The Role of the Demand Effect in the Adjustment of Employment to Trade

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Abstract

This article offers a new explanation to the smooth adjustment of employment to imports at the industry level, observed in recent years in the OECD and developing countries. In fact, we challenge the view through which trade is related to employment via a sole substitution effect. Using an oligopoly setting in international segmented markets, we show that both imports and exports carry out an additional demand effect that is always positive on labor demand in a typical industry. We base our econometric study on that theoretical framework to distinguish in econometrics between the substitution and the demand effects. We construct a dataset that provides together trade, activity and labor related data for around 29 industries and 65 countries between 1981 and 1997. Empirical results support the existence of that 'double' effect of imports and exports. In particular, when controlling for the demand effect, the impact of imports on industry employment appear to be negative and statistically significant for most of the industries in the OECD and developing countries. Nevertheless, when we specify the theoretical equation so that to isolate the substitution effect, then the effect of imports appears in most cases to be positive.

1 Introduction

The relation between trade and employment did not enjoy the same popularity than that between openness and wages. The first reason is purely theoretical. In general equilibrium, traditional trade frameworks assume full employment at the aggregate level and labour adjustments are expected to take place between industries. The second reason is empirical. There has been an urgent need to investigate whether trade was responsible for the observed inequalities in the United States and United Kingdom in the last decades.

In continental Europe, inequalities remained relatively stable throughout the same period but the region had to cope instead with high unemployment rates.. However the conclusions related to employement (Davis (1996) and Krugman (1995))did match the ones obtained by studies focusing on wages: the impact of trade has been limited. Using a CGE-type model, Krugman showed that trade could account only for 1.4% of the fall in European employment. Some studies built on the factor content of trade[1] reach usually the same conclusion that trade did not affect much employment although when relaxing the assumption of perfect substituability between domestic and foreign goods, trade was shown to be sensibly harming labor(Wood (1995)).

Most of the econometric studies conducted at the industry level follow these *mainstream*'s conclusions: trade does not affect significantly employment. In Europe, the existence of high intra industry trade flows stand as one of the main and straightforward reasons (See Brulhart and Hine (1999)). The idea of smooth adjustment to trade comes from the fact that imports could be balanced by exports keeping labor demand relatively unaffected in each industry.

Besides, some disaggregated level work undertaken on developing countries that are known to be more specialized than OECD ones, obtain similar results (See Harrison and Hanson (1999) for a review of the literature). Even in these countries, the effect on industrial labor demand does not seem to be very significant in the manufacturing sector.

In fact, a sound reasoning should authorize disentangling various impacts of trade on employment. First, imports should harm domestic employment by substituting the services of foreign factors to those of domestic ones; on a symmetrical basis, exports should benefit to the latter. This is the substitution effect tackled in most studies. Second, as it will be shown hereafter, there is a compensatory demand effect, which favors employment within a given industry. Lastly, there is a set of general equilibrium impacts that deserve much attention: those effects are well known and have been

[1]See Borjas *et al* (1996), Sachs and Shatz (1994) for the United States, Bonnaz, Courtot and Nivat (1994) and Cortes, Jean and Pisany-Ferry (1997) for France.

emphasized in various studies.

In this article we abandon the general equilibrium approach and focus instead on the sectoral level. We challenge the view through which trade is related to employment via a sole substitution effect at this level. Accordingly, we tackle the second effect referred to above. Using a simple oligopoly framework, we show that imports carry out an additional demand effect that is always positive on labor demand in a typical industry. The mechanism at stake is rather intuitive: imports reduce commodity prices, thus increasing their total demand. This demand expansion benefits to all of the firms, should they be foreign or domestic. Consequently, domestic production and thus the number of domestic employees should rise. The only issue is whether such effect is sizeable and how it can be isolated in empirical studies.

That 'double' effect applies to the exporting firms as well. By replacing the host country sales, exports affect positively the demand for factor services in the source country. This is the (reverse) substitution effect. Incidentally, due to the strengthening of competition generated by openness, this positive impact is reinforced by a higher demand for all commodities in the host market.

In this paper we develop a simple theoretical framework authorizing to distinguish in econometrics between the substitution and the demand effects. Empirical results obtained from two group of developed and developing countries support the existence of that 'double' effect, either when selling to the domestic or foreign markets. In particular, when controlling for the demand effect, the impact of imports on industry employment appear to be negative and statistically significant for most of the industries in the OECD and developing countries. Nevertheless, when we specify the theoretical equation so that to isolate the substitution effect, then the effect of imports appears in most cases to be positive. In that respect, this article offers a new explanation to the smooth adjustment of employment to imports at the industry level, disregard from traditional general equilibrium impacts. These conclusions are highly relevant for economic policy: trade liberalization no longer needs to rely on general equilibrium effects hardly convincing in terms of political economy of protection.

The rest of the paper is organized as follows: Section 2 presents some stylized facts. Sections 3 and 4 outline the theory to be applied. In section 5 we present the data whereas section 6 emphasize the econometric results. The last section concludes.

2 Stylised facts

How are employment series related to trade indicators at the industry level in developed and developing countries? We use two UNIDO databases related to trade and activity to construct a dataset on 65 countries and 29 industries for the 1981-1997 period. Figure 1 reports industry variations in employment in relation to import values in each of the developed countries. These industry variables, expressed in logarithms, are constructed in terms of variations to the means over the period. Such variables have the advantage to sweep out inter-industry variations letting the figures express only intertemporal variations. Hence, the observed trend should be interpreted as a mean intra-industry trend.

Following that figure, we observe that the relation between imports and employment is positive in general. This observation which is inconsistent with the traditional intuition may be explained however by the insufficient disaggregation of the observed industries. In fact, within each observed industry, a typical country could be specializing in a range of products and thus exporting them while importing products that it does not produce or more generally in which it does not have a comparative advantage. This assumption is consistent with figure 3 in appendix, where exports are positively linked to employment.

However, in order to exclude the corresponding impact of trade in *different* products within highly aggregated industries, we focused instead on the same relation on a smaller panel of homogenous goods' industries where imported goods are expected to be similar to domestically produced ones. We choose 4 industries producing a high proportion of homogenous goods that are listed in Olveira-Martins (1994), Rauch (1996) : Paper and Products, Other Non Metallic Products, Iron and Steel and Non Ferrous Metals. Surprisingly, figure 4 in the appendix shows that imports are still significantly and positively related to employment.

Figures 2, and 5 shown in appendix, present the studied link between the openness indicators and employment prevailing in the developing economies. Despite two counterfactual observations (Honduras and Bolivia) the relationship is either positive (in 22 cases) or not significant (in 27 cases). More striking is the persistence of the same positive effect in these countries when considering only the case of homogenous good industries' (see Figure 6 in appendix). Finally, from figure 5, we observe that the relation between the volume of exports and employment is not often positive however, with a strict negative effect in some cases[2].

[2]See figures related to Equator, Honduras, Nigeria, Venezuela, Bolivia, Zimbabwe, Egypt, Trinidad and Tobaggo. in the appendix

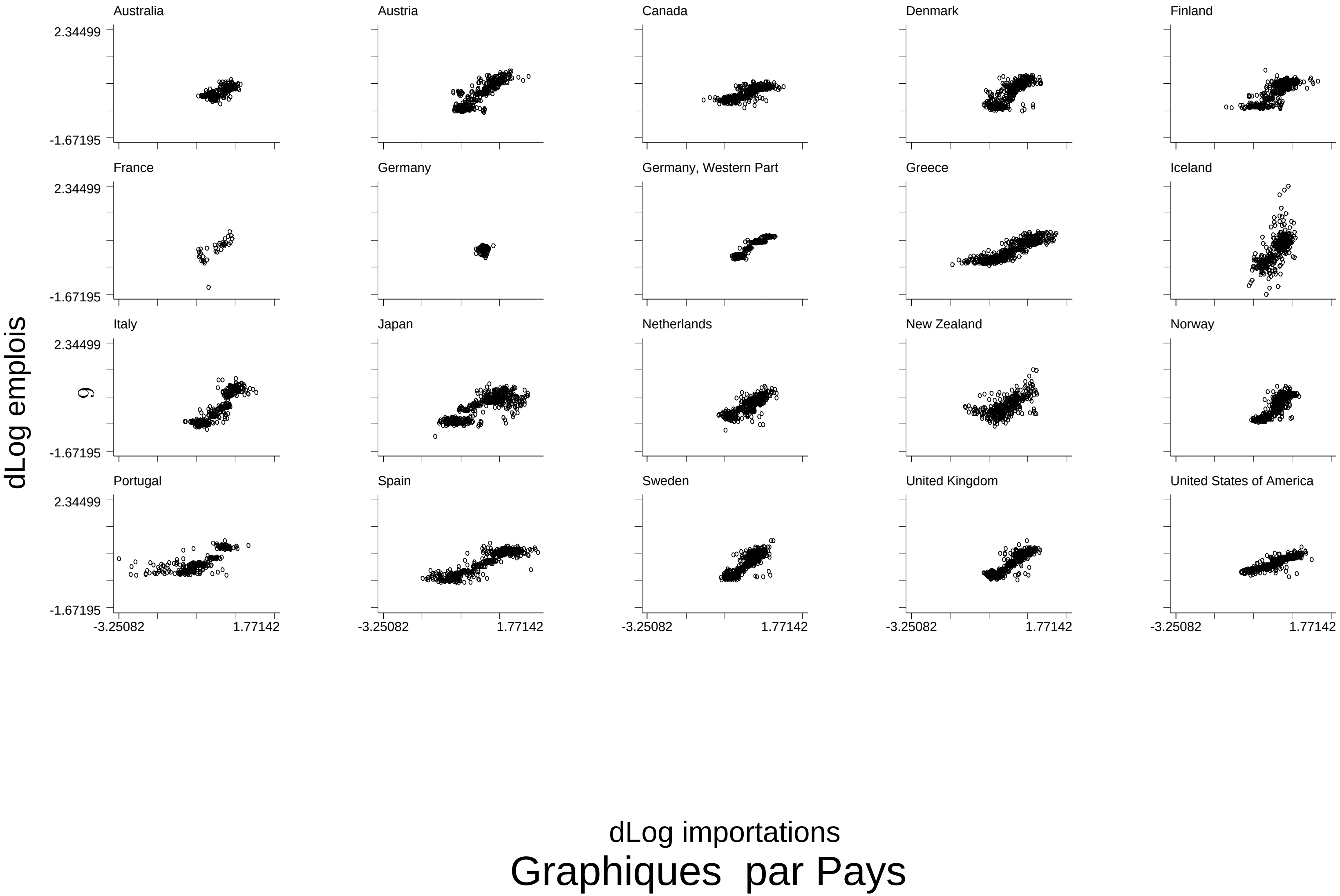

Figure 1: Industrial changes in employment related to imports in OECD countries

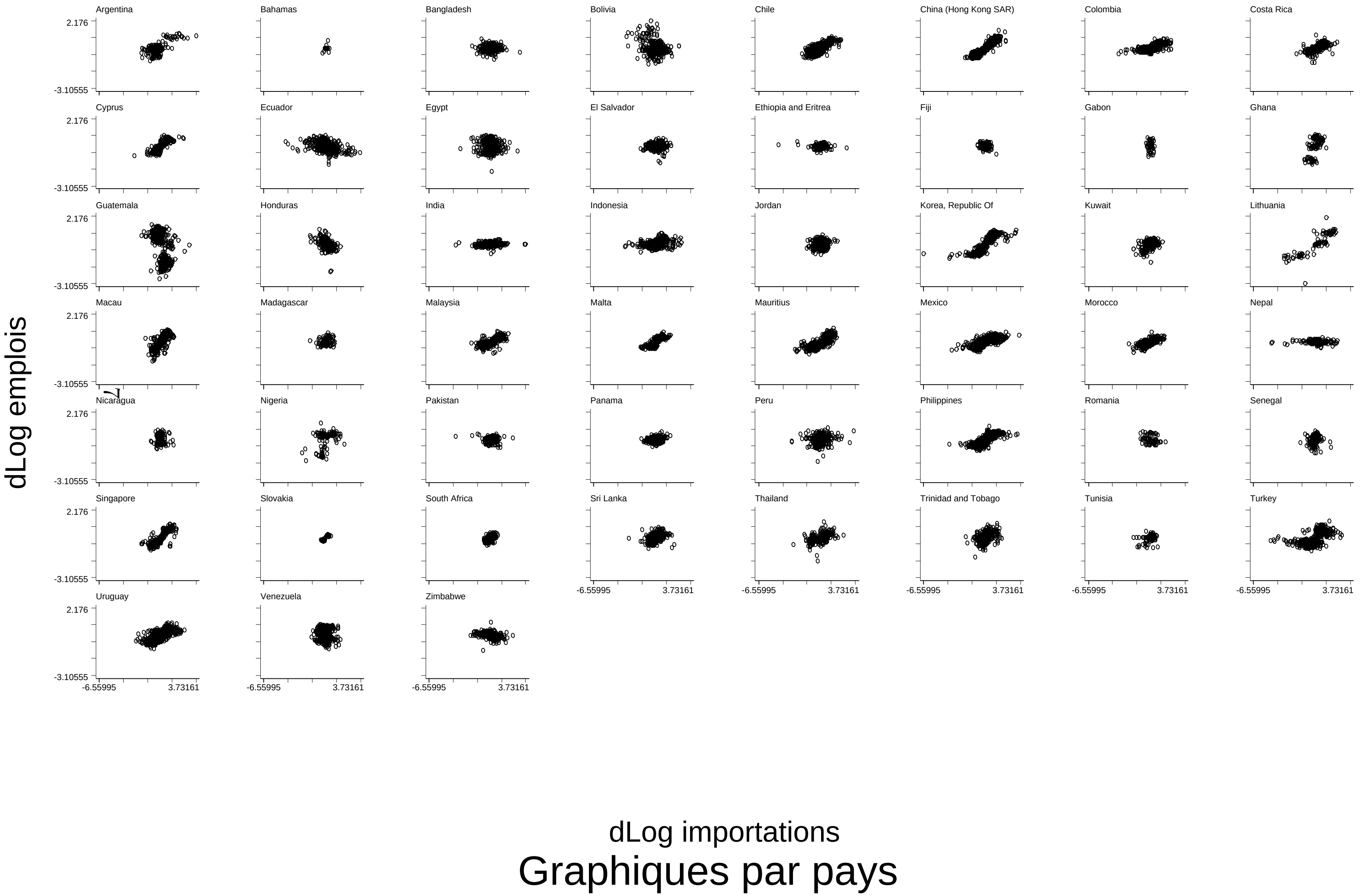

Figure 2: Industrial changes in employment related to imports in **Developing** countries

However, the relationship is less clear when the penetration rate instead of the import variable, is confronted to employment (see figures 7 and 8 in appendix). It appears to be insignificant in general in the developed and developing countries.[3] Nevertheless, employment appears to be negatively linked to the penetration rates for 12 developing countries. In fact, as the penetration rate is measured by the ratio of imports to total sales, these figures suggest that when controlling for the market size (or total demand), the relation between industrial employment and imports ends up to be less positive, non significative or even negative.

These stylized facts invite to focus on the role of market size in the trade's impact on employment. We show in what follows, that beside the substitution effect, imports could reduce prices due to enhanced competition or efficiency on the market. Total demand could increase in return, benefiting for both types of producers domestic and foreigners. Thus, the *total* effect of imports could not be as negative as expected at the industry level, notwithstanding general equilibrium compensatory effects.

3 The theoretical framework

Consider a representative firm n located in a country i and selling on different markets j, $\forall j \in [1 \ldots J]$. It may exports to its own market ($j = i$) or to a foreign one ($j = j'$, $\forall j' \neq i$.) The markets are assumed to be internationally segmented (see Brander (1981) or Brander-Krugman (1983)) and the goods sold on each of them are homogenous[4]. Assuming p_j the equilibrium price, $c_{ij,n}$ the marginal cost of the firm supported when exporting on j, the firm n chooses the quantities $x_{ij,n}$ to export that maximize its profits:

$$\prod_{i,n} = \sum_{j} [p_j x_{ij,n} - c_{ij,n} x_{ij,n}] \tag{1}$$

Without loss of generality, we assume that marginal costs to exports are identical among competitors. This will lead to a symmetrical market structure, with $c_{ij,n} = c_{ij}$, $\forall n$). Let σ_j represent the price elasticity of demand, α_j the conjectural variation,[5] and X_j total demand addressed to all sellers on j. Hence, the first order condition leads to the following equation:

[3]Note that the positive relation persists for a small minority of them

[4]For ease of exposition, we consider here the homogenous good assumption. However, the equations to be tested are still robust to the introduction of differentiation. The algebra can be provided upon request.

