GLOBAL VALUE CHAINS AND LABOUR MARKETS: WAGES, EMPLOYMENT OR BOTH

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Abstract

In this article, we examine the overall effect of GVCs on the labor market outcomes taking into account the potential impact on both employment and wages. We base our analysis on Global Input-Output Database (WIOD, 2016 release) that covers 44 countries and 56 sectors from 2000 to 2014. The GVC involvement is measured by the recently developed by Wang et al. (2017) participation indexes (backward and forward linkages) and GVC position length. The estimates are carried with the usage of three-least squares method. The results indicate that GVC position is negatively correlated both with wages and employment while the effect of GVC participation depends whether backward or forward linkages are considered. We find some country (middle versus high income) and sector heterogeneity

JEL: F14, F16, J31, J21
Keywords: global value chains, employment, wages

1. Introduction

The nexus between global value chains (GVCs) – understood as involvement in international production fragmentation – and labour markets's outcomes is highly disputed theme (see e.g. Global Value Chain Development Report, 2017). Theoretically, it is rooted in Grossman, Rossi-Hansberg (2008) model of wage-offshoring nexus and elaborated e.g. by Wright (2014) to conceptualize the impact on the employment (through displacement, substitution and productive effect). Consequently, empirical analysis usually consists of the assessment of GVCs on the employment (job creation or destruction) of domestic workers (Acemoglu et al., 2016; Harrison and McMillan, 2011; Michel and Rycx, 2012) or their wages (Baumgarten et al., 2013; Ebenstein et al., 2014; Geishecker and Görg, 2013; Hummels et al., 2014; Wolszczak-Derlacz and Parteka, 2018).

Contrary, we examine the overall effect of GVCs on the labor market outcomes taking into account the potential impact on both employment and wages. We base our analysis on Global Input-Output Database (WIOD, 2016 release) that covers 44 countries and 56 sectors from 2000 to 2014. We calculate different measures of production fragmentation based either on import or export decomposition. The first ones relate to the conventional offshoring indices (the ratio of import of intermediate goods to industry output as in Feenstra and Hanson, 1999; Hijzen et al., 2005), but also to global import intensity (GII) in which we are able to trace import needed in different stages of production (Timmer et al., 2016). Then we turn to the decomposition of gross export into foreign value added, domestic value added ad other indices as in Wang et al., 2013. Finally, we employ the measures of the relative production-line position of an industry by approximating its average distance from final use - upstereamness position following Antràs et al. (2012).

We model the potential impact of those different measures of GVCs on labour market outcomes by estimation dynamic seemingly unrelated regressions (DSUR) where the dependent variables are the wage and employment growth. In basic specification we pool all sectors and

countries together (introducing the proper dummies), then we examine the sector and country heterogeneity e.g. manufacturing versus services, EU15 versus CEE. Finally, we compare the estimation for pre- and post-crisis period. In our analysis we also take into account the dichotomy of countries to different wage bargaining schemes as the proxy of labour market institutions' characteristics and e.g. wage rigidness which can be crucial for the channel through which GVCs effects on labour market are materialized: either through wages, employment or both.

2. Data

2.1 New measures of Global value chains (GVC)

In this paper we use measures of GVCs presented in Wang, Wei, Yu and Zhu (2017). As we want to control for particular country-sector involvement in GVC as well as for its position in production chain, we focus mostly on participation and position indices, however, in aforementioned paper one can find a much larger spectrum of characteristics of cross-country production. We adapt methodology provided by Wang et al., 2017[1] to compute GVC characteristics on newest 2016 release of World Input-Output Database (WIOD).

To obtain new GVC measures Wang et al. (2017) start from decomposition of value-added (*VA*) and final production (Y; *fgy*). The former may be decomposed into production of domestically produced and consumed VA, (denoted as *VA_D*); production of VA embodied in final product exports (*VA_T*), and last term denoted as *VA_GVC*. Value-added embodied in final product exports (VA_T) is traditional type of trade where production does not cross borders, and trade has the "Ricardian" character. VA_GVC component is most interesting from our point of view as it is production of VA embodied in exports of intermediate goods and services where domestic VA contributes to foreign country production. Further, VA_GVC might

[1] We base our calculations on the elaborated and adopted R codes provided by Wang et al. 2017 as UIBE GVC Index Team, "Data files structure of the UIBE GVC index system" http://139.129.209.66:8000/d/daedafb854/

be divided into shallow cross country production sharing where intermediates are utylized by direct importers and deeper cross country production sharing where intermediates are either indirectly absorbed by importing country, re-exporting to third countries or finally returned to home country. Similarly, decomposition of final production is done by splitting *Y* into pure domestic production consumed in domestic market (*Y_D*), domestic production embodied in final products exports (*Y_RT)* and domestic and foreign intermediate imports used in final goods production or consumed direcly by source country (*Y_GVC)*.

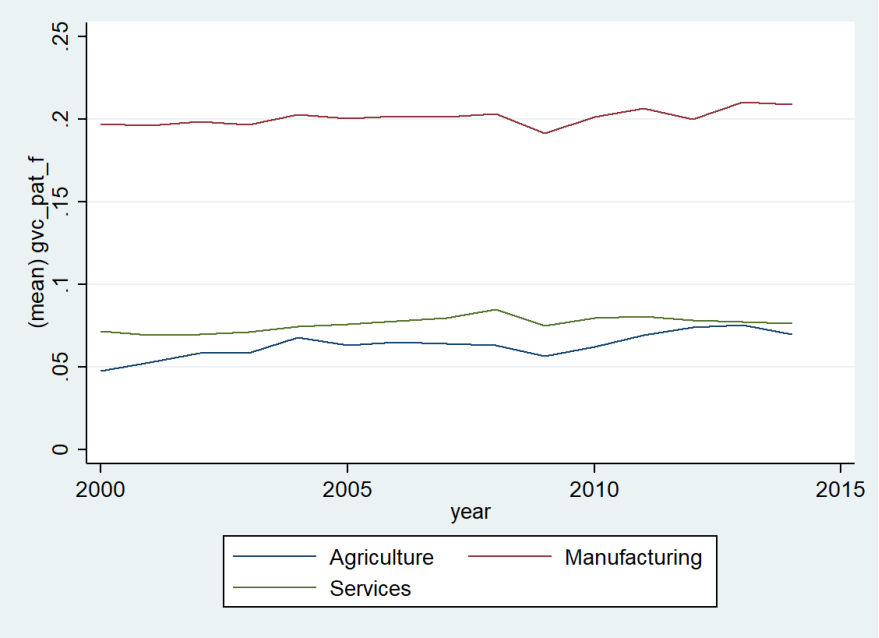
Having both downstream value-added and upstream final production decompositions, Wang et al. (2017) define GVC participation indices, based on forward (*gvc_pat_f)* or backward (*gvc_pat_b)* industrial linkages correspondingly and expressed by formulas:

