

An Evaluation of the Impact of FDI on Skill Premium in CEECs regions

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Abstract

The paper is a contribution to the debate on how FDI affects wage inequality. Using an average treatment effect estimation we explore this relationship in Bulgaria and Romania, investigating, at the regional (Nuts3) level, whether the location of high tech FDI has affected the skill premium and the working labor markets. We find that the presence of FDI in high tech sectors increases the wage ratio between workers in high and low tech sectors. However, while there is no evidence of changes in the employment ratio, foreign investment is associated with higher levels of employment in low tech sectors.

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1 Introduction

Over the past decade the occurrence of increasing wage inequality has been accompanied by a rising process of international economic integration.

In the United States and in other industrialized countries during the last two decades there has been an increase in skill premium (which is defined as the ratio between the high skilled wage and the low skilled wage). Notwithstanding that during the same period there has also been an increase of number of people going to the college, skill premium has not gone down but has increased. This fact has stimulated a growing body of research which has drawn a sharp distinction between the possible causes for the increase in the demand for skills: skill biased technical change and increased international trade. Technical change has widely affected the demand for labor in many OECD countries: many tasks once carried out by unskilled workers are now performed by automated equipment, thereby reducing the demand for low skilled labor. Moreover, there has been a contemporaneous increase in demand for skilled workers as a result of a process of innovations, making some jobs and tasks obsolete.

International trade explanation of the increase in the demand for skilled workers in developed countries relies on the substitution effect exerted by the imports of unskilled labor intensive goods from developing countries on domestic production. However, these arguments seem not to be exhaustive if we focus on the raising of wage inequality in developing countries.

This paper tries to shed some light on other possible causes of the existing wage gap between skilled and unskilled workers, focusing on two Central and Eastern European Countries (CEECs), Bulgaria and Romania, which will enter EU in 2007. CEECs represent a sort of “natural experiment” for several reasons. First, they were involved in a rapid structural change that affected their economic structure and consequently their labor markets, characterized by a huge supply of skilled workers and a compressed wage structure (Boeri, 2000). Second, this economic structural change was accompanied and encouraged by a rapid process of economic integration both via trade and foreign direct investment flows. Third, different regional dynamics are observable in the pattern of wage inequalities: we argue that this could be due to the unequal

location of foreign investment in the hosting countries. Hence, such a sudden opening of the economy and the resulting regional concentration of FDI create a natural experiment aiming at identifying the effects of economic integration via foreign investment on wage inequalities at the regional level.

The structure of the paper is as follows. Section 2 reviews the existing literature on skill premium. Section 3 presents some stylized facts on the wage ratio between skilled and unskilled workers and the distribution of the number of foreign investments in the two candidate countries. Section 4 sets up the econometric model, whereas Section 5 describes the econometric technique used and the empirical results obtained.

2 Literature Review

Even though in the empirical analysis we explore the relationship between skill premium and foreign investments, the approach employed to investigate the phenomenon is mainly drawn from the literature which studies the interaction between wage inequalities and international trade. While the former starts from the estimation of a cost function and employs firm specific data, the latter accounts for macro evidence on how economic integration has affected the relative price of skilled labor intensive goods, and hence their relative factor prices. This is the reason for which we provide a review of these two strands of literature, theoretical and empirical, focusing on the main results they reach.

2.1 International Trade and skill premium

The trade explanation suggests that the US skill premium increased because trade with developing countries, which are abundant in unskilled workers, raised the demand for skilled workers in America. Leamer (1996) uses the Heckscher-Ohlin (HO) framework to argue that price reduction for labor-intensive tradables drives down unskilled workers' wages in the high-wages markets. The lower price of an unskilled good, due to the openness of trade with developing countries, causes lower wages for all unskilled workers in the United States. Wage determination

in a HO model is described by the Stolper and Samuelson Theorem¹ which links product prices with wages. And vice versa, if the price of goods produced in skilled intensive sectors increases, according to Stolper and Samuelson theorem, the wages of skilled labor increase more than proportionally. But looking at the data, the price of skilled intensive goods has not increased in reality. The second problem with this explanation is given by the fact that skill premium in Europe has not increased, even though Europe also trades with developing countries. Thus, opening up to trade does not seem to generate a Stolper Samuelson effect.

Davis (1998) addresses this issue analysing trade between a flexible wage America and a rigid wage Europe, which have experienced divergent factor market dynamics: rising unemployment in Europe (but not in America) and a growing skilled-unskilled wage gap in America (but not in Europe). He argues that commodity trade leads local institutional features to have important spillover effects on other countries. He finds that when developing countries enter the world markets, Europe, given its rigid labor markets, absorbs the full impact of the shock and wholly insulates America from its effects on employment. As in Leamer, the explanation is that trade with developing countries affects goods' prices and as a result should change skill premium, which is function of goods prices (which depends on employment levels) and relative productivities. However, given the rigidity of labor market in Europe, the shock is entirely reflected on employment.

But again according to trade explanation the relative price of skill intensive goods should increase and, as a consequence, the demand for skills should go up. However, the empirical evidence does not show this. Moreover, the skill premium rose despite also the supply of skilled labor increased in the same period. This suggests that the demand for skilled workers has increased even more. Finally, following this argument, if trade is the cause of increasing inequality in US, developing countries should have experienced a decrease of in skill premium. However, according to the empirical evidence, in most of the developing countries inequality has risen after opening to international trade (Pavcnik, 2004).

¹According to Stolper and Samuelson theorem, an increase in the relative price of a good raises more than proportionally the price of the factor used intensively in that sector and lowers the price of the other sector.

For these reasons, many economists have argued that is technology, and not trade, the key explanation of the increase of inequality (Autor et al., 1998). An important contribution to the debate is given by Acemoglu (2003). Indeed, he claims that increased international trade may have been more important than generally believed because it induces skill biased technical change. Therefore, he argues that the two competing explanations for the increase in the demand for skills, trade and technology, may be related. Trade induces an increase for US relative price of skill-intensive goods, and, therefore, raises the demand for technologies used in the production of these goods, making the production of these goods more profitable to develop and encouraging further technical change directed at them. That is how Acemoglu explains that skill-biased technical change is induced by trade.

