

Job Impacts of Global Value Chains: Firm-Level Evidence from Cameroon

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Job Impacts of Global Value Chains: Firm-Level Evidence from Cameroon^{1,2}

By

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Abstract

Today, almost 50% of the world trade involves Global Value Chains (GVCs). New technologies entering GVCs participating firms' exports are skill-biased and understanding the job implications in African countries endowed with unskilled workers is vital. Using firm-level panel data in Cameroon, this paper analyses whether GVCs' integration and position have contributed to job generation and explores whether firm characteristics such as capital and skill intensity of production influence the GVCs-job relationship. I estimate dynamic labour demand functions for skilled and unskilled workers including sector-level GVCs and their interactions with firm characteristics. GVCs integration and position have no significant impact on any type of job. However, examination of moderator effects yields important results: while forward GVCs and GVCs position hurt both (un)skilled workers in less capital- and skill-intensive firms, backward GVCs have a significantly positive impact on (un)skilled jobs in more capital- and skill-intensive firms, and GVCs participation enhances only unskilled jobs in more capital-intensive firms. The findings are robust to the disaggregation of sectors into manufacturing vs services, high- vs low-GVCs participation, and upstream vs downstream industries and highlight the role of human capital in influencing the GVCs-job nexus in African economies.

Keywords: *Forward global value chains; Backward global value chains; Global value chains position; Employment; Complementary policy; Cameroon*

JEL Code : *F12; F13; F23; J24*

1. Introduction

Over the past two decades, one important development in the world trade has been the globalization of production in the form of global value chains (GVCs). GVCs represent the fragmentation and geographical expansion of international production networks to take advantage of local specific sources of comparative advantage (Taglioni and Winkler, 2014). This process involves the division of production chain into specific tasks: design, production, marketing of products, logistic, distribution, and support that can be dispersed around the world, namely where goods can be most cost-efficiently produced. Countries south of the Sahara (Africa) are increasingly involved in GVCs. In 2013, for example, 40% of the continent's gross exports were performed through GVCs (Balié et al., 2019).

For developing economies, GVCs' participation is a double-edged sword for their economic development. On the one hand, it is a critical pathway to attract foreign investments, and access productivity-enhancing technologies and knowledge (Rigo, 2021). It offers substantial opportunities to firms to produce and export according to their comparative advantages, which is particularly important for African countries vastly endowed with less skilled jobs and plagued by substantial open or disguised youth unemployment (Baldwin, 2013). On the other hand, GVCs' participation entails threats for employment. It is a conduit for new technologies and hence might increase the demand for skilled jobs because of the complementarity between new technologies and skilled workers and reduce the demand for unskilled jobs – the only productive resource that African countries have in abundance – which might reduce African countries' gains from GVCs' participation. Another fear expressed by de Melo and Solleder (2022) is that African countries are increasingly deeply involved in GVCs because of advances in digitalization, and digital innovations are biased towards skills, a concern for African countries facing the problem of how to absorb their abundant low skilled workforce.

Pointing out that GVCs participation is skill-biased – it will increase relative demand for skilled labour – is not new, but it is a helpful development advice. Indeed, GVCs are more likely to absorb amounts of employment in more skill- and capital-intensive firms, posing a lasting challenge for African policy makers in how to overcome the skill-biased effects of GVCs involvement. Supporting this premise, Rodrik (2018: 14) points out that “...*development strategies should focus somewhat less on international economic integration and considerably more on what we might call*

‘domestic integration’”. He goes on, *“Improving the economy’s fundamentals through investment in human capital and governance certainly helps”*. Yet, we know little about the importance of complementary skills in influencing the relationship between GVCs participation and employment generation in developing countries. This makes it hard to identify policy levers to address the issue of employment effects of GVCs.

The objective of this paper is twofold. First, is to identify how firm-level demand for different types of workers is associated with sector-level involvement and position in GVCs, and then examine the moderating influence of complementary skills on the relationship between GVCs and employment. In this way, three specific research questions are addressed: i) do the participation and position in GVCs foster employment? ii) does the impact of participation and positioning in GVCs fall disproportionately on workers, especially those with lower levels of skills? and iii) do the firm characteristics, e.g. capital and skill intensity of production affect the job effects of GVCs participation and position?

This paper contributes to the literature in several ways. First, I use sector-level GVCs’ indicators calculated from internationally comparable input-output tables for Cameroon retrieved from the Eora Multi Region Input-Output (MRIO) database, and GVCs’ position to identify their association with firm-level demand for different types of workers, namely production and non-production worker. The measures of sector-level GVCs participation are: i) backward GVCs participation or foreign value added in exports and forward GVCs participation or indirect value added in exports, and ii) GVCs position, which is based on sector specialization in the upstream i.e., production of intermediate inputs used by other countries and downstream, i.e., use of intermediate inputs produced by other countries to produce final goods for exports.⁴ Second, to my knowledge, this is one of the first studies to examine the influence of complementary skills in the relationship between GVCs and employment, with a special focus on Africa. Third, to guide decision-making, I examine the process separately for manufacturing and services firms, for sectors with high versus low GVCs integration, and for sectors specialized upstream versus downstream. Fourth, the empirical analysis draws on firm-level data from Cameroon over the period of 2005-2017. The panel nature of the data allows me to address the possible endogeneity issue, which accounted for performing generalized method of moments (GMM) estimations. Finally, to examine the potential role of firm-level characteristics in the relationship between GVCs and employment, I estimate dynamic labour demand functions augmented by including indicators of GVCs participation and position and their interactions with firm-specific mediating characteristics.

The analysis reveals the following findings. Firstly, the regression results fail to provide evidence of significant relationships between participation and positioning in GVCs and all types of employment, corroborating the line of reasoning that highlights the disappointing local job consequences of developing countries’ recent trade trends – lack of greater job opportunities associated with integration into GVCs. Secondly, two firm-specific attributes have been analysed to understand what drives the GVCs-job nexus. Capital and skill intensity of production have been found to negatively

influence the (un)skilled jobs' effects of forward GVCs and GVCs' position, suggesting that these patterns of GVCs accompanied by a lower level of education and skill are less job intensive. Capital and skill intensity of production turned out to positively influence the job implications of backward GVCs' integration, and this applies to both (un)skilled jobs, and involvement in GVCs is more beneficial only for unskilled workers in more capital-intensive firms. Finally, the main findings are robust to the disaggregation of sectors into: i) manufacturing vs services; ii) high- vs low-GVCs' participation; and iii) upstream vs downstream stages of production.

The rest of the paper is organized as follows. Section 2 provides a review of the relevant background literature and develops theory and hypotheses. Section 3 describes the empirical framework. Section 4 presents the data. Section 5 discusses the main results and checks the sensitivity of the results. Section 6 provides the conclusion.

2. Background literature and hypotheses

GVCs' Involvement and Job

There is a broad-based agreement that GVCs can absorb large amounts of jobs. GVCs offer more opportunities for productivity growth because they are driven by profit maximisation or economic efficiency. Productivity growth might be associated with employment growth (Guschanski and Onaran, 2023). Pan (2020) provides empirical evidence that integration into GVCs is associated with greater job opportunities, income gains for employees and better working conditions. However, and because of skill-biased technologies, developing countries' involvement in GVCs may rather contribute to the skilled-unskilled labour divide (Shen and Zheng, 2020). In this line of reasoning, Ehab and Zaki (2021) use firm-level GVCs for a cross-section of 141 developing economies, and the findings indicate that participation in GVCs results in skill-upgrading, i.e., increase in the demand for skilled jobs. Based on the previous arguments, I can derive the first hypothesis of the study,

H1. GVCs participation has a positive effect on employment and the effect is biased toward high-skilled jobs.

GVCs position and job

One of the interests of this study lies in the mechanisms through which involvement in GVCs affects jobs. Therefore, I consider the independent impacts of both backward and forward GVCs' participation. A widely used indicator of GVCs' participation is the global trade of intermediate goods, which occurs through i) upstream specialisation (i.e., domestic industries supply inputs to foreign final goods producers); and ii) downstream specialisation (i.e., domestic industries use a large portion of intermediate inputs from other countries to produce final goods for exports). The factor-endowment theory of trade predicts gains for the factor in abundance. Less developed countries have a comparative advantage in low-skilled activities with low value-added outputs. This suggests that developing country industries with a higher backward involvement in GVCs should generate labour-intensive activities.

However, developing countries' participation in GVCs allows them to technologically upgrade - movement towards the production of more technologically advanced products. This requires a more educated workforce because new technologies complement skills. Therefore, developing countries expansion in a more stringent downstream integration into GVCs can be skill-biased, associated with high relative demand for skilled jobs, contributing to the skilled-unskilled job divide (Shingal, 2015). The literature on the effects of an industry's position in GVCs on job (e.g., Ma et al., 2019) shows that both developed and developing countries' position in GVCs has significant positive effects on employment, and the effects are statistically larger for capital-intensive compared to labour-intensive industries. Therefore, combining the upstream and downstream specialization in GVCs, I argue that GVCs' position has a different effect on (un)skilled labour. Accordingly:

H2. Upstream (downstream) specialisation in GVCs has a positive effect on un(skilled) jobs in developing countries.⁵

Moderating effect of skill on GVCs' participation and job

For developing countries, engagement in GVCs is not necessarily a panacea for job generation. New technologies may arrive via GVCs participation. In this context, skills availability is paramount to this strategy's success. Involvement in GVCs exposes domestic industries to foreign markets' requirements. In this case, upstream activities in developing countries, which are mainly confined to trade in raw or basic manufacturing materials, may also require more-skilled activities. As already stated, developing countries are typically well-endowed with unskilled labour but GVCs are skill intensive. This prevents them from fully exploiting their comparative advantage and this points to a need for the upskilling of workers to favour human capital accumulation if GVCs' job opportunity is to be turned into reality.

Previous studies largely neglect the moderating role of education and skills in the GVCs-job nexus, and hence do not account for an area of daunting development challenges for policy makers in developing countries, including the African ones, to exploit the GVCs participation for jobs.⁶ Also, and in contrast to past research, this study uses firm-level panel dataset. The panel nature of the data allows one to fully identify the: i) effects of GVCs involvement and position on job; and ii) moderating role of skills in the relationship between GVCs and job, potentially increasing the confidence in the results. From the previous discussion, I formulate the following hypothesis:

H3. Firm-level skill and capital intensity of production positively or negative moderates the relationship between GVCs and job, such that the positive (negative) effect of GVCs on job will be strengthened (weakened) when skill level is high.⁷

3. Methodology

I jointly estimate the demand for skilled and unskilled labour as a system of interrelated factor demands à la Nadiri and Rosen (1969).⁸ For that, I consider the following Cobb-Douglas production function,⁹

$$Y_{ijzt} = A^\lambda K_{ijzt}^\alpha L_{sijzt}^\beta L_{uijzt}^\gamma \quad (1)$$

where Y_{ijzt} , K_{ijzt} , L_{sijzt} and L_{uijzt} denote output, capital stock, skilled, and unskilled labour of firm i , in industry j , province z , at time t , respectively. A is an index of technological progress. Factor share coefficients α , β , and γ are parameters to be estimated. λ allows for factors affecting the efficiency of production. Assuming competitive markets, firms are price and wage takers. The profit-maximising firm will use labour and capital at levels such that the marginal revenue product of capital equals its user cost (r), and the marginal revenue product of skilled and unskilled labour equals their wages (i.e., w_{ijzt}^s and w_{ijzt}^u). Using the first order conditions and solving the system to get rid of capital and unskilled labour from the output expression yields,

$$Y_{ijzt} = A^\lambda \left[\frac{\alpha L_{sijzt}}{\beta} \times \frac{w_{ijzt}^s}{r_{ijzt}} \right]^\alpha L_{sijzt}^\beta \left[\frac{\gamma L_{sijzt}}{\beta} \times \frac{w_{ijzt}^s}{w_{ijzt}^u} \right]^\gamma \quad (2)$$

Applying logarithms to both sides of equation (2) and rearranging terms, the firm's derived demand for skilled and unskilled labour is:

$$\ln l_{ijzt}^s = \Phi_0 + \Phi_1 \ln \left(\frac{w_{ijzt}^s}{r_{ijzt}} \right) + \Phi_2 \ln \left(\frac{w_{ijzt}^s}{w_{ijzt}^u} \right) + \Phi_3 \ln y_{ijzt} \quad (3)$$

where $\Phi_0 = -[\lambda \ln A + \alpha \ln \alpha + \gamma \ln \gamma + (\alpha + \gamma) \ln \beta] / (\alpha + \beta + \gamma)$; $\Phi_1 = -\alpha / (\alpha + \beta + \gamma)$; $\Phi_2 = -\gamma / (\alpha + \beta + \gamma)$; $\Phi_3 = 1 / (\alpha + \beta + \gamma)$, and

$$\ln l_{ijzt}^u = \Gamma_0 + \Gamma_1 \ln \left(\frac{w_{ijzt}^u}{r_{ijzt}} \right) + \Gamma_2 \ln \left(\frac{w_{ijzt}^s}{w_{ijzt}^u} \right) + \Gamma_3 \ln y_{ijzt} \quad (4)$$

where $\Gamma_0 = -[\lambda \ln A + \alpha \ln \alpha + \beta \ln \beta + (\alpha + \beta) \ln \gamma]/(\alpha + \beta + \gamma)$; $\Gamma_1 = -\alpha/(\alpha + \beta + \gamma)$; $\Gamma_2 = -\beta/(\alpha + \beta + \gamma)$; $\Gamma_3 = 1/(\alpha + \beta + \gamma)$.

