Export growth and firms' factor input choice: empirics from Eastern Europe and Central Asia

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1. Introduction

Ever since firm-level data became available a huge stream of research arose, investigating different aspects of the effects of globalization on firms. Bernard and Jensen (1995) were the first to examine differences between exporting and non-exporting firms and found that the first are larger, more productive, more capital-intensive and paid higher loans, compared to the latter. In many papers is confirmed that exporters are more productive than non-exporters.[1] Melitz (2003) created his well-known model in which firm heterogeneity in productivity, together with the consumers love of different varieties of products, explains the entry and exit of firms into (export) markets.

Since previous literature about firms and exports concentrated on the firm heterogeneity in total factor productivity (TFP), less attention was given to the impact which trade could have on the relative factor inputs and prices. However, various researchers found that there are clear differences in factor inputs between exporters and non-exporters (e.g. Bernard and Jensen (1995), Alvarez and Lopez (2005), Emami Namini et al. (2011)). This strongly indicates that firm heterogeneity in factor inputs can be an important determinant of the mutual influences between firms and trade.

Therefore Emami Namini et al. (2011) developed a model with firm heterogeneity in factor shares which describes the entry and exit of firms on the exports market after trade liberalization. Furthermore, it demonstrates the effects of trade liberalization on the factor inputs of the firms. Emami Namini et al. provided empirical evidence for their model with data concerning firms from Chile.

In this thesis firstly I modeled competition on the factor market before and after trade liberalization, relying on the model which Emami Namini et al. (2011) developed. Shown is – in a two country model where in each country exists a single monopolistically competitive industry in which each firm produces a variety of differentiated final good using (human) capital and labor – that only the capital-intensive firms can export if firms face the assumed fixed (export) costs. The demand of capital rises due to the larger production possibilities of these capital-intensive firms, which increases the price of capital. This induces all firms to produce less capital-intensive. So, a negative relationship exists between trade liberalization and capital-intensity of firms. The larger the difference in capital-intensity is between labor- and capital-intensive firms, the stronger this effect is.

[1] See for an overview: Wagner, 2007.

Aside, this can also be related to an explanation which Epifani and Gancia (2008) gave for an increasing demand of skilled labor[2] if trade expands: since skill-intensive technologies often have stronger increasing returns to scale than unskilled-labor-intensive technologies, due to higher fixed costs, expected is that the relative demand of skilled labor rises after trade liberalization, because market size expands. This market size expansion can induce factor market competition, since more skilled labor is demanded.

Secondly the link between factor inputs and export growth is tested empirically for 26 Eastern European and Central Asian countries in the next part of this thesis. Regressions which relate the skill-intensity of a firm – which is a measure of human capital – to sector-wide exports growth and certain control variables are employed to test for factor market competition.

Among the control variables is the import of intermediate products, which can represent outsourcing of the production process. Outsourcing can also influence the choice of factor inputs by firms, as will be explained. By including this variable, al link is laid with the debate about the question whether international trade or the evolution of technology caused the increased demand of skilled labor in developed countries (Feenstra, 2008). Since the majority of the increase of the wage of manufacturing workers and the employment of white-collar employees was caused by shifts *within* industries and not *between* industries, economists tended to think that skill-biased technological innovation was the reason for the increasing skill-intensity of firms. For example Thoenig and Verdier (2003) developed a model of defensive skill-biased innovation: to reduce spillovers and leapfrogging by outside competitors, which danger increases with more trade integration, firms will invest in tacit knowledge and (thereby) increase the share of skilled labor in their workforce. However, outsourcing – which is trade *within* industries – can increase the skill-intensity of firms in both the developed and developing countries, as Feenstra (2008) made clear. Thereby outsourcing can be an alternative explanation of changes in skill-intensity of firms within industries, like factor market competition also can explain changes within industries. Also Krugman (2008) focused on the important role of vertical specialization[3] in international trade and argued that (unskilled) labor abundant countries can specialize themselves in the unskilled-labor-intensive parts of a skilled-labor-intensive product. A study from Hijzen et al. (2005) found for the United Kingdom – which can be assumed to be a (human) capital abundant country – that outsourcing reduced *un*skilled labor. Rosholm et al. (2007) found the same effect for firms in Denmark. Therefore it is important to include the import of intermediate inputs in the regression.

[2] Or read: human capital.
[3] Or read: outsourcing.

Furthermore, in the empirical part of this thesis is controlled for the effect that the comparative advantage has on the skill-intensity of a firm by interacting with the sector-wide exports a measure of the GDP per capita difference between the exporting country and destination countries of the exports. The well-known Heckscher-Olin proposition states that a country will exports the goods that use the relatively abundant factor of production intensively. Trade liberalization or expansion can therefore either strengthen (human) capital-intensive or labor-intensive production. Bernard et al. (2006) found support for the theory of the comparative advantage when using firm-level data. They discovered for the United States that firms switch their production to more capital-intensive industries as a reaction to imports from low-wage countries. Compared to the average firm, capital-intensive firms are also less likely to die as a result of imports from low-wage countries.

To return for a moment to the importing of intermediate inputs: this may also reveal the comparative advantages of countries and play in that way a role in determining the use of factor inputs by firms. Fajnzylber and Fernandes (2009), studying the effect of importing intermediate products in Brazil and China, showed that in the former country the imports enhance the skill-intensity of a firm, while the effect in China is the opposite. Especially in developing countries foreign intermediate inputs may have a higher quality or may embody a higher state of knowledge or technology than domestic inputs, which can be used or extracted by the importing firms. So, in Brazil the effect of a transfer of better technology through the intermediates dominates over the effect of exploiting the comparative advantage by focusing on the non-imported parts of the products. In China the reverse holds.

The empirical results show that the comparative advantages of the countries are an important factor in determining the skill-intensity of a firm. These Eastern European and Central Asian countries export mainly to countries with a higher GDP per capita. This has a negative effect on the skill-intensity of the firms in the exporting countries, implying a confirmation of the Heckscher-Olin proposition.

If controlling for comparative advantages by means of the interaction term, the effect that the sector-wide exports do have on the skill-intensity of a firm apart from the effect of the comparative advantages, is positive. However, the net effect of the sector-wide exports and the skill-intensity is negative, which shows that increasing trade may induce firms to produce less skill-intensive due to factor market competition. So, it could be that the main exporting sector is unskilled-labor-intensive, but that within each sector exporters are generally more skill-intensive than non-exporters. The use

of foreign inputs has a negative significant effect on the skill-intensity of a firm, which can indicate that firms in these – general not the most developed – countries source out more technological advanced parts of the production process. This can be regarded as the counterpart of the effect that various researchers found for developed countries where outsourcing instead reduced demand for unskilled labor.

This thesis contributed to the literature on trade with firm heterogeneity by empirically showing, using data from 26 Eastern European and Central Asian countries, which effects increasing trade (liberalization) could have on the factor inputs used by firms. This underlines that it is needful to continue the by some scholars chosen path to look not only at TFP, but also at factor inputs when analyzing firm selection and responses of firms to export growth. Also, I indirectly contribute to the debate whether trade or technology caused changes in the structure of used labor by theoretically showing and empirically confirming that there is a mechanism –factor market competition – which makes it possible to have intra-industry trade and at the same time have changes in the factor inputs. The effects of this factor market competition can occur besides the Heckscher-Ohlin and outsourcing effects, which are also shown to be present.

The remainder of the thesis is organized as follows. In chapter 2 the theoretical model is set out. Chapter 3 contains the empirical part. First the data is described, then descriptive statistics are given and thirdly the estimations and results thereof are presented. Conclusions are drawn in the final part of the thesis.

2. Modeling factor market competition

To gain understanding in how factor market competition influences firm selection, relative factor prices and the firms factor input choice when exports increase, Emami Namini et al. (2011) developed a model. I will follow their model with the two country setup. First I will describe an economy in autarky, then continuing with explaining the model under free trade.

2.1. Demand side

I start with describing the demand side of the economy of the home country, then the single monopolistically competitive industry which forms the supply side. The representative consumer has Dixit-Stiglitz preferences: his utility increases when consuming more varieties. Using a utility function which exhibits constant elasticity of substitution (CES), his preferences take the form of:

$$(1) \qquad U = \left[\int_{u\in\Omega} q(u)^{\frac{\sigma-1}{\sigma}} du\right]^{\frac{\sigma}{\sigma-1}} \qquad \text{with } \sigma > 1$$

Ω contain all available goods, which are indexed by *u*. σ is the elasticity of substitution between the different varieties. The overall income of the representative consumer is given by fixed amounts of two production factors multiplied by their rates of return. I use the factors labor $(\bar{L})$ and capital $(\bar{K})$ in the description of the model, since this makes the intuition clearer, because of familiarity of economists with it. However, it is also possible to read - for example - unskilled and skilled labor[4]: the mechanisms work the same. The income of this representative consumer is:

$$(2) \qquad I = w\bar{L} + r\bar{K}$$

where *w* and *r* are the rates of return of the factor inputs. For the factors labor and capital these are respectively the wage rate and the rental rate. With cost-minimizing behavior of the representative consumer, the price index – *P* is the price of a unit of utility – is given by:

$$(3) \qquad P = \left[\int_{u\in\Omega} p(u)^{1-\sigma} du\right]^{\frac{1}{1-\sigma}}$$

[4] Note that skilled labor in fact can be named 'capital', namely human capital.

When the representative consumer maximizes his utility subject to his budget constraint, the demand for each single variety can be obtained, applying Shephard's Lemma to the price index *P*, and is given by:

(4) $q(u) = IP^{\sigma-1}p(u)^{-\sigma}$

2.2. Supply side

Infinitely many firms are active on the supply side of the economy. Due to increasing returns to scale each of them produces an unique variety of a differentiated aggregate good. The CES production function of a firm is given by:

(5) $q(\phi) = \left[\phi^{\frac{1}{\varsigma}} K^{\frac{\varsigma-1}{\varsigma}} + (1-\phi)^{\frac{1}{\varsigma}} L^{\frac{\varsigma-1}{\varsigma}}\right]^{\frac{\varsigma}{\varsigma-1}}$ with $\varsigma > 1$ and $\phi \in [0,1]$

The elasticity of substitution between the factor inputs is given by ς. Production leads to output $q(\phi)$. The factor share parameter ϕ characterizes the technology. Also firms are indexed by ϕ in the remainder of this thesis. Each firm has to incur a constant marginal cost and a fixed cost, when producing. The marginal cost function has the following form:

(6) $c(\phi) = [\phi r^{1-\varsigma} + (1-\phi) w^{1-\varsigma}]^{\frac{1}{1-\varsigma}}$

Firms with a different choice of the share of both input factors (ϕ) in the production, will have different marginal costs, as long as $r \neq w$. The fixed costs function has the following structure:

(7) $F(\phi) = c(\phi) f(\phi)$

This means the fixed costs depend (through the marginal cost function) on the chosen factor input mix (ϕ) and the prices of the factors (*r* and *w*). Dependence of the fixed costs on the kind of production process seems reasonable. Moreover, as Emami et al. (2011) already made clear, this type of fixed costs structure is common in two-factor trade models.[5] Furthermore is assumed that the more capital-intensive a firm is, the higher the fixed costs of that firm are. To describe it mathematically: $f(\phi_1) > f(\phi_2)$ if $\phi_1 > \phi_2$.

[5] E.g. Markusen and Venables (2000) and Bernard et al. (2007).

Before market entry all (potential) firms are identical. When entering the market, which is costless, for straightforwardness is assumed that a firm can choose between two different kind of technologies, namely a capital-intensive and a labor-intensive technology. These technologies are labeled respectively ϕ_K and ϕ_L and $\phi_K > \phi_L$. Firms maximizes profit, which are:

(8) $$\pi(\phi_\gamma) = \underbrace{IP^{\sigma-1}p(\phi_\gamma)^{-\sigma}}_{\text{quantity}}\underbrace{[p(\phi_\gamma) - c(\phi_\gamma)]}_{\text{profit margin per product}} \underbrace{- c(\phi)f(\phi)}_{\text{fixed costs}} \qquad \text{with } \gamma = K, L$$

Profit maximization leads to the following output price:

(9) $$p(\phi_\gamma) = \frac{\sigma}{\sigma-1}c(\phi_\gamma)$$

2.3. Factor markets and prices

2.3.1. Factor markets

To reach an equilibrium, clearing of the factor markets is required. Setting labor as the numéraire ($w = 1$), leads to *r* being the *relative* price of capital.[6] Applying Shephard's Lemma to the marginal cost function gives:

(10) $$\bar{L} = \sum_{\gamma=K,L} a_{L_\gamma}[q(\phi_\gamma) + f(\phi_\gamma)]\,\eta_\gamma \qquad \text{with } \gamma = K, L$$

(11) $$\bar{K} = \sum_{\gamma=K,L} a_{K_\gamma}[q(\phi_\gamma) + f(\phi_\gamma)]\,\eta_\gamma \qquad \text{with } \gamma = K, L$$

with $a_{L_\gamma} = (1 - \phi_\gamma)c(\phi_\gamma)^{\varsigma}$ and $a_{K_\gamma} = \phi_\gamma r^{-\varsigma}c(\phi_\gamma)^{\varsigma}$. These are, respectively, the unit labor and capital requirements for variety *γ*. The mass of firms of type *γ* active in the market is represented by η_γ. In equilibrium the profits of each firm become zero, because of the costless entry into the market. Putting equation (9) into equation (8) and solving for $\pi(\phi_\gamma) = 0$ leads to the following zero profit condition:

(12) $$IP^{\sigma-1}p(\phi_\gamma)^{-\sigma} = q(\phi_\gamma) = (\sigma - 1)f(\phi_\gamma) \qquad \text{with } \gamma = K, L$$

[6] So, the relative *r* is: $\frac{r_{absolute}}{w_{absolute}}$

2.3.2. Comparative statics

Having obtained the zero profit condition, it is possible to show some of the mechanisms at work in this model. First of all: what is the effect of an exogenous increase in the aggregate production of capital-intensive firms on the relative price op capital *(r)*?

Proposition 1: An exogenous increase of the production of capital-intensive firms leads to a higher r.

I will show that an exogenous increase of the aggregate production of capital-intensive will lead to a rise of *r*. Furthermore, there exist a positive relation between *r* and the relative labor demand, $\frac{\bar{L}}{\bar{K}}$, because firms produce less capital intensive when faced with a higher *r.* The relative labor demand is given by:

$$\frac{\bar{L}}{\bar{K}} = \frac{1-\phi_K+(1-\phi_L)\frac{\eta_L}{\eta_K}}{\phi_K+\phi_L\frac{\eta_L}{\eta_K}} r^{\sigma} \tag{13}$$

Proof of proposition 1:

First the relative labor demand is calculated. Using the result from the zero profit condition that $f(\phi_\gamma) = \frac{q(\phi_\gamma)}{(\sigma-1)}$ and dividing equation (10) by equation (11) gives us:

$$\frac{\bar{L}}{\bar{K}} = \underbrace{\frac{a_{LK}+a_{LL}\frac{q(\phi_L)\eta_L}{q(\phi_K)\eta_K}}{a_{KK}+a_{KL}\frac{q(\phi_L)\eta_L}{q(\phi_K)\eta_K}}}_{\equiv \Xi} \tag{14}$$

The term Ξ represents the relative labor demand in the economy. The aggregate production of the capital-intensive firms is given by $q(\phi_K)\eta_K$. Calculating the first derivative of the relative labor demand with respect to $q(\phi_K)\eta_K$ (the aggregate production of capital-intensive firms) leads to:

$$\frac{\partial \Xi}{\partial [q(\phi_K)\eta_K]} = \frac{q(\phi_L)\eta_L(a_{LK}a_{KL}-a_{LL}a_{KK})}{[a_{KK}\times q(\phi_K)\eta_K+a_{KL}\times q(\phi_L)\eta_L]^2} \tag{15}$$

Since $\phi_K > \phi_L$, the term $a_{LK}a_{KL} - a_{LL}a_{KK}$ is negative.[7] To restore the equilibrium *r* has to increase.

The positive effect of this increase of *r* on $\frac{\bar{L}}{\bar{K}}$ is realized through two ways. First, a_{L_γ} – appearing in the numerator of equation (14) – increases and a_{K_γ} – which is found in the denominator – decreases.

[7] $a_{LK}a_{KL} - a_{LL}a_{KK} = (1-\phi_K)c(\phi_K)^{\varsigma}\phi_L r^{-\varsigma}c(\phi_L)^{\varsigma} - (1-\phi_L)c(\phi_L)^{\varsigma}\phi_K r^{-\varsigma}c(\phi_K)^{\varsigma}$
Which can be rewritten to: $c(\phi_K)^{\varsigma}c(\phi_L)^{\varsigma}r^{-\varsigma}(\phi_L - \phi_K)$, which is negative, since $\phi_K > \phi_L$

Secondly, due to an increased *r* the fraction $\frac{q(\phi_L)}{q(\phi_K)} = \frac{c(\phi_L)^{-\sigma}}{c(\phi_K)^{-\sigma}}$ will rise, which has on positive effect on $\frac{\bar{L}}{\bar{K}}$, because $a_{LK}a_{KL} - a_{LL}a_{KK} < 0$.

The positive relationship between the relative labor demand and an increase of *r* can be confirmed otherwise. When dividing the derivatives of the marginal cost function with respect to the rental rate and the wage rate by each other, the following fraction is obtained:

(16) $$\frac{\partial c(\phi_\gamma)/\delta r}{\partial c(\phi_\gamma)/\delta w} = \frac{a_{K_\gamma}}{a_{L_\gamma}} = \frac{\phi_\gamma r^{-\varsigma} c(\phi_\gamma)^{\varsigma}}{(1-\phi_\gamma)c(\phi_\gamma)^{\varsigma}} = \frac{\phi_\gamma}{(1-\phi_\gamma)} r^{-\varsigma}$$

If r increases, equation (16) decreases: the firm adjusts its factor input choice by using less capital, because the optimal mix of factor inputs changes. Firms will produce less capital-intensive when *r* increases.

Thus, an exogenous increase of the aggregate production of capital-intensive will lead to a rise of *r*. Intuitively, this is economically logical, because additional production for the capital-intensive firms leads to an increase in the demand of capital, which results in a higher price of capital. Because of the higher *r* more firms will switch to labor-intensive technologies, which is reflected in the positive relation between *r* and the relative labor demand.

Before going further, a short remark: in the remainder of this thesis I will assume that $\varsigma = \sigma$, because this simplifies the algebra, while it does not affect the thrust of the results. This means that σ denotes both the elasticity of substitution between factor inputs and between the different varieties of the product. Effectuating this change into the equation that describes the relative labor demand (14), gives the already above shown equation (13):

$$\frac{\bar{L}}{\bar{K}} = \frac{1-\phi_K+(1-\phi_L)\frac{\eta_L}{\eta_K}}{\phi_K+\phi_L\frac{\eta_L}{\eta_K}} r^{\sigma}$$

The positive relation between $\frac{\bar{L}}{\bar{K}}$ and *r* is clearly illustrated in this equation. This equation is named the *relative factor market clearing* condition (FMC) in the remainder of the thesis.

After is shown that an exogenous increase of the aggregate production of capita-intensive firms leads to an higher *r*, which increases the relative labor demand, the effect of the higher *r* on the profit of the firms can be determined.

Proposition 2: The increase of *r* will decrease the profits of capital-intensive firms and enlarge the profits of labor-intensive firms.

Proof of proposition 2:

When substituting the equations (2), (3) and (9)[8] into equation (8)[9] and taking the partial derivative with respect to *r*, the following equation is obtained:

$$(17) \qquad \frac{\partial \pi(\phi_K)}{\partial r} = \frac{\overline{K}(1-\phi_K)-\overline{L}\phi_K r^{-\sigma}}{\sigma P^{1-\sigma}} + \frac{(\overline{L}+r\overline{K})(1-\sigma)r^{-\sigma}\eta_L(\phi_K-\phi_L)}{\sigma P^{2-2\sigma}} < 0$$

This partial derivative is negative, because $\frac{\overline{K}}{\overline{L}} < \frac{\phi_K r^{-\sigma}}{1-\phi_K}$, which results from combining equation (13) and the facts that $\phi_K > \phi_L$ and $\sigma > 1$. In the same way can be shown that $\frac{\partial \pi(\phi_L)}{\partial r} > 0$. The economic intuition of this result is that an increased *r* enlarges the price of the varieties produced by capital-intensive firms. Therefore demand for these varieties falls, while varieties produced by labor-intensive firms will be bought more. Of course, in the long run, profits will be again zero for all firms, because of the costless entry in the market.

2.4. The autarkic equilibrium

The relationship between r and $\frac{\eta_L}{\eta_K}$ is negative, as follows from the relative factor market clearing condition[10]. An increased price of capital leads to an decrease of the mass of labor-intensive firms relative to the mass of capital-intensive firms. This determines, together with the relative price of capital, the unique and stable equilibrium in autarky. To solve for *r,* first the zero profit conditions of capital and labor-intensive firms be divided by each other, which leads to:

$$(18) \qquad \frac{q(\phi_K)}{q(\phi_L)} = \frac{\left(\phi_K r^{1-\sigma}+1-\phi_K\right)^{-\sigma/(1-\sigma)}}{(\phi_L r^{1-\sigma}+1-\phi_L)^{-\sigma/(1-\sigma)}} = \frac{f(\phi_K)}{f(\phi_L)}$$

[8] Respectively: *I, P* and $p(\phi_K)$.
[9] The equation which defines the profits.
[10] Equation (13).

Solving this equation for *r* (subscript *a* is added, to indicate this is the relative price of capital in the autarkic equilibrium) gives:

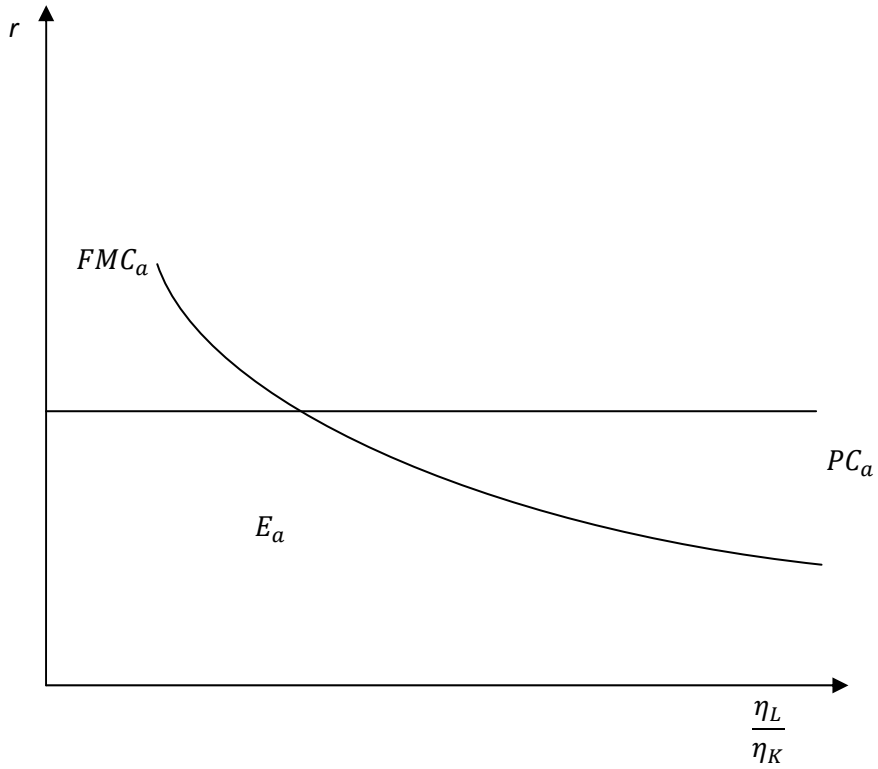
$$(19) \qquad r_a = \left[\frac{\left(\frac{f(\phi_K)}{f(\phi_L)}\right)^{(\sigma-1)/\sigma} (1-\phi_L)-(1-\phi_K)}{\phi_K - \left(\frac{f(\phi_K)}{f(\phi_L)}\right)^{(\sigma-1)/\sigma} \phi_L} \right]^{1/(1-\sigma)}$$

From equation (19), which I will name the *price of capital* condition (PC), can be learned that r_a is only defined if $\phi_K - \left(\frac{f(\phi_K)}{f(\phi_L)}\right)^{(\sigma-1)/\sigma} \phi_L > 0$, in other words, if $\frac{\phi_K}{\phi_L} > \left(\frac{f(\phi_K)}{f(\phi_L)}\right)^{(\sigma-1)/\sigma}$. If the reverse holds, firms will only choose the labor-intensive technology. Since we study a equilibrium with both types of firms active in the market, we only concentrate on the situation where $\frac{\phi_K}{\phi_L} > \left(\frac{f(\phi_K)}{f(\phi_L)}\right)^{(\sigma-1)/\sigma}$. For the relative price of capital to be positive, which in the real world is the case, $\left(\frac{f(\phi_K)}{f(\phi_L)}\right)^{(\sigma-1)/\sigma} > \frac{(1-\phi_K)}{(1-\phi_L)}$. Concluding: $\frac{\phi_K}{\phi_L} > \left(\frac{f(\phi_K)}{f(\phi_L)}\right)^{(\sigma-1)/\sigma} > \frac{(1-\phi_K)}{(1-\phi_L)}$. From this price of capital condition also follows that $r_a < 1$, since $f(\phi_K) > f(\phi_L)$. Therefore capital-intensive firms will generate higher revenues in equilibrium than labor-intensive firms. These higher returns are needed to pay for the higher fixed costs. Note that the price of capital does not depend on the relative mass of labor-intensive firms active $\left(\frac{\eta_L}{\eta_K}\right)$. Therefore, it is possible to solve for $\frac{\eta_L}{\eta_K}$ by substituting the PC-condition into the FMC-condition.

