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HOME COUNTRY LABOR MARKET EFFECTS OF OUTWARD FOREIGN DIRECT INVESTMENT. CASE OF ESTONIA

Master's Thesis

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Name and signature of supervisor…….

Allowed for defence on..... (date)

I have written this master's thesis independently. All viewpoints of other authors, literary sources and data from elsewhere used for writing this paper have been referenced. …….. (signature of author)

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Abstract

Current paper examines the effect of outward foreign direct investment (OFDI) on home country labor market using matched employer-employee dataset, which covers entire population of Estonian companies and workers between 2006 and 2014. Regression analysis is employed to study the wage effects of OFDI. Additionally, propensity score matching is applied to test whether these effects hold when comparing investing companies with closest domestic counterfactual enterprises. Difference-in-difference estimator is used to assess employment growth changes observed in firms investing abroad. Observed results fall in line with many of the previous studies and indicate positive labor effects of OFDI on investing companies. These effects are larger for firms in services sector. Positive wage effects are higher for male workers. Host country of investment seems to be important for the effects too: investors to Baltic and Nordic countries are able to get higher wage and employment benefits from OFDI.

JEL Classification: F21, J16, J31, J21

Keywords: foreign direct investments, wages, gender wage gap, employment

1. Introduction

There is an abundance of papers studying home country effects of outward foreign direct investment (OFDI) from high-income developed countries like Sweden and Japan (Lipsey et al., 2000; Kokko, 2006; Nakamura, 2013) or from low-income big industrial countries like China (Cozza et al., 2015; Li et al., 2017). Emerging and middle-income countries are underrepresented in literature on the effects of OFDI. Possible reason of little spotlight for emerging countries may be the lack of outward FDI activities from them in the past, whereas there are more investments made by developed countries, effect of which was arguably more important to evaluate. However, there has been a steep increase of international investment activity from developing countries in the last two decades. According to UNCTAD World Investment Report 2014, during 2013 developing countries have reached their historical maximum share in world's outward investments equal to 39%, compared to share of only 12% in year 2000. This makes research in effects of OFDI from emerging economies highly relevant. Another characteristic of present literature concerning home country labor market OFDI effect is focus on employment changes (Masso, Vahter and Varblane, 2008; Simpson, 2012; Rozen-Bakher and Ziva, 2017). Wage effects have been getting increased attention from researchers in the last five years (Nakamura, 2013; Vahter and Masso, 2018 for inward FDI) as more detailed data on wages on firm- and individual-level became available. Implications of these papers go beyond the analysis of macro level influence of OFDI and help to explain wage discrepancies between male and female employees, between domestic and foreign companies.

This paper provides new evidence on the effects of outward foreign direct investment on the wages and employment in the home country of investment. The paper looks at the effects of OFDI from Estonia as a middle-income small emerging economy, expanding the research scope of previous articles with similar research goals (Masso, Vahter and Varblane 2008). The paper focuses on extensive margin (establishing subsidiaries, but not their growth) of OFDI, evaluating the effect of international FDI entrance on labor characteristics of the company. Benefit of using Estonia as object of study in the context of the middle-income emerging economies is the availability of the unique matched employer-employee dataset, which covers entire population of Estonian

companies. This allows to control for both individual- and company-level characteristics, build better counterfactuals and overall to obtain more significant and robust results.

Current paper contributes to and combines two strands of economic literature. First strand of literature concerns labor market effects of OFDI. The paper focuses on wage effects observed in Estonia for companies with outward investments. These effects are studied in the context of different destination countries of OFDI and industry sectors of investing companies. Evidence of positive wage and employment effects for Estonian companies with OFDI are found. Similar to the previous studies (Bajo-Rubio and Diaz-Mora, 2015), companies operating in services sector of the economy are able to secure quantitatively bigger positive effects of OFDI compared to the manufacturing firms. Investments into Baltic and Nordic states, which account for almost two thirds of Estonian OFDI, lead to higher wage increases on average, compared to other host destinations of investment.

Secondly, the paper extends current literature of gender wage gap. Estonia has the highest gender pay gap among EU countries (Anspal, 2015) and thus is a good choice of country for such analysis. From that aspect the current paper builds up on findings of Vahter and Masso (2018), who studied how inward FDI (IFDI) affected wages of male and female employees in Estonia and inequality between them. Results of regression analysis in the current paper confirm, that in case of OFDI, similar to case of IFDI in their paper, male employees are getting higher wage benefits compared to their female colleagues. While the exact reason as to why such disparity in effects of FDI occurs is unknown, possible channels of influence are the differences in institutional background between the host and the home country of investments. This issue is discussed more thoroughly in the literature review and results sections of the paper.

Adapted models of Nakamura (2013) and Masso et. all (2008) are used in order to estimate the effects of OFDI on wages and company employment growth respectively. Employment changes due to OFDI are of interest in this paper in order to check whether wage effects come at the cost of lower employment or do these two effects complement each other. Wage effects of outward investment are studied using ordinary least squares (OLS) and fixed effects (FE) models, as well as propensity score matching (PSM). Employment effects of OFDI are estimated using OLS with difference-in-difference estimator.

The rest of the paper is structured as follows. Section 2 provides review of relevant literature on the topic and presents main hypothesis to be tested. Sections 3 and 4 provide overview on methodology and data used in the paper. Afterwards, estimation results are presented in Section 5, followed by conclusion and discussion of the results in Section 6.

2. Literature review

Traditionally, effects of OFDI are viewed as substitutional, meaning that investing abroad is an alternative to home country production growth. As more capital is flowing out of the country, national production is expected to fall. Ari Kokko (2006) surveyed different studies on various home country effects of OFDI for developed economies, such as effects on export structure, production, labor market, investment, the balance-of-payments, technology, and political decision-making in the home country. Similar to IFDI, outward direct investments also have "own-firm" effects, being the effects on the investing company, and the "spill over" effects – changes to other companies in the industry. Above-mentioned research suggests, that while outward investment is beneficial for the investing company, its effects on home country can be mixed. He finds that for developed countries, overall effect on total employment in the countries is negative, but exports and production increase as a result of OFDI.

Difference in the level of economic development between home and host country of investment is one of the important factors which determines the nature of the OFDI effects. Rozen-Bakher and Ziva (2017) compare effect of both inward and outward investment for 33 advanced and 116 developing countries. They find out, that for developed countries both OFDI and IFDI decrease domestic demand for workers in manufacturing sector in favor for an increase in service sector labor demand. Authors did not manage to capture any significant and consistent results of OFDI for developing countries.

Bajo-Rubio and Diaz-Mora (2015) find that characteristics of host country of the investment can change the effect drastically. For Spanish firms in their study, investing to non-EU developed countries has led to negative influence on company growth as opposed to strictly positive effect for other cases. Manufacturing companies' gains from OFDI were lower compared to services sector. Mariotti, Mutinelli, Piscitello (2003) study OFDI from Italian industrial regions, looking for both direct effects and externalities.

Authors find negative impact on the variation in the number of domestic employees in a regional industry[1] in case of vertical investment to less developed countries and positive impact in case of investing in other advanced countries. Li et al. (2017) use diff-in-diff estimator as well as propensity score matching to measure the impact of OFDI on productivity and employment of Chinese multinational companies. They find that companies investing in OECD countries show higher growth compared to those, who invest in non-OECD countries. Authors argue that this result is in accordance with similar findings of Herrerias and Orts (2012) and may arise due to more opportunities to access technology, competitive markets and well-developed infrastructure of developed countries. Lipsey, Ramstetter and Blomstrom (2000) found in their research, that US companies generally have negative impact of OFDI on employment at home while Japanese and Swedish manufacturers tend to have increased employment after controlling for the home country production level.

