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Globalization and FDIs: determinants and competition effects in Central and Eastern European Countries

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Based on a new economic geography model and gravity theory, this article analyzes FDI determinants in the CEECs and competition effects in terms of inward FDIs under increasing economic integration. Applying different econometric techniques (fixed effects, PQML), the results show that market potential and communications infrastructure are more important FDI determinants than wages in the CEECs. Also, they confirm competition effects triggered by Chinese and Southern Europe relative communication costs. We find weak evidence for wage competition effects.

INTRODUCTION

Recent developments in economic modelling allowed a deeper understanding of different channels of international economic integration and their effects on local economic activity and welfare in general.

Fujita and Thisse (2006) and Vechiu (2010) present theoretical models combining new economic geography and multinational production organization aspects, which allow assessing the impact of different kinds of economic integration (trade liberalization and technology diffusion) of industry relocation and welfare and also of third countries competition effects. The models highlighted two essential aspects. Firstly, labour costs and penetration of the new information and communications technologies (NICT) in developing countries may jointly determine FDI flows towards developing countries: too high communication costs may offset the advantage of low labour costs and thus hinder FDIs or low enough labour costs may offset the disadvantage of high communication costs and thus favour FDIs (Fujita and Thisse, 2006). Secondly, with globalization multiplying location choices for firms, it appears what Baldwin et al. (1996) called investment diversion, implying competition effects between destination countries in order to attract FDIs (Vechiu, 2010).

Under these circumstances, the CEECs (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia) represent a very interesting case study for these questions: since the beginning of the 1990s, they have continuously strengthen their economic ties with the rest of the world and especially, with the European Union, of which they became members in 2007, for Romania and Bulgaria, and in 2004, for the eight others. We will see thereafter that their wage differential with investing developed countries and also with other developing countries is quite attractive for companies seeking to minimize their production costs. At the same time, their communications infrastructures continue to improve, thus further attracting FDIs. If we think of the multilateral trade liberalization analyzed within the framework of our theoretical model (Vechiu, 2010), the increasing competitiveness of the CEECs can affect the attractiveness of other challenging countries, such as Portugal, the Mediterranean countries or China. Consequently, this article will empirically assess the importance of FDIs towards the CEECs, the analysis being based primarily on the theoretical model mentioned above and some considerations of the gravity theory.

In the next section, we will present previous work on FDI determinants and investment diversion as well as some stylized facts about the CEECs, our period of interest being 1996-2003. Section II will briefly survey the theoretical model and its main results, while section III will analyze FDI determinants and some possible competition effects between the CEECs and two other chosen destinations in terms of attracting FDIs. Section IV concludes.

I. FDIs TOWARDS THE CEECs: FACTS AND FIGURES

Literature review

In the economic literature concerning developing countries in general, but also the CEECs in particular, *FDI determinants* have been largely analyzed and it has already been highlighted the importance of labour costs for vertical FDIs (Bevan and Estrin, 2004; Nunnenkamp, 2002; Dunning, 2002; Lansbury et al., 1996; Altomonte, 2000).

Nunnenkamp (2002) shows that even if the traditional market factors remain prevalent, the labour costs still have an important influence on FDI decisions, whereas Dunning (2002) finds that FDIs in developing countries have rather vertical motivations (the labour costs would be the main determinants) than market related or resources-seeking motivations. By using simple econometric techniques for panels, Nonnemberg and Mendoça (2004) study

traditional determinants such as GDP, trade openess, risk, inflation, growth rate, the stock index Dow Jones, human capital, most of them turning out significant in all the econometric models used (OLS, fixed and random effects models).

Authors who tried to estimate theoretical models drawn from the theory of multinationals firms (MNF), such as the *KK* (Knowledge Capital) model or Markusen's (1995) model, bring evidence for a horizontal multinational activity rather than vertical (Carr et al., 2001; Markusen and Maskus, 1999, 2002; Brainard, 1997). On the other hand, instead of using FDIs as a measure for multinational activity, as it is largely done in the literature, they use the sales of the subsidiary companies established abroad. M. Chen (2009) gives examples of multinationals (GM and Philips) and statistics (EU) which show that the creation of an FTA (free trade agreement), for example, involves FDI creation inside the FTA, but also FDI diversion between the members of the FTA. With simple techniques such as OLS, but also more sophisticated one such as instrumental variables and Poisson Quasi Maximum Likelihood (PQML), the author finds indeed, that the creation of an FTA triggers FDIs towards the FTA, but asymmetrically assigned inside the agreement: the members with abundant labour force attract more labour intensive FDIs, whereas the members with mainly capital endowments attract less this type of FDIs. Barrell and Pain (1999) also prove that completely removing barriers to trade in the EU triggered increasing FDIs in six European countries (France, Germany, Italy, the Netherlands, Spain and United Kingdom). They empirically analyze FDIs of US multinationals in these countries and introduce in their estimations a dummy variable to assess the impact of the creation of the Single European Market in 1989.

Many studies are based on gravity theory and thus, use as determinants for FDIs the GDP of the investing country and that of the destination country as well as the distance that separates them. Braconier et al. (2005) study vertical and horizontal FDIs and use the *market access* built by Redding and Venables (2004) rather than distance and GDPs. They find a significant impact of absolute labour costs and also of skilled/unskilled relative labour costs. Disdier and Mayer (2004) use a conditional *logit* and *nested logit* model to study the determinants of the FDIs in the CEECs. More precisely, they verify if French investors consider the CEECs differently from the countries of Western Europe. Their results confirm this assumption, but it appears that as European integration proceeds, the assumption loses its strength. Finally, the competition effect in terms of attracting FDIs seems to appear mostly between the countries belonging to the same group (CEECs or Western Europe) rather than

between countries belonging to different groups, the CEECs becoming more and more close substitutes for the Western European countries.

Altomonte (2000) identifies three stylized facts concerning the activity of the MNFs in the CEECs: (1) FDIs in the CEECs reflect the various strategies of MNFs; (2) reform timing is very important; (3) geographical proximity is also very important for FDIs coming from Western Europe. Concerning the strategies of the MNFs, 43% of the FDIs are horizontal (FDIs in sectors with high scale economies), 43% are vertical (FDIs in labour intensive sectors) and only 14% are in high technology sectors; in services (35% of FDIs), FDIs are mainly in the telecommunications and energy distribution sectors. Then, such as already highlighted in other articles (e.g. Pennings and Altomonte, 2006; Holland and Pain, 1998; Carstensen and Toubal, 2004), countries where privatization was conducted more quickly received more FDIs. Finally, according to proximity to Western Europe countries, FDI clusters were formed: Germany in Central Europe, Sweden in the Baltic States, Italy in the Balkans. In his econometric study, this author also finds a significant impact of some traditional variables such as population, GDP per capita, wage differential, quality of the institutions, but not for others, such as distance, the legal framework, macroeconomic volatility and the size of the subsidiary companies.

Most empirical works thus confirm the importance of the traditional factors such as the GDP, the GDP per capita, the population, the unemployment rate, the quality of the institutions, but also of variables resulting from the new economic geography or international trade theory, such as relative factor endowments or relative costs, scale economies, trade costs, distance.

The *diversion phenomenon* was initially mentioned regarding trade: the creation of a free trade agreement or a customs union may bring the replacement of old trade links with countries remained outside the agreement by trade links with the member states. But trade diversion (Viner, 1950) or *investment diversion* (Baldwin et al., 1996) can also appear as a result of the relative competitiveness of countries taking part in preferential or multilateral liberalization: integration in a customs union of new countries more competitive than the former members can divert trade flows from the former members towards the new ones.

Regarding the EU, Boeri and Brücker (2001) do not find any proof of such trade diversion, but rather from certain CEECs towards other CEECs. They also argue against relocation and thus, against vertical FDIs: almost half of the FDIs coming from Western Europe concern sectors of non-exchangeable goods, mainly public services, communications and finance.

More generally, considering the interdependence of the countries taking part in the process of international economic integration, third country effects on bilateral FDI flows cannot be neglected. This was already confirmed by certain studies, which showed that the level of FDIs in a country or region also depends on the activity (or FDI level) in nearby countries or regions (Head et al., 1999; Coughlin and Segev, 2000; Bobonis and Shatz, 2007; Blonigen et al., 2007; Hall and Petroulas, 2008; Y. Chen, 2009). Until today, this generally led to a growing number of regional trade or investment agreements, generating a stronger FDI intensity between partner countries: EU members invest more in other EU member countries than in countries outside the EU; the same is true for Asian economies (UNCTAD, 2007). This is a proof that not only economic integration leads to more FDIs, but also vice versa, FDIs lead to more economic integration.

