Inward FDI, skilled labour, and product differentiation in the CEEC*

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The ratios of spending on R&D, advertising and marketing to sales are employed accordingly as direct determinants of the degree of vertical and horizontal product differentiation. The model is verified with direct regressions and a system of simultaneous regressions combining large firm survey with sector-level data from the UNCTAD for 13 Central and Eastern European countries. The econometric results evince that the increased demand for skilled labour (human capital) was greater than any FDI-induced labour market spillovers. As expected, this contributed to less differentiation which became more costly. Consistently, foreign-owned enterprises employed more highly-skilled employees but they reacted to more foreign investment similarly to domestic firms (so reducing the level of differentiation).

Das Verhältnis für Ausgaben für R&D, Werbung und Marketing zu den Verkäufen wurden als direkte Determinanten für den Grad der vertikalen und horizontalen Produktdifferenzierungen genutzt. Das Model wurde mit direkten Regressionen und einem System simultaner Regressionen verifiziert welches mit großen Firmen Untersuchungen mit sector level? Daten von UNCTAD für 13 Zentral- und Osteuropäische Länder. Die wirtschaftlichen Resultate zeigen das die steigende Nachfrage nach ausgebildeten Arbeitskräften (menschliches Kapital) größer als jeder FDI-induzierte Arbeitsmarktüberschuss.Wie erwartet, führte dies zu weniger Differenzierung was kostenintensiver wurde. Ständig stellten ausländische Firmen mehr hochqualifizierte Angestellte ein aber sie reagierten auf größeres ausländisches Investment ähnlich wie inländische Firmen (so reduzierten sie das Niveau der Differenzierung).

Keywords: product differentiation, business strategy, inward FDI, skilled labour, Central and Eastern Europe

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1. Introduction

The Central and Eastern European Countries (CEEC) experienced a dramatic influx of foreign direct investments (FDI) in the 1990s (from practically nil to an average world level) which has continued in the new century (Rutkowski 2005). FDI have already had quickly observable impact on the CEEC and beyond and they are expected to have an even stronger and more extensive influence in the future. FDI in the CEEC were replacing outward-processing trade[1] not only between the investors' home country and the region but also influencing trade with other regions (Andreff/Andreff 2000-2001). The CEEC appeared to have a greater potential in attracting FDI than the Mediterranean region (Altomonte/Guagliano 2003). Consequently, the advanced European transition countries quickly became integrated into mostly EU-based or even global production and distribution networks (Kaminski/Ng 2005). The overall effects of FDI in the CEEC are commonly seen as robust (Campos/Kinoshita 2002, Lee/Tcha 2004, Uppenberg/Riess 2004). Therefore, these countries constitute a suitable target for examining the effects of a 'natural experiment' in order to test the relation between the degree of foreign presence and the extent of product differentiation.

FDI can influence indigenous firms (both foreign-controlled and domestically-owned) not only by direct product-market competition but also by their impact at the markets of production inputs: production factors and intermediary products. Foreign enterprises both bring resources (most clearly: financial capital and intangible assets such as brands and knowledge) and start employing host-country resources. Hence, in a multi-channel setting, FDI can both oust domestic firms and increase their efficiency because of positive externalities often called spillovers. Differentiation is one of the generic strategies (Porter 1980). It can be the only feasible strategy for domestic firms in the CEEC that face tough competition from multinational enterprises (MNEs); segmentation can be unattainable in view of economic integration and price competition may be unbearable due to scale economies enjoyed by MNEs. On the other hand, incumbent firms may want less differentiation as a result of FDI, if spillover effects are strong and indicate product similarity. Consequently, degrees of vertical and horizontal product differentiation are fundamental variables which domestic enterprises can use to respond to FDI. Referring to the literature, section 2 presents possible and to some extent offsetting mechanisms in final and intermediary product markets. In the second part, mutually counterbalance

[1] Outward processing transaction is a tight cooperation in production, performed on a contract basis, between independent enterprises in different countries. Usually, it does not imply any capital involvement. Instead, certain manufacturing processes can be transferred. Raw material and production components are usually exported, processed, and then re-imported as final products (EBE 1995).

effects are discussed which are predicted by theory to be found at the markets of skilled labour. Regarding capital, FDI-induced borrowing was not found to crowd out domestic firms from financial markets in the CEEC (Harrison et al. 2004, Rutkowski 2006). Section 3 presents a structural model of direct and indirect impact from FDI on product differentiation proxies and argues how the variables should be measured and how the model should be verified. Section 4 describes and interprets the results of the tests. Section 5 concludes.