Epifani and Gancia (2002) find other reasons for which trade integration is likely to increase the skill premium. They argue that with a high (greater than one) elasticity of substitution in consumption and higher economies of scale in the skill-intensive sectors any increase in the volume of trade, even between identical countries, tends to be skill biased. Given the stronger economies of scale, the increase in output, due to the effects of trade on the market size, is relatively greater in the skill intensive sector. As a result the relative price of the skill-intensive good falls. But with an elasticity of substitution in consumption greater than one, the demand for skill-intensive goods increases more than proportionally, raising their share of total expenditure and the relative wage of skilled workers. Summing up, they explain the rise in inequality induced by trade abstracting from technical change².

As far as the empirical work is concerned, there are not many contributions to the debate of international trade and skill premia. One of them is again Epifani and Gancia (2002) who consider a panel of 35 countries observed around 1980 and 1990. Their model suggests that the skill premium is higher the higher is a country's openness to trade, the greater its size and the lower its endowment of skilled workers. They find that, *ceteris paribus*, a doubling of the degree

²Acemoglu (2003); Ekholm and Midelfart-Knarvik (2001) argue that the market size expansion induced by trade increases the profitability of firms characterised by a high (skill-intensive) fixed cost and a low (unskilled labor-intensive) marginal cost, thus inducing the adoption of the more skill-biased technology.

of openness is associated with a 41% increase in the skill premium; a doubling of the scale is associated with a 9% increase in the skill premium, and a doubling in the share of workers with secondary education leads to a 21% fall in the skill premium.

Another contribution is given by Antweiler and Trefler (2000) which using trade data for 71 countries and 5 years show that output expansion is strongly skill-biased, and hence this has an important implication for rising wage inequality.

Focusing on the trade puzzle occurring in developing countries, that implies an increase in wage inequality despite the prediction of the Stolper Samuelson Theorem, Robbins (1996) has found that wage differentials have risen in many developing countries characterized by high trade exposure in Latin America, East and South East Asia.

Also Hanson and Harrison (1999) provide evidence suggesting that rising in skill premium may have been due to import competition in low skill intensive industries. Another possible explanation for this phenomenon is brought by Mazumdar et al. (2002). They argue that one mechanism that has been relatively unexplored is the role of imported machinery and more generally the role of imported intermediate goods if the latter embody a technology that is biased in favour of skilled labor. However, in this case imported intermediate goods can affect the skill premium even if the skill bias of the technology does not change. They argue that the latter can occur if, for example, only the skilled labor intensive sector has access to imported intermediate inputs, and these imports increase after trade liberalization.

2.2 FDI and Skill Premium

Another strand of the literature explains increase in skill premium through FDI: the capital flows from North to South, and the corresponding growth in outsourcing by Northern multinationals, have contributed to a worldwide increase in the relative demand for skilled labor. The main contribution is given by Feenstra and Hanson (1995) who develop a model which shows that capital flows (identified as outsourcing of northern firms) from North to South, or more generally, any increase in the Southern capital stock relative to that in the North can increase the relative wage of skilled labor in both regions. The activities outsourced to the South are, from the

North's perspective, ones that use relatively large amounts of unskilled labor, but, from the south perspective, are ones for which the reverse is true. The result is an increase in the relative demand for skilled labor in both countries, which, in turn, causes the relative wage of skilled labor to rise in both regions. They also apply (1997) their model to study the effect of FDI on the relative demand for skilled labor in Mexico, and find that, consistently with their hypothesis, growth in FDI is positively correlated with the relative demand for skilled labor.

Slaughter (2002) discusses how multinational firms affect both the demand and supply of skills in host-country labor markets. On the demand side, they can encourage a raise of skill workers required by their firm specific knowledge assets. On the other hand, multinationals can boost the supply of skilled workers both at the micro and macro level, i.e. through affiliates training workers in-house and via interactions with host country education and migration decisions.

According to these arguments, Slaughter offers some empirical evidence about the existent correlation of FDI with skill upgrading, using data about 16 countries- developed and developing- from 1982 to 1990. The main empirical finding is the robust positive relationship between skill upgrading- measured as share of total wage bill accounted for by non-production workers- and the presence of U.S. affiliates, with this correlation even stronger within the sub-sample of developing countries.

A very recent contribution, along this line of research, is given by Bruno et al. (2004) who investigate whether and to what extent the increasing inflow of foreign investment might have affected wage inequality and the composition of labor demand between skilled and unskilled workers in some Eastern European countries. They find, contrary to previous works, that FDI does not seem to have affected relative labor demand for the skilled and thus cannot be seen as responsible for the deepening in the wage gap through outward shifts of the relative demand schedule. Instead, wage inequality increased because of the departure from the highly compressed wage structure in place during the communist period and the skilled labor became progressively more rewarded. Moreover, available skills after transition could not be easily adapted to the newborn market economy, as they were overspecialized. Hence, these two labor

market distortions affecting the Central and Eastern European countries explain why the huge increase of foreign investment did not contribute to deepening wage inequality through a raising demand of skilled workers. Instead, FDI might seem to have worsened the wage gap by simply playing a role in changing the compressed wage structure.

Finally, Skuratowicz (2000) studies the impact of FDI on skill premium in the polish case. Following Feenstra and Hanson results (1996 and 1997) she suggests that unequal localization of FDI in the hosting economy induces the growing wage inequality among skilled and unskilled workers.

3 Empirical evidence

In this section we provide empirical evidence on the existing different wage structure not only between the two Central and Eastern European countries, but also looking within them and analysing their regional dynamics at the level of Nuts3.

In order to investigate the wage gap among workers endowed with different skills, we have considered the wage ratio between the average salaries prevailing in high tech and low tech industries in the manufacturing sector from 1992 to 1999. The results we have found can be apparently surprising: the wage ratios computed are not always greater than the unity, meaning that wages in low tech sectors can be higher than wages in high tech sectors. However, this finding can be explained by the peculiarities of the labor market in these countries, characterized by a large availability of human capital inherited from the communist regime and not easily adaptable to the new market oriented economy. This means that the relative abundance of skilled workers is not completely absorbed by the labor market and hence it does not contribute to a higher relative wage in high tech sectors than in low tech sectors.

