



## ORIGINAL ARTICLE


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## Effect of the integration into Global Value Chains on the employment contract in Central and Eastern European countries

**JEL Classification:** F16; F66; J81

**Keywords:** *working conditions; Global Value Chains; well-being of workers; employment contract*

### Abstract

**Research background:** In the era of globalization, there is a need to address decent work deficits in Global Value Chains (GVCs). The forms of working conditions reveal a broad dispersion of contents. The literature review exposes hardly any Europe-focused research assessing the socio-economic impact of global production links and going beyond their pure economic effects assessed in terms of employment, productivity or wages.

**Purpose of the article:** This paper investigates how involvement in GVCs affects labor standards. In particular, we assess how the integration into GVCs impacts the probability of having indefinite type of employment contract, which stands for one of the decent work indicator. Moreover, we draw individual and firm-level characteristics determining the type of employment contract.

**Methods:** We use linked employer-employee data from the Structure of Earnings Survey merged with industry-level statistics on GVCs based on World Input-Output Database — the sample is composed of over 5 million workers from 10 Central and Eastern European countries (CEEC) observed in 2014. The involvement into GVCs is measured using a novel approach based on the concepts of global import intensity (GII). We employ logistic regression with robust standard errors.

**Findings & Value added:** Controlling for individual and firm-level characteristics (sex, age, education level, length of service in enterprise, size of the enterprise) we find that greater integra-

tion into GVCs increases the probability of having temporary type of employment contact, mainly in tradable sectors. However, across CEE countries the relation between GVC and employment type is mixed. In this way we expand the existing literature by reporting the effects of GVCs on labor standards in CEEC.

## Introduction

The recent decades has brought an increasing evidence on the role of proliferation of Global Value Chains (GVCs<sup>1</sup>) in shaping the employment relations. The bulk of research analyses the impact of involvement into Global Value Chains on wages and other working conditions related indicators. Reviewing the relevant literature, it turns out, however, that the majority of research on GVC and working conditions concerns low income countries, while the studies on European countries are rather rare (Smith & Pickles, 2015, pp. 319–353). Moreover, it is not clear, whether the greater inclusion into global production processes results in improvement of quality of work. Recent studies show that the GVC's related processes like economic upgrading (defined as “to make better products, to make products more efficiently, or to move into more skilled activities” (Pietrobelli & Rabelloti, 2006, p. 1)) and social upgrading (described as “the process of improvements in the rights and entitlements of workers as social actors, which enhances the quality of their employment” (Barrientos *et al.*, 2011b, p. 324)) may not occur simultaneously. In other words, the socio-economic impact of global production links is still empirically not confirmed.

Against this background, a significant increase in non-standard types of employment contracts across Europe is observed (IMF, 2017, p. 94). The growing flexibility of employment, next to the fragmentation of production processes, are two major features of the global economy (Presbitero *et al.*, 2015, pp. 81–93). The typical full-time employment is more and more often replaced by so called non-standard forms of employment, which include fixed-term contracts like project- or task-based contracts, seasonal work and casual work (ILO, 2016, pp. 1–374). It is postulated that the type of employment contact significantly influences the well-being of workers (Bosmans *et al.*, 2016, pp. 249–264; Kauhanen & Nätti, 2014, pp. 783–799). Indeed, the burgeoning literature is devoted to examine the impact of non-standard forms of employment on the general quality of employment

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<sup>1</sup> GVC is described as “the full range of activities that firms and workers perform to bring a product from its conception to end use and beyond. This includes activities such as research and development (R&D), design, production, marketing, distribution and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms.” (Gereffi & Fernandez-Stark, 2016, p. 7)

(for review see Hipp *et al.*, 2015, pp. 351–377). The concept of Decent Work promoted by the International Labour Organisation (ILO) points out that the type of employment contract is one of the measurable labour standards (next to wages, social protection, working hours, non-discrimination and harassment, freedom of association and empowerment, see Barrientos *et al.*, 2011a, pp. 298–317). Since, the workers' attitudes towards flexible employment type may be diversified, empirical studies on the relationship between type of employment contract and employees' well-being give no straightforward answers. Regarding Europe, workers predominantly prefer to have stable employment contract over the temporary one, which may be explained by the need for greater security and social protection (Burgoon & Raess, 2009, pp. 554–575).

In this study, we compile two streams of literature which rarely has been analysed together: the phenomenon of temporary employment and Global Value Chains. Despite the enormous research on non-standard forms of employment (a relevant review is presented in section 2), only few of them identify a linkage between involvement in global production processes and the type of employment contract (Görg & Görlich, 2015, pp. 533–554; Presbitero *et al.*, 2015, pp. 81–93; Lee & Lee, 2015, pp. 555–587s).

