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The Effects of Internationalisation on Domestic Labour Demand by Skills: Firm-Level Evidence for Belgium

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Abstract: We empirically investigate the effects of the internationalisation of Belgian firms on domestic demand for production and non-production workers, which are used as proxies for unskilled and skilled labour. Distinction is made between home-employment effects of firms' internationalisation, through either international trade or outward foreign direct investment, in high-income countries and in low-income economies. The results of our econometric analysis, using data over 1997-2007, suggest that increasing import shares from low-income countries or investing in those countries significantly reduces demand for low-skilled labour, while it increases demand for skilled labour. An increase in exports generally raises the demand for production workers, while it reduces the demand for non-production workers. However, these effects are reversed in the case of exports to low-income countries. Considering the impact of FDI, our results tentatively suggest that the setting up of a new international investment project has a positive impact on demand for non-production workers one period before it is made. This positive effect is offset in the long run, particularly in the case of investment in low-income countries.

JEL Classification: C23; F16; F21

Keywords: labour demand, international trade, outward FDI, skilled and unskilled labour

The views expressed in this paper are those of the authors and do not necessarily reflect the views of the National Bank of Belgium. All remaining errors are the authors' responsibility.

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1 INTRODUCTION

During the past two decades, there have been growing concerns about the effects of globalisation on wages and employment, in particular the adverse impact on low-skilled workers generated by the developed countries' international trade with lower-income economies abundantly endowed with low-skilled labour. Likewise, the increased internationalisation of production by multinational enterprises (MNEs) has stimulated extensive international public debate on its effects on domestic activities.

The major concerns shared among policymakers and labour unions stem largely from the perception that international trade and outward foreign direct investment (OFDI) tend to reduce employment by exporting jobs, particularly those of unskilled workers. Similarly, international outsourcing is often opposed in the home country because it may replace exports and reduce labour demand by domestic firms. The changes in demand for labour in the home country may particularly affect low skilled workers, as international outsourcing essentially concerns the relatively more labour-intensive production processes. However, international outsourcing may enable domestic firms to enhance overall competitiveness (spillover effects), and thus boost employment opportunities in the home country.

The present paper investigates the relationships between three aspects of the globalisation process, i.e. exports, imports and outward foreign investment, and demand for skilled and unskilled labour, respectively proxied by white-collar and blue-collar labour (non-production and production workers, respectively). We use firm level data on exports, imports and OFDI for a sample of Belgian firms. Compared to similar studies for Belgium which previously only considered the effect of outward foreign direct investment in Europe (Cuyvers *et al.,* 2005; Cuyvers and Soeng, 2010; Konings and Murphy, 2006), our dataset covers international transactions and OFDI worldwide. We investigate whether exports to, imports from and OFDI to low-income and high-income countries differ significantly in their effects on demand for skilled and unskilled labour.

Using data for 1997-2007, our econometric analysis suggests that increasing import shares from low-income countries or investing in these countries significantly reduces demand for low-skilled labour, while it increases demand for skilled labour. An increase in exports generally raises demand for production workers, while it reduces demand for non-production workers. However, these effects are reversed if this increase in exports originates from low-income countries. Considering the impact of OFDI, our results tentatively suggest that the setting-up of a new international investment project has a positive impact on demand for non-production workers one period before it is made. This positive effect is offset in the long run, particularly in the case of investment in low-income countries.

Our paper is structured as follows. Section 2 summarises the main theoretical and empirical insights of the existing relevant literature. In Section 3, we describe the data employed in our empirical exercise and present basic descriptive statistics. Section 4 briefly presents the methodological framework used, and Section 5 presents and discusses our main estimation results. Finally, Section 6 concludes.

2 GLOBALISATION AND DEMAND FOR LABOUR: THEORETICAL AND EMPIRICAL INSIGHTS

2.1 International Trade and Employment

The Heckscher-Ohlin-Samuelson (HOS) framework predicts that international trade induces a redistribution of employment away from import-competing sectors and towards the export-oriented sectors. When the domestic economy is liberalized, the import-competing sector contracts while the export-oriented sector expands. International trade therefore reduces the real income of the production factors with which a country is relatively poorly endowed, but induces an increase in rewards for the country's relatively abundant factors of production. This implies that internationalisation widens the gap between wages of unskilled and skilled workers in developed economies. The widening gap may be attributed to a decline in the relative prices of products involving intensive use of low-skilled workers in the industrialised countries. This theoretical prediction should provide an explanation for the observed relative worsening of the rewards of low-skilled workers due largely to lower demand for these workers in the developed countries, in particular in the US or in Europe, when trade is liberalised.

The potential explanations of the factor reward implication of international trade are based on the assumption that factor markets are clearing, which implies that the consequences of trade liberalisation for the owners of factors of production are entirely reflected by income adjustments at full employment, with low-skilled workers having their wages reduced. Yet this assumption does not seem to reflect the reality in the EU context where wage rigidity is present. This limits the scope for wage adjustments, therefore increasing the likelihood of employment adjustments. Cuyvers *et al.* (2003) graphically show that international trade between sticky-wage developed countries and lower-income economies well endowed with low-skilled labour reduces demand for low-skilled workers in the high-income countries as relative wages are fixed. Another possible explanation about the relative shift in labour demand may be the technological change which has taken place over the past decades. Technological change has been reported to be skill-biased (Haskel, 2000; Morrison Paul and Siegel, 2001; Zeira, 2007).

Drawing on the theories of labour and international trade, Slaughter (2001) documents how international trade affects labour-demand elasticities, which can be decomposed into two components: the scale effect and the substitution effect. The scale effect arises from labour demand changes after a wage change, due to the change in output. It suggests that this effect is bigger when the firm's output level is more sensitive to prices. The substitution effect arises when a number of stages in the production process are vertically integrated. With trade liberalisation, firms can transfer some stages abroad, either internally - by establishing foreign affiliates - or at arm's length by buying the output of other firms. International trade therefore provides access to foreign factors of production as well as domestic production factors, either directly through the establishment of foreign affiliates or indirectly through imports of intermediate goods (offshoring). Jean (2000) shows theoretically and empirically that trade openness may indeed have a significant effect on labour-demand elasticities, and the effect would be far greater for small economies more open to international trade. Thus, all things being equal, free trade should tend to further increase the elasticity of labour demand.

