THE EFFECTS OF OUTSOURCING AND OUTWARD FDI ON SKILL STRUCTURE IN SLOVENIA: EVIDENCE ON MATCHED FIRM-EMPLOYEE DATA

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ABSTRACT: *This paper studies the effect of outsourcing and outward FDI on firms' skill structure. Its main contributions consist of studying changes in the skill structure that can be associated with outsourcing and outward FDI to high- and low-income countries, and including a new dimension when defining skills, which also controls for occupational classification of workers. The analysis employs a matched employer-employee dataset for Slovenian manufacturing and service firms between 1997 and 2010. The results indicate that outward FDI to high- and low-income countries has a positive impact on the skill share in manufacturing firms. The results also show that in the case of some occupational groups firms prefer to employ more educated individuals.*

Keywords: *skill structure, FDI, outsourcing, skill differentiation, manufacturing and service firms.*
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1. INTRODUCTION

Globalisation has changed the world dramatically in the most recent decades, with trade liberalisation and technology improvements leading to lower trade barriers and to the drop of transportation and communication costs (IMF, 2013). In line with these changes, transnational companies change and adjust the structure and organisation of their value added activities, where outward foreign direct investment (FDI) and outsourcing are among their main methods of strategic positioning. Forecasts on increasing internationalisation specify that firms will carry out even more of their activities outside of their enterprises in the future; for instance by increasing FDI flows, or by increasing foreign affiliate activity (UNCTAD, 2013). Studies argue that outward FDI and outsourcing activities are likely to depend upon several determinants in the future (see for example Baldwin, 2013). First, increasing developments in coordination and communication technology would make the supply chains more complex in terms of the number of stages and countries involved. On the other hand, improvements in information technology would combine different stages of production and thus lead to less complex supply chains. Widening or narrowing the

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wage gap between developed and developing countries is also expected to have a significant impact. Following the "new trade theory", the growth of developing countries would increase the overall trade, while increasing wages and income convergence of emerging markets would cause the flying geese pattern. Finally, an important factor will also be transportation costs, especially oil prices. Increasing oil prices would influence the geography of supply chains, which would consequently become more regional (Baldwin, 2013).

Although empirical studies confirm a significant impact of outward FDI and outsourcing on the skill structure of firms in developed countries, they do not control for both factors in a single model. On average, studies conclude that through increased import competition from low-wage countries, which transfers labour demand towards more skilled workers (Feenstra & Hanson, 1996), outward FDI and outsourcing have a positive impact on the employment of skilled labour (see for example Mion & Zhu, 2013, Hijzen, Görg, & Hine, 2005, Strauss-Kahn, 2003, Egger & Egger, 2003, and Feenstra & Hanson, 1996). Positive impact on the skill structure of firms in developed countries is a consequence of relocating the unskilled labour-intensive production to countries abundant with unskilled labour, whereas high-technology stages of productions continue to be produced in developed countries (Hijzen, Görg, & Hine, 2005). In addition, analysing Slovenian data, Drenkovska and Redek (2015) find that internationalization offers firms access to more developed and competitive markets, which in turn has a positive impact on Slovenian exporters.

The paper is motivated to analyse the following goals. The first aim is to measure the effect of outward FDI and outsourcing on the skill structure of firms. To the best of my knowledge, previous empirical models controlled for only one of the measures at a time and on average confirmed a positive impact of outward FDI or outsourcing on the skilled labour in developed countries. Not controlling for both factors in one model might lead to the missing variable bias. In addition, it is important to account for both factors since their combined effect is expected to increase in the future (see for example UNCTAD, 2013 and Baldwin, 2013). In addition, a new dimension is added for defining skills, which controls also for the occupational classification of workers. It is important to take this into account since workers gain their skills not only by formal education but also through various forms of vocational trainings and during their work career. The final aim is to control for the income level of outward FDI and outsourcing destinations, since previous studies indicate shifts of unskilled-intensive parts of production to countries abundant with relatively less-skilled labour. As a result, one would expect outsourcing from high-income countries and outward FDI to low-income countries to have a positive impact on the relative employment of skilled workers in the home country. The reasoning behind is that outsourcing from high-income countries enables firms to have access to technologically more advanced intermediate inputs, which in turn demand the employment of highly skilled workers. On the other hand, outward FDI to low-income countries might shift some of the more manually-intensive parts of production abroad and keep the high value added departments in the home country (as for example research, sales, marketing, finance, etc.).

The analysis employs a matched firm-employee panel dataset for Slovenian firms in the period from 1997 to 2010. Outsourcing is defined as the ratio between firm's value of

intermediate imports and its value of total material costs, while a dummy variable controls for a presence of outward FDI in a firm. Results of the basic model indicate to a positive impact of outward FDI on the relative employment of tertiary educated workers in manufacturing firms, and to a positive impact of outsourcing on the relative employment of skilled workers in service firms. The results confirm it is important to account for differential effect of the two measures in one model, as their impact on the skill structure of firms differs. In addition, outward FDI to low- and high-income countries shows a positive impact on the relative employment of skilled labour in manufacturing firms. In service firms, results are not statistically significant. Finally, results show that the impact of educational level differs between occupational groups, indicating that firms give different emphasis on educational level when employing different occupational groups.

The remainder of the paper is organised as follows. In the next section, a brief summary of the relevant literature is given. Section three introduces the methodology used, whereas section four describes the data and presents descriptive statistics. The empirical analysis and discussion of results are included in section five. The last section summarises and provides conclusions.

2. LITERATURE REVIEW

First are discussed theoretical models which explore the effects of outsourcing and outward FDI on the labour demand. Since there is not a unique definition of outsourcing and outward FDI/offshoring in the literature, the terms will be used interchangeably throughout the literature review, following the terminology used by the authors of the studies.

Grossman and Rossi-Hansberg (2008) study the impacts of the falling offshoring costs on factor prices in the home country by differentiating between trade in goods, which is the conventional meaning of trade, and trade in tasks, which relates to adding a value to goods in different locations. In the model, offshoring influences the firms' performance positively by allowing them to hire some factors abroad at a lower price. On the other hand, offshoring also brings costs as the monitoring and management of workers is hindered due to long distances. The model also shows that trade in tasks gives rise to shared gains for all domestic factors, including skilled workers (Grossman & Rossi-Hansberg, 2008).

In another theoretical paper, Egger and Egger (2003) focus on a small country case, treated as home country, which has a possibility to outsource a low-skilled part of its production to low-wage foreign countries. In a competitive labour market framework, outsourcing increases relative wages of high-skilled labour, while it does not affect relative employment. However, in a unionised framework, outsourcing increases both, relative wages and the relative employment of high-skilled labour in the home country.

Compared to rather scarce theoretical analyses on the effects of outsourcing and offshoring on the labour market, empirical studies are more abundant. Feenstra and Hanson (1996, 1999) analyse the impact of outsourcing in the United States. The results

of their earlier paper point to an increase in the relative demand for skilled labour due to increased outsourcing (Feenstra & Hanson, 1996). In their later paper, Feenstra and Hanson (1999) conclude that outsourcing impacts the relative wages of non-production workers positively (Feenstra & Hanson, 1999).

Amiti and Wei (2005a, 2005b) explore the effects of service outsourcing and offshoring in the UK and US, respectively. For the UK market, the authors find that job growth and outsourcing are not negatively correlated at the sectoral level (Amiti & Wei, 2005a), whereas for the US market, the effect of offshoring on employment differs according to the disaggregation of industries. When industries are finely disaggregated, the results point to a negative effect. On the other hand, when industries are defined on a broader level, the negative effect disappears. This leads to a conclusion that, although offshoring might affect employment negatively within industries, dismissed workers renew their employment in other growing industries (Amiti & Wei, 2005b).

Hijzen, Görg, and Hine (2005) also examine the effects of outsourcing on the UK labour market. The results indicate that outsourcing affects the demand for unskilled labour negatively and together with technological change leads to changes in the skill structure of manufacturing industries (Hijzen, Görg, & Hine, 2005). Parallel conclusions on the negative effect of increased outsourcing on the relative employment of unskilled workers were made by Strauss-Kahn (2003) for French manufacturing industries. In addition, Egger and Egger (2003) indicate that outsourcing increases the relative employment of high-skilled labour in Austria as a consequence of trade liberalisation in the Central and Eastern Europe.

While Michel and Rycx (2009) find no major influence of materials or business services offshoring on the employment in Belgian firms, they highlight the importance of distinguishing between manufacturing and service industries. Traditionally, only manufacturing industries were related to offshoring, since their products are easily tradable. However, improvements in information and communication technologies had a significantly positive impact on offshoring in service industries (Michel & Rycx, 2009). This was confirmed also by De Backer and Yamano (2012), who compare the increase of offshoring in different countries. Although offshoring increased in the observed period from 1995 to 2005 in both, manufacturing and service industries, the increase was on average bigger in the latter. Importing intermediates from abroad is however on average still more important in manufacturing industries (De Backer & Yamano, 2012). Similar conclusions were made by Horgos (2006) using German data, inferring that outsourcing is concentrated in high-skilled manufacturing industries, while the highest increase in outsourcing is visible in service industries (Horgos, 2006).

A noteworthy restraint of empirical studies, presented in previous paragraphs, is in the type of data used. The studies used data, disaggregated only at the industry level and therefore could not control for firm-specific and individual-specific characteristics that may have an impact on the skill structure of firms. Moreover, identifying the labour demand curve is more challenging when using industry-level data (Hijzen & Swaim, 2010).

Konings and Murphy (2006) evaluate the substitution of workers between parents and their affiliates in European multinational enterprises. Contrary to the common belief, their results indicate employment relocations between parent firms and their affiliates, both based in the North EU, but they find no significant employment flows between the parent and affiliates, based in the South EU, and Central and Eastern Europe (Konings & Murphy, 2006).

In another study using firm-level data, Biscourp and Kramarz (2007) differentiate between two types of imports – imports of finished goods and imports of intermediate goods, which they define as offshoring. They find a strong and negative correlation between imports and job destruction, where this impact is especially strong for imports of finished goods, imports from low-wage countries, and for larger firms (Biscourp & Kramarz, 2007).

Focusing on trade liberalisation in China after its accession to the World Trade Organisation, Bloom, Draca, and Van Reenen (2011) find that the impact on labour demand varied across firms. Specifically, although the increased Chinese competition did not affect labour demand in high-tech firms, it decreased in low-tech firms (Bloom, Draca, & Van Reenen, 2011). Mion and Zhu (2013) analysed the effects of increased Chinese imports on Belgian manufacturing firms and the Belgian labour market, by differentiating between imports of final and intermediate goods. Authors find that the increased Chinese competition hurt firms in low-tech industries, while on the whole, the increased competition was followed by reduces in firm employment growth, and upgrades in skill structure (Mion & Zhu, 2013).

Furthermore, Lo Turco and Maggioni (2012) studied the effects of offshoring on the labour demand in Italian manufacturing firms by controlling also for the origin of countries. The authors emphasise it is important to differentiate between high- and low-income countries, since different origins of outsourcing can point to a different performance level of firms. Their results show that importing intermediates from high-income countries does not affect employment, while the effects on the employment are negative when importing intermediates from low-income countries.

To sum up, the findings of presented studies show that liberalising trade with developing countries brings opportunities for cost reductions and technology improvements in the developed countries, while on the other hand it also presents threats to labour markets. However, the majority of studies conclude this threat is not large and is usually concentrated on the low-skilled employees. Also important is the emphasis made in several papers (see for example De Backer & Yamano, 2012, Michel & Rycx, 2009, Horgos, 2006) on the significance of differentiating between manufacturing and service industries, as well as the importance of using firm-level data (Hijzen & Swaim, 2010).