The main aim of this study is to examine how the sector's involvement into GVCs impacts the workers' labour standards. In particular, we employ the type of employment contract as one of the factors creating the well-being of workers and test how the GVCs may influence the probability of being a temporary worker. To do this, a rich employee-employer data set derived from Structure of Earnings Survey is used. Our sample covers 10 Central and Eastern European countries (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia) resulting in over 5,000,000 observations. We focus on the countries from Central and Eastern Europe, due to the high share of temporary workers in these countries. We use logistic regression with robust standard errors in order to find the determinants influencing the probability of having temporary type of employment contact. We find that individual characteristics of a worker, as well as a presence of collective pay agreements, are significant for determining the extent of a threat of temporary contract. The effect of participation in GVCs on type of contract is also significant, but heterogeneous across different countries and sectors.

The structure of this paper is as follows: section 1 is an introduction itself, in section 2 we provide the literature review on the previous evidence on labour standards with the focus on temporary employment and their relationships with the global production fragmentation processes. Section 3 describes the data used as well as explains the methodology. In section 4,



we present the results of econometric analysis and discussion. Section 5 concludes.

## Literature review

We start this section with a brief review of literature on non-standard forms of employment. Since the evidence of the growing extent of temporary workers in CEE countries is very well documented (for review see e.g. Baranowska & Gebel, 2010, pp. 367–390, 2010; Prosser, 2016, pp. 949–965), we recall only those studies which are related to labour standards. Among the existing studies, Perugini and Pompei (2017, pp. 40–59) report that for CEE countries, on average, the wages of temporary workers are about 14% lower than those of permanent workers. Pirani and Salvini (2015, pp. 121–131) using Italian data from European Union Statistics on Income and Living Conditions (EU SILC), find that temporary employment is negatively correlated with workers' health. Babos (2014, pp. 39–52), using EU SILC data for Central and Eastern European countries, reports that being a temporary workers is rather a trap than a stepping stone, as transition from temporary to permanent employment applies to only 40% of fixed-term worker. Similarly, Aleksynska (2018, pp. 722–735) using EU SILC finds that temporary employment has a negative effect on working conditions. Although a majority of studies find a negative relationship between temporary types of employment contract and workers well-being (Dawson *et al.*, 2017, pp. 69–98), some studies indicate no statistically significant relation (Bardasi & Francesconi, 2004, pp. 1671–1688) or even a positive relation (Taylor, 2006, pp. 127–142).

Turning out to the GVC stream, the literature review shows many studies on the impact of production fragmentation on the demand for skills, the task composition of the labour force and labour markets' polarisation (among others: Autor & Dorn, 2013, pp. 1553–1597; Egger *et al.*, 2015, pp. 112–125; Foster-McGregor *et al.*, 2013, pp. 631–662; Goos *et al.*, 2009, pp. 58–63; Murphy & Oesch, 2017, pp. 1–19; Timmer *et al.*, 2013, pp. 613–661) whereas the relations between GVC on labour standards are much less often analysed<sup>2</sup>. Similarly, the linkage between non-standard types of employment and the GVC are not widely discussed in the literature. Among rare studies, Presbitero *et al.* (2015, pp. 81–93), using Italian

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<sup>2</sup> Existing studies describe mainly the relations between social and economic upgrading for workers in developing countries (see e.g. Barrientos *et al.*, 2011b, pp. 319–340; Barrientos, 2013, pp. 1058–1071). Since our focus is on CEE countries, we do not recall them.



firm-level data, report no relationship between the share of temporary workers in given firm and their propensity to offshore. Görg and Görlich (2015, pp. 533–554) analyse the impact of offshoring on wages for German workers, broken down into temporary and permanent workers and find no difference of this impact. Lee and Lee (2015, pp. 555–587), in turn, based on data for South Korean manufacturing workers, report a positive effect of offshoring on wages which is weaker for temporary workers. In this way, they claim inequalities on the labour market resulting from the globalization effect. González-Díaz and Gandoy (2016, pp. 1255–1270) study the impact of fragmentation of production on the Spanish employment structure and report that the higher share of temporary workers is a determinant of greater demand of manual workers.

However, only few studies focus on the possible impact of GVC on the employment type. Predominantly, it is argued that the greater involvement into GVC may be related to the increasing flexibility and therefore higher share of temporary workers (Posthuma, 2010, pp. 57–80) and lower level of employment stability (Lakhani *et al.*, 2013, pp. 440–472). Greater participation in GVC means greater threat of dealing with global shocks. Hence, companies may be more willing to hire on temporary contracts as it gives more flexibility in adjusting labour inputs to those shocks. Not only intensity of participation, but also position occupied in GVCs matters - developed and developing countries tend to take different positions along the production chain (Szymczak *et al.*, 2019, pp. 1–50). Therefore, specialising in particular production stages, characterised by their very nature with a higher share of temporary workers, may change the employment type structure in a given country/sector. Hierarchical division of work along the chain is mentioned in similar manner e.g. in ILC report (ILC, 2011, pp. 1–284).