I assume that the parameter A (i.e., the efficiency of production) varies with a sector's involvement and position in GVCs and with time (T) as follows:

$$A = e^{\delta_0 T} \times GVCs_{jt}^{\delta_1} \quad (5)$$

Substituting equation (5) into equations (3) and (4), separating wage from user cost factor,¹⁰ and introducing sector-by-year (θ_{jt}), province-by-sector (θ_{zj}) fixed effects, firm fixed effect (μ_i) and a white-noise error term (ε_{ijzt}) yields the following skilled and unskilled labour demand equations:¹¹

$$\begin{aligned} \ln l_{ijzt}^s = & \Phi_0^* + \mu_0 T + \mu_1 GVCs_{jt} + \Phi_1 \ln w_{ijzt}^s + \Phi_2 \ln r_{ijzt} + \Phi_3 \ln \left(\frac{w_{ijzt}^s}{w_{ijzt}^u} \right) \\ & + \Phi_4 \ln y_{ijzt} + \theta_{jt} + \theta_{zj} + \mu_i + \varepsilon_{ijzt} \end{aligned} \quad (6)$$

where $\mu_0 = -\delta_0 \mu$; $\mu_1 = -\delta_1 \mu$; $\mu = \lambda/(\alpha + \beta + \gamma)$;
 $\Phi_0^* = -[\lambda \ln \alpha + \gamma \ln \gamma + (\alpha + \gamma) \ln \beta]/$
 $(\alpha + \beta + \gamma)$; $\Phi_1 = -\Phi_2 = -\alpha/(\alpha + \beta + \gamma)$;
 $\Phi_3 = -\gamma/(\alpha + \beta + \gamma)$; $\Phi_4 = 1/(\alpha + \beta + \gamma)$, and

$$\begin{aligned} \ln l_{ijzt}^u = & \Gamma_0^* + \omega_0 T + \omega_1 GVCs_{jt} + \Gamma_1 \ln w_{ijzt}^u + \Gamma_2 \ln r_{ijzt} + \Gamma_3 \ln \left(\frac{w_{ijzt}^u}{w_{ijzt}^s} \right) \\ & + \Gamma_4 \ln y_{ijzt} + \theta_{jt} + \theta_{zj} + \mu_i + \varepsilon_{ijzt} \end{aligned} \quad (7)$$

where $\omega_0 = -\delta_0 \omega$; $\omega_1 = -\delta_1 \omega$; $\omega = \lambda/(\alpha + \beta + \gamma)$;
 $\Gamma_0^* = -[\alpha \ln \alpha + \beta \ln \beta + (\alpha + \beta) \ln \gamma]/(\alpha + \beta + \gamma)$;
 $\Gamma_1 = -\Gamma_2 = -\alpha/(\alpha + \beta + \gamma)$; $\Gamma_3 = -\beta/(\alpha + \beta + \gamma)$;
 $\Gamma_4 = 1/(\alpha + \beta + \gamma)$,

Because of adjustment costs, short-run actual employment may deviate from the long-term equilibrium. The employment measure is an aggregation of (un)skilled workers with different adjustment costs. This leads to the inclusion of additional lags to allow for heterogeneity effects (Nickell, 1987). Also, in the presence of serially correlated technology shocks, a longer lag structure may be necessary. I am agnostic about the source of dynamics in the employment equation. Therefore, the specification of the dynamics in terms of lags of the dependent variable implicitly imposes a common evolution for employment following a change in an explanatory variable. This restriction may be relaxed by specifying a distributed lag structure for the exogenous variables.

By using the panel aspect of the data, I allow for unobserved heterogeneity (μ_i), which may be correlated with regressors. However, the Ordinary Least Squares (OLS) estimation of the coefficient associated with the lagged dependent variable (ρ) would be inconsistent because the explanatory variables and μ_i are likely correlated. To eliminate μ_i , equations (6) and (7) are differenced, leading to the following dynamic skilled and unskilled labour demand equations:

$$\begin{aligned} \Delta \ln l_{ijzt}^s &= \Phi_0^* + \mu_0 \Delta T + \mu_1 \Delta GVCs_{jt} + \mu_{11} \Delta GVCs_{jt-1} + \rho \Delta \ln l_{ijzt-1}^s + & (8) \\ &\Phi_1 \Delta \ln w_{ijzt}^s + \Phi_{11} \Delta \ln w_{ijzt-1}^s + \Phi_2 \Delta \ln r_{ijzt} + \Phi_{21} \Delta \ln r_{ijzt-1} + \\ &\Phi_3 \ln \Delta \left(\frac{w_{ijzt}^s}{w_{ijzt}^u} \right) + \Phi_{31} \ln \Delta \left(\frac{w_{ijzt-1}^s}{w_{ijzt-1}^u} \right) + \Phi_4 \Delta \ln y_{ijzt} + \Phi_{41} \Delta \ln y_{ijzt-1} + \\ &\Delta \theta_{jt} + \Delta \theta_{zj} + \Delta \varepsilon_{ijzt} \end{aligned}$$

and

$$\begin{aligned} \Delta \ln l_{ijzt}^u &= \Gamma_0^* + \mu_0 \Delta T + \mu_1 \Delta GVCs_{jt} + \mu_{11} \Delta GVCs_{jt-1} + \rho \Delta \ln l_{ijzt-1}^u + & (9) \\ &\Gamma_1 \Delta \ln w_{ijzt}^u + \Gamma_{11} \Delta \ln w_{ijzt-1}^u + \Gamma_2 \Delta \ln r_{ijzt} + \Gamma_{21} \Delta \ln r_{ijzt-1} + \Gamma_3 \ln \Delta \left(\frac{w_{ijzt}^u}{w_{ijzt}^s} \right) \\ &+ \Gamma_4 \Delta \ln y_{ijzt} + \Gamma_{41} \Delta \ln y_{ijzt-1} + \Delta \theta_{jt} + \Delta \theta_{zj} + \Delta \varepsilon_{ijzt} \end{aligned}$$

However, the differencing will induce a bias in the coefficient of the lagged dependent variable because of its correlation with the unobserved fixed effects in the residuals. Therefore, an instrumental variable approach must be used. I adopt the Generalised Method of Moments (GMM) technique of Arellano and Bond (2001), which gives asymptotically efficient coefficients. These estimates are unbiased and consistent as long as the differenced equation is free of second and higher order serial correlation. I use the Difference Sargan test to determine the lag structure of the instrumental variables. In this context, the instruments are the first and subsequent lags of all the differenced explanatory variables, except the firm characteristics. For the latter variables, the analysis uses as instruments the current value and subsequent lags.

The basis for the empirical analysis is equations (8) and (9), which have been augmented by introducing the influence of complementary skills by means of an interaction term. For obvious reasons, more capital-intensive producers may generate less unskilled employment. Therefore, a higher capital intensity may reduce the unskilled job effect of GVCs. If GVCs draw primarily on skilled employment, skill-intensive firms may generate more skilled job opportunities. In sum, the working hypothesis is that the coefficient on the interaction term between complementary skills and GVCs participation and position is positive or negative and significant, indicating that GVCs have affected jobs in more skill- and capital-intensive firms than in less skill- and capital-intensive firms.

4. Data

The analysis uses firm-level data from Cameroon National Institute of Statistics (NIS) and covers a 13-year period (2005-2017). The original sample size of 1,045 firms is reduced for various reasons. I focus on firms employing five or more workers,¹² and with complete information on the different categories of employees. The final sample thus includes 835 firms in 2-digit 25 industries (18 manufacturing and seven service sectors) and covers an unbalanced panel of about 4,860 observations.

Firm-level variables

In contrast to past studies (e.g., Farole et al., 2018), the current paper uses the actual number of employees. Therefore, labour is the number of full-time employees per year. There are four types of occupations, i.e., i) senior manager; ii) senior technician; iii) technician and lower manager; and iv) employee and labourer. I consider the first three of these occupations as the non-production labour (i.e., skilled workers) and the rest as the production employment (i.e., unskilled workers). The wages measured in terms of annual earnings is deflated to 2010 prices using the consumer price index to get a real measure. The firm-level measure of wages is computed by dividing the total wage bill by the number of employees. The relative wage of non-production workers is the ratio of non-production to production wage. The cost of capital is measured by the firm-level interests paid on long-term credit. The output measure is the firm observed sales measured by the turnover per year.

GVCs' indicators

I use the Eora MRIO database, which provides information on value added trade for 189 countries and 26 sectors from 1990 to 2021 (Lenzen et al., 2013).¹³ To account for GVCs involvement of each sector j in Cameroon, I introduce the following indicators of GVCs' participation and position: i) indirect domestic value added - $IDVA_j$ (i.e., the value added embodied in intermediate inputs re-exported to third countries) divided by gross exports; ii) foreign value added content of a sector's intermediate imports included in gross exports - FVA_j divided by gross exports; iii) GVCs' participation measured as the sum of $IDVA_j$ and FVA_j i.e., $GVC_s Participation_j = IDVA_j + FVA_j$ with larger values indicating more intensive participation in the GVCs; and iv) the relative position of sector j within the GVCs, calculated as the log-difference between the upstream

($IDVA_j$) and the downstream component (FVA_j) of the GVCs' participation index: $GVCs\ Position_j = \ln(1 + DVX_j) - \ln(1 + FVA_j)$.¹⁴ Positive values of the GVCs' position indicate upstream specialization in the GVCs' phases of the production process remotest from final demand e.g., production of intermediate goods used by other countries in their exports, while negative values imply downstream specialization in phases close to final demand, e.g., use of intermediate inputs to produce final products for exports.¹⁵

Firm-level mediating variables

For the firm-level attributes, the skill intensity is the ratio of non-production labour to total full-time employment. The capital intensity is the ratio of the total value of fixed assets to total full-time employment. Appendix Table A2 provides an overview of data availability.

Figure 4.1 shows the average $IDVA_j$, FVA_j , and GVCs' participation levels. The figure shows that the sectors with the highest levels of GVCs' participation are: Food and Beverage; Textile and Wearing Apparel; Petroleum, Chemical and Non-Metallic Mineral, Metal products; Electrical and Machinery; Transport Equipment; Other Manufacturing, Construction, Maintenance and Repair; and Wholesale and Retail Trade where at least 57% of exported value added consists of intermediate inputs either imported by other countries or used by foreign countries in their exports. Mining and Quarrying; Petroleum, Chemical and Non-Metallic Mineral; Metal Products; Electrical and Machinery; and Wholesale and Retail Trade are the industries with the highest values of indirect domestic value added. Industries with important foreign value added in exports are Agriculture and Fishing; Food and Beverage; Textile and Wearing Apparel; Petroleum, Chemical and Non-Metallic Mineral; Metal products; Transport Equipment; Other Manufacturing; Construction, Maintenance and Repair; Hotels and Restaurant; and Public Administration.

Figure 4.2 depicts the values of the GVCs position index across sectors. Only two industries, i.e., Electrical and Machinery; and Financial Intermediation and Business Activities are concentrated in upstream activities. This indicates that those industries produce more intermediate goods that can be bought by foreign investors. Likewise, this confirms the specialization of both industries in activities linked to the primary sector, the dominant sector in the Cameroonian economy. In contrast to past studies (e.g., Amendolagine et al., 2019), most industries in Cameroon are characterized by more downstream GVCs' position, i.e., the use of intermediates to produce final goods for exports.¹⁶ Indeed, Cameroon has signed many trade agreements such as AGOA (African Growth and Opportunity Act) with the USA and the EPAs (Economic Partnership Agreements) with the EU, which allow the country to attract export-oriented foreign investors. Since these investors obtain most of their inputs globally, including their home countries, the extent of their local sourcing of intermediate products is limited.

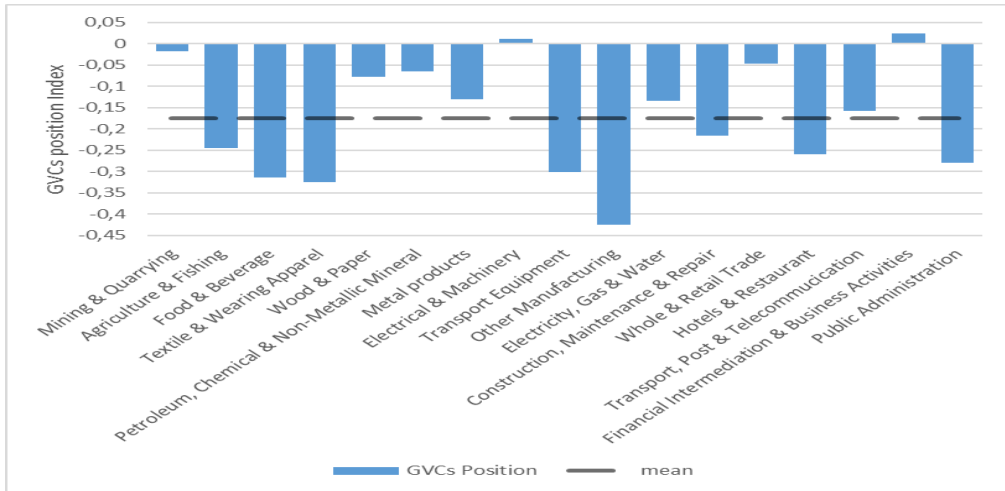
Figure 4.3 finally shows the trends in average GVCs' integration and position over 2005-2017. After a downward trend in 2005-2008, Cameroon has on average kept constant its participation in GVCs over the remaining period under investigation. The same trend is observed for backward GVCs, and the reverse trend is true for forward GVCs. Regarding the GVCs' position, Cameroon has been specialized upstream over 2005-2008 before moving downstream in the remaining period.

Figure 4.1: Average GVCs' participation, FVA_j and IDVA_j across sectors in Cameroon, 2005-2017



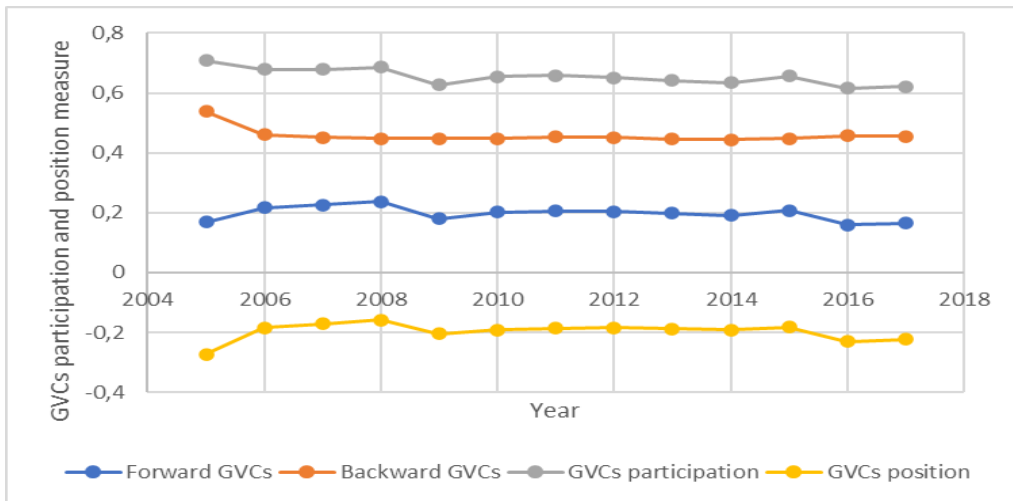
Source: Author's elaboration based on the Eora Multi Region Input-Output database
 Notes: The dotted line represents the average value for all sectors

Figure 4.2: Average GVCs' position across sectors in Cameroon, 2005-2017



Source: Author's elaboration based on the Eora Multi Region Input-Output database
 Notes: The dotted line represents the average value for all sectors

Figure 4.3: Trends in GVCs integration and position, 2005-2017



Source: Author's elaboration based on the Eora Multi Region Input-Output database

5. Results

Main results

As already stated, this paper estimates the effects of GVCs' participation and position on job in the context of dynamic labour demand functions.¹⁷ First, I examined whether the dynamics of adjustment are the same for all firms within a sector by carrying out unit root tests, namely the Pesaran (2007) test of the relevant variables – output, employment, real wage, and price of capital. The unreported results in the interest of space and available upon request indicate that the variables in level are non-stationary and are stationary after the first difference. Then, I analysed the degree of correlation among the indicators of GVCs involvement and position. To do so, the variance inflation factors (VIFs) are calculated to test for the presence of multicollinearity.¹⁸ The results reported in Appendix Table A3 indicate that multicollinearity among the indicators of GVCs' integration and position is a real estimation concern. Therefore, these indicators are included separately in the different specifications. To further minimize the potential for multicollinearity, I also mean-centre the interaction terms (Aiken and West, 1991).