There have been a number of studies, attempting to examine empirically the impact of international trade on domestic employment. Pryor (1999) finds no evidence that foreign trade has much impact on the employment of less skilled US workers. No evidence about the relation between trade openness and labour demand elasticities is found for Turkey (Krishna *et al.*, 2001). In a similar vein, Fajnzylber and Maloney (2005) and Haouas and Yagoubib (2008) do not find

strong support for the hypothesis that trade has a direct impact on own-wage elasticities. However, several studies find a link between international trade and labour demand elasticities or employment. An increase in trade volumes, in terms of both imports and exports, is found to lead to a reduction in labour demand (Greenaway *et al*., 1999; Biscourp and Kramarz, 2007; Mouelhi, 2007). Similarly, trade liberalisation is found to have reduced labour demand elasticities (Slaughter, 2001; Hijzen and Swain, 2010; Senses 2010).

2.2 Outward Foreign Direct Investment and Employment

Outward foreign direct investment (OFDI) and international trade can be viewed as two alternative ways of servicing foreign markets. This view was advanced by Mundell (1957) who believed that movements of goods can be a substitute for factor movements, but this is challenged by a number of researchers in the field. For instance, Markusen (1983) demonstrates theoretically that FDI and international trade may be complements rather than substitutes. Thus, the relationship between these two international business activities is clearly an empirical issue.

In modern international trade theory with imperfect competition, OFDI is considered as an intermediate good, which is exported by the parent company to a lower-cost host country where final output is produced by its foreign subsidiary there (Cuyvers *et al*., 1999). Such activities are often pursued by vertical FDI aiming to take advantage of the differences in international factor endowments. Such relocation of production will disrupt the equilibrium of goods markets and, by implication, also that of labour markets in both the home and host countries.

The effects of OFDI on employment in the home country are summarized by Van Den Bulcke and Halsberghe (1979), Cuyvers *et al*. (1999), Lundan (2007) and Dunning and Lundan (2008), among others. These include production or job displacement effects, export-creating effects, and home employment and supporting firm employment effects.

- production effect: this effect occurs when foreign production in the host country replaces exports by the parent company to that country, or imports from the host country displace domestic production in the home country;
- export-creating effect: this takes place when foreign affiliates purchase raw materials, equipment, components, etc. from the home country, all of which may help to create new employment opportunities for workers at home;
- home employment effect: production abroad may also result in an increase in demand for labour in supervision, R&D, marketing and management in the home country; and
- supporting firm employment effect: this effect occurs in the home country as home country firms and institutions provide supporting services, such as accounting, banking, consulting services, etc. to multinational enterprises in the host country.

Direct effects of OFDI may be felt in output and/or employment, because OFDI activities may either raise or reduce output and/or employment in the home country. However, home-country effects of OFDI may depend on the types of investing multinational enterprises. Vertical OFDI often relocates stages of the production process, which were previously undertaken in the home country, to a low-cost host economy. These production shifts are likely to reduce value added, employment and other economic activities in the home country. However, in the long run these output-reducing effects could well be reversed if the investing MNE gains sufficient market shares via its foreign subsidiary (Navaretti and Venables, 2004). Moreover, firms, which invest in vertical FDI, may combine home with foreign production to increase competitiveness internationally. This may increase the home country's factor demand and output, as the firms may import intermediate goods at lower prices from foreign subsidiaries to produce a higher volume of final output at a lower cost at home (Desai *et al*., 2005; Herzer, 2008).

Horizontal OFDI will reduce the home country's exports to the host country and, by implication, the output of the home country's plants if products in the home and host country are substitutable. Yet if foreign production uses inputs imported from the parent company, output in the home country will eventually rise, indicating that OFDI has trade-creating effects. OFDI can also affect domestic labour demand through changes in the relative skill intensity, as OFDI may change the composition of labour inputs employed in the domestic production facilities. In the case of vertical OFDI, it can be predicted that the relative demand for skilled labour is likely to increase because domestic production, which makes intensive use of unskilled labour, may now be shifted to a low-wage host country that is relatively well endowed with an unskilled labour force. For horizontal OFDI, skill intensity could also rise due mainly to the demand for headquarters' services such as R&D, design, management, etc. The shift towards more skilled labour in the domestic production process at home may also lead to changes in income distribution. The Stolper-Samuelson theorem predicts that the relative wages of unskilled workers will fall, while skilled workers' relative wages will increase due to higher demand for skilled labour at home.

An early study by Kravis and Lipsey (1988), using 1982 survey data from the Bureau of Economic Analysis, suggests that OFDI slightly reduces employment in the US manufacturing sector. Slaughter (1995) shows that labour demand at home and abroad may be substitutes or complements, depending on whether capital is considered as a fixed or variable input. If capital is treated as a fixed input, demand for domestic and foreign labour appear to be substitutes, but demand for domestic and foreign labour seem to be complements if capital is considered as a variable factor of production. However, the estimated elasticities are not statistically significant. Brainard and Riker (1997) and Riker and Brainard (1997) find that foreign labour substitutes one-for-one for parent firm labour.

Blomström *et al*. (1997) find that the net sales (sales minus imports) of all foreign affiliates of a parent *i* have a negative effect on employment in that parent firm, and that only affiliates' net sales in developing countries have a statistically significant negative impact. When breaking down parent employment into blue-collar (unskilled) and white-collar (skilled) labour, it is found that Swedish firms' foreign activities have a significant positive correlation with blue-collar employment in the parent companies. White-collar parent employment only shows a systematic positive correlation with sales of foreign affiliates in developing countries, but blue-collar parent employment is increased by foreign affiliate sales in both developed and developing countries. A study by Hansson (2005) suggests that increased Swedish MNE activity in the non-OECD area is associated with an increasing share of skilled labour in the total wage bill in Sweden. Hatzius (1998) and Braconier and Eckholm (2000) find support for the hypothesis that multinational corporations reallocate employment as relative costs change. Ekholm and Hakkala (2008) find that offshoring to low-income countries is associated with a labour demand shift from low-skilled workers to high-skilled ones, but offshoring to high-income countries is associated with a shift in the opposite direction.

Federico and Minerva (2008) find, for Italy, that local employment growth has a positive correlation with higher levels of OFDI. This is confirmed by Cuyvers and Soeng (2010) for Belgium. Konings and Murphy (2006), however, do not detect substitution effects between parent employment and foreign affiliate employment located in low cost southern EU countries and Central and Eastern Europe, but these effects are detected in high-wage northern EU countries. Yet Cuyvers *et al*. (2005) find evidence that parent employment is negatively related to affiliate employment in the low-wage Central and Eastern European countries (CEEC).

3 DATA AND BASIC DESCRIPTIVE STATISTICS

To conduct the empirical analysis presented in the following sections, we use a sample of Belgian firms observed during the period 1997-2007. Our sample is restricted to firms that filed their annual accounts using the full format[1] in at least one year during the period considered. We merged data from four different sources:

- Central Balance Sheet Office: annual accounts of Belgian firms;
- Foreign Trade Data: exports and imports of Belgian firms, by products and country of destination or origin;[2]
- Survey on Foreign Direct Investment: data on foreign direct investment by Belgian firms abroad, by country of destination;[3]
- Social Security Data Warehouse: average wage and employment by type of workers.