Moreover, a given supply chain pressures which result from compulsion to maintain the delivery schedules, but also to reduce costs, involvement into global production fragmentation process may imply worse labour standards (Plank *et al.*, 2012, pp. 1–28). Cost reducing is often raised in the literature as the channel linking GVC and employment type. Switching toward temporary workers and hence reducing labour costs (through lower average wages and benefits, lower costs of hiring and firing of temporary workers) may be firms' answer to the global competition (Tanaka, 2017, pp. 87–99; Esteban-Pretel *et al.*, 2011; pp. 513–526). Similarly, Kim and Lee (2015, pp. 71–97) explain the relation between imports of intermediates and the balance between types of employment.

Temporary type of employment may also emerge because of the low task complexity in the suppliers firms and high substitutability of employees (Lakhani *et al.*, 2013, pp. 440–472). There are suggestions in the litera-



ture saying that an increase in temporary contracts may appear as a substitute to offshoring, however, both of these strategies may also be implemented simultaneously (Presbitero *et al*, 2015, pp. 81–93; Tanaka, 2017, pp. 87–99). Burgoon and Raes (2009, pp. 554–575), using representative sample of German enterprises, find that an increase in foreign direct investment (FDI), trade, and export orientation (share of foreign sales) has a positive effect on the incidence of temporary and fixed-contract work.

Having the above in mind, a further research on the impact of GVC on labour standards (among others the type of employment contract) is needed. In this paper, we fill the research gap on the response of global production fragmentation processes on the employment relations among European workers.

## **Research methodology**

The analysis in this paper is based on the employee-employer data derived from Structure of Earnings Survey (SES). We use the last available wave from 2014 covering 5,236,674 observations for 10 CEE countries<sup>3</sup>. In order to examine the linkages between the involvement into GVC and the probability of temporary employment type, we merge<sup>4</sup> the SES data with industry level statistics from WIOD (World Input-Output Database) release 2016. In this way, we are able to assess how the global production links influence the individual worker's well-being, simplified by the type of employment contract. The main hypothesis therefore is formulated as follows: “*Workers employed in sectors more involved in GVC expose a higher probability to have a temporary type of employment contract*”. The temporary type of employment is more prevalent among workers such as: youth, less educated people, ones with lower occupational experience, who are relatively less competitive on the labour market. The emergence of temporary employment is also gender-biased, with relatively more woman employed on temporary contracts. Some authors (like e.g. Tanaka, 2017, pp. 87–99; Asano *et al.*, 2013, pp. 360–389) even notice that the division of workers according the type of their contract generally mirrors the distinction between skilled and unskilled labour force. To verify the research hy-

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<sup>3</sup> Similar Linked-Employer-Employee-Data (LEED) covering latest years are available but rather for single countries, for instance The Integrated Database for Labour Market Research (IDA) for Denmark or LEED of the Institute of Employment Research (LIAB) for Germany. As we are interested in studying the case of CEE countries, we consider SES database an optimal choice as it covers wide scope of countries.

<sup>4</sup> A detailed description of merging rules is available upon request.



pothesis, we use logistic regression analysis with robust standard errors. As the response variable we employ binary outcome variable which is 1 for temporary type of employment contract and 0 if indefinite. Figure 1 presents the distribution of contract types by countries.

The proportion between temporary and indefinite type of contracts varies significantly across countries. Within CEEC, there are countries with a relatively high share of temporary contracts like Poland (28.36%), Slovenia (22.97%), the Czech Rep. (18.68%) and Slovakia (16.83%), while in the remaining six ones we observe temporary contracts' shares about 6%-3% with the lowest value for Romania (2.83%). The summary statistics of the dependent variable and explanatory variables are presented in Table 1, where we also included a detailed description of all data used.

Among explanatory variables, we include the characteristics of workers such as sex, length of service in enterprise, age, education level as well as company level factors (size of the enterprise and type of collective pay agreement). As we are especially interested in the impact of GVC on our outcome variable, we use Global Import Intensity (GII), proposed by Timmer *et al.* (2016, pp. 1–65), as an indication for GVC involvement. This new approach overcomes the weaknesses of e.g. traditional offshoring measures, in which only the imports needed on the last stage of production are taken into account. On the contrary, the formula proposed by Timmer *et al.* (2016, pp. 1–65) traces imports of intermediates needed on all of the stages of production along the production chain. The value of GII for a particular country-sector  $i$  is calculated as a sum of elements of a matrix  $M_i^{Int}$ :

$$M_i^{Int} = T * (A\bar{z}) + T * (AA\bar{z}) + T * (AA^2\bar{z}) + \dots = T * \left[ A \left[ (I - A)^{-1} z \right] \right] \quad (1)$$

Every next term in the sum of matrices corresponds to the subsequent stage of production, namely, the imports needed at this stage for the final production of  $i$ . Matrix of intermediate input requirements  $A$  is derived from input-output tables, matrix  $T$  cuts out domestic intermediates flow.  $I$  stands for identity matrix,  $z$  is a vector with 1 for country-sector  $i$  and 0 elsewhere.