Table 5.1 presents the results of the GMM estimation of equations (8) and (9) for the entire sample of Cameroonian firms and separately for each GVCs' indicator.¹⁹ All labour demand equations perform well as there is no evidence of second order autocorrelation, and the Hansen test indicates the absence of correlation between the instrument set and the residuals. In all cases, the coefficient on the lagged dependent variable is positive and statistically significant. This indicates persistence in the wage, cost of capital and output effects on the level of employment. As expected, a firm's current sale is a strong driver of all current employment. Increases in wages have a strong negative effect on the level of labour demand of all types. The current cost of capital counterintuitively increases the demand for total employment, but the effect is strongly negative in the long-run as expected, indicating substitutability between capital and total employment. Moreover, the evidence appears to favour the hypothesis of a complementarity (substitutability) between skilled (unskilled) job and capital.

The coefficients of current and lagged indicators of GVCs participation and position are not significant for any type of job. This is consistent with my expectations and is in line with Pahl and Timmer (2020), whose findings using industry-level GVCs indicate no

evidence for a positive effect on employment generation. The result also corroborates the findings by Rodrik (2018) of quite disappointing domestic employment consequences of developing countries' recent trade trends, i.e., their integration into and position in GVCs are not associated with significant job opportunities.

Table 5.1: GMM estimates of basic labour demand equations

Variable	Forward GVCs			Backward GVCs		
	Total job (1)	Skilled job (2)	Unskilled job (3)	Total job (4)	Skilled job (5)	Unskilled job (6)
$GVCs_t$	-0.042 (0.297)	-0.249 (0.439)	1.357 (1.163)	0.300 (0.216)	-8.231 (8.620)	5.520 (4.236)
$GVCs_{t-1}$	0.022 (0.284)	0.098 (0.074)	2.309 (1.140)	0.588 (0.544)	-9.150 (9.968)	6.917 (7.334)
lnl_{t-1}	0.450*** (0.053)	0.243*** (0.071)	0.293*** (0.072)	0.451*** (0.052)	0.241*** (0.071)	0.284*** (0.069)
lnw_t	-0.187*** (0.056)	0.035 (0.052)	-0.267*** (0.055)	-0.169*** (0.057)	0.034 (0.052)	-0.257*** (0.053)
lnw_{t-1}	0.012 (0.028)	-0.032 (0.032)	0.016 (0.035)	0.004 (0.029)	-0.033 (0.033)	0.002 (0.033)
lnr_t	0.052** (0.027)	0.092*** (0.029)	0.074** (0.036)	0.061** (0.028)	0.092*** (0.029)	0.081*** (0.032)
lnr_{t-1}	-0.051*** (0.021)	-0.050** (0.025)	-0.081*** (0.029)	-0.059*** (0.022)	-0.050** (0.025)	-0.083*** (0.026)
lny_t	0.307*** (0.039)	0.126*** (0.043)	0.309*** (0.050)	0.280*** (0.039)	0.130*** (0.043)	0.299*** (0.046)
lny_{t-1}	-0.060*** (0.025)	-0.034 (0.023)	-0.030 (0.024)	-0.049** (0.025)	-0.034 (0.023)	-0.021 (0.024)
$ln(w^s/w^u)_t$	/	0.0001 (0.0003)	/	/	0.0001 (0.0003)	/
$ln(w^s/w^u)_{t-1}$	/	-0.0002 (0.0002)	/	/	-0.0002 (0.0002)	/
$ln(w^u/w^s)_t$	/	/	-0.032*** (0.015)	/	/	-0.037*** (0.016)
$ln(w^u/w^s)_{t-1}$	/	/	0.039** (0.019)	/	/	0.031 (0.021)
Observations	3,268	1,784	1,784	3,268	1,784	1,784
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.119	0.609	0.725	0.168	0.584	0.975
Hansen (p-value)	0.303	0.685	0.600	0.119	0.726	0.687

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Table 5.1 Continued

Variable	GVCs participation			GVCs position		
	Total job (7)	Skilled job (8)	Unskilled job (9)	Total job (10)	Skilled job (11)	Unskilled job (12)
$GVCs_t$	0.106	-3.745	0.812	-0.395	0.730	0.564
	(0.674)	(2.134)	(0.637)	(0.562)	(0.716)	(0.499)
$GVCs_{t-1}$	0.340	-5.205	1.357	-0.185	3.859	0.950
	(0.715)	(5.683)	(1.877)	(0.133)	(2.948)	(0.825)
lnl_{t-1}	0.456***	0.241***	0.241***	0.449***	0.242***	0.296***
	(0.053)	(0.071)	(0.055)	(0.055)	(0.071)	(0.072)
lnw_t	-0.172***	0.034	-0.264***	-0.187***	0.034	-0.272***
	(0.057)	(0.052)	(0.049)	(0.057)	(0.052)	(0.055)
lnw_{t-1}	0.005	-0.033	0.004	0.016	-0.033	0.016
	(0.028)	(0.033)	(0.026)	(0.028)	(0.033)	(0.035)
lnr_t	0.074***	0.092***	0.072***	0.046**	0.092***	0.073**
	(0.029)	(0.029)	(0.027)	(0.027)	(0.029)	(0.036)
lnr_{t-1}	-0.069***	-0.050**	-0.062***	-0.044**	-0.049**	-0.083***
	(0.023)	(0.025)	(0.022)	(0.021)	(0.025)	(0.029)
lny_t	0.285***	0.130***	0.292***	0.308***	0.129***	0.312***
	(0.038)	(0.044)	(0.042)	(0.041)	(0.044)	(0.050)
lny_{t-1}	-0.051**	-0.034	-0.017	-0.061***	-0.035	-0.030
	(0.025)	(0.023)	(0.022)	(0.025)	(0.023)	(0.025)
$ln(w^s/w^u)_t$	/	0.0001	/	/	0.0001	/
		(0.0003)			(0.0003)	
$ln(w^s/w^u)_{t-1}$	/	-0.0002	/	/	-0.0002	/
		(0.0002)			(0.0002)	
$ln(w^u/w^s)_t$	/	/	-0.038***	/	/	-0.032***
			(0.016)			(0.015)
$ln(w^u/w^s)_{t-1}$	/	/	0.018	/	/	0.039**
			(0.021)			(0.019)
Observations	3,268	1,784	1,784	3,268	1,784	1,784
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.176	0.596	0.853	0.114	0.588	0.786
Hansen (p-value)	0.132	0.635	0.999	0.436	0.744	0.643

Source: Author's elaboration

Notes: Region-sector and sector-year dummies are included in all equations. Asymptotic standard errors robust to general cross-section and time series heteroscedasticity in parentheses. All variables are in first differences. ***, **, and * denote significance at the 1%, 5% and 10%, respectively.

Next, I examine how the job effect of GVCs' participation and position may vary along firm capital and skill intensity of production. I add their interaction terms with indicators of GVCs' participation and position. To avoid omitted variable bias, I simultaneously include the two firm attributes are simultaneously included in the different specifications.²⁰ Table 5.2 shows the results from this exercise. In each case, columns (1), (3) and (5) present the results for the regressions, including both current and lagged GVCs indicators and firm characteristics. The estimated coefficient of the contemporaneous capital-to-labour ratio is negative, of small magnitude and highly significant. This indicates a significantly negative effect on employment of all types including, surprisingly, the skilled job. For total job, the coefficient on current skill intensity is negative and strongly significant, indicating a lower demand for total employment. For skilled (unskilled) jobs, the absolute values of the positive (negative) estimated coefficients on the current skill intensity of production are always larger than the negative (positive) values on the lagged ones. This indicates that skill intensity by itself has a significantly positive (negative) effect on skilled (unskilled) jobs. As hypothesised, there is still no clear relationship between all the indicators of GVCs' participation and position and the demand for any type of job.

Interesting patterns emerge when the interaction terms are included in columns (2), (4) and (6) of Table 5.2. I find some support for Hypothesis 3. The current interaction between forward GVCs and capital intensity is negative and marginally significant in the case of total job, suggesting that forward GVCs is less beneficial for total employment in more capital-intensive firms. Note also that for any type of job, the interaction between GVCs' position and capital-labour ratio is negative and significant, indicating that GVCs position depresses any type of employment in more capital-intensive Cameroonian firms. The magnitude of this negative effect is bigger for unskilled jobs. The previous results are consistent with the hypothesis of substitutability between capital and employment. This pattern highlights the usefulness of improving human capital in Cameroon and is in line with Rodrik (2018) argument that developing countries should rely more on "*domestic integration*" by improving the capabilities and the fundamentals of the economy through investment in human capital, among others. The negative relation between GVCs position and the demand for skilled jobs is in line with Cadarso et al. (2008), Jian and Milberg (2013) and Pan (2020), who show that the jobs generated by trade in GVCs accrue more to the low- and medium-skilled workers than to high-skilled ones in the USA and Spain labour markets, and in the global economy, respectively.

In contrast, in more capital-intensive firms, the job effects of GVCs participation and backward GVCs are positive for all types of jobs. This indicates that: i) more capital-intensive Cameroonian producers specialised upstream absorb significant amounts of employment; and ii) the job effect of GVCs participation is higher for more capital-intensive Cameroonian firms. This is consistent with my expectations – capital-intensive producers involved in GVCs and primarily supplying inputs to others make use of Cameroon's comparative advantage in job-intensive tasks and activities in the value chain. This also indicates that in developing countries, upstream specialisation

also requires a higher level of education and skill to generate employment.

The coefficient on the current (lagged) interaction between skill intensity and forward GVCs is negative and significant for skilled (unskilled) jobs. This suggests that forward GVCs make little use of both (un)skilled job if associated with low levels of skills. This confirms the importance of educated and skilled workforce as a mediating factor on the relationship between the specialisation downstream and job. Furthermore, in absolute terms, the negative influence of skill is considerably stronger for unskilled job. The skill intensity appears to be negatively and significantly mediating the effect of GVCs' position on any type of job. In other words, if accompanied by a lower level of skill, GVCs position tends to have a negative effect on employment. The previous results echo Lall (2005), who point out that involvement in value chains entails stringent requirements for efficiency and quality. I have some speculative ideas on how this may occur. For example, Cameroonian producers should create local skills by providing employees on-the-job training not only limited to basic production, but also, involving more complex skills, e.g. cross-training on multiple tasks, machine maintenance, layout, and patternmaking. Finally, the lagged interaction terms of GVCs' participation-skill intensity and backward GVCs-skill intensity are positive and significant for total job. This suggests that at higher levels of skill intensity, GVCs' participation and backward GVCs are more likely to generate employment.

In sum, lower (higher) levels of education and skill negatively (positively) mediate the GVCs-job nexus.

Table 5.2: GMM estimates of augmented labour demand equations – skill and capital intensity

Variable	Total job		Skilled job		Unskilled job	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>i/ Forward GVCs (IDVAX_{jt})</i>						
<i>IDVAX_{jt}</i>	2.120 (1.771)	-1.305 (5.955)	2.785 (3.363)	-2.631 (2.576)	1.859 (1.613)	0.548 (0.531)
<i>IDVAX_{jt-1}</i>	-0.877 (0.746)	-1.090 (2.370)	7.047 (7.568)	3.185 (3.635)	1.194 (2.540)	1.531 (1.579)
<i>Capital intensity_t</i>	-0.001*** (0.0003)	-0.003** (0.002)	-0.001*** (0.0004)	-0.002** (0.001)	-0.001** (0.0004)	-0.003* (0.002)
<i>Capital intensity_{t-1}</i>	-0.00002 (0.0002)	0.002 (0.001)	0.0004 (0.0003)	0.001 (0.001)	0.0001 (0.0003)	0.001** (0.001)
<i>Skill intensity_t</i>	-0.622*** (0.223)	-0.768** (0.432)	2.214*** (0.384)	1.249** (0.614)	-2.276*** (0.358)	-1.108*** (0.583)
<i>Skill intensity_{t-1}</i>	0.142 (0.442)	-0.085 (0.317)	-1.293*** (0.288)	-1.011* (0.614)	0.830*** (0.290)	0.006 (0.572)
<i>IDVAX_{jt} × Capital intensity_t</i>	/	-0.002* (0.001)	/	-0.001 (0.001)	/	-0.001 (0.001)

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Table 5.2 Continued

Variable	Total job		Skilled job		Unskilled job	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>i/ Forward GVCs (IDVAX_{it})</i>						
<i>IDVAX_{it-1} × Capital intensity_{t-1}</i>	/	0.001 (0.001)	/	0.001 (0.001)	/	0.001 (0.001)
<i>IDVAX_{it} × Skill intensity_t</i>	/	-0.152 (0.214)	/	-0.540** (0.258)	/	-0.348 (0.295)
<i>IDVAX_{it-1} × Skill intensity_{t-1}</i>	/	-0.114 (0.162)	/	0.049 (0.265)	/	-0.469** (0.272)
<i>lnl_{t-1}</i>	0.351*** (0.056)	0.324*** (0.055)	0.467*** (0.056)	0.461*** (0.059)	0.402*** (0.057)	0.383*** (0.058)
<i>lnw_t</i>	-0.206*** (0.041)	-0.244*** (0.039)	-0.030 (0.044)	-0.073** (0.037)	-0.215*** (0.042)	-0.215*** (0.041)
<i>lnw_{t-1}</i>	0.015 (0.024)	0.031 (0.024)	-0.023 (0.028)	-0.002 (0.025)	0.040 (0.026)	0.039 (0.027)
<i>lnr_t</i>	0.092*** (0.025)	0.093*** (0.022)	0.079*** (0.025)	0.086*** (0.022)	0.079*** (0.023)	0.081*** (0.023)
<i>lnr_{t-1}</i>	-0.052*** (0.018)	-0.052*** (0.017)	-0.050*** (0.020)	-0.056*** (0.019)	-0.056*** (0.019)	-0.063*** (0.020)
<i>lny_t</i>	0.226*** (0.031)	0.253*** (0.029)	0.184*** (0.030)	0.198*** (0.027)	0.250*** (0.031)	0.270*** (0.031)
<i>lny_{t-1}</i>	-0.027 (0.023)	-0.034 (0.022)	-0.051*** (0.023)	-0.052*** (0.021)	-0.050** (0.023)	-0.062*** (0.023)
<i>ln(w^s/w^u)_t</i>	/	/	0.001** (0.0004)	0.001*** (0.0004)	/	/
<i>ln(w^s/w^u)_{t-1}</i>	/	/	-0.0005 (0.0003)	-0.001** (0.0003)	/	/
<i>ln(w^u/w^s)_t</i>	/	/	/	/	0.039 (0.038)	0.036 (0.042)
<i>ln(w^u/w^s)_{t-1}</i>	/	/	/	/	-0.022 (0.036)	-0.024 (0.038)
Observations	2,107	2,107	1,787	1,787	1,787	1,787
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.992	0.651	0.160	0.176	0.422	0.493
Hansen (p-value)	0.936	0.966	0.996	0.997	0.968	0.983

