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THE EFFECTS OF INTERNATIONAL LINKAGES ON PRODUCTIVITY AND THE DEMAND FOR SKILLED LABOUR: A FIRM LEVEL ANALYSIS FOR URUGUAY (*)

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RESUMEN

Los vínculos con el exterior pueden conducir a incrementos en la productividad y a la difusión de tecnologías basadas en las habilidades, afectando no solamente la productividad sino también incrementando la demanda por trabajo calificado y los salarios.
Este documento analiza el impacto del uso de insumos intermedios importados, exportaciones e inversión extranjera directa (IED) sobre la productividad, la demanda y los salarios de los trabajadores calificados de las empresas manufactureras uruguayas en el período 1988-2005. Las respuestas de los diversos canales a los vínculos internacionales no son homogéneas, sino que varían de acuerdo a la distribución condicional de cada variable dependiente.
Nuestros resultados preliminares parecen indicar que mayores niveles de vinculación con el exterior están asociados con mayor productividad e incrementos en la demanda de trabajo calificado medido a través de los salarios y el empleo en términos absolutos, aunque no siempre sucede así en términos relativos. Entonces, promover los lazos con el exterior y el entrenamiento de los trabajadores podría conducir a incrementos en la productividad y a mejores oportunidades para los trabajadores calificados mientras otras políticas sociales podrían ayudar a mitigar los efectos de la desigualdad salarial.

Palabras clave: comercio, mercados de trabajo, productividad, exportaciones, inversión extranjera directa.

Código JEL: F02, F16, J23, J31, O33.

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ABSTRACT

International linkages can lead to increases in productivity and to the diffusion of skill-biased technologies affecting not only productivity but increasing the demand for skilled labour and wages.

This work analyses the impact of the use of imported intermediate inputs, exports and foreign direct investment (FDI) on productivity, the demand and wages of skilled workers of the Uruguayan manufacturing firms for the period 1988-2005. The response to the various channels of international linkages are not homogenous, but vary over the conditional distribution of each dpendent variable.

Our preliminary results seem to indicate that increased levels of international linkages are associated with higher productivity and an increased demand for skill labour measured through wages and employment in absolute terms but this is not always so in relative terms. Then, it follows that promoting international linkages and training of workers would lead to increases in productivity and better opportunities for skilled workers while other social policies could help to mitigate wage inequality effects.

Key words: trade, labour markets, productivity, exports, foreign direct investment.

JEL: F02, F16, J23, J31, O33

1. INTRODUCTION

Nowadays countries are more interdependent than ever. This increasing interdependence, named "globalization", could be measured through the increase in trade flows, foreign direct investment and financial flows and labour movements between nations. An important issue in our increasing globalized economic environment is if these international linkages can enhance productivity and help to raise the income of nations, improving so the standard of living. Nevertheless, another related question arise: which are the effects of these international linkages on employment and wages? Are these effects, if any, evenly distributed among firms and workers? or do they have a higher impact on skilled workers than for unskilled ones?. These latter issues have been a source of concern for both developed and developing nations.

Regarding to productivity endogenous growth theory considers that innovation is the main source of productivity growth (Romer, 1990; Lucas, 1988) related either to internal or external factors. Endogenous growth models in open economies recognize that trade in goods and factors of production may open new sources of technological inputs (Grossman and Helpman, 1991, Rivera-Batiz and Romer, 1991). In these models knowledge is not only contained within national boundaries, but it is transmitted through a variety of ways such as trade, foreign direct investment, and personal mobility among others. In particular, some empirical studies have shown that international linkages or technology transfer may be closely related to productivity growth among developed countries (Coe and Helpman, 1995; Eaton and Kortum, 1999; Keller, 2002) as well as among developed and developing countries (Coe et al., 1997; Barba Navaretti and Soloaga, 2001; Meyer, 2001; Falvey et al., 2002; Schiff et al. 2004a, 2004b, 2004c). Thus increased integration with the world economy could lead to the transfer of skill-biased technologies from more developed countries helping to raise productivity and to narrow the income gap between developed and developing economies but also increasing the demand of skilled labour in the recipient economy. Nevertheless, according to standard trade models increased international integration could also lead to a greater specialization in line with the comparative advantage of the country. Since developing countries are characterized by relative abundance of unskilled labour increased participation in world markets could increase the demand of unskilled labour. Then it follows that the diffusion of skill-biased technologies and specialization according to the comparative advantage could have opposite effects in the demand of skilled labour.

Recently, the examination of the new microeconomic evidence points out that exporting- and foreign owned firms- firms are more productive than non-exporting ones, and that increased exposure to international markets may increase productivity. This stylized fact gives raise to new models that incorporates firms' heterogeneity.

These new models of trade with firm heterogeneity, predict that trade liberalization could generate significant across and within-industry reallocation effects. In these models opening to trade and consequently increased trade exposure may not only generate the traditional resource reallocation effects from comparative disadvantage industries to comparative advantage ones, but also from less to more productive firms within industries. Firm heterogeneity in productivity is at the heart of the New-New International Trade Theory, pioneered by Melitz (2003) who develop a theoretical model which introduces firm heterogeneity. This researcher explicitly motivates his theoretical model by referring to empirical findings in the micro-econometric literature, namely that exporting firms are more productive than non-exporters, furthermore they are bigger, pay higher wages and are more capital intensive.[3] The studies by Bernard and Jensen (1995, 1999); Clerides et al. (1998); Aw et al. (2000); Isgut (2001); Alvarez and López (2005) are some studies of this empirical literature. Wage dispersion is related to export participation, with exporters paying higher wages than non exporters. This exporter wage premium is in turn accompanied by differences in workforce composition across firms (Kaplan and Verhoogen, 2006; Schank, Schnabel and Wagner, 2007; and Munch and Skaksen, 2008). Further, wage dispersion within industries is closely related to productivity dispersion (Davis and Haltiwanger, 1991; Fagio Silvanes and van Reenen, 2007). To the extent that wages vary across firms within sectors the reallocation of resources across firms provides an additional channel for international trade/activities to influence income distribution.

3 See Wagner (2007) for a survey on the empirical literature.

Helpman et al. (2008) have provided a theoretical framework for analyzing wages, unemployment and inequality with heterogeneous firms and workers. In their model observed differences in economic outcomes across firms and workers are the result of the interaction of firm and worker heterogeneity with labour market frictions. In this model, heterogeneity in product and labour markets are closely intertwined, with workers sorting across firms according to worker and firm characteristics. As a result firm size and wage distributions are both influenced by the distribution of firms and worker characteristics, as well as features of labour and product markets. Income inequality in this framework has two components: wage inequality and unemployment. One of the results that emerge from this model is that more productive firms screen to a higher ability threshold, employ workers with a higher average ability, and pay higher equilibrium wages.[4]

Even though most empirical works find support for the hypothesis that exporting firms are more productive than non-exporting ones, results regarding to the learning by exporting hypothesis are not so clear cut. While some works support the self-selection hypothesis, i.e. most efficient firms self-select into export markets (Bernard and Jensen, 1999; Clerides et al. 1998; Aw et al., 2000), some recent work for developing countries at the disaggregate level also find evidence of learning by exporting effects (Kraay,1999; Castellani, 2002; Girma et al.; 2004; Alvarez and Lopez, 2005; Fernandes and Isgut, 2006; Van Biesebroeck, 2003; Blalock and Gertler, 2004; Baldwin and Gu, 2004, Yasar et al., 2007; and De Loecker, 2007). Nevertheless, both effects may be present: firms that participate in international markets may be more productive but also improve their productivity through its participation in world markets.[5]

Furthermore, Brambilla et al. (2010) studying the skill premium for sixteen Latin American countries find evidence that higher sectoral exports are positively linked with the skill premium at the industry level, a result that supports recent trade models linking exports with wages and the demand for skills.

4 For a survey on the literature on employer size and wage premium see Oi and Idson (1999).
5 For a survey see Wagner (2007) and Greenaway and Kneller (2007).

As we mention above, aside exports, other international linkages – which are also considered channels of international knowledge transfer- widely cited in the literature, are knowledge transfer by imports and foreign direct investment. Regarding to imports, the role of technology embodied in intermediate inputs and capital has been recognised –imports of intermediate inputs, capital or knowledge embodied in imports of goods that may spill over the domestic economy- some studies have shown that technology transfer from abroad may be closely related to productivity growth (Grossman and Helpman, 1991; Coe and Helpman, 1995; Xu and Wang, 1999; Eaton and Kortum, 2001; Lumenga-Neso et al., 2001; Kraay et al., 2001, Coe et al., 1997; Barba Navaretti and Soloaga, 2001; Meyer, 2001; Falvey et al., 2001; and Schiff et al., 2004a, 2004b and 2004c). Though, most of these studies have shown a positive association between imports and productivity gains, the evidence on labour market outcomes is not clear cut. Even more, usually most of the literature analyses the impact of imports of final goods, and the impact of imported intermediates has been less explored. One of the few exceptions is the work by Fajnzylber and Fernandes (2004) who analyse the effects of international world integration on the demand for skilled workers for Brazil and China. These authors find that while in Brazil greater integration is associated with an increased the demand for skilled labour the opposite is true for China. These findings support the importance of country specific studies.

Foreign ownership or foreign direct investment (FDI) is another international linkage, also considered an important channel of technology transfer, both directly and indirectly through spillovers to domestic firms. The role of FDI has also been extensively studied (Blömstrom and Kokko, 1998, Haddad and Harrison, 1994; Aitken and Harrison, 1999; and Harrison, 1996; Kathuria, 2000; Kugler, 2000, 2001; Smarzynska, 2002).[6] Moreover, it is recognized that foreign firms have a more educated workforce and pay higher wages than domestic firms even after controlling for worker quality, at a given moment in time (Almeida, 2008). There is a group of studies that analyses the wage premium of foreign firms, though usually the focus is on the effect of foreign acquisitions on wages (Aitken et al., 1996; Girma et al., 1999; Conyon et al., 2002; Girma and Görg, 2003; Lipsey and Sjoholm, 2004; Almeida, 2008).

6 For surveys see Crespo and Fontoura (2004) and Görg and Greenaway (2002).

Moreover, these international channels may be associated with internal factors specific to countries, industries and firms. One of the internal factors is absorptive capacity which can be proxied by R&D efforts and skilled labour force. For instance, Blömstrom and Kokko (1998), show that FDI may enhance host country firms' productivity through knowledge flows from cumulative R&D efforts in the foreign country, and of skilled employees and management techniques in the recipient country.

In this work we analyze the various international linkages -which may act as possible international technology transfer channels- at the firm level for a developing country analyzing the impact on productivity, on employment of skilled workers and on wages paid to skilled labour force for the period 1988-2005. To this aim we use various methodologies to test the results. Firstly, we assess performance premia associated with these international channels. Then, we estimate quantile regressions and finally we apply treatment effect techniques to examine the causal effect of imported intermediates, FDI and exporting directly on productivity, skilled employment and wages of skilled workers.

The remainder of this work structures as follows: after this introduction in section 2 we describe the empirical strategy followed, while section 3 presents the results and in the fourth the main conclusions.

2. EMPIRICAL STRATEGY

2.1. Performance Premia

Firstly, we analyze the relationships between imports, exports, FDI and measures of productivity (TFP and labour productivity), employment and wages of skilled workers. In particular we estimate the proportional differences in performance characteristics (P_{it}) of firms with foreign ownership (FDI), exporting firms (EXP) and firms that use imported intermediates (IMPI) and their combinations, and those that do not. To this aim we estimate the following equation:

$$\ln P_{it} = \beta_o + \beta_1 X_{it} + \beta_2 Size_{it} + \delta_j + \lambda_t + \varepsilon_{it} \quad (1)$$

The performance measures P_{it} include measures of productivity, employment and wages paid to skilled employees and capital-labour ratios, expressed in natural logarithms.

The measures of productivity considered are Total Factor Productivity (TFP) estimated assuming a Cobb-Douglas functional form and using the Levinshon and Petrin (2002) methodology. Also we include a measure of labour productivity defined as value added over total number of workers.

We define as skilled labour those workers in non-production activities – usually referred as white collars- and split this category in professionals and technicians and other employees. Professionals and technicians could be considered to be more skilled than other white collars.

The measures of employment include total employment, number of employees –i.e. non-production workers- and number of professional and technicians per firm. Also the share of employees to total employment and professionals and technicians over total employment were analysed.

As measures of wages we considered total wages, wages of skilled workers - employees and wages of professional and technicians- per firm. We analyse also the share of skilled wages –discriminating in employees and professionals and technicians - over variable costs of the firm. Finally, we analyse the share of wages of employees, professionals and technicians over total wages of the firm.

The international linkages variables included in X_{it} are the dummy variables EXP, FDI, IMPI and their combinations. Further, we test the effect of domestic R&D (RD) which is defined as a dummy that takes the value of one if the firm performs R&D activities and zero otherwise.

We control for firm size using two different definitions: as the natural logarithm of total employment and a dummy variable equal to one for those firms with more than 100 workers. This variable captures differences in production technologies of firms with different size. This is omitted when the performance measure ($\ln P_{it}$) measure is based on overall employment or is on a per employee basis.

Time dummies (λ_t) capture macroeconomic shocks and changes in the institutional environment.

Finally, industry dummies (δ_t) control for sectoral differences that remain invariant during the period.

The parameter β_1 indicates the average differences in performance (In P_{it}), i.e. the percentage premia in terms of performance characteristics between firms for the various channels of knowledge transfer and firms that do not have these channels, conditional on industry, year and size.

2.2. Quantile regressions

Quantile regressions allow examining the performance effect of international linkages at different points of the conditional distribution of the dependent variables (productivity, skilled labour and wages paid to skilled workers, share of skilled employment and of skilled wages per firm).

When Ordinary Least Squares (OLS) is used to estimate (1) and there is unobserved heterogeneity, then the estimated coefficients are not representative of the entire conditional distribution (Dimelis and Louri, 2001).

To account for some of the heterogeneity in the sample, observed firm level characteristics (such as firm size and industry) are explicitly included in the regression equation. Nevertheless, in the case of firm level data, usually there is heterogeneity which is quite difficult to observe, such as managerial capability.

Unobserved heterogeneity may cause that the dependent variables in (1) and the error term to be independently but not identically distributed across firms. If observations are not identically distributed then OLS will be inefficient. Moreover, if there are long tails, extreme observations will have significant influence on the estimated coefficient. In this regard quantile regression estimates place less weight on outliers and are robust to departures from normality.

In contrast to the OLS estimator, which provides information only about the effect of regressors at the conditional mean of the dependent variable, the results of quantile regressions give parameter estimates at different quantiles. Thus, this technique provides information regarding to the variation in the effect of the regressors on the dependent variable at different quantiles.

2.3. Treatment Effects Analysis

2.3.1. Discrete Treatment

We use a matching and difference-in-differences methodology which allows studying the causal effect of international linkages (the treatment) on firms which engage in international linkages (the treated) relative to firms that did not have international linkages (the control group). Thus, our aim is to evaluate the causal effect of exporting, FDI and using imported intermediates on Y, where Y represents productivity, number and shares of skilled workers and the level and shares of wages paid to skilled workers. Y is referred to as the "outcome" in the evaluation literature.[7]

The effect of international activities is the estimated difference-in-difference of the outcome variable (productivity, share of skilled employment and wages) between the treated and the control groups.