As the authors of the formula show, by relying on the traditional offshoring measure one may overlook a large part of complexity of international production fragmentation. GII takes values between 0 and 1, where 0 describes entirely domestic production chain and greater values mean greater involvement into production fragmentation processes, either through participation in more fragmented chains or chains with larger values of imports needed at any stages of production. The calculations of GII



are performed on a country-industry level on the full WIOD table, covering 56 industries and 43 countries, using the R implementation by Szymczak *et al.* (2019, 1–50). In our model, we employ a relative change in GII between 2004 and 2014, presented in Figure 2.

For each of the 10 countries we picked for this study, this relative change has a positive sign, however, different dynamics of this change should be noted here. A stand-off value from the bottom of the distribution refers to Romania (<1%). On the other side of the distribution we have Hungary with almost 57% relative change in GII between 2004 and 2014. There is a group of Slovenia, Lithuania and the Czech Republic with very similar results — slightly above 30%. For the remaining countries the relative changes in GII were in the range of 11%–18%.

## Results and discussion

To examine the linkages between the integration into GVC and the probability of having temporary contract of employment, we run several regressions. Table 2 presents the results indicating the determinants influencing the likelihood of temporary type of employment contract for pooled sample (1) and separately for 10 countries (2–11). Based on the model for pooled data, we find determinants which may increase the probability of having temporary type of employment contract. Our results are in line with initial expectations and show that greater probability of having temporary type of employment contract is typical for women, younger, less educated workers and with fewer years of occupational experience, which confirms the assumption that this type of employment is predominant among people with lower chances on the labour market (Reichelt, 2014, pp. 558–572).

We also find that those working in bigger companies and covered with national or industry collective agreement scheme are more likely to work on a temporary basis. This result is in line with the previous evidence existing in the literature: collective bargaining, through implementation of the concept of flexicurity, spread the adoption of non-standard forms of employment (Ibsen & Mailand, 2011, pp. 161–180). This character of impact of collective agreements on type of employment contract is also confirmed by Burgoon and Raess (2009, pp. 554–575), who furthermore stressed the intermediary role of agreements in adoption of changes caused by globalisation.

On the other hand, stronger employment protection forced by certain kinds of agreements may also decrease the scale of temporary contract adoption through promoting long-term worker-employer relationships





(Venn, 2009, pp. 1–54). Turning into the GVC related determinant, we report that workers from sectors which are less involved in global production fragmentation process expose higher probability to work temporary. In this way, we do not find that greater links with globalisation are associated with higher temporary employment probability. Figure 3 shows the predictive margins for selected variables. For instance, for employees who work in the enterprise less than one year the chance of having a temporary contract is about 35%. For workers with 1 to 4 years of experience in the enterprise this chance is already about 15% and only about 5% in the case of 5–14 years of experience. A similar, but weaker, pattern is observed e.g. for the age of employee. The youngest workers (14–19 years old) may expect 12.6% chance of temporary contract, while for the oldest group (60+ years) the same chance is around 10.4%. The group of workers with the lowest level of education corresponds to the value of 13.2% chance and again for best educated employees this chance is slightly lower (10.5%). The probability of having a temporary contract decrease from 12.4% to 10.5% if we move from the sectors less involved in GVCs to most involved, in the terms of GII index. An opposite pattern is observed for variable connected to the size of enterprise, where the chance of temporary type of employment increases from 10.5% for employees of small enterprises to 12.6% for employees of companies belonging to the third size category.

However, if we look into analysed countries separately, we report different effects for different economies. As we focus on the impact of globalisation on the probability of having temporary employment contract, we compare the impact of  $\Delta$ GII on the outcome variable across countries. The negative effect for  $\Delta$ GII is maintained for Estonia, Hungary, Romania, Bulgaria and the Czech Republic, while for Poland, Lithuania and the Slovak Republic the greater involvement of given sector in GVCs is reflected in greater probability of temporary employment of workers. For Latvia and Slovenia, the coefficient for  $\Delta$ GII is not statistically significant. Moreover, considering the impact of collective pay agreements on the probability of temporary employment, no one-way pattern may be observed. However, for most countries, the lack of any type of collective pay agreements are related to the lower chance to have a temporary contract (Burgoon & Raess, 2009, pp. 554–575; Ibsen & Mailand, 2011, pp. 161–180)

Having in mind the ambiguous impact of GVCs on the employment type in particular countries, we provide some extensions of our basic estimations in order to check the reliability of our results. In Table 3, we show

results for separate estimations for tradable and non-tradable sectors<sup>5</sup>, which present different level of integration with international trade. We find that the impact of greater involvement into GVCs resulted in lower chance for temporary employment is mainly materialised in non-tradable sectors, while in tradable sectors the relation is reversed.