[5]The conjectural variation parameter α varies between -1 and $N_j - 1$ to allow for a set of strategic behaviors upon the N_j firms selling in the market. The former value corresponds to a perfectly competitive market while the latter suggests a Cartel behaviour when $N_j > 1$, or a monopoly when only one firm serves the market. A Cournot competition is assumed when $\alpha = 0$.

$$x_{ij,n} = x_{ij} = X_{.j} \frac{\sigma_j}{1+\alpha_j} \frac{p_j - c_{ij}}{p_j} \tag{2}$$

Summing up over all the $N_{.j}$ sellers on j, we obtain from equation 2 the price expression:

$$p_j = \sigma_j \frac{\sum_i N_{ij} c_{ij}}{\sigma_j N_{.j} - (1+\alpha_j)} \tag{3}$$

Let

$$\overline{c_{.j}} = \sum_i \frac{N_{ij}}{N_{.j}} c_{ij} \tag{4}$$

be the weighted average of marginal costs to exports on the j market where N_{ij} represents the number of firms from i selling to j. Moreover, let $\mu_j = \frac{\sigma_j N_{.j}}{\sigma_j N_{.j} - (1+\alpha)}$ represents the mark up rate, so that the price equilibrium can now be expressed:

$$p_j = \mu_j \overline{c_{.j}} \tag{5}$$

Replacing this expression in equation 2 and summing over all the i exporting firms to j gives the bilateral trade equation:

$$X_{ij} = X_{.j} N_{ij} \frac{\sigma_j}{1+\alpha_j} \left[1 - \frac{c_{ij}}{\mu \overline{c_{.j}}} \right] \tag{6}$$

As the marginal cost c_{ij} of a firm should be inferior or equal to the price this gives a ratio $\frac{c_{ij}}{\mu_j \overline{c_{.j}}} \leq 1$. This property enables us to apply the Taylor's expanding series, where $log(1 - \frac{c_{ij}}{\mu \overline{c_{.j}}}) \approx -\frac{c_{ij}}{\mu c_{.j}}$. Hence, log-linearizing expression 6 gives the following equation :

$$logX_{ij} = logX_{.j} + logN_{ij} - \frac{1}{\mu_j} \left[\frac{c_{ij}}{\overline{c_{.j}}} \right] + log \frac{\sigma_j}{1+\alpha_j} \tag{7}$$

Relation 7, emphasizes the determinants of bilateral trade where $X_{.j}$ and N_{ij} components represent respectively a demand and supply effects,[6] whereas relative costs ($\frac{c_{ij}}{\overline{c_{.j}}}$) should capture a substitution effect $\left(-\frac{1}{\mu_j}\right)$. Notice that the degree of substitution depends on that of mark ups, μ_j. In fact, in presence of competitive market structure (i.e small mark ups) resulting for instance from a high sensitivity to prices or aggressive behavior of suppliers, consumers tend to substitute goods more easily.

This relation is similar to some gravity equations tested in the literature. The $logN_{ij}$ and $logX_{.j}$ variables express respectively the supply capacity of country i in market j and the market size of country j whereas geographical distance is captured by the deviation of the marginal costs to exports c_{ij}

[6] N_{ij} may represent a competition effect as well, given a demand level $X_{.j}$.

from the average $\overline{c_{.j}}$. Actually, let $c_{ij} = c_i \pi_{ij}$ where the parameter π_{ij} is superior to unity and represents an *iceberg* transport cost. Then, one can expect that this specific cost to trade to represent geographical distance.

Usually however, gravity equations that are estimated in the literature arise from a demand framework from the Spence-Dixit-Stiglitz type[7]. Here instead, gravity variables (distance and size) are obtained from a supply side equation[8]. The demand function is implicit and it sole representative is the price elasticity of demand σ. Recalling the homogenous good assumption, this function can take the form:

$$X_{.j} = A_j p_j^{-\sigma_j} = A_j \mu_j^{-\sigma_j} \overline{c_{.j}}^{-\sigma_j} \tag{8}$$

with A_j an externality like brand image or quality, affecting total demand for a given price. Replacing 8 in the structural equation 6, we obtain a reduced form trade equation:

$$logX_{ij} = -\sigma_j log\overline{c_{.j}} + logN_{ij} - \frac{1}{\mu_j}\left[\frac{c_{ij}}{\overline{c_{.j}}}\right] + log\frac{\sigma_j}{1+\alpha_j} + logA_j - \sigma_j log\mu_j \tag{9}$$

- First, assume that the *export* country is different from the *host* market ($i \neq j$, $\forall$ country i, and market j). A reduction in the barriers to trade in the host market reduces relative costs (i.e., $\frac{\delta\left[\frac{c_{ij}}{\overline{c_{.j}}}\right]}{\delta\pi_{ij}} = \frac{\left[\frac{c_i \pi_{ij}}{\overline{c_{.j}}}\right]}{\delta\pi_{ij}} > 0$), thus enhancing bilateral exports (X_{ij}, $\forall i \neq j$). Given a fixed total demand, this is a typical substitution effect.

However demand is not fixed. Recalling equation 4, it is straightforward that a reduction in the trade costs c_{ij} affects $\overline{c_{.j}}$ (i.e., $\frac{\delta\overline{c_{.j}}}{\delta c_{ij}}\frac{\delta c_{ij}}{\delta\pi_{ij}} > 0$) although in a smaller proportion. Total demand should increase which amplifies the positive effect of a reduction in the barriers to trade on exports: this corresponding effect is that of demand.

- Next, assume we are observing now firms from one country selling to their own market (i.e. $i = j$). Then, the reduced form trade equation 9 becomes:

$$logX_{ii} = -\sigma_i log\overline{c_{.i}} + logN_{ii} - \frac{1}{\mu_i}\left[\frac{c_{ii}}{\overline{c_{.i}}}\right] + log\frac{\sigma_i}{1+\alpha_i} + logA_i - \sigma_i log\mu_i \tag{10}$$

How does openness to foreign firms impact sales of national ones on their own market? A reduction in the barriers to trade in the *home* market

[7]See for instance Erkel Rousse and Mirza (2002) or Head and Mayer (2000)

[8]Feenstra, Markusen and Rose (2001) showed recently however that the gravity relation could be obtained either from a supply or a demand side framework.

leads to a reduction in the costs of foreign goods that enter it, reducing in consequence average costs $c_{.i}$. This directly and negatively affects domestic firms' sales through the term $\left[\frac{c_{ii}}{c_{.i}}\right]$ (substitution effect), but produces at the same pace a downward pressure on prices. Consequently, total demand increases and leads in return to an indirect positive effect on domestic sales (via $log\overline{c_{.i}}$). This could explain why adjustments to imports might not be very strong as suggested by the facts highlighted in the prior section. Table 1 summarizes the theoretical effects from a liberalization in the home and foreign markets.

Table 1: The effects of liberalisation of the home and foreign markets on sales of country i

	Δ(sales) of country i	
	Substitution effect	**Demand effect**
Liberalisation of own market i	-	+
Liberalisation of foreign market j	+	+

Notice from equation 10 moreover, that both the substitution and demand effects are stronger the strongest is the sensitivity to prices σ. In fact, when the price elasticity of demand is high, mark ups should be low and thus the substitution effect $(\frac{1}{\mu_i})$ would be high. In addition, a high value of σ leads to a high demand effect $(-\sigma_i)$. Again, this framework appears to be consistent with the observations on selected homogenous good products in the latter section.

However, for estimation purposes we shall refer in the following sections to the structural equations like in 7 where total demand is apparent instead of reduced form equations like 9 and 10[9].

4 The Labor Demand Equation

How can we relate these bilateral trade equations to labor demand? Assuming a constant returns to scale, Cobb Douglas function and recalling that total production is the sum of bilateral exports on all of the markets, domestic and foreign ones ($Y_i = \sum_j X_{ij}$), the conditional labor demand equation can be represented by:

[9]In fact, we can construct easily a vector of total demand from our data whereas we do not have access to any demand shifters to represent A_j like quality or brand image variables for the whole panel of countries we work on in order to test the reduced form equation. In addition, the costs data that we use (*Cf.* infra) are imperfect proxies which can produce high correlation between $log\overline{c_{.j}}$ and $\frac{c_{ij}}{c_{.j}}$. This might produce inconsistent estimates if we base our empirical study on the latter equation.

$$L_i = (\sum_j X_{ij})^{\beta} T_i^{\theta} K_i^{v} \tag{11}$$

We assume that capital (K) and technical progress (T) are given in the short run[10]. Let $dlogL_i = \frac{dL_i}{L_i}$ be the growth rate of labour demand, and $\forall j \in [1 \ldots J]$, $dlogX_{ij} = \frac{dX_{ij}}{X_{ij}}$ that of bilateral trade. Transforming equation 11, and defining e_{ij} the intensity to exports on each market j we have:

$$dlogL_i = \beta \left[dlogX_{ii} \; e_{ii} \right] + \beta \sum_{j' \neq i} \left[dlogX_{ij} \; e_{ij} \right] \tag{12}$$

The growth rate of industry labour demand is expressed then as linear combination of bilateral trade growths weighted by the intensity to exports e_{ij}, $\forall j \in 1 \ldots J$.

We assume hereafter that every firm sells to each market j, $\forall j$. Hence, accounting for $N_{ii} = N_{ij}$ and replacing the bilateral trade expression 6, for each market j, in equation 12 we obtain a first equation to estimate :

$$dlogL_i = \beta \left[dlogX_{.i} \; e_{ii} \right] - \frac{\beta}{\mu_i} d\left(\frac{c_{ii}}{\overline{c}_{.i}} \right) \; e_{ii} + \beta \sum_{j' \neq i} \left[dlogX_{.j} \; e_{ij} \right] - \sum_{j'} \frac{\beta}{\mu_j} d\left(\frac{c_{ij}}{\overline{c}_{.j}} \right) \; e_{ij} + \beta dlogN_{ii} \tag{13}$$

In this equation, employment growth depends on that of domestic demand and each foreign markets' demand. Moreover, employment growth is negatively related to relative costs variations on each market to export. Recall that this is a structural equation. Total demand on each market depends on costs in return (see equation 8). Hence, the two effects of demand and substitution on each of the markets affect labour demand j, $\forall j \in [1 \ldots J]$. These effects are the more significant the larger the intensity to export to these markets, e_{ij}, $\forall j$ [11].

In case the country i has a strong export intensity to a market j', $\forall j' \neq i$ in some industry (high $e_{ij'}$), a change in costs or demand related to that market affects significantly the employment in the exporting country. On the opposite, if most of that country's production is sold on the domestic market (small $e_{ij'}$), a shock on foreign market structure (via a variation in costs or demand) would not affect much employment in i.

[10] This could be a strong assumption. However, we did not have access to capital stocks neither to technical progress proxies like TFP for most of the selected countries. We could have found these observations for some OECD countries from other data sources, but we would have lost then all the information regarding developing countries. (See Hamermesh (1993) for a literature review).

[11] This same reasoning prevails for the domestic market i, where these effects are strong when intensity to trade with self, e_{ii}, is high.

In a first step, we test this theoretical equation to see whether these two effects of substitution and demand on each export market impact domestic employment. However, we show next how we can modify slightly the above equation in order to introduce the vector of imports in the equation and emphasize how it could capture a pure demand or substitution effect.

4.1 Imports revealing demand

The total demand on market i, $X_{.i}$, is the sum of national demand for domestic goods X_{ii}, and that of imported goods noted $M_i = \sum_j X_{ji}$ ($X_{.i} = X_{ii} + M_i$). The growth of total demand can be written as:

$$\frac{dX_{.i}}{X_{.i}} = dlogX_{.i} = dlogX_{ii}\ S_{ii} + dlogM_i\ (1 - S_{ii}) \tag{14}$$

with S_{ii} and $1 - S_{ii}$ representing respectively the market shares of domestic and foreign sellers on the i market[12].

Replacing equation 14 into the intra-national trade equation X_{ii}[13] and expressing it in growth terms, we have:

$$dlogX_{ii} = dlogM_i + dlogN_{ii}\left(\frac{1}{1 - S_{ii}}\right) - \frac{1}{\mu_j}\left(\frac{1}{1 - S_{ii}}\right)\left[\frac{c_{ii}}{\overline{c}_{.i}}\right] \tag{15}$$

Here, the growth rate of domestic producers' sales on their market is proportional to that of total imports $dlogM_i$. Hence, when the substitution effect is taken into account by other variables in the equation, the vector of imports reveal a pure demand effect.

This alternative expression of the intra-national trade equation can be replaced in the equation of labour demand to give the second equation to estimate:

$$dlogL_i = \beta\left[dlogM_i\ e_{ii}\right] - \frac{\beta}{\mu_i}\left(\frac{1}{1 - S_{ii}}\right) d\left(\frac{c_{ii}}{\overline{c}_{.i}}\right)\ e_{ii} \tag{16}$$

$$+\beta\sum_{j'\neq i}\left[dlogX_{.j}\ e_{ij}\right] - \sum_{j'}\frac{\beta}{\mu_j} d\left(\frac{c_{ij}}{\overline{c}_{.j}}\right)\ e_{ij} + \beta' dlogN_{ii} \tag{17}$$

with $\beta' = \beta\left[\frac{e_{ii}}{1-S_{ii}} + \sum_j' e_{ij'}\right] > \beta$. Notice that that the size of the positif effect of imports, represented by $dlogM_i$, should be comparable to that of total demand X_i in equation 13.

[12] $1 - S_{ii}$ may be interpreted moreover as the penetration rate of imports.

[13] see equation 6 when $i = j$.

4.2 Imports revealing substitution

The average cost equation 4 can be re-expressed as:

$$\overline{c_{.i}} = \frac{N_{ii}}{N_{.i}} c_{ii} + \frac{\sum_j N_{ji}}{N_{.i}} c_{ji}$$

with N_{ji} et c_{ji} representing respectively the number and marginal cost of firms from country j exporting to i. Dividing by $\overline{c_{.i}}$ and differentiating we obtain:

$$\frac{N_{ii}}{N_{.i}} \left(d\frac{c_{ii}}{\overline{c_{.i}}} \right) = -\frac{\sum_j N_{ji}}{N_{.i}} \left(d\frac{c_{ji}}{\overline{c_{.i}}} \right) \tag{18}$$

Besides, we can obtain an expression for bilateral imports of i, X_{ji}, from equation 6. When summing X_{ji} over all the j countries, we can thus deduce an expression for total imports on market i. Transforming into log differential and replacing $\frac{N_{ji}}{N_{.i}} d\left[\frac{c_{ji}}{\overline{c_{.i}}}\right]$ by its corresponding expression in equation 18 we have:

$$dlogM_i = dlogX_{.i} + dlogN_{.i} - \frac{1}{\mu_j} \frac{N_{ii}}{N_{.i}} \left(d\frac{c_{ii}}{\overline{c_{.i}}} \right) \tag{19}$$

Substituting into the equation of intra-national trade $dlogX_{ii}$ gives:

$$dlogX_{ii} = \left(1 + \frac{N.i}{N_{ii}}\right) dlogX_{.i} + dlogN_{ii} + \frac{N.i}{N_{ii}} dlogN_{.i} - \frac{N.i}{N_{ii}} dlogM_i \tag{20}$$

In this alternative specification, equation 20 explicit the negative effect of imports on domestic producer's sales X_{ii}, in growth terms. The basic idea is as follows: a growth in relative costs of domestic producers should increase imports (see equation 19)) via a substitution effect. At equal market size (i.e: $dlogX_{.i}$ given), the sales of domestic producers shrink (equation 20). Replacing that expression into the labour demand expression and noting $\rho = \frac{N.i}{N_{ii}}\beta$, we have:

$$\begin{aligned} dlogL_i \quad &= \quad (\beta + \rho)\left[dlogX_{.i}\ e_{ii}\right] - \rho\left[dlogM_i\ e_{ii}\right] + \beta \sum_{j' \neq i} \left[dlogX_{.j'}\ e_{ij'}\right] \\ &\quad - \sum_{j'} \frac{\beta}{\mu'_j} d\left(\frac{c_{ij'}}{\overline{c_{.j'}}}\right) e_{ij'} + \beta dlogN_{ii} + \beta \frac{N.i}{N_{ii}} dlogN_{.i} e_{ii} \end{aligned} \tag{21}$$

This alternative equation of labour demand enables to estimate the pure substitution effect of imports while controlling for the demand effect. From this equation we expect that the parameter estimate on imports to be smaller than that on demand (i.e: $\rho < \beta + \rho$.). More rigorously, in case a few numbers of foreign firms compared to domestic one are serving the market, we have

$N_{.i} \approx N_{ii}$, and thus the parameter on the demand variable will tend to 2β and should be twice as big as that on imports $\rho = \beta$. However, when the economy is not specialized in a typical industry leaving most of the market to be served by a high number of foreign firms, then we expect that the two parameters on demand and imports to be relatively similar $(\beta + \rho) \approx \rho$.