Strategy and form of OFDI also play a role in determining the effect of OFDI on home country labor market. There are several ways to classify FDI. Large number of papers (Masso, Vahter and Varblane, 2008; Mariotti et al., 2003; Simpson, 2012) follow traditional classification of investments into vertical and horizontal FDI. Vertical FDI is generally made by companies in order to separate their production into several stages, while benefitting from foreign lower factor prices or legislative factors (Kokko, 2006; Masso, Vahter and Varblane, 2008). Horizontal FDI is when company establishes abroad the same type of business it operates at home. Usually it is done in order to use company's business advantages to gain a share of foreign market and grow in scale. Number of studies have found that both vertical and horizontal OFDI in general have positive effect on employment level and labor productivity (Barba Navaretti et al., 2010; Desai et al., 2009). However, in case of vertical outward FDI, these effects are less homogeneous, as there is evidence of negative influence of such investments on employment in low-wage and labor-intensive industries (Simpson, 2012). Driffield, Love and Taylor (2009) divide FDI into four categories based on technology differences and factor cost differences. They conclude, that depending on the type of investment, the effect is different for the investing companies and their employees. Authors conclude that resource-seeking investments

[1] Authors define this indicator as "labor intensity" – but in our opinion this definition is slightly misleading, as it is different from traditional definition of "labor intensity" as a measure of relative use of labor in comparison to use of capital

have had negative impact on productivity and employment of low-skilled labor in the UK companies. Cozza, Rabellotti, Sanfilippo (2015) study whether the movement of capital abroad is accompanied by changes in labor demand in China. Using difference difference-in-difference estimator as well as propensity score matching they find, that making new OFDI and domestic employment levels are positively correlated. They also distinguish investments based on basis of entry into acquisitions and greenfield investments and find, that the latter type of FDI has stronger impact on employment and labor productivity of companies. Authors state that this result is not surprising, because Chinese firms are using OFDI to increase the scale of investing company in contrast of replacing domestic labor for foreign.

Effects of outsourcing and outward FDI are often considered together (Canello, 2017; Lindič, 2017). International outsourcing does not always involve making outward investments, but can be done in the form of contract between two separate companies. Nevertheless, its effects are comparable with the effects of vertical OFDI, since outsourcing is mainly used as a way to minimize costs of production stages or some support functions of businesses. Feenstra and Hanson (1996) focus on US firms' international outsourcing activities during 1972-1990. Their findings suggest, that outsourcing was positively correlated with the home country employment levels of non-production[2] workers, but weakly negatively correlated with their annual average relative wages. Geishecker et. al (2010) use individual-level data of Denmark, Germany and UK to study wage effects of outsourcing. They test a hypothesis, that labor market institutions such as workers' unions, influence sensitivity of wages in response to outsourcing done by the company. For Denmark, as authors expected, the response is economically negligible, although statistically significant. Similar results are found using German data. Low-skilled workers in UK experience reduction of wages after company's outsourcing activity towards Central and Eastern Europe. All employees seem to benefit slightly for UK firms' outsourcing to OECD countries.

Another point of view on home country effects of OFDI is to distinguish between extensive margin (establishing subsidiaries) and intensive margin (growth of subsidiaries). Raffaello Bronzini (2015) uses matching method and diff-in-diff estimates to study the effects of both abovementioned cases for Italian multinational companies. He

[2] Non-production occupation of workers was used as a proxy for highly skilled labor

finds, that extensive margin of FDI has positive effects on domestic employment in case of horizontal foreign direct investment, but not in case of vertical FDI. For companies, which have had already established foreign subsidiaries, growth of foreign production is accompanied by growth of domestic employment. For both extensive and intensive margins of OFDI he was unable to find significant change in workforce structure between high- and low-skilled workers. Head and Ries (2002) focus on intensive margin of Japanese multinationals, focusing on offshore production. Using firm-level data on 1070 Japanese companies during 1985-1990, they find that average wage per worker tends to grow as oversea production of these firms increases. They also find that share of non-production workers' wages increases with the level of OFDI, suggesting some level of skill upgrading in home country or specialization between headquarters and foreign offices.

Characteristics of investing company itself may be determining the way OFDI will affect its productivity and employees. Masso, Vahter and Varblane (2008) study effect of OFDI on employment using data from the Estonian companies. Additionally, they distinguish between the different types of investors – direct and indirect, based on company ownership and also between vertical and horizontal types of FDI. Results of their research show, that direct investors have a stronger positive effect of outward investment compared to indirect investors. Li et al. (2017) discover, that companies show higher levels of productivity and grow faster after conducting outward investment, and the benefits are higher in case of non-state owned corporations. Chen and Tang (2014) find that participation of Chinese companies in OFDI is followed by better trade performance, higher employment and total factor productivity in future years. Using matching techniques, they confirm that larger and export-intensive companies are more likely to conduct OFDI.

Studies have shown that different types of employees can benefit from firm's FDI activities in a different way. The most common way to group workers used by researchers in this area is by the skill requirements of their job: high-skilled and low-skilled employees. Elia et al. (2009) finds that for Italian industrial regions both groups of workers seem to be gaining from firms' OFDI activities with high-skilled workers getting more benefits compared to others. In her study, Simpson (2012) finds that OFDI from Great Britain caused a drop in domestic labor demand for low-skilled workers. Using

adapted model of Helpman et. al (2004) on plant-level data, she finds out, that plant exit due to OFDI occurs only for companies in relatively low-skilled, labor-intensive industries. Low-skilled workers' employment in high-skill and technology intensive industries showed no signs of declining after OFDI have been made to developing countries. These results are in line with theoretical models (Harrison and MacMillan, 2009; Bernard and Jensen, 2007) of vertical FDI that Simpson based her research on. Leamer (1994) discusses, that the way classification of workers by skill type is done can influence the results. Thus, using "production" and "non-production" as respective proxies for high-skilled and low-skilled employees, used by several authors (Head and Ries, 2002; Slaughter, 2000; Feenstra and Hanson 1996) may be imprecise, since non-production workers usually include also low-skilled employees such as couriers and receptionists, while production workers group includes high-skilled employees like product development personnel.

Among labor market effects of FDI, the way outward investment influences wages of home country employees is less discussed in empirical literature compared to employment. Nakamura (2013) studied wage effects of Japanese manufacturing companies conducting outward investment. He controls for skill level (management or non-management positions), place of employment (headquarters or branch office) and gender by using dummy variables. Thus, the study also contributes to existing literature on gender wage gaps of last several years (see Šilingienė and Radvila, 2014; Goldin, 2014; Vahter and Masso, 2018). He concludes, that both male and female low-skilled employees benefit from their firms' OFDI activities, but there are some gender differences in wage effects, as male management generally get higher bonuses. This observation falls in line with findings of Vahter and Masso (2018), who found, that for Estonian male workers get higher wage premiums from inward FDI than their female colleagues. Authors argue, that difference in commitment requirements may be one of the main reasons as to why such gender disparities are observed. Boler et al. (2015) came to similar conclusion for gender pay gap among Norwegian exporters, which had higher commitment demands than their non-exporting counterparts. Both of these studies base their reasoning on findings of Goldin (2014), who argues that men on average show higher commitment at work and so are able to secure higher wages. Author states, that

disproportional rewards for longer working hours might be the main explanation of gender pay gap still being present in developed countries.

Effects of subsidiary exit are also connected to the effects of OFDI. This topic is usually viewed from the perspective of factors, which cause the company to close a foreign outlet (Song, 2014, for Korean FDI; Demirbag et. al, 2010, for Japanese FDI). Authors build hazard functions in order to predict subsidiary exit based on unfavorable financial and institutional market conditions. Demirbag et. al (2010) also discuss the importance of distance of economic development and economic freedom between the country of parent company and country of subsidiary. Another factor, which is determining subsidiary exit is flexibility of market entry and exit. However, literature is short on the effects of subsidiary exit on the investing company. It is unclear, whether the effects of subsidiary exit are opposite to those of conducting OFDI. This area is underrepresented in the economic studies due to data shortages on details and actual reasons of closing the outlet, but could add significantly to literature on OFDI.

In the existing literature on labor market home country effect of OFDI main focus is on leading world economies such as UK, Sweden, China. Smaller countries and transition economies seem to be underrepresented in the hitherto. So, in author's opinion it would be relevant to use data of medium-income country such as Estonia. Character and magnitude of OFDI labor market effects differ based on number of factors such as level of development of host country of investment, characteristics of the investing company and their employees. Researchers reach consensus, that OFDI has positive, yet quantitatively small impact on wages and employment in the investing companies. Investing to equally developed countries provides highest benefits for the investors. Male and female employees have different wage effects as a reaction to company's OFDI. Both genders benefit from firm's OFDI, but male workers' gains tend to be significantly higher. Using matched employer-employee data, this paper aims to test some of the above-mentioned statements for population of Estonian companies.