When drafting the relative factor market clearing condition (FMC) and the price of capital condition (PC), the intersection displays the relative price of capital (*r)* and the relative mass of labor-intensive firms $\left(\frac{\eta_L}{\eta_K}\right)$ in the equilibrium in autarky.[11] This is shown in figure 1. Using one of the zero profit conditions, the absolute number of firms of each type active in the market can also be determined, because $\frac{\eta_L}{\eta_K}$ is known.

[11] So, respectively the equations (13) and (19).

Figure 1: Equilibrium in autarky



2.5. Trade liberalization

To analyze the effects of opening up for free trade, the analysis is extended in this section to a two-country-setup. To keep the analysis straightforward I assume that the foreign country is identical to the home country. Furthermore I assume zero transport costs and immobility of factor inputs between countries.

Because countries are identical, utility maximization of the representative consumer in the foreign country, leads to following demand function in foreign country for a variety produced in home country:

(20) $q_F(\phi) = I_F P_F^{\sigma-1} p(\phi)^{-\sigma}$

Exporting firms face the following fixed export costs:

(21) $F_X = c(\phi) f_X(\phi_K)$

where the following assumptions are made about the magnitude of the parameter $f_X(\phi_K)$:

(22) $I_F P_F^{\sigma-1} p(\phi_L)^{-\sigma} < f_X(\phi_K)(\sigma - 1)$ and $I_F P_F^{\sigma-1} p(\phi_K)^{-\sigma} \geq f_X(\phi_K)(\sigma - 1)$

Because of these assumptions only capital-intensive firms can earn non-negative results by means of exporting. Labor-intensive firms will not choose to export.

Since the home and foreign country are symmetric, demand for a domestically produced capital-intensive variety increases – compared to equation (4) – to:

(23) $$q(\phi_K) + q_F(\phi_K) = 2\, IP^{\sigma-1} p(\phi_K)^{-\sigma}$$

After opening up to trade the aggregate price index decreases to:

(24) $$P = [2\eta_K p(\phi_K)^{1-\sigma} + \eta_L p(\phi_L)^{1-\sigma}]^{1/(1-\sigma)}$$

For labor-intensive firms, the zero profit condition does not change after trade liberalization, because demand for products from these firms remains the same as in autarky. For capital-intensive firms, this condition becomes:

(25) $$2\, q(\phi_K) = (\sigma - 1)\big(f(\phi_K) + f_X(\phi_K)\big)$$

The factor market clearing condition (FMC) in a free trade equilibrium becomes:

(26) $$\frac{\bar{L}}{\bar{K}} = \frac{2(1-\phi_K)+(1-\phi_L)\frac{\eta_L}{\eta_K}}{2\phi_K+\phi_L\frac{\eta_L}{\eta_K}} r_{ft}^{\sigma}$$

To obtain the price of capital condition (PC) in autarky, I divided the zero profit conditions of labor-intensive and capital-intensive firms by each other. Dividing after trade liberalization the zero profit conditions[12] by each other and solving for *r,* leads to:

(27) $$r_{ft} = \left[\frac{\left(\frac{f(\phi_K)+f_X(\phi_K)}{2f(\phi_L)}\right)^{(\sigma-1)/\sigma}(1-\phi_L)-(1-\phi_K)}{\phi_K-\left(\frac{f(\phi_K)+f_X(\phi_K)}{2f(\phi_L)}\right)^{(\sigma-1)/\sigma}\phi_L}\right]^{1/(1-\sigma)}$$

[12] So: equation (25) for capital-intensive firms and equation (12) for labor-intensive firms.

So, due to the trade liberalization:

a. the price index *P* decreases in each country – as follows from the equation (23) and (24) – because of the availability of more varieties, which come from abroad. Because of the decrease of *P* by the increased competition on the goods market, ceteris paribus the profits of both exporting and non-exporting firms will diminish.
b. capital-intensive firms will increase their production, because of the profit opportunities abroad (which also follows from equations (23) and (24)).
c. *r* will increase, just like the profit of labor-intensive firms. The profit of capital-intensive firms, on the other hand, will decrease. This happens due to the mechanisms elaborated in the section 2.3.2 and 2.3.3. We saw there that an exogenous increase in the production of capital-intensive firms will lead to an increase of *r*, because of the higher demand of capital. This will, ceteris paribus, decrease the profits of capital-intensive firms and increase the profits of the labor-intensive ones. The increase of *r* will also induce firms to produce less capital-intensive. These effects of an exogenous increase in the production of capital-intensive firms, will also result from the trade liberalization, since the production of the capital-intensive firms increase.

The results a. till c. give mixed outcomes about the effect of trade liberalization on the firm selection. De decrease of the price index *P*, described under a., affects both types of firms negatively. The foreign profit opportunities, as named under b., have positive influences for capital-intensive firms. However, at the same time these opportunities induce, through the increase of *r*, negative consequences for these firms and positive effects for labor-intensive firms, as pointed out under c. What the net effect of these different influences is, will be explored in the next section.

2.6. Firm selection after trade liberalization

The net effect of above results depend on the difference in the parameters $\phi_K - \phi_L$, which I will call the *factor intensity gap*. This difference determines the magnitude of the rise of *r* and the effect this will have on the two types of firms.

Proposition 3: The relative mass of labor-intensive firms, $\frac{\eta_L}{\eta_K}$, will increase if the factor intensity gap is maximal and will decrease if $\phi_K - \phi_L$ is at its minimum.

This effect of the factor intensity gap on the relative mass of labor-intensive firms will be shown below in four steps.

Proof of proposition 3:

First of all turns out that $r_{ft} > r_a$, because dividing the both price of capital conditions leads to:

(28) $$\frac{r_{ft}}{r_a} = \left\{\frac{[\Psi_{\text{ft}}(1-\phi_L)-(1-\phi_K)][\phi_K-\Psi_{\text{a}}\phi_L]}{[\Psi_{\text{a}}(1-\phi_L)-(1-\phi_K)][\phi_K-\Psi_{\text{ft}}\phi_L]}\right\}^{1/(1-\sigma)}$$

with $\Psi_{\text{a}} = \left(\frac{f(\phi_K)}{f(\phi_L)}\right)^{\frac{(\sigma-1)}{\sigma}}$ and $\Psi_{\text{ft}} = \left(\frac{f(\phi_K)+f_X(\phi_K)}{2f(\phi_L)}\right)^{\frac{(\sigma-1)}{\sigma}}$. Because we assumed $f_K(\phi_K) > f_X(\phi_K)$, it turns out that $\Psi_{\text{a}} > \Psi_{\text{ft}}$, from which follows that $\frac{r_{ft}}{r_a} \geq 1$.

Secondly, the influences of the factor input share parameters on $\frac{r_{ft}}{r_a}$ are:

(29) $$\frac{\partial {}^{r_{ft}}/_{r_a}}{\partial \phi_K} = \frac{(\phi_K-\Psi_{\text{ft}}\phi_L)(\phi_K-\Psi_{\text{a}}\phi_L)\left(\phi_L r_{ft}^{1-\sigma} r_a^{1-\sigma}+1-\phi_L\right)}{\left(\frac{r_{ft}}{r_a}\right)^{\sigma}\frac{1-\sigma}{\Psi_{\text{a}}-\Psi_{\text{ft}}}\{[\Psi_{\text{a}}(1-\phi_L)-(1-\phi_K)][\phi_K-\Psi_{\text{ft}}\phi_L]\}^2} < 0$$

(30) $$\frac{\partial {}^{r_{ft}}/_{r_a}}{\partial \phi_L} = \frac{(\phi_K-\Psi_{\text{ft}}\phi_L)(\phi_K-\Psi_{\text{a}}\phi_L)\left(\phi_K r_{ft}^{1-\sigma} r_a^{1-\sigma}+1-\phi_K\right)}{\left(\frac{r_{ft}}{r_a}\right)^{\sigma}\frac{1-\sigma}{\Psi_{\text{a}}-\Psi_{\text{ft}}}\{[\Psi_{\text{a}}(1-\phi_L)-(1-\phi_K)][\phi_K-\Psi_{\text{ft}}\phi_L]\}^2} > 0$$

That $\frac{\partial {}^{r_{ft}}/_{r_a}}{\partial \phi_K} < 0$ and $\frac{\partial {}^{r_{ft}}/_{r_a}}{\partial \phi_L} > 0$ follows from the facts that $\Psi_{\text{a}} > \Psi_{\text{ft}}$ and (if both firms are active in general equilibrium, which is assumed) $\phi_K - \Psi_{\text{a}}\phi_L > 0$ and $\phi_K - \Psi_{\text{ft}}\phi_L > 0$. Since the relation between factor input share parameters and $\frac{r_{ft}}{r_a}$ are unambiguous negative (in the case of ϕ_K) or positive (as with ϕ_L) I can assume that $\phi_K > 0.5 > \phi_L$.

Thirdly, the FMC-curve moves always rightward if a country in autarky opens up to free trade. This becomes clear when solving both the FMC-curves for $\left(\frac{\eta_L}{\eta_K}\right)_a$ and $\left(\frac{\eta_L}{\eta_K}\right)_{ft}$ and dividing these expressions of the relative mass of labor-intensive firms, which gives:

(31) $$\frac{(\eta_L/\eta_K)_{ft}}{(\eta_L/\eta_K)_a} = \frac{\frac{2(1-\phi_K)-2\frac{\bar{L}}{\bar{K}}r_{ft}^{-\sigma}\phi_K}{\frac{\bar{L}}{\bar{K}}r_{ft}^{-\sigma}(1-\phi_K)-\phi_K}}{\frac{1-\phi_K-\frac{\bar{L}}{\bar{K}}r_a^{-\sigma}\phi_K}{\frac{\bar{L}}{\bar{K}}r_a^{-\sigma}(1-\phi_K)-\phi_K}}$$

So, if *r* is constant $\left(r = r_a = r_{ft}\right)$ this above fraction becomes 2, meaning that the relative mass of labor-intensive firms doubles after trade liberalization. So, the rightward movement of the FMC-curve after trade liberalization does not depend on the factor intensity gap.

Fourthly, if the factor intensity gap is at its minimum, $\left(\frac{\eta_L}{\eta_K}\right)$ decreases with trade liberalization. The reverse holds when $\phi_K - \phi_L$ is at its maximum. Because I study the situation in which both type of firms are active, the minimum and maximum values of $\phi_K - \phi_L$ are defined by the interval $[0,1]$.[13] It is also possible to define the minimum value of the factor intensity gap otherwise, namely as the result if $\left(\frac{\eta_K}{\eta_L}\right)_a = 0$, which is:

(32) $$\left(\frac{\eta_K}{\eta_L}\right)_a = \frac{\frac{\bar{L}}{\bar{K}} r_a^{-\sigma}(1-\phi_K) - \phi_K}{1-\phi_K - \frac{\bar{L}}{\bar{K}} r_a^{-\sigma}\phi_K} = 0$$

Equation (32) is zero if the numerator of it is zero, thus if: $\frac{\bar{L}}{\bar{K}} r_a^{-\sigma}\left(1-\phi_K^{min}\right) - \phi_K^{min} = 0$.[14] By substituting r_a into this term can be proven that ϕ_K^{min} is uniquely defined:

(33) $$\left(\frac{\eta_K}{\eta_L}\right)_a = 0 \Leftrightarrow \underbrace{\frac{1-\phi_K}{\phi_K} \times \left[\frac{\phi_K(\Psi_a+1)-1}{\phi_K(\Psi_a+1)-\Psi_a}\right]^{\sigma/(\sigma-1)}}_{\equiv \Pi} = \frac{\bar{K}}{\bar{L}}$$

Taking the partial derivative of Π with respect to ϕ_K gives:

(34) $$\frac{\partial \Pi}{\partial \phi_K} = \frac{\sigma}{\sigma-1}\left[\frac{\phi_K(\Psi_a+1)-1}{\phi_K(\Psi_a+1)-\Psi_a}\right]^{1/(1-\sigma)} \frac{(\Psi_a+1)(1-\Psi_a)}{[\phi_K(\Psi_a+1)-\Psi_a]^2} - \left[\frac{\phi_K(\Psi_a+1)-1}{\phi_K(\Psi_a+1)-\Psi_a}\right]^{\sigma/(\sigma-1)} \frac{1}{\phi_K^2} < 0$$

This partial derivative is negative since $\Psi_a > 1$. So, this proves that $\left(\frac{\eta_K}{\eta_L}\right)_a = 0$ if $\phi_K = \phi_K^{min}$.

The denominator of equation (32) is negative, since $\frac{1-\phi_K}{r_a^{-\sigma}\phi_K} < \frac{\bar{L}}{\bar{K}}$. If $\phi_K > \phi_K^{min}$, the numerator becomes also negative $\left(\frac{\bar{L}}{\bar{K}} r_a^{-\sigma}(1-\phi_K) - \phi_K < 0\right)$, so equation (32) as a whole is positive. In other words: $\left(\frac{\eta_K}{\eta_L}\right)_a > 0$.

[13] Recall that $\phi_L = 1 - \phi_K$.

[14] From $\phi_L = 1 - \phi_K$ results also that the factor intensity gap is zero if $\phi_K^{min} = 1 - \phi_K^{min} = 2\phi_K^{min} - 1$.

So, with trade liberalization it follows that $\frac{\eta_K}{\eta_L}$ will increase if the factor intensity gap is at its minimum, because $\frac{\bar{L}}{\bar{K}} r_a^{-\sigma}\left(1-\phi_K^{min}\right)-\phi_K^{min}=0$ and $r_{ft} > r_a$. However, if the factor intensity gap is maximal, thus if $\phi_K = 1$ and $\phi_L = 0$, $\left(\frac{\eta_K}{\eta_L}\right)_a = \frac{\bar{K} f_L(\phi_L)}{\bar{L} f_K(\phi_K)} > \left(\frac{\eta_K}{\eta_L}\right)_{ft} = \frac{\bar{K} f_L(\phi_L)}{\bar{L}[f_K(\phi_K)+f_X(\phi_K)]}$, so $\frac{\eta_K}{\eta_L}$ decreases if the countries open up for trade.

2.7. The free trade equilibrium

Concluding that the relative mass of labor-intensive firms, $\frac{\eta_L}{\eta_K}$, will increase if the factor intensity gap is maximal and that it will decrease if $\phi_K - \phi_L$ is at its minimum, there must be a threshold factor Φ for which holds:

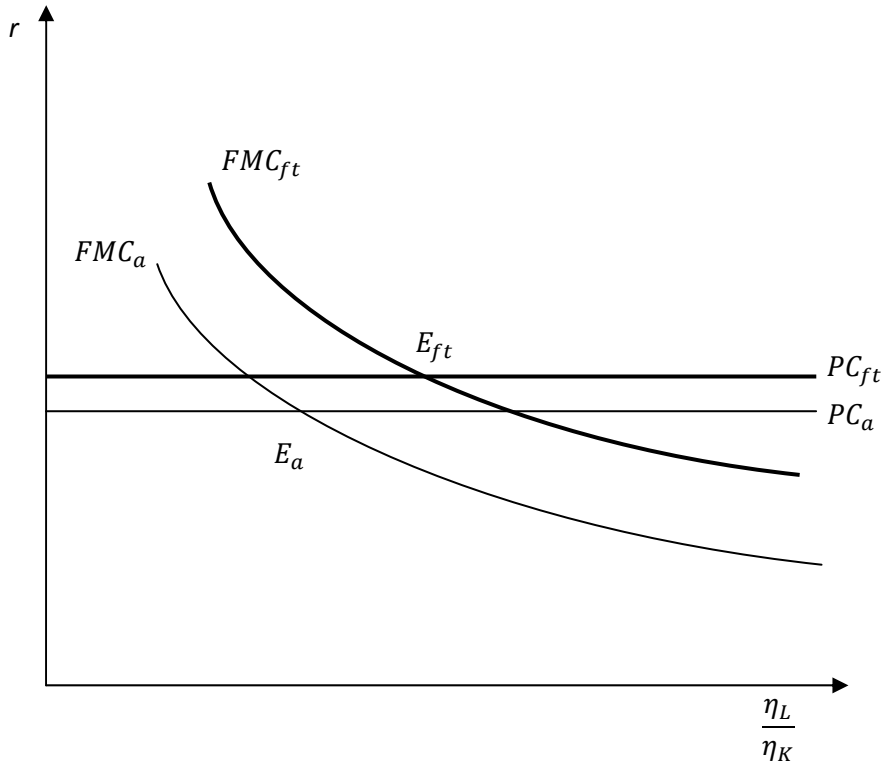
a. If $\phi_K - \phi_L > \Phi$, $\frac{\eta_L}{\eta_K}$ increases, so the relative mass of non-exporters increases;

b. If $\phi_K - \phi_L < \Phi$, $\frac{\eta_L}{\eta_K}$ decreases, so the relative mass of non-exporters decreases.

Therefore, in general holds that capital-intensive – thus exporting – firms will experience the more negative influences from trade liberalization, the larger $\phi_K - \phi_L$ is. Conversely, the larger the factor intensity gap is, the more non-exporting firms will benefit from trade liberalization.

Depicting the FMC-curves and PC-curves under autarky and free trade, accounting for the above described behavior of these curves, leads to figure 2. Due to the trade liberalization capital-intensive firms have additional profit opportunities abroad and start to export, so their production increases. Therefore the demand of capital and the price of it, *r*, rises. This shifts the PC-curve upwards. The larger the difference $\phi_K - \phi_L$ is, the larger the increase in *r.* The FMC-curve shifts also upwards/rightwards, as seen above, because of increased factor market competition, which results from the trade liberalization. This leads to losses for the capital-intensive firms, even to the extent that the net effect of the trade liberalization is negative for them, but positive for the labor-intensive firms. So some capital-intensive firms will exit the market, while labor-intensive firms will entry. The trade liberalization induces firms to produce less capital-intensive. This all results in a free trade equilibrium with a higher *r* and a higher relative mass of labor-intensive firms, as pictured in figure 2.

Figure 2: Equilibriums under autarky and free trade



In many models, like the one of Melitz (2003), which focus on productivity of firms, increasing sector-wide exports drives the least productive firms out of the market. Some of them are driven only out of the export markets, some out both foreign en home markets. This model has a different setup, leading to others results. If the relative price of capital increases all capital-intensive firms are affected, reducing their profits. Only if a capital-intensive firm makes non-negative profits if exporting, it is also able to survive on the home market. The reason for this is that market entry is free, profits are driven to zero in autarky, firms do have no uncertainty about their technology and that all the capital-intensive firms, but none of the labor-intensive firms could make non-negative profits when starting to export after trade liberalization.

This model shows the role which differences in factor inputs can play in trade liberalization, illustrating that, due to factor market competition, firms that start to export could suffer most from the trade liberalization, while it benefits the non-exporting firms. Several aspects of the factor market competition described in this model, could be studied, namely:

a. firm selection / survival
b. firms' factor input choice

The firm-level data which does not allow to test for firm selection/survival, so I will focus on changes in the factor inputs of firms. In the next section of this thesis I will test this result empirically.

3. Empirical part

The main hypothesis that exports growth affects a firms' factor input choice through factor market competition, is tested by regressing a factor input, namely the skill-intensity of a firm, which is measured by the share of skilled workers in the production process, on the exports (growth) of the sector in which the firm is active. Since exporters are generally more skill-intensive than non-exporters, the hypothesis is confirmed if the skill-intensity of a firm depends negatively on sector-wide exports (growth). Some firm characteristics are used as control variables.

3.1. Data description

The hypothesis is tested for a group of Eastern European and Central Asian countries, which to my knowledge is not done before. To assess this hypothesis, firm-level data about the skill-intensity of firms is necessary, as well as data about the sector-wide exports in the respective countries. Furthermore, I added data about certain firm characteristics to the regressions, to control for the effects these may have on the skill-intensity of a firm. These characteristics, which will be described in detail below, are size, foreign ownership, the use of foreign inputs, age and total factor productivity.

3.1.1. Firm-level data

The first source used for this thesis is a harmonized panel data set from the Worldbank Enterprise Surveys, which contains data about Eastern European and Central Asian firms.[15] This data was gathered by conducting the Business Environment and Enterprise Performance Survey (BEEPS). This panel data set contains information about firms out of 27 countries. I excluded observations from Montenegro, because there are too few observations from this country. Therefore the following 26 countries are included in the analysis in this thesis: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, the former Yugoslav Republic of Macedonia (FYROM), Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the Republic of Moldova, Poland, Romania, Russia, Serbia, the Slovak Republic, Slovenia, Tajikistan, Ukraine and Uzbekistan.

The interviews of the BEEPS are conducted in 2002, 2005, 2007, 2008 and 2009. Not many observations are available for 2007, so they are excluded from the analysis. The information gathered by conducting interviews in 2002 concerns 2001, the information in the BEEPS data set labeled as 2005 is from 2004 and the answers on the questions asked in 2008 and 2009 contain

[15] The data is available at www.enterprisesurveys.org

information from 2007. Therefore, in the remainder of the thesis is referred to the years 2001, 2004 and 2007.

The variables at firm-level are defined as follows.[16] The *skill-intensity* of a firm is the number of skilled production workers divided by the total number of workers. The *size* of a firm is measured by the logarithm of the total number of workers. *Foreign ownership* is measured by the share of private foreign individuals, companies or organizations in the total ownership of a firm. The variable *foreign inputs* represents the share of the material inputs or supplies which is of foreign origin. *Age* is the logarithm of the number of years the firms exists in the corresponding year. *Total factor productivity* (TFP) is estimated, using the residual of a industry-specific[17] Cobb-Douglas function with the logarithm of sales as dependent variable and the production factors of the firm as independent variables. In this estimation of the TFP three different setups with respect to the production factors are used, all in logarithms:

1. The repurchase value of capital, the total number of workers and the annual costs of raw materials and intermediate goods (in the remainder of the thesis: inputs costs).[18]
2. The repurchase value of capital and the total number of workers. The inputs costs are not used in this specification, since all observations from 2001 lack information about the inputs costs. So, in regressions with observations from 2001 included, this measure of TFP is used.
3. The repurchase value of capital, the annual costs of labor and the inputs costs.

Furthermore, total factor productivity is estimated separately for exporters and non-exporters, because in the model is assumed that they differ in their factor input choice and (likewise) in their TFP. All monetary values in these variables are in United States dollar, deflated to constant values of 2001, using the GDP-deflator of the World Development Indicators.[19]

Before using the data of the BEEPS, I excluded – besides, as already mentioned, the observations from the 2007 and the firms coming from Montenegro - all observations that lack data about the number of permanent en temporary full-time employees, skilled production workers and percentage

[16] A detailed description of all used variables can be find in Appendix 1.
[17] Industry-specific: by using industry dummies. TFP is assumed to differ across industries, for example because of different kind of production processes.
[18] This estimation procedure of the TFP is comparable with the estimation of TFP which is employed by Saliola and Seker (2011). The other two setups of the estimation of TFP are modifications of this first estimation.
[19] See, for the World Development Indicators: data.worldbank.org

of national sales. This information is needed to construct the skill-intensity, as seen above, and to determine whether a firm exports or not. After these exclusions 18288 observations are left.

3.1.2. Sector-wide exports data

For each firm in the data set is observable in which industry it is active. Some of the industries are from the manufacturing sector, others from the service sector. For the manufacturing sector, the following categories are used in my analysis: Food, Textiles, Garments, Chemicals, Plastics & rubber, Non metallic mineral products, Basic metals and fabricate metal products, Machinery and equipment, Electronics and Other manufacturing. The firms active in service sectors are divided into the industries Construction, Other services, Wholesale and retail, Hotel and restaurants, Transport and IT.[20]

The data about the sector-wide exports comes the International Trade Centre (ITC)[21] and is matched with the above mentioned industries. For more details about the matching, see Appendix 2. Data about exports on product level is available from 2001 onwards. The data about sector-wide exports is used in two different forms, namely in levels – so by using the deflated[22] US$ value of the sector-wide exports – and in growth rates. The growth rate can be defined in several different ways, namely by taking the growth rate of the present year, of the year before or over several years.