This paper contributes to the abovementioned studies in several ways. First, to the extent of my knowledge, previous analyses defined skills only by looking at workers' educational attainment or by differentiating between production and non-production workers. However, since skills can be acquired through employment and experience, and not only

through formal education, it is important to take into account alternative dimensions when defining skills. This study defines skills also by the occupational classification of workers and makes separate analyses for occupational groups that define skills. Second, while the bulk of analyses were concentrated on the effects of only outward FDI or only outsourcing, it is important to study differential effect of the two by controlling for both factors in one model, and to avoid the missing variable bias problem. More precisely, previous empirical models, which accounted for only one of the factors in their model, showed that outward FDI and outsourcing both have a positive impact on the labour demand. Finally, I also control for the income level of source markets of both, outsourcing and outward FDI, in order to control for the potential differences of partner's performance. While Lo Turco and Maggioni (2012) also differentiated between outsourcing from high- and low-income countries, they did not account for outward FDI, skilled workers or service firms in their analysis.

3. METHODOLOGY

As aforementioned, since definitions of outsourcing and offshoring/outward FDI vary significantly across different studies, this section first presents the definitions of outsourcing and outward FDI, used in this analysis. The framework and specification of the basic and extended models are presented next.

Feenstra and Hanson (1996) define outsourcing as the import of intermediate inputs by domestic firms, whereas in their more recent paper (Feenstra & Hanson, 1999), they introduce two measures of outsourcing. First is the ratio between imported intermediate inputs, relative to the total expenditure of non-energy intermediates in each industry, and the second is defined as inputs that are purchased from the same two-digit Standard Industrial Classification (SIC) industry as the good being produced (Feenstra & Hanson, 1999). Many of the papers follow these definitions and methodology. Similar definition for outsourcing is also used in the reports of IMF (2013) and UNCTAD (2013), which define outsourcing as purchasing intermediates from another firm, rather than producing them within the firm. Taking into account these definitions, in this analysis, outsourcing is defined as the ratio between the value of non-energy intermediate imports and the value of total material costs of a firm i in year t:

$$Outsourcing_{it} = \frac{Intermediate\ imports_{it}}{Total\ material\ costs_{it}} \qquad (1)$$

where intermediate imports are defined according to the assigned Broad Economic Categories (BEC) codes. Under BEC classification, goods can be classified in three categories; capital, intermediate, and consumption goods.

Besides estimating the effects of outsourcing, this analysis also takes into account the effects of outward FDI. For the latter, I again follow the definition of IMF (2013) and UNCTAD (2013) which define offshoring either as a process of relocating a part of or

all the activities to another firm, located overseas, or as foreign direct investments. To estimate the effect of outward FDI, I take into account the dataset from the Bank of Slovenia, which comprises information on the FDI flows for every Slovenian firm. This dataset also gathers information on the volume of the FDI and the destination country of the investment. Since the information on the volume and the type of FDI is available only for 2007 onwards, whereas the information on the presence of firm's FDI flows, if the share of equity of the Slovenian firm in a foreign enterprise is at least 10%, is available for the entire observation period, this variable was formed as a dummy variable.

Definitions of the outsourcing and outward FDI therefore take into account only foreign flows. The weaknesses of the abovementioned definitions are mainly the consequence of data limitations. More precisely, since firms can buy intermediate goods also from domestic firms, it would be important to include this information to the analysis, should it be available. To control for this, this study used a proxy in the form of domestic cost level, calculated as the difference between the total level of material costs and imported intermediates. In addition, since not all FDI flows affect firms' skill share, definition of outward FDI should also include information on the type and volume of the FDI flows in order to make a more comprehensive measure on its effect on the skill share. Unfortunately, this data is available only for the recent years. It is also important to mention that the outward FDI dummy can also reflect relocating its assembly to a foreign subsidiary or obtain inputs from the subsidiary. The former would increase the skill share in a Slovenian firm, especially if the outward FDI is present in a country with cheaper labour. To control for this, it is important to take into account also the destination country of the outward FDI. On the other hand, importing inputs from the subsidiary might interlink with firms' outsourcing. Therefore, in future studies, it would be interesting to analyse the share of inputs from countries, where firms have outward FDI, and compare this with the share of inputs from countries, where firms do not have outward FDI.

3.1 Framework and specification of the basic model

The empirical model mainly follows the theoretical framework, introduced by Hummels et al. (2014). The production function of a firm *i* in year *t* is defined as:

$$Y_{it} = A_{it} f(K_{it}, H_{it}, C_{it}) \qquad (2)$$

where the dependent variable, Y_{it}, is the output, A_{it} is productivity, K_{it} is capital, H_{it} is skilled labour, and C_{it} is a composite input, consisting of domestic and foreign inputs. The latter relate to outsourcing and/or outward FDI activities, and the former relate to unskilled labour and domestic inputs. As presented in the literature review, outward FDI and outsourcing activities have distinct impacts on skilled and unskilled labour, where the impact on the skilled labour is on average positive, while the impact on the unskilled labour is on average negative (see for example Hummels et al., 2014, Mion & Zhu, 2013, Hijzen, Görg, & Hine, 2005, Strauss-Kahn, 2003, Egger & Egger, 2003, Feenstra & Hanson, 1996).

Since both factors affect the labour demand of firms, the model of Hummels et al. (2014) is extended by including also domestic inputs and outward FDI into the model. Due to the abovementioned data limitations of outward FDI and outsourcing's definitions, it was not possible to find an appropriate measure for both factors that would consider all flows and is therefore not entirely consistent with the presented model. It would be interesting to take this into account in the future studies, when data limitations are resolved.

To implement the theoretical model in the data, the equation (2) is rearranged and P_{it} introduced as a reduced-form of the demand for firm *i*'s products. Furthermore, international activities of firms are separated into outward FDI (FDI_{it}) and outsourcing (Out_{it}), and domestic inputs into unskilled labour (L_{it}) and domestic costs (DC_{it}). Furthermore, following Hummels et al. (2014), the logarithm of the average wage level (W_{it-s}), and the logarithm of the value of exports (X_{it-s}) in firm *i* and year *t* are added to the model. The latter is introduced in order to capture time varying shocks to demand for firms' output. A detailed derivation of the model is enclosed in the Appendix.

After rearranging, the empirical model becomes:

$$Skill\_share_{it} = \beta_0 + \beta_1 Out_{it} + \beta_2 FDI_{it} + \beta_3 X_{it} + \beta_4 A_{it} + \beta_5 K_{it} + \\ + \beta_6 W_{it} + \beta_7 DC_{it} + Time_t + Ind_t + \varepsilon_{it}, \quad (3)$$

where the dependent variable $Skill\_share_{it}$ is the logarithm of the ratio between skilled employees and the total number of employees in firm *i* and year *t*. Similarly to Hummels et al. (2014), skilled workers in the first part of the analysis are defined as tertiary educated workers, i.e. if they attain some form of college degree, which is normally at least 14 years of school attainment in Slovenia. As already explained, outsourcing (Out_{it}) is defined as the share of intermediate imports in the total material costs, and outward FDI (FDI_{it}) as the dummy variable, controlling for the outward FDI. Other explanatory variables are the following: X_{it} is a logarithm of the value of exports, A_{it} is a measure of productivity, K_{it} is a logarithm of capital per employee, W_{it} is a logarithm of the average annual wage level, and DC_{it} is a logarithm of the domestic cost level in firm *i* and year *t*. Domestic cost level (DC_{it}) is calculated as the difference between the total level of material costs and imported intermediates. To increase the sensitivity of results, two different measures of productivity (A_{it}) are used; value added per employee and total factor productivity. The total factor productivity is calculated using the proposed method of Levinsohn and Petrin (2003). Levinsohn and Petrin (2003) extend the model of Olley and Pakes (1996) by substituting investments with intermediate inputs when estimating the production function. The authors argue one of the main benefits of this procedure is data driven as the procedure can be used also for firms with zero investments, while another advantage is the result of intermediate inputs being more responsive to the total productivity term than investments (see for example Levinsohn & Petrin, 2003, Petrin, Poi & Levinsohn, 2004). Both measures – the Levinsohn-Petrin measured total factor productivity and the value added – have been for example used in Damijan, Konings, and Polanec (2014). Finally, variable $Time_t$ controls for year specific effects and Ind_t denotes industry dummy variables (2-digit NACE rev. 1 industries).

Following Hummels et al. (2014), outsourcing, exports, and levels of domestic costs are not scaled by firm size in order to enhance the explanatory value of the model. More precisely, changes in firm size might be a consequence of the changes in these variables. Instead, the model has been estimated with and without firm size as one of the explanatory variables.

It would be convenient to include also other control variables that have an important effect on the skill structure of firms, as for example information on the R&D expenditures and the number of patents. However, since this data is not available or is incomplete, there exists a missing variable bias, which would be important to be taken into account in the future studies.

Finally, the models are estimated with methods for panel data analysis; the pooled ordinary least squares, fixed effects, and random effects. The three basic panel methods were used in order to test the sensitivity of the results, while the methods were applied following the procedures suggested by Cameron and Trivedi (2009). Following Hummels et al. (2014), standard errors were clustered at firm levels. Due to cluster-robust standard errors and an unbalanced panel dataset, a robust version of the Hausman test was needed in order to compare the models (Cameron & Trivedi, 2009). In accordance, the method proposed by Schaffer and Stillman (2010) was applied, while the Sargan-Hansen test is reported in the tables with regression results.

3.2 Extensions of the model

The formation of the extended model is based on the model, presented in the previous subsection. First, the model is extended by differentiating between outsourcing from high- and low-income countries, and outward FDI to high- and low-income countries. Countries are classified as high- or low-income according to the definitions, made by the World Bank, where the low-income, lower-middle-income and upper-middle-income economies for a particular year are assigned as low-income countries, and high-income economies as high-income countries (WB, 2015).

The extended model, controlling for outsourcing from low- and high-income countries, and outward FDI to low- and high-income countries is the following:

$$\begin{aligned} Skill\_share_{it} = {} & \beta_0 + \beta_1 Out_{it} + \beta_2 Out\_high_{it} + \beta_3 FDI_{it} + \beta_4 FDI\_high_{it} + \\ & + \beta_5 High_{it} + \beta_6 X_{it} + \beta_7 A_{it} + \beta_8 K_{it} + \beta_9 W_{it} + \beta_{10} DC_{it} + \\ & + Time_t + Ind_t + \varepsilon_{it}, \end{aligned} \tag{4}$$

where Out_high_{it} is outsourcing from high-income countries, FDI_high_{it} is an interaction term between outward FDI and a dummy variable, controlling for high-income countries, and $High_{it}$ denotes a dummy variable, controlling for high-income countries. Since firms could import only a fraction of their inputs from high-income countries, the variable Out_high_{it} was restricted so that the definition covers only firms that import more than a half of their intermediate inputs, in terms of value, from high-income countries. The rest of the

model in the expression (4) follows the basic model (3). As aforementioned, the presented literature suggests that outsourcing from high-income countries and outward FDI to low-income countries would increase firms' skill share. The coefficients $ß_1$ and $ß_2$ reflect the impact on firms' skill structure if firms outsource the majority of their intermediate inputs from high-income countries, while the impact of outward FDI to low-income countries on firms' skill structure is reflected in the coefficient $ß_3$.

Subsequently, the extensions of the model also include occupational level when defining skills, in order to take into account also the nature of the tasks and duties of workers' jobs. Four different skill levels could be applied to ten major groups of occupations, which are classified by the International Labour Organization (ILO). The setting of the present paper takes into account a version of the International Standard Classification of Occupations (ISCO), the ISCO-88 classification. The top two skill levels, 3 and 4, with the skill level 4 being the highest, relate to tertiary education and correspond to three major groups: "Managers" (skill levels 3 and 4), "Professionals" (skill level 4) and "Technicians" (skill level 3) (ILO, 2012, Elias & Birch, 1994). These three major groups of occupations define skilled workers in the extended model. "Managers" include legislators, senior officials and managers, whose main tasks consist of determining, formulating and supervising the implementation of government policies, laws and public regulations, or planning, directing and coordinating the policies and activities of enterprises, organisations, or departments. "Professionals" work in the fields of physical, life or social sciences, or humanities and are responsible for increasing the existing stock of knowledge, finding solutions to the problems by applying scientific and artistic concepts and theories, and transferring their knowledge onto others. Finally, "Technicians" include technicians and associate professionals who have technical knowledge and experience in the fields of physical, life or social sciences, or humanities. Their main tasks include carrying out technical work and teaching at particular educational levels, related to the abovementioned fields (ILO, 2014).