We collected information on value added, total output, consumption of intermediate inputs, capital stock, blue-collar and white-collar employment, average wage for blue and white-collar workers, total exports, total imports, and the number of outward foreign direct investment projects. Exports, imports and number of OFDI links are observed by type of country of destination and origin respectively (low-income versus high-income). As there are no data available on skilled and unskilled labour, we assume that low-skilled and high-skilled employment may be approximated by blue-collar and white-collar employment. Moreover, in the rest of the paper, production / non-production labour and blue-collar / white-collar labour are used interchangeably.

We restrict our selection to the manufacturing sector and to profit maximizing firms[4] observed for at least five consecutive years. Selected firms report at least five non-clerical workers and at least five clerical workers in their labour force, positive wage bill, value added, sales, intermediate inputs and capital stock over the period under consideration. We also exclude firms which declare a value of total exports greater than their annual turnover or a value of total imports greater than their annual consumption of intermediate inputs. Finally, our sample excludes outliers in the growth rate of average wages, capital stock and output.

We end up with 20,766 observations and 2,458 firms. Out of these firms, 2,324 are exporters, 2,011 export to low-income countries,[5] 2,837 are importers, 1,841 import from low-income countries, 521 are “FDIers”, i.e. firms which engage in FDI, and 204 have FDI projects in low-income countries.

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1 According to the Belgian legislation, in 2007, a firm had to file its annual accounts using the full account scheme, either when its yearly average number of employees is at least 100 or when at least two of the following thresholds are exceeded: (1) yearly average number of employees is 50, (2) turnover (excluding VAT) amounts to at least EUR 7,300,000, (3) total assets exceed EUR 3,650,000. In general, the latter two thresholds are altered every four years in order to take account of inflation.

2 Trade data come from either the Intrastat inquiry (for intra-EU trade) or from customs data (for extra-EU trade). Participation in the Intrastat inquiry (pertaining to intra-EU trade) is subject to statistical thresholds: (1) in 1997, total exports or imports of at least EUR 104,115 per year, (2) from 1998 to 2005, total exports or imports of at least EUR 250,000 per year, or (3) from 2006 onwards, total exports of at least EUR 1,000,000 or total imports of at least 400,000 EUR per year. Customs data are collected for all transactions amounting to a value of at least EUR 1,000 or a weight of at least 1,000 kilograms.

3 From 1997 to 2000, the survey included the firms that reported FDI transactions in their balance of payments returns. From 2001 onwards, the survey covers firms for which one of the following thresholds is exceeded: (1) financial fixed assets of at least EUR 5,000,000, (2) equity of at least EUR 10,000,000, or (3) balance sheet total of at least EUR 25,000,000.

4 Profit maximising firms are defined according to their legal form, e.g. non profit associations and public authorities are excluded.

5 We define low income countries on the basis of the World Bank analytical classification. A country classified by the World Bank either as a Low income (L), Lower Middle Income (LM) or Upper Middle Income (UM) country in a given year is considered to be a low-income country during that year.

Over the sample period, 223 firms started exporting,[6] 569 firms started exporting to low-income countries, 172 firms started importing,[7] 844 firms started importing from low-income countries, 392 firms developed new investment projects abroad, 164 firms developed new investment projects in low-income countries, 248 became MNEs and 136 started operating plants in low-income countries.[8]

Table 1 indicates that the number of exporters, importers or FDIers in our sample increased up to 2001-2002. Afterwards, the number of internationalized firms declines.

Our sampling strategy offers a general explanation for this decline. As we only select firms observed during at least 5 consecutive periods, we do not keep in our sample firms that start to be observed in 2004 onwards. Our sample size naturally declines after 2003 and this also affects the number of exporters, importers or FDIers sampled. An opposite effect partly explains the positive trend observed between 1997 and 2001.

Table 1: Exporters, Importers and FDIers by type of country

year	No. of firms	No. of Exporters		No. of Importers		No. of FDIers	
		r.o.w[(1)]	l.i.c.[(2)]	r.o.w[(1)]	l.i.c.[(2)]	r.o.w[(1)]	l.i.c.[(2)]
1997	1,707	1,589	1,151	1,641	781	218	50
1998	1,922	1,720	1,268	1,799	915	267	70
1999	1,982	1,765	1,283	1,862	975	279	82
2000	2,062	1,825	1,328	1,921	1,002	302	97
2001	2,066	1,841	1,362	1,930	1,046	361	117
2002	2,058	1,819	1,340	1,913	1,052	375	125
2003	2,046	1,815	1,354	1,913	1,116	375	123
2004	1,983	1,754	1,311	1,851	1,112	362	129
2005	1,899	1,677	1,249	1,775	1,110	331	122
2006	1,775	1,516	1,174	1,638	1,030	306	110
2007	1,266	1,099	835	1,181	767	219	79

(1) r.o.w. = rest of the world (low and high income countries)
(2) l.i.c. = low-income countries only

An additional factor that may affect the number of exporters observed at the end of the sample period is the change in reporting thresholds for Intrastat data in 2006, which may also partly explain the large drop in the number of exporters and importers observed in 2006-2007. This may be true for total exporters, as their relative importance in the sample drops from 88% in 2005 to around 86% in 2006-2007. However, the share of the other types of firms is relatively stable, especially over the period 2003-2007, which may indicate that the changes in reporting thresholds for imports and FDI seem to have little impact on the structure of our sample.

Table 2 reports information on the relative importance of exports, imports and international expansion at the firm level. As Table 2 shows, the average exporter sold between 45 and 49% of its production abroad during our sample period. However, exports to low-income countries only account for around 5% of total output. If export shares increased from 1997 to 2002, the share declined in 2003 and remained below 48% until 2006. The large increase in the average export share in 2006 may be due to changes in reporting thresholds which excluded small exporters from our sample. The changes in thresholds do not seem to affect the share of exports to low-income countries, as most of these transactions are extra-EU trade. The share of exports to low-income countries gradually increased over the sample period.

6 We define a firm as a new exporter in period *t* if it exports in *t* and *t*+1 without exporting in *t*-1.

7 We define a firm as a new importer in period *t* if it imports in *t* and *t*+1 without importing in *t*-1.

8 A firm becomes a multinational in period *t* if it reported no FDI links in *t*-1 and some FDI links in *t*.

As for import shares, the average importer acquired between 34% and 36.5% of its intermediate inputs abroad over the sample period. We also find that imports from low-income countries increase in importance over time, but their share in total input consumption remains relatively small (between 2.5 to 4.2%). Changes in reporting thresholds may also partly explain the increase in the import share observed in 2006.