Many studies focused on Chinese competition, since its outstanding dynamism could lead to FDI diversion from other countries towards China. The conclusions of these studies are rather mitigated. It appears that the Chinese FDI inflows have a rather positive impact on other Asian countries, as if they were all part a regional production network (Eichengreen and Tong, 2007; Chantasasawat et al., 2004), but they have a negative impact on FDIs in some OECD countries (Eichengreen and Tong, 2007), Mexico and Colombia (Garcia-Herrero and Santabarbara, 2007). Chantasasawat et al. (2004) do not find evidence of FDI diversion in absolute terms, but they find some in relative terms: the FDI share in other Asian countries and in Latin America is negatively affected by Chinese FDI inflows. Lastly, Fung et al. (2008) do not find proof for FDI diversion from the CEECs towards China. Jenkins et al. (2008) discuss the impact of Chinese growth on FDI and exports of Latin American countries, through an analysis of descriptive statistics. They conclude that there cannot be an FDI diversion, since FDIs towards China are primarily vertical, whereas Latin America receives rather market-seeking (horizontal FDIs) or resource-seeking FDIs. Lastly, in a more recent study, Hanson and Robertson (2008) analyze the impact of Chinese growth on the exports of other developing countries specialized in manufacturing and find that it is not significant.

Lansbury et al. (1996) show that the CEECs' openness led to FDI diversion from Southern Europe towards these countries. They use an indicator of labour costs as a determinant of this FDI diversion, this indicator being based on a weighted average for Southern Europe (Greece, Spain and Portugal). However, their database is quite small: only 126 observations for FDIs from OECD countries towards Hungary, Poland, Czech Republic and Slovakia, over a too short period (1991-1993) to properly take into account the European integration of these countries. On the same subject of FDI diversion from Southern Europe

towards the CEECs, Buch et al. (2003) indicate that statistics tend to support this idea, but studies based on gravity theory do not confirm it. In their study, they analyze this question indirectly, by comparing the level of expected FDIs to the real one in the two groups of countries. They conclude that the decrease of FDIs in Southern Europe while FDIs towards the CEECs increase does not mean that FDI diversion takes place, but rather that Southern European countries are close to their expected FDI level. Altomonte and Guagliano (2001) present an econometric study of FDI determinants in the CEECs and the Mediterranean countries (MED) and also a study of a possible FDI diversion from the latter towards the former, through a descriptive statistics analysis. FDIs in the CEECs are much more important today than in the MED. More precisely, FDIs in the CEECs started from very low levels, but increased much, especially after the beginning of the negotiations for their adhesion to the EU, whereas in the MED, FDIs were higher, but decreased much during the last years. At a first sight, this seems to confirm some FDI diversion from the MED towards the CEECs.

Stylized facts

By analyzing the statistics, even if the developed countries remain the main engine of FDIs (outward as well as inward), we cannot deny the increasing tendency of FDIs towards developing countries and the fact that these countries become attractive locations for the MNFs, especially during the last decade (Figure 1). In 2006, FDI flows towards developing and transition economies reached their highest level: 379 billion dollars (an increase of 21% compared to 2005) and 69 billion dollars (an increase of 68%) respectively, whereas the number of *greenfield* investments and expansion investment plans increased by 13%, most of them between developing countries (UNCTAD, 2007).

Figure 1 here

After the fall of the Communist regime and the beginning of the negotiations for adhesion with the EU, among developing countries, the CEECs enjoyed a particularly high growth of FDI inflows (Figure 2). A very dynamic phenomenon is also that of cross-border mergers and acquisitions after the adhesion of 2004: sales almost doubled in Czech Republic, from 46 in 2004 to 73 in 2006; in Poland also, they increased from 36 in 2004 to 66 in 2006; finally, in Hungary, they more than doubled, getting from 22 to 49 over the same period.

Figure 2 here

The countries receiving most FDIs are Poland, the Czech Republic and Hungary, the dynamic of the reforms, of the negotiation process of adhesion to the EU and the selected privatization policies having a great impact on our ten CEECs' heterogeneity in terms of attracting FDIs (Figure 2).

The "laggards" of European integration, Romania and Bulgaria have become the favourite destinations since 2004-2005 until the 2008 economic crisis, an improvement very clearly visible on the graph above. During the process of adhesion, Bulgaria placed itself 7th in 2004-2006 on the scale of the performance index created by the UNCTAD instead of 92nd in 1990-1992, whereas Romania ranked 21st instead of 101st during the same periods (UNCTAD, 2007).

According to the empirical literature quoted previously, the main assets of the CEECs are market potentials, qualified labour, the improvement of the business environment and apparently to a lesser extent, the low production costs. Having become almost a trademark during the years 1990, the production costs in the CEECs increased: they are today more than twice as high as in 1996, at the beginning of their European integration. Nevertheless, they remain very low compared to the ones in the older members of the EU, the ratio being approximately 4.5 to 1 in 2006 (Table 1). The lowest costs are obviously found in Romania and Bulgaria, the least developed countries of the EU, but which also become increasingly attractive FDI destinations. Reading Table 1, except for Slovenia, who stands out of the other CEECs thanks to its remarkable performances in terms of reforms and economic stabilization, the countries receiving most FDIs experienced the highest increase of their labour costs, namely the Czech Republic, Hungary and Poland. This could be a partial proof of vertical FDIs in these countries: the increase in vertical FDIs triggered an increase in labour demand, thus contributing to rising labour costs.

Table 1 here

The main investors remain Western European countries, the proximity and the long lasting cultural bonds being essential for the investment decisions of these countries. At the same time, a *bonanza* (Baldwin et al., 1997) for Western European countries, the CEECs represent more than 100 million consumers with rising incomes, some of them having in 2003

a market potential close to that of the Scandinavian countries, such as Slovenia, Hungary, Poland, or even that of France, such as the Czech Republic (Figure 3).

Figure 3 here

An aspect that was less studied in the empirical literature, but which appears to be essential in the theoretical model presented in Fujita and Thisse (2006) is that of communications infrastructures. Globally, Estonia, Slovenia and Hungary stand out with the most dynamic NICT sector among the CEECs, especially thanks to a rapid privatization (Bruce et al., 1999). More precisely, only three countries stand out with a number of telephone lines rather close to that of the old members of the EU: the Czech Republic comes first, then Slovenia and Hungary (Figure 4). Countries like Bulgaria or Romania, which were lagging behind in terms of communications, experience notable progress today, especially in the mobile sector and especially Bulgaria (Figure 5).

Figure 4 here

Figure 5 here

In terms of FDI diversion involving the CEECs and other parts of the world, we would be tempted to think of two main countries/regions. Firstly, we think of Southern Europe, because with integration in the EU, the CEECs became obviously the main challengers for this area in terms FDI attraction. Secondly, we think of China for several reasons. Firstly, analyzing statistics over our period of interest 1996-2003, China was the 3rd favourite destination for FDIs coming from the developed countries retained in our study, right after Latin America and the CEECs (Figure 6). China thus represents the first direct challenger for the CEECs as a FDI destination. Secondly, we retain only China, because it can be regarded as representative for Southeast Asia: China received (over the period 1996-2003) more FDIs (from the same investing countries retained in our study) by itself than all the other main FDI receivers in the area (Thailand, Vietnam, India) together (approximately 56.000 million dollars against 46.000 million dollars). Our calculations are based on cumulated FDI inflows over the period of interest 1996-2003.

Figure 6 here

Lastly, our choice is even more justified by looking at the evolution of FDI flows towards China and the CEECs (Figure 7). We can note the almost opposite trends FDIs inflows follow in each of them: globally, a FDI decrease towards the CEECs corresponds to a FDI increase China and vice versa. Obviously, this does not represent an absolute proof of FDI diversion, but seems to support our point of view.

Figure 7 here

II. THE THEORY BEHIND THE EMPIRICAL STUDY

The theoretical model is based on Fujita and Thisse (2006)[1] who discuss the relocation of industry triggered by differences in labour productivity and wages, in a two-region framework. It is a classic new economic geography (NEG) model, with the particularity that it integrates multinational activity in the industrial sector, multinational firms (MNFs) incurring communication costs for separating their production plant from their headquarters, which directly impact production costs. For the sake of space, we let the more interested readers refer to Fujita and Thisse (2006) and Vechiu (2010) for a complete description and discussion of the model and its enriched version and here we choose only to explain the essence of the model and remind the equation of the model our empirical study is based upon.

In Vechiu (2010), we integrated a third region to the original model discussed by Fujita and Thisse (2006), in order to analyze competition effects in terms of attracting FDIs on relocation of MNF production units. The originality of our model consists of the definition of the three regions: there are one developed region and two developing regions, each one of them at a different level of development. This allows a more realistic representation of the actual world economy, taking into account the high heterogeneity of countries taking part to the process of globalization. The regions are called: the North (*N*), the South (*S*) and the Rest of the World (*RW*). The North is the industrialized region, containing all the headquarters of multinational firms (headquarters are located in the North and the production unit, in one of the two developing regions) and all the national firms (headquarters and the production unit are both located in the same region, namely the North), while the South and the Rest of the World are developing regions, containing only the plants of the multinational firms.

[1] A very interesting version of this model can be found in Candau and Musson (2010), dealing with environmental norms and fragmentation of production.