Plotting a kernel density estimation, Figure 1 compares the distribution of the wage ratio in Bulgaria and Romania, taking into account the regional dynamics within them. In 1992, at the beginning of the transition period, it emerges that in Bulgaria there is a skewed distribution of the wage ratio, which is highly concentrated at a level that is less than 1. Instead, in Romania

it seems that the wage ratio is mostly concentrated on a value slightly higher than the unity. It means that in the latter country the skill premium is higher than in the former, where we cannot speak about the existence of a skill premium as on average workers in low tech sectors are higher awarded than workers in low tech sectors.

Figure 2 highlights that in 1995 for Bulgaria there is a shift on the right hand side of the distribution: indeed most regions show up a wage ratio higher than 1, whereas the contrary occurs in Romania where the average wage ratio across most regions is less than one.

Finally, in 1999 (as outlined in Figure 3) the distribution of the skill premium in Bulgaria shows up an evident “twin peaks property”: even though 50% of the cumulative distribution is concentrated around 1, there is another group of regions for which the skill premium is around 1.3, meaning that sub national entities appear to follow different wage ratio trajectories. Instead, in Romania almost all regions display a wage ratio higher than 1 but the dispersion of the skill premium across its regions increases.

Table 1 summarizes the main statistics of the wage ratio in the two countries over time: it highlights that from 1992 to 1999 there is an increase of the wage ratio in both countries, as well as the dispersion of this labor market index rises among regions. However, if we consider the sub period spanning from 1995 to 1999 the standard deviation of this distribution starts declining in Bulgaria, notwithstanding the formation of two poles around which most regions concentrate. Instead, dispersion of wage ratio in Romania constantly increases, and the skill premium is higher, on average, than in Bulgaria.

As the goal of the paper is to analyse the impact of FDI on the skill premium, it is appropriate to depict the regional location of the number of foreign investment over time. Figure 4 plots the kernel density estimation of the number of foreign investment (in log). It emerges that in 1992 Bulgaria displays a distribution more skewed on the right hand side, meaning that in its regions the number of foreign investment are higher than in Romania. However, in the latter the number of foreign investments is more concentrated around the same values, and hence in Bulgaria there are higher regional disparities looking at the distribution of FDI. Over time, the pattern changes since in both countries regional dynamics seem to converge and in Bulgaria the

distribution is more skewed on the right hand side than in the other acceding country. It results that foreign penetration increases and seems to overcome the numbers of FDI in Romania, where some regions behave like outliers as they are set on the tails of the estimated distribution.

Figure 6 puts into evidence that, as for the wage ratio, in 1999 Bulgaria is characterized by the formation of two poles around which the regions concentrate even though in this case this “twin peaks property” is less marked. Instead, in Romania comparing the distribution of FDI with that of skill premium it does not appear any relationship between them, as the former is more symmetric than the latter which is heavy tailored on the rights hand side. In this acceding country most regions display intermediate values in the number of foreign investments even though there are some outliers characterized by a high concentration of foreign penetration.

4 The empirical model

In this section we provide a very simple model that allows us to draw some testable implications regarding the eventual impact of foreign direct investment on the wage ratio between workers employed in high tech and low tech sectors. As we have previously explained our data permit us to make a sectoral analysis at regional (Nuts3) level. This approach differs substantially from that used by the strand of literature that considers the link between FDI and skill premium as it is generally conducted through the evaluation of a labor cost function. This is not the perspective from which we evaluate the issue since we are interested in analysing regional dynamics regarding the impact of FDI on the reallocations of sectors and hence on the wage ratio between high tech and low tech sectors within the two acceding countries. In this way, the rising of wage inequality emerging in these countries could be explained by distinguishing two different channels, i.e. i) the unequal distribution of FDI across regions and ii) the sectoral reallocation implied by foreign penetration through the observed change in the wage ratio and employment ratios between high tech and low tech sectors.

Our empirical model can be thought of as having two parts. One determines the non-random distribution of the FDI within countries, which is plausibly depending on some regional

characteristics. In particular, we restrict our analysis on the presence of at least one FDI in high tech sectors observed in the region. Obviously, this is a binary variable, that can take two possible values in region i , i.e. 1 if there is at least one foreign direct investment in high tech sectors and 0 otherwise. Then we can write this equation of FDI location as:

$$fdi_i^{HIGH\ TECH} = \begin{cases} 1 & \text{if } fdi_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

where $fdi_{it}^* = \gamma' w_{it} + u_{it}$

where w_{it} are observable regional variables that affects the location of foreign investments in high tech sectors at time t , such as the number of foreign investments in all sectors, the number of domestic firms, and some proxies of regional infrastructure (for instance road and telephones), and u_i is an unobserved error term.

The second part of the model determines the wage ratio between workers employed in high tech and low tech sectors. In order to fit the aim of the empirical analysis, we start from the standard Heckscher-Ohlin framework adapted to the FDI case. Indeed, evaluating regional dynamics in open economies mobility of capitals, rather than mobility of goods, has presumably the main impact on factors' prices differences in the host countries. Suppose these regions are endowed with H units of skilled workers and L units of unskilled workers, where two final goods are produced by a skill intensive (high tech) sector h and labor intensive (low tech) sector l . We assume that the labor-intensive good is produced using mostly unskilled workers, while the skill-intensive good is produced using mostly skilled workers.