Finally, a Belgian firm that owns plants abroad operates on average between 3.6 and 6.2 foreign units and between 0.5 and 1.5 units in low-income countries.

Table 2: Export shares, import shares, and foreign implantation of Belgian firms

	Average export share (in %)[1]		Average import share (in %)[2]		Average No. of FDI projects[3]	
year	To r.o.w[4]	To l.i.c.[5]	From r.o.w[4]	From l.i.c.[5]	In r.o.w[4]	In l.i.c.[5]
1997	45.0	4.6	34.2	2.5	3.6	0.5
1998	46.9	4.4	35.6	2.7	3.9	0.7
1999	47.0	4.2	35.0	2.8	4.2	0.8
2000	47.6	4.7	36.3	3.1	4.8	1.0
2001	47.6	4.8	35.4	3.0	5.1	1.0
2002	48.2	5.0	35.1	3.3	5.2	1.0
2003	47.3	5.2	34.4	3.5	5.2	1.1
2004	47.9	5.1	34.9	3.7	4.9	1.1
2005	47.9	5.5	35.4	4.1	5.0	1.1
2006	49.2	5.5	36.3	4.2	5.7	1.2
2007	48.7	5.0	36.5	4.1	6.2	1.4

[1] conditional on being an exporter in period *t*
[2] conditional on being an importer in period *t*
[3] conditional on being an FDI in period *t*
[4] r.o.w. = rest of the world (low and high income countries)
[5] l.i.c. = low-income countries only

4 ECONOMETRIC SPECIFICATION

In this section, we describe the empirical methodology that we use to assess the impact of exports, imports and OFDI on employment by type of workers.

4.1 Long-run effects of export share and import share

To analyse the impact of increases in export or import shares on production and non-production labour demand, we use a dynamic version of a translog cost share equation.

Starting from a framework similar to Ekholm and Hakkala (2008) or Rosholm *et al.* (2007), we specify the long-run cost share equation, considering the cost share of two variable inputs (production and non-production labour) and assuming that the capital stock is predetermined, as

$$s_{it} = \alpha_i + \gamma\, wrel_{it} + \phi\, y_{it} + \delta\, k_{it} + \theta_1\, z_{it} + \theta_2\, zlow_{it} + D_t + \varepsilon_{it} \qquad (1)$$

where $s_{it} = \frac{w_{it}^{np} L_{it}^{np}}{w_{it}^{p} L_{it}^{p} + w_{it}^{np} L_{it}^{np}}$, is the cost share of non-production labour in total labour cost of firm i at time t;

$wrel_{it}$ is the log of the relative wage of non-production workers of firm i at time t with regard to production workers;

y_{it} is the log of the real value added of firm i at time t;

k_{it} is the log of the real capital stock of firm i at time t;

z_{it} is either the share of total exports in total production or the share of total imports in total consumption of intermediate inputs of firm i at time t;

$zlow_{it}$ is either the share of exports to low-income countries in total production or the share of imports from low-income countries in total consumption of intermediate inputs of firm i at time t;

D_t is a set of time dummies;

α_i is a set of firm-specific fixed effects;

and ε_{it} is an i.i.d. shock.

The estimation of this cost share equation allows for recovery of the production and non-production labour demand elasticities with respect to the different explanatory variables. For instance, the Hicksian wage elasticity of the demand for non-production workers, L_{it}^{np}, with respect to their own wage, W_{it}^{np}, is given by

$$\frac{dL_{it}^{np}}{dW_{it}^{np}} = \frac{\gamma + s_{it}^2}{s_{it}} - 1 \tag{2}$$

while the Hicksian wage elasticity of the demand for non-production workers, L_{it}^{np}, with respect to the wage of production workers, W_{it}^{p}, is given by

$$\frac{dL_{it}^{np}}{dW_{it}^{p}} = \frac{\gamma + s_{it}\,(1 - s_{it})}{s_{it}} \tag{3}$$

Taking advantage of the fact that the cost share of production and non-production workers adds up to 1, the elasticity of the demand for production workers, L_{it}^{p}, with respect to their own wage, W_{it}^{p}, or with respect to the wage of non-production workers, W_{it}^{np},is given by

$$\frac{dL_{it}^{p}}{dW_{it}^{p}} = \frac{-\gamma + (1 - s_{it})^2}{(1 - s_{it})} - 1 \tag{4}$$

and

$$\frac{dL_{it}^{p}}{dW_{it}^{np}} = \frac{-\gamma + s_{it}\,(1 - s_{it})}{(1 - s_{it})} \tag{5}$$

More generally, the elasticity of the demand for non-production and production workers with respect to the other explanatory variables is given by

$$\frac{dL_{it}^{np}}{dx_{it}} = \frac{\beta}{s_{it}} \tag{6}$$

and

$$\frac{dL_{it}^{p}}{dx_{it}} = \frac{-\beta}{(1 - s_{it})} \tag{7}$$

where

x is either the real value added, the real capital stock, the export share or the import share and β is the parameter associated with that variable in equation (1).

As they are a function of the cost share of non-production workers, these elasticities are commonly evaluated at the sample average.

To allow for labour adjustment costs, we follow Holly and Smith (1989) and Kearney (1997), and we consider a dynamic version of the cost share equation. In that setting, we consider an error correction cost share equation with two lags given by:

$$\begin{aligned}\Delta s_{it} = \quad & \beta \Delta s_{i,t-1} + \gamma_0 \, \Delta wrel_{it} + \gamma_1 \, \Delta wrel_{i,t-1} + \phi_0 \, \Delta y_{it} + \phi_1 \, \Delta y_{i,t-1} + \delta_0 \, \Delta k_{it} \\ & + \delta_1 \, \Delta k_{i,t-1} + \theta_{1,0} \, \Delta z_{it} + \theta_{1,1} \, \Delta z_{i,t-1} + \theta_{2,0} \, \Delta zlow_{it} + \theta_{2,1} \, \Delta zlow_{i,t-1} + D_t \\ & - \lambda (s_{it-2} - \alpha_i - \gamma \, wrel_{it-2} - \phi \, y_{it-2} - \delta \, k_{it-2} - \theta_1 \, z_{it-2} - \theta_2 \, zlow_{it-2}) + \varepsilon_{it}\end{aligned} \tag{8}$$