For several reasons I choose to took the growth rate over several years in this thesis where the effect of sector-wide exports on the skill-intensity of firms is investigated. First of all, it seems reasonable to assume that firms need some time to adjust their production process to changing circumstances. Production processes are often partly fixed on the short term. Secondly, there tend to be quite a bit of fluctuation in the yearly growth rates of the sector-wide exports of some of these 26 countries. The growth rate over several years reflects a medium term economic trend. It is more plausible that firms change their production process as reaction on medium term changes than on an accidentally good or bad year, which easily can be caught if using a one-year growth rate. Furthermore, the sector-wide exports data in this thesis is examined using a time interval of three years. Therefore it is reasonable to consider the growth of the sector-wide exports over this complete interval, so over three years. When Bernard et al. (2006) studied the growth of employment, they also considered the

[20] In the data set from the World Enterprise Surveys the industries Basic metals and Fabricate metal products are considered as two industries. I treat these two industries together as one: otherwise it is not possible to match the firm-level data with the export data. The same holds for the industries Wholesale and Retail, whom were also regarded as two separate industries in the data set from the World Enterprise Surveys, but whom I considered together as one industry. For more details, see Appendix 2.

[21] See www.intracen.org.

[22] Deflated to constant values of 2001, using the GDP-deflator of the World Development Indicators.

growth over the used time interval, which was five years in their case. Hence the growth rate used in further estimations, is the rate that the sector-wide exports grew over the past three years:

$$\Delta Exp_{jct} = \frac{Exp_{jct} - Exp_{jct-3}}{Exp_{jct-3}}$$

where Exp_{jct} represents the sector-wide exports in levels in industry *j*, in country *c* at time *t.*

Unfortunately it is not possible to calculate growth rates for the observations coming from 2001, because, as already said above, the earliest data about sector-wide exports is from 2001. Therefore it is not possible to use the growth rates when performing regressions with observations from 2001 included.

3.1.3. GDP per capita difference

The relationship between the skill-intensity of firms and the sector-wide exports can contain several influences, which make it difficult to interpret the outcome as a confirmation or rejection of the hypothesis, if not is controlled for these influences. More particular: a negative relation between the skill-intensity and sector-wide exports may not only result from increased factor market competition, as my hypothesis suggests, but also from specialization according to the comparative advantage which a country has or from differences in skill-intensities between industries. I will explain this below.

As mentioned before, the Heckscher-Ohlin proposition states that countries which trade, will export products that use the relative abundant available production factor intensively. A considerable part of the trade of the Eastern European and Central Asian countries takes place with high-income countries, in which production processes may be more skill-intensive. Negative coefficients for sector-wide exports growth could arise as a result of decisions of firms to specialize in unskilled labor, because they trade with high-income countries. It could be that within each sector exporters are generally more skill-intensive than non-exporters, but that the main exporting sector is unskilled-labor-intensive.

To control for these influences, I included a measure of income difference between the exporting country and the main export destination countries in the regression, namely the GDP per capita difference. In general countries with a high income per capita are skilled-labor abundant, while for

countries with a lower GDP per capita the reverse holds. The GDP per capita difference is constructed as follows:

- For each of the 26 Eastern European and Central Asian countries the five main export destination countries, regarding the total value of exports, are selected, using data from the International Trade Centre (ITC).
- Data about the exports per product group going to these main exports destination countries is obtained from the ITC and matched with the industries used in this thesis (in the manner as described in the Appendix 2).
- A weighted GDP per capita of the export destination countries is constructed for each sector in each exporting country. This is done for each country according to the share which each of the five main export destination countries of that country has in the exports of each sector. The GDP per capita data is obtained from the World Development Indicators, is measured in United States dollars and concerns 2001.
- The GDP per capita difference is calculated by subtracting the per sector weighted GDP per capita of the main exports destination countries from the GDP per capita of the exporting country.

When this GDP per capita difference is included, I interacted it with the sector-wide exports. Because the GDP per capita difference is always negative[23], I took the logarithm of it, after multiplying it with -1. In the regressions a minus sign is placed before the interaction term to make the term negative again and to keep the intuition of the results as straightforward as possible.

3.2. Descriptive statistics

First I will present some descriptive statistics of the variables of interest and control variables. For firms in the manufacturing sector these statistics are from the years 2004 and 2007. For these firms, the observations dating from 2001 are excluded from the regressions, because in that year only data about firms from two industries – Food and Other manufacturing – is present. Within the service sector nearly all observations are from 2001 and 2004, only a few dozen are from 2007 (distributed over all countries and services-industries). So, in the service sector I excluded the observations from 2007. Therefore these excluded observations do also not appear into the descriptive statistics. Of

[23] See the descriptive statistics below.

course all observations for which there is no data available about sector-wide exports cannot be used in the analyses and are dropped in the regressions and descriptive statistics.[24]

In table 1 the mean values of the variables of interest and control variables are presented for all firms.[25] Table 2 reports figures for manufacturing firms.[26] In each table the mean values are presented for all firms, for exporters and for non-exporters. Exporters are defined as firms which sell at least 1% of their sales abroad. Tables presenting besides the mean values, also the standard deviation and the number of observations can be found in Appendix 3. Tables which reports the figures per year can be found in Appendix 4 and tables which show the descriptive statistics per industry in Appendix 5. Also, for the manufacturing firms, per country tables can be found in Appendix 6.

Table 1: Manufacturing firms (2004 & 2007) and Service firms (2001 & 2004), mean values

	All firms	Exporters	Non-exporters
Skill-Intensity	0,46	0,47	0,46
Sector-wide exports (logs)	19,50	20,07	19,27
Workers (number)	131	232	89
Workers (log)	3,34	4,19	3,00
Age (years)	15,0	19,4	13,2
Age (log)	2,28	2,50	2,20
Share of foreign ownership	0,10	0,19	0,06
% of firms with foreign ownership	13%	26%	8%
Share of foreign inputs	0,31	0,44	0,26
% of firms with foreign inputs	54%	76%	45%
TFP 2 (logs)[A]	0,06	0,03	0,07

[A] TFP 2 is the residual of a Cobb-Douglas function estimated with independent variables 'Capital (log)' and 'Workers (log)'. For more details about TFP: see section 3.1.1. and Appendix 1. The mean of TFP 2 is not equal to zero, because TFP 2 is estimated for all firms that do have information about 'Sales (log)', 'Capital (log)' and 'Workers (log)', but for the regressions and descriptive statistics observations that do not have information about sector-wide exports are dropped.

[24] Data about sector-wide exports is not available for all industries in all countries in all years. The dropped observations are nearly all from the service sector, because the data about exports of services shows much more gaps.

[25] Not all variables are presented in table 1, because when working with the sample of observations with both manufacturing and service firms, not all variables are used in the regressions. For example the variables GDP per capita and ΔGDP per capita are not used.

[26] This table presents more variables, because more variables will and can be used for the manufacturing firms than for the service firms.

Table 2: Manufacturing firms (2004 & 2007), mean values

	All firms	Exporters	Non-exporters
Skill-Intensity	0,52	0,53	0,52
Sector-wide exports (logs)	20,20	20,56	19,98
Exports, growth ratio over 3 years	0,49	0,48	0,50
Workers (number)	148	258	81
Workers (log)	3,69	4,52	3,19
Age (years)	16,4	21,1	13,5
Age (log)	2,38	2,59	2,25
Share of foreign ownership	0,10	0,19	0,05
% of firms with foreign ownership	14%	26%	7%
Share of foreign inputs	0,33	0,45	0,26
% of firms with foreign inputs	58%	79%	46%
TFP 1 (logs)[A]	0,00	0,00	0,00
TFP 3 (logs)[A]	0,00	0,00	0,00
GDP per capita ($)[B]	$ 2.387	$ 2.961	$ 2.035
GDP per capita (logs)	7,39	7,61	7,26
ΔGDP per capita ($)[C]	$ -10.245	$ -11.213	$ -9.661
ΔGDP p.c. (log of negative value)	8,74	8,96	8,61

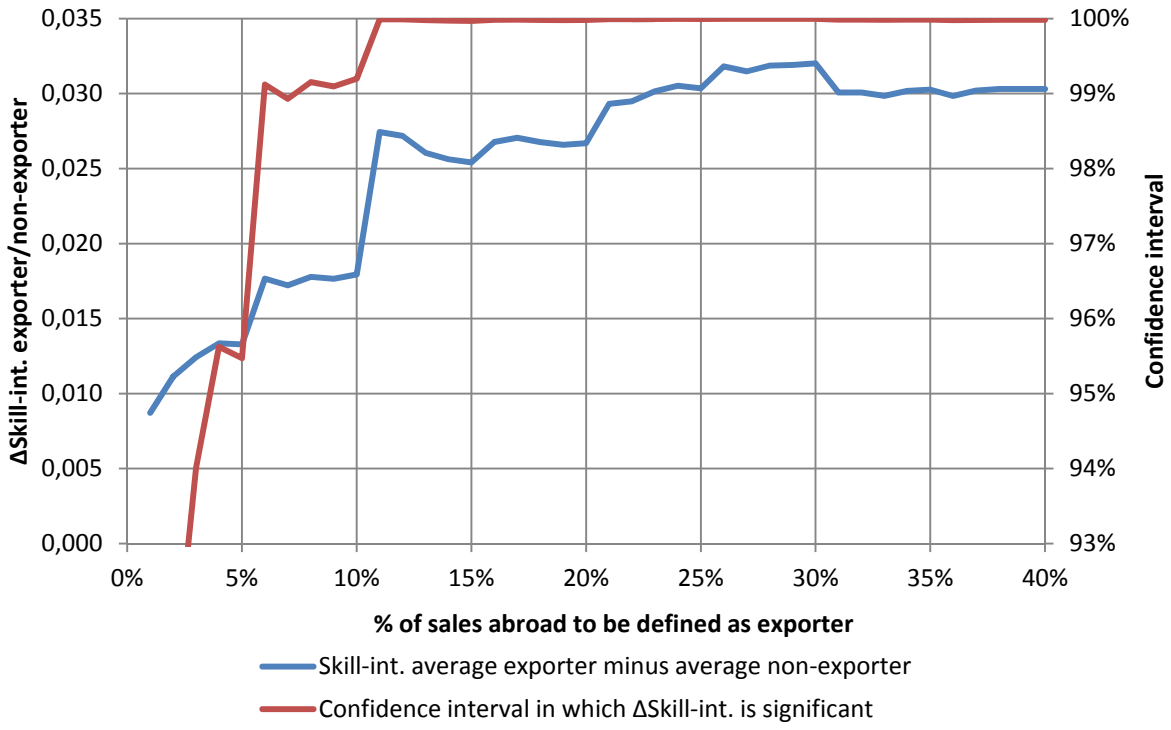
[A] TFP 1 is the residual of a Cobb-Douglas function estimated with independent variables Capital (log), Workers (log) and Inputs costs (logs). TFP 3 uses Labor costs (log) instead of Workers (log). For more details about TFP: see section 3.1.1. and Appendix 1.
[B] GDP per capita is the GDP per capita of the country in which the firms has residence.
[C] ΔGDP per capita is the difference between the GDP per capita of the home country of the firm and a per sector weighted average of the GDP per capita of the five countries to which the biggest exports of that country go. For more details about ΔGDP per capita: see section 3.1.3. and Appendix 1.

Before discussing these descriptive statistics, it is useful to look in more detail at the difference in skill-intensity between exporters and non-exporters, in order to find out if this difference is significant. For the manufacturing firms from 2004 and 2007 this difference is 0,0087 when defining as an exporter each firm which sells at least 1% abroad. This difference is not significant when using a confidence interval of 95%. When raising the threshold value of the percentage of sales which must be sold abroad in order to be considered as an exporter, the difference in skill-intensity between exporters and non-exporters increases and becomes more significant.[27] More specific: if exporters are defined as firms which sell at least 4% of their sales abroad, the difference between the skill-intensity of the average exporter and non-exporter is 0,0134 and is significant when using a 95% confidence interval. In figure 3 the difference between the skill-intensity of the average exporter and

[27] Until the difference between an exporter and non-exporter regarding the skill-intensity stabilizes around 0,03.

non-exporter and the confidence interval in which this difference is significant, are pictured.[28] The percentages along the horizontal axis display the percentage of sales which a firm at least must sell abroad in order to be defined as an exporter. Safely can be concluded that exporters are on average more skill-intensive than non-exporters.

Figure 3: Δ in skill-intensity of av. exporter and non-exporter



Having concluded this, it is time to discuss the descriptive statistics. Compared to non-exporters, exporters are generally more skill-intensive, larger (in number of workers), older and have a bigger share of foreign ownership. Furthermore, they use on average more foreign inputs. In general the differences between exporters and non-exporters regarding the mean values of the variables become smaller over time.[29] For manufacturing firms the skill-intensity of exporters remained the same in 2004 and 2007, while for the non-exporters it rose and was in 2007 even higher than the skill-intensity of exporters. For service firms the skill-intensity of exporters is lower than that of non-exporters, both in 2001 and 2004. Moreover, it did rise over time for non-exporters, but fall over time for exporters.

[28] Figure 3 concerns the manufacturing firms from 2004 and 2007, excluding Bosnia. This is the sample of firms used in most regressions.
[29] See Appendix 4.

The three-year-growth ratio of sector-wide exports is on average lower in the sectors in which exporters are active than in the sectors in which non-exporting firms operate.[30,31] However, this is only the case in half of the countries and less than half of the industries.[32] The growth ratio declined over time. Sector-wide exports increased over time.[33]

The percentage of manufacturing firms which export rose from 36,6% in 2004 till 39,6% in 2007. The opposite is observed for the service firms: the percentage of exporters fell from 23,2% in 2001 till 17,8% in 2004.

Total factor productivity increased over time, for manufacturing firms as well as for service firms.[34] The TFP-value differs more over time in the case of exporters than in the case of non-exporters.[35]

The GDP per capita of the home country is on average higher for exporters than non-exporters. This result holds for all but one industry.[36] This means that within Eastern Europe and Central Asia exporters are relatively more than non-exporters situated in countries with a higher GDP per capita.

For all industries in all countries the GDP per capita difference (ΔGDP per capita) is negative.[37] This means that for countries in Eastern Europe and Central Asia the partner countries to which the biggest value of exports go, are more developed. For exporters ΔGDP per capita is bigger than for non-exporters, although the average GDP per capita of the home country for exporters is also bigger. This higher ΔGDP per capita for exporters is a fact in most industries and the majority of the

[30] Remind that the growth ratio is only reported for manufacturing firms.
[31] To each observation are linked the exports of the sector in which the firm is active. Therefore also growth ratios of sector-wide exports can be reported for non-exporting firms. The reported growth is not the growth of the exports of that firm (which is zero for a non-exporting firm), but of the sector in which the firm is active. This is the case for both exporting and non-exporting firms.
[32] The reason that this is nonetheless on average the fact can by partly explained by the presence of many firms which are active in the Food sector in the data set. In this industry there is quite a big, negative difference between the growth ratio of exports linked to the exporters and the growth ratio of exports linked to the non-exporters. The picture behind this big and negative difference in exports growth ratio between exporters and non-exporters is the following: the growth ratio of exports for the industry Food is in many countries much higher in 2004 than in 2007. Furthermore, the ratio non-exporters / exporters in 2004 is considerable higher than in 2007. When then taking the average exports growth ratio for both the exporters and non-exporters, this leads to a higher average of non-exporters. Therefore, in the industry Food, a higher growth rate of exports is reported in the column of non-exporters than in the column of exporters. This has a big impact on the reported total growth rates, since quite a lot of all firms are active in the Food sector.
[33] Separate tables for service firms are not reported, but when considering only service firms this is also the case.
[34] Separate tables for service firms are not reported, as said in the previous note.
[35] The variance in TFP-values is much bigger in 2007 than in other years (for both exporters and non-exporters).
[36] Only in the industry Hotel and Restaurants the average GDP per capita is higher for non-exporters.
[37] The GDP per capita difference – which is calculated per sector per country – could be and is only calculated for manufacturing firms.

countries. So, there are relatively more exporters active in countries and industries where the difference in development between the home country and trading partner is bigger.

3.3. Estimations

The regression of the skill-intensity of a firm on a measure of sector-wide exports and certain control variables is done in several specifications, which I will treat in different subsections.

3.3.1. Manufacturing and service firms

3.3.1.1. Basic setup

The basic equation I used to test the hypothesis is the following:

(35) $$S_{ijct} = \alpha + \beta_1 Exp_{jct} + \beta' \Omega_{ijct} + \delta_j + \delta_c + \delta_t$$

where S_{ijct} is the *skill-intensity* of firm *i*, operating in industry *j*, in country *c* at time *t*. The *sector-wide exports* for industry *j* in country *c* at time *t* are represented in the equation by Exp_{jct} (in logs). In this basic equation the sector-wide exports are measured in levels. Ω_{ijct} is a vector of firm characteristics that includes *size*, the *share of foreign ownership*, the *share of foreign inputs*, *age* (in logs) and *total factor productivity* (in logs). In the specifications in this subsection *TFP 2 (logs)*$_{ijct}$ is used as measure for total factor productivity. The reason lies in the fact that firms from 2001 are included in the estimations and this is the only measure of total factor productivity available for these firms, as explained in section 3.1.1. δ_j, δ_c and δ_t are dummies for industry, country and time respectively. All monetary values are in United States dollar, deflated to constant values of 2001, using the GDP-deflator of the World Development Indicators.

Overall exporters are more skill-intensive than non-exporters. The main hypothesis is confirmed if the sign of β_1 in equation (35) is negative, so, if an increase of the sector-wide exports results in a lower skill-intensity. The results of this specification (not reported) give indeed a negative sign for β_1. However, it suffers from insignificance. Significant results are obtained if dropping either the country- or industry dummies (not reported). But depending on which dummies are used, the sign of β_1 switch. So, the results obtained from this basic regression are not very robust and need to be investigated further with other setups of the regression.

3.3.1.2. Division into country groups

The model developed in chapter 2 leads to conclusion that an increase of the sector-wide exports likely decreases the (human) capital-intensity of the firms, through the factor market competition, which affects the factor input choice of firms. Exporters are expected to experience this effect stronger than non-exporters, since they are generally more skill-intensive (=human capital-intensive), as seen in section 3.2. However, this is not the case for all countries. In some of them there is no difference in skill-intensity between exporters and non-exporters. In some countries non-exporters are even more skill-intensive than exporters. These differences could influence the outcome. To control for these variations between countries, I divided the countries in three groups:

1. In this group of countries exporters are on average more skill-intensive than non-exporters. The difference between them is ≥ 0.01, which, when including manufacturing and service firms from all years, is the rounded difference in skill-intensity between exporters and non-exporters and which is significant.
2. In this group the skill-intensity of the average non-exporter is at least 0.01 higher than the skill-intensity of the average exporter.
3. In the third group the average difference between exporters and non-exporters with respect to skill-intensity is less than 0.01.

When incorporating this division into three groups of countries in the regression equation, the regression equation becomes:

$$(36) \qquad S_{ijct} = \alpha + \beta_1 \delta_{e(all)} Exp_{jct} + \beta_2 \delta_{ne(all)} Exp_{jct} + \beta_3 \delta_{s(all)} Exp_{jct} + \beta' \Omega_{ijct} + \delta_j + \delta_c + \delta_t$$

where $\delta_{e(all)}$ is 1 for countries where exporters are on average more skill-intensive than non-exporters and 0 otherwise. $\delta_{ne(all)}$ is 1 for countries where the average non-exporter is more skill-intensive than the average exporter and 0 otherwise. And $\delta_{s(all)}$ is 1 for the countries of the third group, that is for countries where the average exporter and non-exporter do have the same skill-intensity (less than 0.01 difference).[38]

[38] See Appendix 1 for the distribution of the countries across these dummies.

3.3.1.3. Results after division into country groups

The results of the estimations using equation (36) are reported in table 3. Each regression uses an as high number of observations as possible, that is all observations that not lack data of the included variables. When country- and industry dummies are included the coefficient of sector-wide exports is never significant for the group of countries where either exporters or non-exporters are more skill-intensive. Instead, most control variables are significant. Bigger firms are more skill-intensive. Both foreign ownership and the use of foreign inputs have a negative impact on skill-intensity. The negative relation between the use of foreign inputs and the skill-intensity could indicate that Eastern European and Central Asian firms that import intermediates – which are likely to embody a higher state of technology than intermediates coming from their own country – focus themselves on the parts of the production process which use unskilled labor intensively. This would reveal comparative advantages and this corresponds with the results Fajnzylber and Fernandes (2009) obtained for China, as mentioned in the introduction. A possible explanation for the finding that foreign ownership decreases the skill-intensity of a firm, is that foreign owned firms can be a part of a concern which moves unskilled labor intensive production to Eastern European and Central Asian countries. For age and total factor productivity are no significant influences found.

However, there are some disadvantages of using values in levels for the sector-wide exports instead of growth rates. For each single country the volume of exports in each sector is represented by the logarithmic value of it. Within one country differences in the level of sector-wide exports reflects (positive or negative) changes over time, making it possible to analyze the effect of changes of the level of sector-wide exports on the factor inputs (represented by the skill-intensity). However, between countries the logarithmic value of the sector-wide exports differs, because some countries have a higher or lower export volume than others, for example because they are bigger or smaller. This fact hinders regressions which relate the logarithmic value of the level of sector-wide exports to the skill-intensity of firms across countries. The growth rate of the sector-wide exports, on the other hand, can be compared across countries and industries. Moreover, longer-run impacts can be taken into account when using growth rates. The use of growth rates of sector-wide exports is not possible with this specification, because no growth rates could be calculated for the observations from 2001. Therefore I turn to another subsection, with another setup with only manufacturing firms included.

Table 3: Estimation results, all firms

Variables	I	II	III	IV	V	VI	VII	VIII	IX	X
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant	0,272*	0,371*	0,361*	0,356*	0,316*	0,324*	0,336*	0,328*	0,387*	0,383*
Constant (Std.Error)	0,020	0,037	0,048	0,048	0,048	0,049	0,049	0,050	0,068	0,068
Sector-wide exports E (logs) [A]	0,010*	0,008*	0,001	-0,001	-0,002	-0,001	-0,001	0,000	-0,006	-0,006
Sector-wide exports 1 (log)	0,001	0,002	0,003	0,003	0,003	0,003	0,003	0,003	0,004	0,004
Sector-wide exports NE (logs)	0,009*	0,001	0,003	0,002	0,002	0,001	0,001	0,002	-0,005	-0,005
Sector-wide exports 2 (log)	0,001	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,003	0,003
Sector-wide exports S (logs) [A]	0,012*	0,013*	0,004	0,002	0,003	0,002	0,001	0,002	-0,009***	-0,009***
Sector-wide exports 3 (log)	0,001	0,003	0,004	0,004	0,004	0,004	0,004	0,004	0,005	0,005
Workers (log)					0,011*	0,014*	0,013*	0,013*	0,014*	0,014*
Workers (log) (Std. Error)					0,002	0,002	0,002	0,002	0,002	0,002
Share of foreign ownership						-0,077*	-0,070*	-0,070*	-0,056*	-0,056*
Share of foreign ownership						0,009	0,009	0,009	0,012	0,012
Share of foreign inputs							-0,017**	-0,017**	-0,019**	-0,019**
Share of foreign inputs (Std.							0,007	0,007	0,009	0,009
Age (log)								0,001	-0,003	
Age (log) (Std. Error)								0,003	0,004	
TFP 2 (log)									0,002	0,002
TFP 2 (log) (Std. Error)									0,003	0,003
Adjusted R-squared	0,012	0,038	0,116	0,118	0,121	0,127	0,120	0,120	0,128	0,129
Sum squared resid	1221	1188	1090	1087	1083	1067	1019	1015	510	512
Dummies	No	Country	Country, industry	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year
Observations	14257	14257	14257	14257	14257	14093	13554	13469	7206	7256

*significant at 1%; ** significant at 5%; *** significant at 10%.

[A] 'Sector-wide exports E' represents the group of countries where exporters have a higher skill-intensity than non-exporters. 'Sector-wide exports NE' represents the group of countries where non-exporters instead have a higher skill-intensity than exporters. 'Sector-wide exports S' represents the countries where exporters and non-exporters do have the same skill-intensity.

3.3.2. Manufacturing firms

3.3.2.1. Regression setup

Regressions with manufacturing firms are employed with observations from 2004 and 2007, as mentioned before. For these firms growth rates of sector-wide exports can be used, as well as measures of total factor productivity estimated with *Inputs costs (logs)* included. Using the growth rate of the sector-wide exports leads to the following modification of equation (35):

$$S_{ijct} = \alpha + \beta_1 \Delta Exp_{jct} + \beta' \Omega_{ijct} + \delta_j + \delta_c + \delta_t \quad (37)$$

where ΔExp_{jct} is the ratio of the sector-wide export growth over the last three years at time *t*, so: $\Delta Exp_{jct} = \frac{Exp_{jct} - Exp_{jct-3}}{Exp_{jct-3}}$, where Exp_{jct} represents the sector-wide exports in levels in industry *j*, in country *c* at time *t.* The other variables in equation (37) are the same as in earlier equations. When using both a division in three groups of countries and growth rates of sector-wide exports equation (38) is obtained:

$$S_{ijct} = \alpha + \beta_1 \delta_e \Delta Exp_{jct} + \beta_2 \delta_{ne} \Delta Exp_{jct} + \beta_3 \delta_s \Delta Exp_{jct} + \beta' \Omega_{ijct} + \delta_j + \delta_c + \delta_t \quad (38)$$

However, the distribution of the countries over the three different country groups is somewhat different as in section 3.3.1. The number of firms in the sample is smaller, so the difference in skill-intensity between exporters and non-exporters has to be bigger in order to be significant. The fact that all the firms of the service sector are excluded, can also influence to which of the three groups a country belongs, because the skill-intensity of firms and the relation of it between exporters and non-exporters differs over industries.