Let Y_{it} be the outcome for plant *i* in industry *j* at time *t*.

Let the international linkages (IL) where $IL_{it} \in \{0,1\}$ denotes an indicator (dummy variable) of whether firm i has started to have an international linkage -exports (EXP), foreign investments (FDI) or using imported intermediates (IMPI)- and $Y^1_{i,t+s}$ is the outcome at t+s, after starting this activity. Also denote by $Y^0_{i,t+s}$ the outcome of firm *i* had it not has this international linkage. The causal effect of the IL for firm *i* at period (t+s) is defined as: $Y^1_{i,t+s} - Y^0_{i,t+s}$

The fundamental problem of causal inference is that the quantity $Y^0_{i,t+s}$, refed as the counterfactual, is unobservable. Causal inference relies on the construction of the counterfactual, which is the outcome the firms would have experienced on average had they not been exposed to the IL. The counterfactual is estimated by the corresponding average value of firms that do not have this IL. An important issue in the construction of the counterfactual is the selection of a valid control group and to this end me make use of matching techniques.

7 Blundell and Costa Dias (2000) present a review of the microeconomic evaluation literature.

The basic idea of matching is to select from the group of firms belonging to the control group those firms in which the distribution of the variables X_{it} affecting the outcome is as similar as possible to the distribution to the firms belonging to the treated group. The matching procedure consists on linking each treated individual with the same values of the X_{it}. We adopt the "propensity score matching" method. To this end, we first identify the probability of being a firm engaged in IL (the "propensity score") for all firms, irrespective if they belong to treated or control group by means of a logit model. A firm k belonging to the control industries, which is "closest" in terms of its "propensity score" to a firm belonging to the tradable industries, is then selected as a match for the former. There are several matching techniques, and in this work we use the "kernel" matching method that penalises distant observations, and bootstrapped standard errors.

A matching procedure is preferable to randomly or arbitrarily choosing the comparison group because it is less likely to suffer from selection bias by picking firms with markedly different characteristics.

As Blundell and Costa Dias (2004) point out, a combination of matching and difference-in-difference is likely to improve the quality of non-experimental evaluation studies. The difference-in-difference approach is a two step procedure. Firstly, the difference between the average output variable before and after engaging in the international activity is estimated for firms belonging to the treated group, conditional on a set of covariates (X_{it}). However, this difference can not be attributed only to the IL since after the firm started to undertake this activity the output variables might be affected by other macroeconomic factors, such as policies aimed to stabilization of the economy. To deal with this the difference obtained at the first stage is further differenced with respect to the before and after difference for the control group of non-tradable plants. The difference-in-difference estimator therefore removes effects of common shocks and provides a more accurate description of the impact of the international linkages.[8]

8 In future work we will address the continuous treatment effect since it is likely to have a different response at different export-sales ratio and rate of imported intermediates in total imports. For FDI we have some data limitation since in most years is a binary variable, and for some years we have 4 categories.

2.3.2. Continuous Treatment Effects

We apply a generalization of the propensity score of Rosenbaum and Rubin (1983b) and recently implemented by Bia and Mattei (2008) for continuous treatment effects. The advantage of using the generalised propensity score is that it reduces the bias caused by non-random treatment assignment as in the binary treatment case. While Joffe and Rosenbaum (1989) and Imbens and Hirano (200) have proposed two possible extensions to standard propensity score for ordinal and categorical treatments respectively, propensity score techniques for continuous treatment effect were proposed by Van Dick Imai (2003) and Imbens and Hirano (2004). Bia and Mattei (2008) developed a Stata programme to deal with continuous treatment effects of public contributions (treatment variable) on the level of employment of firms located in the Piedmont.

In our case we are interested in the effects of export propensity (exports/sales) and the use of imported intermediates (imported intermediate/ total intermediates) on productivity and the demand and wages of skilled labour at the firm level.

Similarly to the binary propensity score matching, the generalised propensity score (gps) matching, evaluates the expected amount of treatment that a firm receives given the covariates. Therefore, the estimation of the impact of the treatment is based on the comparison of firms with similar propensity scores. Further, as in the binary treatment, adjusting for the generalised propensity score (gps) removes the biases associated with differences in the covariates. Thus, we can estimate the marginal treatment effect of a specific treatment level on the outcome variable of firms that have received that specific treatment level with respect to firms that have received another one (counterfactual), but both groups with similar characteristics. This methodology improves the intervention effect evaluation, for instance if there is an economic trend present at the same time as the treatment this technique avoids that positive or negative trends result in an overvaluation or undervaluation of the treatment effect.

Bia and Mattei (2008) introduce a practical implementation of the generalised propensity score methodology, assuming a flexible parametric approach to model the conditional distribution of the treatment given the covariates, and which allows testing if the generalised propensity score balances the covariates.

For the sake of simplicity, we assume a linear model for the treatment -also quadratic, cubic and higher order response models are supported by the programme- as follows:

$$t\left|X_i \approx N(\beta_0 + \beta_1^{'} X_i, \sigma^2)\right. ,$$

Where t stands for the treatment and Xi are the following covariates. The covariates include firm size, the lagged level of the outcome variables, a dummy for high value added firms, size and industry and time dummies. For each one of the output and treatment variable we check the balancing properties to define the set of covariates to be included.

The treatment range was divided in four intervals according to the 25th, 50th, 75th and 100th centile of the treatment and each estimated generalised propensity score, conditional on the treatment median for each of the four treatment groups, was divided in 3 blocks (according to the 25th, 75th, and 100th centile of the propensity score distribution).

In order to estimate the causal effect for continuous treatment, firstly we have to estimate the conditional expectation of the outcome,

$$E\left[Y\left|T=t,R=r\right.\right]=E\left[Y(t)\left|r(t,X)\right.\right]=\beta(t,r)$$

Estimated as a function of a specific level of treatment (t) and of an specific value of the generalised propensity score denoted by R=r.

It should be note that β(t,r) does not have a causal interpretation. To have a causal interpretation it is need to average the conditional expectation over the marginal distribution r(t, X): $\mu(t)=E\left[E(Y(t)\left|r(t,X)\right.\right]$, where $\mu(t)$ is the outcome at each level of the treatment in which we are interested.

Thus, we can obtain an estimate of the entire dose-response function as a average weighted by each different propensity score, i.e. $\hat{r}(t,X_i)$, estimated according to each specific level of treatment, *t*.

After averaging the dose response function over the propensity score function for each level of treatment, we can also compute the derivatives of $\hat{\mu}(t)$, which can be defined as the marginal causal effect of a variation of the treatment Δt, on the output variable (Y), obtaining so the treatment effect function.

2.4. Data sources

The data sources for the panel of firms are from the Industrial Census for 1997 and the Annual Surveys from 1988 until 2005, carried out by the "Instituto Nacional de Estadísticas del Uruguay" (INE).

The harmonised data for the period 1988-2005 was provided by the Department of Economics of the School of Social Sciences.

In 1988 an Economic Census was conducted, and in the period 1989-1996 Annual Surveys were undertaken. In 1997 an Economic Census was carried out and changes in the sample as well as in the methodology with respect to previous years were introduced in the following Annual Surveys.

Before 1997 the INE discriminated firms according to units of activities (Unidades de clase de Actividad also named UCAs) since the same firm can undertake activities in several different sectors. Thus, a firm could have several records in the Survey according to its different activities. Moreover, the Industrial Surveys gathered the data exclusively for manufacturing activities. This methodology changed since the 1997 Economic Census while the INE instead of recording data by activities started to register data globally at the firm level in the so called Surveys of Economic Activities. Hence, since 1997 if a firm has activities in several sectors (which can be manufacturing as well as commerce and services) the data will be at the firm level in just one record and it is not possible to discriminate the different activities. The firms are classified by the INE according to its main activity.

For this reason the data will take into account the whole activity of the firm and do not allow isolating the manufacturing activity from commerce and services, neither the different manufacturing sectors. Thus, the data on the firm give us an approximation to the value of production and the resources used but in some cases could be overestimated.[9]

9 According to the INE the percentage of firms that has activities in several sectors (manufacturing and/or commerce and/or services) accounts for the 25 % of the whole firms surveyed in the period 1997-2005.

The data provided by the INE includes gross output, value added, sales, exports, intermediate consumption discriminated in various items, number of workers, capital, imported and domestic intermediates and expenditures in R&D.

One important variable is capital which is defined as the value of lands, buildings and constructions, machinery and equipment, intangible assets and other capital goods used by the firm.

In order to approximate the flow services of capital we use the stock under the assumption that flow services are proportional to the stock of capital. Nevertheless we should keep in mind that the stock of capital does not adjust quickly to changes in business cycles. Hence, total factor productivity estimated using data on capital stock will fluctuate pro-cyclically in relation to the rate of capital utilization. Nevertheless, since there is no data available to estimate flow services of capital and most of the empirical works use the stock of capital, in this study we use stock the capital in the estimation of the production functions and total factor productivity.

Gross output, value added, intermediates, capital and wages were deflated by specific industry price deflators that were constructed at the 4 ISIC digit level, with base year 1997.

We have to keep in mind that the Uruguayan economy was also affected by the Brazilian devaluation in the 1998 and since this year entered in a phase of recession that end up with the economic crisis in 2002 and the beginning of the recovery in 2004.

2.5. Variable definition

The dependent –or outcome- variables are defined as follows and expressed in natural logarithms.

Productivity

As measures of productivity we estimate Total Factor Productivity (TFP) and Labour Productivity (LP).

Total Factor Productivity was estimated assuming a Cobb-Douglas functional form and using the Levinshon and Petrin methodology which allows correcting for endogeneity in inputs (Ln TFP) while the attrition bias was tackled using an unbalanced panel of firms.

Labour Productivity was defined as value added over total employment (Ln LP).

Employment

As measures of skilled employment we considered the following variables:

Employment of professionals and technicians defined in number of this category of workers per firm (Ln P&T).

Employment of white collars is defined as the number of employees per firm (Ln WC).

Share of white collars defined as the share of employees in total employment –total of workers at the firm level- (Ln EMP_S1).

Share of professionals and technicians in total employment defined as the number of professionals and technicians in total workforce of the firm (Ln EMP_S2).

Share of employees and professionals and technicians in total workforce (Ln EMP_S3).

Wages

As measures of skilled wages we analysed the following variables:

Wages of professionals and technicians defined as the total wages of professionals and technicians over the number of this category of workers at the firm level (Ln Wages_P&T).

Wages of Employees defined as total wages of employees –i.e. non-production workers- over the number of employees at the firm level (Ln Wages_WC).

Share of wages of employees in total wages (Ln Wages_S1).

Share of wages of professionals and technicians in total wages (Ln Wages_S2).

Share of wages of employees in total variable costs (Ln Wages_C1).[10]

Share of wages of professionals and technicians in variable costs (Ln Wages_C2).

Share of wages of employees and professionals and technicians in variable costs (Ln Wages_C0)

Share of total wages in total variable costs (Ln Wages_C3).

Additional variables

Employment defined as the total number of workers at the firm level (Ln EMP).

Average wages by firm defined as the total wages over total employment at the firm level (Ln WAGES).

Capital intensity defined as the capital to labour ratio, i.e. stock of capital over total number of workers at the firm level (Ln K_L).

Size of the firm defined in terms of the number of workers and as a dummy that takes the value of one for firms with more than 100 workers.

Time and industry dummies.

Explanatory variables

As explanatory variable we analyse:

Foreign Direct Investment or foreign ownership: dummy variable equal to one when more than 10 % of the assets of the firms are foreign capital and zero otherwise. We named this variable FDI.

10 Fajnzylber and Fernandes (2004) analysing the demand for skilled labour for Brazil and China use a similar definition of skilled wages over variable costs and skilled labour over total labour.

Export Status: dummy variable that takes the value of one when the firm undertakes exports and zero otherwise. We named this variable EXP.

Export propensity defined as the share of exports in total sales (X_SALES).

Imported intermediates defined as a dummy that takes the value of one if the firm uses imported intermediates and zero otherwise (IMPI).

Share of Imported intermediates in total inputs used by the firm (IM_ITOT).

Research and Development Activities: dummy that takes the value of one when the firm undertakes R&D activities and zero otherwise. We named this variable RD.

3. RESULTS

3.1. Descriptive statistics

In Table 1 we present some descriptive statistics indicating the percentage of firms falling into each category for the dummy variables that capture international linkages (FDI, EXP and IMPI), and the average value for the shares of exports in total sales and imported intermediates in relation to total intermediates.

We find that in the period analyzed 8 % are foreign firms, 34 % undertake exporting activities and 42 % use imported intermediates. On the other hand 19 % of the firms sampled do not undertake any of the three activities analyzed.

Regarding to technological capabilities, 8.5 % of the firms carry out R&D activities. The average export propensity is of 14 % while the share of imported intermediates used by the firms is of 21 %.

Regarding to employment the average number of total workers per firms in the period is of 56 workers, while the 75 % of the firms has less than 50 workers and 14 % more than 100 workers. We discriminate between

skilled workers and unskilled ones using a rough proxy: we considered skilled workers employees and professional and technicians. These latter are assumed to be even more skilled than employees (usually administrative workers). The average number of employees, professional and technicians is of 15.49, for employees the figure is of 15 and for professional and technicians of 3. On the other hand the average number of blue collar per firm is of 49 workers (see Table 1.2.).

With respect to wages, the average wage premia of professionals and technicians in relation to blue collars is of 15 %[11] and a maximum of 240 % while the wages of employees to blue collars reaches maximum gap of 98 %.

In what follows we present our results.

3.2. Premia

In Table 2 we present the estimated performance premia associated to each of the three international transfer channels and their combinations. Additionally, we test the effect of endogenous technological capabilities of the firms proxied by R&D activities[12] (RD) alone and combined with international technology transfer channels. We find that the coefficients for labour productivity, TFP and employment are positive and significant indicating that firms with external linkages and endogenous R&D perform better in terms of labour productivity, total factor productivity and employment, capital intensity and wages per worker paid. In particular for total factor productivity, firms with foreign ownership and its combinations are far more productive than the base group. Our results support the finding of Bernard et al. (2003) that exporting firms perform better and are larger than non-exporting firms. However, firms with foreign ownership perform even better relative to the base group. These results are consistent with those obtained by Helpman et al. (2004), and Yasar et al. (2007).