Furthermore, the Rest of the World is assumed less developed than the South, the level of development being defined in two manners: productivity and wages of the low skilled labour and communication infrastructures. The Rest of the World is more abundant in low skilled labour and its wage rate is smaller than that of the South and at the same time, it has a poorer communications infrastructure implying higher communication costs. One can think of, for instance, Western Europe, South Europe and Eastern and Central Europe, in a multilateral framework, or Western Europe, Eastern and Central Europe and China, if we consider that the first two are members of a FTA. So, when considering the location of production plants (of national and multinational firms), there is a trade off between lower labour costs (w_r) and communication costs (C_r - subscript r stands for region) in the developing regions: a low wage is an incentive to become multinational, as it would reduce production costs, whereas communication costs are an incentive to become national, as it would also reduce production costs.

The new that the three-region framework brings as compared to the two-region one is the competition effect that appears between the two developing regions. We can say that each one of them has an advantage over the other: the Rest of the World challenges the South on a wage basis, whereas the South challenges the Rest of the World on a communications infrastructure basis. On this ground, a two-region model could not a priori predict the outcomes of economic integration, given that an industrial firm faces the same trade off between wages and infrastructure in more than one location: the South has higher wages than the Rest of the World, but at the same time, it offers a better communications infrastructure; the Rest of the World has lower wages than the South, but at the same time, it offers a poorer communications infrastructure.

The rest of the hypothesis are all classic in the NEG literature. There are two production factors: the skilled workers and the unskilled workers and two sectors. The manufacturing sector is under Dixit-Stiglitz competition: each firm produces one horizontally different variety under increasing returns to scale, using both skilled and unskilled workers. The agricultural sector is under perfect competition, using only unskilled labour. Industrial goods are subject to "iceberg" trade costs between regions.

The classic firms' profit and consumers' utility maximization gives the equilibrium profit functions in each region, which allow analyzing the impact of globalization on industry location and welfare (subscripts *N*, *NS* and *NRW* indicate national firms in the North, MNFs in the South and MNFs in the Rest of the World respectively):

$$(1)\quad \pi_N^* = \frac{\mu F}{\sigma K_H}\left[\frac{Y_N}{\gamma_N + \Phi_{NS}\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_S \Phi_{NS}}{\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NS}\gamma_N + \Phi_{SRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_{RW}\Phi_{NRW}}{\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma} + \Phi_{NRW}\gamma_N + \Phi_{SRW}\gamma_S\left(C_S w_S\right)^{1-\sigma}}\right] - w_N^{K_H} F$$

$$(2)\quad \pi_{NS}^* = \left(C_S w_S\right)^{1-\sigma}\frac{\mu F}{\sigma K_H}\left[\frac{Y_S}{\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NS}\gamma_N + \Phi_{SRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_N \Phi_{NS}}{\gamma_N + \Phi_{NS}\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_{RW}\Phi_{SRW}}{\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma} + \Phi_{NRW}\gamma_N + \Phi_{SRW}\gamma_S\left(C_S w_S\right)^{1-\sigma}}\right] - w_N^{K_H} F$$

$$(3)\quad \pi_{NRW}^* = \left(C_{RW} w_{RW}\right)^{1-\sigma}\frac{\mu F}{\sigma K_H}\left[\frac{Y_{RW}}{\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma} + \Phi_{NRW}\gamma_N + \Phi_{SRW}\gamma_S\left(C_S w_S\right)^{1-\sigma}} + \frac{Y_N \Phi_{NRW}}{\gamma_N + \Phi_{NS}\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_S\Phi_{SRW}}{\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NS}\gamma_N + \Phi_{SRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}}\right] - w_N^{K_H} F$$

where:

- $\gamma_N = n_N / n$ represents the share of national firms
- $\gamma_S = n_S / n$ represents the share of MNFs to the South
- $\gamma_{RW} = n_{RW} / n$ represents the share of MNFs to the Rest of the World
- $\Phi_{rs} = \tau_{rs}^{1-\sigma}$, freeness of inter-regional trade ($\Phi_{rs} = 0$ means prohibitive inter-regional trade costs, $0 < \Phi_{rs} < 1$)
- $C_{RW} > C_S$
- Y_r – regional income
- μ - the share of income spent on industrial goods
- σ - the elasticity of substitution between industrial varieties
- F – fixed cost
- K_H – total skilled labour
- $w_N^{K_H}$ – skilled labour wage

Given the complexity of the equations, results could not be obtained analytically, but only through numerical simulations. By varying τ_{rs} and C_r, we analyzed the impact of trade liberalization (decreasing trade costs τ_{rs}), but also information and communication technology (decreasing communication costs C_r) on industry relocation (the evolution of γ_r). We show that industry relocation is influenced not only by the wage and/or communication costs differential between origin and destination regions, but also by the relative competitiveness of the destination region as compared to the other potential destination region. For instance, we show that in a multilateral liberalization framework, when wages and communication costs are low enough in the developing regions so that multinational activity becomes more

beneficial than the national one, the Rest of the World may lose as well as gain industry, depending on its relative competitiveness as compared with the South: if wages in *RW* are low enough to compensate its higher communication costs and thus narrow its competitiveness gap with the South, then *RW* will gain industry at the same time as the South (Figure 8).

Figure 8 here

Finally, the main conclusion to be retained from the theoretic model is that industrial location and multinational activity, as illustrated by the profit function of industrial firms, are not determined only by regions' characteristics alone, but also by their relative competitiveness as compared to their international partners.

Consequently, in the next section, we will describe how the econometric study is derived from the theoretic model and then, we will test it on data for the CEECs.

III. FDIs TOWARDS THE CEECs: DETERMINANTS AND COMPETITION EFFECTS

In this section, an empirical analysis is conducted, based on the linearized operating profit function of the MNFs in the previous section, together with gravity theory-based considerations. Our purpose is two-folded. Firstly, by examining profit functions, some factors determining MNFs location choice can be identified:

(4) $\pi_{rs} = \pi_{rs}\left(Y_r, Y_s, \tau_{rs}, C_s, w_s\right)$

where *r* stands for the investing region, *s* stands for the destination region and the other variables have the usual connotation. Secondly, by emphasizing the wage and communication costs differential between destination countries in the profit functions, we can analyze competition effects on FDI decisions (MNFs plants location).

According to (4), the profit of multinational firms is thus a function of fixed costs, regional incomes, trade and communication costs, wages and price indices. Many of these variables represent quite a challenge as regards the choice and the availability of the appropriate statistics. Consequently, we follow Head and Mayer (2004) and apply several simplifications and transformations in order the get the final estimating equation.

Firstly, in our model, fixed costs do not affect the location decision, as they are the same regardless of the destination region. Thus, we shall use the operating profit function of the multinational firms. Considering that the CEECs are developing countries, we shall use

the operating profit for multinational firms given by (2). Using (3) could also be envisaged, as the results would be exactly the same. Given that monopolistic profit is 0, then the operating profit (Π_{rs}) becomes:

$$(5)\quad \Pi_{NS} = \left(C_S w_S^L\right)\frac{\mu F}{\sigma K_H}\left[\frac{Y_S}{\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NS}\gamma_N w_N^{1-\sigma} + \Phi_{SRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_N \Phi_{NS}}{\gamma_N w_N^{1-\sigma} + \Phi_{NS}\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_{RM}\Phi_{SRM}}{\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma} + \Phi_{NRW}\gamma_N w_N^{1-\sigma} + \Phi_{SRW}\gamma_S\left(C_S w_S\right)^{1-\sigma}}\right]^{1/(1-\sigma)}$$

Then, following the procedure presented by Head and Mayer (2004), we multiply the right-hand side of (?) by $\frac{\sigma K_H}{\mu F}$ and raise the result to the power 1/(1-σ). We thus get a reduced form of the operating profit function:

$$(6)\quad \Pi_{NS} = \left(C_S w_S\right)\left[\frac{Y_S}{\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NS}\gamma_N w_N^{1-\sigma} + \Phi_{SRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_N \Phi_{NS}}{\gamma_N w_N^{1-\sigma} + \Phi_{NS}\gamma_S\left(C_S w_S\right)^{1-\sigma} + \Phi_{NRW}\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma}} + \frac{Y_{RW}\Phi_{SRW}}{\gamma_{RW}\left(C_{RW} w_{RW}\right)^{1-\sigma} + \Phi_{NRW}\gamma_N w_N^{1-\sigma} + \Phi_{SRW}\gamma_S\left(C_S w_S\right)^{1-\sigma}}\right]^{1/(1-\sigma)}$$

Finally, we emphasize the wage differential between origin and destination countries, which is essential for the results of the model, by factorizing $w_N^{1-\sigma}$:

$$(7)\quad \Pi_{NS} = C_S \frac{w_S}{w_N}\left[\frac{Y_S}{\gamma_S\left(C_S \frac{w_S}{w_N}\right)^{1-\sigma} + \Phi_{NS}\gamma_N + \Phi_{SRW}\gamma_{RW}\left(C_{RW} \frac{w_{RW}}{w_N}\right)^{1-\sigma}} + \frac{Y_N \Phi_{NS}}{\gamma_N + \Phi_{NS}\gamma_S\left(C_S \frac{w_S}{w_N}\right)^{1-\sigma} + \Phi_{NRW}\gamma_{RW}\left(C_{RW} \frac{w_{RW}}{w_N}\right)^{1-\sigma}} + \frac{Y_{RW}\Phi_{SRW}}{\gamma_{RW}\left(C_{RW} \frac{w_{RW}}{w_N}\right)^{1-\sigma} + \Phi_{NRW}\gamma_N + \Phi_{SRW}\gamma_S\left(C_S \frac{w_S}{w_N}\right)^{1-\sigma}}\right]^{1/(1-\sigma)}$$

