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# Employment, Skill Structure and International Trade : Firm-level Evidence for France

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We would like to thank participants at various seminars, most particularly at Crest. We would like to thank the referees and the editors of this journal whose suggestions were extremely reasonable and helpful.

# Employment, Skill structure and International Trade : firm-level evidence for France

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**Abstract**
We use the French "Customs files", which provide an exhaustive account of the international trade transactions carried out by firms across the period 1986-1992, to analyze the link between imports, exports, and the employment of manufacturing firms. Firms constantly involved in international trade throughout the period experience higher job destruction rates, or lower job creation rates, than those that are not. The same firms also contribute massively to the observed decrease in the share of production labor in overall employment, and to the decrease in the share of unskilled workers in production labor. However, the firms constantly involved in international trade through imports or exports turn out unsurprisingly to be the biggest firms. A simple analysis based on creation and destruction rates therefore fails to disentangle the size and international trade effects.
An analysis of variance of the link between changes in flows of international trade and changes in our measures of firm employment, conditional on size as well as industry affiliation, shows that increasing imports are associated to decreasing employment. In particular, imports of so-called "finished goods", capturing the outsourcing abroad of part of the firm's local production activities, have the strongest relationship with the decrease in total employment, as well as (unskilled) production employment. On the other hand, exports tend to be associated with job creation, although this result depends on the nature of the exported product. Controlling for firm technological innovation throughout the period does not alter the conclusions obtained on international trade.

Keywords : international trade, labor demand, skills
JEL Classification : F16, J21, J23

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# 1. Introduction

Krugman hypothesized that wage inequality in the United States and unemployment in Western Europe were "the two sides of the same coin". There is a very large literature that examines the American side of the coin (Bound et Johnson, 1992 ; Berman, Bound et Griliches, 1994 ; Revenga, 1992 ; Katz et Murphy, 1992). Its conclusion is that the demand for unskilled labor decreased in virtually every industry, interpreting these within-industry evolutions as evidence of skilled-biased technical change. Bernard and Jensen (1997) (BJ, hereafter) using firm-level measures of wages, skills, employment as well as exports, and in contrast to most previous analysts, find that changes in product demand were key in understanding these phenomena. Their analysis confirmed that exporting plants played a key role during this period of rapid changes. This paper examines the other side of the coin by investigating the relations between trade and employment in France, taking stock of the decrease in wage inequality in this country up to 1984 and its stability afterwards (see Buchinsky, Fields, Fougère, and Kramarz, 2003 for a description of these trends from 1967 to 1999).[1] We also use firm-level micro-data sources for this purpose. Our analysis distinguishes itself from that of Bernard and Jensen not only because its period is slightly more recent (1986 to 1992) or because we study France. The main difference, and asset, in this endeavor is our use of French Customs data in which all flows of goods – imports and exports – are recorded. This administrative data base also contains the origin or the destination as well as the product that is imported or exported. Of course, a thorough examination of the relation between trade, most particularly imports, and employment is of potential academic interest given the debate that we briefly presented just above. But, our results should also allow us to understand if the fears regularly expressed about globalization by the popular press, the unions, or some politicians, and not only in Europe, have any empirical support.

As mentioned just above, the impact of international trade on wages and employment has often been viewed through the "reshuffling of industries" lens: because trade expresses comparative advantages of countries over inputs (and therefore products), its effect should mostly be seen between industries. Most articles examining these issues exactly adopted this view and therefore concluded that trade was not a driving force of the demand for skilled work. In contrast BJ, even though they recognized that most action was taking place within-

[1] See also Card, Kramarz, and Lemieux (1999) for an (negative) evaluation of Krugman's story.

industries, showed that this fact was not in contradiction with exporting firms (plants) playing a central role. Trade was back into the picture through product demand changes. Because we examine the role of both exports **and** imports, there are supplementary channels through which trade relates to wages and employment. More precisely, we assume that firms, whenever possible, seize the opportunity of buying inputs from relatively cheap sources. Such strategies, outsourcing being one among others, have a direct impact on local labor demand. Because the potential impact of international trade may come in various guises, we adopt as often in this literature a very descriptive perspective. To guide us, we present a rapid overview of the potential links, at the level of the firm, between trade and employment. Because the effects and the channels are multiple, the quality and the variety of the firm-level data sources that we are able to match with the Customs data base are of great help in this descriptive task.

Our empirical analysis comprises two stages. First, we study the relation between trade and job creation and job destruction using a quasi-exhaustive file of manufacturing firms. In particular, this file contains very small firms. Then, we examine the relation between trade and skill structure. Unfortunately, the size of the sample is reduced because the Survey on Skill Structure includes establishments with at least 20 employees. To follow the literature we apportion the respective contributions of the between industries, within-industries but between firms, and within firms components of the skill changes.

All these analyses are based on first-differences. Because the link between international trade and birth, growth, and death of firms is potentially central to our analysis, we contrast firms that are present at both ends of our sample period with those that die and those that are born under the same period.

As mentioned earlier, our measures of trade allow us to measure the nature of the imported good (using a 3-digit classification). We use this classification to distinguish between two types of imported goods (following Feenstra and Hanson, 1995, 1996, and 1999). When the classification of the imported good exactly coincides with that of the importing firm, we label the imported good "finished" (hereafter, FG). Otherwise, we label the imported good "intermediate consumption" (hereafter, IC). This concept of finished good tries to capture outsourcing strategies in which the production process is segmented and incorporates finished inputs from abroad (Fontagné, Freudenberg, and Unal-Kesenci, 1995; Venables, 1999).

Our results show that there is a strong correlation between imports, in particular imports of finished goods, and job destruction, most notably destruction of production jobs. And within

those production jobs, destruction mostly affects unskilled production jobs. Interestingly, the strength of this relation varies with the size of the firm. Because these relations may well come from changes in the technology environment, we examine the robustness of these findings to the introduction of firm-level measures of innovation.

The next section presents a brief discussion of our economic motivation; Section 3 presents the data sources. In Section 4, results on employment are shown and Section 5 contains results on the skill structure. A short conclusion tries to summarize the various results.

## 2. Economic Motivation

In this article, a firm is considered active on international markets if it either imports any type of input or if it exports any part of its production. To be sure, there are other ways for firms to be internationalized, such as Foreign Direct Investment (FDI), but our sources of data do not allow us to track these flows. Therefore, our discussion of potential economic motives for being international focuses on those strategies that can be tracked using this "flow" approach.

Let us consider imports first. Let us assume that a factor of production is available a different costs both on the local and on the foreign markets. This cost differential offers an opportunity of cost reduction for those firms that take advantage of it. However, firms must pay a fixed cost if they import. This fixed cost can mostly be viewed as being organizational, therefore only a fraction of firm will indeed pay this cost (a priori, the largest firms). Hence, import strategies are directly interpreted in terms of a tradeoff between paying this fixed cost and reducing the marginal cost of production.

Of course, the potential reduction in the cost of production differs widely depending on both the imported good and the part of the production process to change when using this new input. First, assume that the import exactly replaces an input previously purchased on the local market, then we should see no impact on the firm itself. Now, if the imported good replaces one (or more) segments of production, the impact on the firm is likely to be greater. In the first category, we expect to see imports of capital goods (machines, in particular) or imports of some intermediates. In the second, part of the production is now outsourced and imports are likely to be imports of finished goods but some intermediate consumptions may also enter in that category (because they were produced by the firm itself, for example).

The two types of imports indeed affect employment at the firm through changes in volume induced by the costs reductions. Depending on the various price elasticities and potential substitution effects, when sales grow employment may grow. In addition, when the firm imports FG, a share of the production is now outsourced and employment (per unit of good produced locally) at the firm will decrease. When the firm imports intermediates (IC), employment may also decrease both when the IC was internally produced or when the IC can be substituted for some labor (using in particular capital).

Of course, the above discussion refers to employment of production workers. Within production workers, those at risk of losing employment when a cost reduction strategy is used are obviously the low-skill workers. This effect is most likely to take place in a country like France where minimum costs (i.e. the labor costs at the minimum wage, including payroll taxes) are very high (see Kramarz and Philippon, 2001 for an analysis of this question). But, firms' decisions when shedding workers must include potential separation costs which are also very high in the French context (see Abowd and Kramarz, 2003 for an evaluation of their magnitude at the end of the sample period).

Because import activities may entail an internal reorganization of the firm and may require new abilities, the demand for engineering and managerial labor is likely to increase.

The channels through which firm's employment is affected by exports are potentially different from those for imports. Of course, export activities may well be complement to import activities. The general view though, well captured in Bernard and Jensen (1999), is that "good firms become exporters" (page 1). Employment growth seems to be associated with exports growth, but this obviously depends on the various price elasticities on the various markets. Another channel through which exports may affect employment composition is studied by Maurin, Thesmar, and Thoenig (2002). The authors claim and show that the export activity demands more skilled sales persons, lawyers, marketing personnel…

## 3. Data

Up to 1992, all movements of traded goods that enter or leave France are declared to the customs either by their owner or by the authorized customs commissioners. These declarations constitute the basis of all French trade statistics. Each movement - an operation - generates a record. All records are aggregated first at the monthly level. In the analysis file,

these records are only available on an annual basis. They were aggregated at the firm-level using the firm identification number, the SIREN. Hence, the analysis file contains for all exporting or importing firms and for all years, the amount of their total transactions in each year between 1986 and 1992 for each product of the NAP 100 classification (3-digit equivalent of the SIC code), by destinations for the exports and origins for the imports. Transactions are recorded in French Francs and measure the amount paid or received by the firm (i.e. including discounts, rebates,...). Even though our file is exhaustive - all export or import of goods are present - direct aggregation of all movements differ from published trade statistics, the latter being based on list prices. In particular, the data source includes imports or exports made by manufacturing firms but also those made by trade firms or firms from the service industries. However, we do not know the price of the transaction. To deflate our measures of firm-level trade, we use 4-digit import and export prices computed for three geographic zones (EC, OECD outside EC, outside OECD) by the statisticians from the French National Accounts.

To give an idea of the size of our data source, the original import file has 730,921 observations for year 1986 and 786,299 for year 1987 (Similarly, the original export file has 832,072 observations for year 1986 and 859,115 for year 1987). An observation contains the firm identifier, the year, the transaction value, the product, the origin or the destination. The geographic classification is the most detailed possible since we know the exact country of origin or destination.

In order to make this information tractable, we further aggregate the geographic classification into 3 categories: European Community (plus Switzerland), Other OECD countries and Low-wage countries. In addition, we define two groups of imported products. We compare the 3-digit industry of the imported good with the 3-digit industry of the importing firm. If they match, we call this import a “finished good” (FG, as already defined). If not, we call this import an “intermediate consumption” (IC). Since the Customs file contains only information on the trade of goods - nothing on services - we will essentially focus on firms from the manufacturing sectors (excluding the construction industry).