5 The dataset

We collect our industry data at the 3 digit ISIC nomenclature from two UNIDO databases. The first set is from the Industrial Statistics Database (Indstat3) reports data on activity such as 3-digit industry total compensation (wages and benefits), employment, production and number of firms (ISIC rev.2). The second set is related to trade variables provided by UNIDO trade tapes. For each observed country, import and export values are reported at the 4-digit industry level (ISIC rev.2 as well), easily aggregatable to 3-digit. The trade database does not provide information on bilateral basis. For each given country, it reports total trade (imports and exports) conducted with the developing countries on the one hand and that observed with the developed countries on the other hand. Hence, in what follows we shall consider that each observed country is selling to three distinguished markets: 1) its own market (intra national trade), 2) the industrialized countries' market (noted *Ind* hereafter), and 3) the developing countries' market (*Dev* hereafter). After matching the activity and trade datasets, we were able to construct a table of activity and trade data for 65 developed and developing countries in 29 industries, each selling to these three markets between 1981-1997[14].

We have three relations to estimate. The first represented by equation 13, distinguishes between the costs and demand effects. However, in equation 17, the variable of imports enters explicitly the relation to be tested in order to capture a positive demand effect while equation 21 introduces imports to control for a negative substitution effect.

Before testing these equations, we define hereafter the used variables.

5.1 The relative costs proxy

Equations 13 and 17 enclose relative costs variables $d\left(\frac{c_{ij}}{\overline{c_{.j}}}\right)$ with respect to each export market j, $\forall j \in [i, Ind, Dev]$. We do not observe marginal costs to exports c_{ij}, $\forall j$. *A fortiori*, we cannot infer a measure of the weighted average of marginal costs $\overline{c_{.j}}$. Due to a limited access of internationally comparable data on costs, we consider a simple form of the marginal costs to exports $c_{ij} = \pi_{ij} w_i$, with π_{ij} a barrier to trade parameter in market j that is

[14]See Fontagné and Mirza (2001) for more details concerning this dataset.

superior to 1. w_i represents the wage per employee in the exporting country i. Moreover, referring to equation 4 the weighted average of marginal costs can be proxied by:

$$\widetilde{c_{.j}} = \sum_i \frac{X_{ij}}{X_{.j}} w_i$$

In the theoretical equation 4, the relative number of firms represent the weights for each country's marginal cost. Here instead, we replace the number of firms by relative exports as we know that they capture indirectly specific trade costs (π_{ij}) as well.

The relative costs differential that enters the equations to estimate can then be proxied by :

$$d\left(\frac{c_{ij}}{\widetilde{c_{.j}}}\right) = \pi_{ij} d\left(\frac{w_i}{\sum_i \frac{X_{ij}}{X_{.j}} w_i}\right) = \pi_{ij} d\left(\frac{w_i}{\widetilde{w_j}}\right) \quad \forall j \in [i, Ind, Dev] \tag{22}$$

On the domestic market, π_{ii} should be relatively small (around unity) because the barriers to intra-national trade should not be too significant. However, $\forall j' \neq i$, the value of $\pi_{ij'}$ may be significantly superior to 1. In particular, the barriers to entry of firms from rich countries on developing markets are expected to be high and vice versa.

The wage per employee variable could not be a very good proxy of costs, especially when it can hide productivity effects or mechanisms related to the imperfection of the labour markets. As a matter of fact, high average wages in one industry could reveal a good performance of that industry in productivity which is usually correlated with wages. Moreover, a high remuneration can be the consequence of some rent sharing policy, due to a good performance of the industry. Hence, the estimated negative cost effect on the wage per employee variable could be biased downward. However, we partly avoid this potential problem when estimating equation 21, where the substitution effect is no longer captured by the w_i variable on the domestic market but is controlled for by the vector of imports that enters the regression.

5.2 The demand variables

The total demand on the market i, and both foreign markets Ind and Dev demand variables were computed from production, imports and exports variables provided by UNIDO. Hence, $\forall j \in [i, IndDev]$ demand on the j market is given by $(PIB_j - (Exp_{Ind} + Exp_{Dev}) + (Imp_{Ind} + Imp_{Dev}))$.

5.3 The number of firms

ONUDI database provides the number of firms in each industry for a given country. However, some proportion does not export to foreign markets while our theoretical model is based on the assumption that all the firms are exporting. Our framework is still consistent with the possible fact that part of these firms are not exporting: actually, the same equations to estimate can be retrieved although one additional variable should now enter our formulation. It concerns the growth of the proportion of export firms $dlog\frac{N_{ij}}{NT_i}$, where N_{ij} would express only now the exporting firms from i to j and NT_i is the total number of firms in an industry of a country i. As we do not observe this variable, we consider that it does not evolve much during the period following Roberts and Tybout (1997) findings. This enables us to exclude it from the equation to test[15].

6 Matching theory with data

We break up the panel into two groups, OECD and developing countries, and run industry type regressions. We choose to represent the theoretical variables in differentials, in terms of first differences when computing variables for econometrics. This type of regression has the well-known advantage to take the country fixed effects implicitly into account. We control for heteroscedasticity problems by White's method. We have conducted other estimation methods like GMM but found similar results. In order to save space, and because the DWH tests we ran suggested that IV type regressions were not necessary, the GMM results will not be reported here[16]

We test three specifications: 1- The *general* specification; 2- Imports capturing a demand effect and 3- Imports controlling for a substitution effect.

However, we adjust the theoretical relations to account for the three markets $\{i, Ind, Dev\}$ we observe. Moreover, theory implies some direct links between the parameters referred to in section 4: For example, theory pretends that the coefficients on the demand variables regarding the three markets and that on the number of firms must be equal in the *general* specification. Nevertheless, we do not constrain that link between parameters

[15] Roberts and Tybout gather exhaustive Columbian data on firms above 10 employees and find that the proportion of exporters was relatively stable over the 80s (around 12 per cent). We must add that Bernard et Jensen (1996) and Aitken *et al* (1997) find a significant growth of relative exporters on US and Mexican data. However, theses authors work on surveys gathering a sample of firms that are over-represented by big size units, and thus are likely to export more than small businesses.

[16] GMM results can be provided upon request. The instruments used were the lagged variables of those employed in the equations, added to lagged industrial production, import and export vectors.

as we need to test whether *ex-post* estimates inform us about these theoretical links between parameters conjectured by our framework. In a way, we are trying to test the validity of the adopted theory. Moreover, unconstraining the parameter values or their link, could subsequently inform us on the quality of the data as well. We want to see whether the magnitude of the parameters matches that of theory and other empirical findings in the literature.

1- The general specification

From equation 12 and accounting for our data detailed in the prior section, the equation of the general specification becomes:

$$\begin{aligned} dlogL_i &= \beta_{Dom}\left[dlogX_{.i}\ e_{ii}\right] - \eta_{Dom} d\left(\frac{w_{ii}}{\widetilde{w_i}}\right)\ e_{ii} + \\ &\quad \beta_{Ind}\left[dlogX_{.,Ind}\ e_{i,Ind}\right] - \eta_{Ind} d\left(\frac{w_{ii}}{\widetilde{w_{Ind}}}\right)\ e_{i,Ind} + \\ &\quad \beta_{Dev}\left[dlogX_{.,Dev}\ e_{i,Dev}\right] - \eta_{Dev} d\left(\frac{w_{ii}}{\widetilde{w_{Dev}}}\right)\ e_{i,Dev} + \beta_{N_i} dlogN_i \end{aligned} \quad (23)$$

The β_j parameter, $\forall j \in [i, Ind, Dev]$ express the returns to scale in employment indicator. It stands as a shifter from the market structure adjustment to the employment adjustment. In the case of increasing returns to employment $0 < \beta_1 < 1$, the adjustment on employment is weaker[17]. Oulmane (1999) studies the role of economies to scale at openness and find this result by applying his framework to French employment data.

The relative cost effect (or substitution effect) represented by η_j, ($\eta_j = \beta\frac{\pi_j}{\mu_{ij}}$), $\forall j \in [i, Ind, Dev]$, is associated with a negative sign and its magnitude depends on the state of competition interacted with the degree of employment returns to scale. In fact, an increase in domestic costs reduces domestic production *via* $\frac{\pi_j}{\mu_{ij}}$ before being transmitted to labour demand through β. The $\frac{\pi_j}{\mu_{ij}}$ parameter, can be viewed as an indicator of the state of competition. Its high value reveals a small mark up μ_{ij}, the latter depending on the price elasticity, number of firms and their reciprocal aggressive behavior. Moreover, in an industry where competition is tough, the barriers to trade captured by π_{ij} are more likely to favor domestic producers at the expense of foreign ones. As a result, the effect of the degree of competition interacts with that of employment returns to scale to determine the pure substitution effect on employment. To sum up, in the case of high competition and decreasing returns industry, the substitution impact should be relatively high.

[17]Notice that this indicator informs on the returns to scale from the sole labour factor. It does not give an indication on the degree of economies of scale, that depends on *all* of the factors used in production.

- Demand effect

Constrained by the data we are provided with, equation 17 that highlights imports as capturing a demand effect becomes:

$$
\begin{aligned}
dlogL_i \quad = \quad & \beta_{dem}\left[dlogM_i\ e_{ii}\right] - \eta_{Dom} d\left(\frac{w_{ii}}{\overline{w_i}}\right)\ \frac{e_{ii}}{1-S_{ii}} + \\
& \beta_{Ind}\left[dlogX_{.,Ind}\ e_{i,Ind}\right] - \eta_{Ind} d\left(\frac{w_{ii}}{\overline{w_{Ind}}}\right)\ e_{i,Ind} + \\
& \beta_{Dev}\left[dlogX_{.,Dev}\ e_{i,Dev}\right] - \eta_{Dev} d\left(\frac{w_{ii}}{\overline{w_{Dev}}}\right)\ e_{i,Dev} + \beta'_{N_{ii}} dlogN_{ii} \qquad (24)
\end{aligned}
$$

In this equation, the vector of total demand is replaced by a weighted vector of imports that should capture here a demand effect whereas the relative costs variable is now weighted by $\frac{e_{ii}}{1-S_{ii}} > e_{ii}$. Recall as well from equation 17 that the parameter β' on the number of firms should be greater than that on imports β.

-Substitution effect

Adapting equation 21 to the data gives the following equation where imports reveal a substitution effect:

$$
\begin{aligned}
dlogL_i \quad = \quad & (\beta+\rho)_{Dom}\left[dlogX_{.,i}\ e_{ii}\right] - \rho_{sub}\left[dlogM_i\ e_{ii}\right] + \\
& \beta_{Ind}\left[dlogX_{.,Ind}\ e_{i,Ind}\right] - \eta_{Ind} d\left(\frac{w_{ii}}{\overline{w_{Ind}}}\right)\ e_{i,Ind} + \\
& \beta_{Dev}\left[dlogX_{.,Dev}\ e_{i,Dev}\right] - \eta_{Dev} d\left(\frac{w_{ii}}{\overline{w_{Dev}}}\right)\ e_{i,Dev} + \beta_{N_{ii}} dlogN_{ii} + \beta_{N_{.i}} dlogN_{.i} \qquad (25)
\end{aligned}
$$

This new specification implies that the coefficient on domestic demand should be equal now to $(\beta+\rho)_{Dom}$ whereas that of imports should now be negative and equals ρ_{sub}. The parameter on the domestic demand variable is a linear function of that on imports. Recalling $\rho = \frac{N_{.i}}{N_i i}\beta$ from theory, if foreign firms form a small proportion of domestic ones on a market we have $N_{.i} \approx N_{ii}$ and thus $\beta+\rho \approx 2\rho$. These two parameters tend to be similar, in absolute values however, in the opposite case. Notice moreover that following the theoretical relation 21, the total number of firms variable $dlogN_{.i}$, enters now the equation.

We recapitulate the three specifications that we test in table 2.

Table 2: Alternative Econometric Specifications

	1: *General* (eq. 23)	2: Imports revealing demand (eq. 24)	3: Imports revealing substitution(eq. 25)
$d(logX_{.,i})e_{ii}$	β_{dom}		$(\beta+\rho)_{dom}$
$d\widetilde{\frac{w_{ii}}{w_{.,i}}}e_{ii}$	$-\eta_{dom}$		
$d\widetilde{\frac{w_{ii}}{w_{.i}}}\frac{e_{ii}}{1-S_{ii}}$		$-\eta_{dom}$	
$dlogM_i e_{ii}$		β_{dem}	$-\rho_{sub}$
$d(logX_{.,Ind})e_{i,Ind}$	β_{Ind}	β_{Ind}	β_{Ind}
$d\widetilde{\frac{w_{i,Ind}}{w_{.,Ind}}}e_{i,Ind}$	$-\eta_{Ind}$	$-\eta_{Ind}$	$-\eta_{Ind}$
$d(logX_{.,Dev})e_{i,Dev}$	β_{Dev}	β_{Dev}	β_{Dev}
$d\widetilde{\frac{w_{i,Dev}}{w_{.,Dev}}}e_{i,Dev}$	$-\eta_{Dev}$	$-\eta_{Dev}$	$-\eta_{Dev}$
$dlogN_{ii}$	$\beta_{N_{ii}}$	$\beta'_{N_{ii}}$	
$dlogN_{.i}$			$\beta_{N_{.i}}$

Note: $-\eta_j = -\beta_j \frac{\pi_j}{\mu_j}, \forall j \in [i, Ind, Dom]$

$-\rho_{sub} = -\left[\beta \frac{N_{.i}}{N_{ii}}\right]_{sub}$

Theory conjectures that: Specification 1/ $\beta_{dom} = \beta_{Ind} = \beta_{Dev} = \beta_{N_{ii}} = \beta$

Specification 2/ $\beta_{dem} = \beta_{Ind} = \beta_{Dev} = \beta$ and $\beta < \beta'_{N_{ii}}$

Specification 3/ $\beta_{Ind} = \beta_{Dev} = \beta_{N_{.i}}$ and $\rho_{dom} \leq (\beta+\rho)_{dom} \leq 2\rho$

7 Econometric results

7.1 The *general* specification

7.1.1 OECD results

Table 3 shows the results relative to equation 23 for the panel of developed countries. The substitution effect appear to be more significant on the exporting markets than on the domestic market. Actually, in 9 industries, the effect of relative costs on the domestic market is negative and statistically significant on employment, while it appears to be negative for 6 industries and non significant in most of the remaining industries. These results suggest that wages are not capturing a pure cost effect but a mixed effect of cost and productivity, the latter biasing downward the estimate on the cost variable.

However, an increase in relative wages affect by substitution domestic employment for around 12 sectors on the foreign markets Ind and Dev[18]. The negative effect of costs is then more significant when selling to foreign markets. In addition, when selling to the OECD market, the cost effect appears to be higher in industries known to produce homogenous products rather than differentiated products ones (See for instance the Rauch's or Oliveira Martins' classification to distinguish between homogenous and differentiated goods' industries.).

The value of the η_{Dev} estimator is in general higher in absolute values than that of η_{Ind}, which in return is of greater value than η_{Dom}. This result is perfectly consistent with our theory suggesting that these estimators capture a barrier to trade parameter. The barrier to exports for OECD firms should be actually higher when they tend to reach developing markets than when they want to sell to their own markets (Ind et i).

Moreover, table 3 shows a demand effect on the domestic market almost always positive and statistically significant. On markets Ind and Dev, the effect is positive and significant as well for 14 and 8 industries respectively. Half of the industries do not benefit however from demand expansion in foreign markets (non significant parameters values). Besides, two (resp. 6) industries exhibit negative coefficients when selling to industrialized (resp. developing) markets. In this small minority of sectors, our theory does not seem to be consistent with the data.

[18] One positive effect is still observed for the industry of Other Non Metallic Products on the developing countries' markets.