Linearizing (7), we get:

$$(8)\quad Ln\Pi_{NS} = LnC_S + Ln\frac{w_S}{w_N} + \frac{1}{1-\sigma}LnMP$$

where MP represents Krugman's market potential, with:

$$(9)\quad MP = \frac{Y_S}{\gamma_S\left(C_S \frac{w_S}{w_N}\right)^{1-\sigma} + \Phi_{NS}\gamma_N + \Phi_{SRW}\gamma_{RW}\left(C_{RW} \frac{w_{RW}}{w_N}\right)^{1-\sigma}} + \frac{Y_N \Phi_{NS}}{\gamma_N + \Phi_{NS}\gamma_S\left(C_S \frac{w_S}{w_N}\right)^{1-\sigma} + \Phi_{NRW}\gamma_{RW}\left(C_{RW} \frac{w_{RW}}{w_N}\right)^{1-\sigma}} + \frac{Y_{RW}\Phi_{SRW}}{\gamma_{RW}\left(C_{RW} \frac{w_{RW}}{w_N}\right)^{1-\sigma} + \Phi_{NRW}\gamma_N + \Phi_{SRW}\gamma_S\left(C_S \frac{w_S}{w_N}\right)^{1-\sigma}}$$

Krugman's market potential thus represents the sum of the regional market sizes (incomes deflated by a reduced form of the price indices) weighted by trade costs. We can specify even more the form of the equation to be estimated, by detailing market potentials (market sizes x trade costs):

$$(10)\ Ln\Pi_{NS} = LnC_S + Ln\frac{w_S}{w_N} + \frac{1}{1-\sigma}Ln\sum_{r=1}^{3}\frac{Y_r}{\Delta_r} + \frac{1}{1-\sigma}Ln\Phi_{rs}$$

where $\Delta_r = \Phi_{rs}\sum_{r=1}^{3}\gamma_r\Phi_{rs}\left(C_s\frac{w_s}{w_r}\right)^{1-\sigma}$

Regarding FDI diversion triggered by countries' relative competitiveness, as put forward by the theoretic model, we shall analyze the impact of destination countries' relative wage and communication costs on FDI inflows.

The equations to be estimated are derived from (7) by factorizing $w_{RW}^{1-\sigma}$ instead of $w_N^{1-\sigma}$ for relative wage competitiveness and $C_{RW}^{1-\sigma}$ for relative communication costs competitiveness.

Finally, using the same reasoning, (10) becomes:

$$(11)\ Ln\Pi_{NS} = Ln\frac{C_S}{C_{RW}} + Ln\frac{w_S}{w_{RW}} + \frac{1}{1-\sigma}Ln\sum_{r=1}^{3}\frac{Y_r}{\Delta_r} + \frac{1}{1-\sigma}Ln\Phi_{rs}, \text{ where } \Delta_r = \Phi_{rs}\sum_{r=1}^{3}\gamma_r\Phi_{rs}\left(\frac{C_r}{C_s}\frac{w_r}{w_s}\right)^{1-\sigma}$$

Data and methodology

As data on MNFs profits are difficult to find, a usual solution in the NEG empirical analysis is to use FDI stocks as a proxy (Mayer, 2006). Consequently, we will use a panel of 60 bilateral FDI stocks received by ten CEECs (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia) from 21 developed members of the European Union and the OECD (Austria, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Iceland, Italy, Japan, South Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States). Our annual data come from the OECD database (International direct investment by country Vol 2008 release 01) and cover the 1996-2003 period.

Regarding communication costs, we choose the number of fixed and mobile phone lines for 100 people (C_s), published by the World Bank. The choice of these statistics seems obvious, since the fixed and mobile technology represents one of most important advances of the century in terms of information and communications technology. Moreover, other studies already highlighted the significant impact of these variables on investment decisions or trade

flows (Fink et al., 2005; Dunning, 2002; Zaheer and Manrakhan, 2001). Our variable will thus be inversely proportional to communication costs and will measure the size of the communications infrastructure. Consequently, its impact on FDIs should be positive and not negative as we would be tempted to believe according to the results of our model. Furthermore, given that many CEECs have received important FDIs in the communications sector, our study could suffer from a potential endogeneity bias. In order to address this issue, we construct a dummy variable for communication costs (*Cdummy*), based on the same statistics from the World Bank. The dummy takes value 1 if the number of fixed and mobile phone lines per 100 people in a CEEC is higher than the CEECs average and 0 otherwise. Furthermore, this also allows taking into account the competitiveness of a CEEC relative to its neighbours.

As for wages, we choose as a proxy wages in manufacturing (w_r^m, w_s^m) from the CEPII database (CEPII Trade and Production database), which we reconstituted to cover some missing observations (2003 for Hungary and Slovenia and all years, except 2002, for Poland,) using the quarterly growth rate of the labour costs, posted online by Eurostat. The data are in thousands of dollars per annum, for total manufacturing. Several reasons can be mentioned to justify this choice. Firstly, for manufacturing industries, low skilled labour is the main input, so wages in this type of activity appears suitable enough to be used as a proxy for labour costs. Secondly, more and more multinationals relocate their production units towards the CEECs, largely known for their competitiveness in manufacturing. Therefore it seems rather plausible that wages in this field are important determinants for FDIs in these countries. Lastly, a rather practical reason is that there are no good enough statistics regarding unit labour costs. For instance, OECD and Eurostat publish a unit labour costs index, but it does not cover all the countries or all years in our sample.

Lastly, concerning the last part of our equation to be estimated, Head and Mayer (2004) use a gravity equation to estimate the market potential (market size and trade costs), whereas Mayer (2006) uses as proxies the distance between the investing and destination country for trade costs and the GDPs of the investing and destination country for market size. In the baseline estimations, we follow Mayer (2006) and use as a proxy for Φ, the distance in kilometers between the capital of the investing country and that of the CEEC of destination (d_{rs}), and for market sizes, the GDPs of the countries of origin and destination (GDP_r and GDP_s). The data on distances come from the CEPII database, whereas the data on GDP come from the UNCTAD database. We also proceed to a robustness check, using the market

potential data (RMP_r and RMP_s) as estimated by Mayer (2008) and made available online on the CEPII website.

Consequently, from (10) and (11) respectively, the baseline equations to be estimated in our two studies (FDI determinants and competition effects on FDI decisions) become:

- FDI determinants:

(12) $LnFDI_{rs} = \alpha_1 LnGDP_r + \alpha_2 LnGDP_s + \alpha_3 Lnd_{rs} + \alpha_4 LnC_s + \alpha_5 Ln(w_r^m/w_s^m) + \alpha_6\beta + \varepsilon$

- Relative wage and communication costs competition effects:

(13) $LnFDI_{rs} = \alpha_1 LnGDP_r + \alpha_2 LnGDP_s + \alpha_3 Lnd_{rs} + \alpha_4 Ln(C_s/C_v) + \alpha_5 Ln(w_s^m/w_v^m) + \alpha_6\beta + \varepsilon$

where r – the investing country and s, v – the receiving countries.

β is the intercept, which allows taking into account all the other variables that could have an impact on FDI, but couldn't be explicitly integrated in our model and ε - an error term, which allows taking into account individuals' random behavior and measure errors.

Table 2 hereafter resumes the variables and the proxies chosen, as well as the data sources we used in our analysis.

Table 2 here

Based on the arguments presented in our *Stylized facts* sub-section, we choose two main challengers for the CEECs in terms of attracting FDIs, namely Southern Europe and China. Constructing wage and communication costs for Southern Europe is based on a weighted average taking into account Spain and Portugal. The weights correspond to each country's GDP share in region's total GDP (0.6 for Spain and 0.4 for Portugal) and their evolution is small enough for them to be kept constant over the whole period of interest. Greece couldn't be considered in our calculations because the necessary statistics were too scarce.

Regarding the estimating methods, an empirical investigation could be considered by the procedure of Ordinary Least Squares (OLS), for each country individually or, by panel data methods or the SUR method, collectively. However a panel data method has the advantage of modelling non observed heterogeneity, which is the effect of omitted variables, so we choose this one. The SUR method has been avoided, as its implementation involved the loss of a considerable numbers of observations.

In order to take into account the unobserved heterogeneity, we first carried out several estimations using the classic panel-data methods: the fixed and random effects models. For

the sake of comparison, we also present OLS estimations. Then, in order to take into account the heteroskedasticity generally associated with bilateral FDI data and more generally with gravity equations (Silva and Tenreyro, 2006), we conduct Poisson Quasi Maximum Likelihood estimations (PQML).