The resulting file contains one observation per firm and year between 1986 and 1992, with international trade variables consisting of deflated imports of FG and IC by broad geographic origin, as well as deflated exports by broad geographic destination. This file is first matched with the BAL-SUSE database, which provides firm-level information.

The BAL-SUSE database is constructed from the mandatory reports of French firms to the fiscal administration. These reports are then transmitted to INSEE where controls and confrontation with various other data sources (such as the EAE, "Enquête Annuelle d'Entreprises") are made. All firms subject to the "Bénéfices Industriels et Commerciaux" regime (a fiscal regime mandatory for all firms with a turnover above 3,000,000FF in 1990 and 1,000,000FF in 1990 in the service industries) are included. In 1990, these firms comprised more than 60% of the total number of firms in France whereas their turnover comprised more than 94% of total turnover of firms in France. Hence, the BAL-SUSE is representative of French enterprises in all sectors except the public sector.

From this source, we use balance sheet information (total sales, total labor costs, total wage-bill, sales, value-added, total purchases, total assets, total employment). To deflate those variables, we use various industry-level prices, production, value-added, and wages. All these prices come from French National Accounts using a 2-digit level of aggregation (24 manufacturing industries, in the NAP classification).

The BAL-SUSE database contains 322,591 firms belonging to manufacturing industries (excluding construction) over the period 1986-1992. Among them, 95,581 firms are present in the file only at the beginning of the period. We call them "dying firms" even though these firms may just have passed below the turnover threshold. Conversely, 81,518 firms are present only at the end of the period. We call them "new-born firms". The 145,492 remaining firms are called "continuing firms". They represent 75% of total employment in 1986, and over 80% in 1992. (see Tables A.1 and A.2 in the Appendix).

The previous dataset does not provide information on the composition of firm employment by category of skill. Indeed, there exists no exhaustive source for France providing this information until 1993. The only available source over the 1986-1992 period is the Employment Structure Survey (ESE, "Enquête sur la Structure des Emplois"). The ESE is a yearly survey carried out jointly by the French Ministry of Labour and INSEE. All establishments with more than 10 employees until 1988, 20 employees thereafter, are requested to provide information on their skill structure of employment by sex. We use the 1986 to 1992 surveys aggregated at the firm-level, to supplement the information on firm employment provided by the BAL-SUSE database. This aggregation of establishment level information at the firm level may induce measurement errors for firms with a large number of establishments below the threshold of 10 or 20 employees, therefore not surveyed by the ESE. In practice, however, although total employment is sometimes underestimated, the measured

skill structure is reasonably representative of the actual skill structure in the firm. The 1986 survey has a number of 105,821 firms, while the 1992 survey has 69,072 firms. Using information on skills within the firm therefore implies a strong reduction in the size of our sample, as well as a bias towards large firms. Restricting the sample to manufacturing firms and merging with the BAL-SUSE dataset leaves us with 39,459 firms. Among them, 17,625 are present in the ESE at both dates. The size of this sample is therefore almost ten times smaller than the BAL-SUSE file. This leads to our two step analysis of the links between employment and international trade. Total employment is analyzed using the complete BAL-SUSE file, whereas its composition by skill group is analyzed using the smaller ESE sample.
Skill groups correspond to the 2-digit French Classification of Occupations and Social Categories. We aggregate further these categories into six basic groups : executives, technicians, intermediate administrative occupations, clerks, skilled production workers and unskilled production workers. In this article, we retain two measures of the firm's skill structure. We first compute the proportion of production workers in total employment. We then compute the ratio of the number of unskilled production workers to the total number of production workers (see Table A.2 in the Appendix).

Both previous datasets can be merged further with the 1991 Innovation survey. Indeed, a recurring concern in this literature is that of trying to disentangle the international trade and the biased technical change stories. The 1991 Innovation survey has been conducted among manufacturing firms with 20 employees or more. These firms are requested to report their product innovations, process innovation, commercial innovations and organisational innovations between the beginning of 1986 and the end of 1990. Therefore, innovations carried out in 1991 and 1992 are not reported, which may lead to underestimate the link between innovation and employment. This is however the closest we can get to describing the firms' innovation behavior over our period of analysis. Merging the Innovation Survey with the ESE file reduces the sample size from around 17,000 to 13,000 continuing firms.

## 4. Results for Employment

Before turning to the direct evidence relating trade and employment, we present in Table 1 the structure of firms that are active on the international markets. As discussed above, we may track both imports and exports. Hence, the table contrasts firms that only export or only

import with those that do both. In addition, because we know the product that is imported, we contrast imports of intermediates and imports of finished goods. Finally, because we know the origin of the imports, we contrast three zones, described in the data section, namely European Community (EC), OECD outside the EC, and the so-called "low-wage countries" a very heterogeneous group, by all means. Table 1 shows for the different internationalization categories the fraction involved, un-weighted in the first column and weighted by sales in the second. Results are indeed striking. A small proportion of firms is indeed active on the foreign markets. But those most active (exporting and importing) represent the bulk of French sales. In addition, the further away from the EC the imports come from the smaller the fraction of firms active (un-weighted as well as weighted). Finally, more firms import IC than FG.

Table 2 shows that being active has very different meanings for those firms. The Table presents fractiles (median, third quartile, ninth decile) of the distribution of exports as a fraction of sales (for those active) and fractiles (median, third quartile, ninth decile) of the distribution of imports as a fraction of total purchases (once again for those active). Most firms essentially import or export very little. Even the importer or exporter at the third quartile imports or exports around 10% of its purchases or sales. (see also Table A.1 for a distribution of employment in relation with the export or import status).

Table 3 is our first table decomposing employment changes between the different categories of firms. First, note that the first line of the Table presents the total employment change in manufacturing industries between 1986 and 1992: employment decreased by 7.1%. The first column of the Table presents rates of growth of employment, the second column shows the fraction of employment that each category represents, finally the last column is equal to the product of the first two columns and essentially gives the fraction that this category represents in the overall change. We compute the rate of growth as follows (in the spirit of Davis and Haltiwanger, 1999). First, we define employment of firm *i* at the beginning and at the end of our sample period as follows :

$$L_i^{B} = \frac{L_i^{86} + L_i^{87}}{2}, \quad L_i^{E} = \frac{L_i^{91} + L_i^{92}}{2}$$

Then we define the average employment over the period using $\bar{L}_i = \frac{L_i^{B} + L_i^{E}}{2}$ and use it to compute employment growth in the firm over the period as:

$$\Delta L_i = \frac{L_i^{E} - L_i^{B}}{\bar{L}_i}$$

Then, these numbers are averaged in the economy using the following formula $\sum_i \frac{\bar{L}_i}{\sum_j \bar{L}_j} \Delta L_i$ or across various categories of internationalization that are mutually exclusive, say $I = \bigcup_{k=1}^{K} I_k$ in order to compute the following decomposition of total employment growth:

$$\sum_{k=1}^{K} \frac{\sum_{i \in I_k} \bar{L}_i}{\sum_i \bar{L}_i} \sum_{i \in I_k} \frac{\bar{L}_i}{\sum_{j \in I_k} \bar{L}_j} \Delta L_i$$

The Table comprises two panels, one for imports and the second for exports. Each row within each panel is mutually exclusive (the format resembles Table 3 in BJ). Continuing firms are differentiated from firms that died or were born over the period. And within each of these categories, the Table contrasts the different importing (resp. exporting) regimes (the $I_k$ in the above definition): never imports, starts importing, stops importing, continuously importing (increasing imports w.r.t. purchases), and continuously importing (constant of decreasing imports w.r.t. purchases) (resp. exporting). Clearly, new-born and dying firms have a huge impact on aggregate employment losses since the aggregate impact of continuing firms is essentially zero. And among each of the three categories, the internationally active tend to destroy more employment that those which are not. And these results hold both for exports and imports.

Tables 4 and 5 have essentially the same structure but differentiates imports by type, FG for Table 4 and IC for Table 5. Each Table then further focuses (in the lower panel) on imports from "low-wage" countries. Most results are essentially similar to those presented in Table 3. One striking thing appears though for imports of FG, and even more strikingly for those that import FG from low-wage countries. All those firms that import at some point in time finished goods have much lower growth than those who do not, or who import in general. Furthermore, those firms import FG from low-wage countries (this is also true for firms that IC from low-wage countries) have even more lower growth rates than their equivalent that import FG or IC. More specifically, those firms that are continuously importing FG or IC from low-wage countries destroy employment essentially between two and four times more than firms that continuously import from the average source (mostly EC, in fact). And, even though such firms that source from low-wage countries represent a relatively small fraction of employment (see the second columns in these Tables), because they destroy lots of employment, they represent the bulk of destruction among the continuing firms.

Table 6 and Table 7 analyze the relation between employment growth and imports, and employment growth and exports, respectively. Once again, they adopt a format similar to the previous tables, also found in BJ. The size categories are firms with less than 20 employees, firms between 20 and 199 employees, and firms with at least 200 employees. Notice that our data source includes many small firms, in contrast with most other data sources (BJ for instance). Results in Table 6 show that size really matters. Apparently, the 200 employees threshold has some relevance since all firms below this size (except those that stop importing), in particular firms that are continuously present on the import market, create employment (or at least display positive average employment growth). By contrast, for firms with at least 200 employees, those that are continuously present on international markets have negative employment growth. And, indeed they constitute the bulk of employment destruction among the continuing firms of all sizes.

Table 7 repeats the exercise for exports. And perhaps surprisingly, results are exactly similar. The 200 employees threshold is also present. And, above this limit almost all continuing firms destroy employment, irrespective of their exporting status (except those that never export, a tiny fraction of these firms). Whereas below this threshold, virtually all continuing firms create employment irrespective of their exporting status (except, as found virtually everywhere in this analysis, those firms that stop exporting).

Indeed, to go further this descriptive exercise, a simple regression framework is needed. Of course, and unfortunately, there is no simple way to go beyond the "correlation" conclusion and reach the "causality" heaven.

To try to sort out the variance elements potentially explaining employment growth in the French context, we estimate the following simple first-difference regression:

$$\Delta L_i = \beta Y_i + \gamma T_i + \alpha \Delta Z_i + \delta S_i + \varepsilon_i \qquad (1)$$

where $\Delta L_i$ is employment growth rate for firm *i* under the sample period (defined as before), $Y_i$ is a vector of measures of internationalization of firm *i*, $T_i$ is its size class, $S_i$ is the firm's 4-digit industrial affiliation indicator, and $\varepsilon_i$ is an i.i.d. shock. To make it a labor demand regression, we also include measures of firm's labor costs, sales,… in first-difference denoted in equation (1) as vector $\Delta Z_i$. Our vector of measures of internationalization is constituted as follows. First, it includes the difference in imports of FG (resp. IC, resp. exports) between the beginning and the end of the period as a fraction of sales. Second, it includes indicators for those firms that started to import FG (resp. IC, resp. exports) over the period, $y_B$=0 and $y_E$>0,

that stopped importing (resp. IC, resp. exporting) over the period, $y_E$=0 and $y_B$>0, and that constantly imported FG (resp. IC, resp. exported) over the period, , $y_B$>0 and $y_E$>0.