4. DATA AND DESCRIPTIVE STATISTICS

By combining different databases, a rich firm-level and employee-level panel dataset for Slovenian firms was obtained, covering the period from 1997 to 2010. The dataset comprises information on the balance sheet data and income statements of Slovenian firms, their export and import activities (i.e. value of exports and imports, type of exported and imported goods, and destination of exports and imports), characteristics of employees (i.e. gender, age, gross wage, educational level, and occupational level), and information on the foreign direct investments of Slovenian firms. The latter gathers information on the FDI flows for a particular Slovenian firm. The dataset links the following databases: personal income-tax data, transaction-level data on exports and imports of goods, Statistical Registry of Employees, firm-level accounting data, and FDI, and was provided by the Statistical office of the Republic of Slovenia (SORS), the Tax Authorities of Slovenia (TARS), the Bank of Slovenia, and the Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES).

As a small and open economy, Slovenia presents an interesting country for empirical analysis. During the observation period, Slovenia was exposed to increasing international competition due to EU accession and multilateral liberalisation (Zajc Kejžar & Ponikvar, 2014), while at the end of the observation period, Slovenia experienced the economic downturn.

After observing vast differences between manufacturing and service firms (Table 1), and taking into account the aforementioned emphasis on the importance of separating the analysis for manufacturing and service firms (see for example De Backer & Yamano, 2012, Michel & Rycx, 2009, Horgos, 2006), the empirical analysis was carried out independently for the two types of firms. Manufacturing firms on average employ a higher total number of employees and tertiary educated employees, compared to service firms. Furthermore, especially in the more recent years, manufacturing firms on average employ slightly older employees than service firms, where age can be considered as a proxy for the experience of employees (Zoghi, 2010). When comparing the average annual gross wages for the recent years, manufacturing firms on average pay their employees lower wages than service firms. However, when comparing the average wages of tertiary educated employees, manufacturing firms pay higher average wages than service firms. Manufacturing firms on average also have lower skill shares than service firms. The latter differences in the average gross wages and the skill shares could be the outcome of a different occupational and educational structure of employees in manufacturing and service firms, which will be presented in one of the upcoming paragraphs. For brevity, in the following tables, the descriptive statistics for the first half of the treated period is presented with a four-year gap, while the descriptive statistics for the recent years is complete.

Table 1. Characteristics of Slovenian manufacturing and service firms

Total							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Employment	18.1	17.3	15.5	15.2	14.2	13.0	12.2
Employment of tertiary educated	2.1	2.3	2.4	2.5	2.4	2.4	2.4
Skill share	21.7	23.2	25.0	25.4	25.9	27.0	28.1
Age	36.3	38.2	39.3	39.5	39.8	40.2	40.5
Gross wage	5,139	8,002	10,625	11,311	11,850	11,941	12,260
Gross wage of tertiary educated	8,696	12,804	16,132	16,993	17,993	17,752	17,703
Number of firms	25,216	27,064	30,908	32,799	35,833	36,814	37,882
Manufacturing firms							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Employment	41.4	38.9	35.0	34.4	31.8	27.8	26.6
Employment of tertiary educated	3.9	4.2	4.5	4.6	4.4	4.3	4.3
Skill share	14.5	14.6	15.9	16.1	16.3	17.2	18.0
Age	36.2	37.9	39.7	39.9	40.4	40.8	41.2
Gross wage	5,048	7,658	10,320	11,066	11,664	11,547	11,962
Gross wage of tertiary educated	9,785	14,154	17,397	18,267	19,232	18,868	18,808
Number of firms	5,411	5,750	6,140	6,318	6,696	6,746	6,798
Service firms							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Employment	9.7	9.9	9.6	9.6	9.3	8.9	8.5
Employment of tertiary educated	1.4	1.7	1.9	2.0	2.0	2.0	2.0
Skill share	25.1	27.4	30.1	30.9	31.7	32.9	34.1
Age	36.3	38.3	39.4	39.6	40.0	40.3	40.6
Gross wage	5,229	8,257	11,036	11,779	12,426	12,511	12,791
Gross wage of tertiary educated	8,260	12,363	15,723	16,557	17,565	17,379	17,351
Number of firms	18,037	19,047	21,527	22,729	24,773	25,647	26,495

Note: Explanations of the variables are as follows: *Employment*: mean number of employees; *Employment of tertiary educated*: mean number of tertiary educated employees; *Skill share*: the average of the share of the tertiary educated; *Age*: mean age of employees; *Gross wage*: mean annual gross wage in €; *Gross wage of tertiary educated*: mean annual gross wage of tertiary educated employees in €; *Number of firms*: number of observations.
Source: SORS, author's calculations

In addition, I also make a comparison between outward FDI and outsourcing firms (Table 2). Both types of firms are bigger in size, compared to an average firm in Table 1. This confirms previous findings of Wagner (2011), whose study indicates a self-selection of firms into outward FDI and finds that these firms are larger, more productive and more human capital intensive. The average age of employees in outward FDI and outsourcing firms is also slightly higher than in the average firm. Finally, the average gross wages and gross wages of tertiary educated employees are above the average, where the highest average is in the FDI firms. Checking the overlap between outward FDI and outsourcing by transforming the outsourcing variable into a dummy variable and performing the cross-tabulation between the two dummy variables shows that less than 10% of outsourcing firms also make use of the outward FDI, and vice versa. The table is enclosed in the Appendix.

A separate analysis was done also for firms that make use of outward FDI to high-income countries and outsource the majority of their intermediate inputs from high-income countries. The descriptive statistics for these firms show that they on average pay higher wages than the average FDI and outsourcing firms. Furthermore, while firms that make use of outward FDI to high-income countries are on average bigger than the average FDI firm, firms that outsource from high-income countries are on average smaller than the average outsourcing firm. The table is enclosed in the Appendix. Different characteristics of FDI and outsourcing firms, and the finding that the overlap between both types of firms is less than 10% confirm the importance of taking into account both factors, outsourcing and outward FDI, in one model.

Table 2. Characteristics of Slovenian firms which use outward FDI and outsource

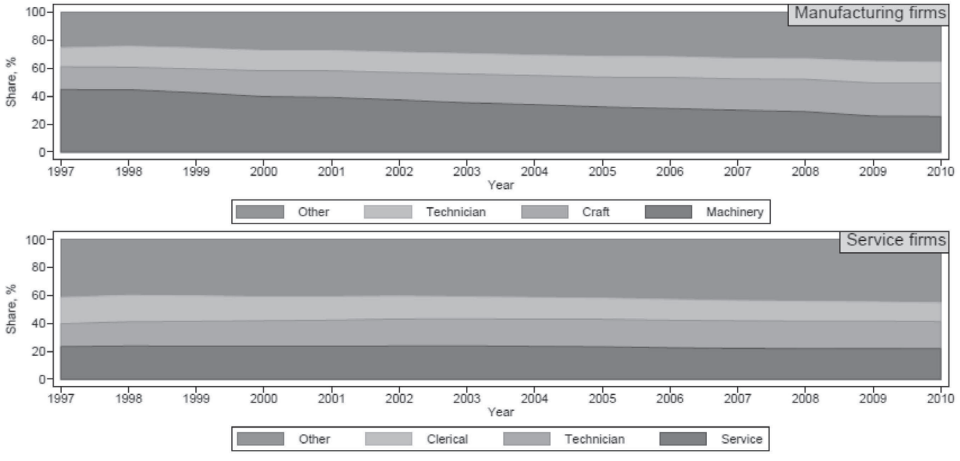
FDI firms							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Employment	301.9	207.3	194.3	185.6	175.0	163.6	161.3
Employment of tertiary educated	35.1	27.9	32.1	32.1	31.9	32.6	34.0
Skill share	22.5	25.7	31.8	32.9	34.5	35.4	37.6
Age	38.9	39.1	40.1	40.1	40.4	41.0	41.5
Gross wage	8,384	11,988	16,934	18,187	19,325	19,453	20,081
Gross wage of tertiary educated	15,215	19,729	24,759	26,282	27,707	27,380	27,487
Number of firms	474	831	895	943	994	957	894
Outsourcing firms							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Employment	56.9	56.2	64.7	57.0	55.4	48.7	48.4
Employment of tertiary educated	5.9	6.5	8.7	8.2	8.2	8.1	8.4
Skill share	23.0	22.2	24.4	25.0	25.1	26.4	27.4
Age	36.6	38.4	39.2	39.5	39.9	40.4	40.6
Gross wage	5,930	9,277	13,391	14,474	15,587	15,622	16,333
Gross wage of tertiary educated	9,867	14,863	19,995	20,758	22,416	22,092	22,370
Number of firms	2,524	2,820	2,430	2,619	2,695	2,473	2,486

Note: Explanations of the variables are as follows: *Outsourcing firms*: firms that import intermediate products; *FDI firms*: firms that engage in outward FDI; *Employment*: mean number of employees; *Employment of tertiary educated*: mean number of tertiary educated employees; *Skill share*: the average of the share of the tertiary educated; *Age*: mean age of employees; *Gross wage*: mean annual gross wage in €; *Gross wage of tertiary educated*: mean annual gross wage of tertiary educated employees in €; *Number of firms*: number of observations.
Source: SORS, author's calculations

Next, the occupational structure of manufacturing and service firms is compared by using ISCO-88 classification (Figure 1). In manufacturing firms, the share of Machinery workers has been decreasing through the period, but it is still the highest among all occupational groups. On the other hand, the share of Craft workers has been increasing through the period, but remained second. The third largest share in manufacturing firms belongs to Technicians, while the fourth and fifth largest shares appertain to Elementary occupations and Clerks, respectively. In service firms, on the other hand, Service workers occupy the largest share and the share remains steady throughout the observed period. The second largest share in service firms belongs to Technicians, while the third to Clerks. Among other occupational groups, Elementary occupations represent the fourth largest share and Machinery workers the fifth. Since the shares of Agricultural and Army workers represent

only a minor part of the total shares in both, manufacturing and service firms, they were excluded from further empirical analysis (description of all major occupational groups is included in the Appendix).

Figure 1. Occupational structure of manufacturing and service firms in Slovenia



Source: SORS, author's calculations

Table 3 presents the descriptive statistics of the three major groups of occupations that define skilled workers in the extended model; i.e. Managers, Professionals, and Technicians. The table combines results for both, manufacturing and service firms. Professionals represent the highest share of tertiary educated among all groups, followed by Managers and Technicians. Looking at the total average in the observed period, 88.7 % of Professionals, 55.1 % of Managers, and 27.4 % of Technicians were tertiary educated. This allocation of shares is consistent with the ISCO-88 classes of skill levels, presented in the methodological part. Taking into account the average age of employees, Managers are on average the oldest among all occupational groups, Professionals were on average a bit older than the average worker in the first years of the observational period, while in the recent years, they are a bit younger than the average. In contrast, Technicians are the youngest of the three groups and compared to the total population of employees. Managers earn the highest gross wages among all occupational groups, followed by Professionals. Technicians also have above average wages, in parallel to the total average numbers. However, since Professionals and Managers present more than a half of all tertiary educated workers and earn the highest wages, tertiary educated Technicians earn below the average gross wages, when taking into account only tertiary educated workers.