On the demand side, consumers have identical homotetic preferences, represented by the following CES function:

$$U = \left[(C_i^l)^{\frac{\varepsilon-1}{\varepsilon}} + (C_i^h)^{\frac{\varepsilon-1}{\varepsilon}} \right]^{\frac{\varepsilon}{\varepsilon-1}} \quad (2)$$

where C_i^l and C_i^h represent the consumption of labor intensive good and skill intensive good

respectively in region i , and $\varepsilon \in [0, \infty]$ is the elasticity of substitution between the two goods. The market for these goods is competitive, and hence the relative demand of the two goods implied by (2) is:

$$\frac{p_i^h}{p_i^l} = \left[\frac{C_i^h}{C_i^l} \right]^{\frac{1}{\varepsilon}} \quad (3)$$

Assuming that the skill intensive good is produced using skilled workers while the labor intensive good is produced employing unskilled workers, the production of these two goods Y_i^h and Y_i^l in region i is represented by:

$$Y_i^h = A_i^h H_i \quad \text{and} \quad Y_i^l = A_i^l L_i \quad (4)$$

where A_i^h and A_i^l are the productivity of skilled workers and unskilled workers respectively in region i . Hence, market clearing condition implies that:

$$\frac{p_i^h}{p_i^l} = \left[\frac{A_i^h H_i}{A_i^l L_i} \right]^{-\frac{1}{\varepsilon}} \quad (5)$$

Finally, since labor markets are competitive, skilled and unskilled workers will be paid according to their marginal products. Then it results the wage ratio:

$$\omega_i = \frac{w_i^h}{w_i^l} = \frac{p_i^h A_i^h}{p_i^l A_i^l} = \left(\frac{A_i^h}{A_i^l} \right)^{\frac{\varepsilon-1}{\varepsilon}} \left(\frac{H_i}{L_i} \right)^{-\frac{1}{\varepsilon}} \quad (6)$$

Eq.(6) highlights the main factors affecting the wage ratio in a closed economy. However, in the econometric estimation we also want to take into account the effects of FDI location, and hence mobility of capital directed towards skill intensive sectors, on the wage gap observed at the regional level over time:

$$\omega_{it} = \alpha + \lambda \phi_{kt} + \beta \left(\frac{H_{it}}{L_{it}} \right) + \delta f di_{it}^{HIGH\ TECH} + e_{it}$$

where ϕ_{kt} is the regional production in high tech sectors, a control variable that tries to take

into account for differences in sectoral productivity levels among regions. At this purpose we employ a selection model that takes into account the *treatment*, *i.e.* the FDI location in high tech sectors, received by the regions. Therefore we nest eq.(1) into the framework of eq.(6) and we obtain the following:

$$E(\omega_{it}|fdi^{HIGH\ TECH} = 1) = \alpha + \beta \left(\frac{H_{it}}{L_{it}} \right) + \eta\phi_{kt} + \delta + E(e_{it}|fdi^{HIGH\ TECH} = 1) \quad (7)$$

Another empirical implication that we want to test regards the eventual skill upgrading effect produced by the the location of FDI in high tech sectors. Hence, to do this we want to test whether the employment ratio between skilled and unskilled workers is also affected by location of FDI in high tech sectors. Using the same treatment equation we derive:

$$E\left(\frac{H_{it}}{L_{it}} \mid fdi^{HIGH\ TECH} = 1\right) = \alpha + \eta\phi_{kt} + \delta + E(e_{it}|fdi^{HIGH\ TECH} = 1) \quad (8)$$

5 Econometric estimation

Before showing the empirical results it seems useful to explain the econometric technique used to estimate eq.(7) and eq.(8). Our inference about the effect of FDI in skill intensive sectors on the wage differentials among regions can be identified from the cross-regions differences in multinationals presence. This raises a number of estimation issues. In particular it is relevant to notice that FDI selection is not random: regions with different FDI location also differ by many other respects. In order to distinguish the effect of FDI location from other observable wage ratio determinants we consider some variables that directly affect FDI location and hence indirectly wage inequalities. The econometric technique employed has been developed by labor economists to estimate the effects of job training programs on individual workers' performance. However, it can be usefully applied in other circumstances or experiments where it is identifiable a selection process relative to a variable entering the original econometric equation. In our case FDI in high tech is characterized by a selction bias due to covariates that do not directly enter

the wage ratio equation. The estimated result highlights the difference in wage ratio with and without the treatment, i.e. FDI location in high tech sectors. Hence, taking eq.(7):

$$E(\omega_{it}|fdi^{HIGH\ TECH} = 1) - E(\omega_{it}|fdi^{HIGH\ TECH} = 0) = \delta + \rho\sigma_e\lambda(\gamma' w_{it}) \quad (9)$$

If we omit the Inverse Mill's ratio λ this difference is what is estimated by the least squares coefficient on the treatment dummy variable, i.e $fdi^{HIGH\ TECH}$. Then, it captures the selectivity correction that is supposed to enter our wage ratio equation. Furthermore ρ represents the correlation between u_{it} and e_{it} , representing that the two equations are not independent, whereas σ_e is the standard deviation of the disturbance e_i .

In order to analyse the relationship between FDI and the wage ratio, as well as between FDI and the employment ratio, we test directly eq.(8) and eq.(9). Wage ratio (or skill premium) is computed as the relation between wages paid in the high tech industries and wages paid in low tech industries at nuts 3 level between 1992 and 1999. Most of the empirical studies about skill premium rely on the ratio between production and non production workers wages (Epifani and Gancia, 2002; Bruno et al., 2004; Feenstra and Hanson, 1997). However the limitation of this approach which identifies skilled workers with non production workers is clear. Pavcnik (2002) relies, for Chile, on a database which distinguishes between production and non production and, inside each of the two categories, between blue collars and white collars.

We follow Acemoglu (2003) focusing on the ratio between wages in high tech sectors and wages in low tech sectors: the intuition is that, in general, high tech sectors employ in a larger percentage high skilled workers.

Our treatment variable is FDI in high tech sectors. This is a dummy variable which assumes value 1 if there is at least a multinational in high tech sectors in year t in region (Nuts3) i , and which is equal to zero otherwise . We have chosen the more disaggregated dimension Nuts3 instead of the bigger Nuts2, to better analyse the relation between FDI and the local industrial reality.

Employment ratio is computed as the number of workers employed in high tech sectors

over the number of workers employed in low tech sectors. An increase in this ratio creates a substitution of skilled workers for unskilled workers and therefore should reduce the relative earnings of skilled workers.

Unemployment rate proxies some labor market conditions; in particular, given the relative high education level in these countries, a higher unemployment level should affect negatively the skill premium.

The independent variables of the second equation derive from the traditional literature on FDI location determinants in developing countries (e.g. Caves, 1996), with appropriate modifications in order to take into account the peculiar experience of both transition economies and high tech sectors. In particular, we include in the estimation the number of domestic firms which are a proxy of the regional competition: we expect that a higher number of enterprises affects negatively the probability of undertaking an investment in the high tech sector. The number of foreign firms localised in each region should instead affect positively the choice of undertaking an investment for the well known agglomeration effects. As a proxy of education level we employ the number of students enrolled in tertiary education. Finally, we introduce two infrastructural variables: the road density and the number of telephone lines at regional level³.