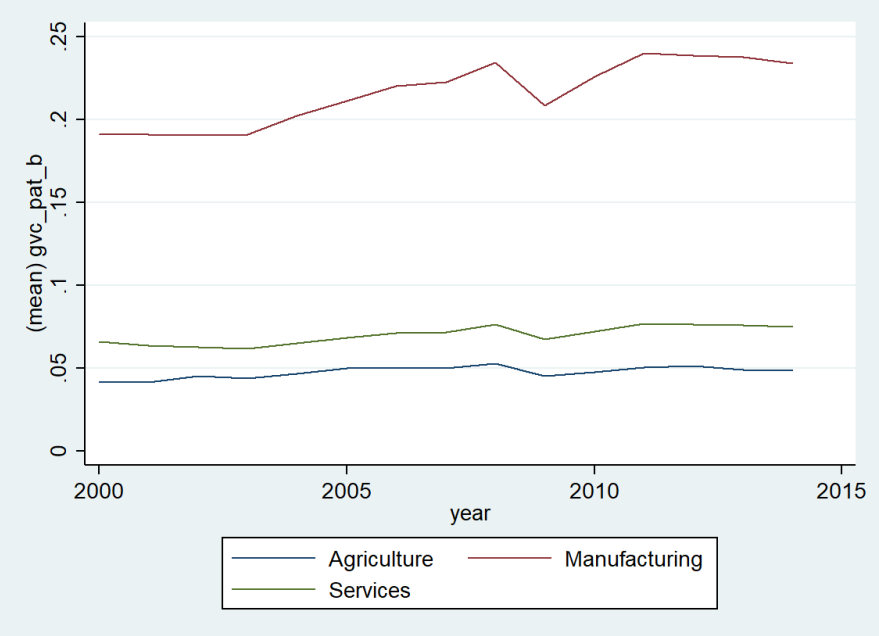
$$GVC\_pat\_f = \frac{VA\_GVC}{VA}\ , \qquad GVC\_pat\_b = \frac{Y\_GVC}{Y} \tag{1}$$

As the authors argue, this new indices describe GVC participation more comprehensive than e.g. vertical specialization (VS, VS1) present in previous works (Wang, Wei & Zhu, 2013), as they do not overlook quite important channels of country-sector involvement in GVC production activities. This channel may be exporting domestic VA embodied in intermediates exports which are used by destination country to produce its domestically consumed final goods and services or using other countries' VA to produce domestically used production. In the idea of GVC participation indices attention is focused not only on trade, but on production, including also domestic production factors involvement in GVC activities of particular industry which were not considered before. Hence, this approach is more precise tool that measures proposed before (eg. ones proposed by Koopman et al., 2014). On the Figure 3A.1 we present changes of forward and backward linkages based indices in period 2000-2014. Data presented are averages weighted by sector size (measured by total hours worked) for three main sectors. For *GVC_pat_f* we do not observe a significant difference between the first and last year of analysis, except the case of Agriculture, where slight increase in share of GVC-related domestic VA in total sector VA is

visible. Regarding downstream decomposition based index (*GVC_pat_b*), clearest increase in GVC participation between 2000 and 2014 (with a drop in global crisis year) is observed for Manufacturing.

Figure 3A.1: GVC participation indices (forward and backward) for Agriculture, Manufacturing and Services in years 2000-2014.





Notes: own elaboration based on Wang et al. (2017) methodology and R codes, using WIOD 2016; averages weighted by total hours works in sector (H_EMPE)

Next important notion elaborated in Wang et al. (2017) is the total production length and its decomposition in similar way as mentioned above. As before, two separate approaches are employed to obtain average production length based on forward or backward linkages respectively:

$$PLv = Gu' , \quad PLy = uL , \tag{2}$$

where *G* is Ghosh inverse matrix, *L* is Leontief inverse matrix (here both calculated on WIOT) and *u* is summation vector (' denotes transposition). These expressions are equivalent to formulas for upstreamness (Fally, 2012; Antras et al., 2012) and downstreamness (Antras & Chor., 2013) respectively, however, derivation of this measures showed in Wang et al. (2017) is different. Production length related to forward linkages (*PLv)* corresponds to "*total value of gross outputs that are related to one unit of value added created by primary input from a particular sector*". This measure can be interpreted as an average number of subsequent production stages related to particular country-sector VA. Analogously, production length related to backward linkages (*PLy)* is expressed by "*total value of inputs induced by a unit of final product produced in a particular sector*" and corresponds to the average number of upstream sectors involved in final production. In the next table one can see average changes of both production lengths in periods before crisis and after for Manufacturing and Services. Interesting contribution to the existing literature included in the work of Wang et al. (2017) is also distinguishing between i.a. pure domestic production length (*PLv_D, PLy_D*) and length of GVC production (*PLV_GVC, PLY_GVC*)[2]. As we can see in the table, value of change of average total production length may be misleading in some cases, when we would like to study if GVCs length increased or decreased. For example, for Services in the post-crisis period average total production length decreased as well as the length of pure domestic production, but at the same time length of GVC production increased.

Table 3A1: Contribution of changes in average production length (forward or backward based) of domestic segment and GVC activities in average total production length.