Table 8 reports the estimation results. The Table has the following structure. In the first two sets of columns, we present estimation results for two regressions unweighted by average firm employment. The regressions In the last two sets of columns are weighted by firm employment. Now, for each specification, the first column presents estimation results for a regression that does not distinguish the origin of imports or the destination of exports. And, for each specification, the second set of (three) columns presents estimation results for imports and exports distinguished by origin and destination.

First, it is important to notice that the labor costs coefficient and the sales coefficient both have the expected sign, negative and positive, respectively, and are very significant. This is reinsuring in that we appear to be estimating a labor demand equation. Concentrating now on the measures of internationalization, estimates appear to confirm the general intuition discussed in the motivating economic section. Employment destruction appears to be associated to imports, in particular imports of finished goods. Indeed, changes in local purchases as a fraction of sales (capturing changes in the local sourcing strategies) are also negatively associated with employment growth. However, the coefficient of FG intensity change is significantly larger than both the coefficient of IC and that of local purchases. As for the indicators of internationalization at the beginning and at the end of the period, there is no clear pattern. Firms continuously importing FG tend to create less employment than non-participants at both ends. However, firms continuously importing IC experience higher employment growth.

We apply the same distinction between FG and IC as for imports. Indeed, according to the customs files, firms do export products outside their 2-digit affiliation. This may happen when the firm's range of economic activities goes beyond the "main activity" captured by the classification. This may also happen when firms export intermediates, possibly to be fed into the production process of foreign plants (unfortunately, we cannot identify the actual strategies behind trade flows). Changes in the share of exports of FG in total sales are not associated with employment growth. However, exports of IC turn out to have a negative association with employment.

Concentrating on the second set of columns, where origins and destinations are differentiated, the previous comments are essentially confirmed. Important, or interesting at least, though are the following facts. First, there is some difference between the impact of imports of FG from low-wage countries and that of imports of FG from the European community or other OECD

countries (outside the EC). But although the coefficient is more negative on the former, the discrepancy is hardly significant. Employment destruction is associated with IC exports to all three geographic zones, but more strongly so to OECD countries outside Europe (mainly the US and Japan). This might be a sign that such exports reflect horizontal foreign direct investment, whereby exports of FG to foreign markets are substituted by production abroad possibly involving the use of domestically produced IC.

All these conclusions are virtually unchanged when examining the employment weighted regressions. The association between imports and employment appears to be stronger in large firms. In these regressions, the dummies of import and export status become less significant, reflecting the fact that the larger firms often belong to the category of constantly importing and exporting firms. But the coefficients of import intensity change are much larger, and estimated with higher precision. Imports from low-wage countries, especially of IC, appear to be the most strongly negatively related to employment growth. As far as exports are concerned, FG now have a significantly positive association with employment, except for exports to OECD outside Europe. IC exports to OECD outside Europe, and also to "low wage countries" including Asia, are again associated with employment destruction.

## 5. Skills and Trade

In this section, we examine the skill side of the relation between employment and trade. We focus on two variables, the share of blue-collar workers in employment and, within blue-collar workers, the share of unskilled blue-collar workers. The share of blue-collar workers is equivalent, given the data we can use, to that of production workers often available in North-American studies. Indeed, this share of production workers is often used as the measure of unskilled work (Berman, Bound, and Griliches, 1994; BJ). Our second measure, the fraction of unskilled blue-collar workers in blue-collar employment should be a better measure of those a priori most likely to be affected by trade competition (as well as changes in the minimum wages, even though the period under study was not one of marked changes in the SMIC policy). According to the French classification of occupations, the so-called unskilled blue-collar workers are those whose job requires little specific training. They embody little specific human capital and should be more easily substitutable by foreign "low-wage" blue-collar workers than their skilled counterparts. According to the skill biased technical change,

however, they should also be the most vulnerable to substitution by technology intensive equipments and associated organizational change (see Table A.2 for descriptive statistics).

In order to compare our results with those obtained by previous analyses (Berman, Bound, and Griliches, 1994; Bernard et Jensen, 1997), we decompose aggregate changes into two components. As usual in this literature, we contrast between and within-industries changes. Then, we decompose the within-industries changes into two parts: between-firms changes and within-firm changes of the skill structure. Such a decomposition allows the analyst to see if most of the movements are due to changes in the size of industries, changes in the composition of firms within an industry (some firms growing when others shrink), or changes in the composition within the firms.

To pursue this task, we use the most detailed industry classification that is available in our firm-level data sources, the so-called NAP600 with 600 positions for the whole economy. To decompose production employment, for instance, we use the following decomposition (see Davis and Haltiwanger, 1999 as well as Berman, Bound et Griliches, 1994 ; and Bernard et Jensen, 1997):

$$\Delta P = \sum_s \Delta S_s \overline{P}_s + \sum_s \Delta P_s \overline{S}_s$$

where :[2]

$$P_s = \frac{Q_s}{L_s}, \quad S_s = \frac{L_s}{L}$$

$$\Delta P_s = P_s^E - P_s^B, \quad \Delta S_s = S_s^E - S_s^B$$

$$\overline{P}_s = \frac{P_s^E + P_s^B}{2}, \quad \overline{S}_s = \frac{S_s^E + S_s^B}{2}$$

with $Q$ denoting blue-collar employment (resp. unskilled blue-collar employment), $L$ total employment (resp. blue-collar employment), $s$ is the industry, $E$ and $B$ denote the end and the beginning of the sample period, defined as in the previous section. Hence $S_s$ is the share of total employment (resp. of blue-collar employment) of industry $s$ in total employment (resp. in total blue-collar employment).

[2] $\Delta$ denotes in this section first differencing and not a growth rate as in the previous section.

The first term in the decomposition gives the contribution to the aggregate change of between-industries reallocations. Whereas the second component gives the contribution of the within-industries reallocations.

Results are presented in Table 9. Notice that the sample size has been reduced because of the matching between sources that is involved in this analysis. The first two columns of Table 9 present the results for the productions workers whereas the last two columns present the results for the unskilled blue-collar workers. For each category, the first column gives the between industries contribution and the second column gives the within-industries contribution. The first line of the Table gives the overall change for the category. The "All" panel presents the first decomposition. Then, each panel of the same Table presents different components of this overall decomposition based on the internationalization status of the industries. To define this status, we measure for each decomposition the change between the beginning and the end of the period in the ratio of each measure of international trade that we use (imports, exports, imports of FG, of FG from low-wage countries, of IC, of IC from low-wage countries) to sales. And, we contrast those industries in which the ratio increased with those in which the ratio decreased or was constant. First, results show the usual fact. The declining share of production workers in total employment (-0.018) is mostly a within-industries phenomenon. Similarly, the declining share of unskilled blue-collar workers in production jobs is mostly a within-industries phenomenon (Berman, Bound, and Griliches, 1994; Bernard et Jensen, 1997). However, when we contrast industries using the changes over the period in their use of foreign markets, Table 9 shows something different. In those industries that increased their use of imports of FG, IC,… over the period, the fraction of production of workers as well as the fraction of unskilled workers among them decreased (whereas it increased for those industries that did the reverse, i.e. decrease their use of imports). Hence, the smallness of the between-industries components hides two opposed behavior related to changes in access to foreign markets of the various industries. This is true for imports of IC and FG but it is not true of exports or of imports without distinguishing FG and IC. And the magnitude of the changes, although slightly inferior to those contained in the within-industries columns, are far from trivial (most particularly in the decomposition for blue-collar jobs).

The analysis of the within part of the changes is pursued in Table 10. It is based on the following decomposition of the within-industries change:

$$\Delta P_s = \sum_{i \in s} \Delta S_i \overline{P}_i + \sum_{i \in s} \Delta P_i \overline{S}_i$$

where $\Delta P_s$ denotes the within-industry change in $s$, $\overline{S}_i$ is the average share of firm $i$ in employment of industry $s$, $\Delta S_i$ is its change, $\overline{P}_i$ is the average share of blue-collar workers in total employment ar firm $i$, and $\Delta P_i$ its change. Once again, this allows us to get a between-firms and a within-firms component. These two components are further decomposed using the firm strategy vis-à-vis the international markets. Finally, all these elements are aggregated across industries to obtain the within-industries measure from the previous decomposition using:

$$\Delta P^{WITHIN} = \sum_s \overline{S}_s \sum_{i \in s} \Delta S_i \overline{P}_i + \sum_s \overline{S}_s \sum_{i \in s} \Delta P_i \overline{S}_i$$

Results are presented in Table 10. This Table has almost the same structure as Table 3 of BJ. We just add a small twist to their table by contrasting firms that are continuously present (in the export or the import market, their "Thru" category) into firms that increased their use of imports or exports (as a ratio of sales) and those that decreased it. Most results have the same flavor as that found by others in the literature: the action is within-firms. Also interestingly for our purpose, most changes take place in firms that are continuously present on foreign markets. But, our decomposition into firms that increased and firms that decreased their use of foreign markets tells us something new. Imports do not play the same role as exports: firms that increase the share of imports in their sales destroy more production jobs and even more unskilled production jobs than firms that decreased this share; but the reverse holds for exports.

Tables 11 and 12 have a similar to Table 10. It presents results for FG and IC imports (total as well as from low-wage countries), respectively. The decomposition gives very similar results. More precisely, it is only for imports of FG from all origins as well as from low-wage countries and imports of IC from low-wage countries that firms that increase their use destroy more production jobs and more unskilled production jobs. In that respect, IC imports from all origins behave like exports.

As before, a regression framework is needed to understand the role of the various factors affecting the skill structure of French firms. This is done in the last three Tables. The estimating framework is virtually similar to that used in the employment regressions based on equation (1). The main difference being indeed the variables to explain, now the change in the

share of blue-collar workers in total employment over the period and the change in the share of unskilled blue-collar workers within blue-collar employment over the same period. The format of Table 13 and Table 14 is exactly similar to that of Table 8.[3]

We start by analyzing results for production jobs. First, focusing on the regression that does not distinguish the origins of imports and the destinations of exports, we see that imports of both types, FG or IC, have a negative impact on the share of production jobs, much more markedly and robustly so for FG, as one should expect. Whereas overall exports of FG have a small but positive impact on this employment category, mainly in large firms, there is no sign of the share of blue-collar workers being affected by IC imports. But the analysis by origin or destination tells us something more complex. Imports of FG are more strongly associated to the destruction of production jobs when they come from close countries within the EC than when they come from further away; a potential reflection that production units for these relatively large firms (remember that the sample includes no small firm anymore) have been sometimes set up outside France within the European Community. By contrast, note that low-wage countries do not seem to have the "negative role" that they appear to have on employment growth. Potentially, this is a reflection of the fact that these countries compete with French firms and essentially this process leads to the elimination of some establishments, shedding all employment and not only production jobs. Indeed, it is important to underline once again that the smallest firms are not in this analysis.