Regarding to skilled labour, we find that the number of employees and professionals and technicians per firm show a positive association with the various channels of international technology transfers as well as with

11 This figure is affected by the large number of firms that do not report professionals and technicians.

12 Dummy that takes the value of one if the firm performs R&D activities.

domestic R&D. The highest association of the number of professionals and technicians is for those firms engaged simultaneously in exports and R&D activities and foreign ownership of capital. On the other hand, the share of skilled workers in total employment -proxied through employees in total employment and professionals and technicians in total employment – show a negative and significant association with exporting, while foreign ownership, imported intermediates and R&D have a positive and significant association. One possible explanation for the negative impact of exports may be the export specialization of the country based on low value added products, mainly agro-industrial goods according to the comparative advantage of the country. Thus, even though exporting firms hire a large number of skilled workers compared to non-exporting firms, the relation is not linear, and the share of unskilled workers is even higher compared to non exporting firms. This could be explained due to the fact that exporting requires both the production of physical units of the good and the provision of export services. These include labelling, marketing, technical support, consumer support (webpage, email, warranty. Then, it follows that to export –even low technology intensive products- will require more skills than to sell in the domestic market (Brambilla et al., 2010) which could explain the positive association between exports and the number of skilled workers. In other words, the negative association between exports and the share of skilled labour on total labour could be explained by a higher increase in unskilled labour in total labour in line with comparative advantages of the country in low technological intensive products. Another puzzling result that emerges is the negative association between the share of professionals and the dummy for imported intermediates, which suggests a substitution effect between skilled labour and imported intermediates –probably due to firms located in free exporting areas-, but this effect vanishes when we take the number of professional and technicians and employees in absolute term. Summing up, firms with foreign ownership, exporting firms and firms that use imported intermediates have a higher number of skilled labour force but when we considered the share of skilled workers in relation to total workers there is a negative association with the export status of the firm and a positive relationship with foreign ownership and imported intermediates except for the share of professionals and technicians in total workforce.

The wages of white collars (employees) and wages of professional and technicians per firm show a positive association with international linkages and endogenous R&D. On the other hand the bill wage share of white collars (employees) in variable costs shows a positive association with

foreign ownership, exports, imported intermediates but a not significant relation with R&D. Furthermore, the bill wage share of professionals in total variable costs has a significant association with exporting and imports of intermediates but insignificant with foreign ownership and R&D. Finally, the share of wages in variable costs shows a positive association with exports and intermediate imports pointing out a higher wage composition in the cost structure of these firms.

Thus, wages of skilled workers and professionals seem to be higher for exporting firms and when we take these variables in levels - in terms of wages of each labour category per firm- and as shares of variable costs, but show a negative association when we consider them as shares of total wage bill per firm. As commented above, these results may be driven by the high presence of firms belonging to the agro-industrial sector, in which the country enjoys comparative advantage and specialize in exporting low value added products, so even though the wage bill of skilled workers per firm is higher in absolute terms when we take this variable in terms of total wage bill there is a negative association, in line with the previous finding on the shares of skilled employment in total employment.

Thus, we find a positive association of international linkages with productivity, number and wages of skilled workers per firm. When we consider the share of skilled workers in total employment we find a positive association with FDI and imported intermediates but a negative association with exports which could be explained by a higher increase in unskilled labour in total labour in line with the comparative advantage of the country.

The wages of white collars (employees) and wages of professional and technicians show a positive association with international linkages and endogenous R&D. The same relation holds true for the total wage bill share of skilled labour in variable costs. Nevertheless we find a not significant association with R&D, and the wage share of professionals and technicians with R&D as well as with FDI is not significant. It is hard to pose an explanation for these unexpected results. One possible explanation for this lack of significance is that there is not a linear relationship with these variables.[13] Furthermore, we should keep in

13 We should keep in mind the low number of firms that report professionals and technicians, so total wage bill for this category is very low compared to total variable costs.

mind the low number of firms that report professionals and technicians, so the total wage bill for this category is very low compared to variable costs, which could be driven the results.

Nevertheless, for the number of skilled workers and the wage bill share of skilled labour in variable costs, international linkages and domestic R&D show a positive and significant association. Finally, it is worth noting that the coefficient for wages are higher than for employment which would indicate that the demand operates more through the price of skilled labour than through the number of skilled workers.

3.3. Quantile regressions

The tests of the normality[14] of the dependent variable indicate that the dependent variables depart from normality which justifies the use of quantile regressions.

In Table 3 we present the results for OLS and of the quantile regressions at 0.10, 0.25, 0.50, 0.75 and 0.90 quantiles of the distribution of each dependent variable. The coefficients can be interpreted as the partial derivative of the conditional quantile of Y with particular regressors, i.e. the marginal change in y at the conditional quantile due to the marginal change in a particular regressor- in our case FDI, EXP and IMPI-.

For productivity, the coefficients associated with FDI and EXP vary significantly as we move from the lowest to the highest quantile. This provides evidence that there is a positive effect of FDI and exports on productivity across the entire conditional output distribution.[15] Thus, firms with higher productivity levels are more responsive to foreign ownership and export status. On the other hand the use of imported intermediate (IMPI) shows a relatively stable and positive coefficient across quantiles. In Chart 1 we depict the estimated coefficients for the different quantiles.

14 We perform the sktest in Stata 11, which throws the skewness and kurtosis tests of normality. In all cases we reject normality. The Kolmogorov-Smirnov tests (ksmirnor in Stata) also confirm non-normality.

15 The positive shift of all quantiles means that foreign ownership and exporter productivity distribution first order stochastic dominates the non-foreign and non-exporter productivity distribution.

Regarding to the number of professionals per firm they increase from the 0.1 quantile up to the 0.5 and then decrease for FDI, while for exports and imported intermediates show a decrease at the 0.25 quantile followed by an increase around the median and stability onwards. Thus, firms are more responsive from the median onwards to exports and imported intermediates (see Chart 2 up to 12 for a graphical view). On the contrary, the number of employees per firm shows a slightly decreasing trend from the lowest to the highest quantile for the three international channels (Chart 3).

The share of employees in total employment for foreign ownership is not significant at the lowest quantile but positive and relatively stable at higher quantiles. The share of professionals for FDI has a stronger effect at the highest quantiles. On the other hand the association with exporting is negative for both variables (share of employees in total employment and the share of professionals in total employment), with and increasing negative effect on the share of employees in total employment and a declining negative effect for the share of professionals as we move towards higher quantiles.

Finally, imported intermediates has a positive association with the share of employees in total employment, rising at the second quantile and then showing a decreasing association, while for the share of professionals in total employment the coefficient is negative and declines as we move towards higher quantiles, so the negative association is higher at the lower tail of the distribution. This could be pointing out a substitution effect between imported intermediates and professionals. When we consider employees plus professionals and technicians over total workers foreign ownership has a positive and significant impact across the entire distribution with a maximum at the 25th quantile, while exporting is not significant at the 10th and 25th quantile and becomes negative from the 50th onwards, indicating that a higher export share is associated to relatively more unskilled employment in line with the comparative advantages of the country. At its time the use of imported intermediates has a higher positive and significant effect at the lowest tail of the distribution becomes not significant at the 75th quantile and negative at the 90th quantile.

Regarding to wages, for wage bill share of professionals and technicians of employees per firm, we find a declining trend over quantiles for the three international channels considered, so the conditional effect

is highest at the lower tail of the distribution. The wages bill share of skilled employees in total wages shows a positive association with foreign ownership with an increasing effect in the second quantile and a decreasing coefficient at the highest quantile for both the wage bill share of employees in total employment and the wage bill share of professional and technicians. On the other hand there is a negative association between the wage bill share of employees with the export status of the firm and not significant association between the wage share of professionals and exports. Finally, imported intermediates show a higher coefficient at the lowest tail of the distribution, for both the share of employees and professionals.

The wages of employees over variable costs shows that FDI increases its effect from the lowest tail and reaches a maximum at 0.5 and 0.75, while exports show a relatively stable effect and imported intermediate reaches the maximum effect at the lowest tail.

On the contrary, wages of professionals and technicians over total costs shows no significant effect of FDI except at the 0.75 quantile, while for exports and imported intermediates seem to be an U inverted relationship with a peak at the 0.75 and a fall at the 0.90 quantile.

Finally, total wages over total variable costs shows a positive and increasing effect of FDI over the distribution with a maximum effect at the highest quantile, while exports reach the maximum at 0.5 and 0.75 and imported intermediates at 0.25 and declines afterwards. When we consider wages of skilled workers (employees plus professionals and technicians) over variable costs we find a not significant effect of foreign ownership at the lowest quantiles and it becomes positive and significant from the 50^{th} quantile onwards reaching a maximum at the 75^{th} quantile. For exports we find a positive and significant increasing effect from the 50^{th} quantile onwards and for imported intermediates a positive and increasing effect across the entire distribution.

Thus, these results confirms that the effect of the different variables of international linkages have a different effect over the distribution of the dependent variable.

To sum up, productivity is more responsive to FDI and exports as we move from the low to the upper tail of the distribution, so firms with higher productivity levels are more responsive to foreign ownership and exporter status, while for imported intermediates the estimated coefficients

are relatively stable and positive across the distribution of productivity. The number of professionals and technicians is more responsive to exports and imported intermediates around the middle of the distribution, while the number of employees shows a decreasing response at the highest tail of the distribution for the three international channels analysed. For the share of employees and professionals and technicians in total employment we find a different behaviour. The association between FDI and the share of employees is not significant at the lowest tail of the distribution and becomes positive and significant at the 0.25 quantile, with a relatively stable coefficient. The share of employees has a negative association with exports with and increasing negative effect as we move towards higher quantiles while there is not association with the share of professional and technicians. On the other hand imported intermediates shows a negative association with the share of professionals and technicians. Imported intermediates show a higher coefficient at the lowest tail of the distribution, for both the share of employees and professionals.

Regarding to wages, for wages of professionals and technicians and wages of employees per firm, we find a declining trend over quantiles for the three international channels considered, so the average effect is highest at lower tail of the distribution. While the share of wages in variable costs show different behaviour according to the explanatory variable analysed at the various points of the distribution. To sum up, the response to the variables differ over the conditional distribution of each variable, confirming that the response or premia is not homogeneous. Since firms are heterogeneous, the premium in terms of productivities, skilled labour and wages for the three international linkages vary along the distribution of the various dependent variables considered to analyse productivity and the demand of skilled labour. Thus, firm heterogeneity translates into different responses that are better captured using quantile regressions than with the standard OLS regressions.

3.4. Treatment Effect Analysis

3.4.1. Discrete Treatments

We use treatment effect techniques which allows analysing the causal effects of international linkages (the treatment) on firms that engage in international activities (the treated) relative to firms that do not (the control group). Our treatment variables are foreign ownership (FDI), exports

(EXP) and imported intermediates (IMPI). We performed regressions in double differences without matching, matching and double differences (MDID) without bootstrapped standard errors and matching and double differences with bootstrapped standard errors. Due to space constraints[16] we will comment the results for MDID with kernel matching techniques[17] and bootstrapped standard errors which are reported in Table 4.1. The advantage of bootstrapping is that it is not assumed a specific distribution of the variable under analysis. Additionally, in Table 4.2 we report the results of MDID without bootstrapping and in Table 4.3, we present the results of the regressions in double differences without matching.

As covariates we included size defined as a dummy that takes the value of one for firms with more than 100 workers and zero otherwise, a dummy that takes the value of one for firms with value added higher than the median for the whole sample and zero otherwise, and a dummy equal one for those firms with gross output higher than the median and zero otherwise, as well as time and industry dummies. In all the cases we check that the balancing test is satisfied.[18]

For productivity, the number of professionals and technicians and employees we find a positive impact of foreign ownership, exports and imported intermediates. For TFP the variable with a higher impact is foreign ownership, while for employment of professionals and technicians the most important effect is from exporting. In the case of the number of employees the higher effect is given by imported intermediates.

On the contrary, for the share of employees in total employment exports has a negative and significant impact, consistent with our previous findings, while foreign ownership and imported intermediates have a positive and significant impact. For the share of professionals in total employment we obtain a not significant effect for exports, a negative impact for imported intermediates but a positive and significant effect for foreign ownership.

16 An analysis of the results from the different methods used will be performed in a future version of this work.

17 The kernel technique penalises distant observations.

18 We use three different commands to estimate results in Stata 11: pscore followed by the attk command with the bootstrap option; the bs: psmatch2 command for MDID and bootstrapping and psmatch2 without the bootstrap option.

Regarding to wages of professionals and technicians we observe a positive and significant effect of the three channels of international technology diffusion analysed, with a stronger impact for exports. We obtain similar results for the number of employees per firm.

The wage bill share of employees in total wages shows a positive effect of foreign capital, exports and imported intermediates, while the share of wages of professionals and technicians in total wages points out a positive and significant effect of foreign ownership and imported intermediates and not significant effect of exports.[19]

Nevertheless, the wage bill share of employees in variable costs shows a positive impact of foreign ownership and imported intermediates and exports, while the wage share of professionals and technicians in total costs shows a positive impact of exports and imported intermediates, but no effects of foreign ownership.

Finally total wages in variable costs shows a positive effect of the three international channels analysed. In Table 5 we present a summary of the results for the treatment effect analysis.

3.4.2. Continuous Treatments

To analyse the effect of different levels of export propensity, i.e. exports/sales and shares of the use of imported intermediates in total inputs we adjust a linear model, i.e. $Y = T + GPS + T*GPS$, where Y stands for the outcome variable, T the treatment level and GPS is the generalised propensity score. The treatment range was divided in four intervals (according to the 25^{th}, 50^{th}, 75^{th} and 90^{th} percentile of the treatment) and estimate the generalised propensity score conditional on the covariates **X** defined above. We estimate the entire dose response function as a weighted average by each different generalised propensity score estimated for each level of treatment. In order to compute standard errors and confidence intervals we use bootstrapped standard errors taking into account the estimation of the generalised propensity score and the coefficients parameters (β).

19 Once again we should remember that the low number of professionals and technicians, and consequently the low wage bill, when taken as share of total wages or total costs, can be affecting the results.

In Chart 13 we present the dose response function and the treatment effect function for the different levels of export propensity.[20] In the left side of the chart the dose response function shows the distribution of Y for different levels of the treatment, while in the right side it shows the derivatives $\hat{\mu}(t)$ that can be defined as the marginal causal effect of a variation of the treatment (Δt) on the outcome variable and the confidence bands for the marginal effects relative to the estimated outcome values. We define a change in treatment of 0.20. We find a positive and significant effect of the export propensity ratio on TFP. We can observe the treatment effect function, i.e. the first derivative of the dose response function with respect to the level of treatment – shows increases in productivity over the dose of 0.4 of exports/sales.

In Chart 14 we present the dose response and treatment effect function of the use of imported intermediates on TFP. We observe a positive distribution of TFP for all the levels of imported intermediate but the marginal effects points out to a negative effect at doses of imported intermediates higher than 70 per cent.

Regarding to the employment of skilled labour we take the variable skilled workers/total employment and evaluate the effect of export propensity and the use of imported intermediates and adjust a linear model. We present the results in Chart 15 and 16 for each treatment variable. We find a strange behaviour of the level of exports on the share of skilled workers in total employment. The treatment effect function shows a decreasing marginal effect on the share of skilled workers for export-sales ratios up to 30% followed by increasing effects and becomes positive after 50%. Nevertheless we should note that the marginal effects though significant are very low, with a maximum of 0.08 for the outcome variable at the level of 100% of total exports. Further, when we analyse the total number of skilled workers per firm –employees plus professionals and technicians– we find positive though not significant effect of the level of exports. The dose response function and the treatment effect function are presented in Chart 17.

In Chart 18 we can observe the response and the treatment effect function for the use of imported intermediates which has a decreasing effect

20 For the sake of space we do not report the whole output and tests.

on the share of skilled workers from 40 % to the upper tail of the distribution. This effect can be explained by firms located in export processing zones that use a high share of imported intermediate and use low skilled workers.