In order to minimise the potential bias deriving from unobservable, heterogeneous fixed effects, a full set of time and regional specific dummy variables has been introduced in every estimation. In this way, the error component should only contain sector-specific fixed-effects appearing in the constant term. A dummy Romania is included in order to take into account structural heterogeneity deriving from two different countries considered.

Table 2 shows the results relative to eq. (7). In line with theoretical predictions, the lagged employment ratio seems to affect negatively and in a slightly significant way the wage ratio. A negative and highly significant sign emerges when the production ratio, which controls for differences in sectoral productivity levels, is taken into account. It does not emerge any evident difference between the two countries included in the sample (dummy Romania is never significant). When introduced (column 3), the unemployment level affects negatively and significantly

³In table 3 we use only the number of telephone lines as infrastructural variable.

the wage ratio. The treatment variable, FDI in high tech sectors, affects in all the specifications, positively and significantly, the wage ratio. All the independent variables of the second equation have the expected sign.

Table 3, first column, shows instead the results relative to eq.(8): it emerges that the presence of FDI in the region does not seem to affect in a significant way the ratio of employed in high tech and in low tech. We expected this given the peculiar labor market conditions in transition countries. To check the robustness of these results, column (2) reports results for the estimation of treatment effect on employment level in high tech sectors while column (3) refers to employment in low tech sectors. It emerges, not surprisingly, that FDI does not seem to affect significantly employment in high tech sectors while a positive and significant relation emerges when employment level in low tech sector is taken into account.

The other control variables have the expected signs: production in high tech sectors has a positive and significant coefficient in the first column, while it is not a relevant variable in the other two specifications. The unemployment level has a negative and significant coefficient in the first column, coherently with transition labor market conditions.

6 Conclusion

Along the paper we investigated the effects of foreign investment on the wage disparities occurring in two CEECs, Bulgaria and Romania, taking into account the different regional dynamics both within and across these acceding countries. To this purpose we followed the strand of literature studying the role of increasing international economic integration in the growing relative demand for skilled workers, whereas to test empirically some theoretical implications we borrowed the average treatment effect estimation, a novel econometric technique crucial in the impact evaluation literature. The main finding of this work is the positive and significant impact of FDI (in high tech sectors) on the wage ratio between workers employed in high and low tech sectors but, despite the main theoretical predictions, not via an increase in the relative labor demand in high tech industries. Notwithstanding the predictions of the theoretical model, FDI

in high tech sectors affect significantly employment in low tech but not in high tech industries. This is probably due to the characteristics of FDI in these two countries as, even though they are set into high tech sectors, foreign investors' activities induce positive linkages on labor demand in unskilled labor intensive sectors, but do not proportionally increase employment in sectors in which they directly operate. Depending on different regional paths, the rising wage inequalities are deepening in response to important structural changes enhanced by their transition process: they reflect adjustments on the labor market through changes in wage determination and increasing the skill premium with respect to the pre-transition period. In order to confirm these results, it should be noteworthy to extend the research taking into account the remaining Central and Eastern European Countries and hence making a comparative analysis with the "first wave" of new member countries that have already overcome some problems related to structural adjustments of their economies.

7 Appendix

The Dataset

Country classification: Bulgaria and Romania

Industry classification – NACE Rev. 1, 1993; ISIC Rev 3

(a) High Tech Industries:

DG, DK, DL, DM

(b) LowTech Industries

DA, DB, DC, DD, DE, DF, DH, DI, DJ, DN

Data Definition and sources

Number of Firms: Bulgaria: Information Service Ltd; Romania: Commercial Register of the Romanian Chamber for Industry and Trade.

Employment: workers employed on sectors of economic activity at Nuts3 level. National Statistical Institutes of Bulgaria and Romania.

Education: number of students enrolled in higher education. National Statistical Institutes of Bulgaria and Romania.

Road density: density of public roads per 100 km² of territory. National Statistical Institutes of Bulgaria and Romania.

Telephones: Number of telephone lines. National Statistical Institutes of Bulgaria and Romania.

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Table1: Statistics on the wage ratio in Romania and Bulgaria

ROMANIA	1992	1995	1999
mean	1.063	0.976	1.150
std dev	0.106	0.124	0.146
skewness	1.285	1.472	1.274
median	1.042	0.945	1.110
BULGARIA			
mean	0.977	1.115	1.036
std dev	0.107	0.152	0.139
skewness	1.088	1.151	0.919
median	0.948	1.089	1.004