[2] For more detailed description of this decomposition see Wang et al. (2017)

		Δ2000-2008	Δ2009-2014
Forward linkage based measures			
Manufacturing	PLv	0.052	-0.001
	PLv_D	0.026	-0.049
	PLv_GVC	0.193	-0.024
Services	PLv	0.047	-0.009
	PLv_D	0.015	-0.021
	PLVv_GVC	0.132	0.114
Backward linkage based measures			
Manufacturing	PLy	0.191	0.071
	PLy_D	0.047	-0.023
	PLy_GVC	0.308	0.135
Services	PLy	0.042	0.011
	PLy_D	-0.003	-0.024
	PLy_GVC	0.261	0.201

Notes: own elaboration based on Wang et al. (2017) methodology and R codes, using WIOD 2016; averages weighted by total hours works in sector (H_EMPE), absolute differences.

To compare time trends of forward and backward based GVC production length values for different sectors, we present figure 3A.2. For Agriculture and Manufacturing higher values are obtained for *PLy_GVC*, while opposite for Construction and Services. Similar trends are observed between these two measure for all cases except Agriculture, where backward linkages based measure shows increasing tendency, while forward one quite undefined trend. Interesting thing is that for Construction the drop of a value characteristic for 2008 is delayed and occurs in 2011.

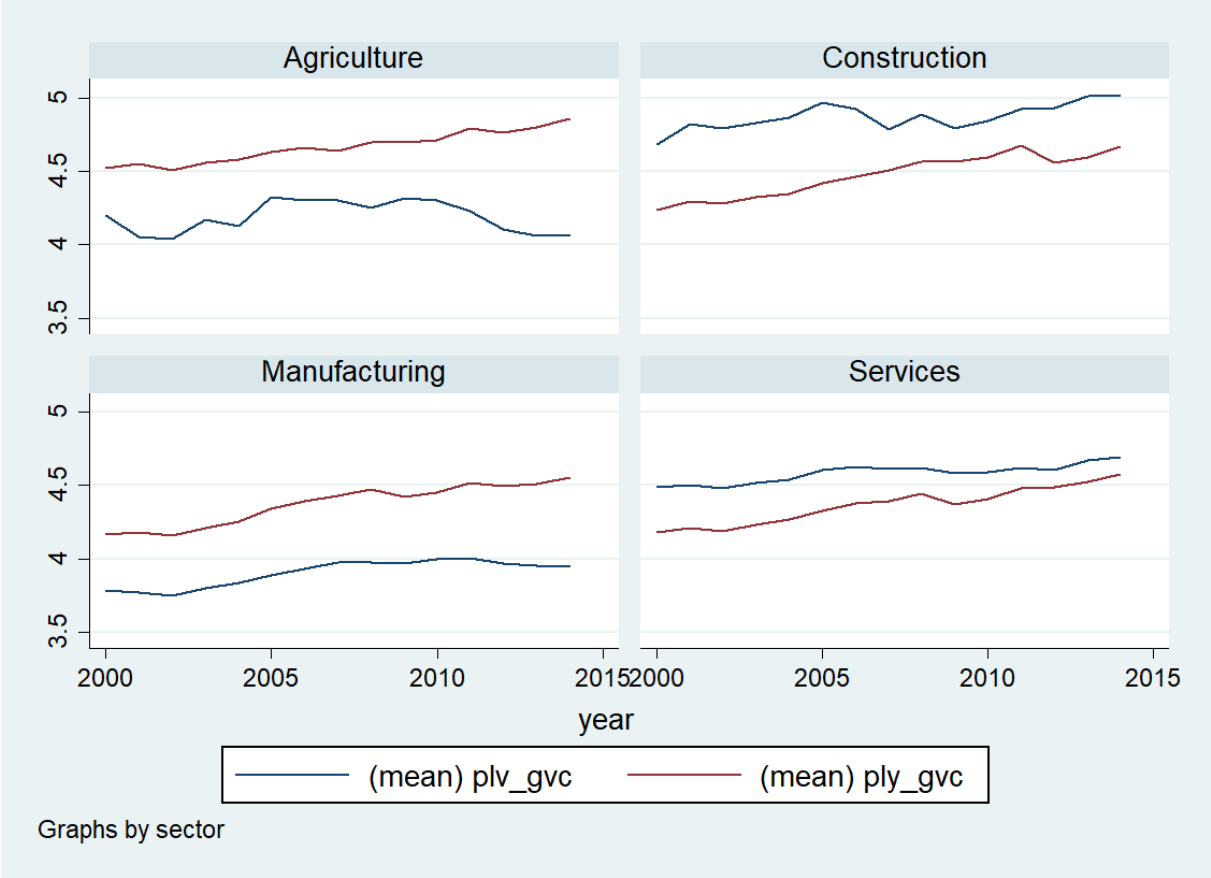
Average total production length and length of GVC production are starting point to definition of two measures of position of a country-sector along the production line. In our paper we consider two position measures proposed by Wang et al. (2017). First of them is based on average total production length and defined as:

$$pos\_tpl = \frac{plv}{ply} \tag{3}$$

In other words, it is the ratio of upstreamness and downstreamness. It leads to a simple interpretation, namely, the higher is *pos_tpl,* the more upstream is the given country-sector. As the authors argue, this formula overcome possible inconsistencies in measures based only on

forward or on backward linkages, as it takes into account distances to both ends of production line, and it is also robust to changes in industries aggregation. There is also another proposition for measuring relative position along the production line.

Figure 3A.2 Changes in average production length of GVC activities (forward and backward based) for main sectors in years 2000-2014.