Table 3. Characteristics of employees in skilled occupations

Managers							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Share in the total employment	5.6	5.5	6.1	6.1	6.3	6.8	7.0
Share in the tertiary educated	25.2	23.4	22.6	21.8	21.7	21.8	21.1
Age	41.5	43.0	43.7	43.7	43.6	43.9	43.9
Gross wage	8,972	14,125	18,436	19,530	20,398	20,231	20,301
Gross wage of tertiary educated	12,859	18,988	24,080	25,517	26,755	26,237	26,092
Professionals							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Share in the total employment	3.9	4.5	5.7	6.0	6.2	7.0	7.8
Share in the tertiary educated	31.2	31.6	33.9	34.1	34.2	34.6	34.8
Age	38.4	38.5	38.6	38.7	39.0	39.2	39.4
Gross wage	9,756	14,707	17,803	18,642	19,792	19,750	19,503
Gross wage of tertiary educated	10,277	15,411	18,455	19,462	20,732	20,750	20,622
Technicians							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Share in the total employment	15.6	16.2	16.8	16.7	16.5	16.9	16.9
Share in the tertiary educated	32.2	31.7	30.9	30.7	30.1	29.3	29.1
Age	35.7	37.5	38.6	38.7	39.1	39.5	39.9
Gross wage	6,113	9,389	12,166	12,980	13,891	13,970	14,246
Gross wage of tertiary educated	8,377	12,484	15,190	16,077	17,127	16,993	17,006

Note. Explanations of the variables are as follows: *Share in the total employment*: share of a particular occupational group in the total employment (in %); *Share in the tertiary educated*: share of a particular occupational group in the total number of tertiary educated employees (in %); *Age*: mean age of a particular occupational group; *Gross wage*: mean annual gross wage of a particular occupational group in €; *Gross wage of tertiary educated*: mean annual gross wage of tertiary educated in a particular occupational group in €.
Source: SORS, author's calculations

The descriptive statistics of other occupational groups (included in the Appendix) reveal that other groups present only a minor share in the group of tertiary educated workers. The highest share in the total employment is on average presented by Machinery workers, followed by Craft workers, Elementary workers, Service workers, and Clerical workers, while the highest earners among these groups are on average Clerical workers, followed by Machinery workers, Craft workers, Service workers and Elementary workers. This distribution of occupations is also the reason for higher average wages and higher average skill shares in service firms.

5. EMPIRICAL ANALYSIS

What is here called a basic model measures the effect of outsourcing and outward FDI on the skill structure of firms. Later, the first extension of the model differentiates between outsourcing from high- and low-income countries, and outward FDI to high- and low-income countries, while in the second extension an alternative definition of skilled employees is introduced, taking into account information on the occupational level of employees.

5.1 Basic model

The basic model analyses the effect of outsourcing and outward FDI on the skill structure in Slovenian firms. As introduced in the methodology part, the models were estimated with the pooled ordinary least squares, and with fixed effects and random effects models. In the basic model, tertiary educated workers are defined as skilled.

Table 4. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.147***	0.063**	0.092***	0.315***	0.002	0.071**
	[4.19]	[2.28]	[3.53]	[7.88]	[0.08]	[2.31]
Outsourcing	-32.55***	1.111	-0.64	34.500**	11.820*	17.180***
	[-4.51]	[0.20]	[-0.13]	[2.15]	[1.93]	[2.72]
log(capital per emp)	0.014	0.013	0.016*	-0.008	0.000	0.001
	[1.23]	[1.39]	[1.92]	[-1.08]	[0.080]	[0.21]
log(tfp)	0.027*	-0.020*	-0.021*	0.046***	-0.067***	-0.043***
	[1.89]	[-1.67]	[-1.95]	[4.74]	[-8.34]	[-6.10]
log(export value)	-0.002	0.000	0.000	-0.016***	-0.002	-0.006***
	[-0.89]	[0.08]	[0.19]	[-4.85]	[-0.68]	[-2.69]
log(gross wage)	0.619***	0.244***	0.295***	0.643***	0.155***	0.260***
	[15.6]	[8.86]	[10.8]	[27.0]	[10.5]	[17.1]
log(domestic costs)	0.172***	0.051***	0.101***	0.126***	0.088***	0.099***
	[13.6]	[3.49]	[9.40]	[14.6]	[8.48]	[13.6]
Constant	-6.172***	-0.675	-2.446***	-6.060***	-0.600*	-2.036***
	[-11.7]	[-1.17]	[-4.49]	[-20.4]	[-1.77]	[-8.11]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.068	0.064		0.035	0.027
R-squared (between)		0.097	0.167		0.059	0.209
R-squared (overall)	0.182	0.158	0.201	0.192	0.175	0.219
Sargan-Hansen statistics		503.727***			1,359.569***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated workers are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; Outsourcing*: share of intermediate imports in the total material costs; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Taking into account only the results of the most preferred model, according to the Sargan-Hansen test, i.e. the fixed effects, outward FDI shows a positive impact on the share of skilled workers in manufacturing firms, while outsourcing shows a positive impact on firms' skill share in service firms (Table 4).

To control the robustness of the results, the models were estimated by adding firm size as one of the control variables. In addition, value added was substituted for the total factor productivity. Robustness checks confirm results from the basic model for manufacturing firms, while the correlation between outsourcing and firms' skill share is no longer statistically significant when controlling also for firms' size. The robustness checks are included in the Appendix.

5.2 Extensions of the model

In order to obtain new information, two extensions of the basic model have been made. The first extension differentiates between outsourcing from high- and low-income countries and outward FDI to high- and low-income countries. The second extension includes information on the occupational level of workers when defining skills.

5.2.1 Differentiation between high- and low-income countries

Differentiating between outsourcing from high- and low-income countries and outward FDI to high- and low-income countries makes possible to estimate whether a particular type of source country of outward FDI and outsourcing has a more significant impact on the skill structure of domestic firms.

Results indicate that the effect of outsourcing and outward FDI on the share of high skilled employees is different for different source countries, especially when including also the alternative definition of skills, which will be presented in the subsequent subsection. Again, according to the Sargan-Hansen statistics, the most preferred results are obtained with the fixed effects method, so the following conclusions concentrate on the results of this method. For manufacturing firms, FDI to low-income countries shows a statistically significant positive impact on the share of skilled employees. The insignificant coefficient of the variable *FDI_high* implies that FDI to high-income countries does not have a stronger impact on the relative employment of skilled employees than FDI to low-income countries. In order to test if the sum between the coefficient *FDI*, which measures the impact of outward FDI to low-income countries on firms' skill share, and interaction term, i.e. *FDI_high*, is statistically significantly different from zero, the Wald test was applied (the p-value of the F-test was 0.056). On the other hand, the impacts of outsourcing and outward FDI on firms' skill structure are statistically insignificant in service firms.

Table 5. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms, differentiating between high- and low-income countries (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.196***	0.059**	0.088***	0.313***	0.006	0.072**
	[5.01]	[2.01]	[3.18]	[7.04]	[0.17]	[2.27]
FDI_high	-0.176***	0.023	0.019	0.012	-0.025	-0.012
	[-3.46]	[0.57]	[0.50]	[0.17]	[-0.43]	[-0.20]
Outsourcing	-19.510	33.190	27.720	59.230**	18.110	26.880**
	[-0.49]	[0.80]	[0.78]	[2.00]	[1.53]	[2.14]
Outsourcing_ high	-16.330	-37.140	-33.370	-42.910	-9.236	-15.86
	[-0.40]	[-0.89]	[-0.93]	[-1.19]	[-0.81]	[-1.28]
High	0.029	0.032*	0.032*	0.014	0.005	0.018
	[0.85]	[1.82]	[1.95]	[0.38]	[0.25]	[0.98]
log(capital per emp)	0.014	0.013	0.016*	-0.008	0.000	0.001
	[1.24]	[1.39]	[1.93]	[-1.09]	[0.08]	[0.19]
log(tfp)	0.026*	-0.020*	-0.020*	0.046***	-0.067***	-0.043***
	[1.83]	[-1.67]	[-1.95]	[4.72]	[-8.34]	[-6.10]
log(export value)	-0.002	0.000	0.000	-0.016***	-0.001	-0.006***
	[-0.91]	[0.083]	[0.20]	[-4.83]	[-0.68]	[-2.67]
log(gross wage)	0.618***	0.244***	0.295***	0.643***	0.155***	0.260***
	[15.6]	[8.85]	[10.8]	[27.1]	[10.5]	[17.1]
log(domestic costs)	0.172***	0.050***	0.100***	0.126***	0.088***	0.099***
	[13.4]	[3.43]	[9.26]	[14.6]	[8.48]	[13.6]
Constant	-6.176***	-0.657	-2.425***	-6.054***	-0.600*	-2.034***
	[-11.6]	[-1.14]	[-4.45]	[-20.3]	[-1.77]	[-8.10]

Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.068	0.064		0.035	0.027
R-squared (between)		0.097	0.166		0.059	0.209
R-squared (overall)	0.183	0.099	0.158	0.192	0.061	0.175
Sargan-Hansen statistics		517.471***			1,371.458***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated workers are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; FDI_high*: dummy variable, controlling for the outward FDI to high-income countries*; Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

5.2.2 Alternative definition of skills

In the final extension of the model, the information on the occupational level of workers is added to the definition of skills, which was to this point defined by reaching a tertiary level of education. As in the previous section, a differentiation between high- and low-income countries has been made. The most preferred method, according to the Sargan-Hansen test, is again the fixed effects, so the following conclusions relate to the results of this method.

When defining skilled employees only by their occupational level; i.e. when they are classified as Managers, Professionals, or Technicians, the results are not statistically significant anymore for manufacturing firms (Table 6). Similarly as when defining skills only by the educational level, the results for service firms are not statistically significant.

Next, to further exploit the advantages of taking into account information on occupational level, the effect of outward FDI and outsourcing on firms' skill share is estimated using disaggregated data for each of the three major skilled occupational groups. The following table presents only the results of the most preferred method according to the Sargan-Hansen test (i.e. the fixed effects), while the results of all methods are included in the Appendix.

When defining skills only by the occupational level and disaggregating the data by the three major skilled occupational groups (Table 7), results for manufacturing firms show a statistically significant impact of outsourcing only for the relative employment of Technicians. The results point to a positive impact of outsourcing from low-income countries on the relative employment of Technicians, while the statistically significant and negative coefficient of the variable, controlling for outsourcing from high-income countries, implies that outsourcing from high-income countries has a weaker but still positive impact on the relative employment of Technicians. In order to test if the sum between the coefficient *Outsourcing*, which measures the impact of outsourcing from low-income countries on the relative employment of Technicians, and interaction term, i.e. *Outsourcing_high*, is statistically significantly different from zero, the Wald test was applied (the p-value of the F-test was 0.035). In service firms, outward FDI to low-income countries shows a statistically significant positive impact on the relative employment of Professionals. The insignificant coefficient of the variable *FDI_high* implies that FDI to high-income countries does not have a stronger impact on the relative employment of Professionals than FDI to low-income countries. The Wald test indicates outward FDI has a positive impact on the relative employment of Professionals in service firms (the p-value of the F-test between the variables *FDI* and *FDI_high* was 0.000). In addition, similarly as for manufacturing firms, the results for service firms show a positive impact of outsourcing from low- and high-income countries on the relative employment of Technicians (the p-value of the F-test between the two variables was 0.001).