Rearranging the different terms of equation (8), we obtain

$$\begin{aligned}s_{it} = \quad & \eta_i + \pi_1 s_{i,t-1} + \pi_2 s_{i,t-2} + \pi_3 \, wrel_{it} + \pi_4 \, wrel_{i,t-1} + \pi_5 \, wrel_{i,t-2} + \pi_6 \, y_{it} \\ & + \pi_7 \, y_{i,t-1} + \pi_8 \, y_{i,t-2} + \pi_9 \, k_{it} + \pi_{10} \, k_{i,t-1} + \pi_{11} \, k_{i,t-2} + \pi_{12} \, z_{it} + \pi_{13} \, z_{i,t-1} \\ & + \pi_{14} \, z_{i,t-2} + \pi_{15} \, zlow_{it} + \pi_{16} \, zlow_{i,t-1} + \pi_{17} \, zlow_{i,t-2} + D_t + \varepsilon_{it}\end{aligned} \tag{9}$$

This equation is a standard dynamic equation with two lags. In order to compute long-run labour demand elasticities using the formulas presented in equations (2) to (7), we may recover the parameters of the long-run equilibrium equation, from the estimated π_i, using

$$\gamma = \frac{\pi_3+\pi_4+\pi_5}{1-\pi_1-\pi_2} \; ; \; \phi = \frac{\pi_6+\pi_7+\pi_8}{1-\pi_1-\pi_2} \; ; \; \delta = \frac{\pi_9+\pi_{10}+\pi_{11}}{1-\pi_1-\pi_2} \; ; \; \theta_1 = \frac{\pi_{12}+\pi_{13}+\pi_{14}}{1-\pi_1-\pi_2} \; ; \; \theta_2 = \frac{\pi_{15}+\pi_{16}+\pi_{17}}{1-\pi_1-\pi_2}$$

The λ parameter, which measures the speed of adjustment, is given by $1 - \pi_1 - \pi_2$.

The parameters of the short-run dynamics can also be recovered using

$$\beta = \pi_1 - 1 \;\; ; \;\; \gamma_0 = \pi_3 \;\; ; \;\; \gamma_1 = \pi_3 + \pi_4 \;\; ; \;\; \phi_0 = \pi_6 \;\; ; \;\; \phi_1 = \pi_6 + \pi_7 \;\; ; \;\; \delta_0 = \pi_9 \;\; ;$$
$$\delta_1 = \pi_9 + \pi_{10} \; ; \; \theta_{1,0} = \pi_{12} \; ; \; \theta_{1,1} = \pi_{12} + \pi_{13} \; ; \; \theta_{2,0} = \pi_{15} \; ; \; \theta_{2,1} = \pi_{15} + \pi_{16}.$$

In Section 5, we estimate equation (9) using the standard system generalized method of moments (GMM-SYS) estimation (Blundell and Bond, 1998) and we recover the long-run elasticities at the sample average using our estimated coefficients. However, as these elasticities are non-linear functions of the estimated coefficients, one cannot directly infer the significance of these elasticities.

To solve this problem, we opt for bootstraps,[9] as in Ekholm and Hakkala (2008). Using 1,000 randomly selected samples, for which our GMM-SYS estimation successfully passes all specification tests (especially the Hansen test and the AR(2) test), we are able to construct an empirical confidence interval for each elasticity to test its statistical significance.

4.2 Long-run effects of new OFDI

To analyse how international expansion, through the development of new OFDI projects, affects domestic demand for production and non-production workers, we use two frameworks.

First, we start from the long-run cost share equation (1) with two different definitions for z_{it} and $zlow_{it}$: the number of FDI projects (in low-income countries only) managed by firm i at time t, or a binary variable that indicates that firm i has FDI projects (in low-income countries only) in period t. Because these two variables are discrete and do not vary a lot over time, a dynamic framework similar to the one used in Section 4.1 is not deemed appropriate. Therefore, we only considered the static model, and directly estimated equation (1) with standard panel data techniques with firm-specific fixed effects. We still use bootstraps to construct empirical confidence intervals for the derived elasticities.

Second, we also try to assess the impact of new FDI projects on production and non-production labour demand using a set of equations, inspired by the event study approach, that

9 See Horowitz (2003) for details about the use of bootstraps in econometrics.

model the change in production or non-production labour around periods where new FDI projects are initiated.

We consider a set of four equations for each type of labour.

$$\begin{aligned}\left(l^j_{i,t-1} - l^j_{i,t-2}\right) = \quad & \eta_{1i} + \beta_{11}\, NFDI_{it} + \beta_{12}\, NFDIlow_{it} + \beta_{13}\left(y_{i,t-1} - y_{i,t-2}\right) \\ & + \beta_{14}\left(k_{i,t-1} - k_{i,t-2}\right) + \beta_{15}\left(wrel_{i,t-1} - wrel_{i,t-2}\right) + D_t + \varepsilon_{1it}\end{aligned} \tag{10}$$

$$\begin{aligned}\left(l^j_{it} - l^j_{i,t-1}\right) = \quad & \eta_{2i} + \beta_{21}\, NFDI_{it} + \beta_{22}\, NFDIlow_{it} + \beta_{23}\left(y_{it} - y_{i,t-1}\right) \\ & + \beta_{24}\left(k_{it} - k_{i,t-1}\right) + \beta_{25}\left(wrel_{it} - wrel_{i,t-1}\right) + D_t + \varepsilon_{2it}\end{aligned} \tag{11}$$

$$\begin{aligned}\left(l^j_{i,t+1} - l^j_{i,t-1}\right) = \quad & \eta_{3i} + \beta_{31}\, NFDI_{it} + \beta_{32}\, NFDIlow_{it} + \beta_{33}\left(y_{i,t+1} - y_{i,t-1}\right) \\ & + \beta_{34}\left(k_{i,t+1} - k_{i,t-1}\right) + \beta_{35}\left(wrel_{i,t+1} - wrel_{i,t-1}\right) + D_t + \varepsilon_{3it}\end{aligned} \tag{12}$$

$$\begin{aligned}\left(l^j_{i,t+2} - l^j_{i,t-1}\right) = \quad & \eta_{4i} + \beta_{41}\, NFDI_{it} + \beta_{42}\, NFDIlow_{it} + \beta_{43}\left(y_{i,t+2} - y_{i,t-1}\right) \\ & + \beta_{44}\left(k_{i,t+2} - k_{i,t-1}\right) + \beta_{45}\left(wrel_{i,t+2} - wrel_{i,t-1}\right) + D_t + \varepsilon_{4it}\end{aligned} \tag{13}$$

where

l^j_{it} is the log of labour demand of type j by firm i in period t;

$NFDI_{it}$ is a binary indicator of new FDI projects abroad by firm i in period t;

$NFDIlow_{it}$ is a binary indicator of new FDI projects in low-income countries by firm i in period t;

Equation (10) tests a potential "anticipation effect" of new FDI projects on employment. A contemporaneous effect is tested in Equation (11). Equations (12) and (13) test for long-run effects of new FDI projects.