Finally for wages we analyse the wage bill share of employees and professionals in variable costs. See Chart 19 for the level of the export-sales ratio and in Chart 20 for imported intermediates and a linear model. In both cases the linear, quadratic and cubic models are not significant, thus we can not inferred a causal effect of the different doses of the treatments on the wage share of skilled workers. Nevertheless when we defined the wage bill share as wages of skilled workers over total wages we find a negative effect up to 30 per cent followed by a increasing positive effect of the export propensity ratio for export levels higher than 40% (Chart 21). On the contrary we find a negative effect of imported intermediates indicating that a high use of imported intermediates has a causal negative effect on the wage bill share of skilled workers[21] This last finding could be due to the firms in export processing zones which import a high proportion of intermediates free of taxes, assembly and re-export without adding too much value added. Thus, it seems to be a different behaviour for the different doses of export propensity and the use of imported intermediates over total inputs on the share of the number and wage bill shares of skilled workers, with a positive impact of the export propensity ratio and a negative effect of the share of imported intermediate and a higher impact on the level of wages than in employment of skilled workers. Finally, it is worth noting that the continuous treatment analysis reveals a different response to the different levels of the treatment complementing the analysis for the discrete treatment case.

4. CONCLUDING REMARKS

Regarding to the OLS estimations, we find that the coefficients for labour productivity, TFP and employment are positive and significant indicating that firms with external linkages and endogenous R&D perform better in terms of labour productivity, total factor productivity and

21 For the discrete treatment analysis we find a positive effect of exports on the wage bill share of employees and a positive effect of imported intermediates.

employment, capital intensity and wages per worker paid. In particular for total factor productivity, firms with foreign ownership and its combinations are far more productive than the base group. Results are not so clear cut when we take skilled labour and wages as shares, particularly when we take skilled employment as the share of total employment and wages of skilled workers as share of total wages. Nevertheless, when we take skilled labour and wages as shares of total variable costs, there is a positive effect of international linkages.

The quantile estimations reveal that the response to the variables differ over the conditional distribution of each variable, confirming that the response or premia is not homogeneous. Since firms are heterogeneous, the premium in terms of productivities, skilled labour and wages for the three international linkages vary along the distribution of the various dependent variables considered to analyse productivity and the demand for skilled labour. Thus, firm heterogeneity is better capture using quantile regressions than with the standard OLS regressions.

The treatment effect analysis reveals a positive causal effect of exports, foreign ownership and imported intermediates on productivity, skilled labour and wages. Nevertheless, the share of white collars (employees) in total employment show a negative effect of exports, while the share of professionals and technicians show a not significant effect of exports and negative from imported intermediates, as we discussed above. Finally, when we take skilled labour wages as share of variable costs, we find that except for the share of professionals, which turns to be not significant, external linkages show a positive effect. In short, it seems to be a causal association of international linkages with the absolute number and wages per firm of skilled workers but negative in relative terms when the numerator is total employment or total wage bill per firm.

The continuous treatment effect shows the causal effect of different levels of export propensity and use of intermediates in total inputs for some of the variables analysed. We find a positive and increasing effect of the level of exports and imported intermediates for productivity while for the share of skilled workers in total employment there is a U-shaped marginal effect for export intensities and an inverted U-shaped marginal effect for imported intermediates. Finally wage bill shares of skilled workers in terms

of total wages shows an increasing marginal effect for export propensities higher than 0.4 and negative marginal effects for imported intermediates.

The whole picture that emerges is that knowledge from abroad helps to increase productivity, in line with the predictions of endogenous growth models in open economies. Furthermore, there is evidence that these linkages tend to increase the demand of skilled labour, which would in turn increase income inequality. Nevertheless there is also some evidence that exporting also increases the employment of unskilled workers and that this effect is more important for those firms with a high export propensity and probably producing goods in which the country enjoys comparative advantages, but a positive effect for the remaining exporting firms. Thus, the policy recommendation should be to promote international linkages as well as to implement complementary domestic policies such as training of workers in order to take advantage of the globalised environment and other social policies to mitigate wage inequality.

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Table 1: Descriptive statistics

Variable	No. Obs.	Mean	Std. Dev.	Min	Max
Foreign Ownership	9,609	0.08	0.27	0	1
Exporter	16,033	0.34	0.47	0	1
Intermediate Imported Intermediates	16,023	0.42	0.49	0	1
R&D expenditures	10,697	0.08	0.28	0	1
Export Propensity	16,033	0.14	0.29	0	1
Share of Imported Imported Intermediates	16,023	0.21	0.33	0	1
Employment (number of workers)	24,313	56.04	148.07	0	4,494
Big	24,330	0.14	0.35	0	1

1.2: Number of Workers per Firm

Variable	No. Obs.	Mean	Std. Dev.	Min	Max
No. of Employees and Prof&Tec	10,182	15.13	36.96	0	954
No. Employees	18,891	15.45	45.17	0	1,419
No. P&T	10,182	3.05	8.68	0	236
No. Blue Collars	18,891	48.59	120.33	0	3,148
Total No. Workers	24,313	56.04	148.07	0	4,494

No. P&T: number of professionals and technicians

Table 2: Performance Premia

	Ln LP(a)	Ln TFP	Ln EMP(b)	Ln PyT	Ln WC	Ln EMP_S1	Ln EMP_S2	Ln WAGES_PyT	Ln WAGES WC	Ln Wages_C1(a)	Ln Wages_C2(a)	Ln Wages_C3(a)	Ln Wages_S1	Ln Wages_S2
FDI	0.884	0.700	0.904	0.672	0.514	0.122	0.216	0.672	0.673	0.851	0.018	0.643	0.188	0.477
	(0.045)***	(0.044)***	(0.053)***	(0.044)***	(0.039)***	(0.033)***	(0.045)***	(0.045)***	(0.032)***	(0.147)***	(0.273)	(0.141)***	(0.031)***	(0.056)***
EXP	0.400	0.378	1.329	0.613	0.387	-0.269	-0.251	0.613	0.378	0.480	1.344	0.667	-0.077	0.028
	(0.022)***	(0.030)***	(0.020)***	(0.027)***	(0.019)***	(0.014)***	(0.023)***	(0.027)***	(0.017)***	(0.082)***	(0.255)***	(0.074)***	(0.015)***	(0.052)
IMPI	0.620	0.459	1.136	0.478	0.611	0.047	-0.277	0.478	0.583	1.198	1.049	1.102	0.186	0.118
	(0.019)***	(0.027)***	(0.020)***	(0.026)***	(0.018)***	(0.013)***	(0.023)***	(0.026)***	(0.015)***	(0.073)***	(0.268)***	(0.067)***	(0.015)***	(0.060)**
RD	0.709	0.581	0.825	0.500	0.536	0.117	0.071	0.500	0.488	0.152	-0.295	-0.054	0.102	0.224
	(0.040)***	(0.039)***	(0.048)***	(0.038)***	(0.037)***	(0.026)***	(0.034)**	(0.038)***	(0.039)***	(0.194)	(0.287)	(0.168)	(0.031)***	(0.062)***
FDI*EXP	0.844	0.643	1.136	0.650	0.391	-0.095	0.155	0.748	0.641	0.692	0.593	0.624	0.008	0.505
	(0.056)***	(0.054)***	(0.060)***	(0.069)***	(0.048)***	(0.040)**	(0.057)	(0.054)***	(0.040)***	(0.182)***	(0.305)*	(0.174)***	(0.030)	(0.066)***
IMPI*EXP	0.442	0.368	1.338	0.451	0.491	-0.140	-0.285	0.543	0.391	0.837	1.319	0.827	0.040	0.138
	(0.024)***	(0.033)***	(0.022)***	(0.058)***	(0.021)***	(0.015)***	(0.026)***	(0.030)***	(0.018)***	(0.087)***	(0.254)***	(0.080)***	(0.015)***	(0.053)**
IMPI*FDI	0.920	0.731	1.062	0.730	0.517	0.114	0.184	0.730	0.701	0.927	0.438	0.643	0.183	0.545
	(0.050)***	(0.048)***	(0.053)***	(0.065)***	(0.044)***	(0.036)***	(0.051)***	(0.051)***	(0.037)***	(0.164)***	(0.294)	(0.157)***	(0.033)***	(0.059)***
FDI*RD	1.155	0.941	0.879	0.610	0.562	0.121	0.400	0.791	0.684	-0.164	-0.470	-0.332	0.069	0.483
	(0.081)***	(0.077)***	(0.124)***	(0.090)***	(0.077)***	(0.057)	(0.070)***	(0.076)***	(0.068)***	(0.311)	(0.386)	(0.289)	(0.056)	(0.082)***
EXP*RD	0.749	0.599	1.066	0.360	0.594	0.040	0.102	0.715	0.498	0.197	0.221	0.066	0.068	0.287
	(0.052)***	(0.050)***	(0.054)***	(0.073)***	(0.046)***	-0.031	(0.044)**	(0.047)***	(0.050)***	(0.249)	(0.339)	(0.215)	(0.035)*	(0.072)***
IMPI*RD	0.736	0.602	0.911	0.379	0.636	0.144	0.007	0.542	0.519	0.296	0.192	0.023	0.140	0.257
	(0.047)***	(0.045)***	(0.050)***	(0.072)***	(0.043)***	(0.030)***	(0.039)	(0.045)***	(0.046)***	(0.224)	(0.319)	(0.194)	(0.036)***	(0.067)***
IMPI*FDI*EXP	0.838	0.650	1.200	0.680	0.400	-0.051	0.141	0.737	0.626	0.764	0.867	0.618	0.039	0.565
	(0.062)***	(0.059)***	(0.062)***	(0.074)***	(0.052)***	(0.044)	(0.062)**	(0.059)***	(0.044)***	(0.199)***	(0.324)***	(0.192)***	(0.04)	(0.065)***
FDI*EXP*RD	1.092	0.882	1.170	0.553	0.504	0.031	0.377	0.953	0.607	-0.028	-0.214	-0.106	-0.044	0.501
	(0.093)***	(0.085)***	(0.107)***	(0.104)***	(0.088)***	(0.061)	(0.080)***	(0.088)***	(0.077)***	(0.356)	(0.433)	(0.341)	(0.062)	(0.100)***
IMPI*EXP*RD	0.744	0.608	1.104	0.402	0.644	0.091	0.042	0.650	0.490	0.200	0.447	-0.038	0.134	0.296
	(0.055)***	(0.053)***	(0.059)***	(0.081)***	(0.052)***	(0.035)***	(0.045)	(0.053)***	(0.055)***	(0.279)	(0.377)	(0.241)	(0.038)***	(0.077)***
IMPI*FDI*RD	1.107	0.921	1.030	0.631	0.531	0.167	0.353	0.815	0.640	-0.198	-0.107	-0.378	0.102	0.492
	(0.091)***	(0.085)***	(0.114)***	(0.099)***	(0.085)***	(0.060)***	(0.072)***	(0.085)***	(0.076)***	(0.348)	(0.423)	(0.333)	(0.061)*	(0.084)***
IMP*FDI*EXP*RD	1.052	0.883	1.213	0.580	0.503	0.101	0.352	0.884	0.550	-0.092	0.156	0.199	0.036	0.505
	(0.104)***	(0.096)***	(0.123)***	(0.112)***	(0.097)***	(0.062)	(0.080)***	(0.097)***	(0.086)***	(0.397)	(0.475)	(0.380)	(0.066)	(0.098)***

Ln LP: labour productivity ; lnTFP: Total factor Productivity; Ln EMP: total number of workers; Ln PyT: number of professionals and technicians; Ln WC: number of employees; Ln EMP_S1: number of employees over total number of workers; Ln EMP_S2: number of professionals and technicians over total number of workers; Ln WAGES PyT: wages of professionals and technicians per person in this category; Ln WAGES WC: wages of employees per person in this category; Ln WAGES_S1: wages of employees over total wages; Ln WAGES_S2: wages of professionals and technicians over total wages; Ln WAGES_C1: wages of employees over total variable costs; Ln WAGES_C2: wages of professionals and technicians over total variable costs; Ln WAGES_C3: total wages over total variable costs. Ln stands for natural logarithms. (a) with a dummy that takes the value of 1 for firms with more than 100 workers and zero otherwise; (b) without control for size. When no specified the control for size is the natural logarithm of the total number of workers.

EXP: dummy equal one if the firm export and zero otherwise; FDI: dummy equal one if the firm has more than 10 % of foreign capital; IMPI: dummy equal one if the firm uses imported intermediates.

Standard errors between brackets. *significant at 10 %; ** significant at 5 %; *** significant at the 1 % of confidence.

Table 3: Quantile regressions

			Quantile Regressions				
Independent	Dependent	OLS	0.1	0.25	0.5	0.75	0.9
Ln TFP	FDI	0.700	0.444	0.564	0.639	0.802	0.974
		(0.044)***	(0.061)***	(0.044)***	(0.037)***	(0.042)***	(0.058)***
	EXP	0.378	0.163	0.201	0.319	0.381	0.512
		(0.030)***	(0.038)***	(0.029)***	(0.022)***	(0.028)***	(0.045)***
	IMPI	0.459	0.475	0.370	0.390	0.435	0.500
		(0.027)***	(0.037)***	(0.026)***	(0.021)***	(0.030)***	(0.042)***
Ln P&T	FDI	0.672	0.404	0.693	0.875	0.756	0.786
		(0.044)***	(0.095)***	(0.000)***	(0.000)***	(0.009)***	(0.051)***
	EXP	0.613	0.571	0.283	0.693	0.693	0.641
		(0.027)***	(0.060)***	(0.000)***	(0.000)***	(0.012)***	(0.030)***
	IMPI	0.478	0.284	0.021	0.562	0.576	0.537
		(0.026)***	(0.051)***	(0.000)***	(0.000)***	(0.036)***	(0.028)***
Ln WC	FDI	0.514	0.693	0.511	0.606	0.539	0.481
		(0.039)***	(0.000)***	(0.000)***	(0.000)***	(0.024)***	(0.068)***
	EXP	0.387	0.693	0.400	0.405	0.342	0.251
		(0.019)***	(0.000)***	(0.000)***	(0.001)***	(0.015)***	(0.039)***
	IMPI	0.611	0.693	0.723	0.651	0.655	0.609
		(0.018)***	(0.000)***	(0.000)***	(0.001)***	(0.012)***	(0.028)***
Ln EMP_S1	FDI	0.122	-0.008	0.181	0.191	0.158	0.170
		(0.033)***	(0.050)	(0.050)***	(0.035)***	(0.038)***	(0.035)***
	EXP	-0.269	-0.180	-0.226	-0.272	-0.304	-0.307
		(0.014)***	(0.027)***	(0.018)***	(0.018)***	(0.018)***	(0.016)***
	IMPI	0.047	0.077	0.105	0.069	0.032	0.000
		(0.013)***	(0.027)***	(0.019)***	(0.016)***	(0.012)**	(0.019)
Ln EMP_S2	FDI	0.216	0.170	0.147	0.238	0.267	0.373
		(0.045)***	(0.078)**	(0.061)***	(0.042)***	(0.046)***	(0.040)***
	EXP	-0.251	-0.400	-0.357	-0.302	-0.214	-0.075
		(0.023)***	(0.040)***	(0.032)***	(0.024)***	(0.024)***	(0.028)***
	IMPI	-0.277	-0.389	-0.359	-0.332	-0.244	-0.137
		(0.023)***	(0.040)***	(0.032)***	(0.024)***	(0.024)***	(0.030)***
Ln WAGES_P&T	FDI	0.672	0.731	0.726	0.626	0.539	0.482
		(0.045)***	(0.127)***	(0.071)***	(0.054)***	(0.060)***	(0.080)***
	EXP	0.613	0.666	0.530	0.333	0.262	0.238
		(0.027)***	(0.120)***	(0.087)***	(0.067)***	(0.061)***	(0.073)***
	IMPI	0.478	0.830	0.525	0.514	0.406	0.335
		(0.026)***	(0.140)***	(0.090)***	(0.074)***	(0.046)***	(0.068)***
Ln WAGES WC	FDI	0.673	0.790	0.744	0.629	0.547	0.471
		(0.032)***	(0.048)***	(0.041)***	(0.038)***	(0.038)***	(0.045)***
	EXP	0.378	0.503	0.463	0.390	0.254	0.172
		(0.017)***	(0.027)***	(0.019)***	(0.018)***	(0.018)***	(0.025)***
	IMPI	0.583	0.670	0.636	0.575	0.517	0.457
		(0.015)***	(0.021)***	(0.019)***	(0.018)***	(0.018)***	(0.020)***
Ln WAGES_S1	FDI	0.188	0.116	0.209	0.223	0.195	0.128
		(0.031)***	(0.075)	(0.045)***	(0.036)***	(0.034)***	(0.0005)***
	EXP	-0.077	0.093	-0.033	-0.097	-0.160	-0.188
		(0.015)***	(0.035)***	(0.025)	(0.019)***	(0.017)***	(0.0002)***
	IMPI	0.186	0.263	0.235	0.220	0.162	0.079
		(0.015)***	(0.033)***	(0.024)***	(0.020)***	(0.015)***	(0.0007)***
Ln WAGES_S2	FDI	0.477	0.550	0.583	0.513	0.428	0.470
		(0.056)***	(0.010)***	(0.087)***	(0.066)***	(0.071)***	(0.095)***
	EXP	0.028	0.131	0.095	0.001	0.051	0.069
		(0.052)	(0.089)	(0.069)	(0.059)	(0.061)	(0.069)
	IMPI	0.118	0.364	0.248	0.167	0.061	-0.117
		(0.060)**	(0.104)***	(0.073)***	(0.071)***	(0.055)	(0.090)