Results for the unskilled are overall similar. Worth of notice though is the fact that unskilled job losses seem mostly associated with imports of FG, and only in the largest firms. Indeed, un-weighted regressions yield no significant coefficient whatsoever. For this reason, results are also more sensitive to the composition of the sample, as a result of the clean up process of the data. In particular, the positive coefficient of FG imports from low-wage countries is neither very significant nor robust. Quite robust however is the coefficients of FG and IC for imports coming from OECD countries (other than EC). They are by far the largest (negative) coefficient in this regression. These countries must have special role in the sourcing strategies of French firms that the analysis pursued here cannot easily identify. A possible explanation consists in interpreting geographical origin of imports in terms of imported input "quality". Quality product being complement to quality workers, one would expect imports from "high quality" zones to be associated with shrinking unskilled labor, and imports from "low quality" countries to have the opposite effect. Indeed, within industries, product quality strategy such

[3] We include the share of local purchases in sales as a regressor in this analysis.

as vertical differentiation, is part of the strategies of firms. In our data, it is unfortunately impossible to disentangle the cost reduction strategies for a given product quality from the vertical differentiation strategies.

Notice also that FG export growth has a negative association with unskilled production jobs, but only for exports to low-wage countries. French firms' comparative advantage is obviously not in unskilled jobs, when compared with most other countries, in particular given the high minimum wage policy.

Table 15 adds measures of innovation to test the robustness of the results to the alternative explanation that changes are due to the so-called "biased technical change". Table 15 presents regressions similar to those included in the columns "all origins" of Tables 8, 13 and 14. All these regressions are again weighted by firm employment. For each dependent variable (total employment, fraction of production workers in total employment, and fraction of unskilled workers among production workers), we present two specifications of each regression. The first specification, presented in the columns 1, 3, and 5 is identical to that used in Tables 8, 13 and 14. The number of firms however differs, as we only retain those firms for which our innovation variables are available. The second specification adds a range of measures of technical, commercial and organizational innovations. Comparing the coefficients of international trade variables in both specifications for all three dependent variables shows that controlling for innovation does not affect the results obtained for imports and exports, even though some innovation variables have a significant association with employment growth and employment structure.

This pattern is however complex. New product introduction and commercial innovation have the clearest association with total employment growth. On the other hand, process innovation as well as product improvement and organizational innovation have a negative association with employment growth. The firms that have substantially improved existing products and technological processes or introduced commercial innovations, experience a change in employment structure at the benefit of production workers. The opposite holds for firms in which an organizational innovation took place. Firms achieving substantial improvements of existing products or commercial innovation experience a higher drop in the proportion of unskilled production labor in overall production labor. On the other hand, firms launching new products experience a change of opposite direction. Finally, firms for which innovation was obtained by means of internal R&D experience higher employment growth, especially among non-production workers.

Assuming that these results tell us something about two competing explanations – trade and technical change – for observed changes in employment (total and composition), these regressions tend to show that these explanations are complementary rather than substitutes.

# 6. Conclusion

In this article, we relate total employment growth, changes in the proportion of production workers in total employment, and changes in the proportion of unskilled production workers in total production labor with trade variables, namely imports and exports of firms. We find evidence that firms importing « finished goods » (FG) always destroy more employment than firms only importing « intermediary consumptions » (IC) conditional on changes in local purchases. The former type of imports should reflect outsourcing strategies. Imports from low-wage countries have a slightly more negative association than average imports, but the difference is far from massive. Exports of « finished goods », a good normally produced by the firm, is positively associated to employment changes but exports of other goods has a robust negative effect, potentially reflecting FDI.

Turning to skills, we find the usual result that most changes occur within firms, a fact often interpreted as evidence of skill biased technical change. Using a regression framework, we find that FG imports have a negative association with production labor, as well as unskilled labor (at least in the largest firms). Controlling for innovations taking place at the firm does not alter any of our conclusions.

Unfortunately, our approach is purely descriptive. To go a step further and identify causal effects, two directions can be taken. In one, valid instruments for firms imports and exports have to be found. A potential route is the use of variations in exchange rates. In the second direction, the estimation of structural models (as those of Eaton and Kortum, 2002 or Melitz, 2003), should help identify the effects of trade on employment.

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**Table 1: Importing and Exporting Firms**

| proportion of firms involved in : | non weighted | weighted by sales |
|---|---|---|
| exports only | 5% | 2% |
| imports only | 6% | 5% |
| exports & imports | 13% | 82% |
| imports of FG, all origins | 11% | 75% |
| imports of FG, EU | 10% | 74% |
| imports of FG, OECD outside EU | 2% | 45% |
| imports of FG, Low wage countries | 2% | 45% |
| imports of IC, all origins | 17% | 85% |
| imports of IC, EU | 16% | 84% |
| imports of IC, OECD outside EU | 4% | 62% |
| imports of IC, Low wage countries | 3% | 54% |

Source : Customs Files and BAL, 1986-1987
Total number of firms : 241,073 in manufacturing industries
FG = Final Goods (same 3 digit imported product as importing firm indus
IC = Intermediary consumptions (all other imports)

**Table 2: The Distribution of Import and Export Intensity**

| Firms involved in : | Number of firms | Distribution of exports/sales or imports/(total purchases) | | |
|---|---|---|---|---|
| | | Median | Third quartile | Ninth decile |
| exports | 43,818 | 3% | 11% | 31% |
| imports | 46,250 | 5% | 16% | 38% |
| imports of FG, all origins | 26,350 | 3% | 11% | 29% |
| imports of FG, EU | 24,753 | 2% | 8% | 24% |
| imports of FG, OECD outside EU | 4,963 | 1% | 2% | 9% |
| imports of FG, Low wage countries | 5,670 | 1% | 6% | 19% |
| imports of IC, all origins | 40,579 | 3% | 10% | 24% |
| imports of IC, EU | 38,909 | 3% | 8% | 20% |
| imports of IC, OECD outside EU | 9,059 | 1% | 2% | 7% |
| imports of IC, Low wage countries | 7,521 | 1% | 3% | 11% |

Source : Customs Files, 1986-1987

FG = Final Goods (same 3 digit imported product as importing firm industry)

IC = Intermediary consumptions (all other imports)

**Table 3: Employment Growth and the Import-Export Status**

| | Rate of growth of employment | Average share in total employment | Contribution to total employment change |
|---|---|---|---|
| All | -0.071 | 1.000 | -0.071 |
| *Continuing Firms* | | | |
| Never imports | 0.075 | 0.096 | 0.007 |
| Starts importing | 0.065 | 0.048 | 0.003 |
| Stops importing | -0.085 | 0.021 | -0.002 |
| Continuously imports, increasing ratio of imports to sales | -0.037 | 0.410 | -0.015 |
| Continuously imports, constant or decreasing ratio of imports to sales | -0.014 | 0.206 | -0.003 |
| *Dying Firms* | | | |
| Does not import | -2.000 | 0.039 | -0.078 |
| Imports | -2.000 | 0.087 | -0.173 |
| *New-Born Firms* | | | |
| Does not import | 2.000 | 0.030 | 0.059 |
| Imports | 2.000 | 0.065 | 0.130 |
| *Continuing Firms* | | | |
| Never exports | 0.085 | 0.115 | 0.010 |
| Starts exporting | 0.063 | 0.045 | 0.003 |
| Stops exporting | -0.065 | 0.034 | -0.002 |
| Continuously exports, increasing ratio of exports to sales | -0.015 | 0.247 | -0.004 |
| Continuously exports, constant or decreasing ratio of exports to sales | -0.047 | 0.340 | -0.016 |
| *Dying Firms* | | | |
| Does not export | -2.000 | 0.042 | -0.084 |
| Exports | -2.000 | 0.083 | -0.167 |
| *New-Born Firms* | | | |
| Does not export | 2.000 | 0.035 | 0.070 |
| Exports | 2.000 | 0.060 | 0.119 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992
Total number of firms : 322,591 in manufacturing industries
FG = Final Goods (same 3 digit imported product as importing firm industry)
IC = Intermediary consumptions (all other imports)

**Table 4: Employment Growth and Imports of Final goods (FG)**

| | Rate of growth of employment | Average share in total employment | Contribution to total employment change |
|---|---|---|---|
| All | -0.071 | 1.000 | -0.071 |
| *Continuing Firms* | | | |
| Never imports FG | 0.057 | 0.192 | 0.011 |
| Starts importing FG | 0.144 | 0.050 | 0.007 |
| Stops importing FG | -0.040 | 0.039 | -0.002 |
| Continuously imports FG, increasing ratio of FG imports to sales | -0.067 | 0.281 | -0.019 |
| Continuously imports FG, constant or decreasing ratio of FG imports to sales | -0.033 | 0.218 | -0.007 |
| *Dying Firms* | | | |
| Does not import FG | -2.000 | 0.056 | -0.113 |
| Imports FG | -2.000 | 0.069 | -0.138 |
| *New-Born Firms* | | | |
| Does not import FG | 2.000 | 0.046 | 0.092 |
| Imports FG | 2.000 | 0.048 | 0.097 |
| *Continuing Firms* | | | |
| Never imports FG from low wage countries | 0.054 | 0.379 | 0.020 |
| Starts importing FG from low wage countries | 0.062 | 0.109 | 0.007 |
| Stops importing FG from low wage countries | -0.109 | 0.032 | -0.003 |
| Continuously imports FG from low wage countries, increasing ratio of FG imports to sales | -0.134 | 0.182 | -0.024 |
| Continuously imports FG from low wage countries, decreasing ratio of FG imports to sales | -0.110 | 0.078 | -0.009 |
| *Dying Firms* | | | |
| Does not import FG from low wage countries | -2.000 | 0.090 | -0.180 |
| Imports FG from low wage countries | -2.000 | 0.036 | -0.071 |
| *New-Born Firms* | | | |
| Does not import FG from low wage countries | 2.000 | 0.067 | 0.134 |
| Imports FG from low wage countries | 2.000 | 0.028 | 0.055 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992
Total number of firms : 322,591 in manufacturing industries
FG = Final Goods (same 3 digit imported product as importing firm industry)
IC = Intermediary consumptions (all other imports)