Since new FDI projects mainly affect local labour demand through output displacement, we estimate a simple version of equations (10) to (13) for changes in output to see if the impact of new FDI projects may also be captured by output changes. A similar strategy has also been used to capture indirect FDI effects on employment through the other variables.

This set of equations is estimated on a restricted sample. As we want to see the effect over time of the occurrence of one direct investment in period t, we restrict our sample to the observations for which the following restrictions are fulfilled.

$$NFDI_{i,t-1} = NFDI_{i,t+1} = NFDI_{i,t+2} = 0.$$

5 ESTIMATION RESULTS

5.1 Long-run employment effects of exports and imports

As explained in Section 4.1., to estimate the long-run employment effects of exports and imports, we consider a dynamic cost share equation (Eq. (9)). This equation is estimated using GMM-SYS for a large number of randomly generated samples (around 15,000 samples for both the export share equation and the import share equation).

To derive the parameters of Eq. (8) and the related long-run elasticities of demand for production and non-production labour, we only consider the results associated with the random samples for which the GMM-SYS estimation passed the specification tests (AR(2) and Hansen tests), leaving us with a set of 1,000 valid replications. These 1,000 replications form the basis for computing point estimates and confidence intervals of Eq. (8) parameters and of the long-run elasticities.

Table 3 presents our estimation results for Eq. (8) parameters, while the estimation results for the various elasticities are presented in Table 4.

Considering the results presented in Table 4, and focusing on the impact of the share of imported inputs, our results seem to indicate that the share of total imported inputs in total input consumption has no significant impact on demand for either production or non-production workers.

Table 3: Estimation results - Bootstrap estimates of Eq. (8) parameters with 95% CI

Parameters	z = import share	z = export share
β	-0.0938**	-0.0946**
	[-0.1187 ; -0.068]	[-0.1203 ; -0.0671]
γ_0	0.1793**	0.1796**
	[0.1695 ; 0.1888]	[0.1696 ; 0.1892]
γ_1	0.0144**	0.0154**
	[0.0049 ; 0.0235]	[0.0057 ; 0.0255]
ϕ_0	0.0006	0.0008
	[-0.0054 ; 0.0064]	[-0.0052 ; 0.0067]
ϕ_1	-0.0015	-0.001
	[-0.0063 ; 0.0032]	[-0.0058 ; 0.0038]
δ_0	-0.0003	-0.0004
	[-0.0031 ; 0.0027]	[-0.0031 ; 0.0026]
δ_1	-0.002	-0.0021
	[-0.0044 ; 0.0004]	[-0.0045 ; 0.0004]
$\theta_{1,0}$	-0.0012	-0.0040
	[-0.0089 ; 0.0071]	[-0.0121 ; 0.0048]
$\theta_{1,1}$	-0.0006	-0.0036
	[-0.0083 ; 0.008]	[-0.0116 ; 0.0042]
$\theta_{2,0}$	0.0054	0.0035
	[-0.0132 ; 0.024]	[-0.0163 ; 0.0241]
$\theta_{2,1}$	0.0189	0.0073
	[-0.0010 ; 0.0390]	[-0.0122 ; 0.0299]
λ	0.0528**	0.0538**
	[0.0167 ; 0.0901]	[0.0154 ; 0.0943]
γ	0.1343**	0.1557**
	[0.0359 ; 0.2413]	[0.0532 ; 0.2555]
ϕ	0.0664**	0.071**
	[0.0423 ; 0.1132]	[0.0438 ; 0.1167]
δ	-0.0400**	-0.0418**
	[-0.0726 ; -0.0213]	[-0.0734 ; -0.0206]
θ_1	-0.0114	-0.0915**
	[-0.1404 ; 0.0645]	[-0.1568 ; -0.038]
θ_2	0.3575**	0.5479**
	[0.1185 ; 0.996]	[0.3056 ; 0.9715]

Notes: The point estimates presented are the average of the estimated values of the different parameters obtained using 1,000 replications of the estimation of equation (9) with GMM-SYS based on randomly selected samples. For each replication, the GMM-SYS estimation passes all standard specification tests (AR(2), Hansen) , using only GMM-type instruments for the lagged cost share. Other variables are instruments by their past values. The confidence interval is constructed using the 2.5 and 97.5 percentile of the empirical distribution of the 1,000 estimations available for each parameter.

** indicates significance at the 5% level, using the 95% empirical confidence interval.

* indicates significance at the 10% level, using the 90% empirical confidence interval (not reported).

However, as found by several authors (Rosholm *et al.*, 2007; Ekholm and Hakkala, 2008), we find that an increase in imports from low-income countries has a significant negative effect on demand for production employment; this is also consistent with the findings of Morrison-Paul and

Siegel (2001),Yan (2006) and Biscourp and Kramarz (2007) for the US, Canada and France, respectively. When developed countries engage in international trade with the developing world, that has a negative impact on unskilled labour demand in the developed countries, as is evident from the finding observed that a reduction of trade barriers has prompted the developed countries to switch from producing all the manufactures they consume towards specialising in the production of skill-intensive manufactures and relying on imports from developing countries for their supply of low-skill-intensive manufactures (Wood, 1995). Based on the estimated semi-elasticities,[10] a one percentage point increase in the share of imports from low-income countries, *ceteris paribus*, reduces demand for production workers by 0.6%, while it increases demand for non-production workers by 0.9%. The reason for the positive estimated coefficient in the case of non-production workers may be that a relatively large proportion of imports from low-income countries consist of intermediate inputs that need further processing by relatively higher skilled workers for re-exports; this is supported by the fact that a significant share of Belgium's exports go to low-income countries.

If production workers and non-production workers are considered as proxies for low-skilled and high-skilled employment respectively, these results seem to indicate that the increased globalisation of the world economy -, and especially the greater participation of low-income countries such as China or India -, has led to a significant amount of skill-upgrading in the Belgian economy, seemingly induced by skill-biased technological change (Bernard and Jensen, 1997).