Table 3: Quantile regressions (cont.)

			Quantile Regressions				
Independent	Dependent	OLS	0.1	0.25	0.5	0.75	0.9
	FDI	0.851	0.611	0.705	0.867	0.838	0.740
		(0.147)***	(0.273)***	(0.246)***	(0.182)***	(0.193)***	(0.248)***
Ln WAGES_C1	EXP	0.480	0.461	0.444	0.443	0.498	0.360
		(0.082)***	(0.132)***	(0.111)***	(0.095)***	(0.125)***	(0.162)**
	IMPI	1.198	1.382	1.238	1.173	1.093	1.089
		(0.073)***	(0.142)***	(0.083)***	(0.084)***	(0.116)***	(0.130)***
	FDI	0.018	-0.171	0.128	0.318	0.737	-0.085
		(0.273)	(0.489)	(0.248)	(0.330)	(0.393)**	(0.474)
Ln WAGES_C2	EXP	1.344	1.318	1.141	1.322	1.764	1.123
		(0.255)***	(0.351)***	(0.386)***	(0.246)***	(0.487)***	(0.389)***
	IMPI	1.049	1.043	0.733	0.771	1.482	1.320
		(0.268)***	(0.389)***	(0.343)***	(0.328)**	(0.393)***	(0.399)***
	FDI	0.018	0.382	0.512	0.598	0.689	0.694
		(0.273)	(0.232)*	(0.182)***	(0.169)***	(0.203)***	(0.237)***
Ln WAGES_C3	EXP	1.344	0.638	0.599	0.656	0.642	0.529
		(0.255)***	(0.118)***	(0.110)***	(0.073)***	(0.095)***	(0.140)***
	IMPI	1.049	1.183	1.275	1.045	0.897	0.821
		(0.268)***	(0.092)***	(0.079)***	(0.095)***	(0.099)***	(0.119)***

Ln LP: labour productivity ; lnTFP: Total factor Productivity; Ln EMP: total number of workers; Ln PyT: number of professionals and technicians; Ln WC: number of employees; Ln EMP_S1: number of employees over total number of workers; Ln EMP_S2: number of professionals and technicians over total number of workers; Ln WAGES PyT: wages of professionals and technicians per person in this category; Ln WAGES WC: wages of employees per person in this category; Ln WAGES_S1: wages of employees over total wages; Ln WAGES_S2: wages of professionals and technicians over total wages; Ln WAGES_C1: wages of employees over total variable costs; Ln WAGES_C2: wages of professionals and technicians over total variable costs; Ln WAGES_C3: total wages over total variable costs. Ln stands for natural logarithms. EXP: dummy equal one if the firm export and zero otherwise; FDI: dummy equal one if the firm has more than 10 % of foreign capital; IMPI: dummy equal one if the firm uses imported intermediates.
Standard errors between brackets.
*significant at 10 %; ** significant at 5 %; *** significant at the 1 % of confidence.

Table 3: Quantile regressions (cont.)

Independent	Dependent	OLS	0.1	0.25	0.5	0.75	0.9
	FDI	0.214	0.193	-0.136	0.350	0.619	0.363
Ln WAGES_C0		(0.154)	(0.24)	(0.182)	(0.178)**	(0.245)**	(0.37)
	EXP	0.781	0.209	0.476	0.873	0.912	1.084
		(0.014)***	(0.168)	(0.129)***	(0.136)***	(0.180)***	(0.255)***
	IMPI	0.960	0.744	0.836	0.933	1.203	1.210
		(0.108)***	(0.189)***	(0.125)***	(0.148)***	(0.159)***	(0.251)***
	FDI	0.290	0.213	0.345	0.339	0.289	0.232
Ln EMP_S3		(0.035)***	(0.073)***	(0.041)***	(0.047)***	(0.038)***	(0.035)***
	EXP	-0.147	0.038	-0.042	-0.165	-0.229	-0.305
		(0.019)***	(0.040)	(0.028)	(0.022)***	(0.028)***	(0.019)***
	IMPI	0.067	0.219	0.223	0.095	-0.005	-0.075
		(0.019)***	(0.034)***	(0.026)***	(0.023)***	(0.020)	(0.020)***

Ln Wages_C0: wages of employees and professionals and technicians over variable costs.
Ln Emp_S3: employment of employees and professionals and technicians over total employment.
Ln stands for natural logarithms. EXP: dummy equal one if the firm export and zero otherwise; FDI: dummy equal one if the firm has more than 10 % of foreign capital; IMPI: dummy equal one if the firm uses imported intermediates. Standard errors between brackets.
*significant at 10 %; ** significant at 5 %; *** significant at the 1 % of confidence.

Chart 1: Quantile coefficients, dependant variable: Ln TFP

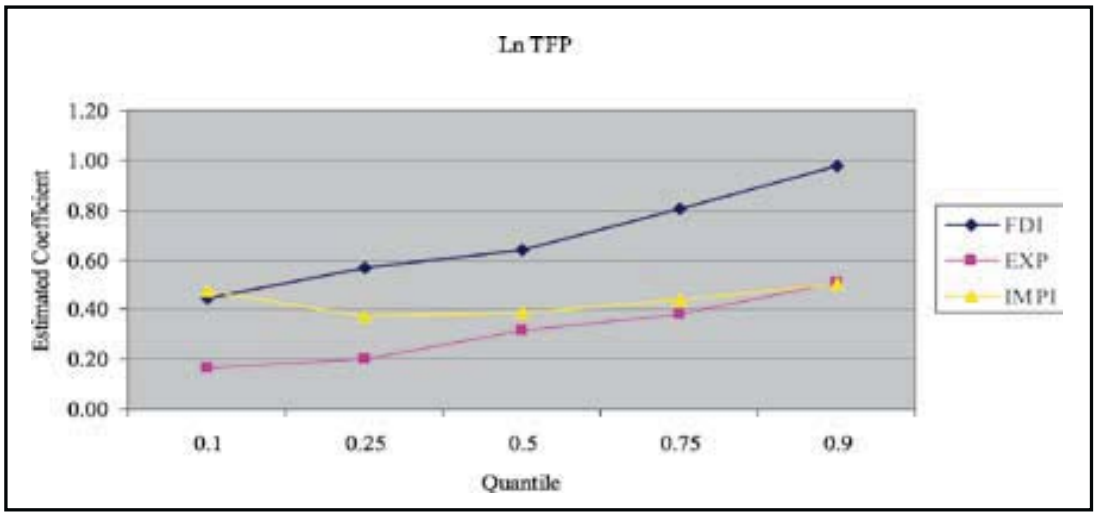


Chart 2: Quantile coefficients, dependent variable: Ln Number of Professional and Technicians

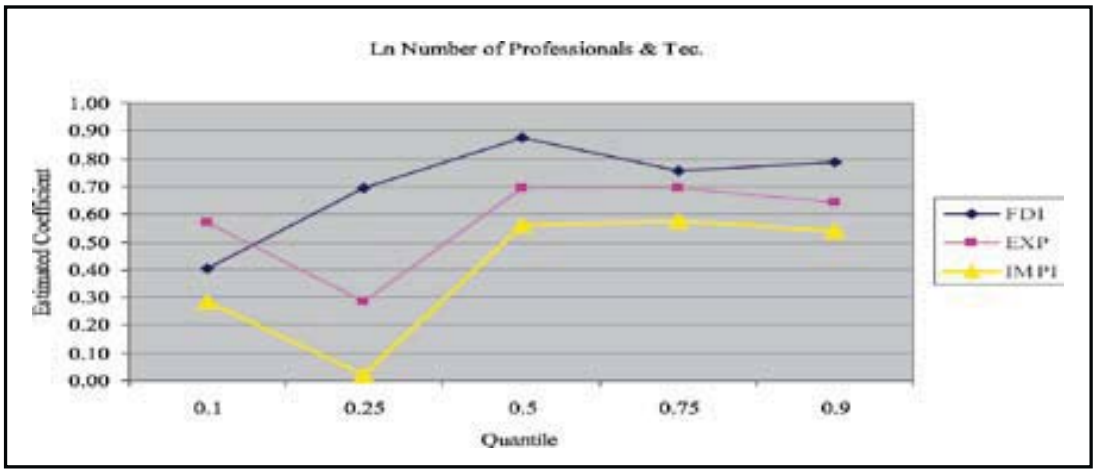


Chart 3: Quantile coefficients, dependent variable: Ln Number of Employees

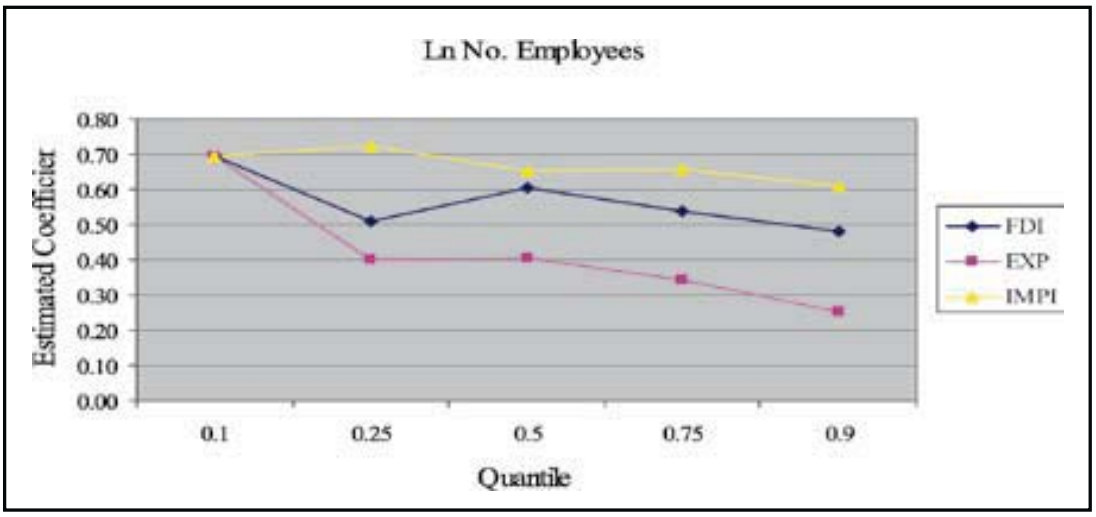


Chart 3: Quantile coefficients, dependent variable: Ln Number of Employees

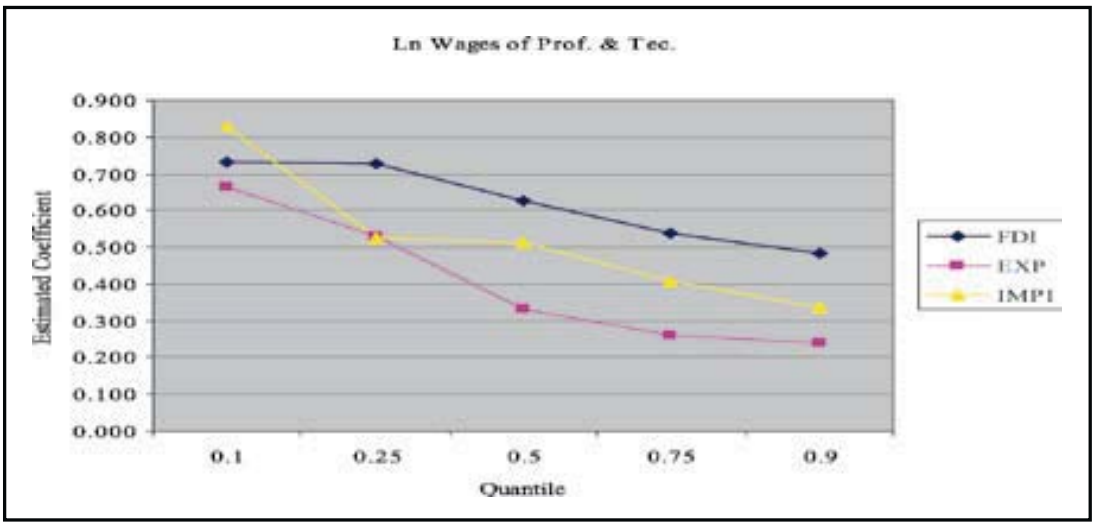


Chart 5: Quantile coefficients, dependent variable: Ln Wages of White Collars (employees)