We will present successively, the results relating to the determinants of FDI stocks in the CEECs, particularly those regarding the impact of the communication costs and wage differentials and then, the results relating to the potential competition effects between CEECs and Southern Europe and CEECs and China in attracting FDIs.

FDI determinants in the CEECs

Table 3 below shows our estimations results using the basic panel methods, while Table 4 shows the results for PQML estimations.

Table 3 here

In table 3, one can see that mainly all the coefficients are statistically significant at 1% and have the expected sign. Especially the baseline equations (1), (2) and (3) perform extremely well. All the coefficients are very robust regardless of the method used: they are statistically significant at 1% and their values do not change significantly. As predicted by the model and the gravitational theory more generally, the GDPs of the countries of origin and destination have a positive impact on bilateral FDI stocks, the GDP of the country of destination being estimated approximately twice more important than the GDP of the country of origin in FDI decisions. Then, trade costs approximated by the distance between partner countries have a negative impact on bilateral FDI stocks, a standard outcome in this kind of analysis, while the size of the communications infrastructure is positive, thus reflecting the negative impact of communication costs (the more people have access to a telephone line, the better the communication infrastructure and thus, the lower the communication costs and the higher the FDI stocks). Lastly, the wage differential is also very significant and has a positive impact on bilateral FDIs, although, it seems to be the least important among the other decision criteria. Consequently, the lower the wages in the CEECs as compared to those of the investing countries, the more FDIs towards the CEECs. The coefficient is positive because we considered the difference in wages between the investing country and the receiving country.

Replacing the proxy for communication costs in the baseline equation ((7), (8) and (9)) doesn't alter the results we have discussed previously. Communications infrastructure continues to appear more important than wages in FDI decisions, but globally the coefficients for the two variables are much lower than in the baseline estimation.

Finally, when considering Mayer's (2008) market potential instead of GDPs and distance as a proxy for market potential, we get approximately the same results, with the difference that wages appear more important than communications infrastructure ((4), (5), (6), (10), (11) and (12)) and the dummy used for the latter has a negative impact on FDIs towards the CEECs ((10), (11) and (12)). The importance of wages when using RMP instead of GDP could be easily explained by the construction of the RMP. The RMP is a much wider concept than the GDP: while the GDP reflects only the importance of the local market, the RMP reflects both the importance of the local market and the access to the foreign markets from the local market. Consequently, the wage becomes a much more important decision criterion for a MNF wishing to serve both local and foreign markets from the same location than for a MNF wishing to serve only the local market by establishing a local production unit. Finally, the negative impact of the communications dummy in the last three columns of table 3 could also be explained by the fact that the construction of the RMP itself is based on many dummy variables. When considering trade costs, the RMP takes into account not only distance, but also different dummy variables capturing factors such as contiguity, common language, colonial links and being part of a free trade agreement, a currency union or GATT/WTO (Mayer, 2008). Alternatively, one must notice the very high coefficient of the RMP, which combined with an also high coefficient for the wage differential, suggests a substantial proof for vertical FDIs in the CEECs. Generally, vertical or efficiency-seeking FDIs are looking for low production costs and a good access to foreign markets from the local market where the FDI is undertaken. Thus, if we think of communications infrastructure as a signal for a country's level of development, it shouldn't come as a surprise that a higher level of development means also higher global production costs and consequently, less efficiency-seeking FDIs. Lastly, this could also be interpreted in the light of the model presented Martin and Rogers (1995): improving the international infrastructure of a country (connecting a peripheral country to a core country) may lead to capital leaving the country instead of coming to the country, whereas improving local infrastructure (connecting local agents inside a peripheral country) may have the opposite outcome.

In table 4 below, the coefficients have globally lower values. As already explained by Silva and Tenreyro (2006), the PQML method shows how much standard methods such as

OLS or fixed and random effects may overestimate the value of the estimated coefficients, by ignoring keteroskedasticity inherent to gravity equations. Nevertheless our variables remain very significant and have the usual sign, except for the communication costs dummy, which becomes non significant when considering RMPs instead of GDPs and distance as a proxy or countries' market potentials.

Table 4 here

Competing for FDIs: CEECs versus Southern Europe and China

Implementing relative labour and communication costs considerations as shown by (13), we were able to test for some competition effects between destination countries, such as predicted by our model. As aforementioned, we choose to test the impact of Southern European (SE) and also Chinese relative competitiveness. We proceed to the same robustness check, by using also RMPs instead of GDPs and distance, but we don't take into account any communication costs dummy. Given that we use only relative communication costs the problem of FDIs endogeneity does not stand anymore as global FDIs towards a CEEC are not very likely to have an impact on the communication costs differential between that CEEC and some potential competitor in particular.

In order to avoid multicollinearity problems, when checking the impact of SE-CEECs relative labour and communication costs, we ignore CEECs labour costs relative to the investing countries and CEECs communication costs. Consequently, in (13), s and v subscripts are replaced by SE and $CEEC$ subscripts respectively and relate to Southern European variables and CEECs variables respectively.

Table 5 below presents the estimations results for the impact of the CEECs-SE relative wage and communication costs.

Table 5 here

One can see that general gravity theory-based considerations are confirmed. This analysis thus confirms some of the results found in the previous analysis: traditional market related factors and distance have a very significant and correctly signed impact on FDIs in the CEECs, the coefficients being quite robust when using standard panel methods, but with lower values when using PQML.

We find rather weak evidence for wage competition effects. The wage differential between Southern Europe and the CEECs becomes significant only in equations using GDPs ((2), (3)) and/or estimations using PQML ((7), (8)). As for communications infrastructure competition effects, the coefficients are very significant, even though they change sign depending on the variable being used as a proxy for market potential. This pattern is similar to the one found in our previous analysis of FDI determinants, when we were considering the communication costs dummy. Consequently, when considering a more efficiency-seeking vision for FDIs towards a CEEC, having a relatively poorer communications infrastructure than other potential destination countries may still have a positive impact on FDIs entering the CEECs. In this particular case, when we consider the impact of the RMP on FDIs towards the CEECs ((3), (4), (5) and (8)), which is very strong and positive, we can conclude that having a good access to foreign markets is very beneficial for FDIs in these countries. But having a good access to foreign markets also means having good access to their better infrastructure. We can thus conclude that the CEECs with a good access to foreign markets (among which Southern Europe) also have a good access to their relatively better communication infrastructure (in our case, Southern Europe) and thus, may enjoy more export platform FDIs.

Finally, table 6 below presents the results for Chinese competition effects. The results are very similar to the ones regarding Southern Europe competition effects, with the difference that evidence for some wage competition effects is now even weaker. Also one can notice that together with standard results being confirmed (very strong and significant impact of market-related factors), the Chinese communications infrastructure competition effect is as important as the Southern European one.

Table 6 here

To sum up, as predicted by the theoretic model, some competition effects do appear between developing countries with regard to attracting FDIs. One of the main sources of competition today is assumed to be the low labour cost, even though some developing countries have succeeded in specializing in high value added sectors, based on more capital intensive goods. However, our analysis supports the idea that wage competition effects are rather weak in the CEECs. Actually, a far more important source of competition effects is adopting the latest communication and information technology, in order to attract MNFs.

IV. CONCLUSION

Based on the main conclusions of a theoretical model, we analyzed FDI determinants and competition effects in terms of attracting FDIs in the CEECs. Our empirical analysis contributed to the existing literature at least in two ways: on the one hand, we estimated FDIs determinants based on a formal model and on the other hand, we used the latest data available. Trade and communication costs together with labour costs seem to have a strong impact on inward FDIs in these countries. Their inward FDIs are positively related to adopting communication technology and negatively related to trade and labours costs. The usual market-related determinants are also confirmed: FDIs in the CEECs are positively related to their GDP or, in a wider view, to their real market potential. As for competition effects between developing countries in attracting FDIs, it seems that FDIs in the CEECs are hindered by the relatively better communication infrastructure in Southern Europe when taking into account only local market considerations, but enhanced by it when considering both local and foreign market access considerations. We found the same competition effects when considering China instead of Southern Europe. Finally, we found rather weak evidence for wage competition effects between Southern Europe and the CEECs and even weaker evidence for the same effects between the CEECs and China.

