lawrence J. Lau, Chen. X, Leonard K. Cheng, K. C. Fung, J. Pei, Yun-Wing Sung, Z. Tang, Y. Xiong, C. Yang and K. Zhu. (2006) Estimates of U. S.-China Trade Balances in Terms of Domestic Value-Added, Stanford Center for International Development, Working Paper No. 295.

[5] Low, P. (2013), The role of services in global value chains, in Elms, D. K., and Low, P. (eds.), Global value chains in a changing world, Geneva: World Trade Organization.

[6] Lanz R, Maurer A. Services and global value chains: Some evidence on servicification of manufacturing and services networks[R]. WTO Staff Working Paper, 2015.