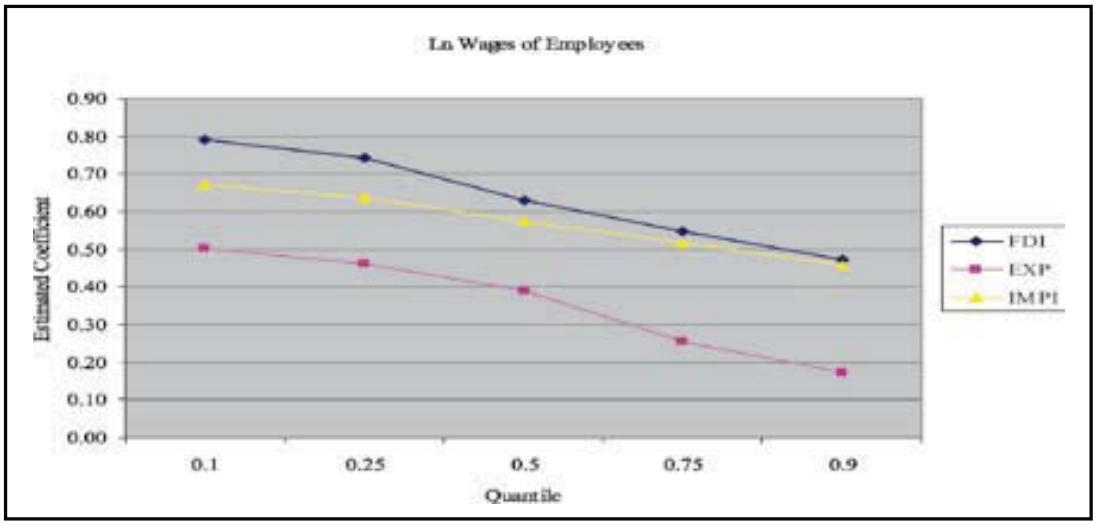
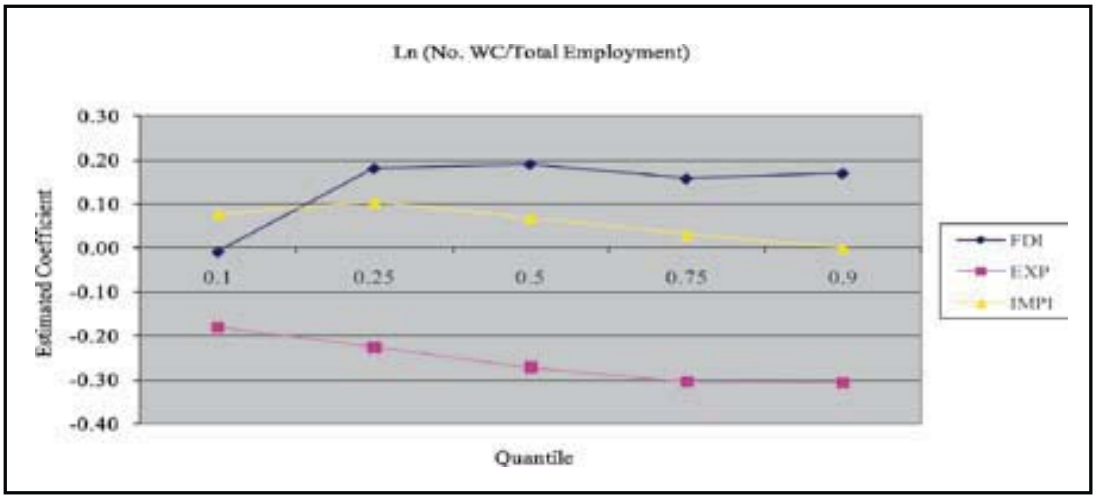


Chart 6: Quantile coefficients, dependent variable: Ln White Collars/ Total Employment



White Collars are the number of employees at the firm level.

Chart 7: Quantile coefficients, dependent variable: Ln Prof&Tech/ Total Employment

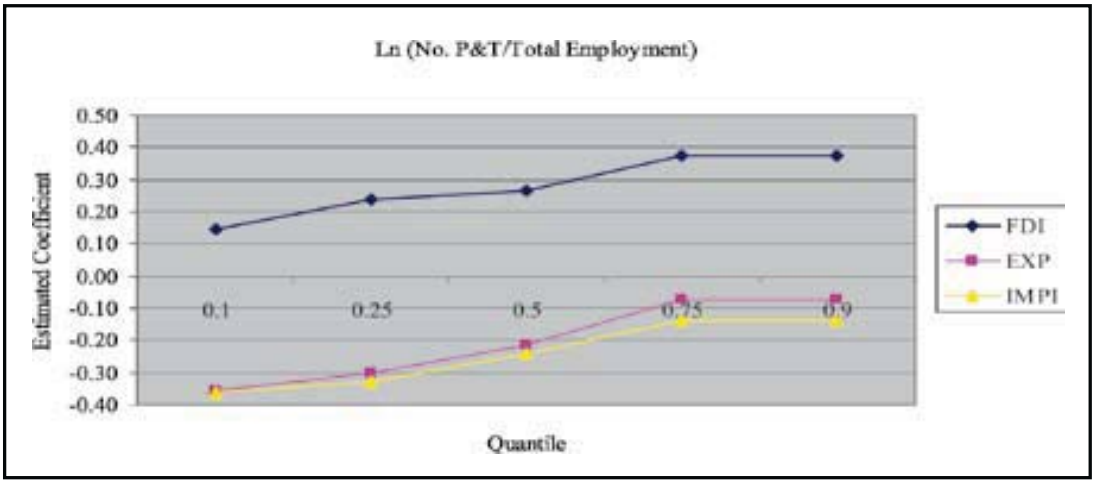


Chart 8: Quantile coefficients, dependent variable: Ln Wages of White Collar/Total Variable Costs

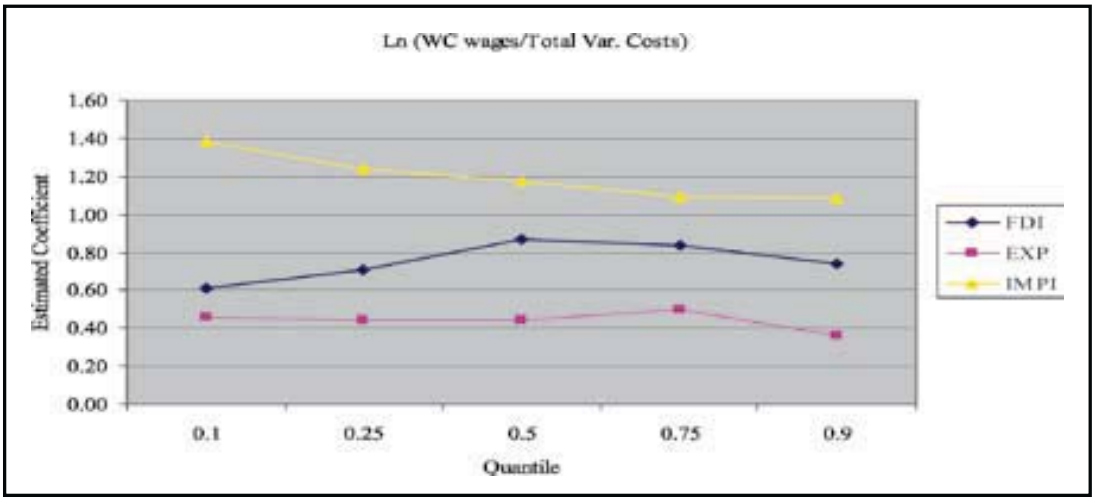


Chart 9: Quantile coefficients, dependent variable: Ln Wages of Prof&Tech/Total Variable Costs

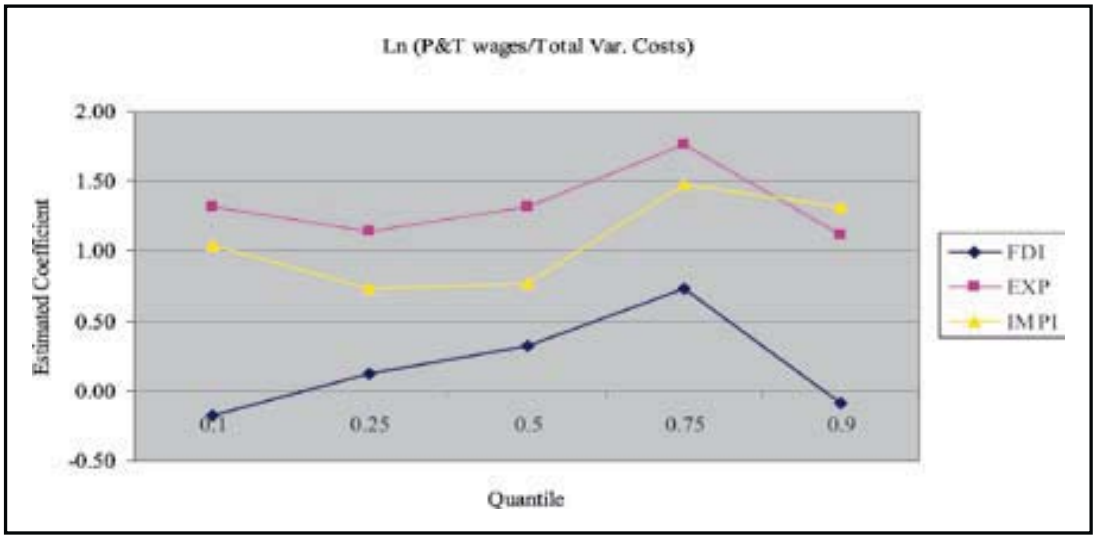


Chart 10: Quantile coefficients, dependent variable: Ln Total Wages/ Total Variable Costs

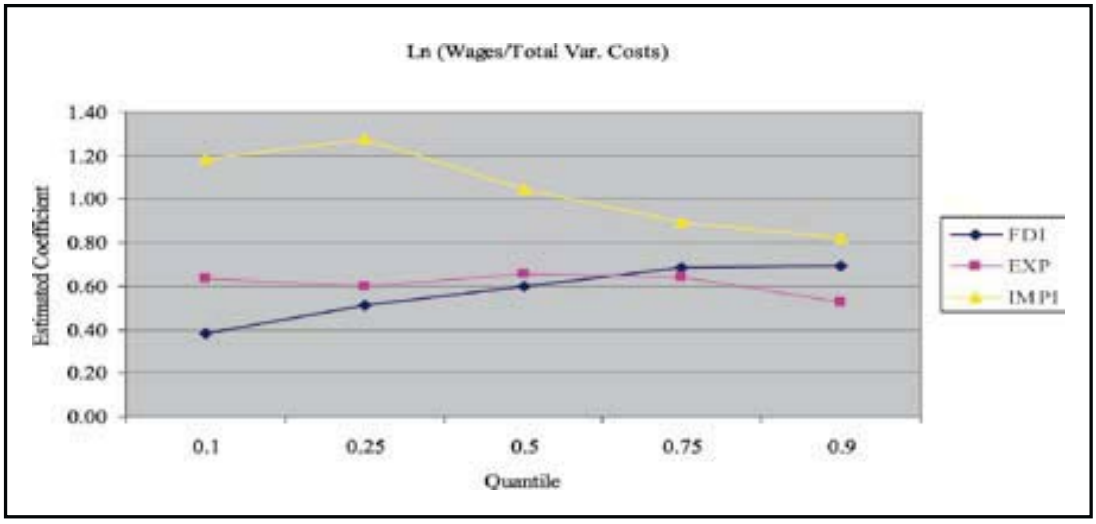


Chart 11: Quantile coefficients, dependent variable: Ln Skilled Workers/Total Employment

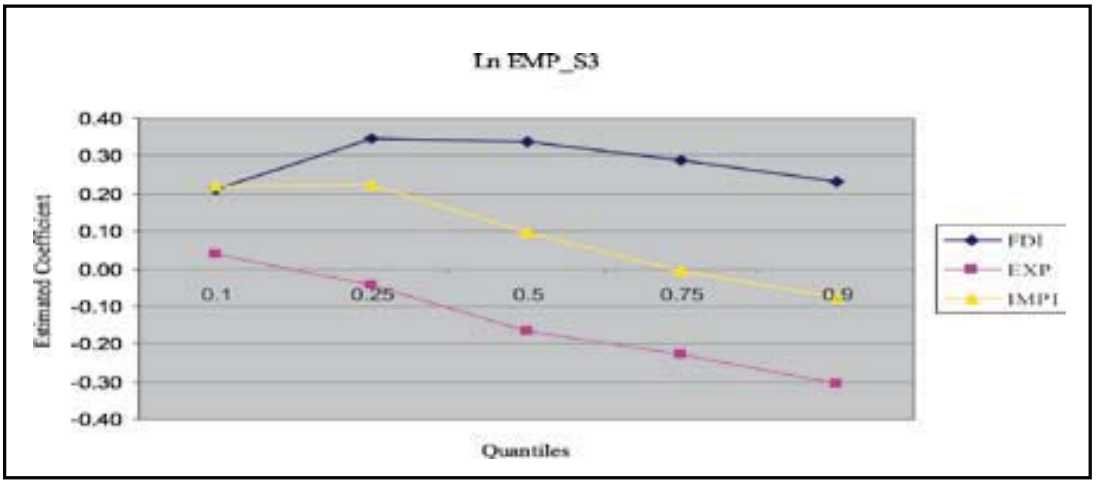


Chart 12: Quantile coefficients, dependent variable: Ln Wages of skilled workers/variable costs

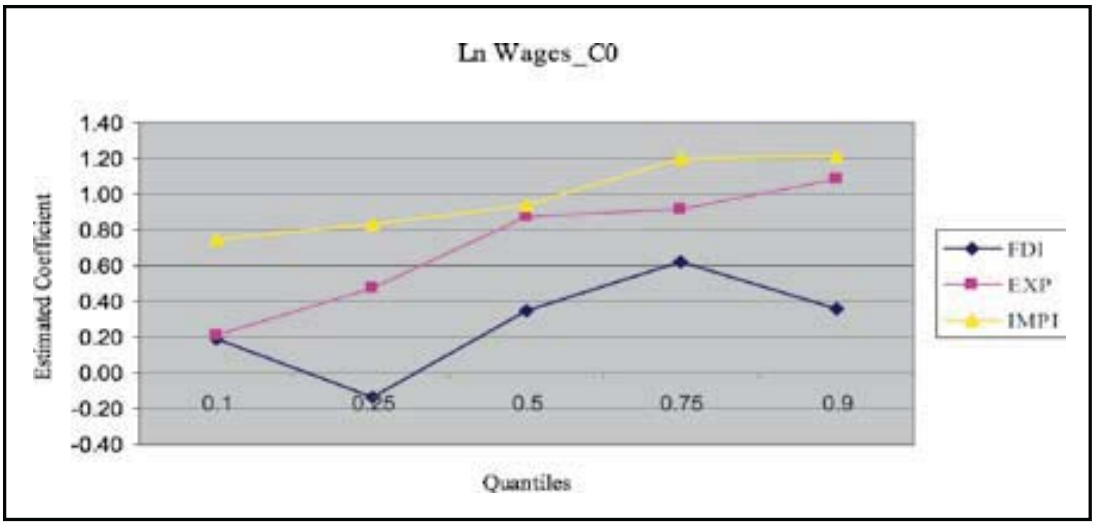


Table 4.1: Matching and Double Difference with bootstrapped standard errors

Output Variable	Ln TFP	Ln PyT	Ln WC	Ln EMP_S1	Ln EMP_S2	Ln Emp_S3	Ln Wages P&T	Ln Wages WC	Ln Wages_S1
EXP(a)	0.130	0.547	0.377	-0.256	-0.067	-0.128	0.597	0.644	0.231
	(0.067)***	(0.050)***	(0.040)***	(0.062)***	(0.058)	(0.038)***	(0.051)***	(0.035)***	(0.045)***
FDI(b)	0.788	0.494	0.214	0.223	0.462	0.322	0.339	0.212	0.240
	(0.042)***	(0.003)***	(0.021)***	(0.032)***	(0.051)***	(0.036)***	(0.060)***	(0.029)***	(0.033)***
IMPI©	0.212	0.356	0.430	0.175	-0.061	0.107	0.453	0.432	0.229
	(0.023)***	(0.033)***	(0.027)***	(0.021)***	(0.031)**	(0.029)***	(0.072)***	(0.035)***	(0.018)***

Output Variable	Ln Wages_S1	Ln Wages_S2	Ln Wages_C0	Ln Wages_C1	Ln Wages_C2	Ln Wages_C3
EXP(a)	0.231	0.078	0.308	0.666	1.089	0.995
	(0.045)***	(0.085)	(0.151)***	(0.36)**	(0.523)**	(0.311)***
FDI(b)	0.240	0.533	0.283	0.850	0.105	0.600
	(0.033)***	(0.048)***	(0.139)***	(0.139)***	(0.249)	(0.151)***
IMPI©	0.229	0.249	0.354	0.712	0.755	0.449
	(0.018)***	(0.081)***	(0.119)***	(0.092)***	(0.335)**	(0.077)***

Ln TFP: Total factor Productivity; Ln EMP: total number of workers; Ln PyT: number of professionals and technicians; Ln WC: number of employees; Ln EMP_S1: number of employees over total number of workers; Ln EMP_S2: number of professionals and technicians over total number of workers; Ln EMP_S3: number of employees and professionals and technicians over total employment; Ln WAGES PyT: wages of professionals and technicians per person in this category; Ln WAGES WC: wages of employees per person in this category; Ln WAGES_S1: wages of employees over total wages; Ln WAGES_S2: wages of professionals and technicians over total wages; Ln WAGES_C0: wages of employees and professionals and technicians over variable costs; Ln WAGES_C1: wages of employees over total variable costs; Ln WAGES_C2: wages of professionals and technicians over total variable costs; Ln WAGES_C3: total wages over total variable costs. Ln stands for natural logarithms. Standard errors between brackets.
EXP: dummy equal one if the firm export and zero otherwise; FDI: dummy equal one if the firm has more than 10 % of foreign capital; IMPI: dummy equal one if the firm uses imported intermediates.
*significant at 10 %; ** significant at 5 %; *** significant at the 1 % of confidence.