Table 6. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms, using occupational classification for defining skills (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.153***	0.022	0.037*	0.132***	0.014	0.033
	[5.04]	[1.08]	[1.85]	[4.19]	[0.59]	[1.44]
FDI_high	-0.001	0.004	0.006	0.086	-0.064	-0.052
	[-0.03]	[0.17]	[0.25]	[1.32]	[-1.05]	[-0.85]
Outsourcing	18.390	9.327	11.240	37.49***	6.797	13.40***
	[0.69]	[0.45]	[0.66]	[2.86]	[1.51]	[2.85]
Outsourcing_high	-64.63**	-10.290	-15.370	-27.73*	-2.318	-6.16
	[-2.24]	[-0.49]	[-0.89]	[-1.75]	[-0.43]	[-1.08]
High	0.150***	0.000	0.020	0.153***	0.029*	0.058***
	[4.52]	[0.005]	[1.07]	[6.65]	[1.93]	[4.21]
log(capital per emp)	0.004	0.019***	0.018***	-0.012**	0.002	-0.002
	[0.45]	[2.59]	[2.74]	[-2.18]	[0.47]	[-0.55]
log(tfp)	0.138***	0.030***	0.043***	0.146***	0.017***	0.046***
	[11.6]	[2.75]	[4.40]	[19.4]	[2.63]	[8.00]
log(export value)	-0.008***	-0.003*	-0.004***	-0.010***	0.000	-0.004**
	[-4.22]	[-1.80]	[-3.04]	[-3.69]	[0.079]	[-2.15]
log(gross wage)	0.454***	0.229***	0.260***	0.353***	0.157***	0.203***
	[13.1]	[8.68]	[9.90]	[21.4]	[11.0]	[14.8]
log(domestic costs)	0.041***	-0.024*	-0.006	0.000	0.012	0.007
	[3.69]	[-1.88]	[-0.61]	[0.028]	[1.43]	[1.09]
Constant	-2.250***	1.500***	-0.606*	-0.857***	1.620***	0.746***
	[-5.84]	[3.82]	[-1.79]	[-4.14]	[6.93]	[3.30]

Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.026	0.024		0.012	0.009
R-squared (between)		0.084	0.145		0.131	0.212
R-squared (overall)	0.176	0.091	0.150	0.195	0.110	0.185
Sargan-Hansen statistics		608.733***			1,003.023***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where Managers, Professionals, and Technicians in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI; *FDI_high*: dummy variable, controlling for the outward FDI to high-income countries; *Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Table 7. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms, for the major skilled occupational groups (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Managers	**Professionals**	**Technicians**	**Managers**	**Professionals**	**Technicians**
FDI	-0.013	0.049	-0.014	-0.022	0.161***	-0.032
	[-0.47]	[1.26]	[-0.53]	[-0.54]	[4.06]	[-0.90]
FDI_high	0.031	0.068	-0.041	0.042	0.007	-0.067
	[0.72]	[1.33]	[-1.32]	[0.58]	[0.10]	[-1.09]
Outsourcing	-8.522	9.717	79.35**	3.162	-3.324	37.180**
	[-0.47]	[0.18]	[2.40]	[0.36]	[-0.68]	[2.29]
Outsourcing_high	3.103	-12.38	-67.09**	-10.32	-1.262	4.780
	[0.17]	[-0.23]	[-2.02]	[-1.28]	[-0.22]	[0.27]
High	0.022	0.014	0.031	0.006	0.028**	0.065***
	[1.02]	[0.74]	[1.21]	[0.32]	[1.99]	[3.00]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)	0.029	0.053	0.024	0.016	0.028	0.035
R-squared (between)	0.030	0.186	0.126	0.030	0.084	0.084
R-squared (overall)	0.040	0.176	0.103	0.026	0.093	0.091
Sargan-Hansen statistics	268.051***	504.516***	487.702***	250.856***	796.516***	584.975***

Note. Econometric method: FE: fixed effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where Managers, Professionals, and Technicians in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI; *FDI_high*: dummy variable, controlling for the outward FDI to high-income countries; *Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries. Control variables used: logarithm of the capital per employee in a firm, logarithm of the total factor productivity per employee in a firm, logarithm of the value of exports, logarithm of the average annual gross wage level, logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Finally, both dimensions for defining skills are combined, defining workers as skilled if they meet both criteria; i.e. if they attain tertiary education and are classified as Managers, Professionals, or Technicians. Equally as when defining skills by only occupational level, the results from the Table 8 for the most preferred method, i.e. the fixed effects, are not statistically significant. When dividing the analysis into the three major occupational groups (Table 9), the results for manufacturing and service firms show that outsourcing from low- and high-income countries has a positive impact on the relative employment of tertiary educated Technicians, where outsourcing from high-income countries has a positive but weaker impact than outsourcing from low-income countries. For manufacturing firms, the p-value of the F-test between the two variables was 0.069, whereas for service firms, it was 0.014. In addition, outward FDI to low- and high-income countries has a positive impact on the relative employment of tertiary educated Technicians in manufacturing firms (the p-value of the F-test between the two variables was 0.026) and also on the relative employment of tertiary educated Professionals in service firms (the p-value of the F-test between the two variables was 0.000).

These results suggest that the effect of educational level is not common, but it instead differs between different occupational groups, indicating that firms give different weight on educational attainment when employing individuals with different occupations. In manufacturing firms, outward FDI to high- and low-income countries does not have a positive impact on the relative employment of Technicians but only on the relative employment of tertiary educated Technicians. This result indicates that FDI firms would rather employ more educated Technicians. The finding is especially interesting as, taking into account descriptive statistics, less than a third of Technicians in the sample are tertiary educated, which means that a higher educational level gives them an opportunity to differentiate from the peers. Furthermore, following the hypothesis made in the introduction, one would expect that outsourcing from high-income countries would increase firms' skill share due to importing more technologically advanced inputs. However, results show that outsourcing from low-income countries has a positive impact on the relative employment of Technicians in both, manufacturing and service firms, and that the impact of outsourcing from low-income countries is on average stronger than the impact of outsourcing from high-income countries. The latter result is not entirely consistent with aforementioned hypothesis. But, this finding might also indicate that outsourcing from high-income countries might not be a sufficient proxy for importing technologically more advanced inputs, which would be important to take into account in the future analyses.

Table 8: The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms, using educational level and occupational classification for defining skills (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.220***	0.036	0.071**	0.364***	0.026	0.092***
	[5.39]	[1.21]	[2.53]	[7.72]	[0.77]	[2.82]
FDI_high	-0.135**	0.025	0.027	0.073	-0.042	-0.018
	[-2.56]	[0.68]	[0.75]	[1.02]	[-0.71]	[-0.31]
Outsourcing	-26.840	17.480	14.800	71.24**	18.57	27.54**
	[-0.65]	[0.44]	[0.43]	[2.23]	[1.47]	[2.10]
Outsourcing_ high	-7.378	-17.230	-16.000	-52.92	-11.68	-16.79
	[-0.18]	[-0.45]	[-0.47]	[-1.42]	[-0.95]	[-1.30]
High	0.186***	0.041**	0.060***	0.184***	0.057***	0.095***
	[4.73]	[1.96]	[2.95]	[5.69]	[3.14]	[5.71]
log(capital per emp)	0.002	0.011	0.013	-0.008	0.003	0.003
	[0.14]	[1.26]	[1.62]	[-1.03]	[0.51]	[0.55]
log(tfp)	0.029**	-0.007	-0.010	0.068***	-0.049***	-0.024***
	[2.08]	[-0.59]	[-0.93]	[6.87]	[-6.41]	[-3.47]
log(export value)	0.001	0.001	0.002	-0.005	0.000	-0.002
	[0.45]	[0.62]	[1.03]	[-1.42]	[0.16]	[-0.89]
log(gross wage)	0.640***	0.246***	0.297***	0.674***	0.168***	0.273***
	[16.4]	[9.41]	[11.3]	[27.3]	[11.3]	[17.6]
log(domestic costs)	0.168***	0.044***	0.096***	0.110***	0.076***	0.085***
	[13.0]	[3.15]	[9.16]	[12.3]	[7.39]	[11.5]
Constant	-6.439***	-0.648	-3.164***	-6.425***	-0.801**	-2.355***
	[-12.1]	[-1.32]	[-9.98]	[-21.6]	[-2.45]	[-9.38]

Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.061	0.057		0.031	0.024
R-squared (between)		0.111	0.180		0.085	0.234
R-squared (overall)	0.196	0.111	0.173	0.212	0.078	0.195
Sargan-Hansen statistics		542.808***			1,611.500***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated Managers, Professionals, and Technicians in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI; *FDI_high*: dummy variable, controlling for the outward FDI to high-income countries; *Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Table 9. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms, for the major skilled occupational groups (observation period: 1997-2010, only tertiary educated)

	Manufacturing firms			*Service firms*		
	Managers	**Professionals**	**Technicians**	**Managers**	**Professionals**	**Technicians**
FDI	0.015	0.036	0.089***	-0.026	0.145***	0.070
	[0.50]	[0.99]	[2.70]	[-0.66]	[3.69]	[1.62]
FDI_high	-0.004	0.075	-0.036	0.021	0.046	-0.091
	[-0.086]	[1.51]	[-0.81]	[0.33]	[0.72]	[-1.16]
Outsourcing	6.473	25.900	57.590**	2.340	-1.409	41.350**
	[0.44]	[0.57]	[2.14]	[0.28]	[-0.31]	[2.43]
Outsourcing_high	-6.381	-29.770	-52.080*	1.138	-5.204	-26.810*
	[-0.43]	[-0.67]	[-1.95]	[0.13]	[-0.95]	[-1.71]
High	0.024	0.017	0.045**	0.017	0.031**	0.048***
	[1.35]	[1.03]	[2.37]	[1.08]	[2.35]	[2.80]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)	0.021	0.055	0.058	0.011	0.030	0.037
R-squared (between)	0.013	0.181	0.139	0.060	0.082	0.064
R-squared (overall)	0.012	0.175	0.133	0.047	0.091	0.076
Sargan-Hansen statistics	693.487***	586.418***	380.796***	569.012***	791.558***	563.509***

Note. Econometric method: FE: fixed effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated Managers, Professionals, and Technicians in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI; *FDI_high*: dummy variable, controlling for the outward FDI to high-income countries; *Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries. Control variables used: logarithm of the capital per employee in a firm, logarithm of the total factor productivity per employee in a firm, logarithm of the value of exports, logarithm of the average annual gross wage level, logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

6. CONCLUSION

This paper studies the impact of outward FDI and outsourcing on the relative employment of skilled employees in Slovenian manufacturing and service firms. Using a matched firm-employee level dataset for the period from 1997 to 2010, the study contributes to the previous studies in several ways. First, it incorporates both measures of strategic positioning of firms into one model with the purpose of measuring differential effect of outward FDI and outsourcing on the skill structure of firms. In addition, study differentiates between outsourcing from high- and low-income countries, and outward FDI to high- and low-income countries. Finally, different dimensions when defining skills are taken into account in order to increase the explanatory value of the model. The basic model uses a conventional definition of skills, defining workers as skilled when they attain tertiary education. However, since workers develop additional knowledge and expertise after entering employment, taking into account solely the level of formal education when defining skills ignores the knowledge acquired during the course of employment. Consequently, three major occupational groups define workers as skilled in the model extensions; Managers, Professionals, and Technicians.

The main findings of the analysis are the following. First, outward FDI has a positive impact on firms' skill share in manufacturing firms, while outsourcing has a positive impact on firms' skill share in service firms. Second, when controlling also for the income level of destination countries, the impact of outsourcing in service firms is no longer positive. On the other hand, in manufacturing firms, outward FDI to low- and high-income countries have a positive impact on firms' skill share. These results confirm the hypothesis about the expected positive effect of outward FDI to low-income countries, while the hypothesis for the expected positive effect of outsourcing from high-income countries is not confirmed.

Finally, using workers' occupational level for defining skills increases the explanatory power of the model. Results for manufacturing firms show that outward FDI to high- and low-income countries have a positive impact on the relative employment of tertiary educated Technicians, while the result for Technicians in general is not significant. This result indicates that firms differentiate between more and less educated individuals within the same occupational group. In addition, this holds only in the case of Technicians, the group with the lowest share of tertiary educated among the three skilled occupation groups, indicating that a Technician can best differentiate from his or her peers by obtaining a higher level of education. Furthermore, the results also show that outsourcing from low-income countries has a stronger impact on the relative employment of tertiary educated Technicians than outsourcing from high-income countries in both, manufacturing and service firms. This result might be the consequence of a different skill structure of outsourcing firms, which was already indicated in descriptive statistics. Namely, the share of tertiary educated workers in outsourcing firms is lower than in FDI firms, which might be a sign that outsourcing firms have different preferences for employing workers with different occupational attainment compared to FDI firms. In the future analyses, it would therefore be interesting to control also for reverse causality between the dependent and control variables. In addition, this result in general confirms the hypothesis, which

assumed that outsourcing from high-income countries increases firms' skill share. The reasoning behind the hypothesis was that outsourcing from high-income countries is a proxy for importing more technologically advanced inputs. In order to fully analyse this hypothesis, it would be important in the future studies to instead of controlling only for the income level of source countries to control also for the type of imported inputs; i.e. high-technology versus low-technology inputs. The results in this paper might indicate that controlling solely for the income level of source countries in the case of outsourcing might not be a sufficient proxy for the technology level of inputs.