So, $\delta_e = 1$ for the group of countries where the skill-intensity of the average exporter is ≥ 0.015 higher than that of the average non-exporters. This 0.015 is the upwards rounded difference in skill-intensity between exporters and non-exporters which is significant for this selection of firms, as seen in section 3.2. For the group of countries for which the average non-exporter has at least a skill-intensity which is 0.015 higher than the average exporter, $\delta_{ne} = 1$. Finally, $\delta_s = 1$ for the group of countries for which there is no difference in skill-intensity between the average exporters and non-exporters is less than 0.015 (so the skill-intensity is more or less the same for exporters and non-exporters). The distribution of the countries over these groups can be found in Appendix 1. Furthermore, descriptive statistics per group of countries (Group E, Group NE, Group S) can be found

in Appendix 7. Bosnia is excluded from the regressions in this section and the remainder of the thesis, because of lack of data. I will use equation (38) for the regressions in this subsection (3.3.2.).

3.3.2.2. Regression results

The results of the regressions are reported in table 4. A negative sign of β_1 would indicate that sector-wide exports growth leads to the in chapter 2 described effects. So, increasing exports lead to a rise of the relative demand for the input factor which is used intensively by exporters, which is skilled labor (for the countries which are in group E). The resulting increase in the relative price of the factor which is intensively used by exporters, will induce all firms to use the other factor more intensively. The more skill-intensive a firm, the more it suffers from this increased factor competition. So, a negative sign of β_1 will support the hypothesis. According to the same reasoning, a positive sign for β_2 is affirmative for the hypothesis, since in case of the group of countries for which $\delta_{ne} = 1$, the average exporter uses unskilled labor intensively.

Table 4 reports the results from estimations without the Republic of Moldova. This country turns out to have a large impact on the results, mainly when total factor productivity is added in the estimations. The reason can be that for industries of the Republic of Moldova large changes in TFP took place from 2004 to 2007.[39] It seems better to exclude the country. However, table A10 in Appendix 8 gives the outcome of the regressions when including the Republic of Moldova in the estimations.

For the group of countries where the average exporters have a higher skill-intensity than the average non-exporters the coefficient of sector-wide exports growth is negative and significant. This is in line with expectations. For the other groups of countries no significant influence of sector-wide exports growth on skill-intensity are found, which is not in contradiction with the hypothesis. Using foreign inputs has a significant negative impact on the skill-intensity, as also found when using the previous setup. Foreign ownership has also a negative impact on the skill-intensity, but this effect is not significant anymore after the inclusion of total factor productivity, although TFP itself also is not significant.[40] The size of a firm seems to affect the skill-intensity positively, but after adding TFP to the control variables this outcome is completely insignificant. Age does not have any significant effect on the skill-intensity of a firm. Before drawing conclusions, more setups are employed. Therefore we go to another subsection.

[39] Also for many industries only in 2007 observations which include information about TFP are present.
[40] There is a difference in significance of TFP 1 and TFP 3. The first measure is significant at 15% at column IX and 18% at column X. The second measure is only significant at 77% and 82% (columns XI and XII).

Table 4: Estimation results, firms from the manufacturing sector, excluding the Republic of Moldova

Variables	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant	0,544*	0,478*	0,400*	0,396*	0,388*	0,388*	0,403*	0,399*	0,343*	0,335*	0,343*	0,333*
Constant (Std.Error)	0,004	0,030	0,030	0,030	0,031	0,031	0,032	0,032	0,044	0,042	0,044	0,042
Growth sector-wide exports E [A]	-0,053*	-0,038*	-0,029*	-0,023*	-0,022*	-0,022*	-0,022*	-0,020*	-0,034**	-0,032**	-0,035**	-0,032**
Growth sector-wide exports 1 (Std. Error)	0,005295	0,007132	0,007	0,007	0,007	0,007	0,007	0,007	0,015	0,015	0,015	0,015
Growth sector-wide exports NE [A]	-0,059*	-0,047*	-0,002	-0,007	-0,007	-0,009	-0,010	-0,011	-0,025	-0,022	-0,024	-0,021
Growth sector-wide exports 2 (Std. Error)	0,009905	0,013299	0,014	0,014	0,014	0,014	0,014	0,014	0,022	0,022	0,022	0,022
Growth sector-wide exports S [A]	-0,012***	-0,042*	-0,004	0,007	0,006	0,006	0,007	0,006	0,013	0,013	0,012	0,013
Growth sector-wide exports 3 (Std. Error)	0,007	0,009	0,009	0,010	0,010	0,010	0,010	0,010	0,014	0,014	0,014	0,014
Workers (log)					0,002	0,004***	0,005**	0,005***	-0,001		-0,002	
Workers (log) (Std. Error)					0,002	0,002	0,002	0,002	0,003		0,003	
Share of foreign ownership						-0,032*	-0,025**	-0,025**	-0,019	-0,021	-0,016	-0,020
Share of foreign ownership (Std. Error)						0,012	0,012	0,012	0,016	0,015	0,016	0,015
Share of foreign inputs							-0,028*	-0,027*	-0,037*	-0,038*	-0,036*	-0,037*
Share of foreign inputs (Std. Error)							0,009	0,009	0,012	0,012	0,012	0,012
Age (log)								0,002	-0,002		-0,001	
Age (log) (Std. Error)								0,004	0,005		0,005	
TFP 1 (log)									0,009	0,008		
TFP 1 (log) (Std. Error)									0,006	0,006		
TFP 3 (log)											0,003	0,002
TFP 3 (log) (Std. Error)											0,006	0,006
Adjusted R-squared	0,018	0,059	0,083	0,087	0,087	0,088	0,088	0,088	0,099	0,100	0,099	0,099
Sum squared resid	433	413	402	400	400	397	388	384	203	204	202	203
Dummies	No	Country	Country, industry	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year
Observations	6488	6488	6488	6488	6488	6455	6312	6236	3432	3469	3416	3453

*significant at 1%; ** significant at 5%; *** significant at 10%.

[A] 'Sector-wide exports E' represents the group of countries where exporters have a higher skill-intensity than non-exporters. 'Sector-wide exports NE' represents the group of countries where non-exporters instead have a higher skill-intensity than exporters. 'Sector-wide exports S' represents the countries where exporters and non-exporters do have the same skill-intensity.

3.3.3. Manufacturing firms: ΔGDP per capita included

3.3.3.1. Controlling for income differences

The just reported results seems to confirm the main hypothesis. However, as mentioned in section 3.1.3 also other economic processes may play a role, for which I will control by interacting the GDP per capita difference with the sector-wide exports. Recall that the GDP per capita difference is the difference between the GDP per capita of the home country of the firm and a per sector weighted average of the GDP per capita of the five main export destination countries of that country. The specification becomes:

(39) $$S_{ijct} = \alpha + \beta_1\delta_e\Delta Exp_{jct} + \beta_2\delta_{ne}\Delta Exp_{jct} + \beta_3\delta_s\Delta Exp_{jct} - \beta_4\Delta Exp_{jct} \times \Delta GDP\_PC_{jc} + \beta'\Omega_{ijct} + \delta_j + \delta_c + \delta_t$$

where ΔGDP_PC_{jc} is the logarithm of the GDP per capita difference (a minus sign is placed in front of this variable, because it is multiplied by -1 before taking the logarithm, as explained in section 3.1.3). I interacted ΔGDP_PC_{jc} with ΔExp_{jct} without placing the dummies for the three country groups before the interaction term. The rationale for not doing this is that the effect of the comparative advantage most likely plays a role irrespective of the reasons which led to creation of these groups of countries. Also ΔGDP_PC_{jc} is not included independently from the sector-wide exports in the regression, because the effects of it are not present if exports are zero.

3.3.3.1. Regression results

The outcome of these estimations is presented in table 5A. The effects and significance of the control variables did not change compared to the estimations without $\Delta Exp_{jct} \times \Delta GDP\_PC_{jc}$. The interaction term is significant and has a positive coefficient, which therefore in fact is negative, because of the minus sign. This confirms the Heckscher-Ohlin proposition. The coefficients of the growth ratio of sector-wide exports for all three groups of countries are positive and significant. Thus after controlling for the GDP per capita difference the significance improved a lot, since before inclusion of it the results were only significant for the group of countries where the exporters do have on average a higher skill-intensity than the non-exporters. To assess the net effect that the sector-wide exports growth has on the skill-intensity of a firm, I computed for each group of countries and each specification: $\beta_\tau - \beta_4\Delta GDP\_PC_{jc}$ with $\tau = 1,2,3$. The results are reported in table 5B.

Table 5A: Firms from the manufacturing sector, interaction with ΔGDP p.c. included

Variables	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant	0,542*	0,496*	0,441*	0,428*	0,418*	0,415*	0,426*	0,419*	0,340*	0,337*	0,340*	0,336*
Constant (Std.Error)	0,004	0,027	0,027	0,027	0,028	0,028	0,029	0,029	0,041	0,038	0,041	0,038
Growth sector-wide exports E [A]	-0,029	0,031	0,054**	0,056**	0,056**	0,056**	0,056**	0,057**	0,102***	0,103**	0,101***	0,102***
Growth sector-wide exports 1 (Std. Error)	0,020	0,024	0,025	0,025	0,025	0,025	0,025	0,025	0,058	0,056	0,058	0,056
Growth sector-wide exports NE [A]	0,008	0,078*	0,086*	0,084*	0,084*	0,083*	0,083*	0,081*	0,128**	0,129**	0,127**	0,128**
Growth sector-wide exports 2 (Std. Error)	0,023	0,027	0,028	0,028	0,028	0,028	0,028	0,028	0,061	0,060	0,061	0,060
Growth sector-wide exports S [A]	-0,013	0,082*	0,133*	0,133*	0,133*	0,132*	0,129*	0,128*	0,145**	0,146**	0,144**	0,144**
Growth sector-wide exports 3 (Std. Error)	0,021	0,026	0,027	0,027	0,027	0,027	0,028	0,028	0,059	0,058	0,059	0,058
Growth s-w exports*ΔGDP p.c. (log)	0,002	0,010*	0,011*	0,010*	0,010*	0,010*	0,010*	0,010*	0,015**	0,015**	0,015**	0,014**
Growth s-w exports*ΔGDP p.c. (log)	0,003	0,003	0,003	0,003	0,003	0,003	0,003	0,003	0,007	0,007	0,007	0,007
Workers (log)					0,003	0,005**	0,005**	0,005**	0,000		-0,001	0,000
Workers (log) (Std. Error)					0,002	0,002	0,002	0,002	0,003		0,003	0,000
Share of foreign ownership						-0,031*	-0,024**	-0,024**	-0,01797	-0,01907	-0,015	-0,017
Share of foreign ownership (Std. Error)						0,012	0,012	0,012	0,016	0,015	0,016	0,015
Share of foreign inputs							-0,026*	-0,025*	-0,031*	-0,032*	-0,03**	-0,031*
Share of foreign inputs (Std. Error)							0,009	0,009	0,012	0,012	0,012	0,012
Age (log)								0,002	-0,001		-0,001	
Age (log) (Std. Error)								0,004	0,005		0,005	
TFP 1 (log)									0,009	0,009		
TFP 1 (log) (Std. Error)									0,006	0,006		
TFP 3 (log)											0,001	0,001
TFP 3 (log) (Std. Error)											0,006	0,006
Adjusted R-squared	0,012	0,057	0,085	0,087	0,087	0,088	0,087	0,088	0,098	0,099	0,097	0,098
Sum squared resid	454	432	418	417	417	415	405	401	211	212	209	211
Dummies	No	Country	Country, industry	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year
Observations	6776	6776	6776	6776	6776	6743	6598	6520	3559	3599	3542	3582

*significant at 1%; ** significant at 5%; *** significant at 10%.

[A] 'Sector-wide exports E' represents the group of countries where exporters have a higher skill-intensity than non-exporters. 'Sector-wide exports NE' represents the group of countries where non-exporters instead have a higher skill-intensity than exporters. 'Sector-wide exports S' represents the countries where exporters and non-exporters do have the same skill-intensity.

Table 5B: Net effect of sector-wide export growth on skill-intensity

Country groups	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Group E	-0,043†	-0,053†	-0,037	-0,031	-0,031	-0,031	-0,030	-0,029	-0,026	-0,024	-0,026	-0,024
Group NE	-0,007†	-0,011†	-0,011	-0,009	-0,009	-0,010	-0,009	-0,010	-0,008	-0,006	-0,008	-0,006
Group S	-0,028†	-0,002†	0,042	0,045	0,045	0,045	0,042	0,042	0,016	0,018	0,015	0,017

†At least one of the coefficients needed to compute the net effect is not significant.

The net effect of the sector-wide exports growth on the skill-intensity of a firm is as expected negative for the group of countries where the average exporters uses skilled labor more intensively than the average non-exporter. On the other hand, the finding for the group of countries in which exporters use unskilled labor more intensively, is not in line with the hypothesis, since we expect it to be positive. Noted must at least that the net effect for group NE is less negative than the effect of group E.

3.3.4. Manufacturing firms: ΔGDP per capita and GDP per capita included

3.3.4.1. Controlling for the level of development of the exporter

Not only differences in income between the home country of the exporting firm and the country receiving the products can influence the skill-intensity of a firm, but also the level of development of the country in which a firm has residence is plausibly an important factor in determining the skill-intensity of a firm. In general less skilled labor is available in lower developed countries. Furthermore, there is quite a bit of difference in the GDP per capita between the three groups of countries (E, NE, S), as can be seen in Appendix 7. This could influence the just reported net effect that the sector-wide exports growth has on the skill-intensity of a firm. Controlling for these potential influences, I include a GDP per capita measure in the regression equation, which then becomes:

(40) $$S_{ijct} = \alpha + \beta_1 \delta_e Exp_{jct} + \beta_2 \delta_{ne} Exp_{jct} + \beta_3 \delta_s Exp_{jct} - \beta_4 Exp_{jct} \times \Delta GDP\_PC_{jc} + \beta_5 GDP\_PC_c + \beta' \gamma_{ijct} + \delta_j + \delta_t$$

where GDP_PC_c is the logarithm of the GDP per capita of the respective country. Inclusion of country dummies (δ_c) is not possible anymore, because otherwise collinearity with GDP_PC_c will be present.

Table 6A: Firms from the manufacturing sector, own GDP and interaction with ΔGDP p.c. included

Variables	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant		0,364*	0,391*	0,365*	0,363*	0,359*	0,360*	0,362*	0,355*	0,346*	0,349*	0,339*
Constant (Std.Error)		0,027	0,027	0,027	0,029	0,029	0,029	0,030	0,041	0,038	0,041	0,038
Growth sector-wide exports E [A]		-0,021	0,019	0,014	0,014	0,013	0,011	0,007	0,080***	0,090***	0,080***	0,089***
Growth sector-wide exports 1 (Std. Error)		0,021	0,022	0,022	0,022	0,022	0,022	0,022	0,048	0,046	0,048	0,046
Growth sector-wide exports NE [A]		-0,065**	0,017	0,008	0,008	0,006	0,005	0,000	0,061	0,072	0,063	0,071
Growth sector-wide exports 2 (Std. Error)		0,025	0,026	0,026	0,026	0,026	0,027	0,027	0,052	0,051	0,052	0,051
Growth sector-wide exports S [A]		-0,012	0,054**	0,054**	0,054**	0,052**	0,048**	0,044**	0,129*	0,138*	0,131*	0,138*
Growth sector-wide exports 3 (Std. Error)		0,022	0,023	0,023	0,023	0,023	0,023	0,024	0,048	0,047	0,048	0,047
Growth s-w exports*ΔGDP p.c. (log)		0,001	0,005***	0,004	0,004	0,004	0,003	0,003	0,012**	0,013**	0,013**	0,013**
Growth s-w exports*ΔGDP p.c. (log) (Std.Error)		0,003	0,003	0,003	0,003	0,003	0,003	0,003	0,006	0,006	0,006	0,006
GDP p.c. exporter (log)		0,024*	0,013*	0,014*	0,014*	0,014*	0,014*	0,013*	0,016*	0,017*	0,017*	0,018*
GDP p.c. exporter (log) (Std. Error)		0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,005	0,005	0,005	0,005
Workers (log)					0,001	0,002	0,003	0,002	-0,002		-0,003	
Workers (log) (Std. Error)					0,002	0,002	0,002	0,002	0,003		0,003	
Share of foreign ownership						-0,027**	-0,018	-0,017	-0,008	-0,012	-0,005	-0,010
Share of foreign ownership (Std. Error)						0,012	0,012	0,012	0,016	0,015	0,016	0,015
Share of foreign inputs							-0,033*	-0,032*	-0,042*	-0,044*	-0,040*	-0,043*
Share of foreign inputs (Std. Error)							0,009	0,009	0,012	0,012	0,012	0,012
Age (log)								0,003	0,002		0,002	
Age (log) (Std. Error)								0,004	0,005		0,005	
TFP 1 (log)									0,010***	0,010***		
TFP 1 (log) (Std. Error)									0,006	0,006		
TFP 3 (log)											0,001	0,000
TFP 3 (log) (Std. Error)											0,006	0,006
Adjusted R-squared		0,017	0,054	0,057	0,057	0,058	0,057	0,057	0,066	0,066	0,065	0,065
Sum squared resid		451	434	432	432	430	420	416	219	221	218	220
Dummies [B]		No	Industry	Industry, year	Industry, year	Industry, year	Industry, year	Industry, year	Industry, year	Industry, year	Industry, year	Industry, year
Observations		6776	6776	6776	6776	6743	6598	6520	3559	3599	3542	3582

*significant at 1%; ** significant at 5%; *** significant at 10%.

[A] 'Sector-wide exports E' represents the group of countries where exporters have a higher skill-intensity than non-exporters. 'Sector-wide exports NE' represents the group of countries where non-exporters instead have a higher skill-intensity than exporters. 'Sector-wide exports S' represents the countries where exporters and non-exporters do have the same skill-intensity.

[B] Inclusion of country dummies is not possible, because otherwise collinearity with 'GDP p.c. exporter (log)' will be present.

3.3.4.2. Regression results

The estimation results are reported in table 6A. The GDP per capita of the country in which the exporting firm has residence has as expected a positive and significant effect on the skill-intensity of a firm. Inclusion of this term does not change the direction of the coefficients of the variables in which the sector-wide exports growth is included (that are $\beta_1, \beta_2, \beta_3$ and β_4). However, in a considerable part of the specifications, coefficients of the sector-wide exports growth became insignificant, especially the coefficient of group NE. The net effect of the sector-wide exports growth on the skill-intensity of a firm, is shown in table 6B. Because of the considerable insignificant coefficients concerning the sector-wide exports growth, quite a number of computations had to be done with at least one insignificant coefficient and cannot be considered reliable. As a result the net effect for the group of countries in which exporters are less skill-intensive than non-exporters does not contradict the main hypothesis anymore.

Table 6B: Net effect of sector-wide exports growth on skill-intensity

Country groups	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Group E		-0,029†	-0,026†	-0,021†	-0,021†	-0,021†	-0,019†	-0,020†	-0,028	-0,026	-0,031	-0,028
Group NE		-0,073	-0,030†	-0,029†	-0,030†	-0,030†	-0,027†	-0,028†	-0,053†	-0,051†	-0,054†	-0,053†
Group S		-0,020†	0,009	0,018†	0,019†	0,018†	0,018†	0,018†	0,020	0,021	0,020	0,021

†At least one of the coefficients needed to compute the net effect is not significant.

The size of a firm (number of workers) is significant in none of the specifications after including GDP per capita. Age and the share of foreign ownership remain insignificant.[41] The use of foreign inputs still has a negative significant effect on the skill-intensity of the firm. The significance of TFP 1 increased a bit and falls below 10%. TFP 3 remains very insignificant.

3.3.4. Findings of the estimations

The regressions of the skill-intensity of a firm on the sector-wide exports (growth), with different setups, seems confirmative for the main hypothesis that sector-wide exports growth results in an increase in the relative demand for the input factor which is used intensively by exporters, which than, by means of a increasing price of that factor, induces all firms to use the other input factor more intensively, which affects exporters most. Furthermore found are significant negative effects of using foreign inputs and significant positive effects of the GDP per capita of the country in which the firm has residence. Comparative advantage also plays a role in determining the skill-intensity of a firm.

[41] To be more precise: foreign ownership is only significant in one specification, namely in number VI.

So, among all these effects, factor market competition influences the demand of skilled labor. However, it must be noted that this effect could not be verified for the group of countries in which unskilled labor is the most intensively used input factor by exporters. There could be several causes which prevented a broader, obvious confirmation of the hypothesis. First of all, a remarkable fact is that the skill-intensity of exporting manufacturing firms remains the same from 2004 till 2007, namely 53%, while that of non-exporters grew from 50% till 54%. Could the effect which in this thesis is labeled factor market competition[42], have precluded that the skill-intensity of exporting firms increased, while that of non-exporters rose? This could be difficult to catch in regressions, because the skill-intensity of exporters did not decline, but remained the same, while it without factor market competition possible would be increased. This remains a conjecture now, but if this would be the case, it is confirmative for the main hypothesis.

Another possibility is that the factor intensity gap[43], the difference in skill-intensity between exporters and non-exporters, is too small to cause pronounced influences on the demand of skilled labor through factor market competition.

[42] So, due to increasing exports, the demand for the factor which is used most intensively by exporters, rises, which shifts, through a higher price of this factor, demand of all firms to the other production factor. The risen price of the production factor which is used most intensively by exporters, effects the exporting firms more than the non-exporting, because the former use this production factor more intensively.
[43] See section 2.6 and 2.7.

4. Conclusion

In this thesis factor market competition is modeled. If trade is liberalized, (human) capital-intensive firms start exporting. As a result the demand of capital increases – since exporting firms use this factor input intensively – which leads to a higher price of it. This induces all firms to use the other factor input more intensively. The net effect of sector-wide export growth on the skill-intensity of a firm is negative. So, factor market competition can be confirmed by the estimation results of this thesis and can – besides Heckscher-Ohlin and outsourcing effects, which are confirmed too – determine the choice of factor inputs which firms use. This highlights the need to take firm heterogeneity in factor input into account when analyzing effects of trade on firms.

However, further research is recommended to get a better understanding which mechanisms influence a firm's factor input choice. The data availability and the resulting empirical setup of my thesis imposed some limitations on the possibility to distinguish between the effects of various determinants of the relation between the skill-intensity of a firm and export growth. When factor *prices* would be taken into account, a better assessment is possible of the question if indeed factor market competition is the reason for the found relation between the skill-intensity of a firm and sector-wide export growth. If more data becomes available, the entry and exit of firms could be examined and related to export growth. When firms would assigned a more detailed ISIC-code when conducting the Business Environment and Enterprise Performance Survey (BEEPS) better tailored estimations can be done. About some time, data about more years will be available in the BEEPS dataset, which allow researchers to investigate effects over a longer period of time.

This is one of the first empirical investigations of factor market competition with firm level data and the results indicate that further research is welcome.