Table 4.2: Matching and Double Difference without bootstrapped standard errors

Output Variable	Ln TFP	Ln EMP_S1	Ln EMP_S2	Ln Wages_S1	Ln Wages_S2	Ln Wages_C1	Ln Wages_C2	Ln Wages_C3
EXP	0.237	-0.175	0.127	-0.082	0.195	0.186	0.739	0.239
	(0.033)***	(0.018)***	(0.031)***	(0.020)***	(0.073)***	(0.103)**	(0.35)***	(0.09)**
FDI	0.564	0.247	0.492	0.243	0.555	0.666	0.096	0.389
	(0.042)***	(0.034)***	(0.048)***	(0.032)***	(0.059)***	(0.151)***	(0.291)	(0.146)***
IMPI	0.212	0.175	-0.061	0.229	0.249	0.712	0.755	0.449
	(0.030)***	(0.018)***	(0.030)**	(0.019)***	(0.085)***	(0.094)***	(0.398)**	(0.090)***

Ln TFP: Total factor Productivity; Ln EMP: total number of workers; Ln PyT: number of professionals and technicians; Ln WC: number of employees; Ln EMP_S1: number of employees over total number of workers; Ln EMP_S2: number of professionals and technicians over total number of workers; Ln WAGES PyT: wages of professionals and technicians per person in this category; Ln WAGES WC: wages of employees per person in this category; Ln WAGES_S1: wages of employees over total wages; Ln WAGES_S2: wages of professionals and technicians over total wages; Ln WAGES_C1: wages of employees over total variable costs; Ln WAGES_C2: wages of professionals and technicians over total variable costs; Ln WAGES_C3: total wages over total variable costs. Ln stands for natural logarithms. Standard errors between brackets.

EXP: dummy equal one if the firm export and zero otherwise; FDI: dummy equal one if the firm has more than 10 % of foreign capital; IMPI: dummy equal one if the firm uses imported intermediates.

*significant at 10 %; ** significant at 5 %; *** significant at the 1 % of confidence.

Table 4.3: Double Difference without Matching

Output Variable	Ln TFP	Ln EMP_S1	Ln EMP_S2	Ln Wages_S1	Ln Wages_S2	Ln Wages_C1	Ln Wages_C2	Ln Wages_C3
EXP(a)	0.089	-0.029	-0.044	-0.044	0.065	0.008	0.341	0.156
	(0.033)***	(0.014)**	(0.028)	(0.017)***	(0.064)	(0.053)	(0.173)*	(0.045)***
FDI(b)	0.700	0.302	0.507	0.289	0.529	0.599	0.122	0.272
	(0.037)***	(0.030)***	(0.034)***	(0.032)***	(0.059)***	(0.138)***	(0.262)	(0.127)**
IMPI	0.459	0.254	0.071	0.283	0.306	0.715	0.708	0.430
	(0.023)***	(0.014)***	(0.021)***	(0.016)***	(0.061)***	(0.071)***	(0.269)***	(0.064)***

Ln TFP: Total factor Productivity; Ln EMP: total number of workers; Ln PyT: number of professionals and technicians; Ln WC: number of employees; Ln EMP_S1: number of employees over total number of workers; Ln EMP_S2: number of professionals and technicians over total number of workers; Ln WAGES PyT: wages of professionals and technicians per person in this category; Ln WAGES WC: wages of employees per person in this category; Ln WAGES_S1: wages of employees over total wages; Ln WAGES_S2: wages of professionals and technicians over total wages; Ln WAGES_C1: wages of employees over total variable costs; Ln WAGES_C2: wages of professionals and technicians over total variable costs; Ln WAGES_C3: total wages over total variable costs. Ln stands for natural logarithms. Standard errors between brackets.
EXP: dummy equal one if the firm export and zero otherwise; FDI: dummy equal one if the firm has more than 10 % of foreign capital; IMPI: dummy equal one if the firm uses imported intermediates. *significant at 10 %; ** significant at 5 %; *** significant at the 1 % of confidence.

Table 5: Summary results of the Matching and Double-Difference Estimations

	Explanatory Variable		
Output Variable	EXP	FDI	IMPI
Ln TFP	+	+	+
Ln PyT	+	+	+
Ln WC	+	+	+
Ln EMP_S1	-	+	+
Ln EMP_S2	ns	+	-
Ln EMP_S3	-	+	+
Ln Wages P&T	+	+	+
Ln Wages WC	+	+	+
Ln Wages_S1	+	+	+
Ln Wages_S2	ns	+	+
Ln Wages_C0	+	+	+
Ln Wages_C1	+	+	+
Ln Wages_C2	+	ns	+
Ln Wages_C3	+	+	+

Ln TFP: Total factor Productivity; Ln EMP: total number of workers; Ln PyT: number of professionals and technicians; Ln WC: number of employees; Ln EMP_S1: number of employees over total number of workers; Ln EMP_S2: number of professionals and technicians over total number of workers; Ln EMP_S3: number of employees and professionals and technicians over total employment; Ln WAGES PyT: wages of professionals and technicians per person in this category; Ln WAGES WC: wages of employees per person in this category; Ln WAGES WC: wages of employees per person in this category; Ln WAGES_S1: wages of employees over total wages; Ln WAGES_S2: wages of professionals and technicians over total wages; Ln WAGES_C1: wages of employees over total variable costs; Ln WAGES_C2: wages of professionals and technicians over total variable costs; Ln WAGES_C3: total wages over total variable costs. Ln stands for natural logarithms. Standard errors between brackets. EXP: dummy equal one if the firm export and zero otherwise; FDI: dummy equal one if the firm has more than 10 % of foreign capital; IMPI: dummy equal one if the firm uses imported intermediates.

Chart 13: Effects of Export Propensity on TFP

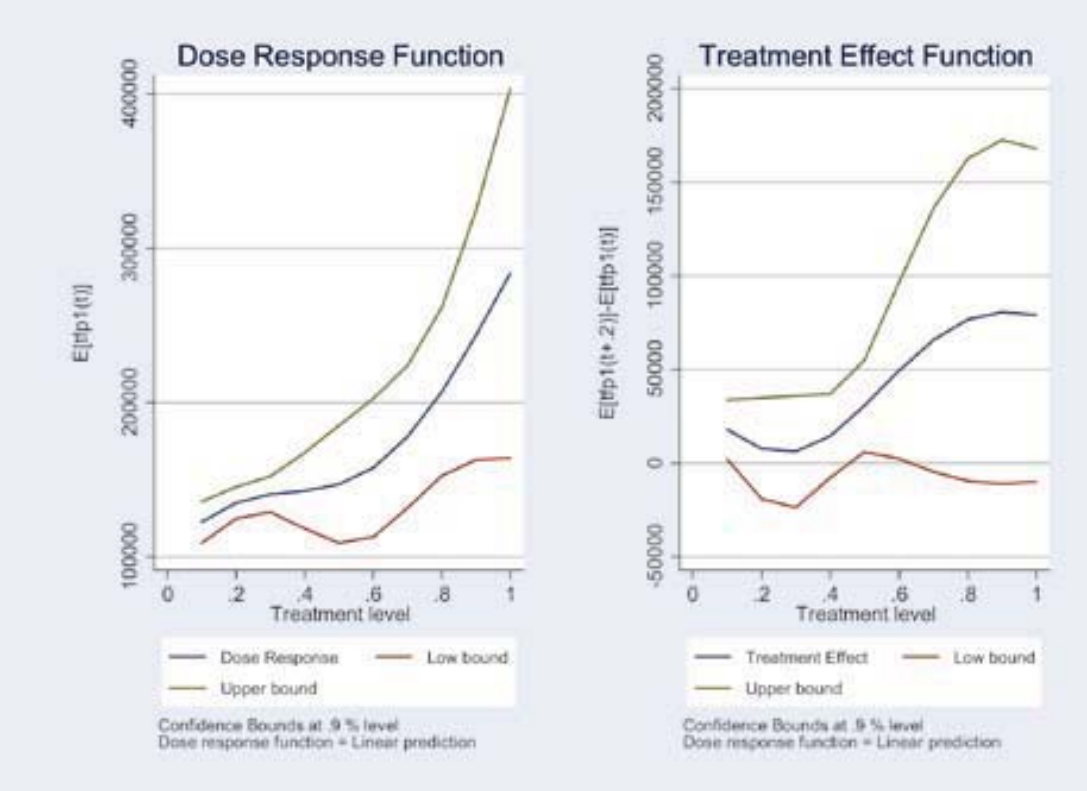


Chart 14: Effects of the Use of Imported Intermediates on TFP

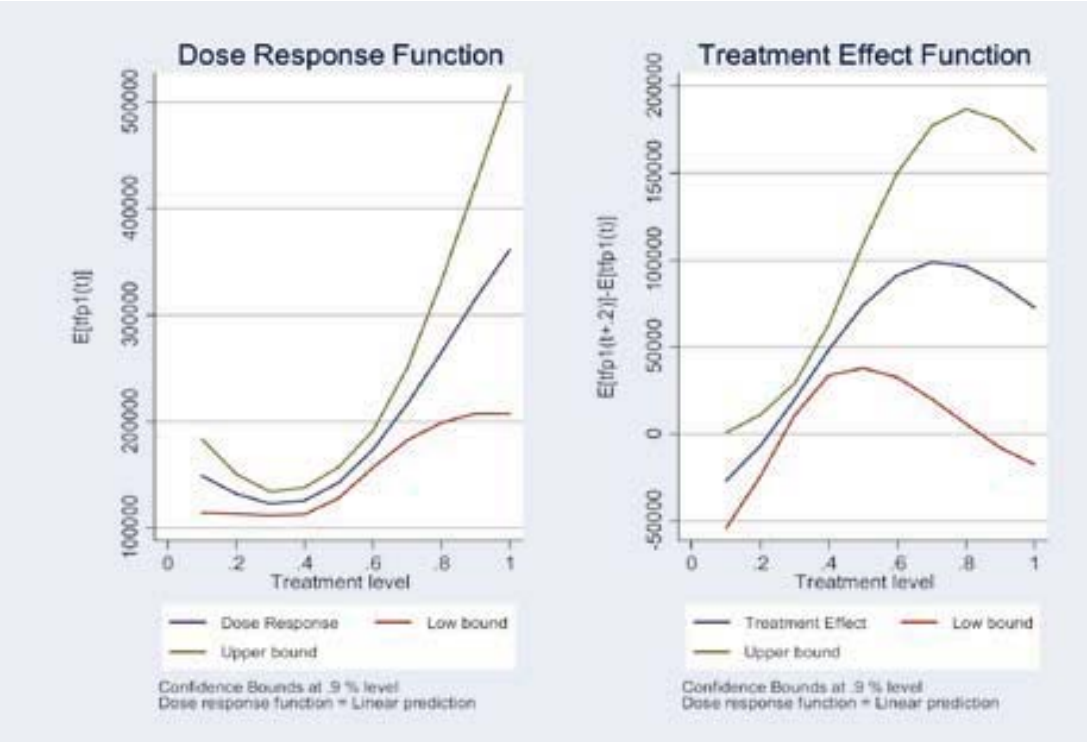


Chart 15: Effects of export propensity in the share of skilled workers in total employment (number of skilled workers/total employment)

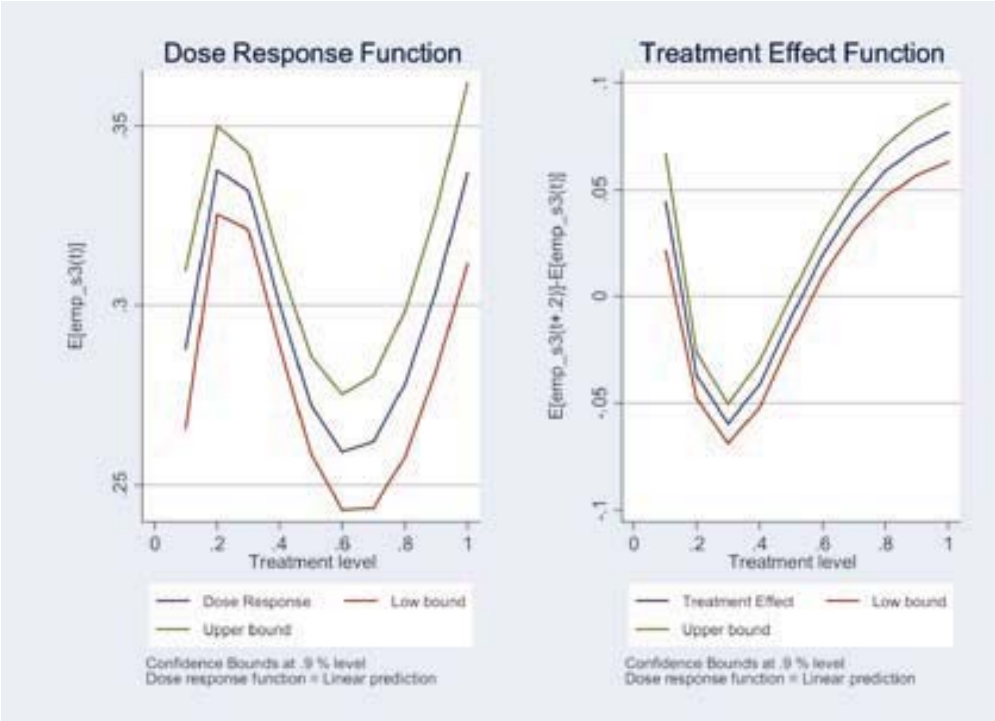


Chart 16: Effects of imported intermediates in the share of skilled workers (number of skilled workers/total employment)