**Table 5: Employment Growth and Imports of Intermediary Consumptions ( IC)**

| | Rate of growth of employment | Average share in total employment | Contribution to total employment change |
|---|---|---|---|
| All | -0.071 | 1.000 | -0.071 |
| *Continuing Firms* | | | |
| Never imports IC | 0.077 | 0.108 | 0.008 |
| Starts importing IC | 0.065 | 0.048 | 0.003 |
| Stops importing IC | -0.066 | 0.027 | -0.002 |
| Continuously imports IC, increasing ratio of IC imports to sales | -0.038 | 0.292 | -0.011 |
| Continuously imports IC, constant or decreasing ratio of IC imports to sales | -0.026 | 0.305 | -0.008 |
| *Dying Firms* | | | |
| Does not import IC | -2.000 | 0.042 | -0.084 |
| Imports IC | -2.000 | 0.084 | -0.167 |
| *New-Born Firms* | | | |
| Does not import IC | 2.000 | 0.033 | 0.067 |
| Imports IC | 2.000 | 0.061 | 0.122 |
| *Continuing Firms* | | | |
| Never imports IC from low wage countries | 0.072 | 0.320 | 0.023 |
| Starts importing IC from low wage countries | 0.057 | 0.102 | 0.006 |
| Stops importing IC from low wage countries | -0.074 | 0.038 | -0.003 |
| Continuously imports IC from low wage countries, increasing ratio of IC imports to sales | -0.117 | 0.182 | -0.021 |
| Continuously imports IC from low wage countries, decreasing ratio of IC imports to sales | -0.101 | 0.139 | -0.014 |
| *Dying Firms* | | | |
| Does not import IC from low wage countries | -2.000 | 0.082 | -0.164 |
| Imports IC from low wage countries | -2.000 | 0.044 | -0.087 |
| *New-Born Firms* | | | |
| Does not import IC from low wage countries | 2.000 | 0.062 | 0.125 |
| Imports IC from low wage countries | 2.000 | 0.032 | 0.065 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992
Total number of firms : 322,591 in manufacturing industries
FG = Final Goods (same 3 digit imported product as importing firm industry)
IC = Intermediary consumptions (all other imports)

**Table 6: Employment Growth and Imports, by Size of the Firm**

| | | Rate of growth of employment | Average share in total employment | Contribution to change in total employment |
|---|---|---|---|---|
| Less than 20 employees | All | -0.021 | 1.000 | -0.021 |
| | *Continuing Firms* | | | |
| | Never imports | 0.077 | 0.377 | 0.029 |
| | Starts importing | 0.282 | 0.051 | 0.015 |
| | Stops importing | -0.083 | 0.041 | -0.003 |
| | Continuously imports, increasing ratio of imports to sales | 0.113 | 0.058 | 0.007 |
| | Continuously imports, constant or decreasing ratio of imports to sales | 0.070 | 0.050 | 0.004 |
| | *Dying Firms* | | | |
| | Does not import | -2.000 | 0.157 | -0.315 |
| | Imports | -2.000 | 0.072 | -0.144 |
| | *New-Born Firms* | | | |
| | Does not import | 2.000 | 0.132 | 0.264 |
| | Imports | 2.000 | 0.062 | 0.125 |
| 20 to 199 employees | All | -0.041 | 1.000 | -0.041 |
| | *Continuing Firms* | | | |
| | Never imports | 0.076 | 0.081 | 0.006 |
| | Starts importing | 0.226 | 0.062 | 0.014 |
| | Stops importing | -0.088 | 0.040 | -0.004 |
| | Continuously imports, increasing ratio of imports to sales | 0.062 | 0.352 | 0.022 |
| | Continuously imports, constant or decreasing ratio of imports to sales | 0.065 | 0.241 | 0.016 |
| | *Dying Firms* | | | |
| | Does not import | -2.000 | 0.031 | -0.062 |
| | Imports | -2.000 | 0.105 | -0.210 |
| | *New-Born Firms* | | | |
| | Does not import | 2.000 | 0.012 | 0.024 |
| | Imports | 2.000 | 0.077 | 0.153 |
| 200 employees and above | All | -0.108 | 1.000 | -0.108 |
| | *Continuing Firms* | | | |
| | Never imports | -0.032 | 0.002 | 0.000 |
| | Starts importing | -0.188 | 0.039 | -0.007 |
| | Stops importing | -0.061 | 0.002 | 0.000 |
| | Continuously imports, increasing ratio of imports to sales | -0.078 | 0.572 | -0.045 |
| | Continuously imports, constant or decreasing ratio of imports to sales | -0.066 | 0.242 | -0.016 |
| | *Dying Firms* | | | |
| | Does not import | -2.000 | 0.000 | -0.001 |
| | Imports | -2.000 | 0.081 | -0.162 |
| | *New-Born Firms* | | | |
| | Does not import | 2.000 | 0.003 | 0.005 |
| | Imports | 2.000 | 0.059 | 0.118 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992
Total number of firms : 322,591 in manufacturing industries
FG = Final Goods (same 3 digit imported product as importing firm industry)
IC = Intermediary consumptions (all other imports)

**Table 7: Employment Growth and Exports, by Size of the Firm**

| | | Rate of growth of employment | Average share in total employment | Contribution to change in total employment |
|---|---|---|---|---|
| Less than 20 employees | All | -0.021 | 1.000 | -0.021 |
| | *Continuing Firms* | | | |
| | Never exports | 0.085 | 0.397 | 0.034 |
| | Starts exporting | 0.287 | 0.036 | 0.010 |
| | Stops exporting | -0.046 | 0.048 | -0.002 |
| | Continuously exports, increasing ratio of exports to sales | 0.103 | 0.045 | 0.005 |
| | Continuously exports, constant or decreasing ratio of exports to sales | 0.069 | 0.051 | 0.004 |
| | *Dying Firms* | | | |
| | Does not export | -2.000 | 0.164 | -0.327 |
| | Exports | -2.000 | 0.066 | -0.131 |
| | *New-Born Firms* | | | |
| | Does not export | 2.000 | 0.147 | 0.293 |
| | Exports | 2.000 | 0.047 | 0.095 |
| 20 to 199 employees | All | -0.041 | 1.000 | -0.041 |
| | *Continuing Firms* | | | |
| | Never exports | 0.089 | 0.123 | 0.011 |
| | Starts exporting | 0.244 | 0.058 | 0.014 |
| | Stops exporting | -0.057 | 0.067 | -0.004 |
| | Continuously exports, increasing ratio of exports to sales | 0.064 | 0.250 | 0.016 |
| | Continuously exports, constant or decreasing ratio of exports to sales | 0.061 | 0.278 | 0.017 |
| | *Dying Firms* | | | |
| | Does not export | -2.000 | 0.037 | -0.075 |
| | Exports | -2.000 | 0.099 | -0.198 |
| | *New-Born Firms* | | | |
| | Does not export | 2.000 | 0.021 | 0.042 |
| | Exports | 2.000 | 0.068 | 0.135 |
| 200 employees and above | All | -0.108 | 1.000 | -0.108 |
| | *Continuing Firms* | | | |
| | Never exports | 0.036 | 0.007 | 0.000 |
| | Starts exporting | -0.155 | 0.042 | -0.007 |
| | Stops exporting | -0.144 | 0.009 | -0.001 |
| | Continuously exports, increasing ratio of exports to sales | -0.058 | 0.318 | -0.019 |
| | Continuously exports, constant or decreasing ratio of exports to sales | -0.088 | 0.482 | -0.042 |
| | *Dying Firms* | | | |
| | Does not export | -2.000 | 0.001 | -0.001 |
| | Exports | -2.000 | 0.081 | -0.161 |
| | *New-Born Firms* | | | |
| | Does not export | 2.000 | 0.002 | 0.005 |
| | Exports | 2.000 | 0.059 | 0.119 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992
Total number of firms : 322,591 in manufacturing industries
FG = Final Goods (same 3 digit imported product as importing firm industry)
IC = Intermediary consumptions (all other imports)