3. Methodological framework

In order to measure the wage effects of OFDI, modified version of ordinary least squares (OLS) model used by Nakamura (2013) will be estimated. The regression equation is specified in the following way:

$$\ln(W_{i,t}) = a_0 + a_1 OFDI_{j,t} + a_2 IFDI_{j,t} + a_3 OFDI_{j,t} \cdot IFDI_{j,t} + \\ + a_4 OFDI_{j,t} \cdot d\_female_i + \beta_1 Z_{i,t} + \beta_2 F_{j,t} + \mu_i \quad (1)$$

where index *i* indicates individuals, index *j* – companies, index *t* denotes time. The parameter a_0 is a regression constant term, $a_1 - a_4$ are regression coefficients of variables connected to FDI activities of company, β_1 and β_2 are the vectors of regression coefficients for the vectors of individual-related variables Z_i and firm-related variables F_j respectively; μ_i is the regression error term. Dependent variable is natural logarithm of real wages of employees, deflated from nominal wages using consumer price index. The terms $OFDI_{j,t}$ and $IFDI_{j,t}$ are dummy variables, which indicate if company has made or received foreign direct investments. IFDI is of interest here to see if ownership of the investing company is important for wage growth. The interaction term $OFDI_{j,t} \cdot IFDI_{j,t}$ is used in order to test whether wage effects of OFDI are different for direct and indirect investors. $OFDI_{j,t} \cdot d\_female_i$ is used to check whether wage effects of OFDI made by firm are different for male and female workers. Vector of individual-related variables Z_i includes age and gender, the two variables that are available in Estonian individual-level longitudinal data. Vector of firm-related variables F_j consists of logarithms of company size and size squared (measured in number of employees); company's age and age squared; logarithm of company's labor productivity; location dummies for 5 geographical regions of Estonia; exports and Estonian 2-digit industry code dummies. This model will be estimated separately for companies in manufacturing and services sectors, and for 5 groups of host countries of outward FDI. These groups of countries were created based on level of economic development and geographical criteria. Latvia and Lithuania are separated into a Baltic states group, as these countries are the most frequent hosts of Estonian foreign investments. Nordic countries are separated from the other EU members due to their geographical proximity to Estonia. Eastern Europe group consists of post-communist and non-EU countries, which are relatively close to Estonia. World group consists of all other countries and has the most variation. Since most of the countries in this group are hosts to only one or two Estonian investing companies, splitting it further into smaller sub-groups may negate their statistical significance. For the list of countries which belong to each group please see Appendix 1. In addition to OLS regressions, two types of fixed effects models with same specifications will be tested – with individual and firm fixed effects separately.

Difference in difference estimator will be used in order to assess the effect of OFDI on employment growth of companies. This method is useful for panel data analysis, as we are able to study the effect of treatment variable (in our case – OFDI dummy) on the outcome variable's change over time. The method is intended to solve selection bias, but is vulnerable to some shortcomings. Difference-in-difference method has all the usual assumptions of OLS and additionally parallel trend assumption. The latter states, that in the absence of treatment, outcome variable of treated and control group would follow the same pattern. This is weakness of the model, as changes in other explanatory variables which happen to one group of companies, but not the other, will be violating the parallel trend assumption.

The model is based on a version of firm growth model of Jovanovic (1982) and Evans (1987) used in Masso et. al (2008). Dependent variable, logarithmic employment growth is defined as $\Delta n_{i,t} = \ln(N_{i,t}) - \ln(N_{i,t-1})$, where $N_{i,t}$ is the number of employees of the company i at time t. According to abovementioned growth model, lagged logarithmic levels of employment (denoted as $n_{i,t-2}$) and age ($a_{i,t-2}$) of the company, as well as their squared values, are used to explain changes in employment growth. Adding FDI-related and firm-related variables, estimated equation has the following form:

$$\Delta n_{j,t} = \alpha_0 + \alpha_1 n_{j,t-2} + \alpha_2 n_{j,t-2}^2 + \alpha_3 a_{j,t-2} + \alpha_4 a_{j,t-2}^2 + \\ + \alpha_5 OFDI_j + \alpha_6 IFDI_j + \alpha_7 OFDI_j \cdot IFDI_j + \beta_1 F_j + \mu_j \quad (2)$$

FDI-related variables serve the same purpose as in the wage equation. Vector of firm-related variables F_j consists of logarithm of average labor costs per employee; logarithms of labor productivity and capital intensity; location dummies, year dummies, 2-digit industry and exports dummies. Similar to wage regressions, this model will be estimated for the 5 groups of OFDI host countries separately.

Lastly, in order to deal with the self-selection bias, where companies which grow faster and employ more workers are also the ones most likely to invest abroad, propensity score matching (PSM) is going to be used. This method will allow us to check whether changes in wages are caused by companies' OFDI activities or by its natural growth. This is achieved by comparing companies with OFDI to those without it, which are closest in terms of the propensity score. Firstly, a probit model is estimated to predict new investing companies. The model is estimated using 1-period lagged logarithmic values of company

size and labor productivity; age of the company, liquidity and capital-to-labor ratios; and IFDI dummy.

Then, using matching methods investing companies are paired with non-investing similar companies. Three matching algorithms are used to group companies in the paper. Nearest neighbor (NN) method is matching investing company with closest firms in terms of propensity score. Two specifications of this method are to be applied: with 2 and 5 closest firms being matched to the treated company. Additionally, Kernel matching method which uses weighted averages of all firms in the control group as counterfactual is to be applied. Finally, average effect on treated is calculated according to equation:

$$ATT_{PSM} = \overline{\Delta^s x_{t+s}^{treated}} - \overline{\Delta^s x_{t+s}^{control}} \quad (3)$$

where the $\overline{\Delta^s x_{t+s}^{treated}}$ is the mean value of outcome variable of interest for treated firms (new investors) and $\overline{\Delta^s x_{t+s}^{control}}$ is a weighted mean value of outcome variable of interest for the counterfactuals over the same period of time. The symbol *s* denotes the time over which the change is calculated – in current paper 1 and 2 year leads are of interest. In this paper, outcome variables of interest are the firm average wage and labor costs. In addition to building PSM model for 1995-2014 period, separate models will be built for 2006-2014 period in order to enable estimation of gender specific wage effects. PSM model for 1995-2014 period will be built using average labor costs, since data on real wages is available only starting 2006.

4. Data description

In order to study the wage effects of outward foreign investments of Estonian companies, matched employer-employee data is used. The firm-level panel data set of Estonian Business Register is combined with tax office data on individuals and Bank of Estonia data set on companies with outward foreign investments. These datasets cover the entire population of Estonian employees and companies. Firm-level and FDI data is available for the period of 1995 to 2014, while detailed individual-level (which includes information on gender and age) data is available for the 2006-2014 period.

Over the period of interest, 1409 Estonian companies have made new FDI abroad. Figure 1 gives yearly number of OFDI entrants among Estonian companies. From the figure it can be clearly seen, that Estonian firms were most actively engaged in investing abroad during 2005-2008. Number of OFDI entrants in 2005 was 4 times higher than in 2004.

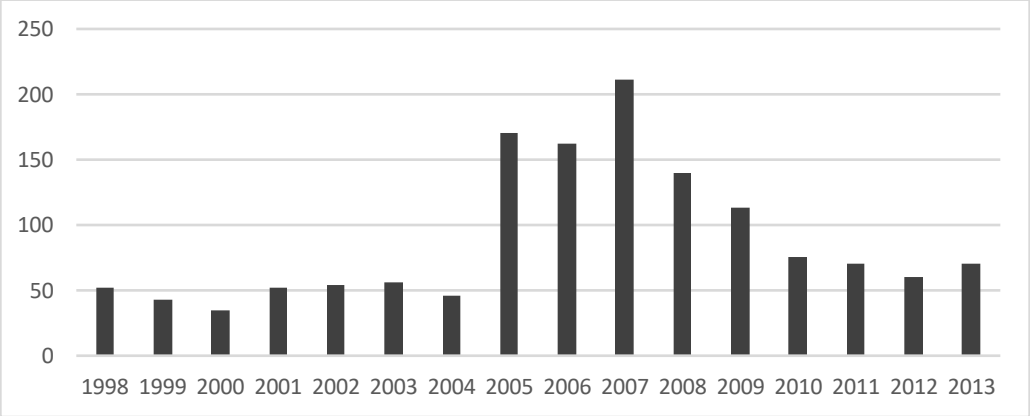

Figure 1. Number of new OFDI entrant per year

Source: own calculations from the Bank of Estonia dataset of outward investors

In order to study, how host country of FDI influences home country effects, target countries of Estonian investors are divided into 5 groups by geographic and economic criteria. Details on these 5 groups are presented in Table 1.