Results also bring policy implications as they confirm how important it is for the governments to provide competitive educational system that would equip individuals with skills and knowledge, which would they later use while working. Finally, paper's results might also encourage individuals to invest in acquiring additional skills and increase their educational level in order to increase their employability.

With the aim of deepening the results of the empirical model, it would be useful to include additional measures for the outward FDI, especially since outward FDI proved to have an important impact on the skill structure of firms. These measures would for instance include the performance indicators of foreign partners that are in control of domestic firms, their employment structure, their value added, their value of the foreign investment, etc. Some of the information is already included in the dataset, but only for the recent years. Therefore, by extending the observation period, the new information might bring additional contributions to the results. In addition, although this study uses additional dimension when defining skills, it would be interesting to control also for other variables (e.g. the period of employment), and personal characteristics of workers (e.g. gender, length of pursuing the studies, social status of the family, etc.) in order to fully control for the informal education of workers. Finally, since previous empirical studies confirmed the importance of analysing not only the impact of outward FDI and/or outsourcing on skills, but rather its impact on offshorable and non-offshorable occupations, it would be interesting to broaden the empirical analysis also to other occupational groups.

In the future studies, it would also be interesting to test the self-selection of firms into outward FDI and outsourcing, as many studies confirmed the self-selection of more productive firms into trading activities (see for example Damijan and Kostevc, 2015; Wagner, 2011; and Melitz 2003). By estimating data on German manufacturing firms, Wagner (2011) confirms there is a self-selection of firms into offshoring. The analysis concludes these firms are larger, more productive and more human capital intensive. Studying the Spanish manufacturing firms, Damijan and Kostevc (2015) confirm that more productive firms self-select into importing. By importing, firms get an access to new, cheaper and/or better-quality products, which decrease firms' variable costs and enable greater investing in innovations. Furthermore, studying the Belgian firm-level data, Amiti, Itskhoki and Konings (2014) confirm that more productive firms import a larger share of their inputs from abroad, which additionally increases their productivity. Although the current paper controls for several firm-characteristic variables, it is limited in controlling fully also for the self-selection of firms into outward FDI and outsourcing.

Therefore, it would be interesting to analyse also the reverse causality between firms' skill structure, and outward FDI and outsourcing.

Finally, it would also be important to take into account in the future studies the recent changes in the economic environment and especially the impacts of various structural reforms. However, since Slovenia passed a labour market reform only in 2013, it would be necessary to extend the observation period in order to fully capture its effects. Using Italian survey data, Presbitero, Richiardi, and Amighini (2012) empirically analyse whether the increased usage of more flexible types of employment can be a substitute to offshoring, and whether it also additionally increases delocalization. The results show that a higher share of temporary workers reduces the likelihood of offshoring in the future. However, the results no longer hold after controlling also for reverse causality and spurious correlation.

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APPENDICES

Appendix A: Derivation of the model

First, consider the following production function for firm i in year t:

$$Y_{it} = A_{it} K_{it}^{\alpha} H_{it}^{\beta} C_{it}^{1-\alpha-\beta} \quad \text{(A1)}$$

As already mentioned, the dependent variable, Y_{it}, is output, A_{it} is productivity, K_{it} is capital, H_{it} is skilled labour, and C_{it} is composite input, consisting of domestic and foreign inputs ($C_{it} = D_{it} + F_{it}$), where the latter relate to outsourcing and/or outward FDI activities, whereas the former relate to domestic costs and unskilled labour.

As in Hummels et al. (2014), I introduce P_{it} as a reduced-form of the demand for firm i's products and determine the demand for skilled labour of firm i in year t, by taking derivatives of the equation (A1):

$$P_{it} (\partial Y_{it} / \partial H_{it}) = P_{it} A_{it} K_{it}^{\alpha} \beta H_{it}^{\beta-1} C_{it}^{1-\alpha-\beta} \quad \text{(A2)}$$

First, foreign inputs of firms, F_{it}, are separated into outsourcing (Out_{it}) and outward FDI (FDI_{it}) activities ($F_{it} = Out_{it} + FDI_{it}$), while the domestic inputs of firms, D_{it}, are separated into unskilled labour (L_{it}) and domestic costs (DC_{it}); ($D_{it} = L_{it} + DC_{it}$). Next, I take logarithms of the equation (A2) and get the following:

$$\ln P_{it} + \ln A_{it} + \alpha \ln K_{it} + \beta(\beta-1) \ln H_{it} + (1-\alpha-\beta) \ln(Out_{it} + FDI_{it} + L_{it} + DC_{it}) = 0 \quad \text{(A3)}$$

To implement equation (A3) in the data, the equation is first rearranged so that the variable of interest is the skilled labour:

$$-\beta(\beta-1) \ln H_{it} = \ln P_{it} + \ln A_{it} + \alpha \ln K_{it} + (1-\alpha-\beta) \ln(Out_{it} + FDI_{it} + L_{it} + DC_{it}) \quad \text{(A4)}$$

The variables are divided by the total number of employees in a firm. However, as already explained, following Hummels et al. (2014), I do not scale outsourcing, exports and levels of domestic costs by firm size in order to enhance the explanatory value of the model. Furthermore, as in Hummels et al. (2014), the logarithm of the value of exports (X_{it}) is introduced to capture time varying shocks to the demand of firms' output (P_{it}), and the logarithm of the average wage level in firm i and year t (W_{it}).

Finally, the observed model is the following:

$$\begin{aligned} Skill\_share_{it} = {} & \beta_0 + \beta_1 Out_{it} + \beta_2 FDI_{it} + \beta_3 X_{it} + \beta_4 A_{it} + \beta_5 K_{it} + \\ & + \beta_6 W_{it} + \beta_7 DC_{it} + Time_t + Ind_t + \varepsilon_{it} \end{aligned} \quad \text{(A5)}$$

Appendix B: Description of ISCO-88 major occupational groups

ISCO-88 classification arranges occupations in ten major groups. The first major group, "Managers", includes legislators, senior officials and managers, whose main tasks consist of determining, formulating and supervising the implementation of government policies, laws and public regulations, or planning, directing and coordinating the policies and activities of enterprises, organisations or departments. The next major group are "Professionals" who work in the fields of physical, life or social sciences, or humanities. They are responsible for increasing the existing stock of knowledge, finding solutions to the problems by applying scientific and artistic concepts and theories, and transferring their knowledge onto others. Another major group, "Technicians", includes technicians and associate professionals who have technical knowledge and experience in the fields of physical, life or social sciences, or humanities. Their main tasks include carrying out technical work and teaching at particular educational levels, related with the abovementioned fields. Furthermore, the group "Clerks" includes occupations which possess the knowledge and skills of organising, storing, computing and retrieving information. Their main tasks are performing secretarial duties, operating different office machines, recording and computing numerical data, and performing various customer-oriented clerical duties. The group "Service workers" covers service, shop, and market sales workers whose main tasks consist of providing personal and protective services, and selling goods in shops or at markets. In addition, the group "Agricultural workers" consists of skilled agricultural and fishery workers, who produce farm, forestry and fishery products, and sell them to purchasers, marketing organisations or at markets. Next, the group "Craft workers" includes craft and other related trade workers, whose main tasks include extracting raw materials, constructing buildings and other structures, and making various products and handicraft goods. Moreover, the group "Machine operators" includes plant and machine operators and assemblers who operate and monitor large scale, and often highly automated, industrial machinery and equipment. "Elementary occupations" combine occupations the main tasks of which in general include simple and routine tasks by using the hand-held tools and in some cases considerable physical effort. Finally, the group "Armed forces" includes individuals, who are serving in the armed forces on a voluntary or compulsory basis and are restricted to accept civilian employment (ILO, 2014).

Appendix C: Complementary tables

Table C1. Cross-tabulation between outward FDI and outsourcing dummy variables

			FDI		Total (Outsource)
			No	Yes	
Outsource	No	Row percentage	98.0%	2.0%	100.0%
		Column percentage	91.8%	68.7%	91.2%
	Yes	Row percentage	90.8%	9.2%	100.0%
		Column percentage	8.2%	31.3%	8.8%
Total (FDI)		Row percentage	97.4%	2.6%	100.0%
		Column percentage	100.0%	100.0%	100.0%

Note. Outsource is a dummy variable, controlling for firms that import intermediate products from abroad; *FDI* is a dummy variable, controlling for firms that engage in the outward FDI. Pearson's chi-squared test: 7,000 (Pr = 0.000).
Source: SORS, author's calculations

Table C2. Characteristics of Slovenian firms which use outward FDI to and outsource from high-income countries

Firms, using outward FDI to high-income countries							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Employment	509.4	421.3	407.8	309.1	214.2	200.4	199.3
Employment of tertiary educated	56.3	55.0	63.5	59.1	39.6	40.1	42.1
Skill share	23.83	25.49	31.46	32.6	34.69	35.85	37.5
Age	39.5	39.5	40.1	40.1	40.6	41.2	41.7
Gross wage	8,930	12,782	17,741	20,128	19,547	19,894	20,481
Gross wage of tertiary educated	15,835	21,712	26,789	29,254	27,963	27,881	28,004
Number of firms	143	172	198	197	207	194	195
Firms, outsourcing from high-income countries							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Employment	27.8	27.2	34.2	35.3	33.6	30.3	29.6
Employment of tertiary educated	2.4	3.0	4.2	4.6	4.5	4.8	4.8
Skill share	22.8	22.4	25.1	25.8	25.6	26.9	27.9
Age	35.9	38.1	39.0	39.4	39.9	40.4	40.5
Gross wage	5,787	9,256	13,987	14,884	15,897	16,167	16,936
Gross wage of tertiary educated	9,106	14,139	20,092	20,677	22,361	22,156	22,437
Number of firms	1,495	1,782	1,345	1,649	1,942	1,839	1,797

Note. The explanations of variables are as follows: *Outsourcing firms*: firms that import intermediate products; *FDI firms*: firms that engage in the outward FDI; *Employment*: mean number of employees; *Employment of tertiary educated*: mean number of tertiary educated employees; *Skill share*: the average of the share of the tertiary educated; *Age*: mean age of employees; *Gross wage*: mean annual gross wage in €; *Gross wage of tertiary educated*: mean annual gross wage of tertiary educated employees in €; *Number of firms*: number of observations.
Source: SORS, author's calculations

Table C3. Characteristics of employees in unskilled occupations

Clerical workers							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Share in the total employment	12.0	10.5	9.7	9.5	9.3	9.5	9.4
Share in the tertiary educated	4.5	4.7	5.9	6.3	6.4	6.6	6.8
Age	35.0	37.1	38.7	38.8	39.3	39.7	39.9
Gross wage	5,203	8,126	10,451	11,064	11,622	11,730	12,044
Gross wage of tertiary educated	7,357	11,217	12,981	13,593	14,419	14,482	14,626
Service workers							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Share in the total employment	11.1	11.3	11.2	11.4	11.5	12.1	12.3
Share in the tertiary educated	1.3	1.6	2.3	2.8	3.0	3.3	3.6
Age	33.0	35.0	36.4	36.7	37.2	37.6	38.0
Gross wage	4,225	6,369	8,286	8,862	9,365	9,458	9,859
Gross wage of tertiary educated	6,698	9,654	11,006	11,411	12,295	12,286	12,766
Craft workers							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Share in the total employment	15.8	16.8	17.8	18.0	18.2	17.9	17.4
Share in the tertiary educated	0.4	0.7	1.3	1.4	1.5	1.6	1.7
Age	35.0	36.6	38.2	38.3	38.6	39.1	39.6
Gross wage	4,553	6,827	9,054	9,615	10,218	10,244	10,631
Gross wage of tertiary educated	6,689	10,606	13,804	14,393	15,984	15,680	15,744
Machinery workers							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Share in the total employment	27.8	23.1	19.0	18.2	17.5	15.8	15.5
Share in the tertiary educated	4.9	5.9	2.5	2.3	2.4	2.1	2.0
Age	35.3	37.4	39.4	39.7	40.1	40.6	41.2
Gross wage	4,582	7,120	9,468	10,154	10,601	10,529	11,241
Gross wage of tertiary educated	6,210	8,512	12,522	13,744	14,427	14,645	16,352
Elementary workers							
Year	**1998**	**2002**	**2006**	**2007**	**2008**	**2009**	**2010**
Share in the total employment	7.2	11.2	13.1	13.5	13.8	13.4	13.1
Share in the tertiary educated	0.1	0.2	0.5	0.5	0.6	0.6	0.7
Age	35.8	36.5	37.9	38.1	38.5	39.2	40.0
Gross wage	3,664	5,400	7,031	7,483	7,700	7,815	8,385
Gross wage of tertiary educated	4,942	6,463	8,340	8,702	9,619	9,334	9,571