Table 3: Equation of labour demand ($dlogL_i$) for the **OECD countries (General specification)**

Industry	R. cost Dom	Conso Dom	R. cost *Ind*	Conso *Ind*	R. cost *Dev*	Conso *Dev*	Estb.	R2	N.Obs.
	$d(w_{ii}/\overline{w_{dom}}).e_{ii}$	$dlogX_{.,i}e_{ii}$	$d(w_{ii}/\overline{w_{Ind}}).e_{i,Ind}$	$dlogX_{.,Ind}e_{i,Ind}$	$d(w_{ii}/\overline{w_{Dev}}).e_{i,Dev}$	$dlogX_{.,Dev}e_{i,Dev}$	$dlogN_{ii}$		
	$-\eta_{Dom}$	β_i	$-\eta_{Ind}$	β_{Ind}	$-\eta_{Dev}$	$\beta_{1,Dev}$	$\beta_{N_{ii}}$		
Beverages	**-0,48**	**0,24** ***	**-1,13** ***	**1,51** ***	**0,12**	**-1,59**	**0,21** ***	**0,68**	**222**
	0,38	*0,05*	*0,38*	*0,20*	*0,48*	*1,47*	*0,04*		
Fab. metal products	**1,27** ***	**0,15** **	**0,23**	**1,04** ***	**-2,03** ***	**-3,33** ***	**0,59** ***	**0,93**	**208**
	0,39	*0,07*	*0,38*	*0,40*	*0,54*	*1,08*	*0,02*		
Food products	**-0,01**	**0,48** ***	**-0,37**	**0,49** **	**-0,42**	**-0,49**	**0,43** ***	**0,95**	**208**
	0,41	*0,05*	*0,39*	*0,22*	*0,53*	*0,65*	*0,04*		
Footwear	**-0,04**	**0,83** ***	**-0,22** *	**0,26**	**-0,51**	**2,78** ***	**0,65** ***	**0,66**	**227**
	0,05	*0,14*	*0,11*	*0,16*	*0,68*	*1,00*	*0,05*		
Furniture	**1,63** ***	**0,44** ***	**-0,17**	**0,44** **	**-1,16** **	**-1,19**	**0,52** ***	**0,85**	**227**
	0,25	*0,06*	*0,18*	*0,18*	*0,47*	*0,98*	*0,03*		
Glass and products	**0,71** **	**1,22** ***	**-1,06** **	**0,75** **	**-3,10** ***	**-9,74** ***	**0,10** **	**0,59**	**231**
	0,36	*0,10*	*0,43*	*0,30*	*0,74*	*1,95*	*0,04*		
Industrial chemicals	**0,47** **	**0,36** ***	**0,26**	**0,44** **	**-3,46** ***	**0,89**	**0,25** ***	**0,76**	**213**
	0,18	*0,05*	*0,22*	*0,20*	*0,47*	*0,64*	*0,02*		
Iron and steel	**-1,10** ***	**0,40** ***	**0,20**	**0,03**	**-0,79** ***	**-3,04** ***	**0,01**	**0,33**	**183**
	0,32	*0,06*	*0,13*	*0,11*	*0,23*	*0,70*	*0,04*		
Leather products	**-0,01**	**0,43** ***	**-0,22** **	**0,18** ***	**-0,14**	**1,68** ***	**0,32** ***	**0,88**	**241**
	0,01	*0,03*	*0,09*	*0,06*	*0,27*	*0,32*	*0,03*		
Machinery, electric	**-0,38** **	**0,25** ***	**0,08**	**0,09**	**0,00**	**0,10**	**0,15** ***	**0,32**	**192**
	0,17	*0,04*	*0,13*	*0,22*	*0,01*	*0,37*	*0,02*		
Machinery	**0,01**	**0,24** ***	**0,10**	**-0,12**	**-0,39** **	**-0,75** **	**0,11** ***	**0,22**	**175**
	0,01	*0,05*	*0,08*	*0,15*	*0,16*	*0,30*	*0,04*		
Misc. petroleum	**-1,28** ***	**0,40** ***	**0,13**	**-0,79** ***	**0,60**	**0,62**	**0,26** ***	**0,22**	**175**
	0,15	*0,03*	*0,25*	*0,23*	*0,39*	*0,83*	*0,05*		
Non-ferrous metals	**0,28**	**0,47** ***	**-0,34** *	**-0,01**	**0,57**	**-1,21** ***	**0,28** ***	**0,48**	**208**
	0,36	*0,05*	*0,18*	*0,09*	*0,55*	*0,35*	*0,06*		
Other chemicals	**-0,58** ***	**0,39** ***	**0,21**	**-0,29**	**-1,10** ***	**-0,68**	**0,18** ***	**0,38**	**218**
	0,14	*0,05*	*0,25*	*0,26*	*0,39*	*1,02*	*0,04*		
Other manuf. prod.	**0,00**	**0,41** ***	**-0,11**	**0,70** ***	**0,00**	**-1,56**	**0,47** ***	**0,58**	**203**
	0,03	*0,08*	*0,11*	*0,20*	*0,21*	*1,27*	*0,04*		
Other non-metal. prod.	**-0,59**	**0,45** ***	**-1,22** ***	**-1,44** **	**1,85** ***	**4,48** ***	**0,54** ***	**0,90**	**219**
	0,38	*0,05*	*0,47*	*0,58*	*0,62*	*1,13*	*0,03*		
Paper and products	**-0,24**	**0,45** ***	**-1,55** ***	**1,97** ***	**0,74**	**2,28**	**0,05** *	**0,49**	**233**
	0,35	*0,07*	*0,27*	*0,29*	*0,76*	*1,51*	*0,03*		
Petroleum refineries	**-0,04**	**0,10** **	**-0,18**	**0,08**	**-0,43**	**-0,99**	**0,07** ***	**0,17**	**190**
	0,08	*0,04*	*0,14*	*0,16*	*0,35*	*0,87*	*0,02*		
Plastic products	**0,47** ***	**0,34** ***	**-0,44**	**0,33**	**0,88**	**-11,20** ***	**0,54** ***	**0,75**	**334**
	0,16	*0,07*	*0,31*	*0,37*	*1,18*	*2,52*	*0,03*		
Pottery, china	**-0,55** ***	**0,64** ***	**-1,08** ***	**0,38** ***	**-0,21**	**-0,17**	**0,08** **	**0,85**	**230**
	0,19	*0,05*	*0,31*	*0,10*	*0,49*	*0,54*	*0,03*		
Printing and publishing	**-0,11**	**0,21** ***	**-0,61** *	**-0,99** *	**-2,64** ***	**3,80** ***	**0,14** ***	**0,39**	**215**
	0,26	*0,03*	*0,35*	*0,51*	*0,71*	*0,98*	*0,02*		
Professional & scientific	**-0,02** *	**0,32** ***	**-0,11**	**0,32**	**-1,44** **	**0,95** ***	**0,33** ***	**0,80**	**183**
	0,01	*0,06*	*0,33*	*0,21*	*0,67*	*0,36*	*0,06*		
Rubber products	**-0,66** **	**0,62** ***	**-0,41**	**2,30** ***	**-2,09** ***	**9,46** ***	**0,83** ***	**0,74**	**232**
	0,33	*0,11*	*0,38*	*0,34*	*0,73*	*2,01*	*0,06*		
Textiles	**0,08** *	**0,25** ***	**-0,26** *	**0,92** ***	**-0,41**	**-0,72**	**0,60** ***	**0,95**	**242**
	0,05	*0,06*	*0,16*	*0,18*	*0,28*	*0,89*	*0,01*		
Tobacco	**0,05**	**0,06** *	**-0,43**	**0,07**	**-0,58**	**-0,16**	**0,11** ***	**0,13**	**218**
	0,24	*0,03*	*0,35*	*0,29*	*0,36*	*1,16*	*0,03*		
Total manufacturing	**-0,12** ***	**0,40** ***	**-0,20**	**0,25** ***	**-0,03**	**2,23** ***	**0,48** ***	**0,99**	**183**
	0,04	*0,04*	*0,13*	*0,07*	*0,29*	*0,49*	*0,03*		
Transport equipment	**-0,65** ***	**0,29** ***	**-0,02**	**0,25**	**-1,02** ***	**0,14**	**0,05** *	**0,46**	**214**
	0,11	*0,06*	*0,24*	*0,22*	*0,12*	*0,42*	*0,03*		
Wearing apparel	**0,01** *	**0,21** **	**-0,12** ***	**-0,02**	**-0,03**	**-0,52**	**0,17** ***	**0,20**	**188**
	0,00	*0,09*	*0,03*	*0,10*	*0,16*	*0,60*	*0,04*		
Wood products	**-0,08**	**0,70** ***	**-0,85** ***	**0,83** ***	**-0,06**	**-7,03** ***	**0,56** ***	**0,94**	**227**
	0,14	*0,06*	*0,17*	*0,22*	*0,50*	*1,55*	*0,03*		

1- Les paramètres estimés sont en **gras** et les erreurs types en *italique*.
2- ***,**,* significatifs respectivement au seuil de 1,5 et 10 %.

Table 4: Equation of labour demand ($dlogL_i$) for the **Developing countries (General specification)**

Industry	R. cost Dom	Conso Dom	R. cost *Ind*	Conso *Ind*	R. cost *Dev*	Conso *Dev*	Estb.	R2	N.Obs.
	$d(w_{ii}/\overline{w_{dom}}).e_{ii}$	$dlogX_{.,i}e_{ii}$	$d(w_{ii}/\overline{w_{Ind}}).e_{i,Ind}$	$dlogX_{.,Ind}e_{i,Ind}$	$d(w_{ii}/\overline{w_{Dev}}).e_{i,Dev}$	$dlogX_{.,Dev}e_{i,Dev}$	$dlogN_{ii}$		
	$-\eta_{Dom}$	β_i	$-\eta_{Ind}$	β_{Ind}	$-\eta_{Dev}$	β_{Dev}	$\beta_{N_{ii}}$		
Beverages	**-0,06**	**0,32** ***	**0,74**	**1,79** ***	**-0,92** *	**0,67**	**0,13** ***	**0,47**	**410**
	0,11	*0,03*	*1,22*	*0,22*	*0,53*	*0,59*	*0,03*		
Fab. metal products	**0,47** ***	**0,43** ***	**-13,48** ***	**1,29** ***	**-4,09** ***	**-2,33** ***	**0,52** ***	**0,78**	**485**
	0,11	*0,05*	*2,41*	*0,21*	*0,95*	*0,61*	*0,02*		
Food products	**-0,83** ***	**0,39** ***	**-3,92** ***	**0,41** ***	**1,73** **	**1,92** ***	**0,31** ***	**0,90**	**513**
	0,09	*0,02*	*1,25*	*0,06*	*0,74*	*0,13*	*0,02*		
Footwear	**-0,04**	**0,20** ***	**-1,86** *	**1,28** ***	**0,21**	**0,90** ***	**0,48** ***	**0,39**	**319**
	0,03	*0,04*	*1,00*	*0,32*	*0,46*	*0,31*	*0,05*		
Furniture	**0,33** ***	**0,43** ***	**-1,19**	**1,17** ***	**-2,53** ***	**-1,10** **	**0,40** ***	**0,60**	**412**
	0,11	*0,04*	*0,84*	*0,35*	*0,68*	*0,52*	*0,03*		
Glass and products	**-0,01**	**0,29** ***	**-12,40** ***	**-0,28**	**0,78**	**-2,14** ***	**0,42** ***	**0,47**	**352**
	0,02	*0,05*	*1,87*	*0,20*	*0,48*	*0,29*	*0,04*		
Industrial chemicals	**0,00**	**0,52** ***	**-2,82** **	**2,41** ***	**-0,07**	**-0,07**	**0,44** ***	**0,54**	**398**
	0,10	*0,06*	*1,29*	*0,37*	*0,33*	*0,09*	*0,03*		
Iron and steel	**-0,12**	**0,15** ***	**9,15** ***	**0,46** **	**-0,66** ***	**0,09**	**0,12** ***	**0,41**	**285**
	0,14	*0,05*	*0,99*	*0,19*	*0,23*	*0,54*	*0,03*		
Leather products	**-0,20** **	**0,29** ***	**-1,43** **	**1,49** ***	**-0,38**	**0,44** *	**0,51** ***	**0,74**	**380**
	0,09	*0,04*	*0,56*	*0,16*	*0,34*	*0,24*	*0,04*		
Machinery, electric	**-0,04**	**0,18** ***	**-0,78**	**-1,22** **	**0,01**	**1,29** **	**0,62** ***	**0,32**	**428**
	0,07	*0,05*	*0,89*	*0,55*	*0,02*	*0,62*	*0,05*		
Machinery	**0,11**	**0,15** ***	**1,68** *	**1,84** ***	**0,00**	**-0,51** *	**0,55** ***	**0,45**	**384**
	0,17	*0,04*	*0,88*	*0,25*	*0,58*	*0,29*	*0,04*		
Misc. petroleum	**0,44** **	**0,37** ***	**-5,27**	**3,99** **	**2,19** ***	**3,43** ***	**0,36** ***	**0,65**	**184**
	0,19	*0,03*	*3,88*	*1,84*	*0,15*	*0,68*	*0,05*		
Non-ferrous metals	**-0,17** *	**0,07** ***	**-0,22**	**0,68** ***	**-0,16** *	**0,13** ***	**0,76** ***	**0,64**	**258**
	0,10	*0,02*	*0,55*	*0,11*	*0,08*	*0,03*	*0,06*		
Other chemicals	**-0,13**	**0,32** ***	**8,07** ***	**0,59**	**0,16**	**-0,27**	**0,32** ***	**0,39**	**425**
	0,09	*0,04*	*1,46*	*0,36*	*0,28*	*0,36*	*0,03*		
Other manuf. Prod.	**0,07**	**0,23** ***	**-0,42**	**-0,13**	**0,02**	**0,05**	**0,44** ***	**0,49**	**399**
	0,10	*0,04*	*0,57*	*0,20*	*0,05*	*0,27*	*0,03*		
Other non-metal. prod.	**0,08** ***	**0,49** ***	**-20,64** ***	**0,10**	**-0,91** ***	**0,35** ***	**0,47** ***	**0,66**	**429**
	0,02	*0,05*	*5,80*	*0,57*	*0,07*	*0,04*	*0,02*		
Paper and products	**-0,13** **	**0,48** ***	**-6,86** **	**-0,37**	**-1,29** **	**1,43** ***	**0,34** ***	**0,48**	**450**
	0,06	*0,03*	*3,16*	*0,30*	*0,51*	*0,37*	*0,02*		
Petroleum refineries	**-0,16**	**0,22** ***	**0,17**	**-0,07**	**-0,48**	**-0,72**	**0,19** ***	**0,12**	**223**
	0,18	*0,06*	*0,71*	*0,97*	*0,75*	*1,43*	*0,05*		
Plastic products	**0,01**	**0,41** ***	**-1,53**	**0,62** ***	**-1,06**	**-0,84**	**0,60** ***	**0,61**	**392**
	0,09	*0,04*	*2,14*	*0,17*	*0,76*	*0,65*	*0,04*		
Pottery, china	**-0,52** ***	**0,25** ***	**2,86** ***	**-0,22** **	**3,10** ***	**1,00** ***	**0,37** ***	**0,71**	**334**
	0,16	*0,03*	*1,05*	*0,10*	*0,44*	*0,11*	*0,03*		
Printing and publishing	**0,10** *	**0,21** ***	**-0,92**	**-0,44**	**0,20**	**-0,25**	**0,17** ***	**0,35**	**443**
	0,06	*0,02*	*1,33*	*0,53*	*0,64*	*0,41*	*0,02*		
Professional & scientific	**-0,19**	**0,35** ***	**-0,68**	**0,33** ***	**1,75**	**-1,71** ***	**0,61** ***	**0,54**	**392**
	0,21	*0,06*	*0,50*	*0,08*	*1,50*	*0,21*	*0,05*		
Rubber products	**0,17** **	**0,44** ***	**0,05**	**0,21**	**-1,09**	**1,69** **	**0,77** ***	**0,65**	**392**
	0,08	*0,05*	*1,65*	*0,24*	*0,71*	*0,73*	*0,04*		
Textiles	**0,00** ***	**0,26** ***	**1,00**	**2,64** ***	**-1,66** ***	**1,83** ***	**0,61** ***	**0,87**	**502**
	0,00	*0,04*	*1,37*	*0,28*	*0,29*	*0,29*	*0,02*		
Tobacco	**0,12**	**0,19** ***	**-5,87**	**-0,65**	**0,10**	**-0,39**	**0,43** ***	**0,52**	**287**
	0,13	*0,03*	*3,74*	*1,73*	*0,17*	*0,27*	*0,03*		
Total manufacturing	**-0,03**	**0,62** ***	**0,57**	**-0,13**	**-2,96** ***	**2,95** ***	**0,31** ***	**0,89**	**473**
	0,07	*0,02*	*0,50*	*0,13*	*0,52*	*0,34*	*0,02*		
Transport equipment	**0,01**	**0,18** ***	**0,70**	**0,13**	**-0,05**	**-0,74**	**0,32** ***	**0,22**	**425**
	0,03	*0,03*	*1,25*	*0,40*	*0,39*	*0,45*	*0,04*		
Wearing apparel	**-0,01**	**0,46** ***	**-0,57**	**0,03**	**0,11**	**-0,09**	**0,26** ***	**0,32**	**258**
	0,01	*0,07*	*0,69*	*0,07*	*0,41*	*0,24*	*0,04*		
Wood products	**-0,09** ***	**0,14** ***	**-0,90**	**0,14**	**0,39** *	**-0,59**	**0,58** ***	**0,56**	**471**
	0,03	*0,03*	*1,03*	*0,15*	*0,21*	*0,43*	*0,03*		

1- Les paramètres estimés sont en **gras** et les erreurs types en *italique*.
2- ***,**,* significatifs respectivement au seuil de 1,5 et 10 %.

The supply effect provided by the number of firms variable is positive and significant for almost all of the industries. The theoretical model informs that the $\beta_{N_{ii}}$ coefficient, interpreted as returns to scale on employment parameter, should be the same that on domestic and foreign markets demand. In fact, the coefficients β_{Dom} and $\beta_{N_{ii}}$ appear to have similar values (once accounting for standard errors) in 8 industries. In addition, 5 out of these industries exhibit similar estimated coefficients on the domestic demand, Industrialised markets' demand and the number of firms' demand variables. Unfortunately, the coefficient relative to the developing countries' demand rarely matches those on the prior variables.

However, the estimated values of returns to employment seem to be of similar magnitude to the values estimated in the literature. Typically, β_{Dom} seem to be consistent with Abowd and Lemieux (1993) or Medoff and Fay (1985) estimations.