Appendix 1. Variable description

Table A1: Variable description

Variable	Description
S_{ijct}	Skill-intensity: number of skilled production workers divided by number of (permanent and temporary) full-time workers. Source of the data: BEEPS (Business Environment and Enterprise Performance Survey, conducted by the Worldbank).
Exp_{jct}	Sector-wide exports: logarithm of the sector-wide exports of the sector in which the firm is active in the corresponding country in the corresponding year (The BEEP survey conducted in 2002 asks for data of 2001, the survey from 2005 asks for data of 2004 and the survey from 2009 asks for data of 2007. So, 2001, 2004 and 2007 are the years used). The export data comes from the International Trade Centre (ITC). The data from the ITC is reported in two-digit HS for exports of goods and in EBOPS for exports of services. The export data is converted to the classification which is used in the BEEPS, namely ISIC. For more information about this conversion, see Appendix 2. The sector-wide exports are deflated to the values of 2001, using the GDP-deflator from the World Development Indicators.
ΔExp_{jct}	Growth rate of sector-wide exports: the rate the sector-wide exports grew from *t-3* till *t.*
ΔGDP_PC_{jc}	Logarithm of the GDP per capita-difference: the difference of the GDP per capita in 2001 of the exporting country and a weighted GDP per capita of the five countries to which the biggest value of exports did go in 2001. The weighted GDP is constructed, using the GDP per capita in 2001 of the five countries to which the biggest total exports go. Using these countries, for each industry a GDP is constructed with as weighting the share of their exports in the respective industry. All the GDP differences are negative, so a logarithm is taken from it, after having multiplied it by -1, and a minus sign is put in front the variable in the regression. Bosnia is excluded in the specification with this variable, because no trade data of 2001 was available. For Serbia no trade data for 2001 was available, so I used the data from Serbia and Montenegro from 2001 about the trading partners. Source of the export data: ITC. Source of GDP per capita-data: World Development Indicators.
GDP_PC_c	Logarithm of the GDP per capita of the exporting country in 2001.
$\delta_{e(all)}$	Dummy for countries where the average exporter has a higher skill-intensity than the average non-exporter, when all (both manufacturing and service) firms are included. Countries which have value 1 for this dummy: Armenia, Azerbaijan, Bosnia, Czech Republic, Estonia, FYROM, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Romania and Tajikistan.
$\delta_{ne(all)}$	Dummy for countries where the average non-exporter has a higher skill-intensity than the average exporter, when all (both manufacturing and service) firms are included. Countries which have value 1 for this dummy: Albania, Georgia, Hungary, Kazakhstan, Russia, Serbia, Slovakia, Slovenia, Ukraine.
$\delta_{s(all)}$	Dummy for countries where the average exporter and non-exporter differ less than 0.01 in skill-intensity, when all (both manufacturing and service) firms are included. Countries which have value 1 for this dummy: Belarus, Bulgaria, Croatia, Poland, Uzbekistan.
δ_e	Dummy for countries where the average exporter has a higher skill-intensity than the average non-exporter, when only manufacturing firms are included. Countries which have value 1 for this dummy: Armenia, Azerbaijan, Bosnia, Czech Republic, FYROM, Kyrgyzstan, Lithuania, Moldova, Romania and Tajikistan.
δ_{ne}	Dummy for countries where the average non-exporter has a higher skill-intensity than the average exporter, when only manufacturing firms are included. Countries which have value 1 for this dummy: Albania, Bulgaria, Estonia, Hungary, Russia, Serbia, Slovakia and Slovenia.
δ_s	Dummy for countries where the average exporter and non-exporter differ less than 0.01 in skill-intensity, when only manufacturing firms are included. Countries which have

	value 1 for this dummy: Belarus, Croatia, Georgia, Kazakhstan, Latvia, Poland, Ukraine and Uzbekistan.
Workers (logs)$_{ijct}$	Number of workers: logarithm of the number of permanent and temporary full-time workers. Source of the data: BEEPS.
Share of foreign ownership$_{ijct}$	Foreign ownership: the share of the firm that is owned by private foreign individuals, companies or organizations. Source of the data: BEEPS.
Share of foreign inputs$_{ijct}$	Foreign inputs: the share of the material inputs or supplies which is of foreign origin. Source of the data: BEEPS.
Age (logs)$_{ijct}$	Age: logarithm of age of the firm in the corresponding year. Source of the data: BEEPS.
TFP 1 (logs)$_{ijct}$	Total factor productivity 1: residual of an industry-specific Cobb-Douglas function. TFP is estimated separately for exporters and non-exporters, because they are assumed to have different factor intensities. The dependent variable is *Sales*. The regressors are *Capital* (current repurchase value of machinery, vehicles, equipment, land and building), *Labor* (number of permanent and temporary full-time workers) and *Inputs costs* (costs of raw materials and intermediate inputs). All variables are in logarithms. Source of the data: BEEPS. Sales, Capital and Inputs costs are deflated to the values of 2001, using the GDP-deflator from the World Development Indicators.
TFP 2 (logs)$_{ijct}$	Total factor productivity 2: because the dataset did not contain any data about *Inputs costs* in the year 2001, I also estimated TFP without *Input costs*. So TFP 2 (logs) is the residual of an industry-specific Cobb-Douglas function, with as dependent variable *Sales* and as regressors *Capital* (current repurchase value of machinery, vehicles, equipment, land and building) and *Labor* (number of permanent and temporary full-time workers). TFP 2 (logs) is estimated both separately for exporters and non-exporters and for manufacturing and service firms, because these firms are divided over different years.
TFP 3 (logs)$_{ijct}$	Total factor productivity 3: compared to *TFP 1 (logs)*$_{ij}$, this measure uses *Labor costs (logs)* instead of the Total number of workers. All other things are equal.

Appendix 2. Matching ISIC, HS and EBOPS-codes

In the BEEPS-panel data set each firm is given an two-digit ISIC-code[44]. This code corresponds with a certain *industry*. However, only some ISIC-codes are used in this BEEPS panel data-set. All other firms have been labeled with the code '2' in the BEEPS-panel data set.

The data about the exports comes from the International Trade Centre (ITC). The data from the ITC about the exports of goods is based on statistics of the United Nations Commodity Trade Statistics Database (UN Comtrade). The classification of the export data is based on the type of *product* and is reported in HS.[45]

Before using the export data, I labeled it with an ISIC-code, using a correspondence table from the United Nations.[46] But because ISIC is an classification of *industries* and HS of *products* this matching is not always straightforward. Also the table matches six-digit HS with four-digit ISIC. Since I worked with less detailed data, I was confronted with the fact that it is possible that a two-digit HS-code can be linked to several two-digit ISIC-codes. To overcome this problem, I combined the ISIC-codes 27 and 28. See table A2 for the matching of the HS-codes to the ISIC-codes.

The data from the ITC about the exports of services is reported in EBOPS.[47] Unfortunately there are no direct correspondence tables for EBOPS and ISIC. Using the *Manual on Statistics of international trade in services*[48] I matched the export data of services as good as possible with the ISIC-codes. I combined the ISIC-codes 51 and 52, for the same reasons as just mentioned in case of the codes 27 and 28. See table A2 for the matching of the EBOPS-codes to the ISIC-codes.

[44] ISIC: **I**nternational **S**tandard **I**ndustrial **C**lassification of All Economic Activities
[45] HS: **H**armonized Commodity Description and Coding **S**ystem.
[46] Available at: http://unstats.un.org/unsd/cr/registry/regdnld.asp?Lg=1
[47] EBOPS: **E**xtended **B**alance of **P**ayments **S**ervices **C**lassification.
[48] United Nations et al., 2002.

Table A2: Converting of product codes to industry codes

Categories BEEPS		Categories ITC
Manufacturing		**Two-digit categories Harmonized System**
15	Food	‘02 Meat and edible meat offal; '04 Dairy products, eggs, honey, edible animal product nes; '09 Coffee, tea, mate and spices; '11 Milling products, malt, starches, inulin, wheat gluten; '12 Oil seed, oleagic fruits, grain, seed, fruit, etc, nes; '15 Animal,vegetable fats and oils, cleavage products, etc; '16 Meat, fish and seafood food preparations nes; '17 Sugars and sugar confectionery; '18 Cocoa and cocoa preparations; '19 Cereal, flour, starch, milk preparations and products; '20 Vegetable, fruit, nut, etc food preparations; '21 Miscellaneous edible preparations; '22 Beverages, spirits and vinegar; '23 Residues, wastes of food industry, animal fodder
17	Textiles	‘50 Silk; '51 Wool, animal hair, horsehair yarn and fabric thereof; '52 Cotton; '53 Vegetable textile fibres nes, paper yarn, woven fabric; '54 Manmade filaments; '55 Manmade staple fibres; '56 Wadding, felt, nonwovens, yarns, twine, cordage, etc; '57 Carpets and other textile floor coverings; '58 Special woven or tufted fabric, lace, tapestry etc; '59 Impregnated, coated or laminated textile fabric; '60 Knitted or crocheted fabric
18	Garments	‘43 Furskins and artificial fur, manufactures thereof; '61 Articles of apparel, accessories, knit or crochet; '62 Articles of apparel, accessories, not knit or crochet; ‘65 Headgear and parts thereof
24	Chemicals	‘27 Mineral fuels, oils, distillation products, etc; '28 Inorganic chemicals, precious metal compound, isotopes; '29 Organic chemicals; '30 Pharmaceutical products; '31 Fertilizers; '32 Tanning, dyeing extracts, tannins, derivs,pigments etc; '33 Essential oils, perfumes, cosmetics, toileteries; '34 Soaps, lubricants, waxes, candles, modelling pastes; '35 Albuminoids, modified starches, glues, enzymes; '36 Explosives, pyrotechnics, matches, pyrophorics, etc; '37 Photographic or cinematographic goods; '38 Miscellaneous chemical products
25	Plastics & rubber	‘39 Plastics and articles thereof; '40 Rubber and articles thereof
26	Non metallic mineral products	‘26 Ores, slag and ash; '68 Stone, plaster, cement, asbestos, mica, etc articles; '69 Ceramic products; '70 Glass and glassware
27+28	Basic metals and Fabricate metal products	‘71 Pearls, precious stones, metals, coins, etc; '72 Iron and steel; '73 Articles of iron or steel; '74 Copper and articles thereof; '75 Nickel and articles thereof;

		'76 Aluminium and articles thereof; '78 Lead and articles thereof; '79 Zinc and articles thereof; '80 Tin and articles thereof; ‘81 Other base metals, cermets, articles thereof; '82 Tools, implements, cutlery, etc of base metal; '83 Miscellaneous articles of base metal
29	Machinery and equipment	‘84 Machinery, nuclear reactors, boilers, etc; '93 Arms and ammunition, parts and accessories thereof
31	Electronics	'85 Electrical, electronic equipment
2	Other manufacturing	‘01 Live animals; '03 Fish, crustaceans, molluscs, aquatic invertebrates nes; '05 Products of animal origin, nes; '06 Live trees, plants, bulbs, roots, cut flowers etc; '07 Edible vegetables and certain roots and tubers; '08 Edible fruit, nuts, peel of citrus fruit, melons; '10 Cereals; '13 Lac, gums, resins, vegetable saps and extracts nes; '14 Vegetable plaiting materials, vegetable products nes; '24 Tobacco and manufactured tobacco substitutes; '25 Salt, sulphur, earth, stone, plaster, lime and cement; '41 Raw hides and skins (other than furskins) and leather; '42 Articles of leather, animal gut, harness, travel goods; '44 Wood and articles of wood, wood charcoal; '45 Cork and articles of cork; '46 Manufactures of plaiting material, basketwork, etc.; '47 Pulp of wood, fibrous cellulosic material, waste etc; '48 Paper & paperboard, articles of pulp, paper and board; '49 Printed books, newspapers, pictures etc; '64 Footwear, gaiters and the like, parts thereof; '66 Umbrellas, walking-sticks, seat-sticks, whips, etc; '67 Bird skin, feathers, artificial flowers, human hair; '86 Railway, tramway locomotives, rolling stock, equipment; '87 Vehicles other than railway, tramway; ‘88 Aircraft, spacecraft, and parts thereof; '89 Ships, boats and other floating structures; '90 Optical, photo, technical, medical, etc apparatus; '91 Clocks and watches and parts thereof; '92 Musical instruments, parts and accessories; '94 Furniture, lighting, signs, prefabricated buildings; '95 Toys, games, sports requisites; '96 Miscellaneous manufactured articles; '97 Works of art, collectors pieces and antiques; '99 Commodities not elsewhere specified
Services		**Categories EBOPS**
45	Construction	‘249 Construction services
50	Other services	Total services minus other here specified categories (That is: ‘200 -/- ('249 + '269 + '897 + '202 + '262))
51+52	Wholesale/Retail	‘269 -- Merchanting and other trade-related services *(Subsection of:* ‘268 Other Business Services*)*
55	Hotel and Restaurants	‘897 -- -- Other *(Subsection of:* ‘289 -- Other personal, cultural and recreational services*, which is a subsection of:* ‘287 Personal, cultural and recreational services*)*
60	Transport	‘205 Transportation
72	IT	‘262 Computer and information services

Appendix 3. Extensive descriptive statistics

Table A3: Descriptive statistics, Manufacturing firms (2004 & 2007) and Service firms (2001 & 2004)

	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observations	Mean	Std.Dev.	Observations	Mean	Std.Dev.	Observations
Skill-Intensity	0,46	0,29	14257	0,47	0,28	4122	0,46	0,30	10135
Sector-wide exports (logs)	19,50	2,45	14223	20,07	2,16	4109	19,27	2,52	10114
Workers (number)	131	665	14257	232	661	4122	89	662	10135
Workers (log)	3,34	1,63	14257	4,19	1,61	4122	3,00	1,51	10135
Age (years)	15,0	18,3	14191	19,4	23,3	4097	13,2	15,4	10094
Age (log)	2,28	0,86	14165	2,50	0,92	4090	2,20	0,81	10075
Share of foreign ownership	0,10	0,28	14093	0,19	0,36	4084	0,06	0,22	10009
% of firms with foreign ownership	13%	34%	14093	26%	44%	4084	8%	27%	10009
Share of foreign inputs	0,31	0,38	13713	0,44	0,38	3953	0,26	0,37	9760
% of firms with foreign inputs	54%	50%	13713	76%	42%	3953	45%	50%	9760
TFP 2 (logs)	0,06	1,13	7549	0,03	1,15	2517	0,07	1,12	5032

For remarks: see table 1.

Table A4: Descriptive statistics, Manufacturing firms (2004 & 2007)

	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,52	0,26	6989	0,53	0,25	2661	0,52	0,27	4328
Sector-wide exports (logs)	20,20	2,21	6989	20,56	2,00	2661	19,98	2,30	4328
Exports, growth ratio over 3 years	0,49	0,81	6989	0,48	0,74	2661	0,50	0,85	4328
Workers (number)	148	608	6989	258	698	2661	81	533	4328
Workers (log)	3,69	1,54	6989	4,52	1,45	2661	3,19	1,36	4328
Age (years)	16,4	19,6	6929	21,1	24,5	2638	13,5	15,2	4291
Age (log)	2,38	0,87	6903	2,59	0,94	2631	2,25	0,80	4272
Share of foreign ownership	0,10	0,28	6955	0,19	0,36	2643	0,05	0,19	4312
% of firms with foreign ownership	14%	35%	6955	26%	44%	2643	7%	25%	4312
Share of foreign inputs	0,33	0,38	6836	0,45	0,38	2598	0,26	0,36	4238
% of firms with foreign inputs	58%	49%	6836	79%	41%	2598	46%	50%	4238
TFP 1 (logs)	0,00	0,77	3753	0,00	0,81	1622	0,00	0,73	2131
TFP 3 (logs)	0,00	0,67	3734	0,00	0,72	1614	0,00	0,63	2120
GDP per capita ($)	$ 2.387	$ 2.091	6989	$ 2.961	$ 2.458	2661	$ 2.035	$ 1.739	4328
GDP per capita (logs)	7,39	0,92	6989	7,61	0,95	2661	7,26	0,88	4328
ΔGDP per capita ($)	$-10.245	$ 7.574	6776	$-11.213	$ 7.100	2549	$ -9.661	$ 7.790	4227
ΔGDP p.c. (log of negative value)	8,74	1,24	6776	8,96	1,06	2549	8,61	1,32	4227

For remarks: see table 2.

Appendix 4. Descriptive statistics per year

Table A5: Descriptive statistics, all firms from 2001

	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observations	Mean	Std.Dev.	Observations	Mean	Std.Dev.	Observations
Skill-Intensity	0,40	0,31	3102	0,38	0,30	719	0,41	0,31	2383
Sector-wide exports (logs)	18,71	2,41	3068	19,15	2,09	706	18,58	2,49	2362
Workers (number)	139	1014	3102	202	638	719	120	1101	2383
Workers (log)	3,12	1,68	3102	3,71	1,73	719	2,94	1,63	2383
Age (years)	13,2	17,7	3102	16,0	22,4	719	12,3	15,9	2383
Age (log)	2,10	0,89	3102	2,25	0,92	719	2,05	0,87	2383
Share of foreign ownership	0,12	0,30	2972	0,23	0,38	699	0,08	0,25	2273
% of firms with foreign ownership	15%	36%	2972	29%	46%	699	11%	31%	2273
Share of foreign inputs	0,31	0,38	2884	0,44	0,39	659	0,28	0,37	2225
% of firms with foreign inputs	54%	50%	2884	73%	44%	659	48%	50%	2225
TFP 2 (logs)	-0,11	1,05	1569	-0,16	1,06	387	-0,09	1,05	1182

In fact these descriptive statistics only concern service firms, since in this sample of observations there are no manufacturing firms from 2001.

Table A6: Descriptive statistics, all firms from 2004

	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observations	Mean	Std.Dev.	Observations	Mean	Std.Dev.	Observations
Skill-Intensity	0,46	0,30	7812	0,47	0,28	2078	0,45	0,31	5734
Sector-wide exports (logs)	19,47	2,43	7812	19,99	2,17	2078	19,28	2,50	5734
Workers (number)	124	588	7812	243	757	2078	81	507	5734
Workers (log)	3,20	1,66	7812	4,13	1,67	2078	2,86	1,52	5734
Age (years)	15,1	18,0	7804	20,2	23,4	2075	13,2	15,1	5729
Age (log)	2,31	0,81	7804	2,55	0,90	2075	2,23	0,76	5729
Share of foreign ownership	0,09	0,27	7812	0,19	0,36	2078	0,06	0,21	5734
% of firms with foreign ownership	12%	33%	7812	26%	44%	2078	7%	26%	5734
Share of foreign inputs	0,30	0,38	7602	0,44	0,38	2018	0,25	0,36	5584
% of firms with foreign inputs	51%	50%	7602	76%	43%	2018	42%	49%	5584
TFP 2 (logs)	0,09	0,91	3939	-0,04	0,90	1237	0,15	0,90	2702

Table A7: Descriptive statistics, all firms from 2007

	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observations	Mean	Std.Dev.	Observations	Mean	Std.Dev.	Observations
Skill-Intensity	0,54	0,25	3343	0,53	0,25	1325	0,54	0,25	2018
Sector-wide exports (logs)	20,29	2,26	3343	20,69	1,99	1325	20,02	2,38	2018
Workers (number)	138	351	3343	231	492	1325	77	188	2018
Workers (log)	3,89	1,39	3343	4,56	1,33	1325	3,44	1,24	2018
Age (years)	16,4	19,4	3285	20,0	23,6	1303	14,1	15,6	1982
Age (log)	2,39	0,90	3259	2,55	0,93	1296	2,28	0,86	1963
Share of foreign ownership	0,10	0,27	3309	0,18	0,35	1307	0,05	0,19	2002
% of firms with foreign ownership	14%	35%	3309	25%	43%	1307	7%	26%	2002
Share of foreign inputs	0,34	0,38	3227	0,44	0,38	1276	0,27	0,36	1951
% of firms with foreign inputs	61%	49%	3227	79%	41%	1276	50%	50%	1951
TFP 2 (logs)	0,12	1,51	2041	0,21	1,45	893	0,06	1,55	1148

In fact these descriptive statistics only concern manufacturing firms, since in this sample of observations there are no service firms from 2007.

Table A8: Descriptive statistics, manufacturing firms from 2004

	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,51	0,27	3646	0,53	0,25	1336	0,50	0,28	2310
Sector-wide exports (logs)	20,13	2,16	3646	20,43	2,00	1336	19,95	2,23	2310
Exports, growth ratio over 3 years	0,67	0,96	3646	0,60	0,90	1336	0,71	0,99	2310
Workers (number)	157	771	3646	284	855	1336	84	708	2310
Workers (log)	3,52	1,64	3646	4,47	1,56	1336	2,97	1,41	2310
Age (years)	16,4	19,8	3644	22,2	25,3	1335	13,0	14,8	2309
Age (log)	2,37	0,85	3644	2,62	0,94	1335	2,22	0,75	2309
Share of foreign ownership	0,10	0,28	3646	0,20	0,36	1336	0,05	0,19	2310
% of firms with foreign ownership	14%	35%	3646	28%	45%	1336	7%	25%	2310
Share of foreign inputs	0,32	0,38	3609	0,46	0,37	1322	0,25	0,36	2287
% of firms with foreign inputs	56%	50%	3609	79%	40%	1322	42%	49%	2287
TFP 1 (logs)	-0,18	0,29	1808	-0,23	0,31	778	-0,14	0,27	1030
TFP 3 (logs)	-0,13	0,27	1798	-0,16	0,28	773	-0,10	0,26	1025
GDP per capita ($)	$ 2.582	$ 2.123	3646	$ 3.025	$ 2.397	1336	$ 2.325	$ 1.901	2310
GDP per capita (logs)	7,47	0,94	3646	7,62	0,97	1336	7,38	0,90	2310
ΔGDP per capita ($)	$ -10.826	$ 7.619	3565	$ -11.843	$ 7.167	1299	$ -10.243	$ 7.808	2266
ΔGDP p.c. (log of negative value)	8,77	1,30	3565	9,01	1,08	1299	8,64	1,40	2266

Table A9: Descriptive statistics, manufacturing firms from 2007

	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,54	0,25	3343	0,53	0,25	1325	0,54	0,25	2018
Sector-wide exports (logs)	20,29	2,26	3343	20,69	1,99	1325	20,02	2,38	2018
Exports, growth ratio over 3 years	0,30	0,55	3343	0,36	0,52	1325	0,26	0,57	2018
Workers (number)	138	351	3343	231	492	1325	77	188	2018
Workers (log)	3,89	1,39	3343	4,56	1,33	1325	3,44	1,24	2018
Age (years)	16,4	19,4	3285	20,0	23,6	1303	14,1	15,6	1982
Age (log)	2,39	0,90	3259	2,55	0,93	1296	2,28	0,86	1963
Share of foreign ownership	0,10	0,27	3309	0,18	0,35	1307	0,05	0,19	2002
% of firms with foreign ownership	14%	35%	3309	25%	43%	1307	7%	26%	2002
Share of foreign inputs	0,34	0,38	3227	0,44	0,38	1276	0,27	0,36	1951
% of firms with foreign inputs	61%	49%	3227	79%	41%	1276	50%	50%	1951
TFP 1 (logs)	0,17	1,00	1945	0,22	1,04	844	0,13	0,96	1101
TFP 3 (logs)	0,12	0,88	1936	0,15	0,93	841	0,10	0,83	1095
GDP per capita ($)	$ 2.176	$ 2.036	3343	$ 2.896	$ 2.517	1325	$ 1.703	$ 1.465	2018
GDP per capita (logs)	7,30	0,90	3343	7,59	0,92	1325	7,11	0,83	2018
ΔGDP per capita ($)	$ -9.600	$ 7.473	3211	$ -10.559	$ 6.972	1250	$ -8.989	$ 7.715	1961
ΔGDP p.c. (log of negative value)	8,70	1,17	3211	8,91	1,03	1250	8,57	1,23	1961

Appendix 5. Descriptive statistics per industry

Food (15)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,47	0,26	1836	0,44	0,26	449	0,48	0,26	1387
Sector-wide exports (logs)	19,49	1,59	1836	19,44	1,51	449	19,51	1,62	1387
Exports, growth ratio over 3 years	0,69	0,89	1836	0,55	0,72	449	0,73	0,94	1387
Workers (number)	158	847	1836	291	671	449	115	892	1387
Workers (log)	3,75	1,47	1836	4,83	1,27	449	3,41	1,36	1387
Age (years)	15,0	19,9	1822	21,4	28,8	446	12,9	15,4	1376
Age (log)	2,28	0,85	1816	2,52	0,97	445	2,20	0,79	1371
Share of foreign ownership	0,09	0,26	1827	0,20	0,35	448	0,05	0,21	1379
% of firms with foreign ownership	13%	34%	1827	30%	46%	448	8%	27%	1379
Share of foreign inputs	0,20	0,31	1810	0,30	0,32	442	0,16	0,30	1368
% of firms with foreign inputs	45%	50%	1810	71%	46%	442	36%	48%	1368
TFP 1 (logs)	0,00	0,82	936	0,00	1,03	269	0,00	0,72	667
TFP 2 (logs)	0,00	1,32	961	0,00	1,45	277	0,00	1,27	684
TFP 3 (logs)	0,00	0,73	931	0,00	0,94	268	0,00	0,63	663
GDP per capita ($)	$1.754	$1.654	1836	$1.912	$1.958	449	$1.703	$1.540	1387
GDP per capita (logs)	7,10	0,87	1836	7,12	0,92	449	7,09	0,85	1387
ΔGDP per capita ($)	-$5.724	$6.075	1798	-$4.760	$4.927	438	-$6.034	$6.371	1360
ΔGDP p.c. (log of negative value)	8,10	1,07	1798	8,04	0,90	438	8,11	1,12	1360