As for home country indicators for effects of interest, the data shows significant wage differences for employees of companies with and without FDI. Table 2 provides averages of gross wage before income taxation for male and female workers in different sectors of the economy. For most of the employee groups shown in the table, wage has increased with time with the average increase between employee groups being 14.4%.

Wages of employees, who work in a company with IFDI and/or OFDI, are on average 25% higher than of those, who work in domestic companies. Influence of OFDI seems to be quantitatively less influential compared to IFDI – wage premium in companies with OFDI only are on average 4% lower than in companies with IFDI only. Average wages of employees in companies operating in services sector are higher than of those, who work for manufacturing companies. Even though the share of female workers has increased from 52.5% in 2006 to 55.6% in 2014, Estonia has the highest gender pay gap in EU (Anspal, 2015) and this can be observed in the Table 2, where figures for males are generally 30-40% higher than for females in the same group. Moreover, male workers seem to benefit more from both IFDI and OFDI for all sectors and periods shown. These results fall in line with results of several previous studies (Vahter and Masso, 2018 for IFDI, Nakamura 2013 for both IFDI and OFDI), which also reached conclusions that male workers are able to get more benefits from FDI activities of their company.

Table 1. Summary of OFDI host country groups

Country group	Number of countries per group	Number of Estonian companies invested in group	Number of new investments from Estonia to the group	Share of new investments from Estonia to the group	Max amount of OFDI target countries per company
Baltic	2	872	655	46.5%	2
Nordic	4	362	239	17.0%	4
Other EU	21	299	208	14.8%	7
Eastern Europe	12	442	306	21.7%	6
World	71	210	133	9.4%	6
Total	110	1727	1409	100%	13

Source: own calculations from the Bank of Estonia dataset of outward investors

Table 2. Average gross wage before taxation for main jobs of Estonian employees

Industry	OFDI	IFDI	2007-2010		2011-2014	
			male	female	male	female
Manufacturing	No	No	740.51	551.34	873.93	644.92
	Yes	No	865.14	645.99	963.21	736.57
	No	Yes	915.08	585.46	1086.67	738.34
	Yes	Yes	855.36	552.65	1083.90	722.25
Services	No	No	813.31	633.07	882.21	691.77
	Yes	No	1206.95	811.16	1275.38	945.72
	No	Yes	1269.42	837.45	1414.14	912.74
	Yes	Yes	1467.11	1003.02	1441.23	1100.27

Source: own calculations from the Estonian Tax and Customs Office dataset

Summary statistics of explanatory variables used in empirical calculations of wage and employment regressions can be found in Appendix 2. Appendix 3 provides correlation matrixes of variables used in employee-level and firm-level regressions. As we can see from these tables, the only very high (>|0.5|) values in both tables belong to correlations between logarithms of employment and age and their respective squared versions. Since some of the variables have relatively high pairwise correlation coefficients of |0.2-0.3|, multicollinearity VIF tests will be performed for estimated models.

In this paper, the top and bottom 1% percentiles of any of the non-indicator variables used for models described above, are considered as an outlier and are hereby excluded from calculations.

5. Results of regression analysis and PSM

Estimation results of wage model are presented in Table 3 and Table 4. Table 3 shows results of 3 different models done separately for manufacturing and services sectors: models (1) and (2) being OLS regressions; (3) and (4) – FE models with individual fixed effects; (5) and (6) – FE models with company fixed effects. Table 4 shows results of OLS wage models with different host country of OFDI dummies: results for 5 groups of host countries and one without this division are presented. All values presented are produced using the robust standard errors, since built models show profound heteroscedasticity according to Breush-Pagan test.

OLS model has highest explanatory power if compared to FE models. Positive values of beta coefficients indicate positive linkage between variable change and real wages. Statistically significant OFDI dummies have positive and non-negligible coefficients, which falls in line with main hypothesis of this paper and results of previous empirical studies (Masso, Vahter and Varblane, 2008). For services sector firms, this effect is higher compared to manufacturing companies. According to OLS estimations, employees of services sector companies have on average 14.6% higher wages compared to employees of domestic companies in the industry. For manufacturing companies this wage premium of OFDI is only 3.5%. These results fall in line with previous conclusions of Bajo-Rubio and Diaz-Mora (2015). Similar to findings of Nakamura (2013), female workers not only generally receive lower pay, but also benefit less from firm's OFDI

activities than male workers based on *OFDI·Female* interaction term. *IFDI dummy* also has positive linkage with real wages – working in company with IFDI is associated with 7 to 15% higher real wages depending on the sector. On the other hand, working in a foreign-owned company with outward investments is associated with lower wages, as indicated by *OFDI·IFDI* interaction term in OLS equations. Age and company size show typical for wage equations parabolic dependence, where they have positive effect on wages, but their squared terms have negative coefficients.

Investing into Nordic and Baltic countries has the biggest positive and significant effect on real wages of employees (17.3% and 19.7% increases respectively). It is not surprising, as these countries are tied closely with Estonia both geographically, culturally and economically. World OFDI dummy is associated with the highest wage benefits (33.3% increase), but also much higher standard deviation compared to abovementioned two groups of host countries. But that result is not odd, since this group contains very different countries in terms of economic development and relationship with Estonia, e.g. Japan and Turkey. Investments to post-communist countries has lower than average, but still positive and significant coefficient. OFDI done by companies with foreign ownership is associated with negative wage change for all host country groups based on coefficients of *OFDI·IFDI* dummy. While female employees still get lower OFDI wage benefits compared to their male colleagues in the general model (1), it is characteristic mainly for investments into Latvia and Lithuania. Other host country groups all have positive coefficient of *OFDI·Female* dummy, although they are quantitatively smaller than the effect of OFDI to Baltic states.

Table 3. OLS and FE regressions for logarithm of real wage, 2006-2014

	(1) OLS Manuf.	(2) OLS Services	(3) FE individual Manuf.	(4) FE individual Services	(5) FE firm Manuf.	(6) FE firm Services
OFDI dummy	0.035***	0.146***	-0.004	0.044***	-0.021	0.024
	(0.007)	(0.006)	(0.009)	(0.008)	(0.028)	(0.035)
Female dummy	-0.349***	-0.269***	0.000	0.000	-0.329***	-0.252***
	(0.002)	(0.003)	(.)	(.)	(0.014)	(0.018)
OFDI · Female dummy	-0.052***	-0.036***	-0.035***	-0.043***	-0.029	-0.033
	(0.007)	(0.008)	(0.012)	(0.010)	(0.028)	(0.027)
IFDI dummy	0.077***	0.150***	0.000	0.074***	-0.047	0.062
	(0.002)	(0.003)	(0.005)	(0.007)	(0.033)	(0.053)
OFDI·IFDI dummy	-0.051***	-0.054***	0.009	-0.040***	0.058	-0.020
	(0.008)	(0.010)	(0.011)	(0.012)	(0.048)	(0.056)
Age of employee	0.069***	0.083***	0.100***	0.082***	0.068***	0.085***
	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	(0.003)
Age of employee squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log of labor productivity	0.284***	0.248***	0.076***	0.079***	0.111***	0.062***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.023)	(0.011)
Export dummy	-0.117***	-0.105	-0.009	-0.161***	0.041	0.058
	(0.023)	(0.111)	(0.026)	(0.062)	(0.047)	(0.148)
Firm size	0.226***	0.171***	0.155***	0.098***	0.112***	0.095**
	(0.004)	(0.004)	(0.009)	(0.011)	(0.038)	(0.043)
Firm size squared	-0.023***	-0.012***	-0.012***	-0.004***	-0.017***	-0.009
	(0.000)	(0.000)	(0.001)	(0.001)	(0.004)	(0.006)
2-digit industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	5.664***	5.643***	6.170***	7.336***	7.754***	7.795***
	(0.037)	(0.122)	(0.061)	(0.109)	(0.292)	(0.239)
N	394714	240911	394714	240911	394714	240911
Adj. R^2	0.259	0.302	0.069	0.033	0.091	0.101

Robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.010

Table 4. OLS regressions for logarithm of real wage, 2006-2014

	(1) ALL	(2) EU	(3) NOR	(4) BAL	(5) CIS	(6) WORLD
OFDI dummy	0.147***	0.033*	0.173***	0.197***	0.140***	0.333***
	(0.004)	(0.017)	(0.009)	(0.004)	(0.006)	(0.013)
IFDI dummy	0.110***	0.090***	0.096***	0.098***	0.098***	0.092***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
OFDI·IFDI	-0.183***	-0.073***	-0.421***	-0.088***	-0.253***	-0.475***
	(0.005)	(0.021)	(0.012)	(0.006)	(0.010)	(0.016)
Female	-0.310***	-0.315***	-0.318***	-0.305***	-0.315***	-0.315***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
OFDI · Female dummy	-0.039***	0.015***	0.033***	-0.072***	0.009**	0.011***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Age of employee	0.072***	0.072***	0.072***	0.072***	0.072***	0.072***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age of employee squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log of labor productivity	0.200***	0.201***	0.200***	0.199***	0.200***	0.204***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Export dummy	-0.101***	-0.098***	-0.104***	-0.099***	-0.098***	-0.102***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Firm size	0.175***	0.176***	0.167***	0.176***	0.175***	0.184***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Firm size squared	-0.015***	-0.015***	-0.013***	-0.015***	-0.015***	-0.016***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
2-digit industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.477***	6.472***	6.509***	6.489***	6.482***	6.433***
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.031)
N	733073	733073	733073	733073	733073	733073
Adj. R^2	0.278	0.276	0.278	0.278	0.277	0.277

Robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

* OFDI dummies for each model are different: these are separate dummies for Baltic, Nordic, EU, Eastern Europe and other countries. Thus other control variables, such as OFDI·IFDI and OFDI·Female are also different for each model

Results of employment diff-in-diff OLS regressions estimation are presented in Table 5. Similar to wage model, it is estimated with different host country dummies while using robust standard errors to account for heteroscedasticity. OFDI has generally positive effect on the growth rate of firms' employment, which is statistically significant only in case of investing to Baltic and Nordic countries. Companies, who invest into Latvia and Lithuania, on average experience 6.4 percentage points higher growth in terms of number of employees. Higher average employment growth rate of 5.5 percentage points is observed for all Estonian outward investors. Companies with foreign ownership grow at 3.7 percentage points faster rates than domestic firms, but investing abroad for them does not bring any significant changes. More capital intensive companies have 1.5 percentage points lower employment growth rate. Lagged employment and age together with their squared values show parabolic effects on size increase for companies. Average employment costs have negative association with employment change. This can potentially be explained by the notion, that companies with higher salary levels will hire less people to balance labor costs.

Overall, these results fall in line with findings of previous papers (Mariotti et al., 2003; Bajo-Rubio and Diaz-Mora, 2015), who found that positive effects of OFDI are the highest, when investing into countries with similar level of development and closer economic ties. Since some variables of wage and employment growth equations showed correlation, VIF tests for multicollinearity have been performed for these models. Results of these tests are presented in Appendix 4. According to rule of thumb applied to VIF test, which states that VIF values over 10 are to be considered sign of multicollinearity, it can be inferred that only the variables, which also have squared versions, show multicollinearity. Additionally, effects of different host country of OFDI dummies have been checked to be statistically different using t-tests.

Table 5. Diff-in-diff OLS estimator of firms' employment, 1994-2014

	(1) ALL	(2) EU	(3) NOR	(4) BAL	(5) CIS	(6) WORLD
OFDI dummy	0.055***	0.053	0.076**	0.064***	0.052	-0.252
	(0.018)	(0.042)	(0.033)	(0.022)	(0.040)	(0.229)
IFDI dummy	0.037***	0.037***	0.038***	0.038***	0.037***	0.037***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
OFDI·IFDI	0.013	0.261	0.083	-0.006	0.030	0.360
	(0.028)	(0.159)	(0.072)	(0.029)	(0.073)	(0.273)
Log of average employee costs	-0.042***	-0.041***	-0.042***	-0.042***	-0.041***	-0.041***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Log of employment level [-2]	-0.083***	-0.083***	-0.082***	-0.083***	-0.082***	-0.082***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Log of employment level squared [-2]	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log of firm age [-2]	-0.042***	-0.041***	-0.042***	-0.041***	-0.041***	-0.041***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Log of firm age squared [-2]	0.008	0.009	0.009	0.008	0.008	0.008
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Log of labor productivity	0.008*	0.008*	0.008*	0.008*	0.008*	0.008*
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Log of capital intensity	-0.015***	-0.015***	-0.015***	-0.015***	-0.015***	-0.015***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
2-digit industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
_cons	0.548***	0.536***	0.537***	0.545***	0.536***	0.532***
	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)
N	29216	29216	29216	29216	29216	29216
Adj. R^2	0.046	0.046	0.046	0.046	0.046	0.046

Robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.010
* OFDI dummies for each model are different: these are separate dummies for Baltic, Nordic, EU, Eastern Europe and other countries. Thus other control variables, such as OFDI·IFDI and OFDI·Female are also different for each model

Lastly, results of PSM are presented. Appendix 5 provides results of probit regressions estimated in order to calculate company's propensity score. Dependent variable in these models is a dummy variable, which indicates company becoming a foreign direct investor. Model (1) is using 2006-2014 data to calculate ATT for average wages, male and female average wages. No lead effects for average real wages in periods t+1 and t+2 are estimated in this paper as number of treated companies decreases drastically in that case making the results statistically insignificant. As an alternative, models (2) and (3) are using data on average employee costs from 1994-2014 period to calculate ATT with and without 1- and 2-year lead effects. Average employee costs and average wages are highly related, so these effects can be compared. Lagged levels of labor productivity, company size and its capital-to-labor ratio have positive effect on company's probability to undertake OFDI and are the best predictors of firms' probability to make new outward FDI's.

After propensity score was estimated for companies, firms which were deemed likely to invest abroad were grouped with their counterfactuals with the help of nearest neighbor algorithm with two and five neighbors and Kernel matching technique. Afterwards, average effect on treated was calculated with respect to outcome variables. Results of ATT calculations are presented in Table 6 and Table 7: Table 6 provides estimated values for 2006-2014 period, where the outcome variables of PSM are average wages; Table 7 shows effects of OFDI as treatment variable on average employee costs in the following 3 years after investment.

Table 6. Effect of OFDI on firm average wages and productivity at home (ATT), period 2006-2014

	Firm avg. wage	Firm male avg.wage	Firm female avg.wage
Unmatched	0.504***	0.502***	0.508***
NN(2)	0.066	0.062	0.043
NN(5)	0.064	0.042	0.056
Kernel	0.474***	0.474***	0.478***
Number of treated companies			132
Number of untreated companies			55 488

* p<0.10, ** p<0.05, *** p<0.010

Table 7. Effect of OFDI on firm average employee costs at home (ATT), period 1994-2014

	Avg. employee costs	Avg. employee costs [+1]	Avg. employee costs [+2]
ATT of model without leads			
Unmatched	0.6594***	-	-
NN(2)	0.049	-	-
NN(5)	0.1404***	-	-
Kernel	0.6261***	-	-
Number of treated companies			272
Number of untreated companies			132 187
ATT of model with leads			
Unmatched	0.5567***	0.6233***	0.6185***
NN(2)	0.048	0.086	0.047
NN(5)	0.0895	0.1602**	0.1574**
Kernel	0.5343***	0.6006***	0.5946***
Number of treated companies			141
Number of untreated companies			62 277

* p<0.10, ** p<0.05, *** p<0.010

Obtained results indicate positive impact of outward foreign investments on labor indicators of interest. All differences have positive sign, which means becoming foreign direct investor has a positive effect on average wages compared to their closest counterfactuals by propensity score. Kernel matching algorithm provides more statistically and quantitatively significant results compared to both nearest neighbor matching methods. Results obtained with Kernel matching imply that firms with OFDI pay on average 47% higher wages than firms which do not undertake OFDI. These results seem to be too high compared to other matching techniques and findings of similar studies (Vahter and Masso, 2018) and are present in multiple variations of the PSM model used in the paper. One possibility as to why such discrepancy occurs lies in the small number of treated companies, compared to the counterfactual. As Kernel method uses weighted averages of all untreated firms as counterfactuals (in contrast to nearest neighbor method, which only uses few closest one in terms of propensity score), mean wage values of control group calculated using this method may be too small due to big share of companies with generally lower wages. The issue can also be caused by the weighting algorithm of Kernel matching. Bandwidth of 0.06 used in the current paper is

the standard and default for propensity score matching but may not be the most appropriate.