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TABLES

TABLE 1

LABOUR COSTS INDEX IN MANUFACTURING

Year / Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
EU15	***2763.2***	***2895.5***	***2987.9***	***3102.7***	***3265.1***	***3245.5***	***3351.2***	***3490.1***	***3670***	***3814.6***	***3718.4***	
Bulgaria					167.6	172.7	177.3	183.7	192.5	205.5	217.3	253.6
Estonia	257.3	299.3	339.5	357.7	400.8	447.1	499.3	539.8	584.5	656.7	769.1	
Hungary	380.5	415	434.1	460.6	524.1	587.6	696.4	720.7	799.9	908.4	890.3	993.6
Latvia		244	255.4	275.9	316.9	325.1	330	326.9	354.2	395.2	483.8	625.4
Lithuania	179.2	249.1	284.5	318.9	373.5	409.5	434.5	450.4	458.7	501.3	583.3	719.4
Poland	399.3	458.2	500	534.1	599.1	694.1	681.7	612.4	607.3	716.3	785	886.3
Czech Rep.	384.6	412.4	453.1	472.1	531.7	594.6	701	713.2	767.1	853.1	944.7	1036.5
Romania	145.3	137.2	166.7	156.2	191.5	209.4	217	212.2	239.5	308.5	358.2	450.7
Slovakia	310.2	373.7	390.2	364.2	425.8	442.7	485.3	532.6	618	662.7	729.4	883
Slovenia	944.3	1014.1	1105.5	1158.5	1165.5	1207.3	1304.8	1352.6	1376.5	1454.9	1513.8	1617
CEECs	***397.7***	***441.5***	***479***	***506.3***	***567***	***641.6***	***678.9***	***659.8***	***685.2***	***777.9***	***840.1***	***931.1***

Data source: EUROSTAT, 2009

TABLE 2

CHOICE OF VARIABLES AND DATA SOURCES

Variable	*Proxy*	*Data source*
Π_{rs}	Bilateral FDI stocks FDI_{rs}	OECD
$\frac{Y_r}{\Delta_r}$	Investing country's GDP GDP_r	UNCTAD
$\frac{Y_s}{\Delta_s}$	Receiving country's GDP GDP_s	UNCTAD
MP_r	Head and Mayer (2004) Real market potential RMP_r	CEPII
MP_s	Head and Mayer (2004) Real market potential RMP_s	CEPII
Φ_{rs}	Distance en km between capitals of investing and receiving countries d_{rs}	CEPII
C_s	Number of fixed and mobile lines subscribers per 100 people C_s	World Bank
${w_r}^m$, ${w_s}^m$, ${w_v}^m$	Wage in manufacturing	CEPII

TABLE 3

FDI DETERMINANTS : STANDARD PANEL METHODS

Model / Variables	OLS (1)	FE (2)	RE (3)	OLS (4)	FE (5)	RE (6)	OLS (7)	FE (8)	RE (9)	OLS (10)	FE (11)	RE (12)
$LnGDP_r$	0.847***	0.855***	0.850***				0.956***	0.899***	0.912***			
	(0.0573)	(0.0580)	(0.0572)				(0.0626)	(0.0563)	(0.0573)			
$LnGDP_s$	1.678***	1.709***	1.680***				1.516***	1.640***	1.613***			
	(0.0705)	(0.0830)	(0.0709)				(0.0825)	(0.0747)	(0.0760)			
Lnd_{rs}	-1.316***	-1.314***	-1.318***				-1.516***	-1.391***	-1.419***			
	(0.0734)	(0.0766)	(0.0734)				(0.0787)	(0.0715)	(0.0726)			
LnC_s	1.448***	1.569***	1.449***	0.582***	-0.310	0.582***						
	(0.145)	(0.315)	(0.155)	(0.172)	(0.292)	(0.172)						
$Ln(w_r^m / w_s^m)$	0.803***	0.846***	0.804***	1.849***	1.741***	1.849***	0.214*	0.628***	0.538***	1.571***	1.745***	1.585***
	(0.126)	(0.152)	(0.127)	(0.184)	(0.185)	(0.184)	(0.130)	(0.123)	(0.124)	(0.179)	(0.178)	(0.179)
$LnRMP_r$				0.796***	0.811***	0.796***				0.909***	0.813***	0.902***
				(0.0866)	(0.0857)	(0.0866)				(0.0830)	(0.0847)	(0.0831)
$LnRMP_s$				3.835***	3.863***	3.835***				3.897***	3.870***	3.896***
				(0.223)	(0.221)	(0.223)				(0.224)	(0.220)	(0.223)
Cdummy							0.393**	0.805***	0.716***	-0.412**	-0.278	-0.402**
							(0.170)	(0.157)	(0.159)	(0.174)	(0.173)	(0.174)
Intercept	-32.50***	-33.77***	-32.58***	-68.96***	-66.03***	-68.96***	-23.80***	-26.73***	-26.11***	-68.96***	-67.26***	-68.85***
	(2.061)	(2.858)	(2.095)	(3.987)	(4.104)	(3.987)	(2.140)	(1.936)	(1.974)	(4.017)	(3.999)	(4.012)
Observations	398	398	398	398	398	398	398	398	398	398	398	398
R-squared	0.731	0.711	0.731	0.536	0.511	0.537	0.667	0.712	0.661	0.530	0.512	0.530
Number of year	8	8	8	8	8	8	8	8	8	8	8	8

Notes: $^{***}(^{**}, ^{*})$ *the null-hypothesis is rejected at 1% (5%, 10%), (.) is the standard error*

TABLE 4

FDI DETERMINANTS IN THE CEECS: PQML ESTIMATION

Model / Variables	PQML (1)	PQML (2)	PQML (3)	PQML (4)
$LnGDP_r$	0.571***	0.601***		
	(0.0443)	(0.0439)		
$LnGDP_s$	1.199***	1.157***		
	(0.0359)	(0.0307)		
Lnd_{rs}	-0.619***	-0.685***		
	(0.0503)	(0.0435)		
$LnRMP_r$			0.386***	0.382***
			(0.0505)	(0.0509)
$LnRMP_s$			2.165***	2.127***
			(0.151)	(0.155)
$Ln(w_r^m / w_s^m)$	0.656***	0.387***	0.762***	0.772***
	(0.0674)	(0.0484)	(0.107)	(0.106)
LnC_s	1.915***		-0.147	
	(0.137)		(0.136)	
Cdummy		0.989***		-0.0166
		(0.0782)		(0.0714)
Observations	403	403	403	403
Number of years	8	8	8	8

*Notes: *** (**, *) the null-hypothesis is rejected at 1% (5%, 10%), (.) is the standard error*

TABLE 5

SE-CEECS WAGES AND COMMUNICATIONS INFRASTRUCTURE COMPETITION EFFECTS

Model / Variables	OLS (1)	FE (2)	RE (3)	OLS (4)	FE (5)	RE (6)	PQML (7)	PQML (8)
$LnGDP_r$	1.07***	1.07***	1.07***				0.653***	
	(0.05)	(0.05)	(0.06)				(0.0282)	
$LnGDP_s$	1.47***	1.56***	1.55***				1.048***	
	(0.10)	(0.11)	(0.10)				(0.0513)	
Lnd_{rs}	-1.55***	-1.58***	-1.58***				-0.691***	
	(0.07)	(0.07)	(0.07)				(0.0403)	
$LnRMP_r$				1.250***	1.245***	1.250***		0.529***
				(0.08)	(0.09)	(0.08)		(0.0428)
$LnRMP_s$				2.109***	2.049***	2.104***		1.343***
				(0.28)	(0.30)	(0.28)		(0.186)
$Ln(w^m_{SE} / w^m_{CEEC})$	0.03	0.40*	0.34*	-0.379	-0.397	-0.380	0.230***	-0.300***
	(0.20)	(0.21)	(0.21)	(0.29)	(0.30)	(0.29)	(0.0724)	(0.0874)
$Ln(C_{SE}/C_{CEEC})$	-0.78***	-1.03***	-0.99***	0.826**	0.989***	0.844**	-1.543***	0.236**
	(0.33)	(0.37)	(0.36)	(0.33)	(0.35)	(0.33)	(0.136)	(0.105)
Intercept	-23.88***		-25.58***	-43.33***	-42.36***	-43.24***		
	(2.31)		(2.38)	(5.26)	(5.51)	(5.28)		
Observations	473	473	473	473	473	473	478	478
R-squared	0.68	0.71	0.71	0.42	0.39	0.42		
Number of years	8	8	8	8	8	8	8	8

*Notes: ***(**, *) the null-hypothesis is rejected at 1% (5%, 10%), (.) is the standard error*