Figure1: Kernel Density of the Wage Ratio, 1992

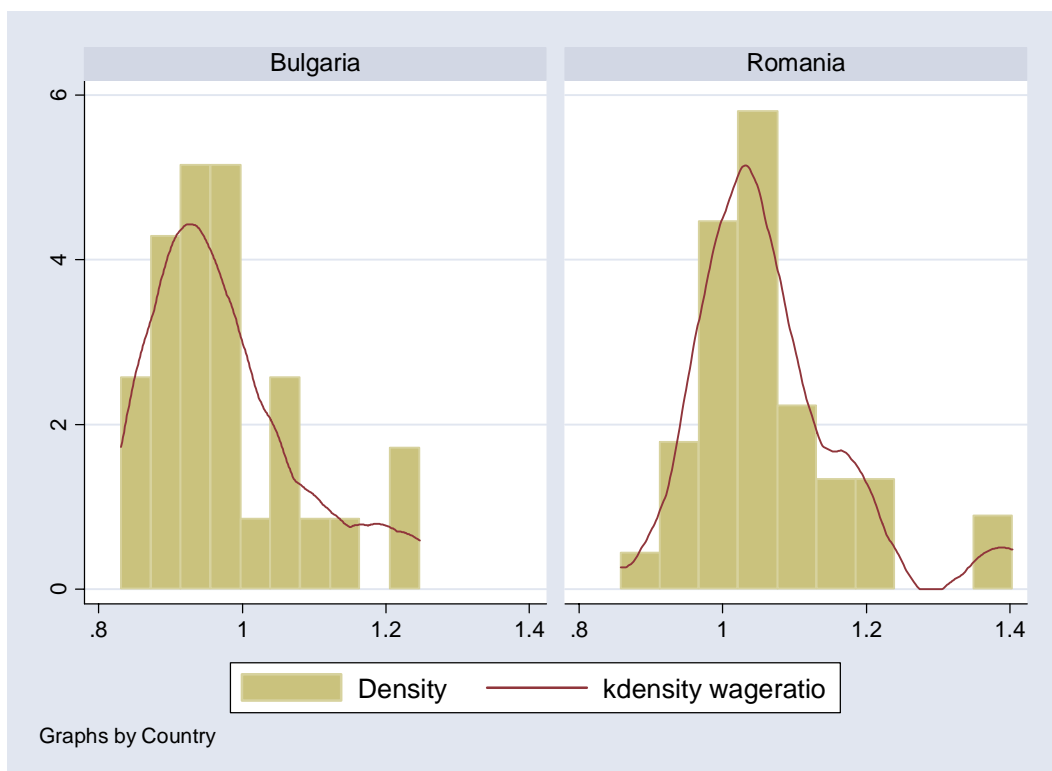


Figure 2: Kernel Density of the Wage Ratio, 1995

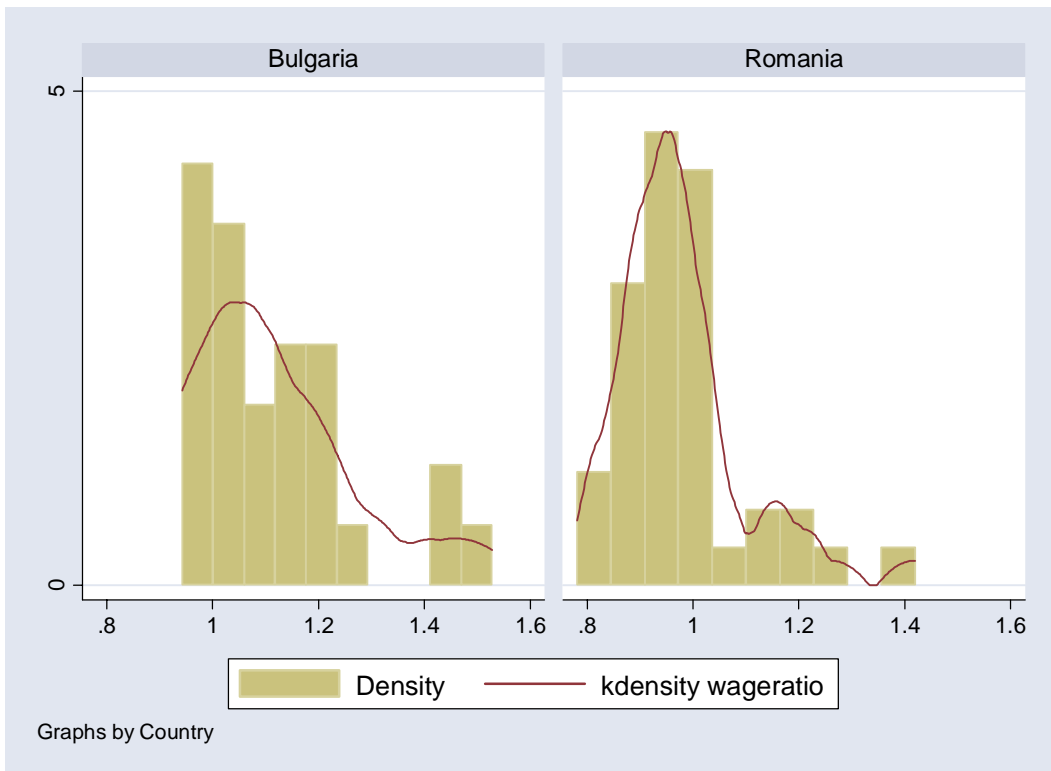


Figure 3: Kernel Density of the Wage Ratio, 1999

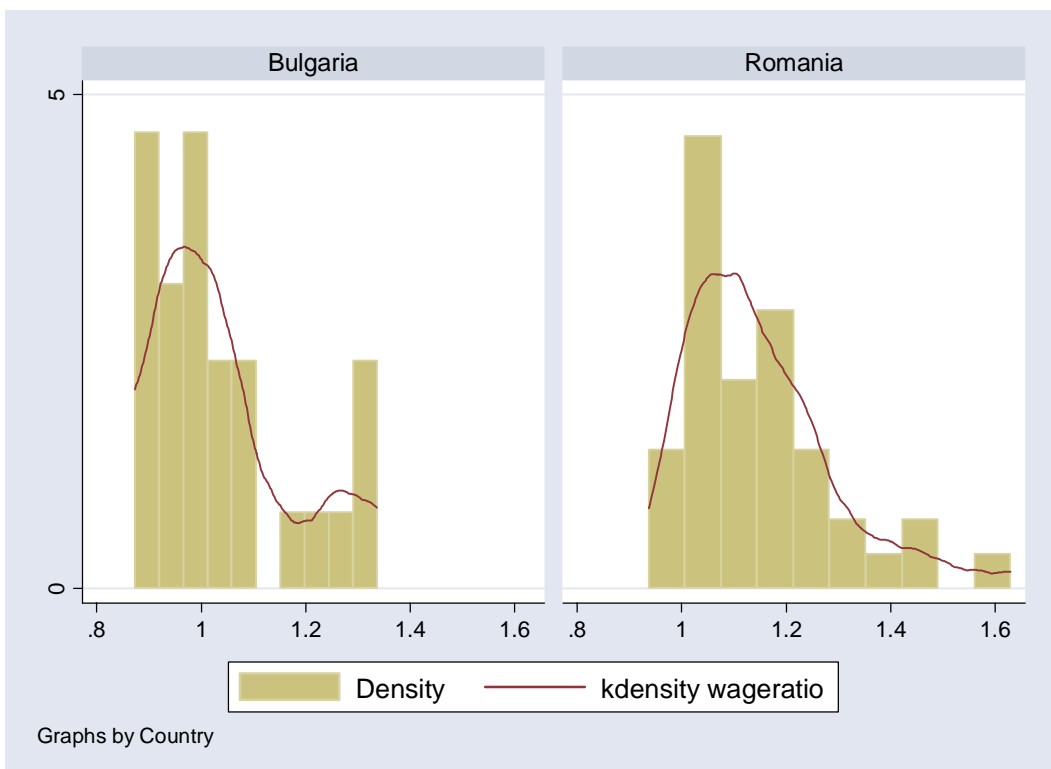


Figure 4: Kernel Density of the Number of FDI (in logarithm), 1992

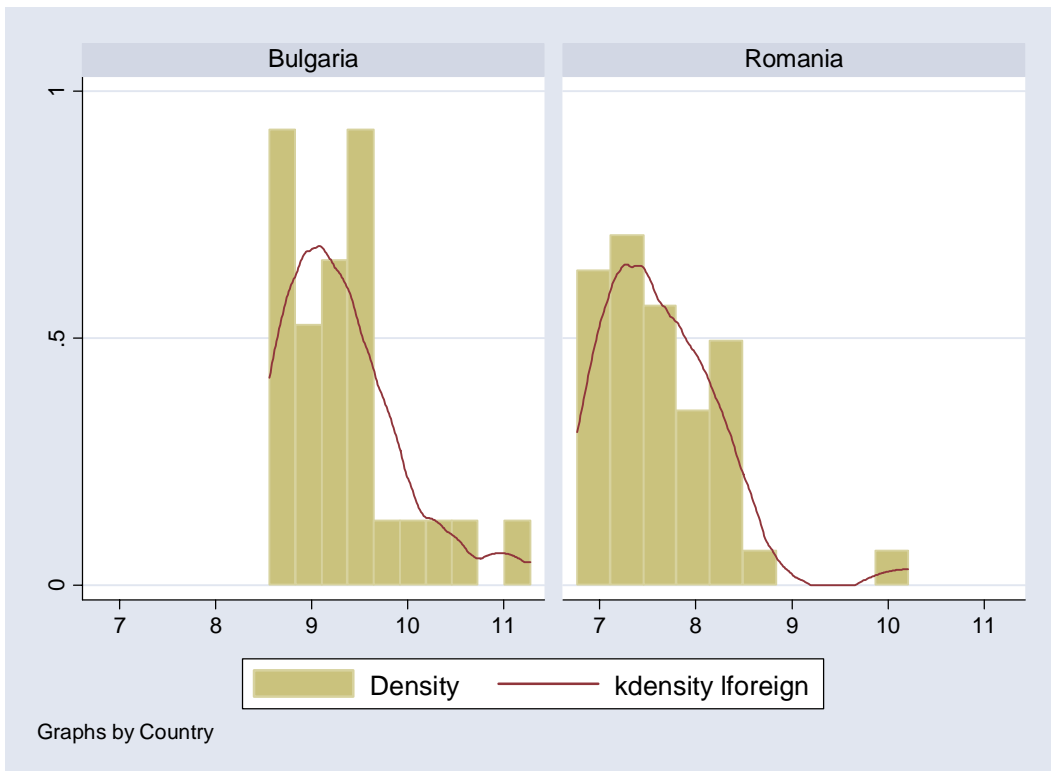


Figure 5: Kernel Density of the Number of FDI (in logarithm), 1995

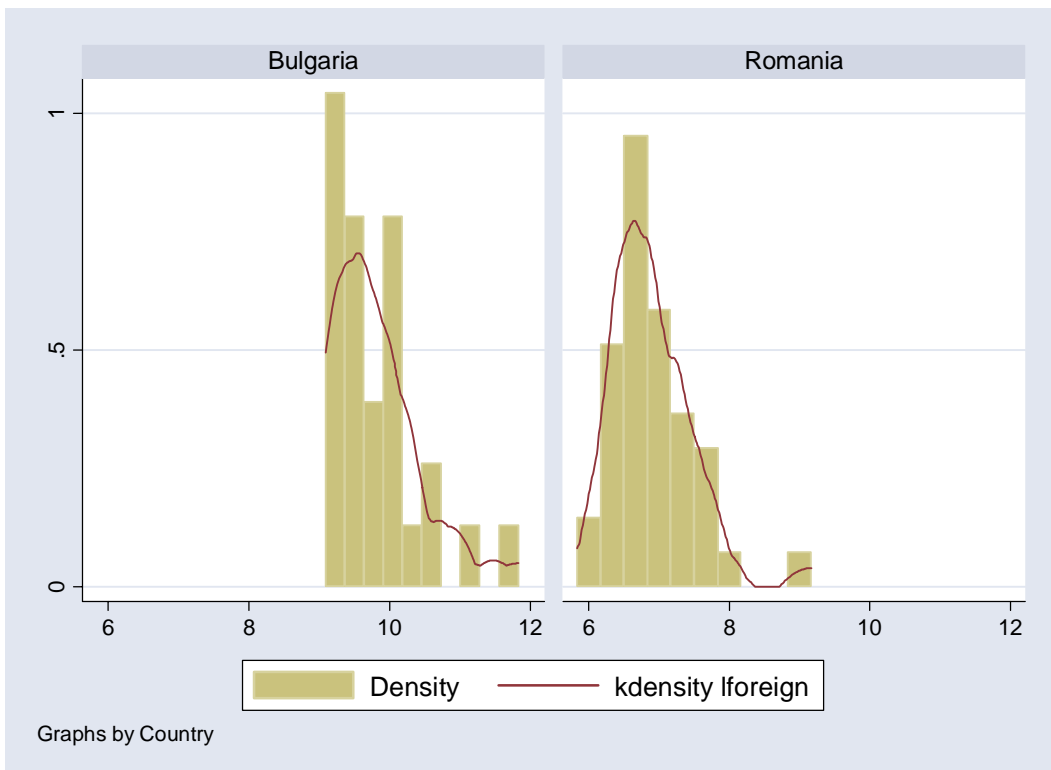


Figure 6: Kernel Density of the Number of FDI (in logarithm), 1999

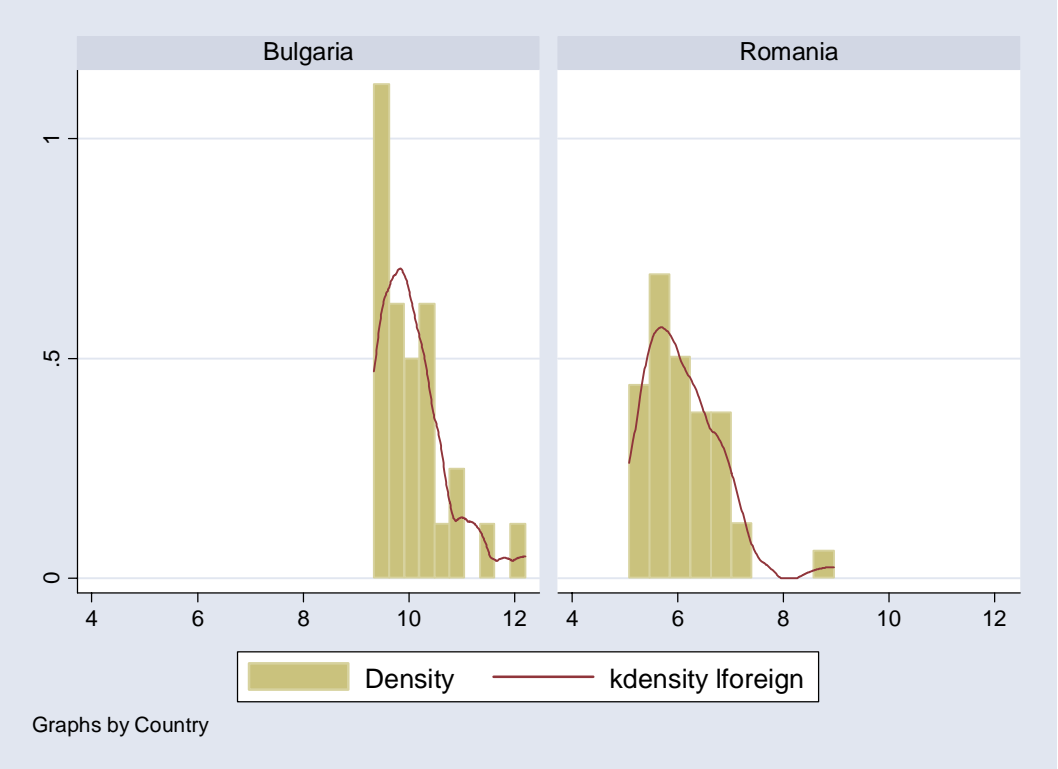


Table 2 Econometric Results

	(1)	(2)	(3)
Employment ratio _{t-1}	-0.037* (-1.81)	-0.035* (-1.74)	-0.03* (-1.71)
Production in High Tech Sectors	-0.083*** (-3.00)	-0.09*** (-3.67)	-0.09*** (-3.46)
Dummy Romania	-0.0002 (-0.22)	0.0002 (0.22)	-0.00007 (-0.91)
Year dummies	Yes	yes	yes
Regional dummies	Yes	yes	yes
Unemployment rate	-	-	-0.052*** (-2.69)
Treatment Variable	0.15*** (7.17)	0.16*** (8.72)	0.15*** (7.97)