**Table 8: Employment Growth and Trade,**
**A Labor Demand View**

| | | Employment Growth | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Measure of internationalisation (Y) | | All origins | UE | non UE OECD | Low wage | All origins | UE | non UE OECD | Low wage |
| FG imports | $y_E$-$y_B$ | -0.765** | -0.782** | -0.647** | -0.927** | -1.042** | -1.018** | -0.997** | -1.151** |
| | | (0.046) | (0.052) | (0.176) | (0.103) | (0.017) | (0.019) | (0.051) | (0.039) |
| | $y_B$=0 $y_E$>0 | 0.023** | 0.017** | 0.014 | 0.008 | 0.009** | 0.005 | 0.006 | -0.004 |
| | | (0.006) | (0.006) | (0.010) | (0.007) | (0.003) | (0.003) | (0.003) | (0.002) |
| | $y_B$>0 $y_E$=0 | -0.036** | -0.030** | -0.018* | -0.033** | -0.014** | -0.005 | -0.020** | -0.002 |
| | | (0.005) | (0.005) | (0.010) | (0.010) | (0.003) | (0.003) | (0.003) | (0.003) |
| | $y_B$>0 $y_E$>0 | -0.015** | -0.015** | -0.004 | -0.024** | -0.015** | -0.010** | 0.002 | -0.011** |
| | | (0.005) | (0.005) | (0.010) | (0.009) | (0.003) | (0.003) | (0.003) | (0.002) |
| IC imports | $y_E$-$y_B$ | -0.535** | -0.579** | -0.743** | -0.391** | -0.820** | -0.784** | -0.882** | -1.148** |
| | | (0.040) | (0.043) | (0.141) | (0.117) | (0.017) | (0.019) | (0.055) | (0.056) |
| | $y_B$=0 $y_E$>0 | 0.046** | 0.044** | 0.032** | 0.027** | 0.023** | 0.019** | 0.008* | 0.012** |
| | | (0.005) | (0.005) | (0.008) | (0.006) | (0.003) | (0.003) | (0.003) | (0.002) |
| | $y_B$>0 $y_E$=0 | -0.038** | -0.038** | -0.009 | -0.023** | -0.010* | -0.015** | -0.002 | 0.001 |
| | | (0.005) | (0.005) | (0.007) | (0.008) | (0.004) | (0.003) | (0.003) | (0.003) |
| | $y_B$>0 $y_E$>0 | 0.016** | 0.011* | 0.010 | 0.014 | 0.012** | 0.007* | -0.010** | 0.001 |
| | | (0.005) | (0.005) | (0.008) | (0.008) | (0.003) | (0.003) | (0.002) | (0.002) |
| FG Exports | $y_E$-$y_B$ | 0.038 | 0.006 | -0.059 | -0.055 | 0.102** | 0.075** | -0.037 | 0.206** |
| | | (0.033) | (0.038) | (0.087) | (0.073) | (0.010) | (0.012) | (0.031) | (0.023) |
| | $y_B$=0 $y_E$>0 | 0.028** | 0.028** | 0.024* | 0.019* | 0.016** | 0.014** | 0.006* | -0.012** |
| | | (0.006) | (0.006) | (0.010) | (0.008) | (0.003) | (0.003) | (0.003) | (0.003) |
| | $y_B$>0 $y_E$=0 | -0.047** | -0.041** | -0.022** | -0.030** | -0.008* | 0.003 | -0.005 | -0.012** |
| | | (0.005) | (0.005) | (0.008) | (0.006) | (0.003) | (0.003) | (0.003) | (0.003) |
| | $y_B$>0 $y_E$>0 | -0.016** | -0.001 | -0.009 | -0.016** | -0.008* | 0.001 | -0.009** | -0.003 |
| | | (0.005) | (0.005) | (0.008) | (0.007) | (0.003) | (0.003) | (0.003) | (0.003) |
| IC Exports | $y_E$-$y_B$ | -0.330** | -0.242** | -0.706** | -0.453** | -0.130** | 0.004 | -0.520** | -0.409** |
| | | (0.059) | (0.069) | (0.201) | (0.132) | (0.042) | (0.049) | (0.166) | (0.107) |
| | $y_B$=0 $y_E$>0 | 0.030* | 0.027** | 0.016 | 0.019** | 0.004 | -0.002 | -0.004 | 0.000 |
| | | (0.005) | (0.005) | (0.009) | (0.007) | (0.003) | (0.003) | (0.003) | (0.003) |
| | $y_B$>0 $y_E$=0 | -0.036** | -0.028** | -0.014 | -0.030** | -0.005 | -0.001 | -0.018** | -0.007 |
| | | (0.005) | (0.005) | (0.008) | (0.006) | (0.003) | (0.003) | (0.002) | (0.002) |
| | $y_B$>0 $y_E$>0 | -0.009 | 0.000 | -0.009 | -0.022** | -0.006* | 0.005 | -0.023** | -0.020** |
| | | (0.005) | (0.006) | (0.009) | (0.007) | (0.003) | (0.003) | (0.003) | (0.003) |
| Rate of growth of labor cost | | -0.263** | | -0.262** | | -0.495** | | -0.490** | |
| | | (0.002) | | (0.002) | | (0.003) | | (0.003) | |
| Rate of growth of sales | | 0.586** | | 0.584** | | 0.839** | | 0.834** | |
| | | (0.002) | | (0.002) | | (0.002) | | (0.002) | |
| Change of the ratio of local purchases to sales | | -0.388** | | -0.388** | | -0.741** | | -0.731** | |
| | | (0.007) | | (0.007) | | (0.007) | | (0.007) | |
| Weighted by employment | | No | | No | | Yes | | Yes | |
| $R^2$ | | 0.419 | | 0.420 | | 0.751 | | 0.753 | |

Sources: Customs Files, BAL 1986-1987 & 1991-1992. 145,492 continuing firms in the manufacturing industry. yB (resp. yE) = ratio of Y over sales at the beginning (resp. end) of the period.

** and * denote coefficients significant at less than 1% and less than 5%. Standard errors are in parenthesis. The coefficients of the firm size and NAP600 firm industry controls, as well as the dummies for firms part of a French or foreign group, are not reported.

**Table 9: Skill Structure Changes and the Import-Export Status of Industries**
**Aggregate Decomposition**

| | Share of production workers in total employment | | Share of low skill workers in production employment | |
|---|---|---|---|---|
| Aggregate change | -0.018 | | -0.038 | |
| | Between industries | Within industries | Between industries | Within industries |
| All | 0.002 | -0.020 | 0.002 | -0.039 |
| Increasing ratio of imports to sales | 0.000 | -0.017 | 0.000 | -0.035 |
| Constant or decreasing ratio of imports to sales | 0.002 | -0.003 | 0.002 | -0.004 |
| Increasing ratio of exports to sales | 0.003 | -0.005 | 0.003 | -0.013 |
| Constant or decreasing ratio of exports to sales | -0.001 | -0.015 | -0.002 | -0.026 |
| Increasing ratio of FG imports to sales | -0.008 | -0.013 | -0.007 | -0.026 |
| Constant or decreasing ratio of FG imports to sales | 0.010 | -0.007 | 0.008 | -0.013 |
| Increasing ratio of FG imports from low wage countries to sales | -0.003 | -0.015 | -0.005 | -0.031 |
| Constant or decreasing ratio of FG imports from low wage countries to sales | 0.005 | -0.005 | 0.006 | -0.009 |
| Increasing ratio of IC imports to sales | -0.004 | -0.011 | -0.003 | -0.027 |
| Constant or decreasing ratio of IC imports to sales | 0.005 | -0.009 | 0.005 | -0.013 |
| Increasing ratio of IC imports from low wage countries to sales | -0.003 | -0.014 | -0.004 | -0.029 |
| Constant or decreasing ratio of IC imports from low wage countries to sales | 0.005 | -0.006 | 0.006 | -0.010 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992, ESE same years.
Total number of firms : 16,288 continuing firms in the manufacturing industry.
FG = Final Goods (same 3 digit imported product as importing firm industry)
IC = Intermediary consumptions (all other imports)

**Table 10: Skill Structure Change and the Import-Export Status, Within-Industry Decomposition**

| | Share of production workers in total employment | | Share of low skill workers in production employment | |
|---|---|---|---|---|
| Within industry change | -0.020 | | -0.039 | |
| | Between firms | Within firms | Between firms | Within firms |
| All | 0.004 | -0.024 | 0.003 | -0.042 |
| Never imports | 0.001 | 0.000 | 0.000 | -0.001 |
| Starts importing | 0.002 | 0.000 | 0.001 | -0.001 |
| Stops importing | -0.001 | 0.000 | 0.000 | -0.001 |
| Continuously imports, increasing ratio of imports to sales | 0.001 | -0.015 | 0.000 | -0.032 |
| Continuously imports, constant or decreasing ratio of imports to sales | 0.001 | -0.008 | 0.002 | -0.009 |
| Never exports | 0.001 | 0.000 | 0.001 | -0.001 |
| Starts exporting | 0.003 | 0.000 | 0.002 | -0.001 |
| Stops exporting | -0.001 | -0.001 | 0.000 | -0.001 |
| Continuously exports, increasing ratio of exports to sales | 0.003 | -0.008 | 0.004 | -0.013 |
| Continuously exports, constant or decreasing ratio of exports to sales | -0.002 | -0.016 | -0.003 | -0.026 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992, ESE same years.
Total number of firms : 16,288 continuing firms in the manufacturing industry.

**Table 11: Skill Structure Changes and Final Goods (FG) Imports**
**Within Industry Decomposition**

| | Share of production workers in total employment | | Share of low skill workers in production employment | |
|---|---|---|---|---|
| Within industry change | -0.020 | | -0.039 | |
| | Between firms | Within firms | Between firms | Within firms |
| all | 0.004 | -0.024 | 0.003 | -0.042 |
| Never imports FG | 0.004 | -0.001 | 0.002 | -0.003 |
| Starts importing FG | 0.003 | -0.001 | 0.002 | -0.001 |
| Stops importing FG | -0.001 | -0.001 | 0.000 | -0.002 |
| Continuously imports FG, increasing ratio of FG imports to sales | -0.003 | -0.012 | -0.003 | -0.023 |
| Continuously imports FG, constant or decreasing ratio of FG imports to sales | 0.001 | -0.009 | 0.002 | -0.013 |
| Never imports FG from low wage countries | 0.007 | -0.005 | 0.006 | -0.012 |
| Starts importing FG from low wage countries | 0.007 | -0.003 | 0.005 | -0.004 |
| Stops importing FG from low wage countries | -0.002 | -0.001 | -0.001 | -0.002 |
| Continuously imports FG from low wage countries, increasing ratio of low wage FG imports to sales | -0.004 | -0.010 | -0.004 | -0.018 |
| Continuously imports FG from low wage countries, constant or decreasing ratio of low wage FG imports to sales | -0.003 | -0.005 | -0.002 | -0.006 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992, ESE same years.
Total number of firms : 16,288 continuing firms in the manufacturing industry.
FG = Final Goods (same 3 digit imported product as importing firm industry)

**Table 12: Skill Structure Changes and Intermediary Consumption (IC) Imports**
**Within Industry Decomposition**

| | Share of production workers in total employment | | Share of low skill workers in production employment | |
|---|---|---|---|---|
| Within industry evolution | -0.020 | | -0.039 | |
| | Between firms | Within firms | Between firms | Within firms |
| all | 0.004 | -0.024 | 0.003 | -0.042 |
| Never imports IC | 0.001 | 0.000 | 0.000 | -0.001 |
| Starts importing IC | 0.003 | 0.000 | 0.001 | -0.001 |
| Stops importing IC | -0.001 | 0.000 | 0.000 | -0.001 |
| Continuously imports IC, increasing ratio of IC imports to sales | 0.003 | -0.011 | 0.001 | -0.016 |
| Continuously imports IC, constant or decreasing ratio of IC imports to sales | -0.002 | -0.012 | 0.001 | -0.024 |
| Never imports IC from low wage countries | 0.007 | -0.004 | 0.004 | -0.008 |
| Starts importing IC from low wage countries | 0.008 | -0.002 | 0.005 | -0.005 |
| Stops importing IC from low wage countries | -0.001 | -0.001 | 0.000 | -0.002 |
| Continuously imports IC from low wage countries, increasing ratio of low wage IC imports to sales | -0.007 | -0.010 | -0.005 | -0.018 |
| Continuously imports IC from low wage countries, decreasing ratio of low wage IC imports to sales | -0.003 | -0.007 | -0.001 | -0.009 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992, ESE same years.
Total number of firms : 16,288 continuing firms in the manufacturing industry.
FG = Final Goods (same 3 digit imported product as importing firm industry)
IC = Intermediary consumptions (all other imports)