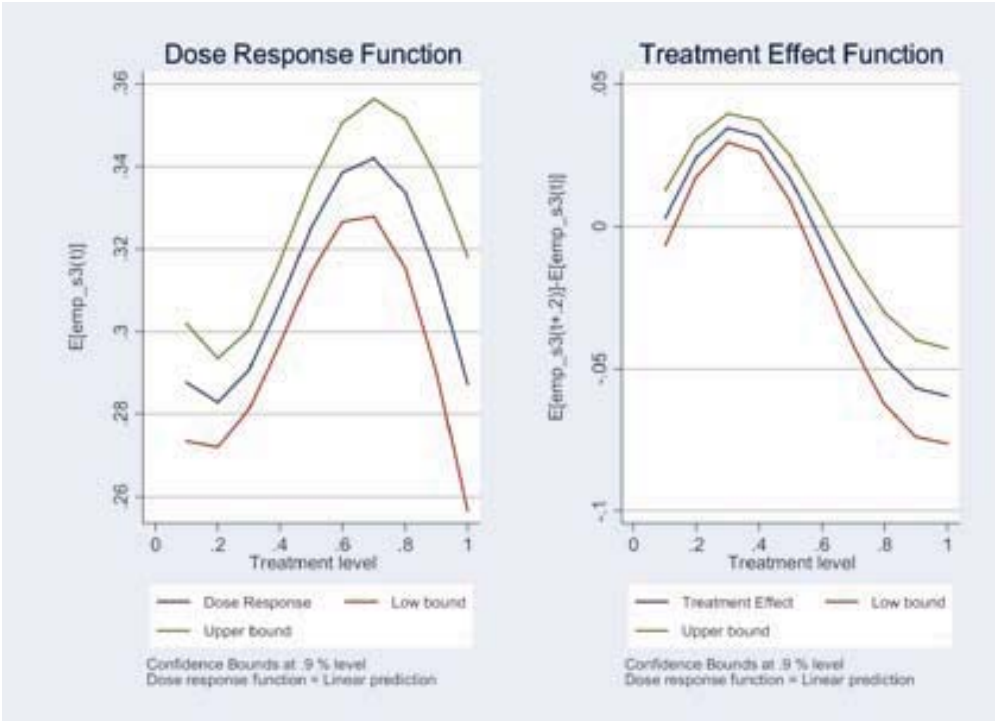


Chart 17: Effects of export propensity on the number of skilled workers per firm (SKL)

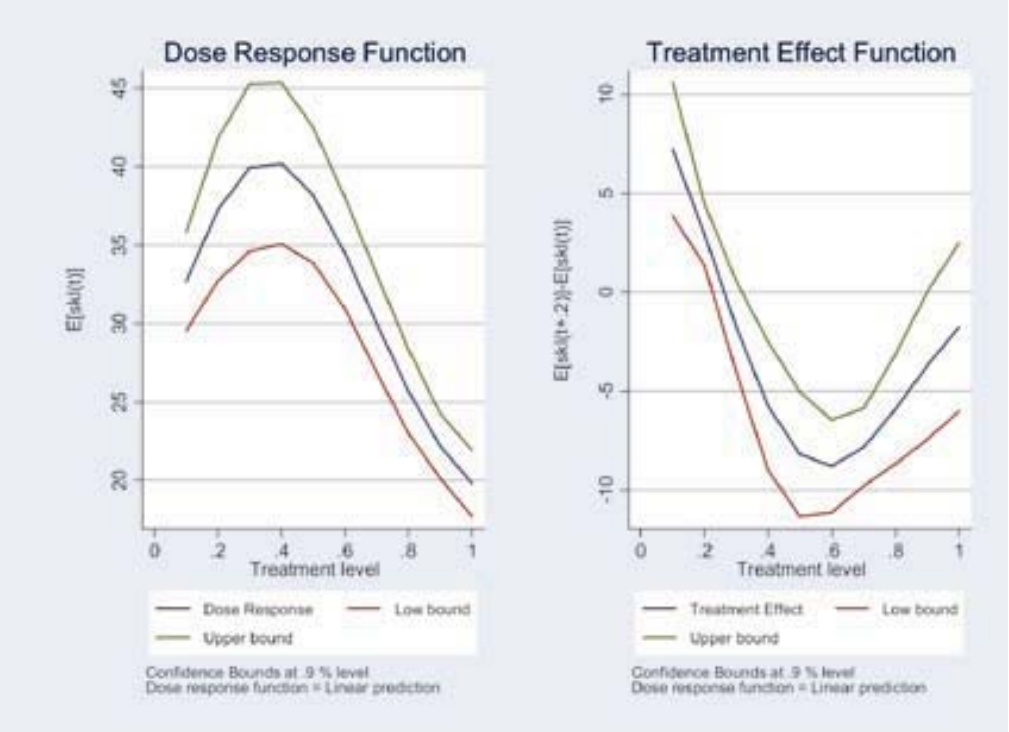


Chart 18: Effects of imported intermediates on the number of skilled workers poer firm (SKL)

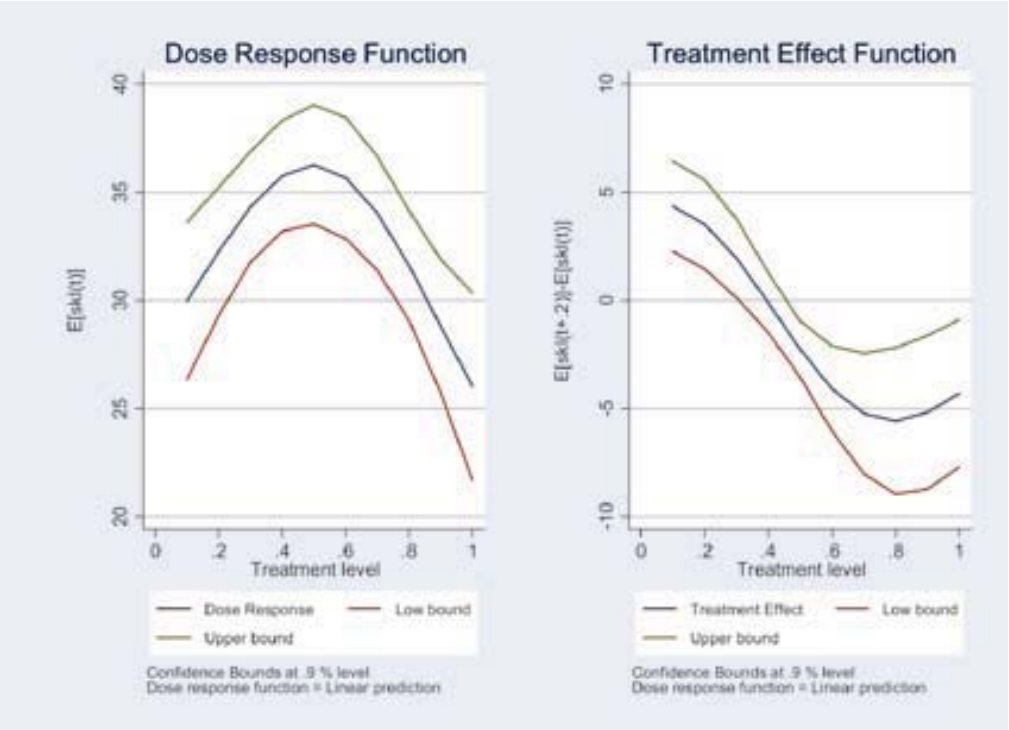


Chart 19: Effects of exports on the wage bill share of skilled labour defined as wages of employees and professionals and technicians over variable costs (linear model)

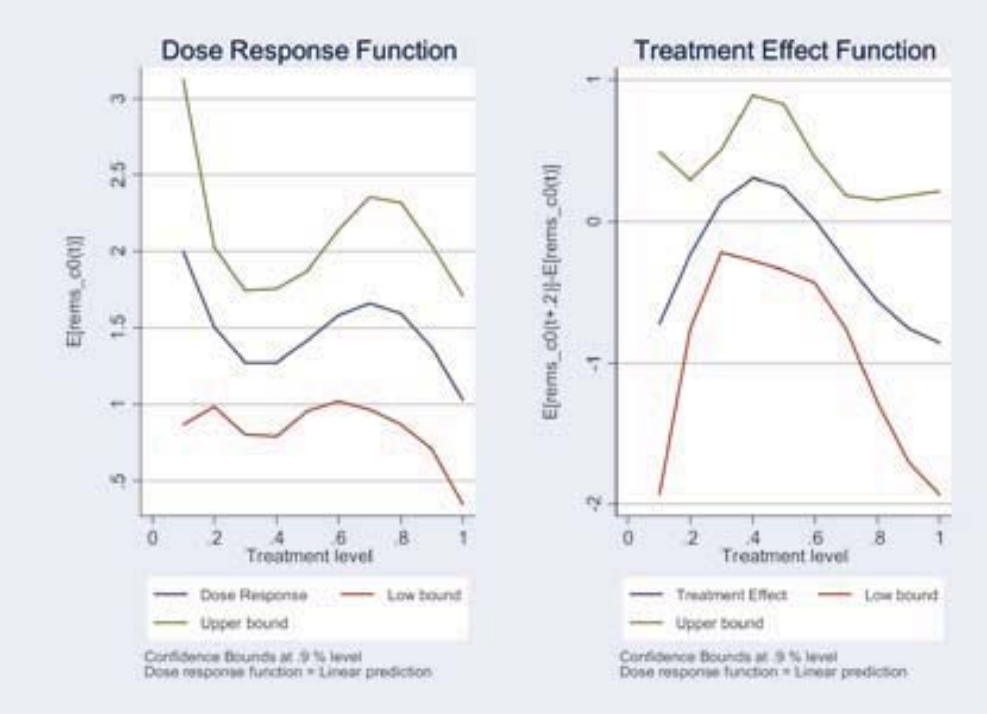


Chart 20: Effect of the use of imported intermediates on the wage bill shares of skilled workers over variable costs (linear model)

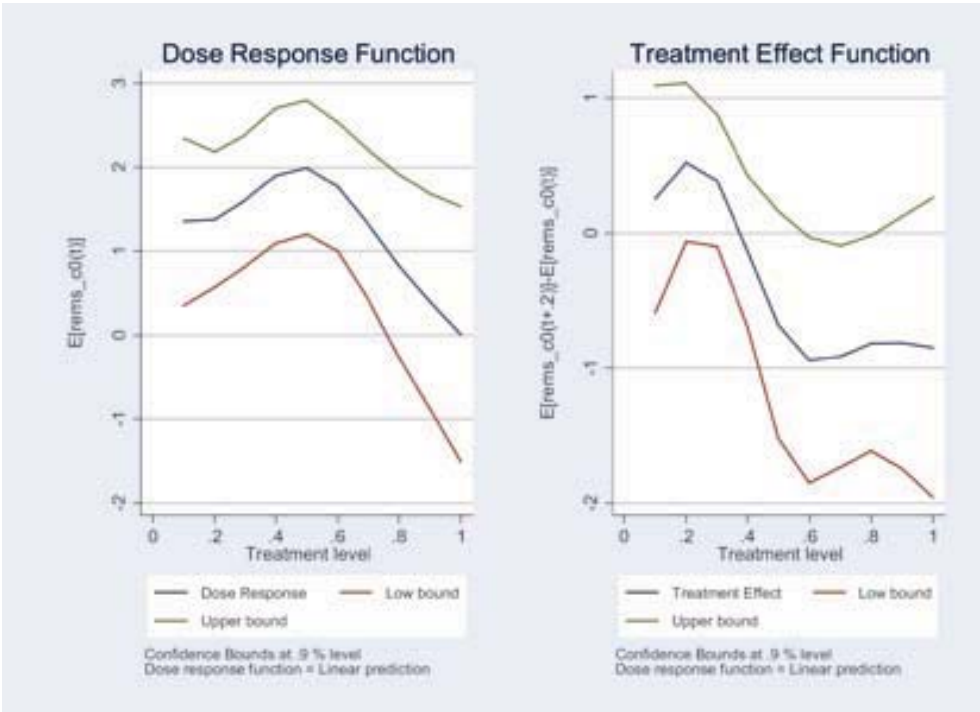


Chart 21: Effect of the level of exports on the wage bill share of total skilled workers/total wages (linear model)

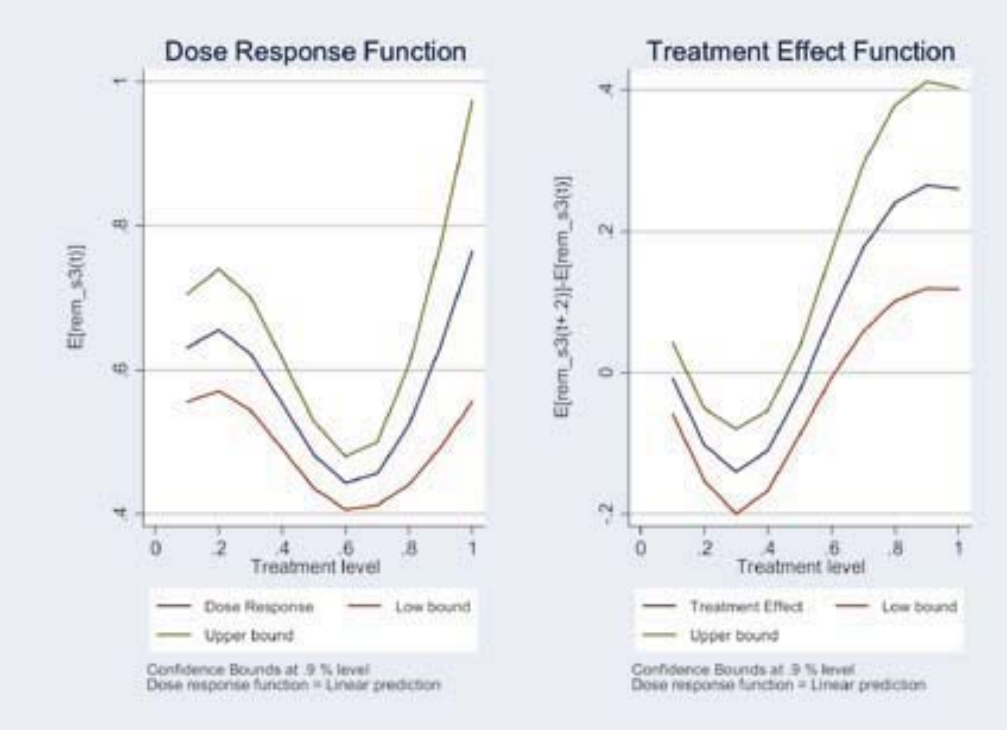


Chart 22: Effect of imported intermediates on the wage bill share of skilled workers in total wages (linear model)