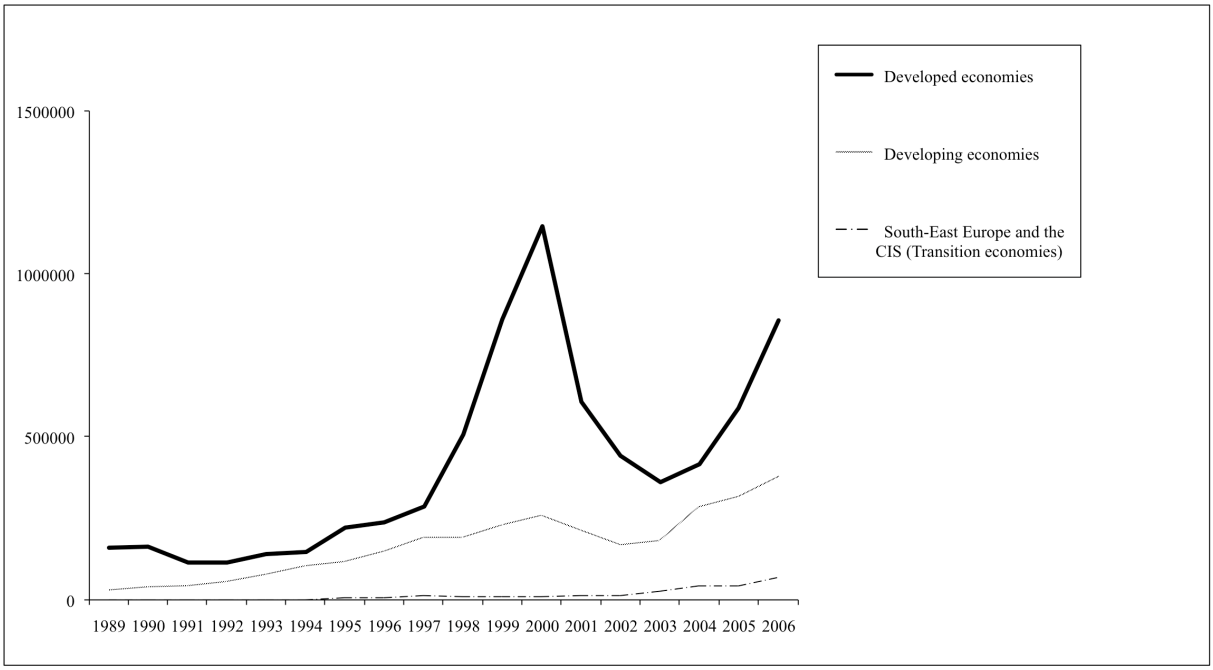
TABLE 6

CEECS-CHINA WAGES AND COMMUNICATIONS INFRASTRUCTURE COMPETITION EFFECTS

Model / Variables	OLS (1)	FE (2)	RE (3)	OLS (4)	FE (5)	RE (6)	PQML (7)	PQML (8)
$LnGDP_r$	1.05***	1.07***	1.07***				0.653***	
	(0.05)	(0.05)	(0.06)				(0.0282)	
$LnGDP_s$	1.28***	1.56***	1.52***				1.048***	
	(0.10)	(0.11)	(0.10)				(0.0513)	
Lnd_{rs}	-1.63***	-1.58***	-1.59***				-0.691***	
	(0.07)	(0.07)	(0.07)				(0.0403)	
$LnRMP_r$				1.22***	1.25***	1.22***		0.529***
				(0.08)	(0.09)	(0.08)		(0.0428)
$LnRMP_s$				1.96***	2.05***	1.96***		1.343***
				(0.27)	(0.30)	(0.27)		(0.186)
$Ln(w^m_{CEEC} / w^m_{CHN})$	0.20	-0.40*	-0.32	0.42	0.40	0.42	-0.230***	0.300***
	(0.20)	(0.21)	(0.21)	(0.29)	(0.30)	(0.29)	(0.0724)	(0.0874)
$Ln(C_{CEEC}/C_{CHN})$	-0.69***	1.03***	0.80***	-0.95***	-0.99***	-0.95***	1.543***	-0.236**
	(0.27)	(0.37)	(0.35)	(0.30)	(0.35)	(0.30)	(0.136)	(0.105)
Intercept	-19.55***		-25.67***	-40.07***	-41.73***	-40.07***		
	(2.34)		(2.43)	(4.55)	(5.02)	(4.55)		
Observations	473	473	473	473	473	473	478	478
R-squared	0.67	0.71	0.71	0.42	0.39	0.42		
Number of years	8	8	8	8	8	8	8	8

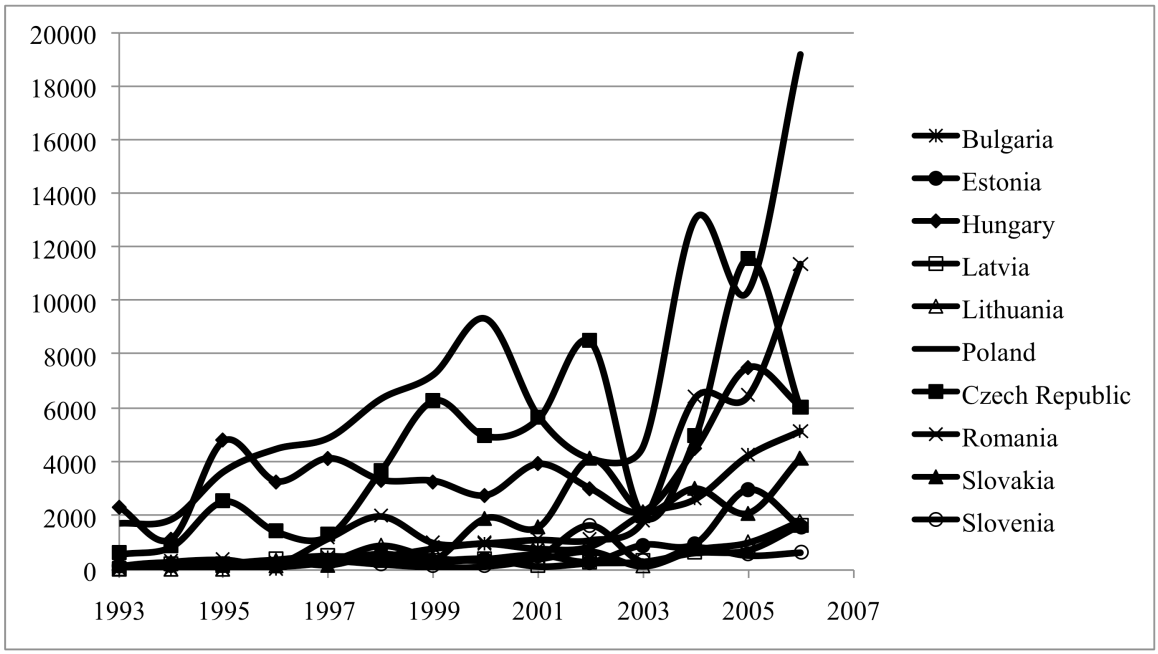
*Notes: ***(**, *) the null-hypothesis is rejected at 1% (5%, 10%), (.) is the standard error*

FIGURES



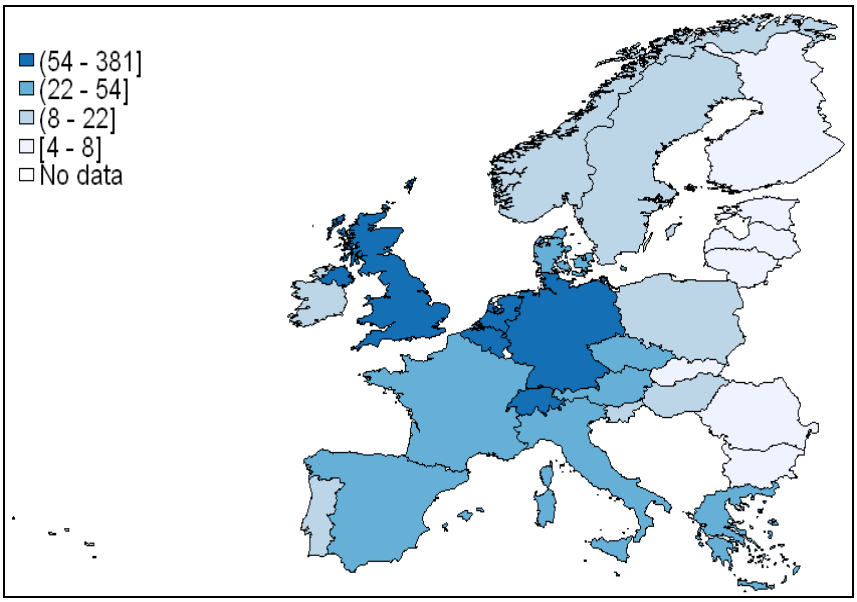
Data source: UNCTAD, million dollars

FIGURE 1. FDI inflows trends.



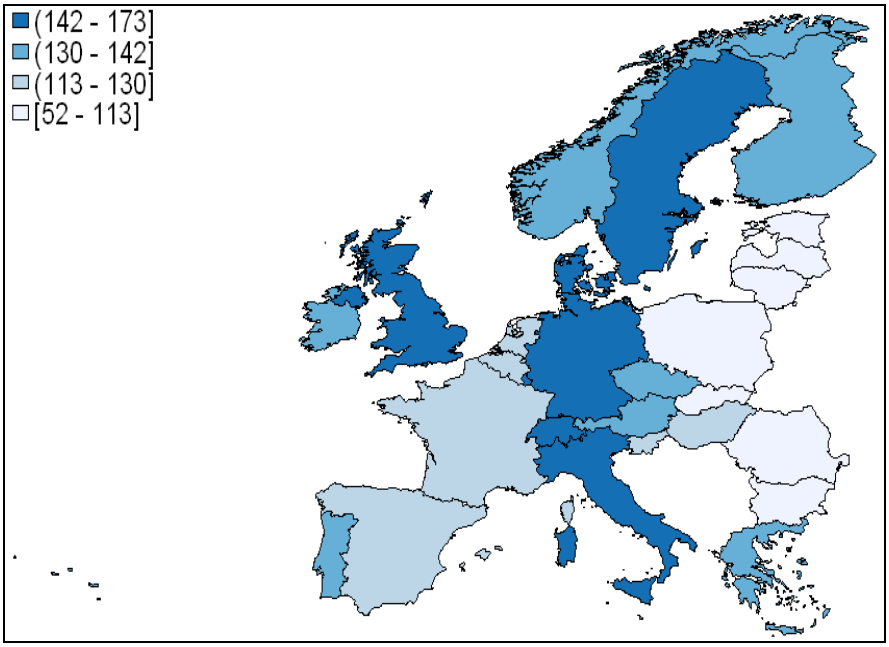
Data source: World Bank, million dollars

FIGURE 2. FDI inflows in the CEECs.