From results of PSM model with 1- and 2-year lead effects on firm average employee costs we can see, that 2nd and 3rd years of investment have quantitatively bigger influence on employee costs. Such dependence might be possibly explained by the fact that OFDI increases labor productivity and hence output in the 1st year of investment, which leads to company investing more into its workers. According to ATT's from PSM with nearest neighbor algorithm, average employee costs are 16% higher in the second and third years after investment for outward investors compared to firms without OFDI. Appendix 6 provides pstest results, which tests whether the matching has been successful and the treatment and matched control group have on average similar key variables in the pre-treatment period. As we can see, all matching methods used in the analysis were able to match treatment and control groups of firms in the year before OFDI were made by the treated companies.

Overall, findings from PSM fall in line with regression results discussed above and the notion that OFDI increases wages of home country employees present in earlier studies (Nakamura, 2013). They also follow similar pattern as IFDI effects on wages outlined in Vahter and Masso (2018). Contrary to regression analysis, PSM was unable to provide evidence on gender specific wage effects of OFDI.

6. Conclusions and Discussion

Current paper studies home-country labor effects of OFDI from Estonian companies. Regression analysis and PSM were applied on the data of the entire population of Estonian firms and employees over the period of 1994-2014. Wage effects were estimated separately for manufacturing and services sectors of the economy, for 5 groups of host countries of investments (Baltic states; Nordic countries; other EU members; post-communist counties; all other host countries). Employment effects were assessed using diff-in-diff estimator separately for each group of host countries and for all investing companies in total. Propensity score matching was used to test whether firm average wages, employee costs and labor productivity are significantly different for investing companies compared to their counterfactuals. Additionally, control variables were used to separate wage effects for male and female employees.

Results from wage equations suggest positive association of OFDI with real wages of employees in investing companies. This effect seems to be stronger for companies in the services sector. Male workers are able to secure higher wage benefits compared to their female colleagues. Investing into the Baltic and Nordic states is associated with higher than average wage increases for the companies. Investing into post-communist Eastern European countries results in lower than average, although still positive wage effects for workers. Workers in investing companies which have foreign ownership have lower wages than employees of domestic investors.

Estimated model for diff-in-diff estimator of employment growth suggests positive effect of OFDI on dependent variable. This effect is highest for Estonian companies investing into the other Baltic states. Both Latvia and Lithuania are close to Estonia in terms of economic development and labor costs, so it is reasonable to expect investments into these countries to have horizontal character. In this case, effects from OFDI do not carry substitutional character for domestic production, but have more distributive and supplementary nature.

Results of PSM support findings from regression results. Investing companies were found to have higher labor productivity, average wages and employee costs than their closest counterfactuals found by matching propensity scores. This result holds for both male and female average wages. Average employee costs have been found to have higher growth during 2nd and 3rd year of the company making OFDI.

Although the obtained results are mostly statistically significant and in line with theory and the previous studies, the conducted study has its limitations. Number of companies with OFDI from Estonia is relatively small compared to the datasets from countries like USA. Detailed data about employees is available only starting 2006. Potentially different or opposite results might have been observed in the other periods. Employee skill or occupational position dummies are typical for similar studies, while for this paper this kind of data is unavailable. This makes analysis of potential skill upgrading effects of OFDI unavailable. Additionally, there is no data on the foreign subsidiaries of the investing companies. Several previous studies emphasized that nature of subsidiary and its performance may have different home country effects. In current paper, extensive margins are considered, while intensive margins, that is, growth of subsidiary, are ignored

due to the lack of data. Such data could potentially be linked from the other sources, e.g. Amadeus BvD database.

The paper has two main implications for Estonian economic policy. Firstly, since there seems to be strictly positive impact of OFDI for wages and employment in companies, government could consider promotion of entry of Estonian companies to foreign markets, while accounting for potential spill-over effects on home market. Helping to cover the sunk costs related to foreign market entry might help boost growing Estonian companies by giving them access to new customers, workers and suppliers. However, findings from regression analysis also imply that OFDI deepens gender pay gap in successful investing companies. Male workers have higher salaries on average and benefit more from firms' investing activities compared to female workers. Since gender pay gap has negative implications for welfare of the society, addressing this issue and promoting equal pay should provide for more sustainable growth of Estonian economy as a whole.

References

Anspal, S. (2015), "Essays on gender wage inequality in the Estonian labour market", PhD dissertation, Faculty of Economics and Business Administration, University of Tartu

Bajo-Rubio, O., Diaz-Mora, C. (2015), "On the employment effects of outward FDI: the case of Spain, 1995-2011", *Applied Economics*, 47:21, p.2127-2141

Barba Navaretti, G., Castellani, D., & Disdier, A. C. (2010), "How does investing in cheap labour countries affect performance at home? Firm-level evidence from France and Italy", *Oxford Economic Papers*, Volume 62, p.234–260.

Bernard, A.B., Jensen, J.B. (2007), "Firm structure, multinationals and manufacturing plant deaths", *Review of Economics and Statistics*, Volume 89, p.193-204

Boler, E. A., Javorcik, B. S., Ultveit-Moe, K. H. (2015), "Globalization: A Woman's Best Friend? Exporters and the Gender Wage Gap", CEPR Discussion Paper No. 10475

Bronzini, R. (2015), "The Effects of Extensive and Intensive Margins of FDI on Domestic Employment: Microeconomic Evidence from Italy", *The B.E. Journal of Economic Analysis & Policy*, Volume 15, Issue 4, p.2079–2109

Canello, J. (2017), "Outward foreign direct investment, offshore outsourcing and local network resilience in industrial districts", *European Planning Studies*, Volume 25, Issue 2, p.181-201

Chen, W., Tang, H. (2014), "The Dragon Is Flying West: Micro-level Evidence of Chinese Outward Direct Investment", *Asian Development Review 2014*, 31:2, p.109-140

Cozza, C., Rabelotti, R., Sanfilippo, M. (2015), "The impact of outward FDI on the performance of Chinese firms", *China Economic Review*, Volume 36, p.42-57

Cuyvers, L., De Lombaerde, P., Rayp, G. (2011), "The labour market consequences of globalisation and regionalization", *International Journal of Manpower*, 2011, Volume 32, Issue 3, p.252-256

Demirbag, M., Apaydin, M., Tatoglu, E. (2011), "Survival of Japanese subsidiaries in the Middle East and North Africa", *Journal of World Business*, Volume 46, p.411-425

Desai, M. A., Foley, C. F., Hines, J. R. (2009), "Domestic effects of the foreign activities of US multinationals", *American Economic Journal: Economic Policy*, Volume 1, Issue 1, p.181–203

Driffield, N., Love, J.H., Taylor, K. (2009), "Productivity and Labour Demand Effects of Inward and Outward Foreign Direct Investment on UK Industry", *The Manchester School*, Volume 77, Issue 2, p.171–203

Elia, S., Mariotti, I., Piscitello, L. (2009), "The impact of outward FDI on the home country's labour demand and skill composition", *International Business Review*, 18 (2009), p.357–372

Evans, D.S. (1987), "The Relationship Between Firm Growth, Size, and Age: Estimates for100 Manufacturing Industries", *Journal of Industrial Economics*, Volume 35, Issue 4, p.567–581

Federico, S., Minerva, G.A. (2008), "Outward FDI and Local Employment Growth in Italy", *Review of World Economics*, 2008, Volume 144, Issue 2, p.295-324

Feenstra, R.C., Hanson., G.H. (1996), "Globalization, Outsourcing, and Wage Inequality", *American Economic Review*, Volume 86, Issue 2, p.240–245

Geishecker, I., Görg, H., Munch, J.R. (2010), "Do labour market institutions matter? Micro-level wage effects of international outsourcing in three European countries", *Review of World Economics*, Volume 146, Issue 1, p.179-198

Goldin, C. (2014), "A Grand Gender Convergence: Its Last Chapter", *American Economic Review*, Volume 104, Issue 4, p.1091–1119.