Based on the above results some conclusions regarding the impact of GVCs on the employment type may be drawn. First of all, the influence of integration into global production fragmentation processes on workers' labour conditions varies across countries. For most of the CEE countries (except for Poland, Lithuania and the Slovak Republic) the higher involvement in GVC results in lower probability of having temporary type of employment contract. For these countries, the international fragmentation of production does not favour in an increase of probability of temporary employment. However, if we look deeper into this pattern by splitting workers according to the type of the sectors of employment (tradable vs. non-tradable), the analysis reveals diversity in line with our expectations. In particular, in tradable sectors there is a higher chance that temporality of employment may be a consequence of deeper links with globalisation processes, while in non-tradable sectors the relation is not sustained.

Moreover, if we compare the structure of sectors in Poland, Lithuania and Slovak Republic taking into account the tradability, we find that that the majority of workers is employed in tradable sectors, what may provide an explanation of positive relation between  $\Delta GII$  and probability of temporary employment in these countries. In this way, we claim that although the impact of GVCs on employment type varies across countries, the higher involvement in global production fragmentation processes may lead to the greater probability of non indefinite employment contract. As previous studies predominantly confirm a positive relation between GVC involvement and temporary employment share (Lakhani *et al.*, 2013, pp. 57–80; Posthuma, 2010, pp. 57–80), our evidence is partially in line with those results. Workers from sectors more integrated into international trade (tradable sectors) are more exposed to the impact of GVCs on employment type, which is also postulated in the literature (Burgoon & Raess, 2009, pp. 554–575).

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<sup>5</sup> A similar approach for CEE countries is applied by Kordalska and Olczyk (2018, pp. 269–291). Among tradable sectors, we include transportation and storage (H), information and communication (J), financial and insurance activities (K), manufacturing (C) and mining and quarrying (B) according to NACE rev.2 classification.



## Conclusions

In this paper, we examine the determinants of the temporary employment, with the main focus on the impact of the involvement into GVCs. Indeed, we employ employment type as one of the indicators of the labour standards, and therefore we investigate the relationship between GVCs and the social upgrading of workers. Existing studies are mainly devoted to the developing and low income countries, while research for European countries are rare. To the best of our knowledge, there are no studies on the impact of global production fragmentation on the working conditions including temporary employment among European countries.

In particular, we use over 5,000,000 observations coming from employee-employer data, for 10 CEE countries, for the year 2014. Our main aim is to examine how the involvement in GVCs influences the labour standards, simplified by the type of employment contract. Based on the previous literature, we assume the temporary employment as the worse employment type, with less security and social protection. As the implications of global production fragmentation processes may have diversified impact on working conditions, we test the hypothesis on the positive relation between sector's involvement in GVC and the probability to work temporary.

Our results reveal a significant relations between involvement into GVC and the employment type. We find that a greater intensification of global production links may be connected with the higher probability of temporary work. This pattern is most visible in tradable sectors, and in countries with a greater share of tradable sectors (Poland, Lithuania and the Slovak Republic). For the remaining countries, as well as for non-tradable sectors, the higher  $\Delta$ GII does not result in higher probability of temporary employment. These modified effects may be also results of the presence or lack of different collective agreements, working as a catalysts for globalization impact.

Our key contribution is the examination of the effect of globalisation on the situation of individual workers. It is extremely important to analyse the benefits from global trends, not only regarding the economic effects but also social ones. The involvement of CEE countries into global production process is growing, what may be reflected in the working conditions. We provide a cross-country empirical study which helps to understand the globalisation effects on the labour market.

One of the limitations worth to be mentioned is that we are able to assess the involvement in GVCs only at the sectoral level. Obviously, the actual level of a particular firm's GVC participation may differ from the sectoral average, however, there are no data which would allow to calculate it more precisely and then merge it with our micro-level dataset. Other di-



mensions of working conditions (as safety work conditions, social security, work-life balance, etc.) may designate the future research directions. Except for GVC participation, a contribution from the side of GVC field of study would be employing one of available measures of position along the chain (e.g. Wang *et al.*, 2017, pp. 1–72), as there is evidence that this dimension also matters for assessing the overall impact of GVC on labour market outcomes as wages or employment. Another topic worth exploring could also combine the GVC impact on employment type together with deeper analysis of gender distribution across employment types. This issue was raised in some works (e.g. Chan, 2013, pp. 1–27), but not so much for the case of European countries.