Table 4: Long-run labour demand elasticities - Bootstrap estimates with 95% CI

	z = import share		z = export share	
	L_{it}^{np}	L_{it}^{p}	L_{it}^{np}	L_{it}^{p}
W_{it}^{np}	-0.2636*		-0.2105*	
	[-0.5067 ; 0.0017]		[-0.4624 ; 0.0353]	
W_{it}^{p}		-0.6294**		-0.6654**
		[-0.8122 ; -0.4634]		[-0.8381 ; -0.4917]
Y_{it}	0.1642**	-0.1114**	0.1756**	-0.1191**
	[0.1036 ; 0.2769]	[-0.1914 ; -0.0706]	[0.1081 ; 0.2867]	[-0.1962 ; -0.0733]
K_{it}	-0.0989**	0.0671**	-0.1034**	0.0702**
	[-0.1808 ;-0.0524]	[0.0357 ; 0.1216]	[-0.1837 ; -0.0509]	[0.0349 ; 0.1223]
z_{it}	-0.0281	0.0191	-0.2264**	0.1536**
	[-0.3465 ; 0.161]	[-0.1077 ; 0.2363]	[-0.3892; -0.0943]	[0.0636 ; 0.2624]
$zlow_{it}$	0.8849**	-0.6000**	1.3557**	-0.9196**
	[0.2952 ; 2.4596]	[-1.6745 ; -0.1996]	[0.7587 ; 2.4284]	[-1.6200 ; -0.5159]

Notes: The point estimates presented are the average of the estimated values of the different parameters obtained using 1,000 replications of the estimation of equation (9) with GMM-SYS based on randomly selected samples. For each replication, the GMM-SYS estimation passes all standard specification tests (AR(2), Hansen), using only GMM-type instruments for the lagged cost share. Other variables are instruments by their past values. The confidence interval is constructed using the 2.5 and 97.5 percentile of the empirical distribution of the 1,000 estimations available for each parameter.

** indicates significance at the 5% level, using the 95% empirical confidence interval.

* indicates significance at the 10% level, using the 90% empirical confidence interval (not reported).

The remaining estimated elasticities are of reasonable magnitude, except for the labour demand elasticities with respect to capital which have unexpected signs. Based on Table 4, non-production workers are substitutes for capital while production workers are complements to it.

10 As the z variables are expressed in percentages, the estimated coefficient associated with these variables is the semi-elasticity of labor demand with respect to z.

As expected, globalisation measured by the increase in imported inputs from low-income countries seems to reduce demand for production workers in the importing country (Belgium) while, with respect to exports, it generates positive effects on non-clerical employment when globalisation is measured by the share of exports in total turnover. Our results are in line with a number of previous studies (Anderton and Brenton, 1999; Bella and Quintieri, 2000; Cuyvers *et al.*, 2003). Increases in export shares seem to significantly increase demand for the blue-collar labour, while they significantly reduce demand for white-collar workers in Belgium's manufacturing sector. Based on our results, a one percentage point increase in the share of exports increases demand for production workers by 0.15%, while it reduces demand for non-production workers by 0.23%. However, these effects are offset and even reversed if the increase in the export share comes from an increase in the share of exports to low-income countries, as a one percentage point increase in the export share which originates from low-income countries reduces demand for blue-collar labour by 0.77% overall, and increases demand for white-collar workers by 1.13%. In a small, open economy such as Belgium, imports from a low-income economy may, as explained earlier, contain a large component of intermediate goods which need to be further processed for exports by relatively higher skilled workers, thereby increasing demand for highly skilled labour at the expense of lower-skilled labour. The remaining elasticities are similar in magnitude and sign to those obtained with the import share equation.

5.2 Long-run employment effects of OFDI

As mentioned in Section 4.2, the long-run employment effects of OFDI cannot be estimated with a similar framework as the one used to study the impact of exports and imports, as our measure of OFDI activity (either a variable that counts the number of FDI projects managed by each firm or a simple OFDI indicator variable) is discrete and is either constant over the firm's individual observation period or varies infrequently over that period, which makes the estimation of a dynamic equation inappropriate.

In the following two sub-sections, we therefore present the results obtained using two different methodologies. First, we consider the static version of the cost equation (Eq. (1)). Second, we analyse the (anticipated / contemporaneous / long term) impact of the event "setting-up of a new FDI" on production and non-production employment in the parent company.

5.2.1 A static cost share equation with OFDI

Table 5 presents the estimation results for the static cost share equation (Eq. (1)) with either the number of OFDI links or an OFDI indicator. Referring to the results associated with the first measure of OFDI, we find that international expansion seems to have a significant effect on demand for both production and non-production workers. An increase in the number of plants abroad tends to reduce domestic demand for production workers while it increases demand for non-production workers, pointing to further skill-upgrading in Belgian manufacturing parent firms. This finding is in accordance with Blomström *et al*. (1997) and Hansson (2005). These results may be interpreted as indicating that more foreign affiliates are associated with transfer of the more labour-intensive activities - which use relatively more low-skilled workers - to the foreign affiliates located in a host country where labour cost is comparatively lower, but the more capital-intensive activities are kept in the parent firm. The significant, positive correlation between the number of OFDI links and non-production employment may also suggest that more FDI abroad needs additional supervisory, management, marketing and R&D personnel in the parent company at home.

According to the estimated coefficients for non-production and production employment, the setting-up of a plant abroad reduces blue-collar employment by 0.003% while it increases demand for white-collar employment by 0.004%. In economic terms, these effects seem to be relatively small. However, the destination of the foreign investment does not seem to matter, as the number of plants owned in low-income countries does not seem to affect demand for both types of labour, since it is not statistically significant. Regarding the impact of 'being a multinational' on domestic labour demand, the results reported in Table 5 indicate that starting to operate in low-income countries reduces demand for production workers in Belgium; this is consistent with Elia *et al.* (2009). However, it is found to increase demand for non-production workers, in line with the findings of Egger and Egger (2003) and Castellani *et al.* (2008) for Austria and Italy, respectively, though these effects are only significant at the 10% level.

With respect to (direct or cross) wage elasticities, our estimation results are in line with those presented in Section 5.1. However, the magnitude of the elasticities with respect to value added and capital stock is much smaller than those presented above.

Table 5: Long-run labour demand elasticities- Bootstrap estimates with 95%CI

	z = No. of OFDI links		z = OFDI indicator	
	L_{it}^{np}	L_{it}^{p}	L_{it}^{np}	L_{it}^{p}
W_{it}^{np}	-0.1665**		-0.1654**	
	[-0.2431 ; -0.0959]		[-0.2430 ; -0.0943]	
W_{it}^{p}		-0.6957**		-0.6964**
		[-0.7455 ; -0.6404]		[-0.7470 ; -0.6413]
Y_{it}	0.0223**	-0.0152**	0.0222**	-0.0151**
	[0.0024 ; 0.0421]	[-0.0288 ; -0.0017]	[0.0027 ; 0.0424]	[-0.0287 ; -0.0018]
K_{it}	-0.0157**	0.0107**	-0.0157**	0.0107**
	[-0.0286 ; -0.0052]	[0.0034 ; 0.0196]	[-0.0288 ; -0.0051	[0.0034 ; 0.0195]
z_{it}	0.0041**	-0.0028**	0.0045	-0.0030
	[0.0016 ; 0.0070]	[-0.0048 ;-0.0011]	[-0.0146 ; 0.0240]	[-0.0163 ; 0.0100]
$zlow_{it}$	-0.0052	0.0035	0.0226*	-0.0153*
	[-0.0131 ; 0.0018]	[-0.0012 ; 0.0089]	[-0.0052 ; 0.0498]	[-0.0336 ; 0.0035]

Notes: The point estimates presented are the average of the estimated values of the different parameters obtained using 1,000 replications of the estimation of equation (1) based on randomly selected samples. The confidence interval is constructed using the 2.5 and 97.5 percentile of the empirical distribution of the 1,000 estimations available for each parameter.