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Table 5.2 Continued

Variable	Total job		Skilled job		Unskilled job	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>ii/ Backward GVCs (FVAX_{jt})</i>						
FVAX _{jt}	2.958	3.610	-1.005	-1.016	1.858	2.203
	(2.821)	(4.249)	(1.042)	(1.968)	(1.479)	(1.845)
FVAX _{jt-1}	-1.335	2.998	-1.709	2.800	-3.111	-0.940
	(1.787)	(1.914)	(1.247)	(1.825)	(2.996)	(0.862)
Capital intensity _t	-0.001**	0.001	-0.001***	0.001	-0.001**	0.002**
	(0.0003)	(0.001)	(0.0004)	(0.001)	(0.0004)	(0.001)
Capital intensity _{t-1}	-0.00005	0.0004	0.0004	0.002***	0.0001	0.002***
	(0.0002)	(0.001)	(0.0003)	(0.001)	(0.0003)	(0.001)
Skill intensity _t	-0.657***	-0.203	2.136***	3.994***	-2.333***	-1.199***
	(0.232)	(0.510)	(0.371)	(0.694)	(0.390)	(0.574)
Skill intensity _{t-1}	0.115	0.558**	-1.274***	-1.532***	0.889***	1.550***
	(0.148)	(0.286)	(0.281)	(0.571)	(0.307)	(0.630)
FVAX _{jt} × Capital intensity _t	/	0.001***	/	0.001**	/	0.002***
		(0.0003)		(0.0005)		(0.001)
FVAX _{jt-1} × Capital intensity _{t-1}	/	0.0004	/	0.001***	/	0.001***
		(0.0002)		(0.0003)		(0.0004)
FVAX _{jt} × Skill intensity _t	/	0.415	/	2.078***	/	1.308**
		(0.483)		(0.701)		(0.659)
FVAX _{jt-1} × Skill intensity _{t-1}	/	0.521**	/	-0.427	/	0.387
		(0.255)		(0.534)		(0.605)
lnI _{t-1}	0.363***	0.345***	0.466***	0.448***	0.416***	0.460***
	(0.056)	(0.054)	(0.056)	(0.056)	(0.057)	(0.061)
lnw _t	-0.200***	-0.244***	-0.006	-0.044	-0.216***	-0.237***
	(0.044)	(0.045)	(0.038)	(0.045)	(0.044)	(0.045)
lnw _{t-1}	0.012	0.016	-0.031	-0.021	0.032	0.015
	(0.026)	(0.026)	(0.026)	(0.027)	(0.029)	(0.028)
lnr _t	0.096***	0.118***	0.082***	0.088***	0.078***	0.079***
	(0.027)	(0.023)	(0.024)	(0.022)	(0.024)	(0.025)
lnr _{t-1}	-0.055***	-0.056***	-0.049***	-0.041***	-0.057***	-0.053***
	(0.019)	(0.016)	(0.018)	(0.019)	(0.020)	(0.020)
lny _t	0.223***	0.248***	0.185***	0.177***	0.245***	0.249***
	(0.031)	(0.032)	(0.027)	(0.031)	(0.031)	(0.034)

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Table 5.2 Continued

Variable	Total job		Skilled job		Unskilled job	
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln y_{t-1}$	-0.021 (0.023)	-0.020 (0.023)	-0.051*** (0.023)	-0.025 (0.022)	-0.037 (0.024)	-0.043** (0.024)
$\ln(w^s/w^u)_t$	/	/	0.001** (0.0004)	0.001*** (0.0004)	/	/
$\ln(w^s/w^u)_{t-1}$	/	/	-0.0005* (0.0002)	-0.001** (0.0003)	/	/
$\ln(w^u/w^s)_t$	/	/	/	/	0.042 (0.040)	0.056 (0.042)
$\ln(w^u/w^s)_{t-1}$	/	/	/	/	-0.024 (0.036)	-0.040 (0.041)
Observations	2,107	2,107	1,787	1,787	1,787	1,787
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.958	0.799	0.147	0.236	0.442	0.516
Hansen (p-value)	0.965	0.935	0.871	0.189	0.982	0.987
<i>iii/ GVCs participation</i>						
$GVC\ participation_{jt}$	3.999 (3.021)	3.136 (2.027)	4.005 (4.728)	-4.901 (3.122)	1.429 (1.409)	0.223 (0.295)
$GVC\ participation_{jt-1}$	-9.424 (8.216)	-1.455 (2.349)	1.043 (1.931)	6.373 (5.040)	-0.645 (0.514)	0.216 (0.271)
$Capital\ intensity_t$	-0.001** (0.0003)	0.001 (0.001)	-0.001*** (0.0004)	0.0002 (0.001)	-0.001** (0.0004)	0.001 (0.001)
$Capital\ intensity_{t-1}$	-0.00003 (0.0002)	0.0003 (0.0004)	0.0004 (0.0003)	0.002*** (0.001)	0.0001 (0.0003)	0.002*** (0.001)
$Skill\ intensity_t$	-0.664*** (0.231)	-0.612** (0.350)	2.188*** (0.382)	2.640*** (0.524)	-2.553*** (0.399)	-2.136*** (0.416)
$Skill\ intensity_{t-1}$	0.088 (0.152)	0.462** (0.242)	-1.307*** (0.287)	-1.436*** (0.440)	0.809*** (0.309)	0.685 (0.438)
$GVCs\ participation_{jt} \times Capital\ intensity_t$	/	0.002*** (0.001)	/	0.001 (0.001)	/	0.002*** (0.001)
$GVCs\ participation_{jt-1} \times Capital\ intensity_{t-1}$	/	0.001 (0.0005)	/	0.001*** (0.001)	/	0.001*** (0.001)
$GVCs\ participation_{jt} \times Skill\ intensity_t$	/	-0.058 (0.557)	/	1.206 (0.888)	/	0.653 (0.861)

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Table 5.2 Continued

Variable	Total job		Skilled job		Unskilled job	
	(1)	(2)	(3)	(4)	(5)	(6)
$GVCs$ $participation_{jt-1} \times$ $Skill\ intensity_{t-1}$	/	0.999*** (0.415)	/	-0.286 (0.611)	/	-0.282 (0.575)
lnI_{t-1}	0.358*** (0.056)	0.374*** (0.055)	0.467*** (0.056)	0.467*** (0.055)	0.402*** (0.058)	0.430*** (0.060)
lnw_t	-0.191*** (0.043)	-0.239*** (0.045)	-0.026 (0.044)	-0.048 (0.044)	-0.194*** (0.044)	-0.219*** (0.046)
lnw_{t-1}	0.012 (0.025)	0.017 (0.025)	-0.022 (0.028)	-0.020 (0.027)	0.038 (0.029)	0.030 (0.031)
lnr_t	0.098*** (0.027)	0.116*** (0.026)	0.080*** (0.025)	0.090*** (0.021)	0.081*** (0.024)	0.089*** (0.024)
$lnrt_{-1}$	-0.056*** (0.019)	-0.063*** (0.019)	-0.050*** (0.021)	-0.049*** (0.018)	-0.057*** (0.020)	-0.059*** (0.021)
lny_t	0.216*** (0.030)	0.224*** (0.033)	0.179*** (0.029)	0.178*** (0.032)	0.239*** (0.031)	0.264*** (0.035)
lny_{t-1}	-0.026 (0.023)	-0.022 (0.024)	-0.050** (0.023)	-0.040** (0.021)	-0.051** (0.024)	-0.067*** (0.026)
$ln(w^s/w^u)_t$	/	/	0.001** (0.0004)	0.001*** (0.001)	/	/
$ln(w^s/w^u)_{-1}$	/	/	-0.0005* (0.0002)	-0.001** (0.0003)	/	/
$ln(w^u/w^s)_t$	/	/	/	/	0.0038 (0.039)	0.034 (0.039)
$ln(w^u/w^s)_{-1}$	/	/	/	/	-0.026 (0.037)	-0.027 (0.037)
Observations	2,107	2,107	1,787	1,787	1.787	1.787
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.956	0.802	0.157	0.121	0.410	0.321
Hansen (p-value)	0.932	0.983	0.989	0.998	0.992	0.990

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Table 5.2 Continued

Variable	Total job		Skilled job		Unskilled job	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>iv/ GVCs position</i>						
$GVC\ position_{jt}$	-0.546	2.080	1.405	-1.175	0.921	-2.828
	(0.489)	(2.569)	(1.677)	(1.137)	(0.902)	(2.571)
$GVC\ position_{jt-1}$	-0.481	-1.331	3.328	0.595	0.303	-0.508
	(0.656)	(1.187)	(3.480)	(0.876)	(0.758)	(0.663)
$Capital\ intensity_t$	-0.001***	-0.001***	-0.001***	-0.001**	-0.001**	-0.001***
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0002)
$Capital\ intensity_{t-1}$	-0.0001	-0.00003	0.0004	0.0003**	0.0001	0.0002
	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
$Skill\ intensity_t$	-0.754***	-0.728***	2.213***	1.128***	-2.431***	-3.167***
	(0.239)	(0.315)	(0.384)	(0.499)	(0.386)	(0.476)
$Skill\ intensity_{t-1}$	0.198	-0.345	-1.296***	-0.590	0.797***	0.852***
	(0.141)	(0.217)	(0.290)	(0.384)	(0.310)	(0.375)
$GVCs\ position_{jt} \times$ $Capital\ intensity_t$	/	-0.004***	-0.005***	-0.009***	/	/
		(0.002)	(0.002)	(0.002)		
$GVCs\ position_{jt-1} \times$ $Capital\ intensity_{t-1}$	/	-0.0002	-0.005***	-0.006***	/	/
		(0.001)	(0.002)	(0.002)		
$GVCs\ position_{jt} \times$ $Skill\ intensity_t$	/	-0.973	/	-4.301***	/	-4.196***
	/	(1.555)		(1.654)		(1.668)
$GVCs\ position_{jt-1}$ $\times Skill\ intensity_{t-1}$	/	-3.291***	/	1.315	/	-0.356
		(1.096)		(1.379)		(1.449)
lnl_{t-1}	0.204***	0.324***	0.467***	0.385***	0.381***	0.341***
	(0.057)	(0.057)	(0.056)	(0.046)	(0.059)	(0.051)
lnw_t	-0.166***	-0.242***	-0.032	0.006	-0.213***	-0.227***
	(0.041)	(0.042)	(0.044)	(0.039)	(0.043)	(0.045)
lnw_{t-1}	-0.003	0.029	-0.023	-0.033	0.050**	0.045**
	(0.025)	(0.025)	(0.028)	(0.022)	(0.027)	(0.025)
$lnrt$	0.067***	0.095***	0.078***	0.107***	0.074***	0.085***
	(0.023)	(0.023)	(0.025)	(0.020)	(0.023)	(0.021)
lnr_{t-1}	-0.048***	-0.045***	-0.050***	-0.056***	-0.047***	-0.043***
	(0.016)	(0.017)	(0.020)	(0.016)	(0.019)	(0.017)
lny_t	0.208***	0.243***	0.185***	0.158***	0.250***	0.264***
	(0.032)	(0.031)	(0.030)	(0.031)	(0.033)	(0.032)
lny_{t-1}	-0.013	-0.034	-0.051***	-0.031*	-0.057***	-0.053***
	(0.021)	(0.024)	(0.023)	(0.018)	(0.024)	(0.022)

*continued next page***Table 5.2 Continued**

Variable	Total job		Skilled job		Unskilled job	
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(w^s/w^u)_t$	/	/	0.001**	0.001***	/	/
			(0.0004)	(0.0004)		
$\ln(w^s/w^u)_{t-1}$	/	/	-0.0005*	-0.001**	/	/
			(0.0002)	(0.0003)		
$\ln(w^u/w^s)_t$	/	/	/	/	0.057	0.059
					(0.042)	(0.046)
$\ln(w^u/w^s)_{t-1}$	/	/	/	/	-0.028	-0.023
					(0.037)	(0.037)
Observations	2,107	2,107	1,787	1,787	1,787	1,787
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.458	0.731	0.162	0.374	0.399	0.813
Hansen (p-value)	0.487	0.934	0.989	1.000	0.975	0.671

Source: Author's elaboration

Notes: Region-sector and sector-year dummies are included in all equations. Asymptotic standard errors robust to general cross-section and time series heteroscedasticity in parentheses. All variables are in first differences. ***, **, and * denote significance at the 1%, 5% and 10%, respectively.

Robustness check

To further increase confidence in my benchmark results, I present three robustness tests. First, I run the analysis separately for Cameroonian firms in the manufacturing and services sectors. The presumption is that manufacturing firms are more likely to get involved in external trade, given that many services are produced and consumed locally. The results shown in Appendix Table A4 are stable. More precisely, if involved in forward GVCs, more capital- and skill-intensive manufacturing and services firms are relatively less likely to make use of any type of employment, and this is particularly important in the manufacturing sector. In addition, GVCs' participation and position have a negative and significant effect on employment of all types in both more capital- and skill-intensive firms. However, the results concerning the mediating effect of skill intensity in the services sector is affected in one case: its (current) interaction term with GVCs' participation is statistically significant and positive for all types of job. As before, backward GVCs exert a statistically significant and positive effect on any type of job in more capital- and skill-intensive manufacturing and services enterprises. Overall, when I account for the impact of the heterogeneity across industries, the main results hold with one exception in the services sector: for all types of job, more skill-intensive firms involved in GVCs are more beneficial.

As a second robustness check, I split the sample into low- versus high-GVCs' participation sectors based on the average level of GVCs' participation index.²¹ The

results in Appendix Table A5 are very similar to my baseline regressions. That is, the analysis lends support to the findings that there is a positive association between backward GVCs and any type of employment in more capital- and skill-intensive firms. I also find that in more capital- and skill-intensive enterprises, forward GVCs, GVCs' participation and position have a negative effect on total, skilled and unskilled workforce. In summary, the previous reported benchmark results are robust to the distinction between high- versus low-GVCs' participation industries.

It has been demonstrated that potential upstream or downstream processes in the production chains might matter for job creation by skill groups. Therefore, as a final sensitivity analysis, I compare sectors concentrated in upstream activities with those specialized in more downstream stages of production processes. The results are in Appendix Table A6. Reassuringly, this distinction provides almost similar estimates for upstream and downstream industries and strongly supports my earlier findings. Indeed, comparing both sub-groups shows that the point estimates and significance levels previously reported remain. However, there is one notable difference: the finding for current interaction term between GVCs' position and skill intensity validates the tendency of Cameroonian producers using more skill-intensive techniques of production in upstream industries to use more jobs, and this applies to all types of employment. In sum, my results are stable to the disaggregation of sectors into concentration in more upstream activities or their specialisation in more downstream stages of production.