Nevertheless, these values are smaller than that suggested by Griliches and Hausman (1986) who estimate that parameter to be around unity on average when accounting for the possible measurement errors or endogeneity bias that exist between total demand and labour demand. However, our alternative estimates of the degree of returns to employment revealed by β_{Ind} and β_{Dev} seem to be more consistent with Griliches and Hausman estimations, possibly because the foreign demand variables are more exogenous to labour demand than is the domestic demand. Typically, the corresponding estimates are around or above unity for some industries known to be very competitive (Beverages, Fab. Metal Products, Glass and Products, Paper and products, Rubber, Textiles) which suggests that the corresponding sectors exhibit constant or decreasing returns to scale in employment.

7.1.2 Developing countries results

Table 4 shows the results for the panel of developing countries. The cost effect is significant and negative only for 6 (resp.8) industries when selling on the domestic (resp. foreign) markets. However, the corresponding parameters are of high values when developing countries sell to industrialized markets. This is again consistent with the fact that on these markets, barriers to imports from developing countries are high which drives the estimated parameters to be high[19]. Within these estimates moreover, η_{Ind} and η_{Dev} are high when industries are known to be competitive and/or produce homogenous products. For most of the remaining industries, the effect appears to be insignificant for the same reasons noted above regarding wages, that stand as imperfect proxy of the theoretical cost variables.

[19]Recall that $\eta_j = \beta_j \pi_{ij} / \mu_j$, where π_{ij} is a barrier to trade indicator.

However, the demand effect remains consistent in general with theory in the developing countries' panel. It is significant and positive in the majority of cases , but some minority of estimates are statistically insignificant or even negative. Notice however that unlike the developped countries' panel, the magnitude of the demand effect when selling on developing markets β_{Dev} is now comparable to β_{Ind} and $\beta_{N_{ii}}$ to a lesser extent, which is what theory suggests.

Moreover, the parameters of returns to scale measured by β_{Ind} and β_{Dev} estimates are constant or decreasing for more than the third of the industries that are known to be competitive. However, some values of the same magnitude are estimated for Machinery and Industrial Chimicals known to be more oligopolistic. One can think that for these industries the technology of production is more labour intensive in developing than developed countries.

We have shown that the demand effect and, to a lesser extent, the substitution effect, both when selling to the domestic and foreign markets, are playing a significant role in determining industrial employment. In what follows, we estimate alternative theoretical equations where imports enter the relations to capture first, a pure demand effect and second, an exclusive substitution effect.

7.2 The demand effect of imports

Table 5 presents the results of the specification of 'Imports revealing demand' (equation 24) for the panel of industrialised countries. The cost variable appears with the right expected sign for only 4 industries while the effect is insignificant or positive in the remaining cases. This non convincing result could be simply explained by the 'new' weights applied on the relative costs variable. Actually, these weights are represented by the inverse of the penetration rate that could be positively related to employment. Now, if the change in the penetration rate is stronger than that of relative wages, which is plausible in the case of the industrialised countries during the considered period, the *total* effect could end up to be positive.

More interestingly however, is the positive effect related to imports that appears for more than half of the industries. This result is completely consistent with our framework that states the positive role that imports have on total demand which is transformed then into a positive effect on employment.

The parameter values on imports for the remaining industries, do not enjoy the same outcome however as they appear to be very low, or even negative in the case of 6 sectors. Again, one of the reasons is due to the error of measurement of the cost proxy, that do not control for some costs variations which in return, could be captured by the vector of imports. Consequently, the demand effect expected on imports in this specification might be altered by a substitution one, thus biasing downward the corresponding parameter.

Table 6 reports the results for the panel of developing countries. Again, the effect of imports appears to be positive and significant for 19 sectors. Moreover, the value of the parameter appears to be smaller when compared to that of the number of the firms, which is what is expected from theory.

In the following specification, imports enters the equation to capture instead the negative cost effect. In addition, the import vector replaces the wage vector which allows to avoid the problem of measurement errors carried by relative wage variable so far.

7.3 Imports as substituts

Table 7 reports the results for the specification of 'Imports revealing substitution' for the OECD countries (equation 25). The impact of imports is shown to be negative and statistically significant for over 17 industries while the effect is not significant for the remaining sectors. Moreover, as expected the sign and significance of the domestic demand parameter is found to be positive for a very large proportion of the industries. Besides, the coefficients corresponding to the demand variable are twice as bigger than that of imports in absolute values for 11 industries (when accounting for standard errors). This is consistent with theory when there are relatively few foreign firms serving the market[20]. Finally, the coefficients relative to imports are comparable to those on $dlogN_i$, the number of domestic firms' variable, in 13 industries.

Hence, all the above results are consistent with the related theory and thus, with the fact that imports are carrying a substitution effect when the demand effect is properly accounted for in the specification. One should note moreover, that the substitution effect measured here is higher for homogeneous good industries than for differentiated good ones, except for textile where the results are not significant. This general result is consistent with the intuition that in presence of homogenous goods, the substitution is of a larger magnitude[21]. At the same pace, this large substitution effect for ho-

[20]Notice however, that although in small number the market share of these foreign firms could be relatively high in an oligopolistic market. This is to show that such a result remains perfectly consistent with the a high degree of openness of the corresponding industries to foreign products

[21]This result joins that of Erkel-Rousse and Mirza (2002) who found that the price elasticity corresponding to the elasticity of substitution is higher in homogenous than differentiated good industries.

Table 5: First alternative equation of labour demand ($dlogL_i$) for **OECD countries (imports capturing a demand effect)**

Industry	R. Dom Cost		Imports		R. cost *Ind*		Conso *Ind*		R. Cost *Dev*		Conso *Dev*		Estb.		R2	N.Obs.
	$d(w_{ii}/\overline{w_{Dom}})e_{i,Dom}\frac{1}{1-S_{ii}}$		$dlogM_i e_{ii}$		$d(w_{ii}/\overline{w_{Ind}})e_{i,Ind}$		$dlogX_{.,Ind}e_{i,Ind}$		$d(w_{ii}/\overline{w_{Dev}}).e_{i,Dev}$		$dlogX_{.,Dev}e_{i,Dev}$		$dlogN_{ii}$			
	$-\eta_{Dom}$		β_{Dom}		$-\eta_{Ind}$		β_{Ind}		$-\eta_{Dev}$		β_{Dev}		$\beta'_{N_{ii}}$			
Beverages	0,02		-0,01		-0,90	**	2,11	***	0,23		-2,08		0,25	***	0,62	222
	0,02		0,04		0,38		0,22		0,51		1,55		0,04			
Fab. metal products	-0,04		-0,18	***	1,07	***	2,15	***	-1,33	**	-2,91	***	0,53	***	0,77	208
	0,03		0,05		0,36		0,42		0,53		1,05		0,02			
Food products	0,16	***	0,22	***	0,06		0,64	***	-0,04		-0,53		0,60	***	0,87	208
	0,05		0,03		0,42		0,21		0,57		0,68		0,04			
Footwear	0,17	***	0,21		-0,32	***	0,22		-0,53		3,28	***	0,80	***	0,49	231
	0,06		0,14		0,11		0,16		0,72		1,15		0,05			
Furniture	-0,38	***	0,10	**	0,17		0,68	***	-2,02	***	-0,18		0,54	***	0,84	227
	0,04		0,04		0,18		0,18		0,48		1,00		0,04			
Glass and products	0,09		-0,33	***	0,22		2,68	***	-0,84		-2,55		0,17	***	0,39	231
	0,06		0,10		0,49		0,34		0,93		2,66		0,05			
Industrial chemicals	-0,15		0,26	***	0,49	**	0,28		-3,51	***	0,96		0,37	***	0,63	213
	0,09		0,05		0,23		0,21		0,51		0,68		0,02			
Iron and steel	0,40	***	0,29	***	0,20		0,03		-0,38		-2,31	***	0,08	**	0,26	183
	0,09		0,04		0,13		0,12		0,25		0,73		0,04			
Leather products	0,02	*	0,35	***	-0,22	**	0,19	***	-0,05		1,59	***	0,33	***	0,83	241
	0,01		0,02		0,09		0,06		0,28		0,33		0,03			
Machinery, electric	0,14	**	0,13	***	0,12		0,36		0,00		0,02		0,15	***	0,22	192
	0,07		0,04		0,13		0,22		0,01		0,40		0,02			
Machinery	-0,01		0,18	***	0,11		0,05		-0,33	**	-0,76	**	0,13	***	0,13	175
	0,02		0,05		0,08		0,15		0,16		0,31		0,04			
Misc. petroleum	0,35	***	0,46	***	-0,40	**	-0,80	***	1,20	***	1,10		0,39	***	0,54	189
	0,05		0,04		0,19		0,25		0,39		0,88		0,05			
Non-ferrous metals	-0,15		0,24	***	-0,37	*	-0,04		1,73	***	-0,24		0,31	***	0,27	208
	0,13		0,05		0,21		0,10		0,62		0,40		0,07			
Other chemicals	0,22	***	0,08		0,42		0,06		-0,85	*	-1,10		0,23	***	0,21	218
	0,06		0,06		0,27		0,30		0,45		1,15		0,04			
Other manuf. Prod.	0,06		0,17	**	-0,18	*	0,44	***	-0,01		0,21		0,57	***	0,68	213
	0,05		0,08		0,10		0,13		0,21		0,43		0,04			
Other non-metal. prod.	0,00		-0,16	***	-0,40		0,80		2,18	***	1,64		0,59	***	0,73	219
	0,02		0,04		0,52		0,60		0,69		1,26		0,03			
Paper and products	0,17	**	-0,17	***	-1,19	***	2,22	***	1,55	**	3,44	**	0,07	**	0,47	233
	0,08		0,06		0,28		0,29		0,79		1,51		0,03			
Petroleum refineries	0,07	**	-0,02		-0,14		0,19		-0,27		-1,23		0,08	***	0,12	190
	0,04		0,03		0,12		0,15		0,36		0,88		0,02			
Plastic products	-0,18	***	0,07		-0,02		0,97	***	0,12		-9,83	***	0,55	***	57,00	234
	0,03		0,05		0,30		0,36		1,22		2,55		0,04			
Pottery, china	0,49	***	0,33	***	-0,83	**	0,49	***	-0,04		1,82	**	0,24	***	0,74	230
	0,12		0,06		0,38		0,13		0,61		0,72		0,04			
Printing and publishing	-0,01		0,08	***	-0,03		-0,28		-2,04	**	3,31	***	0,16	***	0,13	215
	0,03		0,03		0,37		0,57		0,80		1,09		0,02			
Professional & scientific	0,08		0,27	***	0,08		0,29		-1,47	**	0,84	**	0,31	***	0,77	184
	0,08		0,05		0,24		0,21		0,64		0,35		0,06			
Rubber products	-0,19	**	0,14		-0,21		2,53	***	-2,01	***	6,61	***	0,99	***	0,61	233
	0,10		0,11		0,36		0,37		0,77		2,17		0,06			
Textiles	0,03		0,20	***	-0,14		0,83	***	-0,47	*	-0,29		0,56	***	0,90	235
	0,08		0,04		0,15		0,18		0,27		0,87		0,02			
Tobacco	0,00		0,02		-0,38		0,10		-0,48		-0,12		0,14	***	0,05	218
	0,02		0,02		0,34		0,29		0,34		1,17		0,03			
Total manufacturing	0,09	***	0,38	***	-0,03		0,17	**	-0,61	**	2,01	***	0,55	***	0,98	176
	0,02		0,03		0,12		0,08		0,26		0,51		0,03			
Transport equipment	0,41	***	0,26	***	0,08		0,15		-1,03	***	-0,24		0,05	*	0,49	214
	0,07		0,04		0,23		0,22		0,12		0,43		0,03			
Wearing apparel	-0,01	*	0,18	***	-0,08	***	0,07		0,04		-0,75		0,18	***	0,18	192
	0,00		0,04		0,02		0,08		0,16		0,56		0,04			
Wood products	0,03		0,08		-1,04	***	-0,94	***	1,92	***	-0,36		0,79	***	0,82	222
	0,03		0,08		0,24		0,27		0,73		2,14		0,03			

1- Les paramètres estimés sont en **gras** et les erreurs types en *italique*.
2- ***,**,* significatifs respectivement au seuil de 1,5 et 10 %.

Table 6: First alternative equation of labour demand ($dlogL_i$) for **Developing countries (imports capturing a demand effect)**

Industry	R. Dom Cost		Imports		R. cost *Ind*		Conso *Ind*		R. Cost *Dev*		Conso *Dev*		Estb.		R2	N.Obs.
	$d(w_{ii}/\overline{w_{Dom}})e_{i,Dom}\frac{1}{1-S_{ii}}$		$dlogM_ie_{ii}$		$d(w_{ii}/\overline{w_{Ind}})e_{i,Ind}$		$dlogX_{.,Ind}e_{i,Ind}$		$d(w_{ii}/\overline{w_{Dev}}).e_{i,Dev}$		$dlogX_{.,Dev}e_{i,Dev}$		$dlogN_{ii}$			
	$-\eta_{Dom}$		β_{Dom}		$-\eta_{Ind}$		β_{Ind}		$-\eta_{Dev}$		β_{Dev}		β'_{N_i}			
Beverages	**0,00**		**0,05**	***	**1,55**		**2,21**	***	**-0,88**		**0,89**		**0,15**	***	**0,33**	**403**
	0,00		*0,02*		*1,33*		*0,24*		*0,57*		*0,65*		*0,03*			
Fab. metal products	**-0,10**	***	**0,02**		**-10,06**	***	**1,22**	***	**-2,49**	**	**-1,50**	**	**0,57**	***	**0,56**	**485**
	0,03		*0,04*		*2,64*		*0,22*		*1,02*		*0,67*		*0,02*			
Food products	**-0,02**	***	**0,35**	***	**-4,89**	***	**0,37**	***	**-0,29**		**1,87**	***	**0,36**	***	**0,78**	**515**
	0,01		*0,02*		*1,26*		*0,06*		*0,75*		*0,13*		*0,02*			
Footwear	**-0,04**	***	**0,15**	***	**0,29**		**1,51**	***	**-0,69**	***	**0,65**	**	**0,47**	***	**0,31**	**325**
	0,01		*0,03*		*0,42*		*0,22*		*0,24*		*0,27*		*0,05*			
Furniture	**-0,02**	***	**0,01**		**-0,52**		**1,06**	***	**-1,24**	*	**-0,22**		**0,52**	***	**0,27**	**412**
	0,01		*0,03*		*0,60*		*0,32*		*0,74*		*0,60*		*0,03*			
Glass and products	**0,00**		**0,02**		**-5,44**	***	**-0,71**	***	**0,33**		**-1,71**	***	**0,49**	***	**0,19**	**352**
	0,01		*0,05*		*1,52*		*0,19*		*0,50*		*0,30*		*0,04*			
Industrial chemicals	**-0,01**	***	**0,20**	***	**-3,22**	**	**0,67**	**	**0,43**		**0,29**	**	**0,52**	***	**0,38**	**399**
	0,00		*0,04*		*1,35*		*0,34*		*0,33*		*0,12*		*0,03*			
Iron and steel	**-0,02**		**0,12**	***	**7,40**	***	**0,56**	***	**-0,56**	**	**0,07**		**0,13**	***	**0,41**	**285**
	0,04		*0,04*		*0,95*		*0,18*		*0,23*		*0,54*		*0,03*			
Leather products	**0,00**		**0,21**	***	**-0,48**		**1,16**	***	**-0,51**		**0,84**	***	**0,61**	***	**0,58**	**389**
	0,00		*0,03*		*0,53*		*0,14*		*0,33*		*0,24*		*0,04*			
Machinery, electric	**0,00**		**0,06**		**-0,81**		**-0,05**		**0,00**		**0,76**		**0,62**	***	**0,20**	**430**
	0,04		*0,04*		*0,57*		*0,32*		*0,02*		*0,62*		*0,05*			
Machinery	**-0,36**	***	**0,14**	***	**1,83**	**	**1,83**	***	**-1,08**	**	**-0,61**	**	**0,56**	***	**0,39**	**384**
	0,13		*0,05*		*0,87*		*0,25*		*0,48*		*0,28*		*0,04*			
Misc. petroleum	**-0,09**	***	**0,26**	***	**-4,76**		**9,33**	***	**0,29**	***	**3,59**	***	**0,38**	***	**0,38**	**184**
	0,02		*0,04*		*4,67*		*2,01*		*0,07*		*0,87*		*0,07*			
Non-ferrous metals	**-0,10**	***	**0,09**	***	**-0,76**		**0,71**	***	**-0,08**	**	**0,11**	***	**0,81**	***	**0,35**	**262**
	0,01		*0,03*		*0,50*		*0,11*		*0,04*		*0,03*		*0,06*			
Other chemicals	**-0,06**	***	**0,14**	***	**6,12**	***	**0,72**	*	**0,08**		**-0,46**		**0,37**	***	**0,22**	**425**
	0,02		*0,03*		*1,55*		*0,38*		*0,28*		*0,39*		*0,03*			
Other manuf. Prod.	**0,00**		**-0,09**	***	**-1,30**	***	**-0,43**	***	**0,00**		**0,43**	**	**0,57**	***	**0,16**	**423**
	0,01		*0,03*		*0,38*		*0,10*		*0,06*		*0,19*		*0,03*			
Other non-metal. prod.	**-0,01**		**0,01**		**-7,19**		**0,14**		**-0,08**	**	**0,02**		**0,55**	***	**0,17**	**429**
	0,01		*0,03*		*6,54*		*0,65*		*0,04*		*0,04*		*0,03*			
Paper and products	**-0,14**	***	**0,24**	***	**-7,08**	**	**-0,18**		**-1,70**	***	**1,86**	***	**0,41**	***	**0,14**	**451**
	0,03		*0,03*		*3,59*		*0,35*		*0,57*		*0,41*		*0,03*			
Petroleum refineries	**0,03**	***	**-0,07**		**0,16**		**-0,11**		**-0,15**		**-0,77**		**0,14**	***	**0,14**	**224**
	0,01		*0,06*		*0,66*		*0,85*		*0,75*		*1,44*		*0,05*			
Plastic products	**-0,03**	**	**0,15**	***	**-6,99**	***	**0,00**		**0,19**		**0,13**		**0,73**	***	**0,25**	**394**
	0,01		*0,04*		*1,21*		*0,14*		*0,81*		*0,71*		*0,04*			
Pottery, china	**-0,03**	***	**0,19**	***	**1,47**		**-0,29**	***	**2,46**	***	**0,95**	***	**0,45**	***	**0,40**	**335**
	0,01		*0,03*		*1,06*		*0,09*		*0,45*		*0,11*		*0,03*			
Printing and publishing	**0,00**	**	**0,10**	***	**-0,46**		**-0,59**		**0,47**		**-0,40**		**0,20**	***	**0,07**	**443**
	0,00		*0,02*		*1,50*		*0,59*		*0,71*		*0,45*		*0,02*			
Professional & scientific	**-0,13**		**0,19**	***	**-0,18**		**0,41**	***	**1,42**		**-1,86**	***	**0,62**	***	**0,41**	**287**
	0,15		*0,04*		*0,50*		*0,10*		*1,55*		*0,22*		*0,05*			
Rubber products	**-0,06**	***	**0,09**	*	**-2,08**		**0,29**		**-0,61**		**2,23**	***	**0,80**	***	**0,35**	**392**
	0,01		*0,05*		*1,81*		*0,26*		*0,76*		*0,78*		*0,04*			
Textiles	**0,00**		**0,16**	***	**3,32**	***	**2,87**	***	**-1,68**	***	**1,50**	***	**0,56**	***	**0,71**	**502**
	0,00		*0,02*		*1,28*		*0,28*		*0,28*		*0,27*		*0,02*			
Tobacco	**0,00**	***	**0,00**		**-4,79**		**-1,08**		**0,09**		**0,04**		**0,44**	***	**0,05**	**282**
	0,00		*0,02*		*3,94*		*1,81*		*0,18*		*0,27*		*0,03*			
Total manufacturing	**-0,05**	**	**0,52**	***	**-0,34**		**-0,34**	**	**-2,10**	***	**3,14**	***	**0,44**	***	**0,82**	**474**
	0,02		*0,03*		*0,55*		*0,15*		*0,61*		*0,39*		*0,02*			
Transport equipment	**-0,02**		**0,08**	***	**0,48**		**0,26**		**0,09**		**-0,77**		**0,34**	***	**0,13**	**425**
	0,02		*0,03*		*1,28*		*0,41*		*0,40*		*0,46*		*0,04*			
Wearing apparel	**0,01**	**	**-0,04**	**	**0,25**		**0,62**	***	**0,26**		**-0,04**		**0,31**	***	**0,09**	**296**
	0,00		*0,02*		*0,41*		*0,13*		*0,40*		*0,23*		*0,04*			
Wood products	**0,00**	**	**-0,03**		**0,35**		**0,05**		**0,21**		**-0,49**		**0,61**	***	**0,11**	**477**
	0,00		*0,02*		*0,97*		*0,16*		*0,20*		*0,42*		*0,03*			