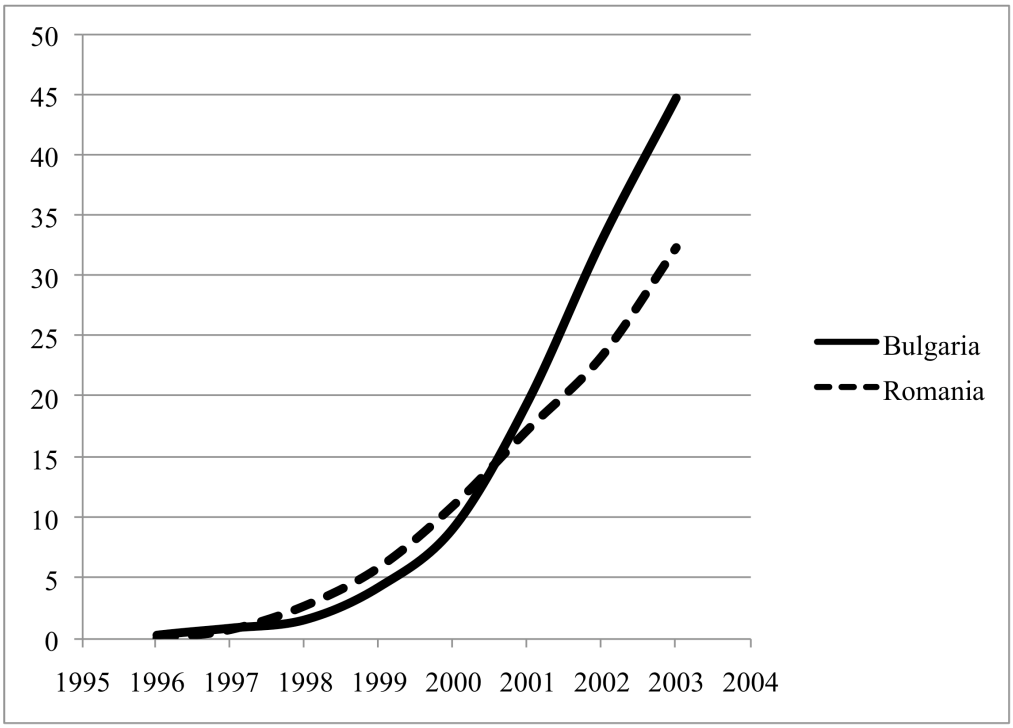
Data source: CEPII

FIGURE 3. Head et Mayer (2004) market potential in 2003.



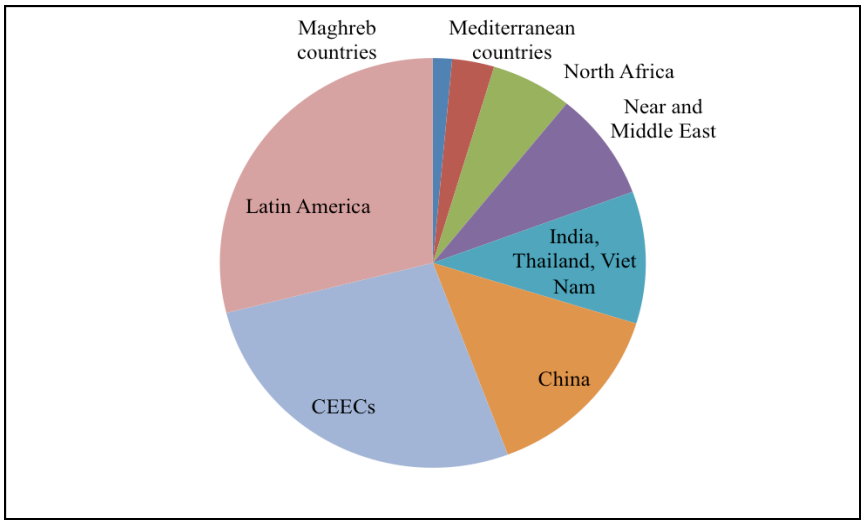
Data source: World Bank

FIGURE 4. Communications infrastructure in 2003: the number of fixed and mobile subscribers per 100 persons.



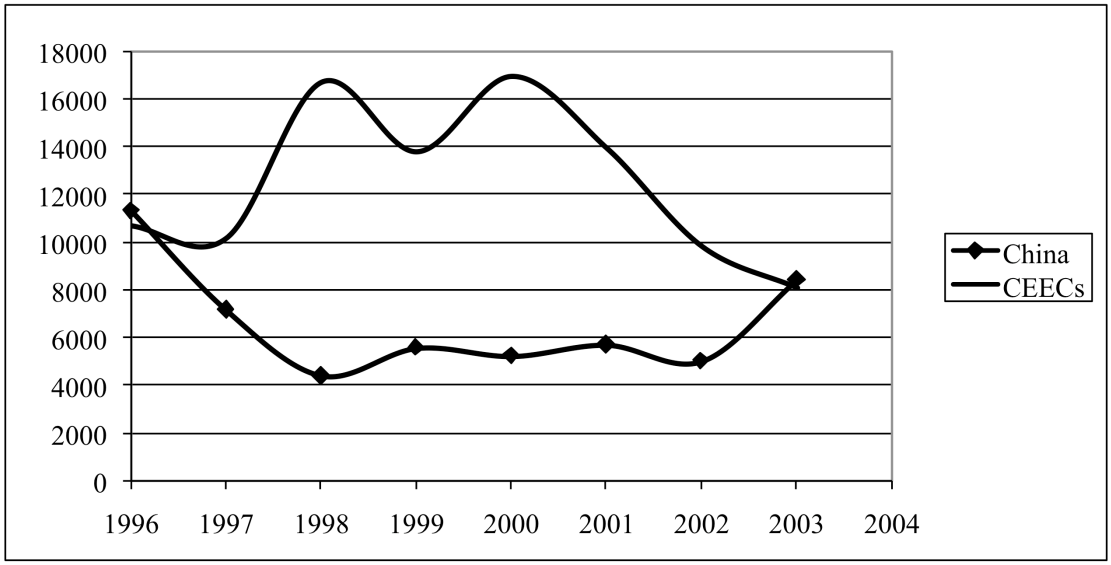
Data source: World Bank

FIGURE 5. The penetration rate of communication technologies in Bulgaria and Romania: the number of mobile subscribers per 100 persons.



Source: OECD, author's calculation

FIGURE 6. OECD FDIs by destination.



Source: OECD, million dollars, author's calculation

FIGURE 7. The evolution of FDI inflows: China versus the CEECs.

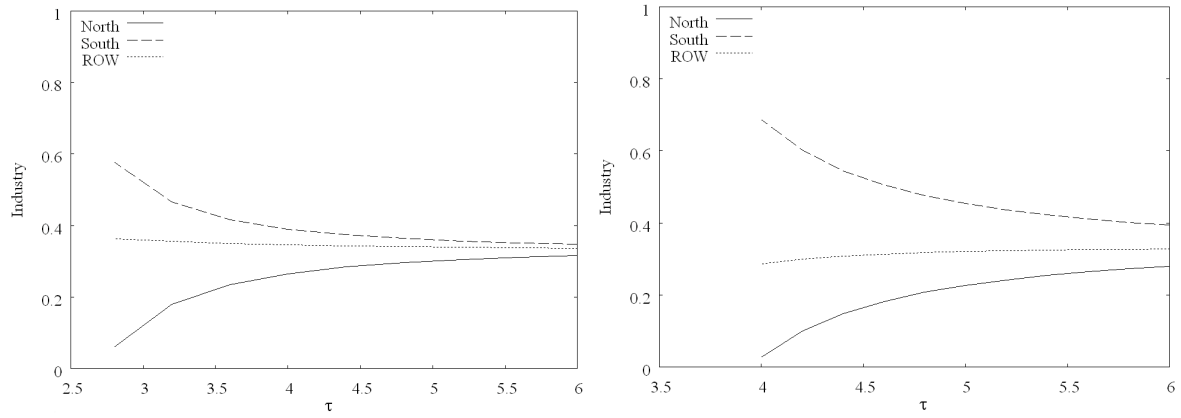


FIGURE 8. The impact of multilateral trade liberalization on the distribution of industry in a context of low communication costs and wages: (a) a small competitiveness differential between the developing regions; (b) a high competitiveness differential between the developing regions.