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Annex

Table 1. Descriptive statistics, all 10 CEEC, 2014

| Variable  | N       | Mean  | Std. Dev. | Min    | Max   |
|---|---------|-------|-----------|--------|-------|
| <i>temporary</i> : 1 for temporary type of employment contract, 0 for indefinite type of employment contract  | 5236674 | 0.115 | 0.319     | 0      | 1     |
| <i>sex</i> : 0 for female, 1 for male   | 5236674 | 0.501 | 0.500     | 0      | 1     |
| <i>length of service</i> : Length of service in enterprise (in years): 1 for less than 1 year; 2 for 1 to 4 years; 3 for 5 to 14 years; 4 for 15 years and more                               | 5236674 | 2.545 | 0.934     | 1      | 4     |
| <i>size of enterprise</i> Size class category of enterprise to which the local unit belongs: 1 for 1-49 employees; 2 for 50-249 employees; 3 for 250 and more employees                       | 5236278 | 2.038 | 0.842     | 1      | 3     |
| <i>age group</i> Age group category: 1 for 14-19 years; 2 for 20-29 years; 3 for 30-39 years; 4 for 40-49 years; 5 for 50-59 years; 6 for 60 and more years                                   | 5236674 | 3.790 | 1.177     | 1      | 6     |
| <i>educ</i> Highest successfully completed level of education (ISCED-2011): 1 for low level which corresponds to G1 level; 2 for medium level – G2 level; 3 for high level - G3 and G4 levels | 5236674 | 2.294 | 0.596     | 1      | 3     |
| <i>nationagr</i> : 1 if national level or interconfederal agreement exists  | 5236674 | 0.037 | 0.188     | 0      | 1     |
| <i>industagr</i> : 1 if industry agreement or agreement for individual industries in individual regions exists  | 5236674 | 0.157 | 0.364     | 0      | 1     |
| <i>enteragr</i> : 1 if enterprise or single employer agreement exists; agreement applying only to workers in the local unit; any other type of agreement                                      | 5236674 | 0.275 | 0.446     | 0      | 1     |
| <i>noagr</i> : 1 if no collective agreement exists  | 5236674 | 0.531 | 0.499     | 0      | 1     |
| <i>GII_2014_2004</i> : relative change in GII between 2004 and 2014   | 5236674 | 0.230 | 0.240     | -0.637 | 1.333 |

Notes: weights applied (based on grossing-up factor for employees (from SES), country sum=10000). Source: own elaboration based on SES and WIOD.



**Table 2.** Estimation results - for pooled sample and for each of the 10 CEEC separately

| Dep. variable:        | Temporary/fixed duration of employment contract (except apprentice) |                       |                       |                     |                     |                       |                       |                       |                       |                       |                       |
|-----------------------|---|-----------------------|-----------------------|---------------------|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                       | all   | PL                    | EE                    | LT                  | LV                  | SK                    | HU                    | RO                    | BG                    | SI                    | CZ                    |
|                       | (1)   | (2)                   | (3)                   | (4)                 | (5)                 | (6)                   | (7)                   | (8)                   | (9)                   | (10)                  | (11)                  |
| sex, 0-female, 1-male | 0.940***<br>(0.00834)   | 0.813***<br>(0.00679) | 1.081<br>(0.0454)     | 1.012<br>(0.0705)   | 1.548**<br>(0.0698) | 1.053**<br>(0.0171)   | 0.776***<br>(0.0205)  | 1.138***<br>(0.0507)  | 1.019<br>(0.0270)     | 1.075*<br>(0.0369)    | 0.737***<br>(0.0110)  |
| length of service     | 0.260***<br>(0.00162)   | 0.182***<br>(0.00112) | 0.501***<br>(0.0115)  | 0.289**<br>(0.0128) | 0.486**<br>(0.0132) | 0.229***<br>(0.00264) | 0.319***<br>(0.00590) | 0.185***<br>(0.00535) | 0.287***<br>(0.00539) | 0.279***<br>(0.00563) | 0.211***<br>(0.00210) |
| size of enterprise    | 1.146***<br>(0.00684)   | 1.075***<br>(0.00537) | 1.323***<br>(0.0580)  | 2.252**<br>(0.115)  | 1.063*<br>(0.0308)  | 1.060***<br>(0.0138)  | 1.230***<br>(0.0195)  | 1.612***<br>(0.0496)  | 1.161***<br>(0.0187)  | 0.945**<br>(0.0191)   | 1.307***<br>(0.0138)  |
| age group             | 0.947***<br>(0.00381)   | 0.869***<br>(0.00356) | 0.965*<br>(0.0162)    | 1.195**<br>(0.0314) | 1.085**<br>(0.0187) | 0.981**<br>(0.00737)  | 0.983<br>(0.0122)     | 0.937**<br>(0.0204)   | 1.087***<br>(0.0122)  | 0.685***<br>(0.0122)  | 0.992<br>(0.00687)    |
| educ                  | 0.842***<br>(0.00649)   | 0.465***<br>(0.00346) | 1.453***<br>(0.0521)  | 1.267**<br>(0.0815) | 1.198**<br>(0.0403) | 0.919***<br>(0.0129)  | 0.762***<br>(0.0155)  | 0.779***<br>(0.0305)  | 0.730***<br>(0.0173)  | 0.742***<br>(0.0205)  | 0.897***<br>(0.0118)  |
| nationagr             | 1.273***<br>(0.0352)  | 0.825***<br>(0.0209)  | 0.516***<br>(0.0521)  | 0.469*<br>(0.0623)  | 0.365**<br>(0.0739) | 1.788***<br>(0.0225)  | 1.535***<br>(0.114)   | 0.996<br>(0.0950)     | 1.420***<br>(0.0681)  | 1.424***<br>(0.117)   | 0.809***<br>(0.0181)  |
| industagr             | 1.298***<br>(0.0166)  | 1.032***<br>(0.00931) | 0.378***<br>(0.0216)  | 0.898<br>(0.0689)   | 0.950<br>(0.0447)   | 0.815***<br>(0.0162)  | 0.805***<br>(0.0362)  | 0.703***<br>(0.0668)  | 0.726***<br>(0.0242)  | 0.770<br>(0.0725)     | 0.887***<br>(0.00723) |
| noagr                 | 0.871***<br>(0.0171)  | 1.301***<br>(0.0212)  | 0.0208**<br>(0.00691) | 2.751**<br>(0.519)  | 0.891<br>(0.105)    | 1.268***<br>(0.0475)  | 0.223***<br>(0.0130)  | 0.360***<br>(0.0301)  | 0.725***<br>(0.0424)  | 0.770<br>(0.104)      | 0.728***<br>(0.0211)  |
| PseudoR^2             | 0.27  | 0.3                   | 0.08                  | 0.15                | 0.05                | 0.23                  | 0.11                  | 0.2                   | 0.13                  | 0.25                  | 0.23                  |
| N                     | 5236278   | 655035                | 114887                | 39427               | 152678              | 831476                | 867316                | 206913                | 121404                | 252896                | 1994246               |