1- Les paramètres estimés sont en **gras** et les erreurs types en *italique*.
2- ***,**,* significatifs respectivement au seuil de 1,5 et 10 %.

Table 7: Second alternative equation of labour demand ($dlogL_i$) for **OECD countries (imports capturing a substitution effect)**

Industry	Imports	Dom Conso	R. cost *Ind*	Conso *Ind*	R. cost *Dev*	conso *Dev*	Estb.	Total Estb.	R2	N.Obs.
	$dlogM_i e_{ii}$	$dlogX_{.,i}e_{ii}$	$d(w_{ii}/\overline{w_{Ind}})e_{i,Ind}$	$dlogX_{.,Ind}e_{i,Ind}$	$d(w_{ii}/\overline{w_{Dev}})e_{i,Dev}$	$dlogX_{.,Dev}e_{i,Dev}$	$dlogN_{ii}$	$dlogN_{.i}$		
	$-\rho_{Dom}$	$\beta_{Dom}+\rho_{dom}$	$-\eta_{Ind}$	β_{Ind}	$-\eta_{Dev}$	β_{Dev}	$\beta_{N,i}$	$\beta_{N,i}$		
Beverages	**-0,09** ***	**0,32** ***	**-1,16** ***	**1,33** ***	**0,06**	**-1,13**	**0,20** ***	**0,13** **	**0,71**	**222**
	0,04	*0,05*	*0,35*	*0,25*	*0,47*	*1,45*	*0,04*	*0,06*		
Fab. metal products	**-0,25** ***	**0,44** ***	**0,66** **	**1,67** ***	**-2,01** ***	**-4,53** ***	**0,36** ***	**0,12** **	**0,93**	**208**
	0,05	*0,07*	*0,33*	*0,39*	*0,49*	*0,97*	*0,04*	*0,06*		
Food products	**-0,15** ***	**0,52** ***	**-0,35**	**0,31**	**-0,56**	**-0,32**	**0,36** ***	**0,32** ***	**0,95**	**208**
	0,06	*0,09*	*0,38*	*0,19*	*0,52*	*0,61*	*0,04*	*0,09*		
Footwear	**-0,55** ***	**1,02** ***	**-0,23** ***	**0,31** **	**-0,28**	**1,07**	**0,58** ***	**0,57** ***	**0,70**	**219**
	0,15	*0,17*	*0,09*	*0,15*	*0,63*	*0,98*	*0,05*	*0,13*		
Furniture	**-0,31** ***	**0,67** ***	**-0,01**	**0,07**	**-0,40**	**-1,40** *	**0,33** ***	**0,63** ***	**0,90**	**219**
	0,04	*0,07*	*0,14*	*0,14*	*0,39*	*0,78*	*0,03*	*0,07*		
Glass and products	**-0,41** ***	**1,08** ***	**-1,07** ***	**0,96** ***	**-0,81**	**-1,58**	**0,16** ***	**-0,73** ***	**0,71**	**231**
	0,08	*0,10*	*0,34*	*0,25*	*0,65*	*1,84*	*0,03*	*0,18*		
Industrial chemicals	**0,31** ***	**0,27** ***	**0,41** *	**0,30**	**-3,11** ***	**0,14**	**0,22** ***	**0,18** ***	**0,77**	**213**
	0,07	*0,06*	*0,21*	*0,20*	*0,44*	*0,65*	*0,03*	*0,05*		
Iron and steel	**-0,12** *	**0,35** ***	**0,14**	**0,03**	**-0,28**	**-1,15** *	**0,09** **	**-0,62** ***	**0,44**	**175**
	0,07	*0,09*	*0,12*	*0,10*	*0,23*	*0,69*	*0,04*	*0,09*		
Leather products	**0,04**	**0,14**	**-0,19** ***	**0,17** ***	**-0,09**	**1,70** ***	**0,28** ***	**0,47** ***	**0,89**	**233**
	0,07	*0,09*	*0,07*	*0,06*	*0,26*	*0,31*	*0,03*	*0,10*		
Machinery, electric	**-0,10** *	**0,32** ***	**-0,07**	**0,05**	**0,00**	**0,12**	**0,15** ***	**-0,02**	**0,31**	**192**
	0,06	*0,06*	*0,11*	*0,23*	*0,01*	*0,38*	*0,02*	*0,12*		
Machinery	**0,02**	**0,22** ***	**0,10**	**-0,12**	**-0,34** **	**-0,74** **	**0,12** ***	**-0,16**	**0,20**	**175**
	0,06	*0,07*	*0,08*	*0,15*	*0,16*	*0,30*	*0,04*	*0,15*		
Misc. petroleum	**0,04**	**0,16** ***	**0,35**	**-0,84** ***	**1,24** ***	**1,47**	**0,37** ***	**-0,43** **	**0,54**	**188**
	0,07	*0,06*	*0,30*	*0,27*	*0,47*	*1,03*	*0,06*	*0,19*		
Non-ferrous metals	**-0,06**	**0,42** ***	**-0,19**	**-0,02**	**0,38**	**-1,41** ***	**0,26** ***	**0,59** ***	**0,51**	**208**
	0,05	*0,07*	*0,18*	*0,08*	*0,50*	*0,34*	*0,06*	*0,15*		
Other chemicals	**-0,43** ***	**0,63** ***	**0,10**	**-0,11**	**-1,15** ***	**-0,88**	**0,16** ***	**0,02**	**0,43**	**218**
	0,07	*0,06*	*0,23*	*0,26*	*0,37*	*0,98*	*0,04*	*0,10*		
Other manuf. Prod.	**-0,10**	**0,13**	**-0,05**	**0,45** ***	**0,07**	**-1,76** *	**0,21** ***	**0,97** ***	**0,75**	**203**
	0,10	*0,10*	*0,08*	*0,16*	*0,16*	*0,98*	*0,04*	*0,08*		
Other non-metal. prod.	**-0,30** ***	**0,65** ***	**-1,21** ***	**-1,43** ***	**1,61** ***	**4,87** ***	**0,20** ***	**0,16** ***	**0,94**	**219**
	0,03	*0,05*	*0,33*	*0,43*	*0,42*	*0,73*	*0,03*	*0,04*		
Paper and products	**-0,31** ***	**0,52** ***	**-1,24** ***	**1,89** ***	**-0,04**	**1,53**	**0,07** *	**-0,15** **	**0,59**	**233**
	0,05	*0,07*	*0,25*	*0,26*	*0,68*	*1,35*	*0,04*	*0,07*		
Petroleum refineries	**-0,06** *	**0,12** ***	**-0,23** **	**0,11**	**-0,39**	**-0,74**	**0,07** ***	**0,08**	**0,21**	**190**
	0,04	*0,04*	*0,11*	*0,15*	*0,35*	*0,88*	*0,02*	*0,10*		
Plastic products	**-0,35** ***	**0,83** ***	**-0,49** **	**-0,31**	**1,25**	**-3,56** *	**0,02**	**0,64** ***	**0,85**	**234**
	0,06	*0,08*	*0,24*	*0,28*	*0,91*	*1,99*	*0,05*	*0,08*		
Pottery, china	**-0,79** ***	**1,41** ***	**-1,21** ***	**0,49** ***	**-0,88** **	**1,24** ***	**0,03**	**-0,24** **	**0,90**	**230**
	0,08	*0,09*	*0,23*	*0,09*	*0,41*	*0,47*	*0,03*	*0,12*		
Printing and publishing	**-0,10** ***	**0,29** ***	**-0,75** **	**-0,79**	**-2,51** ***	**3,94** ***	**0,13** ***	**-0,04**	**0,37**	**215**
	0,03	*0,04*	*0,33*	*0,50*	*0,72*	*0,96*	*0,02*	*0,06*		
Professional & scientific	**-0,07**	**0,09**	**-0,05**	**0,37** *	**-1,65** **	**0,73** **	**0,26** ***	**0,43** ***	**0,81**	**183**
	0,10	*0,09*	*0,30*	*0,21*	*0,64*	*0,35*	*0,06*	*0,11*		
Rubber products	**-0,46** ***	**0,63** ***	**-0,11**	**1,41** ***	**-1,59** ***	**3,05** ***	**0,48** ***	**1,37** ***	**0,91**	**232**
	0,09	*0,09*	*0,20*	*0,21*	*0,43*	*1,17*	*0,04*	*0,07*		
Textiles	**0,03**	**0,09**	**0,09**	**1,17** ***	**-0,72** ***	**0,02**	**0,40** ***	**0,50** ***	**0,96**	**242**
	0,04	*0,06*	*0,14*	*0,17*	*0,25*	*0,79*	*0,03*	*0,07*		
Tobacco	**0,01**	**0,05**	**-0,42**	**0,07**	**-0,54**	**-0,25**	**0,12** ***	**-0,01**	**0,18**	**218**
	0,02	*0,03*	*0,34*	*0,29*	*0,34*	*1,18*	*0,03*	*0,02*		
Total manufacturing	**0,04**	**0,25** ***	**-0,39** ***	**0,04**	**0,43**	**1,61** ***	**0,48** ***	**0,34** ***	**0,99**	**183**
	0,04	*0,05*	*0,12*	*0,08*	*0,29*	*0,54*	*0,03*	*0,09*		
Transport equipment	**0,06**	**0,22** *	**-0,37**	**0,09**	**-1,07** ***	**-0,41**	**0,05** *	**-0,07**	**0,43**	**214**
	0,09	*0,12*	*0,25*	*0,24*	*0,13*	*0,47*	*0,03*	*0,19*		
Wearing apparel	**0,20** **	**0,02**	**-0,05** **	**-0,07**	**-0,01**	**-0,57**	**0,19** ***	**-0,13**	**0,20**	**188**
	0,10	*0,15*	*0,03*	*0,09*	*0,16*	*0,60*	*0,04*	*0,11*		
Wood products	**-0,49** ***	**1,07** ***	**-0,78** ***	**1,19** ***	**-0,33**	**-5,62** ***	**0,44** ***	**-0,09** **	**0,94**	**227**
	0,07	*0,08*	*0,15*	*0,21*	*0,46*	*1,43*	*0,04*	*0,04*		

1- Les paramètres estimés sont en **gras** et les erreurs types en *italique*.
2- ***,**,* significatifs respectivement au seuil de 1,5 et 10 %.

Table 8: Second alternative equation of labour demand ($dlogL_i$) for **Developing countries (imports capturing a substitution effect)**