Note. The explanations of variables are as follows: *Share in the total employment*: share of a particular occupational group in the total employment (in %); *Share in the tertiary educated*: share of a particular occupational group in the total number of tertiary educated employees (in %); *Age*: mean age of a particular occupational group; *Gross wage*: mean gross annual wage of a particular occupational group in €; *Gross wage of tertiary educated*: mean gross annual wage of tertiary educated employees in €.
Source: SORS, author's calculations

Table C4. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms, robustness checks: include firm size as explanatory variable (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.158***	0.063**	0.090***	0.285***	-0.019	0.042
	[4.52]	[2.26]	[3.43]	[7.08]	[-0.57]	[1.38]
Outsourcing	-29.46***	0.114	-2.032	32.280**	6.616	12.270**
	[-4.13]	[0.020]	[-0.41]	[1.99]	[1.20]	[2.11]
log(capital per emp)	0.009	0.016	0.019**	-0.005	0.012**	0.0104**
	[0.81]	[1.64]	[2.26]	[-0.68]	[2.07]	[2.05]
log(tfp)	-0.031	-0.005	-0.001	0.126***	0.003	0.033***
	[-1.39]	[-0.43]	[-0.098]	[8.90]	[0.40]	[4.11]
log(export value)	-0.001	0.000	0.000	-0.017***	-0.001	-0.006***
	[-0.59]	[0.08]	[0.08]	[-5.19]	[-0.55]	[-2.75]
log(gross wage)	0.638***	0.240***	0.290***	0.608***	0.132***	0.234***
	[15.7]	[8.63]	[10.5]	[25.3]	[9.02]	[15.6]
log(domestic costs)	0.204***	0.039**	0.0849***	0.080***	0.026**	0.034***
	[11.2]	[2.30]	[5.90]	[6.38]	[2.37]	[3.88]
log(employment)	-0.081***	0.032	0.039*	0.130***	0.197***	0.188***
	[-2.72]	[1.16]	[1.77]	[6.36]	[9.45]	[11.8]
Constant	-6.354***	-0.606	-2.363***	-5.638***	-0.105	-1.482***
	[-11.9]	[-1.04]	[-4.19]	[-18.0]	[-0.31]	[-5.78]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.068	0.064		0.039	0.031
R-squared (between)		0.098	0.165		0.060	0.205
R-squared (overall)	0.099	0.156	0.200	0.056	0.168	0.216
Sargan-Hansen statistics		503.784***			1,384.700***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated workers are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; Outsourcing*: share of intermediate imports in the total material costs; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level; *log(employment)*: logarithm of the number of employees. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Table C5. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms; robustness checks: exchange total factor productivity for value added (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.136***	0.063**	0.094***	0.302***	0.012	0.082***
	[3.87]	[2.30]	[3.62]	[7.54]	[0.37]	[2.68]
Outsourcing	-34.140***	1.577	0.012	32.730**	12.580**	17.290***
	[-4.65]	[0.29]	[0.0024]	[2.03]	[1.98]	[2.69]
log(capital per emp)	0.015	0.013	0.016*	-0.022***	0.003	0.001
	[1.30]	[1.40]	[1.90]	[-2.84]	[0.52]	[0.14]
log(value added per emp)	0.013	-0.014	-0.012	0.112***	-0.039***	-0.006
	[0.60]	[-1.08]	[-0.97]	[8.27]	[-4.50]	[-0.77]
log(export value)	-0.003	0.000	0.001	-0.017***	-0.002	-0.006***
	[-1.18]	[0.098]	[0.32]	[-4.99]	[-0.77]	[-2.74]
log(gross wage)	0.629***	0.243***	0.294***	0.613***	0.153***	0.255***
	[15.5]	[8.83]	[10.7]	[25.7]	[10.4]	[16.8]
log(domestic costs)	0.157***	0.057***	0.108***	0.100***	0.098***	0.105***
	[15.4]	[3.80]	[10.4]	[12.4]	[9.21]	[13.9]
Constant	-5.924***	-0.780	-2.608***	-5.909***	-0.937***	-2.348***
	[-11.4]	[-1.37]	[-4.87]	[-20.7]	[-2.74]	[-9.52]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,795	41,795	41,795	87,621	87,621	87,621
R-squared (within)		0.068	0.064		0.033	0.025
R-squared (between)		0.097	0.167		0.067	0.213
R-squared (overall)	0.183	0.100	0.160	0.193	0.068	0.179
Sargan-Hansen statistics		1,694.361***			1,464.491***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated workers are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI; *Outsourcing*: share of intermediate imports in the total material costs; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(value added per emp)*: logarithm of the value added per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Table C6. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms, robustness checks: include firm size as explanatory variable; robustness checks: exchange total factor productivity for value added (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.159***	0.063**	0.090***	0.280***	-0.019	0.043
	[4.52]	[2.26]	[3.44]	[6.96]	[-0.57]	[1.38]
Outsourcing	-29.63*0**	-0.007	-2.150	32.310**	6.641	12.300**
	[-4.15]	[-0.0012]	[-0.43]	[2.00]	[1.21]	[2.11]
log(capital per emp)	0.013	0.016*	0.019**	-0.022***	0.012**	0.006
	[1.09]	[1.72]	[2.26]	[-2.90]	[2.01]	[1.19]
log(value added per emp)	-0.020	-0.003	0.001	0.127***	0.003	0.0319***
	[-0.91]	[-0.26]	[0.10]	[8.92]	[0.30]	[4.00]
log(export value)	-0.001	0.000	0.000	-0.017***	-0.001	-0.006***
	[-0.57]	[0.083]	[0.11]	[-5.16]	[-0.55]	[-2.74]
log(gross wage)	0.634***	0.240***	0.290***	0.607***	0.132***	0.234***
	[15.6]	[8.62]	[10.5]	[25.3]	[9.03]	[15.6]
log(domestic costs)	0.201***	0.038**	0.083***	0.078***	0.026**	0.035***
	[11.1]	[2.22]	[5.81]	[6.44]	[2.39]	[3.93]
log(employment)	-0.055***	0.037	0.041**	0.037**	0.195***	0.164***
	[-2.80]	[1.56]	[2.23]	[2.50]	[10.5]	[12.0]
Constant	-6.364***	-0.594	-2.351***	-5.632***	-0.104	-1.485***
	[-12.0]	[-1.02]	[-4.17]	[-18.1]	[-0.31]	[-5.79]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,795	41,795	41,795	87,621	87,621	87,621
R-squared (within)		0.069	0.065		0.039	0.031
R-squared (between)		0.099	0.165		0.060	0.205
R-squared (overall)	0.184	0.100	0.157	0.193	0.056	0.168
Sargan-Hansen statistics		1,693.178***			1,571.077***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated workers are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; Outsourcing*: share of intermediate imports in the total material costs; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(value added per emp)*: logarithm of the value added per employee; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level; *log(employment)*: logarithm of the number of employees. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Table C7. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms for the occupational group "Managers" (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.153***	-0.013	-0.007	0.075	-0.022	-0.0244
	[4.04]	[-0.47]	[-0.26]	[1.37]	[-0.54]	[-0.64]
FDI_high	0.077	0.031	0.033	0.094	0.042	0.045
	[1.56]	[0.72]	[0.81]	[0.88]	[0.58]	[0.65]
Outsourcing	39.38	-8.522	-4.528	5.631	3.162	3.072
	[1.18]	[-0.47]	[-0.27]	[0.20]	[0.36]	[0.33]
Outsourcing_high	-66.26*	3.103	-4.694	-22.73	-10.32	-9.253
	[-1.87]	[0.17]	[-0.27]	[-0.67]	[-1.28]	[-1.06]
High	0.0898**	0.022	0.031	0.083**	0.006	0.016
	[2.20]	[1.02]	[1.48]	[2.57]	[0.32]	[0.91]
log(capital per emp)	0.024**	0.023**	0.020**	-0.029***	0.010*	0.001
	[2.16]	[2.53]	[2.55]	[-3.78]	[1.78]	[0.14]
log(tfp)	0.148***	0.040***	0.057***	0.136***	0.029***	0.048***
	[10.1]	[3.16]	[5.02]	[13.3]	[3.58]	[6.70]
log(export value)	-0.001	0.001	-0.001	-0.011***	-0.005*	-0.007***
	[-0.46]	[0.34]	[-0.30]	[-2.95]	[-1.89]	[-3.02]
log(gross wage)	0.400***	0.257***	0.272***	0.300***	0.233***	0.248***
	[10.2]	[8.72]	[9.52]	[14.3]	[13.4]	[15.4]
log(domestic costs)	-0.088***	-0.050***	-0.065***	-0.074***	-0.013	-0.035***
	[-6.65]	[-3.48]	[-5.73]	[-8.28]	[-1.25]	[-4.50]
Constant	-0.868*	-0.074	-1.152**	0.251	0.111	0.127
	[-1.79]	[-0.18]	[-2.05]	[0.78]	[0.39]	[0.51]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.029	0.027		0.016	0.014
R-squared (between)		0.030	0.055		0.030	0.049
R-squared (overall)	0.087	0.040	0.067	0.053	0.026	0.046
Sargan-Hansen statistics		268.051***			250.856***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where Managers in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; FDI_high*: dummy variable, controlling for the outward FDI to high-income countries*; Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Table C8. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms for the occupational group "Professionals" (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.267***	0.049	0.101***	0.373***	0.161***	0.223***
	[5.85]	[1.26]	[2.86]	[6.72]	[4.06]	[5.97]
FDI_high	0.040	0.068	0.0886*	0.166*	0.007	0.046
	[0.59]	[1.33]	[1.82]	[1.67]	[0.10]	[0.70]
Outsourcing	-20.98	9.717	11.01	-17.82*	-3.324	-5.842
	[-0.64]	[0.18]	[0.25]	[-1.81]	[-0.68]	[-1.22]
Outsourcing_high	6.365	-12.38	-13.12	-17.76	-1.262	-2.706
	[0.19]	[-0.23]	[-0.30]	[-1.42]	[-0.22]	[-0.47]
High	0.009	0.014	0.016	0.056***	0.028**	0.047***
	[0.32]	[0.74]	[0.94]	[2.84]	[1.99]	[3.81]
log(capital per emp)	-0.017**	0.004	0.002	0.004	-0.007*	-0.001
	[-2.26]	[0.50]	[0.37]	[0.91]	[-1.91]	[-0.40]
log(tfp)	-0.070***	-0.041***	-0.055***	-0.084***	-0.068***	-0.067***
	[-7.35]	[-4.33]	[-7.17]	[-11.6]	[-11.6]	[-13.6]
log(export value)	0.004**	0.002	0.004**	0.007***	0.005**	0.005***
	[2.01]	[1.03]	[2.46]	[2.73]	[2.07]	[2.96]
log(gross wage)	0.361***	0.096***	0.141***	0.366***	0.048***	0.121***
	[13.6]	[5.51]	[8.56]	[22.8]	[4.89]	[13.1]
log(domestic costs)	0.147***	0.078***	0.121***	0.079***	0.080***	0.083***
	[16.5]	[6.47]	[15.4]	[12.7]	[9.77]	[15.5]
Constant	-4.273***	-0.849**	-2.673***	-3.497***	-1.100***	-1.741***
	[-9.36]	[-2.12]	[-11.8]	[-17.7]	[-3.98]	[-12.8]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.053	0.049		0.028	0.022
R-squared (between)		0.186	0.244		0.084	0.222
R-squared (overall)	0.242	0.176	0.227	0.214	0.093	0.203
Sargan-Hansen statistics		504.516***			796.516***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where Professionals in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI; *FDI_high*: dummy variable, controlling for the outward FDI to high-income countries; *Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Table C9. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms for the occupational group "Technicians" (observation period: 1997-2010)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	-0.027	-0.014	-0.002	0.024	-0.032	0.009
	[-0.68]	[-0.53]	[-0.091]	[0.46]	[-0.90]	[0.27]
FDI_high	-0.304***	-0.041	-0.069**	-0.210**	-0.067	-0.060
	[-5.47]	[-1.32]	[-2.28]	[-2.17]	[-1.09]	[-1.07]
Outsourcing	-43.280	79.35**	57.860	59.580***	37.180**	46.050***
	[-0.90]	[2.40]	[1.60]	[2.77]	[2.29]	[2.90]
Outsourcing_high	-0.257	-67.09**	-49.910	2.928	4.780	1.549
	[-0.01]	[-2.02]	[-1.37]	[0.11]	[0.27]	[0.087]
High	0.192***	0.031	0.055**	0.206***	0.065***	0.103***
	[4.77]	[1.21]	[2.25]	[6.61]	[3.00]	[5.29]
log(capital per emp)	-0.002	0.007	0.010	0.006	-0.024***	-0.017***
	[-0.14]	[0.68]	[1.12]	[0.81]	[-3.56]	[-2.99]
log(tfp)	-0.038***	-0.083***	-0.082***	-0.102***	-0.132***	-0.124***
	[-2.74]	[-6.26]	[-7.19]	[-10.1]	[-14.1]	[-15.8]
log(export value)	-0.007***	-0.002	-0.003	-0.002	0.003	-0.002
	[-2.93]	[-0.89]	[-1.62]	[-0.62]	[0.97]	[-0.69]
log(gross wage)	0.325***	0.070***	0.114***	0.255***	-0.010	0.052***
	[10.1]	[2.66]	[4.65]	[13.1]	[-0.61]	[3.77]
log(domestic costs)	0.215***	0.105***	0.158***	0.241***	0.188***	0.222***
	[17.2]	[6.34]	[13.6]	[28.7]	[15.7]	[28.2]
Constant	-5.234***	-0.608	-1.883***	-5.096***	-0.839**	-2.143***
	[-9.39]	[-0.97]	[-3.86]	[-19.4]	[-2.42]	[-10.5]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.024	0.022		0.035	0.030
R-squared (between)		0.126	0.185		0.084	0.166
R-squared (overall)	0.176	0.103	0.154	0.170	0.091	0.158
Sargan-Hansen statistics		487.702***			584.975***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where Technicians in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; FDI_high*: dummy variable, controlling for the outward FDI to high-income countries*; Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.
Source: SORS, author's calculations