6. Conclusion

In this paper, I explored the job effects of involvement and position in global value chains (GVCs), disaggregated the effects by skill level, and investigated the potential of firm characteristics (e.g., capital and skill intensities of production) in moderating the GVCs' participation and position-job relationship. I used the Eora MRIO database to calculate four industry-level indicators of involvement and position in GVCs: i) backward GVCs' participation; ii) forward GVCs' participation; iii) GVCs' participation; and iv) GVCs' position. The information on the global input-output structure is combined with firm-level panel dataset from Cameroonian industries during the period 2005-2017. The paper estimated dynamic labour demand functions for total, skilled and unskilled job, including both indicators of GVCs' integration and position and their interactions with firm-specific characteristics. The possible endogeneity of GVCs is accounted for by performing generalized method of moments (GMM) estimations.

My main results can be summarized as follows. Firstly, there is no clear effect of participation and positioning in GVCs on any type of job, corroborating the line of reasoning that development strategies should focus less on international economic integration. Secondly, two firm-specific attributes have been analysed to understand what drives the GVCs-job nexus. Capital and skill intensity of production have been found to negatively influence the (un)skilled jobs effects of forward GVCs and GVCs' position, suggesting that these patterns of GVCs accompanied by a lower level of education and skill are less job intensive. Capital and skill intensity of production turned out to positively influence the job implications of backward GVCs' integration, and this applies to both (un)skilled jobs, and involvement in GVCs is more beneficial only for unskilled workers in more capital-intensive firms. Finally, the main findings are robust to the disaggregation of sectors into i) manufacturing vs services; ii) high- vs low-GVCs' participation; and iii) upstream vs downstream stages of production.

From a policy perspective, the policy challenge in Cameroon extends far beyond more involvement into GVCs. Two issues appear to deserve priority attention. Firstly, skill development – Cameroonian firms should create local skill, for example, by providing employees on-the-job training not only limited to basic production but including more complex skills e.g., cross-training on multiple tasks, machine maintenance, layout, and patternmaking. Secondly, investment in human capital – a deficient human capital system constrains the supply of high-skilled jobs. Therefore, the upgrading of educational system and technical training are vital in helping more GVCs-related job generation, especially for backward GVCs integration generally associated with lower value-added activities, and to ease labour market issues in general.

Notes

1. African Economic Research Consortium – AERC [*Consortium pour la Recherche Economique en Afrique – CREA* ‘Value chain development, trade and economic transformation in Africa: Phase II’]
2. I wish to express my deep appreciation to the African Economic Research Consortium (AERC) for the financial support to carry out this research (Grant No 23508). I am also grateful to the participants at the May 17-19, 2023 AERC virtual workshop on ‘Value chain development, trade and economic transformation in Africa: Phase II’, namely James de Melo for valuable comments. I am indebted to Vigny Sayal Ngohoba, PhD student in computer sciences for the extensive assistance, namely in decomposing the gross exports into the different indicators of GVCs participation.
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4. It is worth noting that I could not use firm-level data on GVCs for several reasons, e.g., i) lack of information on exporting and importing firms, and firms having international certification and foreign ownership in the dataset; ii) various caveats associated with the uses of customs transactions data, e.g. informality of a significant volume of trade and so not reflected in official Custom data (Nkendah, 2013) and under-reporting of a significant share of extra-regional trade; iii) inaccurate matching of firms’ data with Customs transactions, e.g., an important number of firms in the Customs data might not exist in the firms’ census data and vice-versa.
5. This hypothesis is tested by estimating dynamic labour demand functions separately for skilled and unskilled workers, including both indicators of backward and forward participation in GVCs.
6. I interact the GVCs’ indicators with firm characteristics, e.g. skill and capital intensity of production, to allow for firm-level heterogeneity in the relationship between GVCs involvement and position and job.
7. This hypothesis is tested by interacting the GVCs’ proxies with firm characteristics, e.g. skill and capital intensities.

8. Estimating a single equation of the demand for different types of labour is not appropriate given the common shocks affecting those labour demand functions. Moreover, the decision to employ (un)skilled workers is a joint one. Therefore, a simultaneous estimation where the expected changes in one skill group matters in the expected demand for the other skill group is desirable. Kaiser (2001) follows a similar approach.
9. Using the Stata command '*lincom*', the constant return to scale (CRTS) hypothesis is tested and the test results provide an estimate of 0.652, SD=0.806 and t=0.809. Therefore, the CRTS hypothesis cannot be rejected.
10. In contrast to previous studies, the cost of capital varies by firm and over time.
11. By utilising the panel aspect of data, I allow for unobserved heterogeneity (μ_i), which may be correlated with regressors. The interactive sector-by-year and province-by-year fixed effects are added to control, respectively, for unobserved industry trends over the period, and aggregate shocks that may vary across different provinces due, for example, to local market conditions.
12. Within the Cameroonian context, firms with less than 5 workers usually operate in the informal sector.
13. Appendix Table A1 provides the combination of the 26 harmonised industries into 17 broadly defined sectors.
14. Eora is the only input-output (IO) database that provides sector- and country-level information on African economies. I am not aware of an IO database that specifically identifies firms participating in GVCs for African countries. Amendolagine et al. (2019) follow the same approach. Moreover, the literature (e.g., World Bank, 2020) is converging on using two-way trading (i.e., exporting and importing at the same time) as the firm-level measure of GVCs participation. Unfortunately, the dataset does not allow me to identify the two-way trading firms.
15. For a step-by-step decomposition of gross exports into the domestic value added, indirect domestic value added, and foreign value added in exports, see among others, Koopman et al. (2011), Koopman et al. (2014), and Aslam et al. (2017).
16. These exports are intermediates and not final goods, as they undergo further processing before reaching the final consumer.
17. The GVCs data from 2017 on are nowcasted, not the real data. The estimations, excluding the year 2017 yielded the same results.
18. Independent regression equations are formed using each $k - 1$ explanatory variable as the dependent variable. For each of the $k - 1$ independent variable equations, the VIF is calculated as $(1 - R^2)^{-1}$. As a rule of thumb, a VIF exceeding 10 is seen as a sign of serious multicollinearity (Belsley et al., 1980).

19. The two-step difference GMM produce the same results and hence they are not reported.
20. The degree of correlation between capital intensity and skill intensity is significantly positive and very low (estimate=0.059; p-value=0.000).
21. Low-GVCs' integration sectors include Mining & Quarrying; Agriculture & Fishing; Wood & Paper; Electricity, Gas & Water; Hotels & Restaurants; Transport, Post & Telecommunication; Financial Intermediation & Business Activities; and Public Administration. The high-GVCs participation sectors consist of Food & Beverage; Petroleum, Chemical & Non-Metallic Mineral; Metal Products; Electrical & Machinery; Transport Equipment; Other Manufacturing; Construction, Maintenance & Repair; and Wholesale & Retail Trade.

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Appendix

Table A1: Sectoral aggregation

Cameroon database		Eora database	
No.	Industry	No.	Industry
1	Grain Milling and Stark	1	Agriculture and Fishing
2	Extractive Industries	2	Mining and Quarrying
3	Food Processing	3	Food and Beverage
4	Bakery and Pastry		
5	Other Food Products		
6	Beverage and Tobacco		
7	Textile and Weaving	4	Textiles and Wearing Apparel
8	Footwear and Leather Products		
9	Wood and Furniture	5	Wood and Paper
10	Paper and Printing		
11	Chemicals	6	Petroleum, Chemical and Non-Metallic Mineral
12	Rubber and Plastic Products		
13	Non-Metallic Minerals		
14	Basic Metals	7	Basic Metals
15	Machinery, Electrical Machinery and Apparatus	8	Electrical and Machinery
16	Transport Equipment	9	Transport Equipment
17	Miscellaneous	10	Other Manufacturing
18	Electricity, Gas and Water	11	Electricity, Gas and Water
19	Construction and Public Works	12	Construction
			Maintenance and Repair
20	Wholesale and Retail Trade	13	Wholesale Trade
			Retail Trade
21	Restaurants and Hotels	14	Hotels and Restaurants
22	Transport, Warehouse and Communication	15	Transport
			Post and Telecommunication
23	Banking and Insurance	16	Financial Intermediation and Business Activities
24	Business and Real Estate Services		
25	Services to Communities and Social Services	17	Public Administration

Source: Author's construction base on Cameroon and Eora databases

Table A2: Summary statistics of variables

Variable	All sector		Mining and Quarrying		Agriculture and Fishing		Food and Beverage		Textile and Wearing Apparel	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Total labour	132.350	579.414	82.535	88.518	30.75	25.526	244.477	1169.763	66.824	137.601
Skilled labour	55.038	236.250	66.670	90.076	9.056	11.363	63.166	243.409	43.578	86.870
Unskilled labour	98.553	472.249	17.981	28.811	23.789	25.249	204.727	1004.618	50.008	98.800
Total wage rate	4.169	38.919	114.177	314.429	7.024	14.400	2.192	5.878	1.597	3.104
Skilled wage rate	48.226	165.108	411.348	1024.393	29.040	47.885	59.213	87.515	49.058	85.073
Unskilled wage rate	3.442	48.660	189.707	392.066	6.183	16.573	0.669	2.591	0.564	3.479
Sales	5701.12	36410.52	24072.36	42836.32	678.39	1152.016	4285.479	10135.77	2194.283	6562.942
Cost of capital	243.624	1799.155	921.91	1270.508	125.651	111.403	156.210	480.832	55.598	208.732
Skill intensity	0.410	0.306	0.667	0.356	0.417	0.301	0.354	0.254	0.319	0.300
Capital intensity	8.166	65.266	31.141	153.182	14.633	19.790	11.485	102.172	3.994	12.356
$IDVA_j$	0.201	0.116	0.245	0.100	0.087	0.010	0.172	0.020	0.095	0.012
FVA_j	0.454	0.118	0.271	0.141	0.421	0.031	0.605	0.013	0.516	0.018
GVCs participation	0.655	0.159	0.516	0.182	0.502	0.034	0.777	0.023	0.611	0.014
GVCs position	-0.192	0.129	-0.018	0.131	-0.244	0.021	-0.315	0.019	-0.325	0.021

Table A3: Correlation among indicators of GVCs participation and position

	Indicators of GVCs participation and position				VIFs
	<i>IDVAX_j</i>	<i>FVAX_j</i>	<i>GVC participation_j</i>	<i>GVC position_j</i>	
<i>IDVAX_j</i>	1				11.13
<i>FVAX_j</i>	-0.074	1			33.76
	(0.000)				
<i>GVC participation_j</i>	0.675	0.687	1		28.01
	(0.000)	(0.000)			
<i>GVC position_j</i>	0.755	-0.707	0.027	1	15.54
	(0.000)	(0.000)	(0.068)		

Source: Author's elaboration.

Notes: P-values in parentheses.

Table A4: First difference GMM estimates of augmented labour demand equations – sample split

Variable	Forward GVCs			Backward GVCs		
	Total job (1)	Skilled job (2)	Unskilled job (3)	Total job (4)	Skilled job (5)	Unskilled job (6)
<i>i/ Manufacturing sector</i>						
GVC_{st}	-5.461	1.194	1.226	-0.302	-0.544	0.273
	(7.066)	(1.434)	(1.847)	(0.440)	(0.329)	(0.394)
GVC_{st-1}	-2.006	0.480	0.413	-0.075	0.117	0.152
	(2.959)	(0.452)	(0.446)	(0.103)	(0.167)	(0.106)
<i>Capital intensity</i> _t	-0.002	-0.002**	-0.002***	0.0001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
<i>Capital intensity</i> _{t-1}	0.001	0.0001	0.001	-0.001***	-0.001	-0.0001
	(0.001)	(0.001)	(0.001)	(0.0005)	(0.001)	(0.001)
<i>Skill intensity</i> _t	-1.116***	1.175**	-3.661***	-1.216***	2.528***	-2.638***
	(0.427)	(0.583)	(0.568)	(0.488)	(0.703)	(0.649)
<i>Skill intensity</i> _{t-1}	0.167	-0.931	0.523	0.552**	-1.258***	1.688***
	(0.330)	(0.600)	(0.525)	(0.272)	(0.521)	(0.649)
$GVC_{sjt} \times \text{Capital intensity}_t$	-0.001	-0.001**	-0.002***	0.0003	0.003	0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)
$GVC_{sjt-1} \times \text{Capital intensity}_{t-1}$	0.001	-0.0001	-4.53e-06	-0.002***	-0.002**	-0.001
	(0.001)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.001)
$GVC_{sjt} \times \text{Skill intensity}_t$	-0.404**	-0.648***	-0.602***	-0.733**	0.244	-0.322
	(0.201)	(0.247)	(0.254)	(0.413)	(0.736)	(0.717)
$GVC_{sjt-1} \times \text{Skill intensity}_{t-1}$	-0.049	0.008	-0.220	0.292	-0.159	0.672
	(0.161)	(0.263)	(0.231)	(0.216)	(0.559)	(0.698)
$\ln l_{t-1}$	0.315***	0.430***	0.289***	0.353***	0.463***	0.451***
	(0.058)	(0.068)	(0.053)	(0.060)	(0.064)	(0.062)
$\ln w_t$	-0.268***	-0.031	-0.204***	-0.246***	-0.012	-0.235***
	(0.051)	(0.044)	(0.040)	(0.047)	(0.047)	(0.049)
$\ln w_{t-1}$	0.040	-0.023	0.021	0.031	-0.036	0.021
	(0.032)	(0.030)	(0.025)	(0.030)	(0.032)	(0.032)
$\ln r_t$	0.084***	0.066***	0.047***	0.097***	0.058***	0.050**
	(0.021)	(0.022)	(0.018)	(0.023)	(0.022)	(0.026)
$\ln r_{t-1}$	-0.044***	-0.039**	-0.026**	-0.045***	-0.024	-0.036**
	(0.017)	(0.019)	(0.013)	(0.017)	(0.017)	(0.020)
$\ln y_t$	0.273***	0.178***	0.256***	0.260***	0.174***	0.257***
	(0.034)	(0.030)	(0.030)	(0.035)	(0.029)	(0.033)

$\ln y_{t-1}$	-0.027	-0.036	-0.034	-0.025	-0.028	-0.043*
	(0.027)	(0.024)	(0.022)	(0.027)	(0.023)	(0.026)
$\ln(w^s/w^u)_t$	/	0.001**	/	/	0.001***	/
		(0.0004)			(0.0004)	
$\ln(w^s/w^u)_{t-1}$	/	-0.0005	/	/	-0.0004	/
		(0.0003)			(0.0003)	
$\ln(w^u/w^s)_t$	/	/	0.160**	/	/	0.134**
			(0.082)			(0.075)
$\ln(w^u/w^s)_{t-1}$	/	/	0.008	/	/	0.010
			(0.025)			(0.029)
Observations	1,742	1,502	1,502	1,742	1,502	1,502
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.400	0.160	0.918	0.550	0.084	0.380
Hansen (p-value)	0.574	0.993	1.000	0.439	0.997	0.129