Notes: own elaboration based on Wang et al. (2017) methodology and R codes, using WIOD 2016; averages weighted by total hours works in sector (H_EMPE)

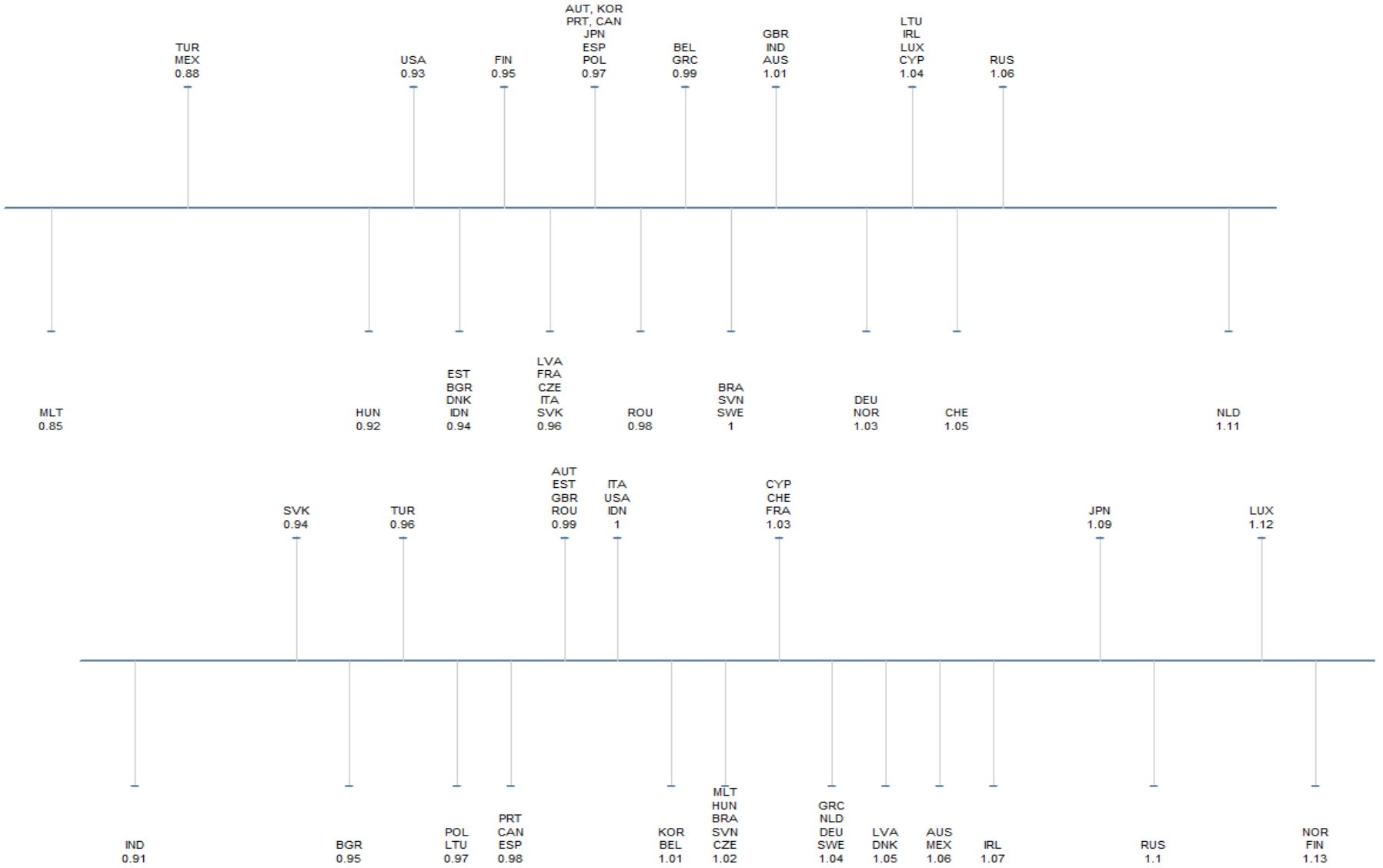
Using decomposition described above, Wang et al. (2017) propose analogous measure based on the production length indices related only to the GVC production:

$$pos\_gvc = \frac{plv\_gvc}{ply\_gvc} \tag{4}$$

The advantage of such a formulation is that here we do not take into account other components of average length like e.g. pure domestic production length, which could disturb the

approximation of position in GVC if e.g. given sector is characterised by relatively high share of pure domestic production processes. On the Figure 3A.3 we present average positions along the production line for 40 analysed countries for 2014, calculated using average total production length on the first picture and using GVC length on the second picture. We can see that results for these two measures differ and so conclusions about countries' more upstream or downstream character may differ depending on chosen measure of relative position. As a summary for this subsection we also include table of basic statistics for abovementioned indices.

Figure 3A.3: Countries position on production line – index based on TPL (top one) vs. GVC position index (bottom one); data for 2014.