Textiles (17)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,56	0,28	262	0,58	0,27	134	0,54	0,28	128
Sector-wide exports (logs)	18,60	1,42	262	18,72	1,49	134	18,47	1,34	128
Exports, growth ratio over 3 years	0,22	0,56	262	0,15	0,47	134	0,30	0,63	128
Workers (number)	176	389	262	295	512	134	52	75	128
Workers (log)	4,06	1,52	262	4,80	1,45	134	3,28	1,15	128
Age (years)	18,3	21,0	255	22,8	24,5	131	13,5	15,0	124
Age (log)	2,48	0,87	253	2,66	0,96	130	2,29	0,72	123
Share of foreign ownership	0,14	0,31	261	0,24	0,37	134	0,05	0,19	127
% of firms with foreign ownership	21%	41%	261	34%	47%	134	8%	27%	127
Share of foreign inputs	0,41	0,40	256	0,51	0,39	130	0,30	0,38	126
% of firms with foreign inputs	64%	48%	256	78%	41%	130	50%	50%	126
TFP 1 (logs)	0,00	1,02	135	0,00	1,14	83	0,00	0,82	52
TFP 2 (logs)	0,00	1,53	139	0,00	1,53	86	0,00	1,55	53
TFP 3 (logs)	0,00	0,76	134	0,00	0,83	83	0,00	0,63	51
GDP per capita ($)	$2.089	$2.327	262	$2.556	$2.670	134	$1.600	$1.787	128
GDP per capita (logs)	7,09	1,09	262	7,26	1,18	134	6,92	0,96	128
ΔGDP per capita ($)	-$9.044	$6.913	257	-$9.936	$6.566	133	-$8.088	$7.170	124
ΔGDP p.c. (log of negative value)	8,75	0,95	257	8,94	0,84	133	8,56	1,02	124

Garments (18)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,64	0,26	963	0,65	0,25	338	0,63	0,26	625
Sector-wide exports (logs)	19,32	2,23	963	20,07	1,53	338	18,91	2,43	625
Exports, growth ratio over 3 years	-0,09	0,35	963	0,02	0,41	338	-0,14	0,30	625
Workers (number)	121	655	963	255	1071	338	49	166	625
Workers (log)	3,39	1,58	963	4,51	1,38	338	2,78	1,32	625
Age (years)	14,8	16,1	952	18,7	20,4	334	12,7	12,8	618
Age (log)	2,32	0,85	948	2,48	0,96	333	2,23	0,77	615
Share of foreign ownership	0,08	0,25	960	0,19	0,37	337	0,02	0,12	623
% of firms with foreign ownership	10%	30%	960	24%	43%	337	2%	15%	623
Share of foreign inputs	0,48	0,42	939	0,74	0,34	330	0,34	0,39	609
% of firms with foreign inputs	65%	48%	939	90%	30%	330	52%	50%	609
TFP 1 (logs)	0,00	0,73	477	0,00	0,78	182	0,00	0,70	295
TFP 2 (logs)	0,00	1,11	527	0,00	1,06	212	0,00	1,15	315
TFP 3 (logs)	0,00	0,58	475	0,00	0,62	181	0,00	0,55	294
GDP per capita ($)	$2.322	$1.751	963	$2.554	$1.883	338	$2.196	$1.664	625
GDP per capita (logs)	7,44	0,82	963	7,54	0,84	338	7,39	0,81	625
ΔGDP per capita ($)	-$17.554	$7.256	954	-$18.894	$5.230	330	-$16.845	$8.040	624
ΔGDP p.c. (log of negative value)	9,51	1,01	954	9,73	0,71	330	9,39	1,13	624

Chemicals (24)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,44	0,22	273	0,44	0,22	142	0,44	0,22	131
Sector-wide exports (logs)	21,86	3,10	273	21,57	2,89	142	22,17	3,30	131
Exports, growth ratio over 3 years	0,44	0,46	273	0,49	0,46	142	0,40	0,44	131
Workers (number)	211	415	273	346	536	142	65	86	131
Workers (log)	4,21	1,50	273	4,83	1,54	142	3,53	1,12	131
Age (years)	17,9	23,4	273	22,4	28,2	142	13,0	15,4	131
Age (log)	2,44	0,87	272	2,65	0,90	141	2,21	0,79	131
Share of foreign ownership	0,17	0,33	270	0,22	0,36	141	0,11	0,27	129
% of firms with foreign ownership	27%	44%	270	35%	48%	141	18%	38%	129
Share of foreign inputs	0,45	0,37	269	0,47	0,35	140	0,43	0,40	129
% of firms with foreign inputs	78%	42%	269	83%	38%	140	72%	45%	129
TFP 1 (logs)	0,00	0,88	154	0,00	0,84	90	0,00	0,95	64
TFP 2 (logs)	0,00	1,42	162	0,00	1,31	91	0,00	1,57	71
TFP 3 (logs)	0,00	0,71	154	0,00	0,71	90	0,00	0,71	64
GDP per capita ($)	$2.220	$1.951	273	$2.654	$2.352	142	$1.750	$1.239	131
GDP per capita (logs)	7,39	0,82	273	7,52	0,89	142	7,25	0,71	131
ΔGDP per capita ($)	-$9.138	$5.906	269	-$8.750	$5.785	140	-$9.560	$6.029	129
ΔGDP p.c. (log of negative value)	8,78	0,97	269	8,74	0,95	140	8,81	0,99	129

Plastics & rubber (25)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,48	0,26	186	0,48	0,25	88	0,47	0,28	98
Sector-wide exports (logs)	19,43	2,24	186	19,99	2,05	88	18,94	2,30	98
Exports, growth ratio over 3 years	0,76	1,13	186	0,80	1,12	88	0,72	1,13	98
Workers (number)	98	377	186	98	117	88	98	509	98
Workers (log)	3,54	1,33	186	3,89	1,29	88	3,22	1,29	98
Age (years)	14,0	12,2	186	17,8	14,0	88	10,6	9,0	98
Age (log)	2,30	0,87	186	2,57	0,85	88	2,06	0,83	98
Share of foreign ownership	0,16	0,34	185	0,22	0,38	88	0,11	0,29	97
% of firms with foreign ownership	21%	41%	185	28%	45%	88	13%	34%	97
Share of foreign inputs	0,46	0,41	184	0,50	0,36	86	0,41	0,44	98
% of firms with foreign inputs	70%	46%	184	84%	37%	86	57%	50%	98
TFP 1 (logs)	0,00	0,68	98	0,00	0,61	56	0,00	0,78	42
TFP 2 (logs)	0,00	1,25	103	0,00	1,11	59	0,00	1,43	44
TFP 3 (logs)	0,00	0,57	97	0,00	0,54	56	0,00	0,61	41
GDP per capita ($)	$3.104	$2.671	186	$3.972	$3.006	88	$2.325	$2.051	98
GDP per capita (logs)	7,65	0,95	186	7,92	0,97	88	7,40	0,86	98
ΔGDP per capita ($)	-$8.102	$6.390	174	-$10.204	$5.768	80	-$6.314	$6.377	94
ΔGDP p.c. (log of negative value)	8,37	1,44	174	8,91	1,04	80	7,90	1,57	94

Non metallic mineral products (26)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,50	0,25	274	0,52	0,24	91	0,49	0,26	183
Sector-wide exports (logs)	18,27	2,30	274	19,01	1,64	91	17,90	2,48	183
Exports, growth ratio over 3 years	0,68	1,11	274	0,66	0,91	91	0,69	1,20	183
Workers (number)	172	332	274	287	452	91	115	233	183
Workers (log)	4,05	1,52	274	4,81	1,42	91	3,67	1,43	183
Age (years)	19,7	23,7	271	30,0	33,0	91	14,5	14,8	180
Age (log)	2,48	0,98	270	2,88	1,05	90	2,28	0,88	180
Share of foreign ownership	0,12	0,31	271	0,30	0,43	89	0,03	0,16	182
% of firms with foreign ownership	16%	37%	271	37%	49%	89	5%	23%	182
Share of foreign inputs	0,24	0,33	266	0,36	0,35	88	0,17	0,30	178
% of firms with foreign inputs	48%	50%	266	70%	46%	88	37%	48%	178
TFP 1 (logs)	0,00	0,74	159	0,00	0,60	59	0,00	0,82	100
TFP 2 (logs)	0,00	1,31	167	0,00	1,14	62	0,00	1,40	105
TFP 3 (logs)	0,00	0,71	159	0,00	0,51	59	0,00	0,80	100
GDP per capita ($)	$2.165	$2.261	274	$3.201	$2.699	91	$1.650	$1.807	183
GDP per capita (logs)	7,16	1,07	274	7,64	1,03	91	6,92	1,01	183
ΔGDP per capita ($)	-$9.217	$9.178	248	-$10.934	$8.633	87	-$8.290	$9.355	161
ΔGDP p.c. (log of negative value)	8,19	1,87	248	8,86	1,07	87	7,83	2,10	161

Basic metals (27) & Fabricate metal products (28)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,56	0,25	1031	0,57	0,24	430	0,54	0,26	601
Sector-wide exports (logs)	21,50	1,71	1031	21,44	1,64	430	21,54	1,76	601
Exports, growth ratio over 3 years	0,84	1,12	1031	0,89	1,15	430	0,80	1,09	601
Workers (number)	137	546	1031	256	808	430	53	166	601
Workers (log)	3,46	1,59	1031	4,24	1,58	430	2,90	1,34	601
Age (years)	16,2	17,1	1027	19,5	20,0	428	13,9	14,2	599
Age (log)	2,42	0,85	1023	2,57	0,88	427	2,30	0,80	596
Share of foreign ownership	0,09	0,27	1028	0,17	0,35	427	0,04	0,17	601
% of firms with foreign ownership	12%	33%	1028	22%	42%	427	5%	21%	601
Share of foreign inputs	0,31	0,36	1012	0,39	0,37	418	0,24	0,35	594
% of firms with foreign inputs	60%	49%	1012	77%	42%	418	47%	50%	594
TFP 1 (logs)	0,00	0,70	621	0,00	0,69	278	0,00	0,72	343
TFP 2 (logs)	0,00	1,15	644	0,00	1,09	289	0,00	1,20	355
TFP 3 (logs)	0,00	0,64	617	0,00	0,67	275	0,00	0,61	342
GDP per capita ($)	$3.183	$2.267	1031	$3.815	$2.560	430	$2.730	$1.909	601
GDP per capita (logs)	7,75	0,87	1031	7,95	0,86	430	7,60	0,85	601
ΔGDP per capita ($)	-$14.139	$5.022	1000	-$14.474	$4.905	408	-$13.908	$5.092	592
ΔGDP p.c. (log of negative value)	9,46	0,51	1000	9,50	0,48	408	9,44	0,52	592

Machinery & equipment (29)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,54	0,22	798	0,55	0,20	420	0,54	0,24	378
Sector-wide exports (logs)	20,62	2,15	798	20,96	1,93	420	20,23	2,31	378
Exports, growth ratio over 3 years	0,33	0,50	798	0,42	0,48	420	0,23	0,50	378
Workers (number)	196	515	798	305	680	420	75	142	378
Workers (log)	4,07	1,56	798	4,68	1,49	420	3,38	1,34	378
Age (years)	19,6	21,6	788	24,6	25,4	415	14,0	14,3	373
Age (log)	2,54	0,92	787	2,76	0,95	415	2,29	0,83	372
Share of foreign ownership	0,10	0,27	791	0,13	0,31	413	0,06	0,21	378
% of firms with foreign ownership	14%	34%	791	19%	39%	413	8%	27%	378
Share of foreign inputs	0,33	0,35	780	0,40	0,34	412	0,26	0,35	368
% of firms with foreign inputs	67%	47%	780	82%	39%	412	51%	50%	368
TFP 1 (logs)	0,00	0,66	401	0,00	0,75	251	0,00	0,50	150
TFP 2 (logs)	0,00	1,17	410	0,00	1,17	255	0,00	1,19	155
TFP 3 (logs)	0,00	0,58	397	0,00	0,65	249	0,00	0,45	148
GDP per capita ($)	$2.828	$2.353	798	$3.365	$2.661	420	$2.231	$1.777	378
GDP per capita (logs)	7,59	0,88	798	7,77	0,89	420	7,39	0,83	378
ΔGDP per capita ($)	-$9.208	$7.028	785	-$10.154	$6.696	407	-$8.190	$7.240	378
ΔGDP p.c. (log of negative value)	8,55	1,57	785	8,81	1,27	407	8,26	1,80	378

Electronics (31)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,53	0,24	87	0,53	0,24	43	0,54	0,24	44
Sector-wide exports (logs)	18,85	2,85	87	20,01	2,51	43	17,72	2,73	44
Exports, growth ratio over 3 years	0,50	0,76	87	0,53	0,79	43	0,47	0,73	44
Workers (number)	135	186	87	193	235	43	79	94	44
Workers (log)	4,18	1,29	87	4,66	1,19	43	3,72	1,22	44
Age (years)	19,2	17,1	83	20,9	17,8	41	17,5	16,5	42
Age (log)	2,57	0,94	83	2,69	0,89	41	2,44	0,98	42
Share of foreign ownership	0,15	0,33	86	0,24	0,40	42	0,06	0,22	44
% of firms with foreign ownership	21%	41%	86	33%	48%	42	9%	29%	44
Share of foreign inputs	0,39	0,37	83	0,54	0,33	42	0,23	0,34	41
% of firms with foreign inputs	71%	46%	83	100%	0%	42	41%	50%	41
TFP 1 (logs)	0,00	0,96	58	0,00	0,85	29	0,00	1,07	29
TFP 2 (logs)	0,00	1,64	58	0,00	1,51	29	0,00	1,79	29
TFP 3 (logs)	0,00	0,87	58	0,00	0,75	29	0,00	0,98	29
GDP per capita ($)	$2.452	$2.242	87	$3.444	$2.494	43	$1.482	$1.424	44
GDP per capita (logs)	7,34	1,06	87	7,78	1,00	43	6,90	0,94	44
ΔGDP per capita ($)	-$8.777	$5.497	84	-$10.360	$5.220	43	-$7.117	$5.346	41
ΔGDP p.c. (log of negative value)	8,83	0,78	84	9,07	0,66	43	8,57	0,81	41

Other manufacturing (2)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,49	0,27	1279	0,50	0,26	526	0,49	0,28	753
Sector-wide exports (logs)	21,18	1,84	1279	21,39	1,69	526	21,03	1,92	753
Exports, growth ratio over 3 years	0,46	0,42	1279	0,43	0,37	526	0,48	0,44	753
Workers (number)	118	377	1279	190	498	526	67	249	753
Workers (log)	3,52	1,48	1279	4,24	1,42	526	3,02	1,31	753
Age (years)	16,5	20,8	1272	19,3	23,9	522	14,6	18,1	750
Age (log)	2,37	0,87	1265	2,49	0,92	521	2,29	0,82	744
Share of foreign ownership	0,11	0,28	1276	0,20	0,36	524	0,05	0,18	752
% of firms with foreign ownership	15%	36%	1276	26%	44%	524	7%	26%	752
Share of foreign inputs	0,38	0,40	1237	0,46	0,38	510	0,33	0,40	727
% of firms with foreign inputs	60%	49%	1237	76%	43%	510	49%	50%	727
TFP 1 (logs)	0,00	0,73	714	0,00	0,72	325	0,00	0,75	389
TFP 2 (logs)	0,00	1,22	745	0,00	1,19	342	0,00	1,25	403
TFP 3 (logs)	0,00	0,68	712	0,00	0,69	324	0,00	0,67	388
GDP per capita ($)	$2.466	$2.093	1279	$3.033	$2.337	526	$2.071	$1.803	753
GDP per capita (logs)	7,44	0,91	1279	7,70	0,86	526	7,26	0,90	753
ΔGDP per capita ($)	-$9.776	$6.464	1207	-$11.315	$5.870	483	-$8.749	$6.640	724
ΔGDP p.c. (log of negative value)	8,76	1,11	1207	9,04	0,98	483	8,58	1,16	724

Construction (45)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,49	0,26	1509	0,49	0,26	181	0,49	0,26	1328
Sector-wide exports (logs)	17,91	1,96	1497	18,13	1,40	176	17,88	2,03	1321
Workers (number)	116,89	334,33	1509	242,62	450,40	181	99,75	311,54	1328
Workers (log)	3,60	1,45	1509	4,28	1,62	181	3,50	1,40	1328
Age (years)	13,43	13,63	1508	16,69	16,39	181	12,99	13,16	1327
Age (log)	2,23	0,81	1508	2,44	0,83	181	2,21	0,80	1327
Share of foreign ownership	0,05	0,19	1458	0,12	0,29	180	0,04	0,17	1278
% of firms with foreign ownership	7%	26%	1458	18%	38%	180	6%	23%	1278
Share of foreign inputs	0,22	0,31	1489	0,36	0,34	178	0,20	0,30	1311
% of firms with foreign inputs	49%	50%	1489	76%	43%	178	45%	50%	1311
TFP 2 (logs)	0,04	0,93	848	0,04	0,97	110	0,04	0,93	738

Other services (50)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,32	0,31	2294	0,25	0,27	367	0,34	0,32	1927
Sector-wide exports (logs)	20,77	1,53	2281	20,83	1,26	364	20,76	1,57	1917
Workers (number)	66,04	237,58	2294	126,90	386,29	367	54,45	194,94	1927
Workers (log)	2,76	1,51	2294	3,51	1,60	367	2,62	1,45	1927
Age (years)	14,21	18,34	2293	19,88	25,68	367	13,13	16,36	1926
Age (log)	2,18	0,88	2293	2,42	0,99	367	2,13	0,85	1926
Share of foreign ownership	0,09	0,27	2239	0,22	0,39	359	0,06	0,23	1880
% of firms with foreign ownership	11%	31%	2239	27%	44%	359	8%	27%	1880
Share of foreign inputs	0,25	0,37	2064	0,32	0,36	325	0,24	0,37	1739
% of firms with foreign inputs	41%	49%	2064	63%	48%	325	37%	48%	1739
TFP 2 (logs)	0,01	1,02	1016	0,01	1,03	206	0,01	1,02	810

Wholesale (51) & Retail (52)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,40	0,32	2174	0,35	0,29	440	0,41	0,33	1734
Sector-wide exports (logs)	17,19	1,91	2174	17,56	1,75	440	17,10	1,93	1734
Workers (number)	93,87	1117,53	2174	140,50	556,82	440	82,04	1219,31	1734
Workers (log)	2,54	1,57	2174	3,26	1,63	440	2,36	1,50	1734
Age (years)	11,75	14,15	2172	13,77	16,22	439	11,24	13,53	1733
Age (log)	2,13	0,73	2172	2,25	0,78	439	2,10	0,72	1733
Share of foreign ownership	0,12	0,31	2174	0,22	0,38	440	0,10	0,28	1734
% of firms with foreign ownership	15%	36%	2174	27%	45%	440	12%	32%	1734
Share of foreign inputs	0,41	0,41	2133	0,59	0,39	436	0,36	0,41	1697
% of firms with foreign inputs	62%	49%	2133	83%	37%	436	56%	50%	1697
TFP 2 (logs)	0,31	0,98	1152	0,24	0,99	257	0,33	0,98	895

Hotel & restaurants (55)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,43	0,31	206	0,36	0,23	26	0,44	0,32	180
Sector-wide exports (logs)	14,40	2,06	206	14,10	1,29	26	14,44	2,14	180
Workers (number)	60,48	118,76	206	108,54	138,48	26	53,54	114,41	180
Workers (log)	2,89	1,52	206	3,88	1,46	26	2,74	1,48	180
Age (years)	14,41	14,78	206	15,35	12,52	26	14,28	15,10	180
Age (log)	2,29	0,85	206	2,45	0,77	26	2,27	0,86	180
Share of foreign ownership	0,12	0,30	206	0,27	0,43	26	0,10	0,27	180
% of firms with foreign ownership	15%	36%	206	31%	47%	26	13%	33%	180
Share of foreign inputs	0,09	0,20	204	0,16	0,19	26	0,08	0,20	178
% of firms with foreign inputs	29%	45%	204	58%	50%	26	25%	43%	178
TFP 2 (logs)	0,30	0,86	110	0,09	0,65	17	0,34	0,89	93

Transport (60)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,50	0,31	1016	0,47	0,30	424	0,52	0,31	592
Sector-wide exports (logs)	20,26	1,51	1007	20,27	1,39	419	20,25	1,58	588
Workers (number)	275,12	811,47	1016	266,98	791,68	424	280,95	825,96	592
Workers (log)	3,72	1,94	1016	3,75	1,85	424	3,70	2,01	592
Age (years)	16,45	22,15	1014	15,85	22,37	423	16,89	22,00	591
Age (log)	2,29	0,93	1014	2,28	0,87	423	2,29	0,97	591
Share of foreign ownership	0,12	0,29	992	0,18	0,35	413	0,07	0,24	579
% of firms with foreign ownership	16%	37%	992	25%	43%	413	10%	30%	579
Share of foreign inputs	0,28	0,38	919	0,37	0,39	368	0,22	0,36	551
% of firms with foreign inputs	48%	50%	919	64%	48%	368	38%	48%	551
TFP 2 (logs)	0,01	0,99	468	0,00	0,99	211	0,02	1,00	257

IT (72)	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.	Mean	Std.Dev.	Observ.
Skill-Intensity	0,20	0,28	69	0,18	0,30	23	0,22	0,28	46
Sector-wide exports (logs)	17,53	1,44	69	17,53	1,47	23	17,53	1,44	46
Workers (number)	48,96	146,01	69	89,61	240,13	23	28,63	52,50	46
Workers (log)	2,57	1,47	69	3,06	1,52	23	2,32	1,39	46
Age (years)	10,35	8,66	69	9,48	4,60	23	10,78	10,12	46
Age (log)	2,11	0,65	69	2,12	0,55	23	2,11	0,70	46
Share of foreign ownership	0,14	0,33	69	0,33	0,44	23	0,04	0,21	46
% of firms with foreign ownership	17%	38%	69	43%	51%	23	4%	21%	46
Share of foreign inputs	0,40	0,44	68	0,56	0,44	22	0,32	0,42	46
% of firms with foreign inputs	59%	50%	68	73%	46%	22	52%	51%	46
TFP 2 (logs)	-0,01	1,02	39	0,00	0,68	14	-0,02	1,17	25

Appendix 6. Descriptive statistics of manufacturing firms per country

Albania	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,42	0,26	99	0,40	0,28	45	0,44	0,25	54
Sector-wide exports (logs)	18,11	1,08	99	18,30	0,97	45	17,95	1,15	54
Exports, growth ratio over 3 years	1,13	1,18	99	0,96	0,56	45	1,27	1,50	54
Workers (number)	105,75	264,13	99	186,04	373,43	45	38,83	56,46	54
Workers (log)	3,60	1,24	99	4,15	1,33	45	3,14	0,95	54
Age (years)	10,10	8,47	99	8,78	6,36	45	11,20	9,81	54
Age (log)	2,13	0,57	98	2,01	0,56	45	2,24	0,56	53
Share of foreign ownership	0,14	0,31	99	0,26	0,39	45	0,05	0,20	54
% of firms with foreign ownership	20%	40%	99	36%	48%	45	7%	26%	54
Share of foreign inputs	0,68	0,38	99	0,80	0,28	45	0,58	0,43	54
% of firms with foreign inputs	84%	37%	99	98%	15%	45	72%	45%	54
TFP 1 (logs)	-0,14	0,31	49	-0,16	0,30	23	-0,13	0,33	26
TFP 3 (logs)	-0,02	0,31	49	-0,02	0,31	23	-0,02	0,31	26
GDP per capita ($)	$ 1.333		99	$ 1.333		45	$ 1.333		54
GDP per capita (logs)	7,20		99	7,20		45	7,20		54
ΔGDP per capita ($)	$-15.237	$ 2.639	99	$-15.754	$ 2.169	45	$-14.807	$ 2.925	54
ΔGDP p.c. (log of negative value)	9,61	0,22	99	9,65	0,15	45	9,58	0,26	54

Armenia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,39	0,28	338	0,43	0,28	105	0,38	0,27	233
Sector-wide exports (logs)	17,94	0,98	338	17,71	1,00	105	18,05	0,96	233
Exports, growth ratio over 3 years	0,61	0,45	338	0,57	0,52	105	0,63	0,42	233
Workers (number)	69,43	132,42	338	151,50	206,96	105	32,45	42,98	233
Workers (log)	3,41	1,23	338	4,35	1,24	105	2,98	0,96	233
Age (years)	14,12	15,52	338	18,63	18,56	105	12,08	13,50	233
Age (log)	2,23	0,89	336	2,47	0,96	105	2,11	0,84	231
Share of foreign ownership	0,06	0,19	337	0,15	0,29	104	0,02	0,11	233
% of firms with foreign ownership	11%	31%	337	25%	44%	104	4%	20%	233
Share of foreign inputs	0,41	0,40	336	0,50	0,39	103	0,37	0,40	233
% of firms with foreign inputs	65%	48%	336	83%	38%	103	57%	50%	233
TFP 1 (logs)	-0,19	0,61	225	-0,29	0,51	59	-0,15	0,64	166
TFP 3 (logs)	-0,05	0,56	224	-0,07	0,54	58	-0,05	0,57	166
GDP per capita ($)	$ 691		338	$ 691		105	$ 691		233
GDP per capita (logs)	6,54		338	6,54		105	6,54		233
ΔGDP per capita ($)	$-11.592	$ 10.381	338	$-11.602	$ 10.908	105	$-11.588	$ 10.158	233
ΔGDP p.c. (log of negative value)	8,92	0,96	338	8,89	0,99	105	8,93	0,95	233