Table A4 Continued

Variable	GVCs participation			GVCs position		
	Total job (7)	Skilled job (8)	Unskilled job (9)	Total job (10)	Skilled job (11)	Unskilled job (12)
$GVCs_t$	-0.557 (0.618)	-0.435 (0.467)	-1.611 (1.287)	-0.127 (0.356)	-0.564 (0.856)	0.114 (0.208)
$GVCs_{t-1}$	-0.081 (0.083)	0.509 (0.922)	-3.347 (3.360)	0.150 (0.078)	0.156 (0.153)	-0.079 (0.069)
$Capital\ intensity_t$	0.0002 (0.001)	-0.0002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002*** (0.001)	-0.001 (0.001)
$Capital\ intensity_{t-1}$	-0.0003 (0.0004)	0.0004 (0.001)	-0.0003 (0.0005)	0.002 (0.001)	0.001*** (0.0005)	0.001 (0.0005)
$Skill\ intensity_t$	-0.821*** (0.342)	1.772*** (0.510)	-3.195*** (0.476)	-0.677*** (0.298)	1.756*** (0.454)	-3.081*** (0.415)
$Skill\ intensity_{t-1}$	0.408** (0.231)	-0.878** (0.447)	1.261*** (0.371)	-0.072 (0.199)	-0.852** (0.444)	0.923*** (0.410)
$GVCs_{jt} \times Capital\ intensity_t$	0.0002 (0.002)	0.001 (0.003)	-0.001 (0.002)	-0.002 (0.003)	-0.011** (0.003)	-0.008*** (0.003)
$GVCs_{jt-1} \times Capital\ intensity_{t-1}$	-0.002 (0.001)	-0.001 (0.001)	-0.002* (0.001)	0.006*** (0.002)	-0.003 (0.003)	-0.004 (0.003)
$GVCs_{jt} \times Skill\ intensity_t$	-0.0765* (0.476)	-1.138 (0.883)	-1.464** (0.773)	-0.295 (0.495)	-2.207 (1.669)	-2.894* (2.804)
$GVCs_{jt-1} \times Skill\ intensity_{t-1}$	0.477 (0.319)	0.220 (0.772)	0.653 (0.642)	-2.2215*** (0.968)	0.312 (0.592)	-0.415 (0.563)
lnl_{t-1}	0.336*** (0.061)	0.436*** (0.057)	0.315*** (0.051)	0.325*** (0.063)	0.409*** (0.062)	0.341*** (0.062)
lnw_t	-0.256*** (0.051)	-0.0001 (0.041)	-0.210*** (0.038)	-0.230*** (0.051)	0.026 (0.042)	-0.225*** (0.054)
lnw_{t-1}	0.035 (0.031)	-0.043 (0.029)	0.024 (0.025)	0.020 (0.032)	-0.047* (0.028)	0.039 (0.031)
lnr_t	0.094*** (0.023)	0.064*** (0.021)	0.062*** (0.018)	0.096*** (0.022)	0.056*** (0.019)	0.045** (0.021)
lnr_{t-1}	-0.047*** (0.017)	-0.034** (0.017)	-0.026** (0.013)	-0.049*** (0.018)	-0.031** (0.016)	-0.023 (0.018)
lny_t	0.266*** (0.036)	0.179*** (0.028)	0.250*** (0.026)	0.252*** (0.035)	0.176*** (0.029)	0.255*** (0.033)
lny_{t-1}	-0.030 (0.028)	-0.032 (0.022)	-0.026 (0.020)	-0.025 (0.027)	-0.040* (0.024)	-0.041* (0.026)

$\ln(w^s/w^u)_t$	/	0.001***	/	/	0.001**	/
		(0.0003)			(0.0004)	
$\ln(w^s/w^u)_{t-1}$	/	-0.0003	/	/	-0.0003	/
		(0.0002)			(0.0002)	
$\ln(w^u/w^s)_t$	/	/	0.141**	/	/	0.185***
			(0.078)			(0.065)
$\ln(w^u/w^s)_{t-1}$	/	/	-0.006	/	/	0.009
			(0.031)			(0.025)
Observations	1,742	1,502	1,502	1,742	1,502	1,502
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.438	0.142	0.790	0.603	0.100	0.645
Hansen (p-value)	0.535	1.000	1.000	0.663	1.000	0.997

Source: Author's elaboration

Notes: Region-sector and sector-year dummies are included in all equations. Asymptotic standard errors robust to general cross-section and time series heteroscedasticity in parentheses. All variables are in first differences. ***, **, and * denote significance at the 1%, 5% and 10%, respectively.

Table A4 Continued

Variable	GVCs participation			GVCs position		
	Total job (7)	Skilled job (8)	Unskilled job (9)	Total job (10)	Skilled job (11)	Unskilled job (12)
<i>ii/ Services sector</i>						
$GVCs_t$	-0.778	0.055	0.222	-0.332	-0.666	0.505
	(0.709)	(0.209)	(0.306)	(0.209)	(0.707)	(0.407)
$GVCs_{t-1}$	-2.700	-0.111	-0.017	-0.099	-0.066	-0.1777
	(2.788)	(0.207)	(0.037)	(0.122)	(0.061)	(0.809)
<i>Capital intensity_t</i>	0.009	0.007	0.014	-0.001	0.014	0.015
	(0.017)	(0.027)	(0.032)	(0.012)	(0.019)	(0.021)
<i>Capital intensity_{t-1}</i>	0.002	0.0005	-0.022	-0.004	-0.003	0.002
	(0.011)	(0.022)	(0.020)	(0.006)	(0.013)	(0.010)
<i>Skill intensity_t</i>	1.217	-0.542	-2.385	0.975	5.481***	0.991
	(1.346)	(0.566)	(2.426)	(1.117)	(1.171)	(1.148)
<i>Skill intensity_{t-1}</i>	-1.222	-0.885	1.146	-0.309	-2.312***	-0.789
	(1.065)	(0.704)	(1.764)	(0.706)	(1.064)	(0.984)
$GVCs_t \times \text{Capital}$ intensity_t	0.007	0.005	0.010	0.0003	0.007	0.007
	(0.011)	(0.017)	(0.020)	(0.006)	(0.009)	(0.009)
$GVCs_{j_t}$ $\times \text{Capital}$ intensity_{t-1}	0.002	0.001	-0.014	-0.001	0.0002**	0.001
	(0.007)	(0.014)	(0.013)	(0.003)	(0.0001)	(0.004)
$GVCs_{j_t} \times \text{Skill}$ intensity_t	1.013	-0.919	0.535	1.865	3.763***	3.928***
	(0.636)	(1.290)	(0.367)	(1.205)	(1.059)	(1.105)
$GVCs_{j_{t-1}} \times \text{Skill}$ intensity_{t-1}	-0.501	0.161	0.333	-0.242	-1.242	-1.280
	(0.522)	(1.010)	(0.938)	(0.651)	(0.873)	(0.896)
$\ln l_{t-1}$	0.289***	0.407***	0.307***	0.235***	0.352***	0.249***
	(0.068)	(0.076)	(0.073)	(0.071)	(0.092)	(0.078)
$\ln w_t$	-0.197***	-0.014	-0.184***	-0.212***	-0.043	-0.222***
	(0.048)	(0.055)	(0.064)	(0.044)	(0.048)	(0.050)
$\ln w_{t-1}$	-0.043	-0.072**	-0.061	-0.057	-0.061**	-0.063
	(0.036)	(0.038)	(0.049)	(0.037)	(0.034)	(0.047)
$\ln r_t$	0.127***	0.141***	0.102***	0.107***	0.113***	0.070**
	(0.043)	(0.057)	(0.047)	(0.037)	(0.046)	(0.036)
$\ln r_{t-1}$	-0.057**	-0.063	-0.046	-0.039	-0.050	-0.038
	(0.033)	(0.042)	(0.035)	(0.032)	(0.040)	(0.031)
$\ln y_t$	0.258***	0.138***	0.266***	0.262***	0.154***	0.272***
	(0.052)	(0.059)	(0.060)	(0.051)	(0.056)	(0.059)
$\ln y_{t-1}$	-0.014	-0.025	-0.020	0.014	-0.016	0.009
	(0.046)	(0.044)	(0.050)	(0.043)	(0.042)	(0.046)

$\ln(w^s/w^u)_t$	/	0.003***	/	/	0.003***	/
		(0.001)			(0.001)	
$\ln(w^s/w^u)_{t-1}$	/	-0.001			-0.0003	
		(0.001)			(0.001)	
$\ln(w^u/w^s)^t$	/	/	-0.013	/	/	-0.021***
			(0.008)			(0.008)
$\ln(w^u/w^s)_{t-1}$	/	/	0.017**			0.016***
			(0.009)			(0.007)
Observations	414	327	335	414	327	335
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.080	0.176	0.762	0.118	0.119	0.338
Hansen (p-value)	1.000	0.702	0.3008	1.000	0.098	0.265

Table A4 Continued

Variable	GVCs participation			GVCs position		
	Total job (7)	Skilled job (8)	Unskilled job (9)	Total job (10)	Skilled job (11)	Unskilled job (12)
$GVCs_t$	-0.111 (0.222)	-0.333 (0.308)	-0.177 (0.100)	-0.133 (0.888)	-0.155 (0.200)	-0.088 (0.099)
$GVCs_{t-1}$	0.025 (0.306)	0.012 (0.224)	-0.028 (0.022)	0.208 (0.189)	0.111 (0.89)	0.053 (0.066)
$Capital\ intensity_t$	0.005 (0.017)	0.023 (0.025)	0.027 (0.024)	-0.002 (0.002)	0.001 (0.003)	-0.0002 (0.003)
$Capital\ intensity_{t-1}$	-0.008 (0.010)	-0.012 (0.013)	-0.001 (0.012)	-0.001 (0.001)	-0.002 (0.002)	6.12e-06 (0.002)
$Skill\ intensity_t$	1.670 (1.256)	5.497*** (1.116)	1.260 (1.043)	-1.539* (0.948)	-0.923 (1.211)	-5.771*** (1.365)
$Skill\ intensity_{t-1}$	-0.946 (0.776)	-2.790*** (0.977)	-1.229 (0.926)	-0.150 (0.524)	-0.356 (0.839)	1.047 (0.893)
$GVCs_{jt} \times Capital\ intensity_t$	0.006 (0.015)	0.021 (0.021)	0.024 (0.021)	0.009 (0.022)	-0.026 (0.038)	-0.012 (0.040)
$GVCs_{jt-1} \times Capital\ intensity_{t-1}$	-0.006 (0.009)	-0.010 (0.011)	-0.001 (0.011)	0.004 (0.011)	0.020 (0.021)	-0.008 (0.019)
$GVCs_{jt} \times Skill\ intensity_t$	3.717** (2.001)	5.785*** (1.531)	6.428*** (1.474)	-3.148 (3.744)	-0.128*** (0.053)	-0.124*** (0.056)
$GVCs_{jt-1} \times Skill\ intensity_{t-1}$	-1.006 (1.062)	-2.311** (1.207)	-2.438** (1.212)	-0.399 (0.247)	0.036 (0.040)	0.030 (0.039)
lnl_{t-1}	0.245*** (0.077)	0.367*** (0.093)	0.246*** (0.076)	0.270*** (0.065)	0.374*** (0.085)	0.246*** (0.083)
lnw_t	-0.237*** (0.048)	-0.047 (0.046)	-0.239*** (0.049)	-0.205*** (0.048)	-0.022 (0.049)	-0.199*** (0.054)
lnw_{t-1}	-0.046 (0.035)	-0.069** (0.037)	-0.061 (0.049)	-0.049 (0.037)	-0.060** (0.034)	-0.056 (0.046)
lnr_t	0.106*** (0.039)	0.111*** (0.044)	0.070** (0.034)	0.122*** (0.040)	0.119*** (0.048)	0.094*** (0.042)
lnr_{t-1}	-0.039 (0.033)	-0.053 (0.039)	-0.044 (0.031)	-0.045 (0.033)	-0.053 (0.039)	-0.039 (0.035)
lny_t	0.276*** (0.053)	0.165*** (0.052)	0.289*** (0.057)	0.259*** (0.056)	0.128*** (0.059)	0.239*** (0.062)
lny_{t-1}	-0.003 (0.040)	-0.022 (0.042)	-0.001 (0.046)	-0.0004 (0.044)	-0.006 (0.042)	0.004 (0.048)

$\ln(w^s/w^u)_t$	/	0.003***	/	/	0.003***	/
		(0.001)			(0.001)	
$\ln(w^s/w^u)_{t-1}$	/	-0.0004	/	/	-0.001	/
		(0.001)			(0.001)	
$\ln(w^u/w^s)_t$	/	/	-0.020***	/	/	-0.016**
			(0.007)			(0.009)
$\ln(w^u/w^s)_{t-1}$	/	/	0.018***	/	/	0.009
			(0.012)			(0.006)
Observations	414	327	335	414	327	335
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.339	0.118	0.126	0.125	0.125	0.182
Hansen (p-value)	0.291	0.573	0.221	0.275	0.199	0.137

Source: Author's elaboration

Notes: Region-sector and sector-year dummies are included in all equations. Asymptotic standard errors robust to general cross-section and time series heteroscedasticity in parentheses. All variables are in first differences. ***, **, and * denote significance at the 1%, 5% and 10%, respectively.