** indicates significance at the 5% level, using the 95% empirical confidence interval.

* indicates significance at the 10% level, using the 90% empirical confidence interval (not reported).

5.2.2 The effects of new OFDI on domestic employment

Table 6 presents the estimation results of the set of equations (10) to (13) which characterises the effect of the setting-up of (at least) one new OFDI in period *t* on demand for production and non-production workers and on value added.[11]

Our estimation results suggest that, if we control for changes in output, capital stock and wages, the setting-up of a new OFDI in period *t* has a positive and significant anticipation effect on non-production employment in *t*-1, indicating that firms that plan to invest abroad hire new clerical workers in anticipation. However, if this new investment takes place in a low-income country, it has

11 The effects of new OFDI on relative wages and capital stock have also been estimated. We do not find any significant impact on these variables in the case of the new OFDI indicators. Results are therefore not reported in the paper, but are available on request.

a negative effect on clerical employment in *t*-1. For blue-collar workers, we find no significant anticipation effects of OFDI, while we find a weakly significant anticipated impact on value added.

Table 6: Anticipated, contemporaneous and long-run impacts of new FDI projects

a. on employment

	Non-production labour				Production labour			
	Eq. (10)	Eq. (11)	Eq. (12)	Eq. (13)	Eq. (10)	Eq. (11)	Eq. (12)	Eq. (13)
$NFDI$	0.025**	0.014*	0.014	0.021	0.003	0.008	0.010	0.013
	(0.010)	(0.008)	(0.011)	(0.013)	(0.009)	(0.008)	(0.013)	(0.016)
$NFDIlow$	-0.046**	-0.004	-0.025	-0.065**	-0.021	-0.033**	-0.061**	-0.073**
	(0.023)	(0.012)	(0.019)	(0.027)	(0.016)	(0.016)	(0.028)	(0.033)
y	0.271**	0.258**	0.341**	0.394**	0.328**	0.323**	0.381**	0.426**
	(0.021)	(0.019)	(0.016)	(0.014)	(0.017)	(0.016)	(0.014)	(0.013)
$wrel$	-0.027	-0.025	-0.078**	-0.062**	-0.014	-0.018	-0.030	-0.031
	(0.023)	(0.020)	(0.024)	(0.027)	(0.021)	(0.018)	(0.022)	(0.033)
k	0.052**	0.047**	0.058**	0.064**	0.054**	0.050**	0.069**	0.073**
	(0.008)	(0.006)	(0.005)	(0.005)	(0.007)	(0.006)	(0.006)	(0.006)
R^2	0.118	0.111	0.188	0.232	0.181	0.177	0.187	0.285
# obs.	8869	11140	11140	11140	8869	11140	11140	11140

Notes: ** indicates significance at the 5% level; * indicates significance at the 10% level.
Standard errors in brackets
Estimated equations include sector specific time dummies

b. on value added

	Eq. (10)	Eq. (11)	Eq. (12)	Eq. (13)
$NFDI$	0.018*	0.006	0.019	0.015
	(0.010)	(0.009)	(0.014)	(0.020)
$NFDIlow$	-0.004	-0.008	-0.031	-0.038
	(0.025)	(0.016)	(0.024)	(0.034)
R^2	0.158	0.153	0.136	0.138
# obs.	8869	11140	11140	11140

Notes: ** indicates significance at the 5% level; * indicates significance at the 10% level.
Standard errors in brackets
Estimated equations include sector specific time dummies

On impact, effects are still relatively moderate. The setting up of the new foreign facility still increases demand for non-production workers (though the positive effect is only weak). Production workers are now negatively affected, but only when the investment takes place in a low-income country. A new investment abroad reduces demand for blue-collar workers by 0.03% on impact. No effects are found for value added. OFDI therefore has no indirect effects on employment through output.

The negative impact of investment in low-income countries on demand for production workers increases after one period (in *t*+1, the decrease in employment compared to its pre-investment level is of 0.06%) while we cannot find any effect on non-production labour. Nevertheless, we find

that the coefficient associated with new OFDI in low-income countries becomes more negative between *t* and *t*+1.

These negative employment effects on production and non-production workers are even larger in *t*+2. After two periods, both effects are significant, and the cumulated decrease in employment of production and non-production workers in *t*+2 compared to the pre-investment period amounts to 0.07% for both categories.

It is important to stress that these estimated effects are computed after controlling for changes in value added, capital stock and relative wages. If OFDI generates production shifts and disinvestment in the home countries, the total OFDI effects differ from those associated with the dummy variables. However, as mentioned above, we do not find that OFDI has any significant effect on the other explanatory variables.

6 CONCLUSIONS

The increased integration of the world economy affects the composition of labour demand in the home country in various ways. In particular, increased international trade with, and international investment activities in, less-developed countries tend to displace lower-skilled labour-intensive production, which leads to a reduction in demand for low-skilled labour in the home countries. The motivation for the current paper centres on the question of the effects of the increased international trade and outward FDI and its consequences for labour demand by skill levels in Belgium's small, open economy.

In the present paper, we investigate how the internationalisation of Belgian firms affects domestic demand for low- and high-skilled workers, using a dynamic error-correction framework derived from the translog production function. By analogy with previous studies, we use white-collar and blue-collar labour as proxies for skilled and unskilled labour respectively. To detect differential labour-demand effects, a distinction is made between home-employment effects of the firms' internationalisation in high-income countries and low-income economies, through international trade and outward foreign direct investment.

Our analysis using company-level data over 1997-2007 suggests that imports from low-income countries increase demand for high-skilled workers, but reduce domestic demand for low-skilled workers.

Our findings indicate that exports have exerted a negative impact on white-collar workers, but increased domestic demand for blue-collar workers. However, when export destinations are differentiated, we find that exports to low-income countries are beneficial for white-collar workers, but hurt blue-collar workers.

Finally, with respect to outward FDI our econometric results also suggest that investing in low-income countries significantly reduces demand for low-skilled labour, while it increases demand for skilled labour. Our results also tentatively suggest that the setting-up of a new project increases demand for non-production workers one period before the investment is made. This positive effect is, however, offset in the long run, particularly when investment is directed to low-income countries.

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