Azerbaijan	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,46	0,24	328	0,52	0,22	52	0,45	0,24	276
Sector-wide exports (logs)	17,80	1,62	328	18,07	1,54	52	17,75	1,64	276
Exports, growth ratio over 3 years	1,73	1,54	328	1,52	1,51	52	1,77	1,54	276
Workers (number)	136,66	294,71	328	472,54	597,43	52	73,38	108,31	276
Workers (log)	3,83	1,41	328	5,43	1,36	52	3,53	1,21	276
Age (years)	13,39	15,09	308	23,15	20,46	46	11,68	13,27	262
Age (log)	2,20	0,83	308	2,75	0,92	46	2,10	0,77	262
Share of foreign ownership	0,12	0,30	328	0,12	0,29	52	0,12	0,30	276
% of firms with foreign ownership	17%	37%	328	17%	38%	52	17%	37%	276
Share of foreign inputs	0,28	0,35	326	0,44	0,36	52	0,24	0,33	274
% of firms with foreign inputs	48%	50%	326	73%	45%	52	43%	50%	274
TFP 1 (logs)	-0,32	0,68	89	-0,60	0,70	15	-0,26	0,67	74
TFP 3 (logs)	-0,12	0,56	89	-0,36	0,55	15	-0,07	0,56	74
GDP per capita ($)	$ 704		328	$ 704		52	$ 704		276
GDP per capita (logs)	6,56		328	6,56		52	6,56		276
ΔGDP per capita ($)	$ -3.250	$ 5.443	328	$ -5.228	$ 7.153	52	$ -2.877	$ 4.986	276
ΔGDP p.c. (log of negative value)	6,49	2,12	328	6,71	2,51	52	6,44	2,04	276

Belarus	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,56	0,24	132	0,57	0,25	61	0,56	0,23	71
Sector-wide exports (logs)	20,00	0,95	132	20,08	0,93	61	19,94	0,97	71
Exports, growth ratio over 3 years	-0,09	0,24	132	-0,14	0,21	61	-0,05	0,25	71
Workers (number)	149,86	308,45	132	286,74	412,37	61	32,27	44,04	71
Workers (log)	3,70	1,57	132	4,67	1,53	61	2,87	1,05	71
Age (years)	18,15	21,71	131	22,63	28,48	60	14,35	12,65	71
Age (log)	2,47	0,88	131	2,59	0,98	60	2,36	0,78	71
Share of foreign ownership	0,12	0,29	130	0,20	0,33	60	0,06	0,22	70
% of firms with foreign ownership	18%	39%	130	32%	47%	60	7%	26%	70
Share of foreign inputs	0,43	0,40	121	0,54	0,38	57	0,32	0,40	64
% of firms with foreign inputs	70%	46%	121	88%	33%	57	55%	50%	64
TFP 1 (logs)	0,80	1,32	38	0,67	1,57	19	0,93	1,03	19
TFP 3 (logs)	0,22	0,87	38	0,24	0,87	19	0,20	0,90	19
GDP per capita ($)	$ 1.239		132	$ 1.239		61	$ 1.239		71
GDP per capita (logs)	7,12		132	7,12		61	7,12		71
ΔGDP per capita ($)	$ -980	$ 239	132	$ -974	$ 240	61	$ -985	$ 240	71
ΔGDP p.c. (log of negative value)	6,87	0,19	132	6,86	0,19	61	6,87	0,19	71

Bosnia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,50	0,28	192	0,52	0,28	110	0,47	0,27	82
Sector-wide exports (logs)	19,52	1,30	192	19,76	1,13	110	19,20	1,45	82
Exports, growth ratio over 3 years									
Workers (number)	115,13	228,70	192	169,05	285,28	110	42,78	67,58	82
Workers (log)	3,68	1,45	192	4,22	1,36	110	2,96	1,23	82
Age (years)	23,82	26,28	192	27,75	28,47	110	18,55	22,11	82
Age (log)	2,66	1,03	192	2,82	1,06	110	2,45	0,95	82
Share of foreign ownership	0,06	0,21	191	0,07	0,22	109	0,04	0,18	82
% of firms with foreign ownership	10%	30%	191	13%	34%	109	6%	24%	82
Share of foreign inputs	0,46	0,40	185	0,50	0,40	107	0,40	0,40	78
% of firms with foreign inputs	70%	46%	185	73%	45%	107	67%	47%	78
TFP 1 (logs)	0,01	0,60	93	-0,05	0,60	60	0,12	0,60	33
TFP 3 (logs)	-0,11	0,46	93	-0,15	0,48	60	-0,05	0,42	33
GDP per capita ($)	$ 1.534		192	$ 1.534		110	$ 1.534		82
GDP per capita (logs)	7,34		192	7,34		110	7,34		82
ΔGDP per capita ($)									
ΔGDP p.c. (log of negative value)									

Bulgaria	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,58	0,28	151	0,57	0,25	65	0,59	0,30	86
Sector-wide exports (logs)	20,70	0,72	151	20,62	0,69	65	20,76	0,74	86
Exports, growth ratio over 3 years	0,55	0,42	151	0,58	0,45	65	0,53	0,39	86
Workers (number)	119,33	171,98	151	206,05	215,28	65	53,79	84,87	86
Workers (log)	3,81	1,50	151	4,71	1,27	65	3,13	1,31	86
Age (years)	18,19	19,73	145	21,44	19,23	61	15,83	19,87	84
Age (log)	2,55	0,81	144	2,76	0,80	60	2,39	0,78	84
Share of foreign ownership	0,12	0,31	151	0,16	0,36	65	0,08	0,27	86
% of firms with foreign ownership	13%	33%	151	17%	38%	65	9%	29%	86
Share of foreign inputs	0,40	0,41	151	0,52	0,40	65	0,31	0,41	86
% of firms with foreign inputs	61%	49%	151	78%	41%	65	48%	50%	86
TFP 1 (logs)	-0,08	0,52	99	-0,19	0,36	42	0,00	0,59	57
TFP 3 (logs)	0,01	0,43	98	-0,07	0,31	42	0,07	0,50	56
GDP per capita ($)	$ 1.753		151	$ 1.753		65	$ 1.753		86
GDP per capita (logs)	7,47		151	7,47		65	7,47		86
ΔGDP per capita ($)	$-12.174	$ 2.154	151	$-12.472	$ 2.632	65	$-11.948	$ 1.688	86
ΔGDP p.c. (log of negative value)	9,39	0,18	151	9,41	0,23	65	9,38	0,13	86

Croatia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,46	0,26	107	0,46	0,22	60	0,45	0,30	47
Sector-wide exports (logs)	20,63	0,94	107	20,52	0,94	60	20,77	0,94	47
Exports, growth ratio over 3 years	0,59	0,31	107	0,61	0,33	60	0,57	0,28	47
Workers (number)	200,35	523,54	107	326,93	669,74	60	38,74	93,34	47
Workers (log)	3,64	1,89	107	4,41	1,88	60	2,66	1,37	47
Age (years)	30,85	33,59	107	44,03	38,86	60	14,02	12,11	47
Age (log)	2,97	0,92	107	3,40	0,90	60	2,43	0,61	47
Share of foreign ownership	0,09	0,27	107	0,13	0,32	60	0,04	0,20	47
% of firms with foreign ownership	11%	32%	107	17%	38%	60	4%	20%	47
Share of foreign inputs	0,46	0,37	96	0,51	0,34	55	0,39	0,40	41
% of firms with foreign inputs	80%	40%	96	91%	29%	55	66%	48%	41
TFP 1 (logs)	0,11	0,46	81	-0,03	0,34	44	0,28	0,52	37
TFP 3 (logs)	-0,07	0,41	81	-0,17	0,30	44	0,04	0,49	37
GDP per capita ($)	$ 5.192		107	$ 5.192		60	$ 5.192		47
GDP per capita (logs)	8,55		107	8,55		60	8,55		47
ΔGDP per capita ($)	$-10.606	$ 3.287	107	$-10.582	$ 3.483	60	$-10.636	$ 3.055	47
ΔGDP p.c. (log of negative value)	9,20	0,41	107	9,19	0,43	60	9,21	0,40	47

Czech Republic	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,50	0,25	133	0,51	0,23	89	0,49	0,29	44
Sector-wide exports (logs)	22,92	0,95	133	23,08	0,86	89	22,61	1,06	44
Exports, growth ratio over 3 years	0,77	0,21	133	0,77	0,20	89	0,77	0,22	44
Workers (number)	241,74	955,31	133	292,26	1110,68	89	139,55	510,87	44
Workers (log)	3,95	1,56	133	4,38	1,35	89	3,07	1,61	44
Age (years)	13,98	14,21	131	14,98	15,68	87	12,00	10,59	44
Age (log)	2,35	0,73	130	2,40	0,76	86	2,25	0,66	44
Share of foreign ownership	0,15	0,34	127	0,21	0,39	86	0,02	0,15	41
% of firms with foreign ownership	18%	39%	127	26%	44%	86	2%	16%	41
Share of foreign inputs	0,29	0,31	125	0,37	0,31	83	0,13	0,26	42
% of firms with foreign inputs	70%	46%	125	89%	31%	83	31%	47%	42
TFP 1 (logs)	0,17	0,78	107	0,20	0,87	69	0,10	0,59	38
TFP 3 (logs)	0,26	1,14	106	0,36	1,23	69	0,09	0,93	37
GDP per capita ($)	$ 6.049		133	$ 6.049		89	$ 6.049		44
GDP per capita (logs)	8,71		133	8,71		89	8,71		44
ΔGDP per capita ($)	$-12.655	$ 2.383	133	$-12.811	$ 2.151	89	$-12.339	$ 2.794	44
ΔGDP p.c. (log of negative value)	9,42	0,22	133	9,44	0,20	89	9,39	0,27	44

Estonia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,51	0,29	126	0,51	0,29	83	0,52	0,30	43
Sector-wide exports (logs)	20,75	1,00	126	20,71	1,03	83	20,82	0,94	43
Exports, growth ratio over 3 years	0,50	0,30	126	0,48	0,33	83	0,55	0,25	43
Workers (number)	142,08	411,07	126	124,88	151,27	83	175,28	675,67	43
Workers (log)	3,85	1,44	126	4,08	1,35	83	3,40	1,51	43
Age (years)	17,28	21,05	126	18,22	23,62	83	15,47	14,96	43
Age (log)	2,48	0,79	126	2,50	0,83	83	2,45	0,73	43
Share of foreign ownership	0,22	0,40	126	0,29	0,44	83	0,09	0,27	43
% of firms with foreign ownership	28%	45%	126	36%	48%	83	12%	32%	43
Share of foreign inputs	0,55	0,41	121	0,62	0,39	80	0,43	0,43	41
% of firms with foreign inputs	79%	41%	121	88%	33%	80	61%	49%	41
TFP 1 (logs)	0,24	0,89	101	0,37	1,00	70	-0,06	0,41	31
TFP 3 (logs)	0,06	0,74	100	0,15	0,84	70	-0,14	0,38	30
GDP per capita ($)	$ 4.575		126	$ 4.575		83	$ 4.575		43
GDP per capita (logs)	8,43		126	8,43		83	8,43		43
ΔGDP per capita ($)	$-12.017	$ 5.005	126	$-12.503	$ 4.720	83	$-11.079	$ 5.448	43
ΔGDP p.c. (log of negative value)	9,13	0,97	126	9,22	0,89	83	8,97	1,10	43

FYROM	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,59	0,28	170	0,65	0,26	115	0,47	0,29	55
Sector-wide exports (logs)	19,32	0,95	170	19,40	1,02	115	19,16	0,75	55
Exports, growth ratio over 3 years	0,51	0,52	170	0,49	0,57	115	0,56	0,39	55
Workers (number)	174,31	783,06	170	235,68	944,77	115	45,98	99,61	55
Workers (log)	3,85	1,54	170	4,41	1,29	115	2,68	1,38	55
Age (years)	17,27	18,92	169	18,61	19,16	114	14,47	18,27	55
Age (log)	2,33	1,04	169	2,40	1,10	114	2,21	0,91	55
Share of foreign ownership	0,11	0,28	169	0,16	0,32	114	0,03	0,12	55
% of firms with foreign ownership	17%	38%	169	23%	42%	114	5%	23%	55
Share of foreign inputs	0,58	0,40	170	0,66	0,37	115	0,40	0,41	55
% of firms with foreign inputs	83%	38%	170	91%	28%	115	65%	48%	55
TFP 1 (logs)	0,18	0,99	97	0,16	0,99	59	0,21	1,02	38
TFP 3 (logs)	0,15	0,81	97	0,14	0,74	59	0,17	0,92	38
GDP per capita ($)	$ 1.703		170	$ 1.703		115	$ 1.703		55
GDP per capita (logs)	7,44		170	7,44		115	7,44		55
ΔGDP per capita ($)	$-12.147	$ 6.329	170	$-13.273	$ 6.840	115	$ -9.794	$ 4.274	55
ΔGDP p.c. (log of negative value)	9,20	0,78	170	9,28	0,83	115	9,05	0,66	55

Georgia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,48	0,27	158	0,47	0,28	50	0,48	0,26	108
Sector-wide exports (logs)	18,33	1,36	158	18,27	1,34	50	18,36	1,38	108
Exports, growth ratio over 3 years	0,49	0,55	158	0,52	0,78	50	0,48	0,40	108
Workers (number)	113,46	260,04	158	263,64	417,73	50	43,93	62,40	108
Workers (log)	3,69	1,36	158	4,84	1,16	50	3,15	1,08	108
Age (years)	16,03	19,99	158	23,66	27,12	50	12,49	14,48	108
Age (log)	2,28	0,97	158	2,64	1,03	50	2,11	0,90	108
Share of foreign ownership	0,11	0,28	157	0,20	0,34	50	0,07	0,23	107
% of firms with foreign ownership	17%	37%	157	32%	47%	50	9%	29%	107
Share of foreign inputs	0,35	0,39	153	0,47	0,37	50	0,29	0,38	103
% of firms with foreign inputs	56%	50%	153	76%	43%	50	47%	50%	103
TFP 1 (logs)	-0,32	0,62	80	-0,34	0,79	27	-0,31	0,52	53
TFP 3 (logs)	-0,15	0,62	79	-0,10	0,83	27	-0,18	0,48	52
GDP per capita ($)	$ 723		158	$ 723		50	$ 723		108
GDP per capita (logs)	6,58		158	6,58		50	6,58		108
ΔGDP per capita ($)	$ -4.918	$ 7.028	158	$ -4.304	$ 4.993	50	$ -5.203	$ 7.798	108
ΔGDP p.c. (log of negative value)	7,88	1,05	158	8,02	0,79	50	7,82	1,14	108

Hungary	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,52	0,29	457	0,49	0,26	223	0,56	0,31	234
Sector-wide exports (logs)	22,01	0,90	457	22,01	0,91	223	22,02	0,89	234
Exports, growth ratio over 3 years	0,44	0,29	457	0,44	0,26	223	0,43	0,33	234
Workers (number)	106,93	269,70	457	176,25	359,85	223	40,87	99,98	234
Workers (log)	3,42	1,57	457	4,14	1,49	223	2,74	1,31	234
Age (years)	14,83	17,52	457	17,16	21,05	223	12,62	12,98	234
Age (log)	2,40	0,71	454	2,49	0,77	223	2,32	0,63	231
Share of foreign ownership	0,16	0,36	457	0,30	0,44	223	0,04	0,19	234
% of firms with foreign ownership	19%	39%	457	35%	48%	223	5%	21%	234
Share of foreign inputs	0,30	0,36	456	0,43	0,35	222	0,19	0,32	234
% of firms with foreign inputs	60%	49%	456	83%	38%	222	39%	49%	234
TFP 1 (logs)	-0,04	0,51	329	-0,01	0,64	178	-0,07	0,29	151
TFP 3 (logs)	-0,03	0,48	328	0,01	0,61	177	-0,08	0,26	151
GDP per capita ($)	$ 5.221		457	$ 5.221		223	$ 5.221		234
GDP per capita (logs)	8,56		457	8,56		223	8,56		234
ΔGDP per capita ($)	$-18.175	$ 563	457	$-18.203	$ 582	223	$-18.148	$ 545	234
ΔGDP p.c. (log of negative value)	9,81	0,03	457	9,81	0,03	223	9,81	0,03	234

Kazakhstan	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,52	0,24	525	0,53	0,21	68	0,52	0,24	457
Sector-wide exports (logs)	18,65	2,29	525	19,25	1,47	68	18,56	2,37	457
Exports, growth ratio over 3 years	0,65	0,71	525	0,74	0,68	68	0,64	0,71	457
Workers (number)	128,27	595,77	525	331,57	691,89	68	98,02	574,85	457
Workers (log)	3,55	1,47	525	4,95	1,34	68	3,34	1,37	457
Age (years)	8,97	9,13	524	11,31	12,17	68	8,62	8,54	456
Age (log)	1,92	0,69	522	2,11	0,75	67	1,90	0,68	455
Share of foreign ownership	0,05	0,19	524	0,12	0,29	68	0,04	0,17	456
% of firms with foreign ownership	7%	26%	524	22%	42%	68	5%	22%	456
Share of foreign inputs	0,24	0,36	518	0,42	0,37	67	0,21	0,35	451
% of firms with foreign inputs	38%	49%	518	70%	46%	67	34%	47%	451
TFP 1 (logs)	-0,17	0,61	190	-0,34	0,33	38	-0,13	0,66	152
TFP 3 (logs)	-0,06	0,57	189	-0,11	0,40	38	-0,05	0,61	151
GDP per capita ($)	$ 1.491		525	$ 1.491		68	$ 1.491		457
GDP per capita (logs)	7,31		525	7,31		68	7,31		457
ΔGDP per capita ($)	$ -2.289	$ 3.265	525	$ -2.737	$ 4.635	68	$ -2.223	$ 3.010	457
ΔGDP p.c. (log of negative value)	7,33	0,74	525	7,41	0,82	68	7,32	0,73	457

Kyrgyzstan	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,42	0,26	153	0,43	0,28	51	0,41	0,25	102
Sector-wide exports (logs)	17,59	0,65	153	17,56	0,66	51	17,61	0,65	102
Exports, growth ratio over 3 years	0,87	1,27	153	0,89	1,36	51	0,86	1,22	102
Workers (number)	167,50	319,47	153	289,96	364,57	51	106,27	276,48	102
Workers (log)	4,10	1,41	153	5,00	1,24	51	3,64	1,27	102
Age (years)	19,40	20,39	152	18,30	18,70	50	19,94	21,24	102
Age (log)	2,53	0,91	152	2,51	0,87	50	2,54	0,93	102
Share of foreign ownership	0,17	0,33	152	0,37	0,41	50	0,07	0,23	102
% of firms with foreign ownership	22%	42%	152	48%	50%	50	10%	30%	102
Share of foreign inputs	0,39	0,40	149	0,43	0,36	49	0,37	0,42	100
% of firms with foreign inputs	62%	49%	149	76%	43%	49	55%	50%	100
TFP 1 (logs)	-0,19	0,96	92	-0,35	0,89	31	-0,11	0,99	61
TFP 3 (logs)	0,16	1,01	91	0,07	1,02	30	0,21	1,01	61
GDP per capita ($)	$ 308		153	$ 308		51	$ 308		102
GDP per capita (logs)	5,73		153	5,73		51	5,73		102
ΔGDP per capita ($)	$ -2.864	$ 5.792	153	$ -2.842	$ 5.401	51	$ -2.874	$ 6.004	102
ΔGDP p.c. (log of negative value)	7,47	0,69	153	7,52	0,67	51	7,44	0,70	102

Latvia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,52	0,27	117	0,52	0,26	72	0,52	0,28	45
Sector-wide exports (logs)	20,45	0,96	117	20,43	0,95	72	20,48	0,99	45
Exports, growth ratio over 3 years	0,44	0,40	117	0,43	0,43	72	0,46	0,35	45
Workers (number)	129,43	205,79	117	169,35	179,66	72	65,56	229,75	45
Workers (log)	3,83	1,54	117	4,52	1,24	72	2,71	1,31	45
Age (years)	14,09	17,23	117	16,15	20,58	72	10,78	8,99	45
Age (log)	2,33	0,78	116	2,44	0,77	72	2,14	0,77	44
Share of foreign ownership	0,24	0,41	117	0,37	0,46	72	0,04	0,17	45
% of firms with foreign ownership	29%	46%	117	43%	50%	72	7%	25%	45
Share of foreign inputs	0,45	0,40	110	0,51	0,38	68	0,36	0,43	42
% of firms with foreign inputs	70%	46%	110	81%	40%	68	52%	51%	42
TFP 1 (logs)	-0,01	0,72	75	0,08	0,86	46	-0,15	0,38	29
TFP 3 (logs)	-0,12	0,56	75	-0,02	0,67	46	-0,27	0,27	29
GDP per capita ($)	$ 3.524		117	$ 3.524		72	$ 3.524		45
GDP per capita (logs)	8,17		117	8,17		72	8,17		45
ΔGDP per capita ($)	$-14.163	$ 6.577	117	$-13.891	$ 6.877	72	$-14.598	$ 6.118	45
ΔGDP p.c. (log of negative value)	9,33	0,81	117	9,29	0,86	72	9,41	0,74	45

Lithuania	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,47	0,27	137	0,52	0,26	89	0,40	0,29	48
Sector-wide exports (logs)	21,03	0,97	137	20,97	0,97	89	21,14	0,98	48
Exports, growth ratio over 3 years	0,84	0,57	137	0,83	0,58	89	0,87	0,55	48
Workers (number)	109,28	169,90	137	145,98	185,79	89	41,25	107,81	48
Workers (log)	3,78	1,39	137	4,30	1,25	89	2,82	1,10	48
Age (years)	12,32	12,82	136	13,39	14,52	88	10,35	8,71	48
Age (log)	2,16	0,85	136	2,19	0,91	88	2,11	0,72	48
Share of foreign ownership	0,20	0,39	137	0,31	0,44	89	0,00	0,00	48
% of firms with foreign ownership	24%	43%	137	37%	49%	89	0%	0%	48
Share of foreign inputs	0,48	0,40	131	0,55	0,37	86	0,34	0,43	45
% of firms with foreign inputs	73%	44%	131	87%	34%	86	47%	50%	45
TFP 1 (logs)	0,13	0,69	103	0,02	0,60	67	0,32	0,80	36
TFP 3 (logs)	-0,05	0,50	103	-0,12	0,44	67	0,08	0,58	36
GDP per capita ($)	$ 3.493		137	$ 3.493		89	$ 3.493		48
GDP per capita (logs)	8,16		137	8,16		89	8,16		48
ΔGDP per capita ($)	$ -8.023	$ 3.772	137	$ -8.085	$ 3.654	89	$ -7.907	$ 4.019	48
ΔGDP p.c. (log of negative value)	8,91	0,37	137	8,92	0,36	89	8,89	0,38	48

Moldova	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,53	0,26	309	0,58	0,25	112	0,50	0,26	197
Sector-wide exports (logs)	18,73	0,97	309	18,57	1,01	112	18,83	0,93	197
Exports, growth ratio over 3 years	0,80	1,85	309	1,04	2,07	112	0,66	1,69	197
Workers (number)	124,88	260,48	309	220,51	298,58	112	70,51	218,95	197
Workers (log)	3,75	1,45	309	4,79	1,14	112	3,16	1,27	197
Age (years)	11,51	10,59	309	13,88	13,79	112	10,17	7,96	197
Age (log)	2,21	0,67	306	2,33	0,76	111	2,13	0,61	195
Share of foreign ownership	0,11	0,27	309	0,24	0,37	112	0,03	0,15	197
% of firms with foreign ownership	17%	37%	309	38%	49%	112	5%	22%	197
Share of foreign inputs	0,35	0,43	307	0,45	0,43	112	0,29	0,41	195
% of firms with foreign inputs	51%	50%	307	65%	48%	112	43%	50%	195
TFP 1 (logs)	-0,13	0,89	139	-0,18	1,01	58	-0,09	0,80	81
TFP 3 (logs)	0,06	0,79	138	-0,02	0,83	57	0,12	0,76	81
GDP per capita ($)	$ 408		309	$ 408		112	$ 408		197
GDP per capita (logs)	6,01		309	6,01		112	6,01		197
ΔGDP per capita ($)	$ -5.356	$ 6.031	309	$ -6.487	$ 6.733	112	$ -4.713	$ 5.508	197
ΔGDP p.c. (log of negative value)	8,16	0,84	309	8,33	0,90	112	8,06	0,79	197