Table A5: First difference GMM estimates of augmented labour demand equations –high- vs low-GVCs’ participation

Variable	Forward GVCs			Backward GVCs		
	Total job (1)	Skilled job (2)	Unskilled job (3)	Total job (4)	Skilled job (5)	Unskilled job (6)
i/ High-GVCs participation sector						
$GVCs_t$	-0.606	-0.400	-0.185	-0.326	0.124	0.127
	(0.735)	(0.382)	(0.331)	(0.405)	(0.275)	(0.226)
$GVCs_{t-1}$	-0.641	0.184	-0.531	-0.048	0.163	0.301
	(0.522)	(0.250)	(0.410)	(0.092)	(0.160)	(0.793)
<i>Capital intensity</i> _t	-0.003***	-0.004***	-0.003***	0.009	0.015***	0.017***
	(0.001)	(0.001)	(0.001)	(0.009)	(0.004)	(0.004)
<i>Capital intensity</i> _{t-1}	0.003***	0.001	0.001	-0.001	-0.002	-0.006
	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.005)
<i>Skill intensity</i> _t	-0.108	1.787***	-3.429***	-1.880**	1.227	-4.028***
	(0.430)	(0.631)	(0.625)	(1.109)	(1.599)	(1.709)
<i>Skill intensity</i> _{t-1}	-0.495	-0.711	0.555	1.452***	-0.400	3.764***
	(0.403)	(0.805)	(0.609)	(0.560)	(1.103)	(1.129)
$GVCs_{jt} \times \textit{Capital intensity}_t$	-0.002***	-0.002***	-0.002**	0.011	0.019***	0.021***
	(0.001)	(0.001)	(0.001)	(0.011)	(0.005)	(0.005)
$GVCs_{jt-1} \times \textit{Capital intensity}_{t-1}$	0.002***	-0.00005	0.0004	-0.003	-0.004	-0.008
	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)	(0.006)
$GVCs_{jt} \times \textit{Skill intensity}_t$	0.310	-0.260	-0.422	-1.484	-1.356	-1.859
	(0.277)	(0.337)	(0.309)	(1.404)	(2.116)	(2.304)
$GVCs_{jt-1} \times \textit{Skill intensity}_{t-1}$	-0.526***	0.116	-0.154	1.566**	0.707	2.949**
	(0.243)	(0.397)	(0.609)	(0.795)	(1.486)	(1.496)
$\ln l_{t-1}$	0.331***	0.475***	0.161***	0.326***	0.479***	0.435***
	(0.065)	(0.062)	(0.071)	(0.059)	(0.061)	(0.060)
$\ln w_t$	-0.272***	-0.065	-0.220***	-0.261***	-0.059	-0.258***
	(0.053)	(0.047)	(0.054)	(0.047)	(0.045)	(0.045)
$\ln w_{t-1}$	0.034	-0.020	0.007	0.019	-0.025	0.012
	(0.028)	(0.028)	(0.029)	(0.027)	(0.028)	(0.029)
$\ln r_t$	0.062***	0.066***	0.076***	0.055***	0.080***	0.053***
	(0.026)	(0.025)	(0.023)	(0.023)	(0.027)	(0.025)
$\ln r_{t-1}$	-0.031*	-0.046***	-0.043***	-0.020	-0.047***	-0.046***
	(0.019)	(0.019)	(0.019)	(0.017)	(0.020)	(0.020)
$\ln y_t$	0.278***	0.198***	0.255***	0.275***	0.180***	0.272***
	(0.037)	(0.032)	(0.035)	(0.035)	(0.032)	(0.034)
$\ln y_{t-1}$	-0.030	-0.036	-0.010	-0.020	-0.021	-0.024
	(0.028)	(0.025)	(0.025)	(0.026)	(0.024)	(0.025)

$\ln(w^s/w^u)_t$	/	0.001**	/	/	0.001**	/
		(0.001)			(0.001)	
$\ln(w^s/w^u)_{t-1}$	/	-0.001	/	/	-0.001	/
		(0.0004)			(0.0004)	
$\ln(w^u/w^s)_t$	/	/	0.163***	/	/	0.208***
			(0.051)			(0.053)
$\ln(w^u/w^s)_{t-1}$	/	/	0.006	/	/	0.004
			(0.021)			(0.030)
Observations	1,663	1,416	1,372	1,663	1,416	1,372
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.852	0.384	0.199	0.969	0.660	0.746
Hansen (p-value)	0.585	0.805	0.302	0.812	0.950	0.978

Table A5 (continued)

Variable	GVCs participation			GVCs position		
	Total job (7)	Skilled job (8)	Unskilled job (9)	Total job (10)	Skilled job (11)	Unskilled job (12)
$GVCs_t$	-0.175 (0.210)	-0.306 (0.798)	-1.179 (1.559)	-0.301 (0.403)	-0.175 (0.124)	0.318 (0.217)
$GVCs_{t-1}$	-0.138 (0.182)	0.285 (0.923)	-2.528 (2.512)	-0.170 (0.717)	0.752 (0.921)	0.050 (0.087)
$Capital\ intensity_t$	-0.008*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.001 (0.001)	-0.003*** (0.001)	-0.002*** (0.001)
$Capital\ intensity_{t-1}$	-0.001 (0.001)	0.002 (0.002)	-0.0003 (0.002)	0.002*** (0.001)	0.001** (0.0005)	0.0004 (0.001)
$Skill\ intensity_t$	-0.942** (0.529)	0.981 (0.766)	-4.584*** (0.695)	-0.826*** (0.322)	2.053*** (0.474)	-3.221*** (0.505)
$Skill\ intensity_{t-1}$	0.301 (0.408)	-1.191 (0.792)	1.983*** (0.647)	-0.023 (0.231)	-0.635 (0.604)	0.658 (0.521)
$GVCs_{jt} \times Capital\ intensity_t$	-0.027*** (0.006)	-0.018*** (0.008)	-0.021*** (0.008)	-0.010 (0.008)	-0.017*** (0.004)	-0.014*** (0.004)
$GVCs_{jt-1} \times Capital\ intensity_{t-1}$	-0.002 (0.006)	0.003 (0.007)	-0.004 (0.007)	0.005*** (0.002)	-0.002 (0.004)	-0.002 (0.005)
$GVCs_{jt} \times Skill\ intensity_t$	-0.423 (0.410)	-3.653** (2.079)	-5.331*** (1.828)	0.438 (0.476)	-1.018 (1.984)	-3.049 (2.168)
$GVCs_{jt-1} \times Skill\ intensity_{t-1}$	-0.062 (0.121)	-0.811 (1.958)	2.025 (1.601)	-2.664*** (1.023)	0.941 (0.993)	-2.015 (1.921)
lnl_{t-1}	0.303*** (0.060)	0.472*** (0.062)	0.355*** (0.060)	0.332*** (0.063)	0.417*** (0.059)	0.336*** (0.065)
lnw_t	-0.253*** (0.049)	-0.054 (0.046)	-0.218*** (0.044)	-0.258*** (0.049)	-0.031 (0.039)	-0.261*** (0.056)
lnw_{t-1}	0.026 (0.028)	-0.022 (0.027)	-0.001 (0.027)	0.026 (0.028)	-0.045** (0.025)	0.029 (0.031)
lnr_t	0.062*** (0.025)	0.085*** (0.025)	0.066*** (0.023)	0.057*** (0.024)	0.064*** (0.022)	0.063*** (0.024)
lnr_{t-1}	-0.032** (0.019)	-0.057*** (0.020)	-0.053*** (0.019)	-0.026 (0.019)	-0.038*** (0.017)	-0.045*** (0.020)
lny_t	0.268*** (0.033)	0.187*** (0.030)	0.273*** (0.031)	0.263*** (0.035)	0.2001*** (0.031)	0.268*** (0.036)
lny_{t-1}	-0.025 (0.026)	-0.038 (0.025)	-0.023 (0.024)	-0.024 (0.027)	-0.028 (0.022)	-0.026 (0.026)

$\ln(w^s/w^u)_t$	/	0.001**	/	/	0.001***	/
		(0.001)			(0.001)	
$\ln(w^s/w^u)_{t-1}$	/	-0.001	/	/	-0.0004	/
		(0.0004)			(0.0003)	
$\ln(w^u/w^s)_t$	/	/	0.201***	/	/	0.254***
			(0.061)			(0.049)
$\ln(w^u/w^s)_{t-1}$	/	/	-0.001	/	/	0.023
			(0.029)			(0.024)
Observations	1,663	1,416	1,372	1,663	1,416	1,372
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.753	0.515	0.851	0.968	0.536	0.687
Hansen (p-value)	0.484	0.680	1.000	0.550	1.000	0.730

Table A5 (continued)

Variable	Forward GVCs			Backward GVCs		
	Total job (1)	Skilled job (2)	Unskilled job (3)	Total job (4)	Skilled job (5)	Unskilled job (6)
<i>ii/ Low-GVCs participation sector</i>						
$GVCs_t$	-0.543	0.629	-0.152	-0.307	-2.293**	-2.103***
	(0.522)	(0.566)	(0.326)	(0.656)	(1.054)	(1.122)
$GVCs_{t-1}$	-0.268	0.358	0.457**	-0.029	1.710***	0.866
	(0.416)	(0.304)	(0.232)	(0.462)	(0.688)	
Capital intensity _t	-0.001	0.0005	-0.002	0.001	-0.009	-0.010
	(0.004)	(0.004)	(0.004)	(0.001)	(0.009)	(0.013)
Capital intensity _{t-1}	-0.008***	-0.004	-0.004	0.002**	0.004***	0.003***
	(0.002)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)
Skill intensity _t	-2.076**	-0.351	-4.482***	-0.026	5.436***	-0.281
	(1.000)	(0.519)	(1.746)	(0.886)	(1.395)	(0.150)
Skill intensity _{t-1}	-0.020	-0.327***	-2.365	-0.095	-3.900***	-0.111
	(0.082)	(0.141)	(1.649)	(0.075)	(1.019)	(0.110)
$GVCs_{jt} \times$ Capital intensity _t	0.0004	0.001	-0.001	0.001**	-0.004	-0.004
	(0.002)	(0.003)	(0.003)	(0.001)	(0.004)	(0.006)
$GVCs_{jt-1} \times$ Capital intensity _{t-1}	-0.005***	-0.003	-0.002	0.001***	0.002***	0.002***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
$GVCs_{jt} \times$ Skill intensity _t	-0.573	-1.057*	-0.482	0.580	2.559***	2.310**
	(0.414)	(0.638)	(0.624)	(0.743)	(1.163)	(1.282)
$GVCs_{jt-1} \times$ Skill intensity _{t-1}	0.113	-1.009	-1.153*	0.038	-1.874***	-1.101
	(0.366)	(0.663)	(0.692)	(0.049)	(0.736)	(0.823)
$\ln I_{t-1}$	0.290***	0.373***	0.242***	0.310***	0.443***	0.278***
	(0.076)	(0.087)	(0.083)	(0.096)	(0.094)	(0.109)
$\ln w_t$	-0.127**	0.061	-0.085	-0.138**	0.079	-0.079
	(0.064)	(0.059)	(0.086)	(0.068)	(0.050)	(0.081)
$\ln w_{t-1}$	0.007	-0.059	0.024	-0.003	-0.069**	0.020
	(0.047)	(0.045)	(0.055)	(0.048)	(0.035)	(0.056)
$\ln r_t$	0.149***	0.121***	0.130***	0.146***	0.108***	0.115***
	(0.035)	(0.042)	(0.045)	(0.033)	(0.040)	(0.042)
$\ln r_{t-1}$	-0.034	-0.037	0.0002	-0.034	-0.016	0.023
	(0.023)	(0.025)	(0.023)	(0.023)	(0.023)	(0.026)
$\ln y_t$	0.224***	0.148***	0.190***	0.222***	0.142***	0.195***
	(0.051)	(0.049)	(0.073)	(0.052)	(0.043)	(0.074)
$\ln y_{t-1}$	-0.041	-0.027	-0.057	-0.035	-0.022	-0.047
	(0.040)	(0.040)	(0.044)	(0.043)	(0.039)	(0.048)

Table A5 (continued)

Variable	GVCs participation			GVCs position		
	Total job (7)	Skilled job (8)	Unskilled job (9)	Total job (10)	Skilled job (11)	Unskilled job (12)
$GVCs_t$	0.077	-4.406***	-3.028**	-0.305	0.033	0.066
	(0.222)	(1.693)	(1.644)	(0.270)	(0.044)	(0.089)
$GVCs_{t-1}$	0.526	2.746***	2.472***	-0.077	-0.148	-0.299
	(0.618)	(0.913)	(1.044)	(0.067)	(0.101)	(0.301)
Capital intensity _t	0.001	-0.018***	-0.018***	-0.001***	-0.001	-0.002
	(0.002)	(0.007)	(0.007)	(0.0003)	(0.002)	(0.002)
Capital intensity _{t-1}	0.001	0.004***	0.003***	0.00003	0.001**	0.001
	(0.002)	(0.002)	(0.002)	(0.0003)	(0.0004)	(0.0004)
Skill intensity _t	-0.420	5.019***	-0.617	-1.175**	0.590	-4.401***
	(0.836)	(1.554)	(0.651)	(0.679)	(0.985)	(1.192)
Skill intensity _{t-1}	-0.475	-4.710***	-0.254***	-0.254	-0.687	0.856
	(0.832)	(1.212)	(0.014)	(0.497)	(0.681)	(0.922)
$GVCs_{jt} \times Capital$ intensity _t	0.002	-0.014***	-0.015***	-0.006	0.008	0.007
	(0.002)	(0.006)	(0.006)	(0.004)	(0.019)	(0.023)
$GVCs_{jt-1} \times Capital$ intensity _{t-1}	0.001	0.004***	0.003***	-0.007**	-0.011***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)
$GVCs_{jt} \times Skill$ intensity _t	0.336	3.606**	3.084*	-2.778	-0.101**	-0.900**
	(0.991)	(1.833)	(1.850)	(3.529)	(0.050)	(0.526)
$GVCs_{jt-1} \times Skill$ intensity _{t-1}	-0.460	-3.647***	-3.054***	-0.382	0.037	0.248
	(0.745)	(1.196)	(1.177)	(0.284)	(0.035)	(0.364)
lnl_{t-1}	0.374***	0.333***	0.268***	0.304***	0.388***	0.315***
	(0.099)	(0.091)	(0.091)	(0.094)	(0.097)	(0.102)
lnw_t	-0.123**	0.045	-0.099	-0.127**	0.065	-0.104
	(0.073)	(0.056)	(0.080)	(0.069)	(0.054)	(0.078)
lnw_{t-1}	-0.001	-0.071	0.011	-0.013	-0.054	-0.012
	(0.047)	(0.044)	(0.056)	(0.051)	(0.038)	(0.055)
lnr_t	0.152***	0.124***	0.122***	0.126***	0.104***	0.097***
	(0.040)	(0.045)	(0.044)	(0.036)	(0.040)	(0.038)
lnr_{t-1}	-0.042**	-0.008	0.009	-0.027	-0.017	0.009
	(0.024)	(0.026)	(0.024)	(0.022)	(0.025)	(0.022)
lny_t	0.217***	0.167***	0.223***	0.207***	0.153***	0.206***
	(0.054)	(0.054)	(0.071)	(0.056)	(0.049)	(0.070)
lny_{t-1}	-0.041	-0.003	-0.043	-0.020	-0.030	-0.044
	(0.042)	(0.041)	(0.044)	(0.043)	(0.042)	(0.047)
$ln(w^s/w^u)_t$	/	0.0002	/	/	0.0005	/
		(0.001)			(0.001)	

$\ln(w^s/w^u)_{t-1}$	/	-0.001*	/	/	-0.001	
		(0.0004)			(0.0005)	
$\ln(w^u/w^s)_t$	/	/	-0.020***	/	/	-0.026***
			(0.009)			(0.012)
$\ln(w^u/w^s)_{t-1}^t$	/	/	0.020*	/	/	0.020
			(0.012)			(0.015)
Observations	493	421	412	493	421	412
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.293	0.103	0.311	0.127	0.644	0.550
Hansen (p-value)	1.000	0.562	1.000	1.000	1.000	1.000

Source: Author's elaboration

Notes: Region-sector and sector-year dummies are included in all equations. Asymptotic standard errors robust to general cross-section and time series heteroscedasticity in parentheses. All variables are in first differences. ***, **, and * denote significance at the 1%, 5% and 10%, respectively.