Table C10. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms for the occupational group "Managers" (observation period: 1997-2010, only tertiary educated)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.172***	0.015	0.038	0.296***	-0.026	0.012
	[4.19]	[0.50]	[1.38]	[5.36]	[-0.66]	[0.31]
FDI_high	-0.058	-0.004	0.001	0.028	0.021	0.031
	[-1.02]	[-0.086]	[0.013]	[0.27]	[0.33]	[0.51]
Outsourcing	-1.731	6.473	6.051	39.070	2.340	7.559
	[-0.054]	[0.44]	[0.44]	[1.48]	[0.28]	[0.87]
Outsourcing_high	-16.01	-6.381	-6.625	-30.540	1.138	-1.760
	[-0.49]	[-0.43]	[-0.47]	[-0.90]	[0.13]	[-0.19]
High	0.117***	0.024	0.032*	0.098***	0.017	0.037**
	[3.40]	[1.35]	[1.90]	[3.25]	[1.08]	[2.53]
log(capital per emp)	0.005	0.015**	0.015**	-0.019**	0.001	-0.002
	[0.47]	[2.00]	[2.15]	[-2.57]	[0.19]	[-0.41]
log(tfp)	0.037***	0.025**	0.022**	0.090***	-0.006	0.011*
	[2.75]	[2.14]	[2.17]	[9.63]	[-0.88]	[1.82]
log(export value)	0.004	0.003	0.004*	-0.008**	-0.003	-0.005***
	[1.63]	[1.51]	[1.89]	[-2.37]	[-1.56]	[-2.62]
log(gross wage)	0.432***	0.164***	0.193***	0.440***	0.154***	0.206***
	[13.0]	[7.63]	[9.15]	[21.4]	[11.9]	[16.1]
log(domestic costs)	0.037***	-0.016	0.011	0.031***	0.025***	0.024***
	[3.16]	[-1.30]	[1.14]	[3.69]	[2.80]	[3.64]
Constant	-3.544***	-0.203	-1.520***	-3.761***	-0.790***	-1.367***
	[-7.24]	[-0.52]	[-5.24]	[-12.1]	[-2.89]	[-6.15]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.021	0.018		0.011	0.009
R-squared (between)		0.013	0.062		0.060	0.111
R-squared (overall)	0.075	0.012	0.055	0.098	0.047	0.089
Sargan-Hansen statistics		693.487***			569.012***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated Managers in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; FDI_high*: dummy variable, controlling for the outward FDI to high-income countries*; Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.

Source: SORS, author's calculations

Table C11. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms for the occupational group "Professionals" (observation period: 1997-2010, only tertiary educated)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.288***	0.036	0.093***	0.368***	0.145***	0.204***
	[6.37]	[0.99]	[2.80]	[6.65]	[3.69]	[5.53]
FDI_high	0.053	0.075	0.101**	0.174*	0.046	0.075
	[0.78]	[1.51]	[2.13]	[1.74]	[0.72]	[1.21]
Outsourcing	-21.370	25.900	22.980	-13.730	-1.409	-3.239
	[-0.69]	[0.57]	[0.60]	[-1.47]	[-0.31]	[-0.76]
Outsourcing_high	7.226	-29.770	-25.640	-20.260*	-5.204	-6.498
	[0.23]	[-0.67]	[-0.68]	[-1.69]	[-0.95]	[-1.17]
High	0.020	0.017	0.020	0.060***	0.031**	0.048***
	[0.78]	[1.03]	[1.30]	[3.17]	[2.35]	[4.12]
log(capital per emp)	-0.017**	0.006	0.005	0.001	-0.008**	-0.002
	[-2.27]	[0.86]	[0.84]	[0.27]	[-2.11]	[-0.70]
log(tfp)	-0.063***	-0.034***	-0.048***	-0.080***	-0.062***	-0.061***
	[-7.05]	[-3.77]	[-6.63]	[-11.7]	[-11.2]	[-13.1]
log(export value)	0.005**	0.001	0.004**	0.006***	0.005**	0.005***
	[2.43]	[0.81]	[2.54]	[2.71]	[2.12]	[3.06]
log(gross wage)	0.343***	0.090***	0.134***	0.366***	0.051***	0.122***
	[13.5]	[5.57]	[8.72]	[23.1]	[5.58]	[13.9]
log(domestic costs)	0.139***	0.069***	0.112***	0.073***	0.073***	0.076***
	[16.2]	[6.43]	[15.8]	[12.0]	[9.32]	[14.7]
Constant	-4.049***	-0.741**	-2.598***	-3.391***	-1.063***	-1.727***
	[-9.06]	[-2.01]	[-12.4]	[-17.7]	[-3.92]	[-13.3]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.055	0.050		0.030	0.023
R-squared (between)		0.181	0.248		0.082	0.218
R-squared (overall)	0.251	0.175	0.234	0.213	0.091	0.201
Sargan-Hansen statistics		586.418***			791.558***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated Professionals in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; FDI_high*: dummy variable, controlling for the outward FDI to high-income countries*; Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.

Source: SORS, author's calculations

Table C12. The effect of outsourcing and outward FDI on the skill share in Slovenian manufacturing and service firms for the occupational group "Technicians" (observation period: 1997-2010, only tertiary educated)

	Manufacturing firms			*Service firms*		
	Pooled OLS	**FE**	**RE**	**Pooled OLS**	**FE**	**RE**
FDI	0.214***	0.089***	0.130***	0.340***	0.070	0.156***
	[4.83]	[2.70]	[4.33]	[6.70]	[1.62]	[4.13]
FDI_high	-0.210***	-0.036	-0.048	0.000	-0.091	-0.030
	[-3.62]	[-0.81]	[-1.16]	[-0.00]	[-1.16]	[-0.43]
Outsourcing	19.890	57.590**	50.200*	51.680**	41.350**	45.940***
	[0.63]	[2.14]	[1.94]	[1.98]	[2.43]	[2.77]
Outsourcing_high	-38.790	-52.080*	-47.520*	-24.660	-26.810*	-27.120*
	[-1.22]	[-1.95]	[-1.85]	[-0.88]	[-1.71]	[-1.73]
High	0.123***	0.045**	0.063***	0.092***	0.048***	0.073***
	[4.46]	[2.37]	[3.59]	[3.65]	[2.80]	[4.85]
log(capital per emp)	0.003	-0.014	-0.004	0.002	-0.004	-0.001
	[0.36]	[-1.51]	[-0.52]	[0.39]	[-0.76]	[-0.24]
log(tfp)	-0.019*	-0.046***	-0.048***	-0.063***	-0.081***	-0.077***
	[-1.72]	[-4.48]	[-5.77]	[-7.83]	[-10.9]	[-13.1]
log(export value)	-0.001	-0.002	-0.001	0.003	0.001	0.001
	[-0.33]	[-0.97]	[-0.60]	[0.91]	[0.49]	[0.27]
log(gross wage)	0.300***	0.109***	0.147***	0.341***	0.035***	0.122***
	[11.3]	[5.62]	[8.40]	[18.7]	[2.90]	[11.1]
log(domestic costs)	0.177***	0.0745***	0.126***	0.170***	0.118***	0.146***
	[18.5]	[5.69]	[15.1]	[23.5]	[12.0]	[24.7]
Constant	-5.280***	-1.487***	-2.795***	-5.222***	-1.348***	-2.627***
	[-13.8]	[-3.16]	[-11.4]	[-22.5]	[-4.79]	[-16.9]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,751	41,751	41,751	87,613	87,613	87,613
R-squared (within)		0.058	0.055		0.037	0.032
R-squared (between)		0.139	0.199		0.064	0.144
R-squared (overall)	0.194	0.133	0.181	0.152	0.076	0.142
Sargan-Hansen statistics		380.796***			563.509***	

Note. Econometric methods: Pooled OLS: pooled ordinary least squares; FE: fixed effects; RE: random effects. The dependent variable is defined as the logarithm of the ratio between skilled employees and the total number of employees, where tertiary educated Technicians in ISCO-88 classification are defined as skilled. The explanation of variables: *FDI*: dummy variable, controlling for the outward FDI*; FDI_high*: dummy variable, controlling for the outward FDI to high-income countries*; Outsourcing*: share of intermediate imports in the total material costs; *Outsourcing_high*: share of intermediate imports from high-income countries in the total material costs if a firm imports the majority of its intermediate products from high-income countries; *High*: dummy variable, controlling for high-income countries; *log(capital per emp)*: logarithm of the capital per employee in a firm; *log(tfp)*: logarithm of the total factor productivity per employee in a firm; *log(export value)*: logarithm of the value of exports; *log(gross wage)*: logarithm of the average annual gross wage level; *log(domestic costs)*: logarithm of the domestic cost level. *** p<0.01, ** p<0.05, * p<0.1, robust t-statistics in brackets, the analysis used cluster-robust standard errors.

Source: SORS, author's calculations