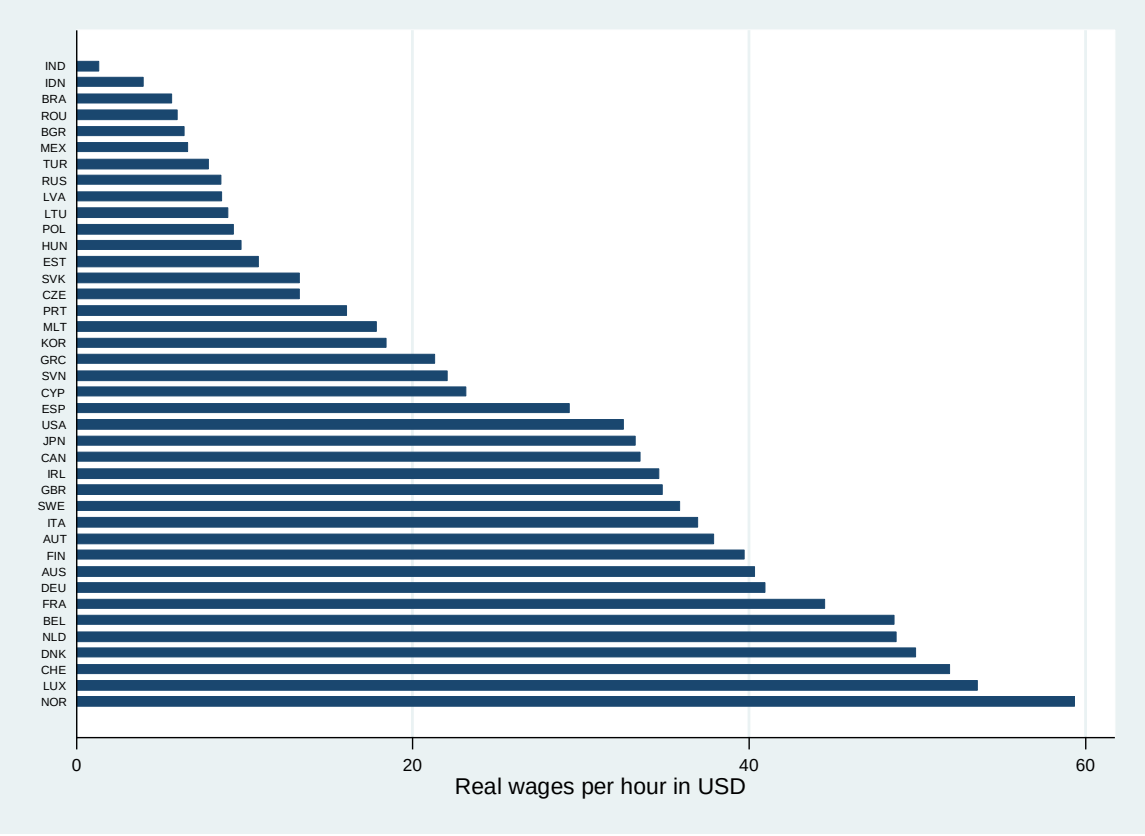


Notes: own elaboration based on Wang et al. (2017) methodology and R codes, using WIOD 2016; averages weighted by total hours works in sector (H_EMPE)

2.2 Wages and employment in global context

Based on WIOD's Socio-Economic Accounts (2016 release) we calculate wages per hour as the ratio of labour compensation to the total number of hours worked by all persons engaged in a given sector. The original data is expressed in nominal values. The real values (in prices from 2010) are obtained by dividing the nominal ones by sectoral price deflators, and are converted into USD with the use of exchange rate from 2010. For further analysis we keep information for 40 countries (we omit from the analysis China due to the lack of information on the total number of hours worked, Croatia and Taiwan for which data are highly unreliable) and 55 sectors (no information on sector *Activities of extraterritorial organizations and bodies*). Sectors are classified into: Agriculture, Manufacturing, Mining, Construction and Services (NACE REV 2.2.). The figure 3B.1 presents cross-country wage differences in total economy.

Figure 3B.1 Cross-country differences in average wages, 2014

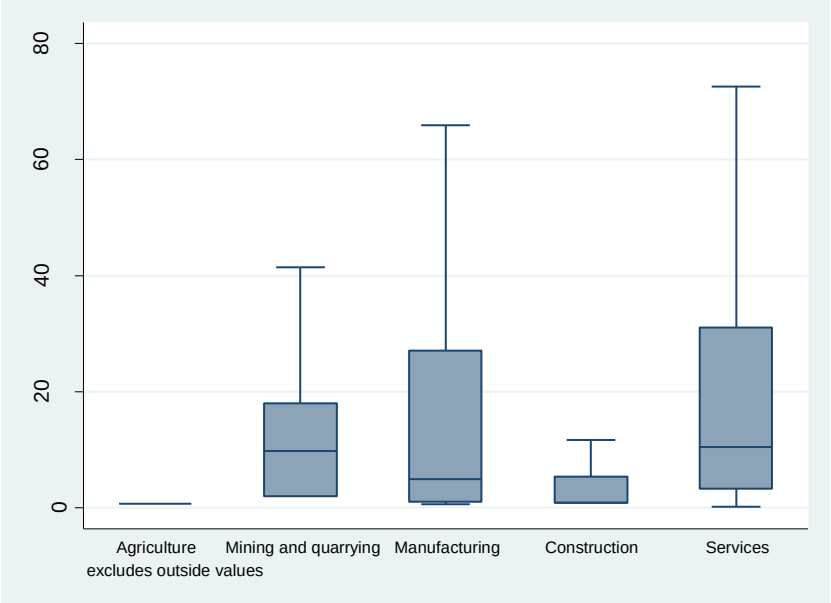


Notes: wages weighted by total number of hours worked in sectors

Source: own elaboration with socioeconomic accounts data from WIOD 2016

We can see that wages differ substantially from only 1.4 USD per hour in Indie to 60 USD per hour in Norway. Cross – countries differences are quite similar both for manufacturing and services. Of course, figure 1 which presents the average wages (weighted by the total number of hours worked) hinders the cross-sectoral dispersion. The disparity of earnings among five main sectors: agriculture, mining and quarrying, manufacturing, construction and services in shown on the figure 3B.2. This time for the illustration purposes we calculate the average wage across countries. We see that from the global perspective, the lowest earnings are obtained by workers employed in agriculture and the highest in services.

Figure 3B.2 Cross industry differences in wages, 2014



Notes: average wages weighted by total number of hours worked in countries
Source: own elaboration with socioeconomic accounts data from WIOD 2016

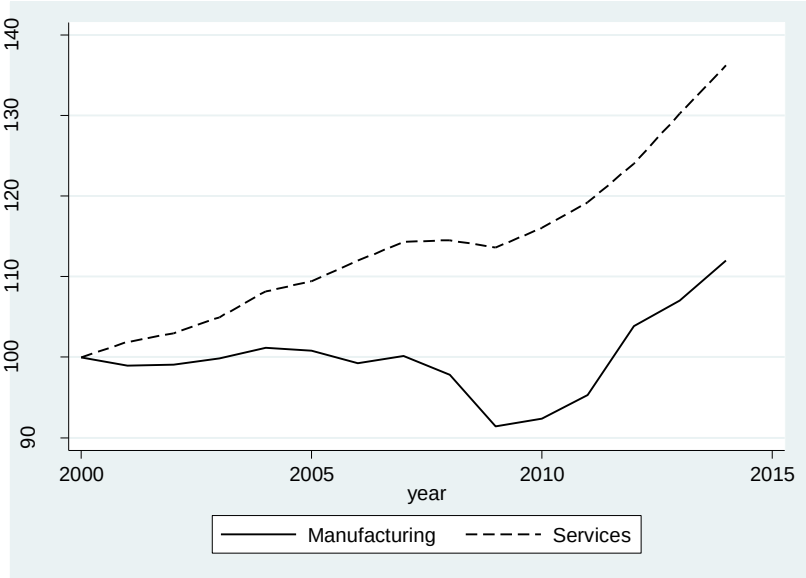
Finally, we present the time trends. In the analysed period of time, real wages increased in CEE countries and EU15, while were constant for the US (Figure 3B.3).