Constant	1.39*** (10.71)	1.40*** (11.91)	0.89*** (3.86)
Value Added Ratio	-1.37 (-0.60)	0.19 (0.09)	-0.75 (-0.36)
Capital	-1.09** (-2.33)	-0.08 (-0.02)	-2.40*** (-2.50)
Number of Domestic Firms	-0.84*** (-10.66)	-0.71*** (-9.91)	-0.74*** (-10.38)
Number of Foreign Firms	0.69*** (8.36)	0.75*** (9.53)	0.74*** (9.16)
Students	-0.15*** (-3.09)	0.02 (0.04)	-0.06 (-1.44)
Telephones	1.12*** (4.76)	-	1.12*** (4.76)
Road Density	-	0.20 (0.65)	-
Dummy Romania	-0.006 (-1.63)	-0.007 (-0.02)	-0.006 (-10.38)
Constant	-8.14*** (-3.85)	1.11 (1,05)	-2.21*** (-4.30)
Number of Observations	551	543	551
Wald Chi2	1407.15***	1557.57***	1497.87***
LR test	33.28***	74.22***	52.11***

T-statistics in parentheses

*** significant at the 1 per cent level, ** significant at the 5 per cent level, * significant at the 10 per cent level

Table 3 Econometric Results

	(1)	(2)	(3)
Production in High Tech Sectors	0.12*** (2.11)	0.05 (0.42)	-0.018 (-0.72)
Dummy Romania	-0.02*** (-11.83)	-0.04*** (-15.07)	-0.003*** (-5.31)