**Table 13: Skill Structure Changes and Trade,**
**A Labor Demand View**

| Measure of internationalisation (Y) | | Change in the proportion of production workers in total employment | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | All origins | UE | non UE OECD | Low wage | All origins | UE | non UE OECD | Low wage |
| FG imports | $y_E$-$y_B$ | -0.102** | -0.085** | -0.044 | -0.055 | -0.098** | -0.094** | 0.051 | -0.053 |
| | | (0.019) | (0.019) | (0.061) | (0.038) | (0.016) | (0.015) | (0.037) | (0.031) |
| | $y_B$=0 $y_E$>0 | 0.000 | 0.000 | -0.003 | 0.002 | -0.005 | -0.003 | -0.005* | 0.001 |
| | | (0.002) | (0.002) | (0.003) | (0.002) | (0.003) | (0.003) | (0.002) | (0.002) |
| | $y_B$>0 $y_E$=0 | 0.002 | 0.003 | 0.000 | -0.003 | 0.000 | 0.002 | 0.001 | -0.005* |
| | | (0.002) | (0.002) | (0.003) | (0.003) | (0.003) | (0.002) | (0.002) | (0.002) |
| | $y_B$>0 $y_E$>0 | -0.002 | 0.001 | -0.002 | -0.006* | -0.008** | -0.002 | -0.006** | -0.005* |
| | | (0.002) | (0.002) | (0.003) | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) |
| IC imports | $y_E$-$y_B$ | -0.045* | -0.038* | -0.069 | 0.008 | -0.017 | -0.046** | -0.039 | -0.101* |
| | | (0.018) | (0.017) | (0.058) | (0.046) | (0.016) | (0.015) | (0.043) | (0.045) |
| | $y_B$=0 $y_E$>0 | 0.000 | -0.001 | -0.001 | 0.000 | -0.003 | -0.003 | -0.002 | 0.001 |
| | | (0.003) | (0.002) | (0.002) | (0.002) | (0.004) | (0.004) | (0.002) | (0.002) |
| | $y_B$>0 $y_E$=0 | -0.001 | -0.002 | 0.003 | 0.002 | -0.001 | 0.000 | 0.003 | 0.004 |
| | | (0.003) | (0.002) | (0.002) | (0.003) | (0.004) | (0.004) | (0.002) | (0.002) |
| | $y_B$>0 $y_E$>0 | -0.002 | -0.002 | -0.003 | 0.000 | -0.004 | -0.003 | -0.007** | 0.000 |
| | | (0.002) | (0.002) | (0.002) | (0.002) | (0.004) | (0.003) | (0.002) | (0.002) |
| FG Exports | $y_E$-$y_B$ | 0.010 | 0.014 | -0.012 | -0.024 | 0.037** | -0.008 | 0.092** | 0.007 |
| | | (0.012) | (0.012) | (0.028) | (0.023) | (0.009) | (0.009) | (0.023) | (0.018) |
| | $y_B$=0 $y_E$>0 | -0.003 | -0.005* | -0.002 | 0.000 | 0.001 | -0.003 | -0.008* | 0.000 |
| | | (0.003) | (0.002) | (0.003) | (0.003) | (0.004) | (0.003) | (0.003) | (0.003) |
| | $y_B$>0 $y_E$=0 | 0.001 | -0.002 | 0.002 | 0.001 | -0.002 | -0.007* | 0.003 | 0.005** |
| | | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.002) | (0.002) |
| | $y_B$>0 $y_E$>0 | -0.001 | -0.003 | 0.004 | -0.001 | -0.001 | -0.003 | 0.000 | 0.003 |
| | | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) | (0.002) | (0.002) |
| IC Exports | $y_E$-$y_B$ | 0.023 | 0.033 | 0.040 | 0.006 | 0.076 | 0.013 | 0.198 | 0.066 |
| | | (0.034) | (0.035) | (0.138) | (0.080) | (0.045) | (0.044) | (0.169) | (0.104) |
| | $y_B$=0 $y_E$>0 | -0.001 | -0.002 | -0.003 | -0.005* | -0.002 | -0.002 | -0.003 | -0.008** |
| | | (0.003) | (0.002) | (0.003) | (0.002) | (0.004) | (0.003) | (0.002) | (0.002) |
| | $y_B$>0 $y_E$=0 | 0.000 | 0.001 | 0.000 | 0.001 | 0.002 | -0.001 | 0.007** | -0.002 |
| | | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.002) | (0.002) |
| | $y_B$>0 $y_E$>0 | 0.000 | 0.000 | -0.003 | -0.001 | -0.001 | 0.000 | 0.000 | -0.005* |
| | | (0.002) | (0.002) | (0.003) | (0.002) | (0.003) | (0.002) | (0.002) | (0.002) |
| Rate of growth of labor cost | | -0.042** | | -0.039** | | -0.075** | | -0.063** | |
| | | (0.004) | | (0.003) | | (0.004) | | (0.004) | |
| Rate of growth of sales | | 0.013** | | 0.014** | | 0.009** | | 0.014** | |
| | | (0.002) | | (0.002) | | (0.002) | | (0.001) | |
| Change of the ratio of local purchases to sales | | -0.068** | | -0.060** | | -0.084** | | -0.082** | |
| | | (0.008) | | (0.007) | | (0.008) | | (0.006) | |
| Weighted by employment | | No | | No | | Yes | | Yes | |
| $R^2$ | | 0.049 | | 0.052 | | 0.193 | | 0.208 | |

Sources: Customs Files, BAL 1986-1987 & 1991-1992, ESE same years. 16,288 continuing firms in the manufacturing industry. yB (resp. yE) = ratio of Y over sales at the beginning (resp. end) of the period.

** and * denote coefficients significant at less than 1% and less than 5%. Standard errors are between parentheses. The coefficients of the firm size and NAP600 firm industry controls, as well as the dummies for firms part of a French or foreign group, are not reported.

**Table 14: Skill Structure Changes and Trade,**
**A Labor Demand View**

| Measure of internationalisation (Y) | | Change in the proportion of unskilled workers within production workers | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | All origins | UE | non UE OECD | Low wage | All origins | UE | non UE OECD | Low wage |
| FG imports | $y_E$-$y_B$ | -0.004 | -0.022 | 0.019 | 0.122 | -0.109** | -0.145** | -0.333** | 0.184* |
| | | (0.033) | (0.037) | (0.127) | (0.076) | (0.027) | (0.032) | (0.081) | (0.065) |
| | $y_B$=0 $y_E$>0 | 0.004 | 0.002 | 0.009 | 0.001 | -0.004 | -0.005 | 0.000 | 0.003 |
| | | (0.004) | (0.004) | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) | (0.003) |
| | $y_B$>0 $y_E$=0 | 0.004 | 0.003 | 0.008 | 0.002 | -0.003 | -0.002 | 0.018** | -0.004 |
| | | (0.004) | (0.004) | (0.005) | (0.006) | (0.005) | (0.005) | (0.004) | (0.005) |
| | $y_B$>0 $y_E$>0 | 0.006 | 0.003 | 0.007 | 0.003 | 0.000 | -0.003 | -0.004 | -0.004 |
| | | (0.004) | (0.004) | (0.005) | (0.005) | (0.004) | (0.004) | (0.004) | (0.004) |
| IC imports | $y_E$-$y_B$ | 0.022 | 0.009 | -0.003 | 0.149 | -0.032 | -0.029 | -0.269** | 0.135 |
| | | (0.031) | (0.033) | (0.114) | (0.092) | (0.029) | (0.032) | (0.092) | (0.096) |
| | $y_B$=0 $y_E$>0 | 0.000 | 0.004 | -0.010* | 0.001 | -0.004 | 0.003 | -0.007 | -0.003 |
| | | (0.005) | (0.005) | (0.004) | (0.004) | (0.008) | (0.008) | (0.004) | (0.004) |
| | $y_B$>0 $y_E$=0 | 0.003 | 0.006 | -0.007 | -0.003 | 0.002 | 0.009 | -0.009* | 0.000 |
| | | (0.005) | (0.005) | (0.004) | (0.005) | (0.008) | (0.008) | (0.004) | (0.005) |
| | $y_B$>0 $y_E$>0 | 0.000 | 0.003 | -0.017** | 0.011* | -0.001 | 0.005 | -0.001 | 0.004 |
| | | (0.004) | (0.004) | (0.004) | (0.005) | (0.006) | (0.006) | (0.004) | (0.004) |
| FG Exports | $y_E$-$y_B$ | -0.034 | -0.023 | -0.015 | -0.080 | -0.045** | 0.034 | -0.013 | -0.301** |
| | | (0.020) | (0.024) | (0.055) | (0.046) | (0.016) | (0.019) | (0.048) | (0.037) |
| | $y_B$=0 $y_E$>0 | -0.005 | -0.006 | -0.010 | 0.011 | -0.019 | -0.024** | -0.008 | 0.021** |
| | | (0.005) | (0.005) | (0.006) | (0.006) | (0.007) | (0.006) | (0.005) | (0.006) |
| | $y_B$>0 $y_E$=0 | 0.002 | 0.002 | -0.002 | 0.002 | 0.008 | 0.003 | 0.007 | 0.020** |
| | | (0.004) | (0.004) | (0.005) | (0.004) | (0.006) | (0.006) | (0.004) | (0.004) |
| | $y_B$>0 $y_E$>0 | -0.006 | -0.006 | -0.006 | 0.000 | -0.002 | -0.008 | -0.002 | 0.012* |
| | | (0.004) | (0.004) | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) | (0.005) |
| IC Exports | $y_E$-$y_B$ | -0.004 | 0.008 | 0.118 | -0.068 | -0.023 | -0.028 | -0.195 | 0.121 |
| | | (0.059) | (0.067) | (0.290) | (0.156) | (0.080) | (0.092) | (0.367) | (0.219) |
| | $y_B$=0 $y_E$>0 | 0.005 | 0.005 | 0.007 | -0.002 | 0.006 | 0.013* | -0.015** | -0.024** |
| | | (0.005) | (0.004) | (0.005) | (0.005) | (0.007) | (0.006) | (0.005) | (0.005) |
| | $y_B$>0 $y_E$=0 | 0.005 | 0.004 | 0.007 | 0.001 | 0.004 | 0.001 | 0.008* | -0.024** |
| | | (0.004) | (0.004) | (0.005) | (0.004) | (0.006) | (0.006) | (0.004) | (0.004) |
| | $y_B$>0 $y_E$>0 | -0.002 | 0.000 | 0.007 | 0.003 | 0.004 | 0.010* | 0.007 | -0.022** |
| | | (0.004) | (0.004) | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) | (0.004) |
| Rate of growth of labor cost | | -0.036** | | -0.037** | | -0.070** | | -0.069** | |
| | | (0.006) | | (0.006) | | (0.008) | | (0.008) | |
| Rate of growth of sales | | 0.022** | | 0.022** | | 0.027** | | 0.029** | |
| | | (0.003) | | (0.003) | | (0.003) | | (0.003) | |
| Change of the ratio of local purchases to sales | | -0.031** | | -0.030** | | -0.035** | | -0.038** | |
| | | (0.013) | | (0.013) | | (0.013) | | (0.013) | |
| Weighted by employment | | No | | No | | Yes | | Yes | |
| $R^2$ | | 0.031 | | 0.034 | | 0.131 | | 0.139 | |

Sources: Customs Files, BAL 1986-1987 & 1991-1992, ESE same years. 16,288 continuing firms in the manufacturing industry. yB (resp. yE) = ratio of Y over sales at the beginning (resp. end) of the period.