Figure 3B.3 The wage changes between 2014 and 2000 by country group

Notes: average wages weighted by total number of hours worked in countries
Source: own elaboration with socioeconomic accounts data from WIOD 2016

Now we turn to the employment structure. As we can see, over the period 2000 – 2014 there were visible changes in the employment structure: the decline in the share of manufacturing is observed till 2009, then the trend is reversed, while increase in services is observed for the whole period with a slight drop in 2009 (Figure 3B.4).

Figure 3B.4 Changes in employment (number of total hours worked) (2000=100)



Source: own elaboration with socioeconomic accounts data from WIOD 2016

Finally, as the last indicator of labour market, we present data on labour productivity across sectors and country groups. The labour productivity is measured in standard way as the real value added per number of hours worked. Table 3B.1 illustrates the differences in labour productivity for middle income and high income countries across industries in 2000 and 2014. The income grouping of countries is based on World Bank classification.

Table 3b.1 Labor productivity across sectors in middle and high income countries, 2000 and 2014

Country group	Sector	2000	2014
Middle income countries	Agriculture	14.7	16.4
	Mining and quarring	69.2	60.8
	Manufacturing	15.5	18.6
	Construction	6.9	9.5
	Services	21.3	25.9
High income countries	Agriculture	55.9	65.4
	Mining and quarring	280.3	174.1
	Manufacturing	49.7	61.9
	Construction	40.2	43.4
	Services	93.3	94.5

Source: own elaboration with socioeconomic accounts data from WIOD 2016

Some interesting observations can be drawn from the table 3B.4. First of all, labour productivity is much lower in middle income countries than in high income ones, and this is true for all analysed sectors. For example for manufacturing labour productivity in high income countries is on average, three times higher than for middle income, while for services the difference is even more pronounced. For both income group of countries, the distribution of labour productivity across sectors is quite similar, with construction industry at the lowest tile and Mining and quarrying at the highest tile. Finally, the labour productivity in 2014 for most of the sectors (except Mining and quarrying) increased in relation to 2000.

3. Empirical model

3.1. Empirical specification and estimation method

As noted earlier, in the previous literature the impact of GVC was either analysed from the perspective of employment or wages of natives' workers. Contrary, we estimate the following regressions simultaneously:

$$lnw_{ij,t} = \alpha + \beta_1 lnProd_{ij,t-1} + \beta_2 lnEmp_{ij,t-1} + \beta_3 GVC\_pat_{ij,t-1} + \beta_4 Pos\_gvc_{ij,t-1} + \gamma_i + \delta_j + \theta_t + \epsilon_{ij,t} \quad (5)$$

$$lnEmp_{ij,t} = \alpha + \beta_1 lnProd_{ij,t-1} + \beta_2 lnw_{ij,t-1} + \beta_3 GVC\_pat_{ij,t-1} + \beta_4 Pos\_gvc_{ij,t-1} + \gamma_i + \delta_j + \theta_t + \epsilon_{ij,t} \quad (6)$$

where: *i* – sector, *j* – country and *t* - time. The eq. (5) is a wage regression where the log of wage (real wage per hour) is regressed on productivity (*Prod*) – measured as real value-added by the total numbers of hours worked, employment (*Emp*) – total number of hours worked in a given sector and involvement in GVC expressed by participation index (*GVC_pat*) as shown in eq. 1. and production line position index (*Pos_gvc*) which refers to eq.4 Note that *GVC_pat* can be measured either by forward or backward industrial linkages. All repressors are expressed as lags. The eq. (6) represents the labour demand function which is measured by employment (Emp). Additionally, in both specifications we include industry (γ_i), country (δ_j) and time (θ_t) fixed effects. Estimation method of the system of equations is three-stage least squares (3SLS) as proposed by Zellner and Theil (1962) in which *lnw* and *lnEmp* are correlated with the disturbances in the system's equations and treated as endogenous to the system.

3.1 Results

In the Table, 4B.1 we present the results, when all countries and sectors are taken into consideration. Note that we include a full set of individual effects, which should to some extend control for sector, country variability and time trends.

Table 4B.1 Estimation of wage and employment regressions – 3SLS: full sample of sectors and countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Backward linkage GVC participation index				Forward linkage GVC participation index		
Dependent variable: lnw							
$lnProd_{ij,t-1}$	0.442***	0.462***	0.461***	0.461***	0.469***	0.468***	0.468***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
$lnEmp_{ij,t-1}$	-0.073***	-0.066***	-0.066***	-0.067***	-0.059***	-0.064***	-0.064***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
$GCV\_pat_{ij,t-1}$	-0.016		-0.012	-0.16	-0.099***	-0.141***	-0.202***
	[0.025]		[0.025]	[0.098]	[0.016]	[0.016]	[0.078]
$Pos\_gvs_{ij,t-1}$		-0.074***	-0.073***	-0.102***		-0.127***	-0.138***
		[0.018]	[0.018]	[0.026]		[0.019]	[0.023]
$GCV\_pat_{ij,t-1}$ x $Pos\_gvsij,t-1$				0.142			0.065
				[0.092]			[0.080]
Dependent variable: lnEmp							
lnProdij,t-1	-0.167***	-0.166***	-0.170***	-0.170***	-0.242***	-0.202***	-0.201***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
$lnw_{ij,t-1}$	-0.399***	-0.363***	-0.362***	-0.363***	-0.326***	-0.347***	-0.344***
	[0.014]	[0.014]	[0.014]	[0.014]	[0.014]	[0.014]	[0.014]
$GCV\_pat_{ij,t-1}$	-0.344***		-0.229***	-0.719***	0.600***	0.342***	-1.976***
	[0.058]		[0.057]	[0.227]	[0.036]	[0.037]	[0.176]
$Pos\_gvs_{ij,t-1}$		-0.908***	-0.891***	-0.987***		-0.798***	-1.199***
		[0.041]	[0.041]	[0.059]		[0.042]	[0.052]
$GCV\_pat_{ij,t-1}$ x $Pos\_gvsij,t-1$				0.473**			2.443***
				[0.212]			[0.182]
N	28851	28467	28467	28467	28630	28247	28247
R2 (lnw)	0.9	0.9	0.9	0.9	0.9	0.9	0.9
R2(lnEmp)	0.89	0.89	0.89	0.89	0.89	0.9	0.9