Industry	Imports		Dom Conso		R. cost *Ind*		Conso *Ind*		R. cost *Dev*		conso *Dev*		Estb.		Total Estb.		R2	N.Obs.
	$dlogM_ie_{ii}$		$dlogX_{.,i}e_{ii}$		$d(w_{ii}/\overline{w_{Ind}})e_{i,Ind}$		$dlogX_{.,Ind}e_{i,Ind}$		$d(w_{ii}/\overline{w_{Dev}})e_{i,Dev}$		$dlogX_{.,Dev}e_{i,Dev}$		$dlogN_{ii}$		$dlogN_{.i}$			
	$-\rho_{Dom}$		$\beta_{Dom}+\rho_{dom}$		$-\eta_{Ind}$		β_{Ind}		$-\eta_{Dev}$		β_{Dev}		$\beta_{N,i}$		$\beta_{N,i}$			
Beverages	**0,00**		**0,31**	***	**0,61**		**1,62**	***	**-0,97**	*	**0,58**		**0,13**	***	**0,10**	**	**0,47**	**402**
	0,01		*0,03*		*1,21*		*0,24*		*0,52*		*0,59*		*0,03*		*0,05*			
Fab. metal products	**-0,30**	***	**0,75**	***	**-12,02**	***	**1,49**	***	**-2,57**	***	**-1,77**	***	**0,42**	***	**0,15**	***	**0,79**	**485**
	0,04		*0,06*		*2,27*		*0,20*		*0,88*		*0,58*		*0,03*		*0,04*			
Food products	**0,08**	***	**0,15**	***	**-4,11**	***	**0,38**	***	**0,42**		**1,75**	***	**0,26**	***	**0,42**	***	**0,89**	**513**
	0,02		*0,02*		*1,12*		*0,05*		*0,65*		*0,12*		*0,02*		*0,04*			
Footwear	**0,07**	*	**0,13**	***	**-0,63**		**1,29**	***	**-0,29**		**0,87**	***	**0,45**	***	**0,51**	***	**0,49**	**319**
	0,04		*0,04*		*0,45*		*0,27*		*0,25*		*0,29*		*0,05*		*0,13*			
Furniture	**-0,14**	***	**0,46**	***	**-1,46**	*	**1,08**	***	**-1,91**	***	**-1,57**	***	**0,31**	***	**0,61**	***	**0,68**	**410**
	0,02		*0,04*		*0,76*		*0,32*		*0,60*		*0,47*		*0,03*		*0,07*			
Glass and products	**-0,08**		**0,33**	***	**-12,45**	***	**-0,12**		**0,81**	*	**-1,93**	***	**0,41**	***	**-0,27**	*	**0,44**	**352**
	0,05		*0,05*		*1,88*		*0,21*		*0,48*		*0,30*		*0,04*		*0,15*			
Industrial chemicals	**0,11**		**0,44**	***	**-2,64**	**	**2,33**	***	**-0,07**		**-0,04**		**0,42**	***	**0,08**		**0,55**	**398**
	0,08		*0,09*		*1,30*		*0,42*		*0,33*		*0,12*		*0,04*		*0,06*			
Iron and steel	**-0,12**	**	**0,24**	***	**5,13**	***	**0,75**	***	**-0,43**	**	**0,65**		**0,09**	***	**-0,62**	***	**0,51**	**285**
	0,05		*0,06*		*1,11*		*0,18*		*0,22*		*0,50*		*0,03*		*0,08*			
Leather products	**0,07**	**	**0,18**	***	**-1,62**	***	**1,41**	***	**0,01**		**0,44**	**	**0,41**	***	**0,43**	***	**0,76**	**380**
	0,03		*0,04*		*0,53*		*0,16*		*0,29*		*0,22*		*0,04*		*0,09*			
Machinery, electric	**-0,07**		**0,24**	***	**-0,31**		**-1,24**	**	**0,01**		**1,44**	**	**0,61**	***	**-0,18**		**0,32**	**428**
	0,07		*0,08*		*0,95*		*0,55*		*0,02*		*0,63*		*0,05*		*0,19*			
Machinery	**-0,03**		**0,18**	***	**1,61**	*	**1,82**	***	**0,09**		**-0,46**	*	**0,55**	***	**-0,11**		**0,45**	**384**
	0,07		*0,07*		*0,87*		*0,25*		*0,71*		*0,28*		*0,04*		*0,31*			
Misc. petroleum	**-0,11**	***	**0,49**	***	**-2,73**		**2,07**		**2,31**	***	**3,36**	***	**0,32**	***	**-0,03**		**0,62**	**184**
	0,04		*0,05*		*3,71*		*1,68*		*0,21*		*0,68*		*0,06*		*0,15*			
Non-ferrous metals	**-0,20**	***	**0,08**	***	**-0,35**		**0,74**	***	**0,22**	***	**0,17**	***	**0,70**	***	**1,34**	***	**0,63**	**258**
	0,07		*0,02*		*0,53*		*0,12*		*0,09*		*0,04*		*0,06*		*0,35*			
Other chemicals	**-0,04**		**0,32**	***	**7,91**	***	**0,67**	*	**0,03**		**-0,30**		**0,32**	***	**0,01**		**0,39**	**425**
	0,04		*0,04*		*1,49*		*0,35*		*0,27*		*0,36*		*0,03*		*0,06*			
Other manuf. Prod.	**-0,18**	***	**0,37**	***	**-0,84**		**-0,04**		**0,02**		**-0,01**		**0,42**	***	**0,25**		**0,53**	**399**
	0,03		*0,04*		*0,55*		*0,19*		*0,05*		*0,26*		*0,03*		*0,23*			
Other non-metal. prod.	**0,03**		**0,38**	***	**-17,82**	***	**-0,35**		**-0,75**	***	**0,23**	***	**0,34**	***	**0,34**	***	**0,67**	**429**
	0,02		*0,04*		*5,46*		*0,54*		*0,07*		*0,04*		*0,03*		*0,04*			
Paper and products	**-0,19**	***	**0,51**	***	**-7,13**	**	**-0,32**		**-1,31**	***	**1,22**	***	**0,39**	***	**-0,45**	***	**0,50**	**450**
	0,05		*0,05*		*3,05*		*0,30*		*0,49*		*0,36*		*0,03*		*0,08*			
Petroleum refineries	**-0,09**	*	**0,24**	***	**0,29**		**-0,36**		**-0,51**		**-0,50**		**0,03**		**0,38**	***	**0,20**	**223**
	0,05		*0,06*		*0,68*		*0,93*		*0,71*		*1,37*		*0,06*		*0,08*			
Plastic products	**-0,09**	**	**0,51**	***	**-1,85**		**0,58**	***	**-1,16**		**-0,69**		**0,54**	***	**0,25**	***	**0,63**	**392**
	0,04		*0,05*		*2,09*		*0,17*		*0,73*		*0,64*		*0,04*		*0,09*			
Pottery, china	**-0,14**	***	**0,29**	***	**-0,96**		**0,15**		**2,69**	***	**0,81**	***	**0,25**	***	**0,46**	***	**0,76**	**334**
	0,04		*0,04*		*0,98*		*0,10*		*0,38*		*0,10*		*0,03*		*0,05*			
Printing and publishing	**-0,01**		**0,22**	***	**-1,01**		**-0,44**		**0,46**		**-0,36**		**0,19**	***	**-0,05**		**0,34**	**443**
	0,02		*0,02*		*1,34*		*0,53*		*0,64*		*0,40*		*0,02*		*0,05*			
Professional & scientific	**-0,19**	**	**0,43**	***	**-0,75**		**0,18**	*	**1,34**		**-1,70**	***	**0,59**	***	**0,47**	***	**0,49**	**287**
	0,09		*0,11*		*0,49*		*0,10*		*1,46*		*0,22*		*0,05*		*0,15*			
Rubber products	**-0,19**	***	**0,62**	***	**-1,18**		**0,24**		**-1,18**	*	**1,84**	***	**0,49**	***	**0,82**	***	**0,73**	**392**
	0,05		*0,05*		*1,46*		*0,21*		*0,61*		*0,63*		*0,04*		*0,08*			
Textiles	**0,06**	***	**0,14**	***	**-0,25**		**2,75**	***	**-1,63**	***	**1,62**	***	**0,49**	***	**0,22**	***	**0,87**	**502**
	0,02		*0,03*		*1,30*		*0,27*		*0,27*		*0,26*		*0,02*		*0,05*			
Tobacco	**-0,04**	***	**0,21**	***	**-4,77**		**-0,46**		**0,09**		**-0,53**	**	**0,43**	***	**0,00**		**0,52**	**282**
	0,01		*0,03*		*3,72*		*1,71*		*0,17*		*0,26*		*0,03*		*0,04*			
Total manufacturing	**0,10**	**	**0,41**	***	**0,66**		**0,06**		**-2,61**	***	**2,57**	***	**0,28**	***	**0,31**	***	**0,88**	**473**
	0,04		*0,04*		*0,45*		*0,13*		*0,50*		*0,34*		*0,02*		*0,06*			
Transport equipment	**-0,31**	***	**0,50**	***	**-0,12**		**0,39**		**-0,21**		**-0,55**		**0,30**	***	**0,19**		**0,26**	**425**
	0,07		*0,07*		*1,23*		*0,39*		*0,39*		*0,44*		*0,04*		*0,20*			
Wearing apparel	**-0,07**		**0,48**	***	**0,14**		**0,55**		**0,04**		**-0,09**		**0,26**	***	**-0,13**	**	**0,35**	**264**
	0,05		*0,07*		*0,47*		*0,43*		*0,40*		*0,24*		*0,04*		*0,07*			
Wood products	**-0,09**	***	**0,17**	***	**-0,04**		**0,03**		**0,27**		**-0,53**		**0,58**	***	**-0,01**		**0,56**	**471**
	0,02		*0,03*		*0,97*		*0,16*		*0,21*		*0,44*		*0,03*		*0,04*			

1- Les paramètres estimés sont en **gras** et les erreurs types en *italique*.
2- ***,**,* significatifs respectivement au seuil de 1,5 et 10 %.

mogenous good industries is balanced by a high demand effect for the same type of industries as it is shown in Footwear, Glass and Products, Pottery and China and Wood products. Actually, while it is shown to be above 1 for these industries, the effect rarely reaches 0.4 for some known differentiated good industries like Electrical and Machinery, Chemical Products, Professional and Scientific Products and Transport Equipment.

The specification produces qualitatively the same results for the developing countries' panel (see table 8). In particular, the same negative effect is usually observed on imports, which is systematically smaller than that on domestic demand. In 13 sectors, the effect of the latter is twice as high making these findings consistent with the hypothesis of few number of foreign firms serving the market.

Finally, the sign and maginitudes of the demand and substitution effects on foreign markets are still comparable to that related to the first specification tested. The new variable $dlogN_{.i}$ introduced produces positive effects in addition, coherent with our framework in general. However, the magnitude of the coefficients should not be regarded to be a measure of returns to scale in employment like theory pretends, as the variable $dlogN_{.i}$ does not reflect solely the exporting firms to the country i, but all of the firms surveyed by UNIDO in the 65 selected countries.

8 Conclusion

This paper constitutes one of the first attempts to explain why imports have not been affecting much employment in the OECD and developing countries at the industry level.

While most of the literature bases its research on a substitution effect of imports, we show that a demand effect of imports, positive on employment could intervene consecutively. In fact, in an oligopolistic world, imports might be reducing prices and thus increasing total demand that benefits in return to employees of domestic sellers on the market. The same demand effect appears when exporting to foreign markets. Exports can have pro competitive effects on the host market, reducing prices and thus increasing total foreign demand, which ends up creating a positive effect on domestic employment too.

We present a simple ologopolistic theory and show that it can be easily tested in three alternative ways. The first specification presents the cost and demand factors present on each market to export as well as the domestic market. This relation shows that the interaction of returns to scale of employment and industry market power constitutes the channel of labour adjustment to openness. In fact, the substitution and demand effects of trade adjust first the commodity markets and the magnitude of that adjustment is shown to depend on the degree of market power. Second, the commodity markets' adjustments is then transmitted to the labour market through the returns to scale parameter.

The theoretical relation between factor of openness and labour demand is then transformed in two manners. First, we reshape the equation to allow for imports to capture a pure demand effect. Then, we introduce the same vector of imports in an alternative relation in order to capture instead a pure substitution effect.

We test these three specifications on two panels of developed and developing countries, on 29 industries over the period 1981-1997. We find solid evidence on the effects of substitution and demand on domestic employment, either when selling on the home or on the industrialized and developing countries' markets.

In bilateral trade, imports from one country constitutes the exports of the other. Thus, the same effects of substitution and demand could be applied to exports. Unlike imports however, these effects are both positive on the employment of export country. In fact, by replacing foreign labor services, export countries would be employing more of domestic services (substitution effect). Moreover, an increase in exports might be reducing equilibrium prices and thus increasing total demand that benefit to the host country but also exporting countries' sellers.

We did not show however, which effect is the strongest, and thus what is the *total* impact of imports on employment. Some work related to the strategic trade policy literature, concludes that the *overall* impact of tariff barriers or transaction costs in general should be negative on employment as long as the demand function is not too convex and the variables are strategic substitutes (see Brander (1995)). Our model fails to test these hypothesis and thus does not bring a response to this purpose.

In addition, we have to mention that this paper is based on one type of labour, due to the absence of industry data by qualification for the panel of countries that is used. Consequently, we cannot infer any conclusion on the relative demand for unskilled employees. *A fortiori,* we cannot drive any conclusion from this work regarding the impact of openness on income inequalities during the considered period.

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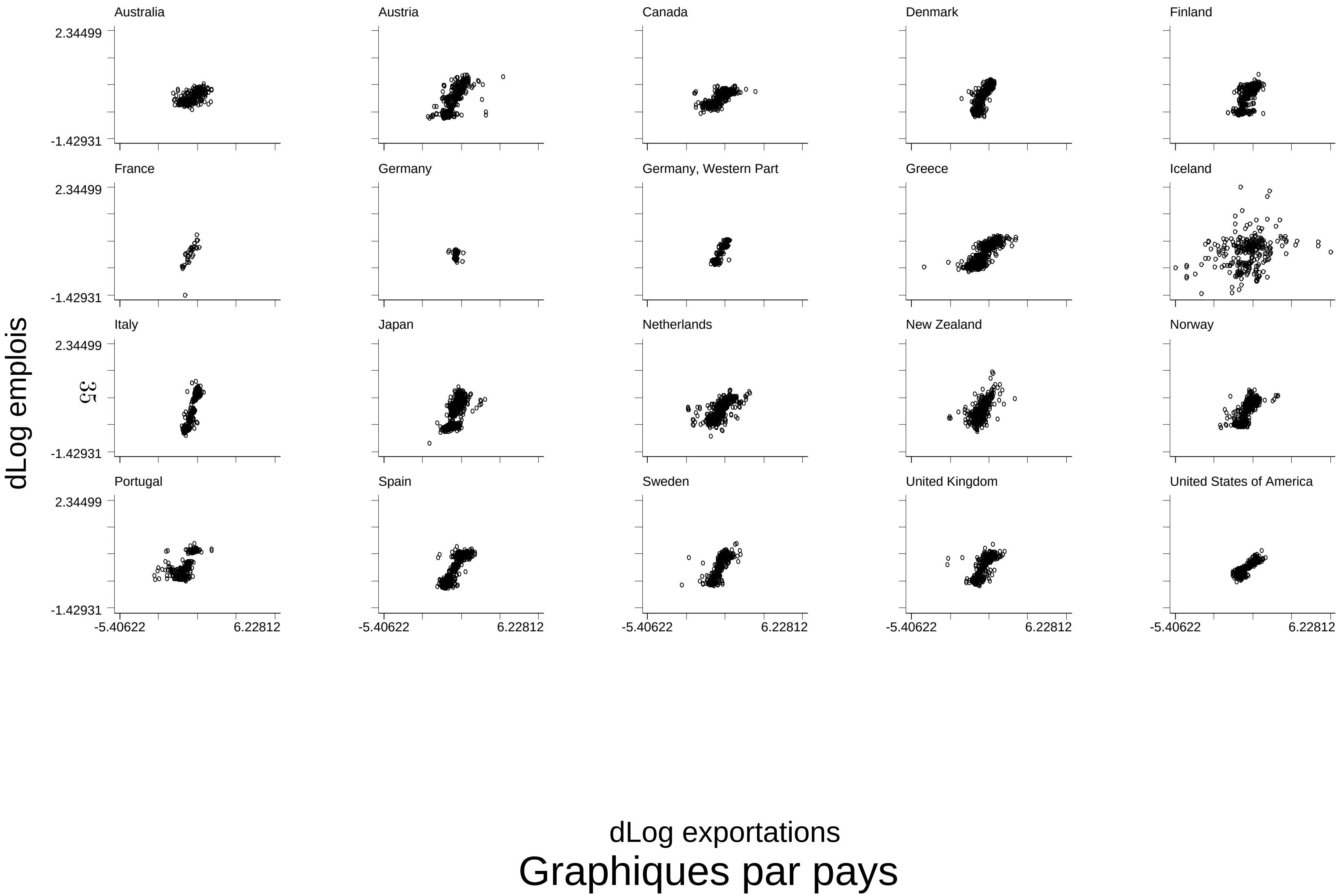

Figure 3: Industrial changes in employment related to exports in OECD countries

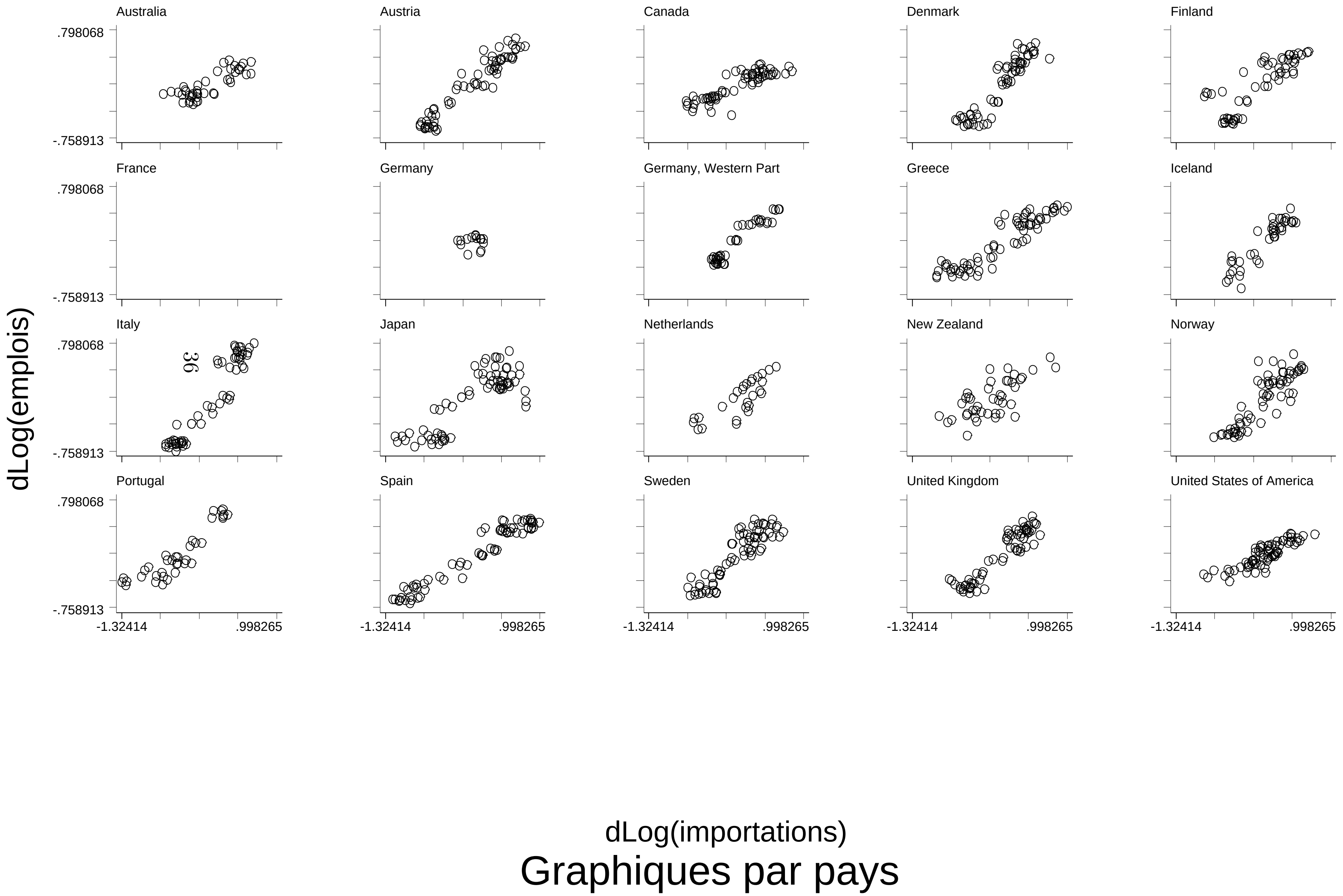

Figure 4: OECD employment changes related to imports in homogenous good industries