** and * denote coefficients significant at less than 1% and less than 5%. Standard errors are between parentheses. The coefficients of the firm size and NAP600 firm industry controls, as well as the dummies for firms part of a French or foreign group, are not reported.

**Table 15: Employment Growth, Skill Structure Changes: Trade and (or) Innovation**

| Measure of internationalisation (Y) | | Employment Growth | | Change in proportion of production workers | | Change in proportion of unskilled workers | |
|---|---|---|---|---|---|---|---|
| FG imports | $y_E$-$y_B$ | -1.177** | -1.173** | -0.100** | -0.098** | -0.110** | -0.127** |
| | | (0.041) | (0.041) | (0.019) | (0.019) | (0.033) | (0.033) |
| | $y_B$=0 $y_E$>0 | 0.011 | 0.013 | -0.006 | -0.006 | -0.004 | -0.005 |
| | | (0.009) | (0.009) | (0.004) | (0.004) | (0.007) | (0.007) |
| | $y_B$>0 $y_E$=0 | -0.007 | -0.006 | -0.004 | -0.004 | 0.004 | 0.005 |
| | | (0.009) | (0.009) | (0.004) | (0.004) | (0.007) | (0.007) |
| | $y_B$>0 $y_E$>0 | -0.012 | -0.011 | -0.011** | -0.011** | 0.004 | 0.003 |
| | | (0.007) | (0.007) | (0.003) | (0.003) | (0.006) | (0.006) |
| IC imports | $y_E$-$y_B$ | -0.983** | -0.983** | -0.002 | -0.003 | -0.058 | -0.059 |
| | | (0.044) | (0.044) | (0.020) | (0.020) | (0.035) | (0.035) |
| | $y_B$=0 $y_E$>0 | 0.015 | 0.014 | -0.008 | -0.007 | -0.007 | -0.008 |
| | | (0.012) | (0.012) | (0.006) | (0.006) | (0.011) | (0.011) |
| | $y_B$>0 $y_E$=0 | -0.006 | -0.006 | -0.005 | -0.004 | -0.002 | -0.002 |
| | | (0.013) | (0.013) | (0.006) | (0.006) | (0.011) | (0.011) |
| | $y_B$>0 $y_E$>0 | -0.002 | -0.003 | -0.006 | -0.004 | -0.003 | -0.004 |
| | | (0.010) | (0.010) | (0.005) | (0.005) | (0.009) | (0.009) |
| FG Exports | $y_E$-$y_B$ | 0.138** | 0.130** | 0.047** | 0.043** | -0.020 | -0.024 |
| | | (0.025) | (0.025) | (0.011) | (0.011) | (0.020) | (0.020) |
| | $y_B$=0 $y_E$>0 | 0.018 | 0.017 | -0.001 | -0.002 | -0.038** | -0.038** |
| | | (0.010) | (0.010) | (0.005) | (0.005) | (0.009) | (0.009) |
| | $y_B$>0 $y_E$=0 | 0.005 | 0.005 | -0.009* | -0.009* | -0.001 | -0.002 |
| | | (0.009) | (0.009) | (0.004) | (0.004) | (0.008) | (0.008) |
| | $y_B$>0 $y_E$>0 | -0.009 | -0.011 | -0.007 | -0.007 | -0.012 | -0.010 |
| | | (0.008) | (0.008) | (0.004) | (0.004) | (0.007) | (0.007) |
| IC Exports | $y_E$-$y_B$ | -0.199 | -0.208 | 0.077 | 0.078 | -0.011 | -0.022 |
| | | (0.124) | (0.124) | (0.058) | (0.058) | (0.103) | (0.103) |
| | $y_B$=0 $y_E$>0 | 0.004* | 0.002* | -0.001 | -0.001 | 0.009 | 0.010 |
| | | (0.010) | (0.010) | (0.005) | (0.005) | (0.009) | (0.009) |
| | $y_B$>0 $y_E$=0 | -0.008 | -0.007 | 0.004 | 0.004 | 0.006 | 0.006 |
| | | (0.010) | (0.010) | (0.004) | (0.004) | (0.008) | (0.008) |
| | $y_B$>0 $y_E$>0 | -0.007 | -0.009 | 0.001 | 0.001 | 0.014 | 0.014 |
| | | (0.009) | (0.009) | (0.004) | (0.004) | (0.007) | (0.007) |
| Substantial improvement of existing products | | | -0.010* | | 0.005* | | -0.021** |
| | | | (0.005) | | (0.002) | | (0.003) |
| New product at the market level | | | 0.005 | | -0.002 | | 0.006 |
| | | | (0.004) | | (0.002) | | (0.003) |
| New product for the firm, but preexisting on the market | | | 0.020** | | -0.003 | | 0.010** |
| | | | (0.004) | | (0.002) | | (0.003) |
| New technological process | | | -0.010* | | -0.003 | | 0.000 |
| | | | (0.004) | | (0.002) | | (0.003) |
| Substantial improvement of existing technological process | | | 0.000 | | 0.007** | | 0.000 |
| | | | (0.004) | | (0.002) | | (0.003) |
| Organisational innovation | | | -0.009* | | -0.016** | | 0.005 |
| | | | (0.004) | | (0.002) | | (0.003) |
| Commercial innovation | | | 0.018** | | 0.011** | | -0.022** |
| | | | (0.005) | | (0.002) | | (0.003) |
| R&D, internal to the firm | | | 0.014* | | -0.009** | | 0.010* |
| | | | (0.006) | | (0.003) | | (0.005) |
| R&D, internal to the group | | | -0.014* | | 0.002 | | 0.004 |
| | | | (0.004) | | (0.002) | | (0.003) |
| $R^2$ | | 0.793 | 0.794 | 0.243 | 0.252 | 0.160 | 0.168 |

Sources: Customs Files, BAL 1986-1987 & 1991-1992, ESE same years, Innovation Survey. 13,313 continuing firms in the manufacturing industry. yB (resp. yE) = ratio of Y over sales at the beginning (resp. end) of the period.

** and * denote coefficients significant at less than 1% and less than 5%. Standard errors are in parenthesis. The regressions are weighted by average firm employment. The coefficients of the rate of growth of sales, of the rate of growth of labor cost, of the change of the ratio of local purchases to sales, of the firm size and NAP600 firm industry controls, as well as the dummies for firms part of a French or foreign group, are not reported.

**Table A.1: Distribution of Employment and the Import-Export Status**

| | Number of firms | First quartile | Median | Third quartile |
|---|---|---|---|---|
| *Continuing Firms* | | | | |
| Never imports | 104,964 | 1 | 2 | 4 |
| Starts importing | 8,238 | 4 | 9 | 20 |
| Stops importing | 6,768 | 3 | 7 | 17 |
| Continuously imports, increasing ratio of imports to sales | 14,523 | 11 | 31 | 76 |
| Continuously imports, constant or decreasing ratio of imports to sales | 10,999 | 9 | 25 | 57 |
| *Dying Firms* | | | | |
| Does not import | 81,621 | 1 | 1 | 2 |
| Imports | 13,960 | 2 | 6 | 17 |
| *New-Born Firms* | | | | |
| Does not import | 69,017 | 1 | 1 | 2 |
| Imports | 12,501 | 2 | 5 | 14 |
| *Continuing Firms* | | | | |
| Never exports | 108,595 | 1 | 2 | 5 |
| Starts exporting | 6,033 | 4 | 9 | 24 |
| Stops exporting | 8,229 | 3 | 8 | 20 |
| Continuously exports, increasing ratio of exports to sales | 10,592 | 10 | 29 | 72 |
| Continuously exports, constant or decreasing ratio of exports to sales | 12,043 | 11 | 29 | 70 |
| *Dying Firms* | | | | |
| Does not export | 82,627 | 1 | 1 | 2 |
| Exports | 12,954 | 2 | 6 | 17 |
| *New-Born Firms* | | | | |
| Does not export | 72,055 | 1 | 1 | 2 |
| Exports | 9,463 | 2 | 5 | 15 |

Source : Customs Files and BAL, 1986-1987 and 1991-1992
Total number of firms : 322,591 in manufacturing industries
FG = Final Goods (same 3 digit imported product as importing firm industry)
IC = Intermediary consumptions (all other imports)

**Table A.2: Descriptive Statistics on Continuing Firms in Manufacturing**

| | | Beginning (1986-1987) | End (1991-1992) | Rate of growth |
|---|---|---|---|---|
| Firm employment | mean | 23.30 | 23.10 | 0.06 |
| | median | 2.50 | 3.00 | 0.00 |
| | standard deviation | 379.78 | 320.51 | 0.44 |
| Proportion of production workers | mean | 0.74 | 0.72 | -0.01 |
| | median | 0.79 | 0.78 | -0.01 |
| | standard deviation | 0.19 | 0.20 | 0.09 |
| Proportion of unskilled production workers among production workers | mean | 0.34 | 0.32 | -0.02 |
| | median | 0.27 | 0.24 | -0.01 |
| | standard deviation | 0.30 | 0.29 | 0.18 |
| Ratio of local purchases to sales | mean | 0.477 | 0.481 | 0.004 |
| | median | 0.482 | 0.485 | -0.002 |
| | standard deviation | 0.193 | 0.194 | 0.140 |
| Ratio of FG imports to sales | mean | 0.006 | 0.005 | -0.001 |
| | median | 0.000 | 0.000 | 0.000 |
| | standard deviation | 0.034 | 0.030 | 0.021 |
| Ratio of IC imports to sales | mean | 0.008 | 0.010 | 0.002 |
| | median | 0.000 | 0.000 | 0.000 |
| | standard deviation | 0.035 | 0.040 | 0.029 |
| Ratio of total imports to sales | mean | 0.014 | 0.016 | 0.001 |
| | median | 0.000 | 0.000 | 0.000 |
| | standard deviation | 0.054 | 0.056 | 0.034 |
| Ratio of FG exports to sales | mean | 0.012 | 0.010 | -0.002 |
| | median | 0.000 | 0.000 | 0.000 |
| | standard deviation | 0.060 | 0.053 | 0.034 |
| Ratio of IC exports to sales | mean | 0.003 | 0.007 | 0.004 |
| | median | 0.000 | 0.000 | 0.000 |
| | standard deviation | 0.019 | 0.033 | 0.030 |
| Ratio of total exports to sales | mean | 0.015 | 0.017 | 0.002 |
| | median | 0.000 | 0.000 | 0.000 |
| | standard deviation | 0.064 | 0.068 | 0.032 |

Sources: Customs Files, BAL 1986-1987 & 1991-1992, ESE same years, 145,492 continuing firms in the manufacturing industry.