Year dummies	yes	yes	yes
Regional dummies	yes	Yes	yes
Unemployment rate	-0.16*** (-4.09)	-0.003 (-0.05)	-0.04 (-2.06)
Treatment Variable	-0.07 (-1.23)	-0.49*** (-8.09)	0.08*** (2.67)
Constant	2.45*** (5.13)	8.56*** (9.45)	8.55*** (40.95)
Capital	-1.59*** (-3.17)	-1.05*** (-2.52)	-1.64*** (-3.28)
Number of Domestic Firms	-0.80*** (-10.88)	-0.27*** (-4.23)	-0.80*** (-10.81)
Number of Foreign Firms	0.41*** (4.58)	0.06 (0.90)	0.43*** (4.90)
Students	-0.132** (-2.52)	0.024 (0.52)	-0.14*** (-2.58)
Telephones	1.77** (7.12)	0.90*** (4.56)	1.76*** (7.10)
Constant	-14.61*** (-6.61)	-8.66*** (-4.91)	-14.66*** (-6.63)
Number of Observations	552	552	552
Wald Chi2	8.68***	3572.49***	71015.44***
LR test	2.65	153.15***	2.16

T-statistics in parentheses

*** significant at the 1 per cent level, ** significant at the 5 per cent level, * significant at the 10 per cent level

(1) dependent variable= employment ratio

(2) dependent variable=employment in high tech sectors

(3) dependent variable= employment in low tech sectors