Notes: Odds ratios reported, std. err. in parentheses; weights applied (based on grossing-up factor for employees (from SES)); for model (1): country sum=10000, country dummies included; default category: enterpragr. Source own elaboration based on SES and WIOD. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001.

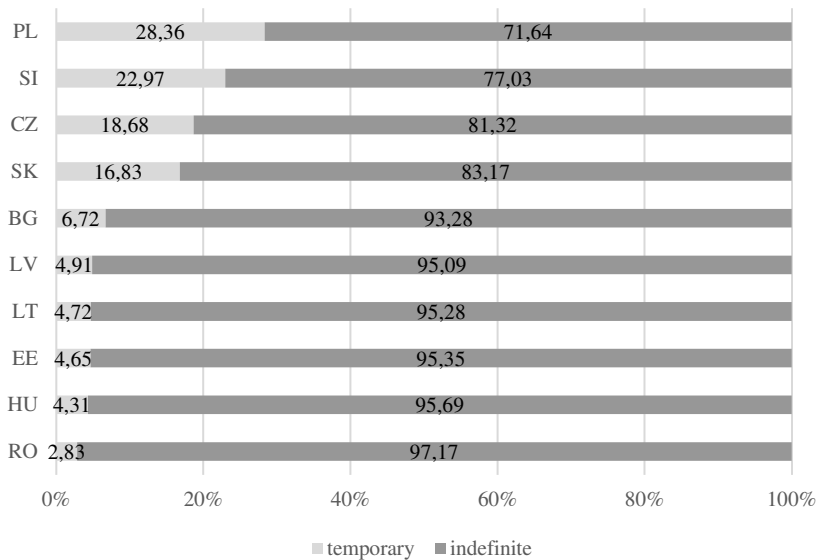
**Table 3.** Estimation results – separately for tradable and non-tradable sectors

| Dep. variable:        | Temporary/fixed duration of employment contract<br>(except apprentice) |                       |
|-----------------------|--|-----------------------|
|                       | Tradable sectors   | Non-tradable sectors  |
| sex, 0-female, 1-male | 0.797***<br>(0.0104)   | 1.094***<br>(0.0127)  |
| length of service     | 0.212***<br>(0.00213)  | 0.283***<br>(0.00222) |
| size of enterprise    | 1.103***<br>(0.0113)   | 1.212***<br>(0.00895) |
| age group             | 0.909***<br>(0.00583)  | 0.951***<br>(0.00485) |
| educ                  | 0.624***<br>(0.00774)  | 0.914***<br>(0.00888) |
| nationagr             | 0.921<br>(0.0807)  | 1.209***<br>(0.0367)  |
| industagr             | 0.916***<br>(0.0212)   | 1.321***<br>(0.0233)  |
| noagr                 | 0.919***<br>(0.0123)   | 0.740***<br>(0.0109)  |
| GII_2014_2004         | 1.315***<br>(0.0608)   | 0.877***<br>(0.0190)  |
| PseudoR <sup>2</sup>  | 0.32   | 0.25                  |
| N                     | 1942883  | 152486                |