Table A6: First difference GMM estimates of augmented labour demand equations – upstream vs downstream industry

Variable	Forward GVCs			Backward GVCs		
	Total job (1)	Skilled job (2)	Unskilled job (3)	Total job (4)	Skilled job (5)	Unskilled job (6)
<i>i/ Upstream sector</i>						
GVC_{it}	-0.088	-0.505	-0.075	-0.111	0.088	-0.111
	(0.102)	(0.404)	(0.175)	(0.088)	(0.201)	(0.069)
GVC_{it-1}	-0.235	-0.005	-0.033	0.055	-0.077	0.098
	(0.200)	(0.106)	(0.044)	(0.103)	(0.081)	(0.100)
<i>Capital intensity</i> _{<i>t</i>}	-0.008***	-0.020***	-0.014**	-0.007***	-0.019***	-0.017***
	(0.003)	(0.007)	(0.008)	(0.003)	(0.006)	(0.007)
<i>Capital intensity</i> _{<i>t-1</i>}	0.008***	0.007**	0.009	0.006***	0.007**	0.010**
	(0.002)	(0.004)	(0.007)	(0.002)	(0.003)	(0.005)
<i>Skill intensity</i> _{<i>t</i>}	0.973	6.820***	1.800	0.414	5.339***	-0.096
	(1.726)	(1.391)	(1.743)	(0.455)	(1.451)	(0.093)
<i>Skill intensity</i> _{<i>t-1</i>}	-0.816	-2.347***	-1.117	-0.231	-1.311	0.349
	(0.985)	(1.092)	(1.239)	(0.965)	(1.175)	(0.229)
$GVC_{jit} \times \text{Capital intensity}_t$	-0.004**	-0.012***	-0.088*	-0.003***	-0.008***	-0.007**
	(0.002)	(0.004)	(0.005)	(0.001)	(0.003)	(0.003)
$GVC_{jit-1} \times \text{Capital intensity}_{t-1}$	0.005***	0.005**	0.006	0.003***	0.003***	0.005**
	(0.001)	(0.003)	(0.005)	(0.001)	(0.002)	(0.002)
$GVC_{jit} \times \text{Skill intensity}_t$	2.261	5.588***	5.491***	1.675	4.004***	3.815***
	(1.808)	(1.045)	(1.164)	(1.438)	(1.048)	(1.212)
$GVC_{jit-1} \times \text{Skill intensity}_{t-1}$	-0.718	-1.640**	-1.702**	-0.156	-0.601	-0.542
	(0.717)	(0.823)	(0.902)	(0.676)	(0.870)	(0.883)
$\ln l_{t-1}$	0.225**	0.177***	0.153***	0.219**	0.196***	0.193**
	(0.123)	(0.083)	(0.085)	(0.123)	(0.088)	(0.095)
$\ln w_t$	-0.020	-0.004	-0.148	-0.013	0.054	-0.055
	(0.108)	(0.093)	(0.113)	(0.113)	(0.099)	(0.137)
$\ln w_{t-1}$	0.048	-0.064	-0.080**	0.029	-0.078	-0.107***
	(0.070)	(0.066)	(0.042)	(0.073)	(0.065)	(0.047)
$\ln r_t$	0.064	0.147***	0.055	0.074	0.169***	0.079
	(0.061)	(0.038)	(0.054)	(0.061)	(0.037)	(0.054)
$\ln r_{t-1}$	-0.004	-0.022	0.009	-0.011	-0.044	-0.012
	(0.036)	(0.032)	(0.033)	(0.037)	(0.033)	(0.037)
$\ln y_t$	0.236***	0.164**	0.244***	0.221***	0.106	0.171
	(0.077)	(0.092)	(0.116)	(0.079)	(0.094)	(0.123)
$\ln y_{t-1}$	-0.059**	-0.010	0.024	-0.051	-0.003	0.024
	(0.033)	(0.051)	(0.041)	(0.032)	(0.048)	(0.034)

Table A6 (continued)

Variable	GVCs participation			GVCs position		
	Total job (7)	Skilled job (8)	Unskilled job (9)	Total job (10)	Skilled job (11)	Unskilled job (12)
$GVCs_t$	-0.116 (0.095)	-0.306 (0.206)	-0.099 (0.202)	-0.222 (0.235)	-0.109 (0.089)	-0.333 (0.288)
$GVCs_{t-1}$	-0.088 (0.077)	-0.054 (0.066)	-0.078 (0.117)	-0.099 (0.085)	-0.400 (0.376)	-0.044 (0.056)
$Capital\ intensity_t$	-0.005*** (0.002)	-0.013*** (0.004)	-0.010*** (0.005)	-0.004*** (0.002)	-0.017*** (0.006)	-0.017*** (0.006)
$Capital\ intensity_{t-1}$	0.004*** (0.001)	0.004** (0.002)	0.006 (0.004)	0.004*** (0.001)	0.007 (0.005)	0.012** (0.006)
$Skill\ intensity_t$	-0.0616 (0.621)	2.965*** (0.845)	-2.147** (1.178)	-1.505*** (0.524)	0.164 (0.783)	-4.949*** (1.027)
$Skill\ intensity_{t-1}$	-0.260 (0.580)	-1.165** (0.631)	0.272 (0.733)	0.243 (0.450)	-0.443 (0.551)	0.984 (0.637)
$GVCs_{jt} \times Capital\ intensity_t$	-0.003** (0.002)	-0.010*** (0.003)	-0.008** (0.004)	0.034 (0.021)	0.202*** (0.071)	0.198*** (0.077)
$GVCs_{jt-1} \times Capital\ intensity_{t-1}$	0.004*** (0.001)	0.004** (0.002)	0.005 (0.003)	-0.045*** (0.011)	-0.085 (0.055)	-0.146*** (0.066)
$GVCs_{jt} \times Skill\ intensity_t$	2.078 (1.703)	5.140*** (0.996)	5.000*** (1.177)	0.765 (0.539)	-0.735 (0.878)	-4.311 (8.241)
$GVCs_{jt-1} \times Skill\ intensity_{t-1}$	-0.493 (0.721)	-1.306 (0.843)	-1.307 (0.900)	-1.446*** (0.259)	-0.218*** (0.094)	-2.229*** (1.064)
lnl_{t-1}	0.220** (0.124)	0.188*** (0.084)	0.170** (0.090)	0.245*** (0.107)	0.200** (0.103)	0.187 (0.119)
lnw_t	-0.023 (0.110)	0.010 (0.093)	-0.120 (0.124)	0.045 (0.140)	0.222 (0.144)	0.104 (0.168)
lnw_{t-1}	0.038 (0.072)	-0.072 (0.065)	-0.094*** (0.044)	0.040 (0.068)	-0.063 (0.074)	-0.054 (0.050)
lnr_t	0.069 (0.061)	0.157*** (0.037)	0.065 (0.054)	0.072 (0.060)	0.176*** (0.041)	0.091** (0.051)
lnr_{t-1}	-0.007 (0.037)	-0.029 (0.032)	0.002 (0.036)	-0.009 (0.037)	-0.059** (0.033)	-0.018 (0.028)
lny_t	0.232*** (0.079)	0.141 (0.092)	0.216** (0.119)	0.220*** (0.075)	0.091 (0.108)	0.165 (0.121)
lny_{t-1}	-0.056** (0.032)	-0.011 (0.050)	0.020 (0.039)	-0.046* (0.028)	0.011 (0.049)	0.026 (0.032)

Table A6 (continued)

Variable	Forward GVCs			Backward GVCs		
	Total job (1)	Skilled job (2)	Unskilled job (3)	Total job (4)	Skilled job (5)	Unskilled job (6)
<i>ii/ Downstream sector</i>						
GVC_{jt}	-3.889	-1.900	0.687	-3.389	-0.096	-3.339
	(3.172)	(1.109)	(0.696)	(3.999)	(0.093)	(3.436)
GVC_{jt-1}	-1.396	2.471	-0.374	-4.083	0.076	-1.114
	(2.861)	(2.204)	(0.644)	(3.734)	(0.060)	(1.636)
Capital intensity _t	-0.002***	-0.002**	-0.002	-0.0001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Capital intensity _{t-1}	0.001	0.001	0.001	-0.001***	0.0004	0.001
	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.001)
Skill intensity _t	-0.587	1.724***	-3.341***	-1.027***	2.282***	-2.731***
	(0.474)	(0.688)	(0.711)	(0.460)	(0.660)	(0.626)
Skill intensity _{t-1}	-0.117	-1.081	0.567	0.423	-1.256**	1.027*
	(0.374)	(0.680)	(0.637)	(0.269)	(0.690)	(0.637)
$GVC_{jt} \times \text{Capital}$ intensity _t	-0.002***	-0.001**	-0.001**	-0.0002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
$GVC_{jt-1} \times \text{Capital}$ intensity _{t-1}	0.001	0.0002	-0.00005	-0.002***	-0.001	0.0001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
$GVC_{jt} \times \text{Skill}$ intensity _t	-0.086	-0.377	-0.504	-0.584	-0.193	-0.857
	(0.224)	(0.283)	(0.326)	(0.410)	(0.786)	(0.701)
$GVC_{jt-1} \times \text{Skill}$ intensity _{t-1}	-0.089	0.042	-0.086	0.416**	0.185	0.391
	(0.189)	(0.295)	(0.292)	(0.243)	(0.737)	(0.663)
$\ln l_{t-1}$	0.324***	0.459***	0.305***	0.341***	0.489***	0.442***
	(0.057)	(0.064)	(0.053)	(0.057)	(0.065)	(0.062)
$\ln w_t$	-0.284***	-0.099***	-0.193***	-0.257***	-0.081**	-0.260***
	(0.044)	(0.044)	(0.034)	(0.042)	(0.046)	(0.044)
$\ln w_{t-1}$	0.023	-0.004	0.016	0.013	-0.012	0.031
	(0.025)	(0.027)	(0.023)	(0.025)	(0.029)	(0.028)
$\ln r_t$	0.091***	0.081***	0.074***	0.093***	0.084***	0.083***
	(0.021)	(0.023)	(0.018)	(0.022)	(0.029)	(0.025)
$\ln r_{t-1}$	-0.052***	-0.053***	-0.044***	-0.045***	-0.043**	-0.056***
	(0.017)	(0.019)	(0.0140)	(0.017)	(0.021)	(0.018)
$\ln y_t$	0.277***	0.210***	0.248***	0.267***	0.207***	0.272***
	(0.032)	(0.031)	(0.027)	(0.033)	(0.032)	(0.033)
$\ln y_{t-1}$	-0.021	-0.053***	-0.037**	-0.023	-0.059***	-0.050**
	(0.025)	(0.024)	(0.022)	(0.026)	(0.025)	(0.027)

$\ln(w^s/w^u)_t$	/	0.001***	/	/	0.001***	/
		(0.0004)			(0.0004)	
$\ln(w^s/w^u)_{t-1}$	/	-0.001**	/	/	-0.001	/
		(0.0003)			(0.0003)	
$\ln(w^u/w^s)_t$	/	/	0.003	/	/	0.0004
			(0.019)			(0.016)
$\ln(w^u/w^s)_{t-1}$	/	/	-0.010	/	/	0.003
			(0.020)			(0.020)
Observations	1,973	1,685	1,685	1,973	1,685	1,685
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.764	0.091	0.884	0.794	0.098	0.312
Hansen (p-value)	0.322	0.114	0.256	0.219	0.230	0.784

Table A6 (continued)

Variable	GVCs participation			GVCs position		
	Total job (7)	Skilled job (8)	Unskilled job (9)	Total job (10)	Skilled job (11)	Unskilled job (12)
$GVCs_t$	-1.612	-3.646	0.129	-2.248	-2.135	-0.562
	(1.914)	(2.942)	(0.208)	(2.575)	(2.443)	(0.434)
$GVCs_{t-1}$	-0.945	1.103	0.164	1.376	1.379	0.266
	(0.979)	(2.873)	(0.229)	(1.056)	(1.711)	(0.841)
Capital intensity _t	-0.0001	-0.0001	0.0002	-0.001	-0.002**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Capital intensity _{t-1}	-0.0004	0.001*	0.001	0.001***	0.001***	0.001
	(0.0004)	(0.001)	(0.001)	(0.0005)	(0.001)	(0.001)
Skill intensity _t	-0.819***	2.079***	-2.407***	-0.554**	2.421***	-2.391***
	(0.368)	(0.504)	(0.450)	(0.302)	(0.444)	(0.522)
Skill intensity _{t-1}	0.242	-0.875	0.222	-0.418**	-0.988	-0.081
	(0.258)	(0.602)	(0.474)	(0.236)	(0.630)	(0.501)
$GVCs_{jt} \times Capital$ intensity _t	-0.001	-0.0002	-0.001	-0.002	-0.009**	-0.009***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)
$GVCs_{jt-1}$ \times Capital intensity _{t-1}	-0.002	-0.001	0.0002	0.005***	-0.001	-0.002
	(0.001)	(0.002)	(0.001)	(0.001)	(0.003)	(0.003)
$GVCs_{jt} \times Skill$ intensity _t	-0.649	-0.658	-0.721	0.306	0.317	-1.133
	(0.553)	(0.975)	(0.763)	(0.485)	(0.843)	(1.129)
$GVCs_{jt-1} \times Skill$ intensity _{t-1}	0.397	0.499	-0.655	-3.085***	0.820	-3.191*
	(0.394)	(0.981)	(0.708)	(1.112)	(0.703)	(1.939)
lnl_{t-1}	0.352***	0.442***	0.386***	0.358***	0.433***	0.344***
	(0.059)	(0.061)	(0.064)	(0.062)	(0.067)	(0.063)
lnw_t	-0.265***	-0.045	-0.250***	-0.241***	-0.080*	-0.238***
	(0.046)	(0.039)	(0.045)	(0.045)	(0.048)	(0.049)
lnw_{t-1}	0.017	-0.029	0.045	0.003	-0.021	0.026
	(0.025)	(0.028)	(0.029)	(0.026)	(0.029)	(0.030)
lnr_t	0.101***	0.085***	0.090***	0.089***	0.084***	0.074***
	(0.022)	(0.025)	(0.024)	(0.022)	(0.025)	(0.025)
lnr_{t-1}	-0.057***	-0.045***	-0.059***	-0.050***	-0.050***	-0.045***
	(0.017)	(0.018)	(0.018)	(0.018)	(0.020)	(0.020)
lny_t	0.263***	0.210***	0.282***	0.251***	0.213***	0.276***
	(0.034)	(0.030)	(0.034)	(0.034)	(0.030)	(0.034)
lny_{t-1}	-0.022	-0.061***	-0.070***	-0.020	-0.062***	-0.045**
	(0.026)	(0.025)	(0.028)	(0.025)	(0.026)	(0.026)

$\ln(w^s/w^u)_t$	/	0.001***	/	/	0.001***	/
		(0.0004)			(0.0004)	
$\ln(w^s/w^u)_{t-1}$	/	-0.0005*	/	/	-0.001*	/
		(0.0003)			(0.0003)	
$\ln(w^u/w^s)_t$	/	/	-0.002	/	/	0.003
			(0.014)			(0.017)
$\ln(w^u/w^s)_{t-1}$	/	/	0.003	/	/	0.010
			(0.017)			(0.022)
Observations	1,973	1,685	1,685	1,973	1,685	1,685
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.641	0.117	0.416	0.950	0.101	0.501
Hansen (p-value)	0.219	0.755	0.515	0.458	0.405	0.819

Source: Author's elaboration

Notes: Region-sector and sector-year dummies are included in all equations. Asymptotic standard errors robust to general cross-section and time series heteroscedasticity in parentheses. All variables are in first differences. ***, **, and * denote significance at the 1%, 5% and 10%, respectively.



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