Harrison, A., McMillan, M. (2009), "Offshoring jobs? Multinationals and U.S. manufacturing employment", Tufts University Department of Economics, Discussion Paper #0741

Head, K., Ries, J. (2002), "Offshore production and skill upgrading by Japanese manufacturing firms", *Journal of International Economics*, Volume 58, p.81–105

Helpman, E., Melitz, M., Yeaple, S. (2004), "Export versus FDI with heterogeneous firms", *American Economic Review*, Volume 94, p.300-16

Herrerias, M. J., Orts, V. (2012), "Equipment investment, output and productivity in China", *Empirical Economics*, Volume 42, Issue 1, p.181–207

Jovanovic, B. (1982), "Selection and the Evolution of an Industry", *Econometrica*, Volume 50, Issue 3, p.649–670.

Kokko, A. (2006), The Home Country Effects of FDI in Developed Economies, European Institute of Japanese Studies, Stockholm, Working Paper #225

Leamer, E. (1994), "Trade, wages, and revolving door ideas", National Bureau of Economic Research, Working paper #4716

Leuven, E., Sianesi, B. (2003), "PSMATCH2: Stata Module to Perform Mahalanobis and Propensity Score Matching, Common Support Graphing, and Covariate Testing.", *Statistical Software Components* no. S432001, Department of Economics, Boston College (available at http://ideas.repec.org/c/boc/bocode/s432001.html)

Li L., Liu, X., Yuan, D., Yu, M. (2017), "Does outward FDI generate higher productivity for emerging economy MNEs? - Micro-level evidence from Chinese manufacturing firms". *International Business Review,* October 2017, Volume 26, Issue 5, p.839-854

Lindič, M. (2017), "The effects of outsourcing and outward FDI on skill structure in Slovenia: evidence on matched firm-employee data", *Economic & Business Review,* Volume 19, Issue 3, p.365-413

Lipsey, R.E., Ramstetter, E., Blomström, M. (2000), "Outward FDI and Parent Exports and Employment: Japan, the United States, and Sweden." *Global Economy Quarterly,* Volume 1, Issue 4, p.285–302

Mariotti, S., Mutinelli, M., Piscitello, L. (2003), "Home country employment and foreign direct investment: evidence from the Italian case", *Cambridge Journal of Economics,* May 2003, Volume 27, Issue 3, p.419-432

Masso, J., Varblane, U., Vahter, P. (2008), "The Effect of Outward Foreign Direct Investment on Home-Country Employment in a Low-Cost Transition Economy", *Eastern European Economics,* vol. 46, no. 6, p.25–59

Nakamura, M. (2013), "Globalization and Sustainability of Japan's Internal Labor Markets: Foreign Direct Investment (FDI) and Wages at Japanese Manufacturing Firms", *Journal of Asian and African Studies*, p.405-407

Rozen-Bakher, Ziva (2017), "Impact of inward and outward FDI on employment: the role of strategicasset-seeking FDI", *Transnational Corporations Review,* January 2017, Volume 9, Issue 1, p.16-30

Šilingienė, V., Radvila, G. (2014), "Gender differences of wage trends in the Baltic States", *Procedia - Social and Behavioral Sciences*, Volume 156, p.98-101

Simpson, H. (2012), "Investment abroad and labour adjustment at home: evidence from UK multinational firms", *Canadian Journal of Economics*, May 2012, Volume 45, Issue 2, p.698-731

Slaughter, A.J. (2000), "Production transfer within multinational enterprises and American wages", *Journal of International Economics*, Volume 50, p.449–472

Song, S. (2014), "Unfavorable market conditions, institutional and financial development, and exits of foreign subsidiaries", *Journal of International Management*, Volume 20, p.279-289

Vahter, P., Masso, J. (2018), "The contribution of multinationals to wage inequality: foreign ownership and the gender pay gap", *University of Tartu - Faculty of Economics & Business Administration Working Paper Series*, Issue 106, p.3-41

APPENDIX 1

List of OFDI host countries divided into five groups

Country group	List of countries
Baltic	Latvia, Lithuania
Eastern European & CIS	Ukraine, Russia, Belarus, Azerbaijan, Serbia, Georgia, Albania, Bulgaria, Kazakhstan, Moldova, Tajikistan, Uzbekistan
Nordic	Finland, Sweden, Norway, Denmark
Other EU members	Austria, Belgium, Czech Republic, Switzerland, Germany, Spain, France, UK, Croatia, Hungary, Ireland, Italy, Liechtenstein, Luxembourg, Poland, Portugal, Romania, Slovenia, Slovakia, Netherlands
World	UAE, Afghanistan, Netherlands Antilles, Argentina, Bermuda, Brazil, Bahamas, Canada, Chile, China, Costa Rica, Cyprus, Dominican Republic, Egypt, Gibraltar, Hong Kong, Indonesia, Israel, Isle of Man, India, Jersey, Jordan, Cayman Islands, Sri Lanka, Liberia, Morocco, Marshall Islands, Macedonia, Mongolia, Mauritania, Malta, Mexico, Malaysia, Oman, Panama, Pakistan, Seychelles, Singapore, Senegal, Turks and Caicos Islands, Thailand, Turkey, Tanzania, USA, Uruguay, Saint Vincent and Grenadines, British Virgin Isles, Viet Nam, South Africa, Australia, Barbados, Belize, Cuba, Cape Verde, Fiji, Grenada, Guernsey, Iceland, Japan, Saint Kitts and Nevis, South Korea, Cambodia, Kenya, Lebanon, New Zealand, Philippines, Taiwan, Vanuatu

APPENDIX 2

Summary of variables used for empirical analysis

Variable name	Description	Mean	Standard deviation
Age of employee	Age of individual, years	44.839	14.396
Log of real wage	Natural logarithm of employee's real wage. Deflated from nominal wages using consumer price index	10.030	0.872
Firm size	Natural logarithm of company's number of employees (used in individual-level dataset)	3.835	2.034
Log of firm age [-2]	2-period lagged natural logarithm of age of company	0.531	0.428
Log of firm age squared [-2]	2-period lagged natural logarithm of age of company squared	0.466	0.359
Log of average employee cost	Natural logarithm of average costs per employee in the company	8.339	1.023
Log of capital intensity ratio	Natural logarithm of capital intensity ratio (assets divided by turnover)	8.393	1.748
Log of employment growth	Natural logarithm of difference of employment level at time [t] and employment level at time [t-1]	0.004	0.397
Log of employment level [-2]	2-period lagged natural logarithm of company's number of employees	1.251	1.160
Log of squared employment level [-2]	2-period lagged natural logarithm of company's number of employees squared	2.863	4.201
Log of labor productivity	Natural logarithm of labor productivity (output divided by number of employees)	9.441	1.214
Liquidity ratio	Calculated as (1-equity/total assets). Is a financial ratio, values range from 0 to 1	0.377	0.335
Capital to labor ratio	Calculated as (Deflated capital stock of company divided by number of employees). Is a financial ratio, values range from 0 to 1	0.582	0.276

Source: author's calculation using matched dataset from Estonian Business Registry for 1994-2014 period and Estonian Tax and Customs Office for 2006-2014 period