Poland	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,61	0,24	658	0,60	0,23	243	0,61	0,25	415
Sector-wide exports (logs)	22,52	0,85	658	22,63	0,89	243	22,46	0,82	415
Exports, growth ratio over 3 years	0,79	0,43	658	0,79	0,42	243	0,79	0,43	415
Workers (number)	56,83	136,73	658	107,92	192,83	243	26,91	74,19	415
Workers (log)	2,78	1,52	658	3,72	1,46	243	2,23	1,26	415
Age (years)	18,36	16,46	656	21,30	18,85	243	16,63	14,63	413
Age (log)	2,63	0,72	656	2,77	0,74	243	2,55	0,70	413
Share of foreign ownership	0,04	0,19	656	0,10	0,28	242	0,01	0,08	414
% of firms with foreign ownership	6%	23%	656	13%	34%	242	1%	12%	414
Share of foreign inputs	0,24	0,33	650	0,35	0,35	239	0,18	0,30	411
% of firms with foreign inputs	51%	50%	650	71%	46%	239	39%	49%	411
TFP 1 (logs)	-0,07	0,36	428	-0,10	0,40	161	-0,06	0,34	267
TFP 3 (logs)	-0,11	0,35	428	-0,12	0,38	161	-0,10	0,34	267
GDP per capita ($)	$ 4.979		658	$ 4.979		243	$ 4.979		415
GDP per capita (logs)	8,51		658	8,51		243	8,51		415
ΔGDP per capita ($)	$-17.976	$ 113	658	$-17.956	$ 117	243	$-17.988	$ 109	415
ΔGDP p.c. (log of negative value)	9,80	0,01	658	9,80	0,01	243	9,80	0,01	415

Romania	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,59	0,27	536	0,66	0,25	163	0,55	0,27	373
Sector-wide exports (logs)	20,82	1,10	536	21,28	0,79	163	20,62	1,15	373
Exports, growth ratio over 3 years	0,20	0,22	536	0,15	0,26	163	0,22	0,20	373
Workers (number)	181,01	1331,79	536	257,79	442,71	163	147,46	1569,00	373
Workers (log)	3,62	1,53	536	4,68	1,39	163	3,16	1,34	373
Age (years)	14,08	16,35	534	20,28	25,03	163	11,36	9,30	371
Age (log)	2,33	0,72	532	2,55	0,90	161	2,24	0,60	371
Share of foreign ownership	0,13	0,31	533	0,24	0,40	161	0,07	0,24	372
% of firms with foreign ownership	16%	36%	533	30%	46%	161	9%	29%	372
Share of foreign inputs	0,32	0,39	520	0,53	0,41	154	0,24	0,35	366
% of firms with foreign inputs	53%	50%	520	78%	42%	154	43%	50%	366
TFP 1 (logs)	-0,18	0,65	243	-0,30	0,67	73	-0,12	0,64	170
TFP 3 (logs)	-0,06	0,58	241	-0,14	0,58	73	-0,02	0,58	168
GDP per capita ($)	$ 1.816		536	$ 1.816		163	$ 1.816		373
GDP per capita (logs)	7,50		536	7,50		163	7,50		373
ΔGDP per capita ($)	$-17.335	$ 2.564	536	$-18.158	$ 2.525	163	$-16.975	$ 2.501	373
ΔGDP p.c. (log of negative value)	9,75	0,17	536	9,80	0,16	163	9,73	0,17	373

Russia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,51	0,24	711	0,44	0,23	188	0,53	0,24	523
Sector-wide exports (logs)	21,86	2,25	711	22,62	1,84	188	21,58	2,32	523
Exports, growth ratio over 3 years	0,10	0,37	711	0,13	0,29	188	0,09	0,39	523
Workers (number)	256,62	718,88	711	577,07	1246,11	188	141,42	310,42	523
Workers (log)	4,30	1,50	711	5,15	1,61	188	4,00	1,34	523
Age (years)	16,74	20,92	706	20,40	26,58	187	15,42	18,31	519
Age (log)	2,37	0,90	702	2,48	1,00	186	2,33	0,85	516
Share of foreign ownership	0,05	0,19	705	0,09	0,25	187	0,03	0,17	518
% of firms with foreign ownership	7%	26%	705	15%	36%	187	5%	21%	518
Share of foreign inputs	0,25	0,32	697	0,26	0,31	185	0,25	0,33	512
% of firms with foreign inputs	60%	49%	697	70%	46%	185	56%	50%	512
TFP 1 (logs)	0,07	0,82	324	-0,04	0,72	92	0,12	0,85	232
TFP 3 (logs)	0,05	0,70	323	0,04	0,66	92	0,06	0,71	231
GDP per capita ($)	$ 2.101		711	$ 2.101		188	$ 2.101		523
GDP per capita (logs)	7,65		711	7,65		188	7,65		523
ΔGDP per capita ($)	$ -7.764	$ 5.573	711	$ -6.432	$ 4.829	188	$ -8.243	$ 5.746	523
ΔGDP p.c. (log of negative value)	8,58	0,99	711	8,40	0,96	188	8,65	0,99	523

Serbia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,47	0,24	212	0,46	0,23	139	0,48	0,26	73
Sector-wide exports (logs)	19,75	0,92	212	19,69	0,98	139	19,87	0,79	73
Exports, growth ratio over 3 years	0,53	0,45	212	0,53	0,46	139	0,54	0,44	73
Workers (number)	273,59	1345,15	212	360,82	1649,27	139	107,51	215,47	73
Workers (log)	4,17	1,61	212	4,58	1,45	139	3,38	1,61	73
Age (years)	33,23	33,16	211	33,90	32,56	138	31,97	34,44	73
Age (log)	3,00	1,08	211	3,07	1,00	138	2,86	1,20	73
Share of foreign ownership	0,10	0,28	212	0,12	0,30	139	0,05	0,21	73
% of firms with foreign ownership	12%	33%	212	15%	36%	139	7%	25%	73
Share of foreign inputs	0,37	0,36	209	0,42	0,34	138	0,27	0,37	71
% of firms with foreign inputs	70%	46%	209	83%	38%	138	45%	50%	71
TFP 1 (logs)	-0,02	0,65	163	-0,02	0,63	111	-0,04	0,69	52
TFP 3 (logs)	-0,01	0,62	163	0,04	0,60	111	-0,10	0,67	52
GDP per capita ($)	$ 1.518		212	$ 1.518		139	$ 1.518		73
GDP per capita (logs)	7,33		212	7,33		139	7,33		73
ΔGDP per capita ($)	$-11.973	$ 6.110	212	$-11.988	$ 6.201	139	$-11.946	$ 5.976	73
ΔGDP p.c. (log of negative value)	9,23	0,60	212	9,23	0,62	139	9,25	0,56	73

Slovakia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,57	0,24	113	0,54	0,24	74	0,62	0,25	39
Sector-wide exports (logs)	21,43	0,97	113	21,41	0,94	74	21,47	1,03	39
Exports, growth ratio over 3 years	0,60	0,21	113	0,59	0,22	74	0,62	0,19	39
Workers (number)	231,58	922,65	113	317,88	1127,62	74	67,82	155,94	39
Workers (log)	3,93	1,63	113	4,43	1,50	74	2,98	1,44	39
Age (years)	17,58	24,24	112	21,34	29,04	73	10,54	6,29	39
Age (log)	2,40	0,91	112	2,55	0,95	73	2,13	0,78	39
Share of foreign ownership	0,14	0,32	112	0,17	0,35	73	0,08	0,24	39
% of firms with foreign ownership	19%	39%	112	23%	43%	73	10%	31%	39
Share of foreign inputs	0,42	0,35	109	0,49	0,34	70	0,30	0,35	39
% of firms with foreign inputs	76%	43%	109	87%	34%	70	56%	50%	39
TFP 1 (logs)	0,46	0,98	66	0,29	0,88	46	0,85	1,11	20
TFP 3 (logs)	0,05	0,67	66	-0,03	0,66	46	0,22	0,69	20
GDP per capita ($)	$ 5.632		113	$ 5.632		74	$ 5.632		39
GDP per capita (logs)	8,64		113	8,64		74	8,64		39
ΔGDP per capita ($)	$-10.304	$ 3.617	113	$-10.539	$ 3.612	74	$ -9.858	$ 3.632	39
ΔGDP p.c. (log of negative value)	9,16	0,45	113	9,18	0,44	74	9,11	0,47	39

Slovenia	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,48	0,21	146	0,47	0,19	127	0,52	0,31	19
Sector-wide exports (logs)	21,28	0,95	146	21,33	0,92	127	20,98	1,13	19
Exports, growth ratio over 3 years	0,54	0,21	146	0,55	0,21	127	0,48	0,23	19
Workers (number)	203,03	298,97	146	222,64	307,06	127	71,95	197,95	19
Workers (log)	4,20	1,67	146	4,43	1,56	127	2,63	1,55	19
Age (years)	27,50	30,01	146	29,68	31,50	127	12,95	7,33	19
Age (log)	2,86	0,97	146	2,92	0,99	127	2,39	0,69	19
Share of foreign ownership	0,15	0,34	146	0,18	0,36	127	0,00	0,00	19
% of firms with foreign ownership	21%	41%	146	24%	43%	127	0%	0%	19
Share of foreign inputs	0,46	0,33	143	0,49	0,32	124	0,26	0,34	19
% of firms with foreign inputs	89%	32%	143	93%	26%	124	63%	50%	19
TFP 1 (logs)	0,24	0,64	103	0,22	0,64	92	0,35	0,72	11
TFP 3 (logs)	-0,05	0,59	102	-0,05	0,60	91	-0,05	0,57	11
GDP per capita ($)	$ 10.236		146	$ 10.236		127	$ 10.236		19
GDP per capita (logs)	9,23		146	9,23		127	9,23		19
ΔGDP per capita ($)	$ -8.646	$ 2.601	146	$ -8.859	$ 2.390	127	$ -7.218	$ 3.471	19
ΔGDP p.c. (log of negative value)	8,96	0,59	146	9,00	0,53	127	8,65	0,86	19

Tajikistan	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,45	0,26	171	0,57	0,24	42	0,41	0,26	129
Sector-wide exports (logs)	16,03	1,53	171	16,36	1,61	42	15,93	1,49	129
Exports, growth ratio over 3 years	-0,08	0,54	171	-0,13	0,51	42	-0,06	0,54	129
Workers (number)	132,01	216,87	171	292,40	327,16	42	79,79	130,35	129
Workers (log)	4,04	1,31	171	5,07	1,17	42	3,70	1,17	129
Age (years)	16,13	18,19	168	21,38	23,82	42	14,38	15,60	126
Age (log)	2,30	0,99	165	2,50	1,06	42	2,23	0,96	123
Share of foreign ownership	0,10	0,24	171	0,24	0,34	42	0,05	0,17	129
% of firms with foreign ownership	16%	37%	171	40%	50%	42	9%	28%	129
Share of foreign inputs	0,29	0,39	166	0,27	0,35	41	0,29	0,40	125
% of firms with foreign inputs	46%	50%	166	56%	50%	41	43%	50%	125
TFP 1 (logs)	-0,44	0,75	71	-0,53	0,78	16	-0,41	0,74	55
TFP 3 (logs)	-0,08	0,66	71	-0,15	0,65	16	-0,06	0,66	55
GDP per capita ($)	$ 173		171	$ 173		42	$ 173		129
GDP per capita (logs)	5,15		171	5,15		42	5,15		129
ΔGDP per capita ($)	$ -4.768	$ 5.074	150	$ -5.847	$ 5.352	40	$ -4.375	$ 4.936	110
ΔGDP p.c. (log of negative value)	8,09	0,79	150	8,31	0,85	40	8,01	0,76	110

Ukraine	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,59	0,24	613	0,59	0,21	171	0,58	0,25	442
Sector-wide exports (logs)	21,00	1,05	613	21,08	0,99	171	20,96	1,08	442
Exports, growth ratio over 3 years	0,08	0,39	613	0,09	0,39	171	0,07	0,39	442
Workers (number)	129,60	374,46	613	294,05	511,11	171	65,98	281,67	442
Workers (log)	3,61	1,46	613	4,85	1,35	171	3,13	1,19	442
Age (years)	15,77	19,26	601	23,11	26,62	167	12,94	14,61	434
Age (log)	2,29	0,92	600	2,61	1,00	167	2,17	0,86	433
Share of foreign ownership	0,07	0,23	605	0,17	0,35	166	0,03	0,14	439
% of firms with foreign ownership	10%	31%	605	22%	41%	166	6%	24%	439
Share of foreign inputs	0,25	0,35	593	0,39	0,38	168	0,20	0,33	425
% of firms with foreign inputs	51%	50%	593	75%	43%	168	42%	49%	425
TFP 1 (logs)	0,05	0,92	231	0,00	0,86	83	0,08	0,95	148
TFP 3 (logs)	0,08	0,81	225	0,05	0,76	80	0,10	0,84	145
GDP per capita ($)	$ 781		613	$ 781		171	$ 781		442
GDP per capita (logs)	6,66		613	6,66		171	6,66		442
ΔGDP per capita ($)	$-10.553	$ 8.828	613	$ -9.353	$ 8.031	171	$-11.017	$ 9.084	442
ΔGDP p.c. (log of negative value)	8,91	0,83	613	8,83	0,76	171	8,95	0,86	442

Uzbekistan	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,54	0,22	197	0,54	0,22	64	0,55	0,22	133
Sector-wide exports (logs)	17,70	1,55	197	17,57	1,44	64	17,76	1,60	133
Exports, growth ratio over 3 years	0,07	1,16	197	-0,13	1,22	64	0,16	1,13	133
Workers (number)	177,09	357,87	197	371,08	543,03	64	83,74	149,68	133
Workers (log)	4,01	1,53	197	5,18	1,23	64	3,45	1,33	133
Age (years)	17,83	22,14	196	21,83	25,77	64	15,89	19,97	132
Age (log)	2,36	0,98	194	2,52	1,04	64	2,29	0,94	130
Share of foreign ownership	0,20	0,31	197	0,32	0,30	64	0,14	0,30	133
% of firms with foreign ownership	34%	47%	197	63%	49%	64	20%	40%	133
Share of foreign inputs	0,17	0,29	195	0,25	0,30	63	0,14	0,27	132
% of firms with foreign inputs	39%	49%	195	62%	49%	63	29%	45%	132
TFP 1 (logs)	0,72	1,36	137	0,88	1,95	43	0,65	0,98	94
TFP 3 (logs)	0,27	1,25	137	0,46	1,82	43	0,18	0,88	94
GDP per capita ($)	$ 457		197	$ 457		64	$ 457		133
GDP per capita (logs)	6,12		197	6,12		64	6,12		133
ΔGDP per capita ($)	$ -3.250	$ 3.203	197	$ -2.903	$ 2.169	64	$ -3.417	$ 3.592	133
ΔGDP p.c. (log of negative value)	7,84	0,60	197	7,81	0,51	64	7,85	0,64	133

Appendix 7. Descriptive statistics per country group

Group E	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,50	0,27	2275	0,56	0,26	818	0,46	0,27	1457
Sector-wide exports (logs)	19,12	2,10	2275	19,66	2,16	818	18,82	2,00	1457
Exports, growth ratio over 3 years	0,68	1,13	2275	0,64	1,07	818	0,71	1,16	1457
Workers (number)	145	744	2275	245	600	818	88	809	1457
Workers (log)	3,75	1,44	2275	4,63	1,31	818	3,25	1,26	1457
Age (years)	14,3	15,9	2245	17,7	19,5	807	12,4	13,0	1438
Age (log)	2,28	0,83	2234	2,44	0,92	803	2,20	0,76	1431
Share of foreign ownership	0,12	0,29	2263	0,22	0,37	810	0,06	0,21	1453
% of firms with foreign ownership	17%	37%	2263	31%	46%	810	9%	28%	1453
Share of foreign inputs	0,36	0,40	2230	0,49	0,39	795	0,29	0,38	1435
% of firms with foreign inputs	58%	49%	2230	79%	41%	795	47%	50%	1435
TFP 1 (logs)	-0,11	0,78	1166	-0,12	0,82	447	-0,11	0,75	719
TFP 3 (logs)	0,02	0,74	1160	0,01	0,80	444	0,02	0,69	716
GDP per capita ($)	$ 1.412	$ 1.431	2275	$ 1.857	$ 1.747	818	$ 1.163	$ 1.145	1457
GDP per capita (logs)	6,83	0,92	2275	7,08	0,99	818	6,69	0,85	1457
ΔGDP per capita ($)	$ -9.730	$ 8.006	2254	$ -10.958	$ 7.757	816	$ -9.033	$ 8.064	1438
ΔGDP p.c. (log of negative value)	8,55	1,49	2254	8,86	1,23	816	8,38	1,59	1438

Group NE	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,51	0,26	2015	0,48	0,24	944	0,54	0,27	1071
Sector-wide exports (logs)	21,26	1,83	2015	21,26	1,64	944	21,26	1,98	1071
Exports, growth ratio over 3 years	0,39	0,50	2015	0,46	0,38	944	0,33	0,57	1071
Workers (number)	194	680	2015	299	940	944	102	273	1071
Workers (log)	3,96	1,57	2015	4,50	1,53	944	3,48	1,45	1071
Age (years)	18,7	23,1	2002	22,3	26,8	937	15,5	18,7	1065
Age (log)	2,49	0,89	1993	2,63	0,94	935	2,37	0,82	1058
Share of foreign ownership	0,11	0,30	2008	0,19	0,37	942	0,04	0,19	1066
% of firms with foreign ownership	15%	35%	2008	25%	43%	942	6%	23%	1066
Share of foreign inputs	0,35	0,37	1985	0,45	0,36	929	0,27	0,36	1056
% of firms with foreign inputs	66%	47%	1985	83%	38%	929	52%	50%	1056
TFP 1 (logs)	0,06	0,70	1234	0,06	0,71	654	0,05	0,69	580
TFP 3 (logs)	0,01	0,60	1229	0,02	0,62	652	0,00	0,57	577
GDP per capita ($)	$ 3.626	$ 2.416	2015	$ 4.280	$ 2.840	944	$ 3.048	$ 1.780	1071
GDP per capita (logs)	8,01	0,60	2015	8,14	0,67	944	7,88	0,50	1071
ΔGDP per capita ($)	$ -11.738	$ 5.899	2015	$ -12.073	$ 5.675	944	$ -11.442	$ 6.076	1071
ΔGDP p.c. (log of negative value)	9,13	0,84	2015	9,20	0,78	944	9,08	0,90	1071

Group S	All firms			Exporters			Non-exporters		
	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations	Mean	Std.Dev.	Obser-vations
Skill-Intensity	0,56	0,25	2507	0,56	0,23	789	0,56	0,25	1718
Sector-wide exports (logs)	20,38	2,18	2507	20,76	1,92	789	20,21	2,27	1718
Exports, growth ratio over 3 years	0,44	0,65	2507	0,42	0,66	789	0,45	0,65	1718
Workers (number)	117	384	2507	235	449	789	63	337	1718
Workers (log)	3,43	1,56	2507	4,46	1,50	789	2,96	1,34	1718
Age (years)	15,9	18,7	2490	22,4	25,2	784	12,9	13,8	1706
Age (log)	2,35	0,87	2484	2,66	0,92	783	2,21	0,81	1701
Share of foreign ownership	0,08	0,25	2493	0,18	0,34	782	0,04	0,17	1711
% of firms with foreign ownership	12%	33%	2493	25%	44%	782	6%	24%	1711
Share of foreign inputs	0,27	0,36	2436	0,40	0,37	767	0,21	0,34	1669
% of firms with foreign inputs	51%	50%	2436	75%	43%	767	40%	49%	1669
TFP 1 (logs)	0,05	0,81	1260	0,03	0,93	461	0,06	0,73	799
TFP 3 (logs)	-0,02	0,69	1252	-0,01	0,79	458	-0,02	0,62	794
GDP per capita ($)	$ 2.343	$ 1.869	2507	$ 2.726	$ 1.970	789	$2.166	$ 1.794	1718
GDP per capita (logs)	7,41	0,85	2507	7,56	0,90	789	7,34	0,81	1718
ΔGDP per capita ($)	$ -9.508	$ 8.182	2507	$ -10.449	$ 7.789	789	$ -9.077	$ 8.322	1718
ΔGDP p.c. (log of negative value)	8,59	1,20	2507	8,79	1,11	789	8,50	1,22	1718

Appendix 8. Estimation results, manufacturing firms

Table A10: Estimation results, firms from the manufacturing sector

Variables	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant	0,540*	0,478*	0,396*	0,394*	0,383*	0,383*	0,395*	0,391*	0,328*	0,323*	0,327*	0,321*
Constant (Std.Error)	0,004	0,030	0,030	0,030	0,031	0,031	0,031	0,032	0,044	0,041	0,044	0,041
Growth sector-wide exports E	-0,034*	-0,017*	-0,015*	-0,012**	-0,012**	-0,012**	-0,012**	-0,010***	-0,010	-0,007	-0,011	-0,008
Growth sector-wide exports 1 (Std. Error)	0,004	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,011	0,011	0,011	0,011
Growth sector-wide exports NE	-0,055*	-0,04657	-0,001	-0,006	-0,006	-0,007	-0,009	-0,010	-0,023	-0,019	-0,021	-0,01767
Growth sector-wide exports 2 (Std. Error)	0,010	0,013	0,014	0,014	0,014	0,014	0,014	0,014	0,022	0,021	0,022	0,022
Growth sector-wide exports S	-0,009	-0,04248	-0,002	0,006	0,006	0,005	0,006	0,005	0,013	0,014	0,013	0,013
Growth sector-wide exports 3 (Std. Error)	0,007	0,009	0,009	0,009	0,009	0,009	0,010	0,010	0,014	0,014	0,014	0,014
Workers (log)					0,003	0,005**	0,005**	0,005**	0,000		0,000	
Workers (log) (Std. Error)					0,002	0,002	0,002	0,002	0,003		0,003	
Share of foreign ownership						-0,031*	-0,025**	-0,025**	-0,020	-0,020	-0,017	-0,019
Share of foreign ownership (Std. Error)						0,012	0,012	0,012	0,016	0,015	0,016	0,015
Share of foreign inputs							-0,024*	-0,024*	-0,032*	-0,032*	-0,031**	-0,032*
Share of foreign inputs (Std. Error)							0,009	0,009	0,012	0,012	0,012	0,012
Age (log)								0,002	-0,002		-0,001	
Age (log) (Std. Error)								0,004	0,005		0,005	
TFP 1 (log)									0,009	0,009		
TFP 1 (log) (Std. Error)									0,006	0,006		
TFP 3 (log)											0,000	0,000
TFP 3 (log) (Std. Error)											0,006	0,006
Adjusted R-squared	0,011	0,054	0,079	0,083	0,083	0,084	0,083	0,084	0,096	0,097	0,096	0,097
Sum squared resid	455,6	434	422	420	420	418	408	405	211	213	210	212
Dummies	No	Country	Country, industry	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year	Country, industry,year
Observations	6797	6797	6797	6797	6797	6764	6619	6540	3568	3608	3551	3591

*significant at 1%; ** significant at 5%; *** significant at 10%.

For remarks: see table 4.

Literature overview

Almeida, R. and A.M. Fernandes, 2008, Openness and Technological Innovations in Developing Countries: Evidence from Firm-Level Surveys, *Journal of Development Studies*, 44, 701-727

Alvarez, R. and R.A. Lopez, 2005, Exporting and performance: evidence from Chilean plants, *Canadian Journal of Economics* 38, 1384-1400

Bernard, A.B. and J. B. Jensen, 1995, Exporters, jobs and wages in U.S. manufacturing: 1976-1987, *Brookings Papers on Economic Activity*, 67-119

Bernard, A. B., J. B. Jensen, and P. K. Schott, 2006, Survival of the best fit: Exposure to low{wage countries and the (uneven) growth of U.S. manufacturing plants, *Journal of International Economics*, 68, 219-237

Bernard, A.B., S.J. Redding and P.K. Schott, 2007, Comparative Advantage and Heterogeneous Firms, *Review of Economic Studies*, 74, 31–66

Emami Namini, J., G. Facchini and R. A. Lopez, 2011, Export Growth and Factor Market Competition: Theory and Evidence, *Centre for Economic Policy Research,* Discussion Paper No. 8256

Epifani, P. and Gancia, G., 2008, The Skill Bias of World Trade, *The Economic Journal* 118, 927–960

Fajnzylbera P. and A.M. Fernandes, 2009, International economic activities and skilled labour demand: evidence from Brazil and China, *Applied Economics*, 41, 563–577

Feenstra, R. 2008, *Offshoring in the global economy* (The Ohlin Lectures 2008), Stockholm: Stockholm School of Economics.

Hijzen, A., H. Görg and R.C. Hine, 2005, International Outsourcing and The Skill Structure Of Labour Demand in the United Kingdom, *The Economic Journal*, 115, 860-878

Krugman, P., 2008, Trade and wages, reconsidered, *Brookings Papers on Economic Activity*, 103-154

Melitz, M., 2003, The impact of trade on intra-industry reallocations and aggregate industry productivity, *Econometrica*, 71, 1695-1725

Rosholm, M., C. Scheuer and A. Sørensen, 2007, *The Implications of Globalization for Firms' Demand for Skilled and Unskilled Labor*, Copenhagen Business School, Working paper 8-2007

Saliola, F. and M. Seker, 2011, *All firms Factor Productivity Across The Developing World*, World Bank Group, Enterprise Note Series, No. 23.

Thoenig, M. and Verdier, T., 2003, A theory of defensive skill-biased innovation and international trade, *American Economic Review* 93, 709–28

United Nations, 2002, Manual on Statistics of international trade in services, United Nations publication, Sales No. E.02.XVII.11

Wagner, J., 2007, Exports and Productivity: A Survey of the Evidence from Firm-Level Data, *The World Economy* 30, 60-82.