Notes: Odds ratios reported, std. errors in parentheses; weights applied (based on grossing-up factor for employees (from SES)); country sum=10000, country dummies included; default category: enterpagr. Source: own elaboration based on SES and WIOD. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001



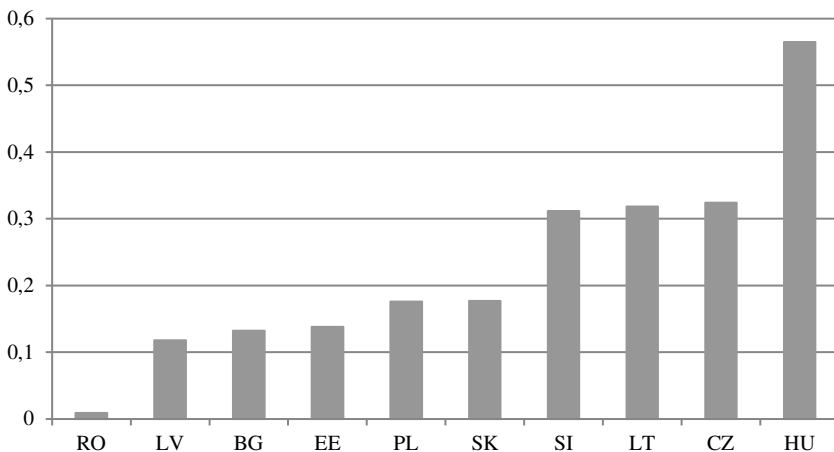
**Figure 1.** Share of temporary and indefinite contracts, by country, 2014



Notes: weights applied (based on grossing-up factor for employees (from SES)).

Source: own elaboration based on SES.

**Figure 2.** Relative changes in global import intensity between 2004 and 2014, by country

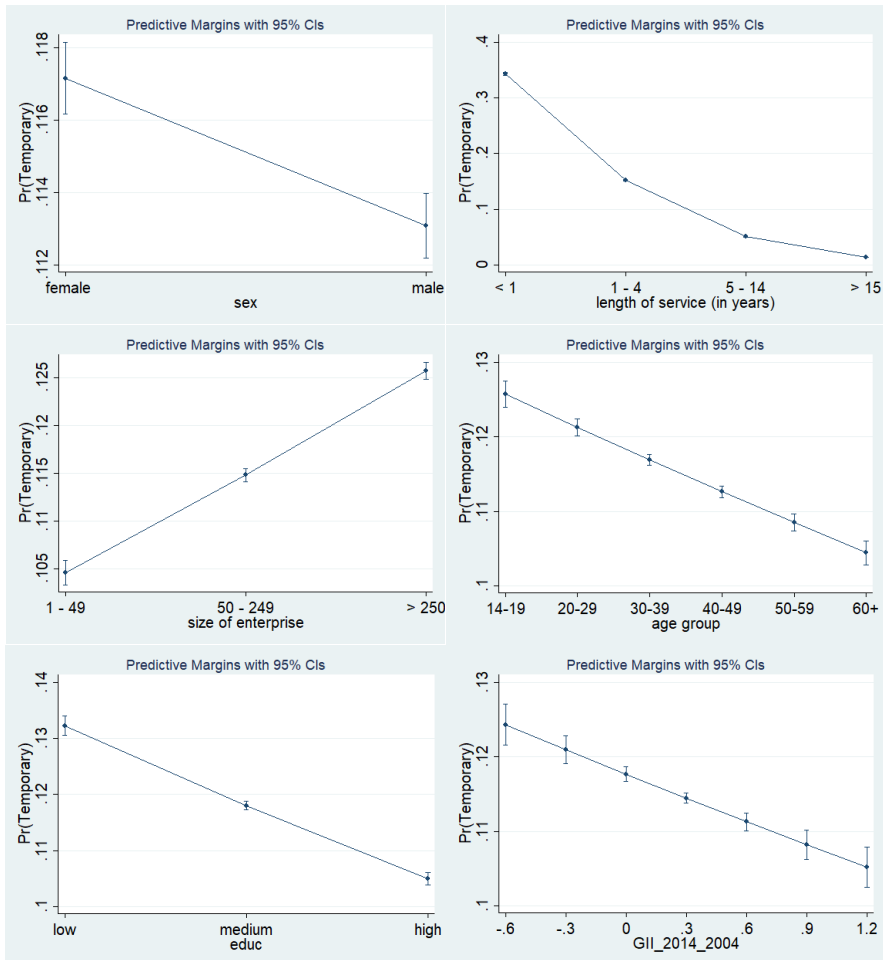


Notes: weighted by sectors' value added

Source: own elaboration based on SES and WIOD.



**Figure 3.** Margins plots corresponding to estimation results from column (1) in Table 4, selected variables



Notes: weights applied (based on grossing-up factor for employees (from SES), country sum=10000).

Source: own elaboration based on SES and WIOD.