Notes: * p<0.10, ** p<0.05, *** p<0.01. Constant not reported. Industry, country and time dummies included in all specifications
Source: own compilation

For wage regression (upper panel), we obtain the statistically significant and positive coefficient for productivity which is along theory and negative for employment. In all specification GVC position index is negative and statistically significant: higer the index (sectors are relatively further from the final consumption end) lower the wages. For the GVC participation, the relationship is

negative and statistically significant only in case of forward linkages. The intersection between GVC_pat and Pos_gvc turns not to b statistically significant.

For the employment regression, we obtain negative coefficients for productivity and wages. Additionally, the results yield the negative and statistically significant coefficients on GVC participation and position index, indicating that for countries and sectors which more involved in GVC the employment is lower. Without taking into account the possible endogeneity of GVC we do not draw conclusions about causality.

Table 4B.2 Estimation of wage and employment regressions – 3SLS: different country groups

	Backward linkage GVC participation index					Forward linkage GVC participation index				
	Middle income countries	High income countries	EU15	CEE	USA	Middle income countries	High income countries	EU15	CEE	USA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable: lnw										
$lnProd_{ij,t-1}$	0.530***	0.408***	0.321***	0.417***	0.330***	0.541***	0.413***	0.333***	0.417***	0.355***
	[0.012]	[0.004]	[0.005]	[0.006]	[0.019]	[0.011]	[0.004]	[0.005]	[0.006]	[0.020]
$lnEmp_{ij,t-1}$	-0.142***	-0.048***	-0.079***	-0.050***	0.021	-0.136***	-0.046***	-0.072***	-0.047***	0.162***
	[0.009]	[0.003]	[0.004]	[0.005]	[0.024]	[0.009]	[0.003]	[0.004]	[0.005]	[0.024]
$GCV\_pat_{ij,t-1}$	-0.295	-0.252***	0.491***	0.201	-5.222***	-2.077***	-0.004	0.385***	0.034	2.919***
	[0.381]	[0.091]	[0.136]	[0.186]	[0.792]	[0.317]	[0.072]	[0.094]	[0.148]	[0.886]
$Pos\_gvs_{ij,t-1}$	-0.302***	-0.066***	0.059*	0.110*	-0.703***	-0.649***	-0.004	0.069**	0.101**	-0.492***
	[0.081]	[0.025]	[0.035]	[0.058]	[0.176]	[0.071]	[0.022]	[0.031]	[0.047]	[0.159]
$GCV\_pat_{ij,t-1}$ x $Pos\_gvsij,t-1$	0.111	0.327***	-0.309**	-0.087	3.529***	1.874***	-0.061	-0.508***	-0.029	-3.802***
	[0.365]	[0.084]	[0.127]	[0.177]	[0.785]	[0.348]	[0.073]	[0.093]	[0.154]	[0.954]
Dependent variable: lnEmp										
lnProdij,t-1	-0.455***	-0.049***	0.019	0.042**	-0.243***	-0.431***	-0.102***	-0.025	-0.055***	-0.351***
	[0.021]	[0.012]	[0.015]	[0.017]	[0.034]	[0.021]	[0.012]	[0.016]	[0.017]	[0.033]
$lnw_{ij,t-1}$	-0.325***	-0.341***	-0.520***	-0.309***	-0.033	-0.319***	-0.318***	-0.465***	-0.275***	0.323***
	[0.022]	[0.017]	[0.024]	[0.023]	[0.057]	[0.022]	[0.017]	[0.024]	[0.023]	[0.055]
$GCV\_pat_{ij,t-1}$	-0.952	0.996***	-1.497***	3.816***	-5.580***	-0.779	-1.445***	-2.329***	0.358	-11.886***

	[0.593]	[0.230]	[0.344]	[0.399]	[1.214]	[0.502]	[0.178]	[0.235]	[0.307]	[1.253]
$Pos\_gvs_{ij,t-1}$	-0.774***	-0.609***	-0.545***	-0.109	0.222	-1.030***	-0.871***	-0.627***	-0.524***	-0.758***
	[0.126]	[0.063]	[0.090]	[0.125]	[0.267]	[0.112]	[0.054]	[0.079]	[0.098]	[0.230]
$GCV\_pat_{ij,t-1}$ x $Pos\_gvsij,t-1$	-0.512	-0.526**	1.572***	-2.630***	2.553**	1.132**	2.100***	2.766***	0.406	12.126***
	[0.568]	[0.214]	[0.322]	[0.382]	[1.197]	[0.551]	[0.182]	[0.232]	[0.320]	[1.370]
N	5250	23217	10903	8993	748	5248	22999	10805	8901	748
R2 (lnw)	0.75	0.88	0.77	0.8	0.97	0.75	0.88	0.77	0.8	0.97
R2(lnEmp)	0.89	0.9	0.91	0.88	0.99	0.89	0.91	0.91	0.89	0.99

Notes: * p<0.10, ** p<0.05, *** p<0.01. Constant not reported. Industry, country and time dummies included in all specifications
Source: own compilation

Table 4B.3 Estimation of wage and employment regressions – 3SLS: different sectors group