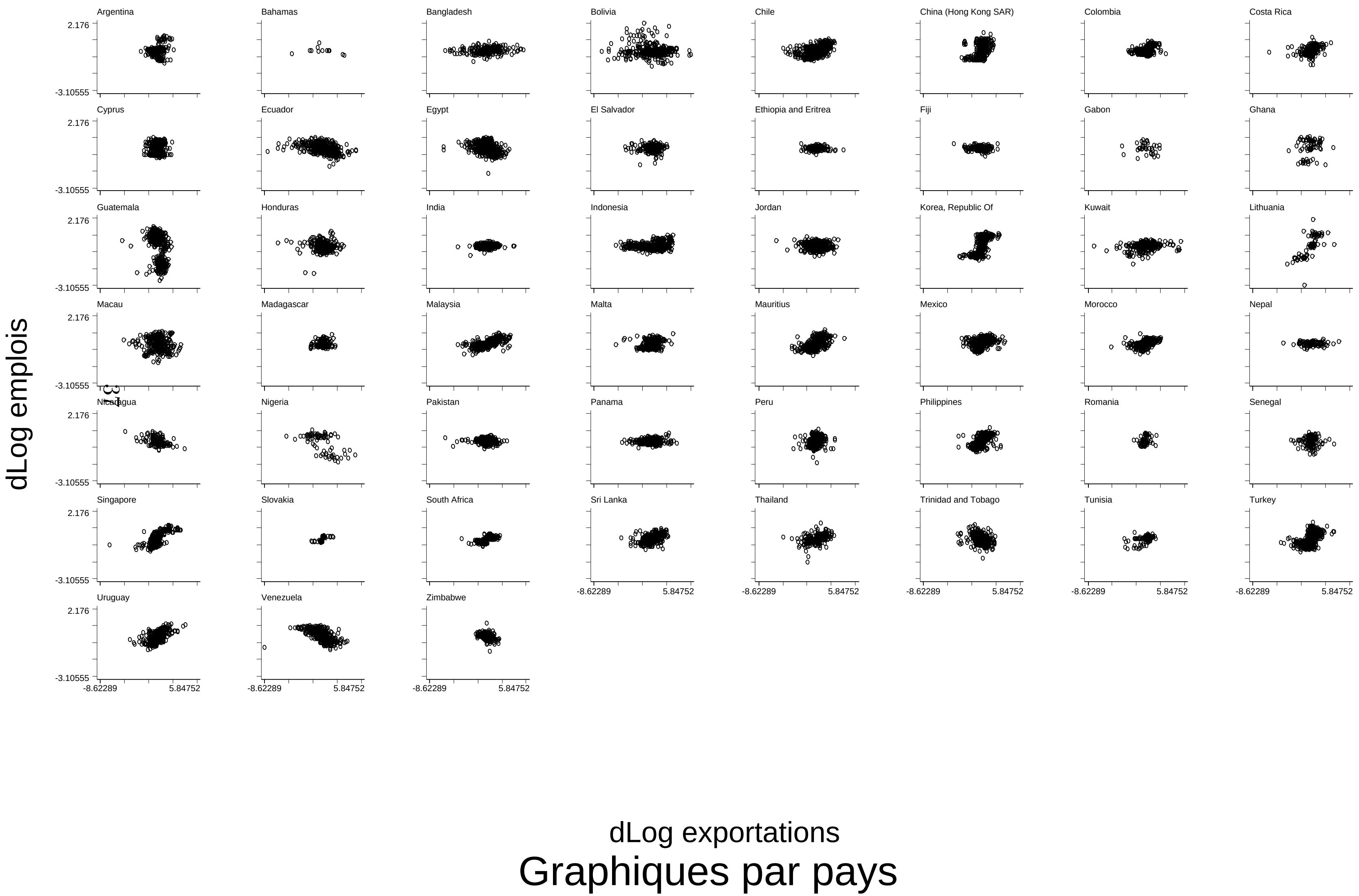

Figure 5: Industrial changes in employment related to exports in **Developing** countries

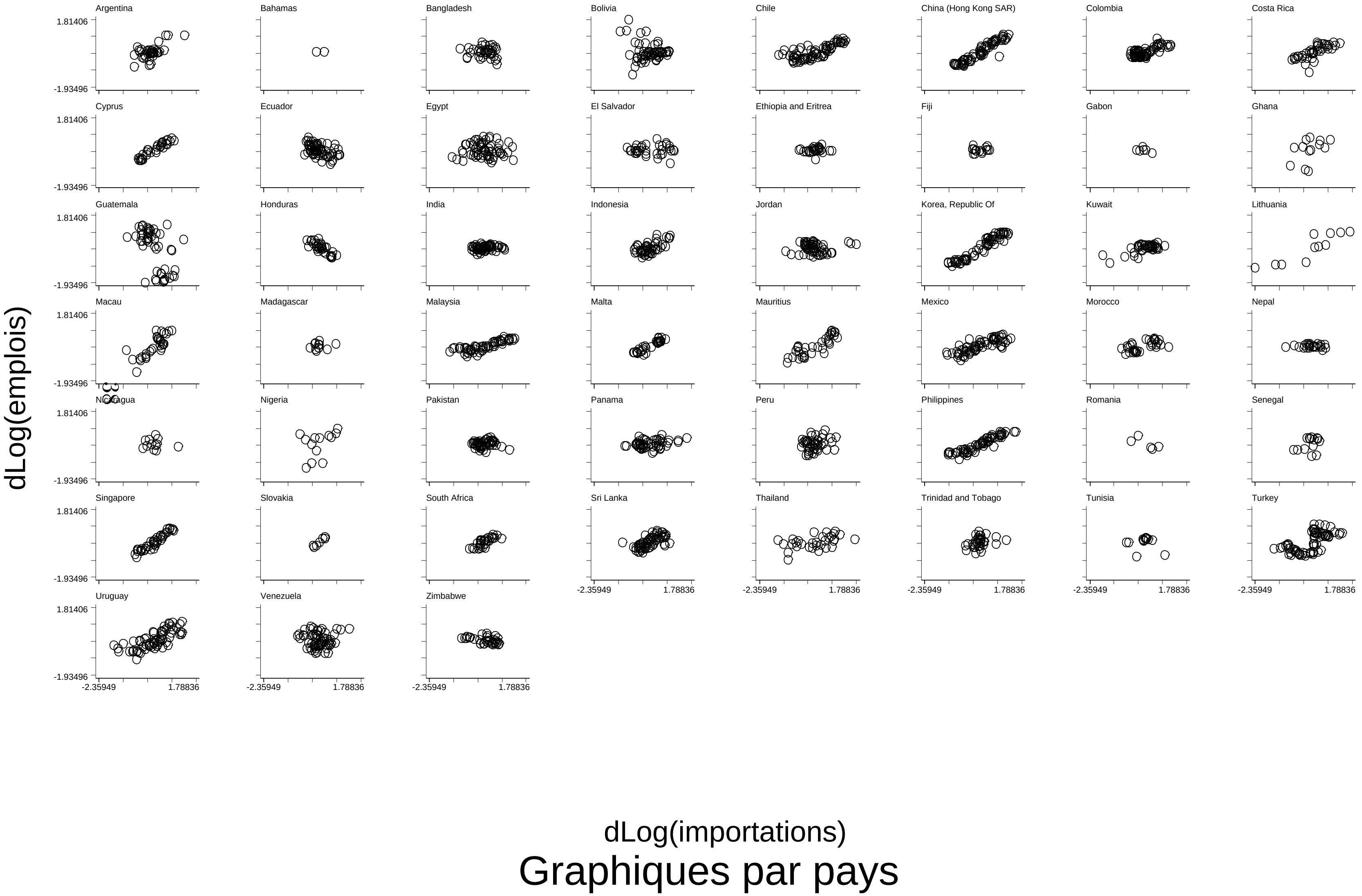

Figure 6: Developing countries employment changes related to imports in homogenous good industries

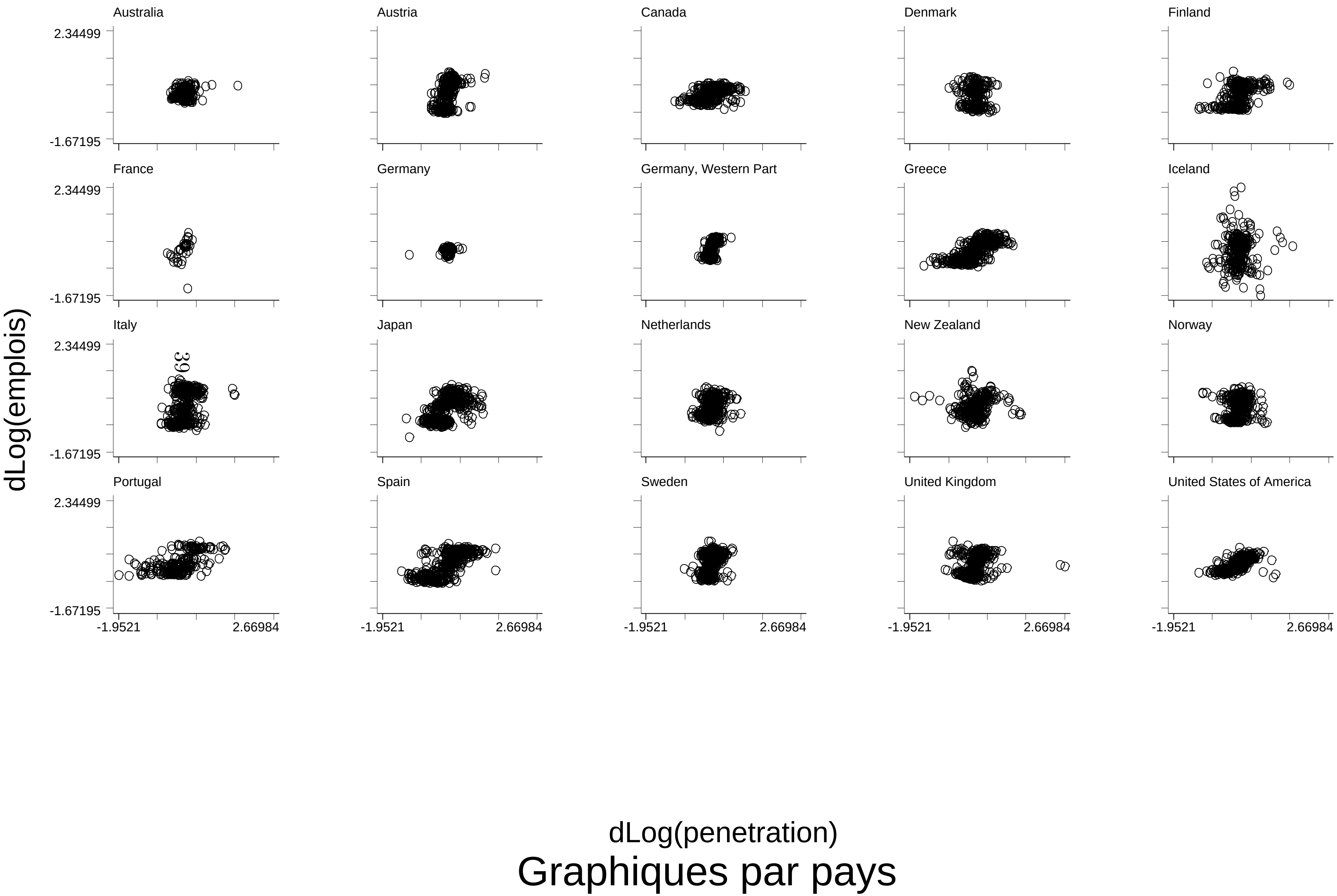

Figure 7: Industrial changes in employment related to **penetration** rates in **OECD** countries

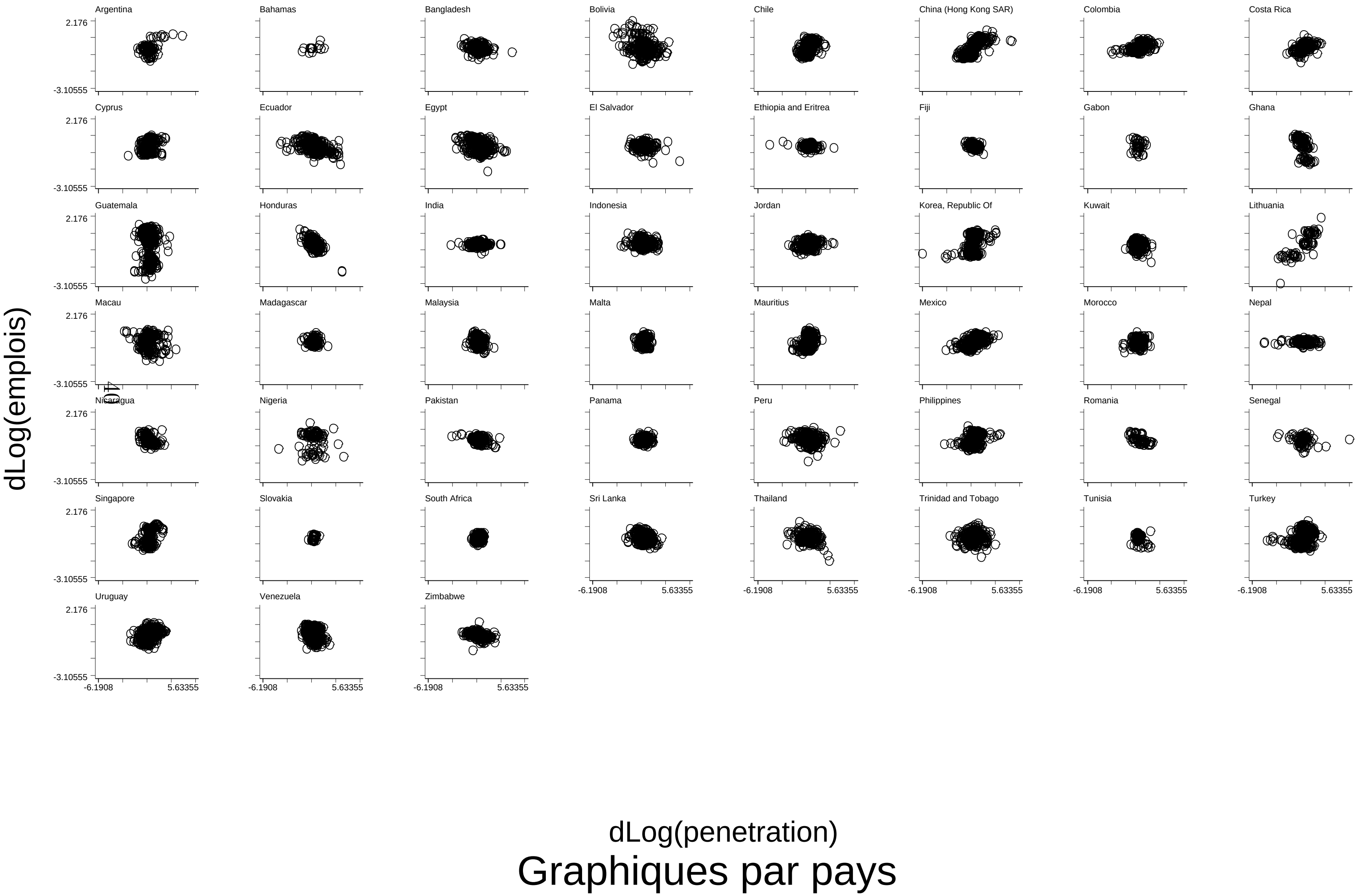

Figure 8: Industrial changes in employment related to **penetration** rates in **Developing** countries