APPENDIX 3

Correlation matrix of variables used for firm-level empirical analysis

	Log of employment growth	Log of employment level [-2]	Log of employment level squared [-2]	Log of firm age [-2]	Log of firm age squared [-2]	Log of labor productivity	Log of capital intensity ratio	OFDI dummy	IFDI dummy	OFDI·IFDI dummy	Log of average employee costs
Log of employment growth	1.000										
Log of employment level [-2]	-0.122***	1.000									
Log of employment level squared [-2]	-0.096***	0.945***	1.000								
Log of firm age [-2]	-0.091***	0.308***	0.263***	1.000							
Log of firm age squared [-2]	-0.087***	0.311***	0.276***	0.869***	1.000						
Log of labor productivity	-0.022***	-0.158***	-0.130***	-0.005***	-0.004***	1.000					
Log of capital intensity ratio	-0.084***	0.101***	0.110***	0.154***	0.182***	0.347***	1.000				
OFDI dummy	-0.005*	0.044***	0.059***	0.014	0.013	0.031***	0.033***	1.000			
IFDI dummy	0.014***	0.133***	0.141***	-0.021***	-0.019***	0.155***	0.024***	0.022***	1.000		
OFDI·IFDI dummy	-0.001	0.029***	0.034***	0.013	0.011	0.013***	0.023***	0.671***	0.050***	1.000	
Log of average employee costs	-0.089***	0.122***	0.105***	0.232***	0.297***	0.591***	0.288***	0.028***	0.273***	0.027***	1.000

Correlation matrix of variables used for individual-level empirical analysis

	Log of real wage	OFDI dummy	IFDI dummy	OFDI·IFDI dummy	OFDI · Female dummy	Female dummy	Age of employee	Age of employee squared	Log of labor productivity	Export dummy	Firm size	Firm size squared
Log of real wage	1.0000***											
OFDI dummy	0.0335***	1.0000***										
IFDI dummy	0.0568***	0.0226***	1.0000***									
OFDI·IFDI dummy	-0.0170**	0.7071***	0.0879***	1.0000***								
OFDI · Female dummy	-0.2456***	0.0226***	0.1114***	0.0252***	1.0000***							
Female dummy	-0.0623***	0.2300***	0.0578***	0.1832***	0.2582***	1.0000***						
Age of employee	-0.0650***	0.0032***	-0.0742***	0.0054***	0.0596***	0.0234***	1.0000***					
Age of employee squared	-0.0900***	0.0017***	-0.0773***	0.0042***	0.0478***	0.0174***	0.9881***	1.0000***				
Log of labor productivity	0.3489***	-0.0454***	0.0789***	-0.0133***	-0.1380***	-0.0387***	-0.1132***	-0.1157***	1.0000***			
Export dummy	0.0119***	0.0030***	0.0068***	0.0021**	-0.0261***	0.0071***	-0.0070***	-0.0060***	0.0302***	1.0000***		
Firm size	0.0345***	0.0976***	0.2455***	0.0336***	0.1404***	0.2057***	0.0032***	0.0049***	-0.0710***	0.0141***	1.0000***	
Firm size squared	0.0230***	0.1116***	0.2260***	0.0268***	0.1434***	0.2251***	0.0075***	0.0083***	-0.0711***	0.0170***	0.9784***	1.0000***

APPENDIX 4

VIF test results of wage OLS regression

Variable	VIF	1/VIF
OFDI dummy	2.11	0.474
IFDI dummy	1.11	0.901
OFDI·IFDI dummy	2.07	0.483
Female dummy	1.12	0.891
OFDI · Female dummy	1.18	0.848
Age of employee	42.72	0.023
Age of employee squared	42.71	0.023
Log of labor productivity	1.05	0.953
Export dummy	1	0.998
Firm size	24.85	0.040
Firm size squared	24.95	0.040
Mean VIF	13.17	

VIF test results of wage OLS regression

Variable	VIF	1/VIF
Log of employment level [-2]	13,12	0,076243
Log of employment level squared [-2]	12,81	0,078088
Log of firm age [-2]	4,32	0,231609
Log of firm age squared [-2]	4,1	0,243834
OFDI·IFDI dummy	1,93	0,517854
OFDI dummy	1,93	0,518055
Log of average employee costs	1,93	0,519106
Log of labor productivity	1,81	0,551891
Log of capital intensity ratio	1,18	0,84588
IFDI dummy	1,11	0,898455
Mean VIF	4,42	

APPENDIX 5

Probit regression results for PSM on firm-level data

	(1) 2006-2014 No leads Av. real wage	(2) 1994-2014 No leads Av. labor costs	(3) 1994-2014 With leads Av. labor costs
Log of labor productivity [-1]	0.238*** (0.051)	0.122*** (0.023)	0.192*** (0.044)
Firm size [-1]	0.467*** (0.063)	0.296*** (0.048)	0.354*** (0.102)
Firm size squared [-1]	-0.026 (0.027)	-0.003 (0.001)	-0.002 (0.020)
Firm age [-1]	0.250 (0.275)	-0.028 (0.138)	-0.069 (0.221)
Firm age squared [-1]	-0.090 (0.071)	-0.019 (0.038)	-0.064 (0.060)
Liquidity ratio [-1]	0.002 (0.111)	-0.010 (0.012)	-0.145 (0.113)
Capital to labor ratio [-1]	0.073*** (0.024)	0.059*** (0.014)	0.057** (0.026)
IFDI dummy [-1]	0.181** (0.081)	0.220*** (0.055)	0.066 (0.084)
2-digit industry dummies	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
_cons	-6.382*** (0.770)	-4.500*** (0.477)	-5.570*** (0.653)
N	55620	132459	62418
Pseudo R^2	0.166	0.177	0.177

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.010

APPENDIX 6

Results of pstest for estimated PSM models

Matching method	Variable	Samle	Mean of treated	Mean of controls	Bias	t-stat	p-value
NN(2)	Firm avg. wage	Unmatched	10,467	9,964	93,7	10,24	0,000
		Matched	10,467	10,401	12,3	1,05	0,293
	Firm avg. female wage	Unmatched	10,256	9,755	81,2	8,80	0,000
		Matched	10,256	10,194	10,1	0,93	0,352
	Firm avg. male wage	Unmatched	10,539	10,031	86,6	9,46	0,000
		Matched	10,539	10,496	7,3	0,62	0,535
	Firm avg. labor costs	Unmatched	9,458	8,927	78,3	9,19	0,000
		Matched	9,458	9,409	7,2	0,60	0,547
	Firm avg. labor costs[+1]	Unmatched	9,550	8,964	88,1	10,23	0,000
		Matched	9,550	9,464	13,0	1,11	0,269
	Firm avg. labor costs[+2]	Unmatched	9,525	8,949	80,8	9,41	0,000
		Matched	9,525	9,478	6,6	0,57	0,572
NN(5)	Firm avg. wage	Unmatched	10,467	9,964	93,7	10,24	0,000
		Matched	10,467	10,403	11,9	1,01	0,311
	Firm avg. female wage	Unmatched	10,256	9,755	81,2	8,80	0,000
		Matched	10,256	10,214	6,8	0,62	0,539
	Firm avg. male wage	Unmatched	10,539	10,031	86,6	9,46	0,000
		Matched	10,539	10,482	9,6	0,81	0,418
	Firm avg. labor costs	Unmatched	9,458	8,927	78,3	9,19	0,000
		Matched	9,458	9,424	5,0	0,43	0,667
	Firm avg. labor costs[+1]	Unmatched	9,550	8,964	88,1	10,23	0,000
		Matched	9,550	9,471	11,9	1,03	0,303
	Firm avg. labor costs[+2]	Unmatched	9,525	8,949	80,8	9,41	0,000
		Matched	9,525	9,471	7,6	0,66	0,513
Kernel	Firm avg. wage	Unmatched	10,467	9,964	93,7	10,24	0,000
		Matched	10,467	9,993	88,2	7,07	0,000
	Firm avg. female wage	Unmatched	10,256	9,755	81,2	8,80	0,000
		Matched	10,256	9,782	76,7	6,19	0,000
	Firm avg. male wage	Unmatched	10,539	10,031	86,6	9,46	0,000
		Matched	10,539	10,061	81,4	6,53	0,000
	Firm avg. labor costs	Unmatched	9,458	8,927	78,3	9,19	0,000
		Matched	9,458	8,951	74,8	6,14	0,000
	Firm avg. labor costs[+1]	Unmatched	9,550	8,964	88,1	10,23	0,000
		Matched	9,550	8,988	84,4	6,93	0,000
	Firm avg. labor costs[+2]	Unmatched	9,525	8,949	80,8	9,41	0,000
		Matched	9,525	8,974	77,3	6,35	0,000

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