	Backward linkage GVC participation index					Forward linkage GVC participation index				
	Agriculture	Mining	Manuf	Constr	Services	Agriculture	Mining	Manuf	Constr	Services
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable: lnw										
$lnProd_{ij,t-1}$	0.541***	0.507***	0.457***	0.665***	0.421***	0.553***	0.494***	0.467***	0.614***	0.421***
	[0.020]	[0.032]	[0.006]	[0.043]	[0.005]	[0.021]	[0.029]	[0.006]	[0.044]	[0.005]
$lnEmp_{ij,t-1}$	0.048***	0.082**	-0.077***	-0.028	-0.056***	0.082***	0.058*	-0.085***	-0.101***	-0.051***
	[0.013]	[0.034]	[0.004]	[0.034]	[0.004]	[0.014]	[0.032]	[0.004]	[0.034]	[0.004]
$GCV\_pat_{ij,t-1}$	-1.082	0.811	0.251**	-4.326***	0.24	0.939**	-1.830***	-0.743***	2.215	-0.137
	[0.702]	[0.860]	[0.125]	[1.431]	[0.198]	[0.379]	[0.652]	[0.105]	[2.622]	[0.135]
$Pos\_gvs_{ij,t-1}$	-0.771***	0.421*	0.062	-1.073***	-0.043	-0.252**	-0.49	-0.281***	0.309	-0.093***
	[0.160]	[0.217]	[0.049]	[0.338]	[0.035]	[0.123]	[0.331]	[0.040]	[0.219]	[0.031]

$GCV\_pat_{ij,t-1}$ x $Pos\_gvsij,t-1$	2.356***	-0.52	-0.316***	4.857***	-0.11	-1.491***	1.563***	0.641***	-1.566	-0.014
	[0.703]	[0.620]	[0.122]	[1.314]	[0.175]	[0.382]	[0.573]	[0.113]	[2.652]	[0.133]
Dependent variable: lnEmp										
lnProdij,t-1	-0.197***	-0.521***	0.278***	-0.128*	-0.391***	-0.414***	-0.356***	0.252***	-0.006	-0.404***
	[0.053]	[0.056]	[0.020]	[0.074]	[0.012]	[0.049]	[0.057]	[0.020]	[0.073]	[0.012]
$lnw_{ij,t-1}$	0.160***	0.148**	-0.603***	-0.299***	-0.202***	0.249***	0.026	-0.650***	-0.406***	-0.180***
	[0.057]	[0.066]	[0.027]	[0.064]	[0.016]	[0.052]	[0.071]	[0.026]	[0.062]	[0.016]
$GCV\_pat_{ij,t-1}$	-11.869***	2.861**	-0.734**	8.533***	0.089	-9.179***	0.663	-2.433***	4.195	-1.922***
	[1.415]	[1.213]	[0.334]	[1.888]	[0.386]	[0.672]	[0.982]	[0.273]	[3.448]	[0.260]
$Pos\_gvs_{ij,t-1}$	-2.164***	0.478	-1.471***	2.788***	-0.589***	-1.861***	-0.501	-1.825***	0.996***	-0.762***
	[0.329]	[0.304]	[0.129]	[0.440]	[0.069]	[0.227]	[0.496]	[0.102]	[0.286]	[0.060]
$GCV\_pat_{ij,t-1}$ x $Pos\_gvsij,t-1$	8.986***	-3.933***	0.917***	-8.526***	0.025	11.233***	-0.954	2.368***	-5.771*	2.609***
	[1.437]	[0.866]	[0.327]	[1.734]	[0.341]	[0.660]	[0.863]	[0.293]	[3.482]	[0.257]
N	1488	532				1480	521	10032	560	15654
R2 (lnw)	0.91	0.97	0.94	0.99	0.89	0.91	0.97	0.94	0.99	0.89
R2(lnEmp)	0.93	0.99	0.9	0.99	0.92	0.94	0.99	0.9	0.99	0.92

Notes: * p<0.10, ** p<0.05, *** p<0.01. Constant not reported. Industry, country and time dummies included in all specifications
Source: own compilation

Table 4B.4 Estimation of wage and employment regressions – 3SLS: different sectors group

	Backward GVC_pat		Forward GVC_pat	
	2000 - 2008	2009-2014	2000 - 2008	2009-2014
	(1)	(2)	(3)	(4)
Dependent variable: lnw				
$lnProd_{ij,t-1}$	0.472***	0.431***	0.478***	0.437***
	[0.005]	[0.006]	[0.005]	[0.006]
$lnEmp_{ij,t-1}$	-0.064***	-0.074***	-0.062***	-0.073***
	[0.003]	[0.004]	[0.003]	[0.004]
$GCV\_pat_{ij,t-1}$	-0.330**	-0.1	-0.132	-0.359***
	[0.141]	[0.139]	[0.109]	[0.111]
$Pos\_gvs_{ij,t-1}$	-0.114***	-0.120***	-0.111***	-0.191***
	[0.035]	[0.039]	[0.030]	[0.035]
$GCV\_pat_{ij,t-1}$ x $Pos\_{gvsij,t-1}$	0.266**	0.146	0.011	0.200*
	[0.131]	[0.130]	[0.112]	[0.115]
Dependent variable: lnEmp				
lnProdij,t-1	-0.195***	-0.132***	-0.215***	-0.179***
	[0.015]	[0.017]	[0.014]	[0.017]
$lnw_{ij,t-1}$	-0.331***	-0.436***	-0.320***	-0.412***
	[0.018]	[0.022]	[0.018]	[0.021]
$GCV\_pat_{ij,t-1}$	-0.891***	-0.235	-2.430***	-1.488***
	[0.320]	[0.327]	[0.245]	[0.256]
$Pos\_gvs_{ij,t-1}$	-0.958***	-1.008***	-1.195***	-1.187***
	[0.079]	[0.092]	[0.068]	[0.081]
$GCV\_pat_{ij,t-1}$ x $Pos\_{gvsij,t-1}$	0.567*	0.232	2.941***	1.977***
	[0.298]	[0.305]	[0.252]	[0.264]
N	16212	12255	16106	12141
R2 (lnw)	0.9	0.9	0.91	0.9
R2(lnEmp)	0.89	0.9	0.9	0.9

Notes: * p<0.10, ** p<0.05, *** p<0.01. Constant not reported. Industry, country and time dummies included in all specifications
Source: own compilation

4. Conclusion

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