2. Possible impact from inward FDI

2.1. Competition in product markets, spillovers, and differentiation

Inward FDI entail the entry of new competitors ('greenfield' investment) or an abrupt reinforcement of some of the incumbents (merger or acquisition). According to a simple view on the effects of FDI, competitors in a host country react with an increased degree of differentiation of their products to reduce the degree of price competition and retain their market power at the level they had hitherto. This view can be called simple because it considers neither factor market competition nor externalities (spillover effects).

Geographical distance and differentiation may serve interchangeably as proxies for the intensity of competition (Piga/Poyago-Theotoky 2005). The more tacit information is, i.e. the more it can be gathered by personal experience only, the more transport costs matter. Goods offered by the suppliers within the same reach can be compared easily and reliably: by personal judgement. Goods offered in distant places require incurring high travelling expenses or relying on less credible second-hand evaluations. In addition, the closer firms are to each other the greater the benefit will be which they receive from their rivals' efforts in R&D (Balazs/Halpern 2005, Piga/Poyago-Theotoky 2005). Even in case of no cooperation between MNEs and domestic firms, there are three different channels through which the spillovers work: product imitation or demonstration effects (Lin/Saggi 1999), rotation of employees (Fosfuri et al. 2001) as well as/ plus forward and backward linkages (Keren/Ofer 2002, Smarzynska-Javorcik 2004). The first two are intra-industry effects, compared to backward linkages which are inter-industry effects. From an alternative perspective, the last two effects work on the markets of inputs: labour (see the next section) and intermediary goods accordingly. All these positive spillovers increase incumbents' productivity and profitability thus reducing the competitive pressure and the need for differentiation. Therefore, FDI may also reduce the local level of differentiation.

In a theoretical model by Sanna-Randaccio (2002), spillovers do not directly increase profitability; they only increase the effectiveness of domestic firms' R&D. Hence, high spillovers make foreign-controlled and domestic R&D complements opposing what was argued above. However, in this model, product

homogeneity and purely cost-reducing R&D is considered only. No option of differentiation is given.

High spillovers affecting technology do not have to be real. The empirical results, even for the European transition economies, are mixed. The research on technological and productivity spillovers in Hungary failed to produce definitive conclusions (Bosco 2001, Sass 2004). Djankov and Hoekman (2000) found that FDI had a negative spillover effect on purely domestic firms in the Czech Republic between 1992 and 1996 when the impact by joint ventures was controlled. The magnitude of spillovers was much smaller and was losing significance concerning FDI. Kinoshita (2001) did not notice any significant effect of foreign presence on the productivity in the Czech manufacturing firms between 1995 and 1998 in the same sector. However, he has shown that indirect influence by 'absorptive capacity' (see the next section) was far more important than the direct effect of FDI in increasing productivity growth. Konings (2001) detected negative spillovers to domestic firms in Bulgaria and Romania and did not find any spillovers to domestic firms in Poland. Van Pottelsberghe de la Potterie and Lichtenberg (2001) noticed that FDI did not transfer technology from home to host country. More likely the opposite occurred: a country's productivity was increased if its firms invested in R&D-intensive countries but not if foreign enterprises from R&D-intensive countries invested in that country. A comprehensive study specifically devoted to transition economies conducted by Damijan et al. (2003) considered different possible channels of technology transfer. The authors detected no positive intra-industry spillovers for domestic firms. Sinani and Meyer (2004) discovered that spillovers in Estonia varied with the measure of foreign presence and were influenced by the recipient firm's characteristics. Smarzynska-Javorcik (2004) detected positive backward-linkage spillovers in Lithuania. According to Uppenberg and Riess (2004), evidence of technology spillovers is more likely to be found in developed economies than in the CEEC.

2.2. Competition and spillovers in skilled-labour markets

Dyker (1999) mentioned the similarity between the 'Bangalore model' and the inward FDI impact on labour markets in transition economies. He claimed that the low wages were not the primary pull factor for foreign investors. However, low employment costs were important in the context of high qualifications of employees, especially in technology. For Dyker (1999), this condition was one of the main ways in which FDI were absorbing rather than bringing in highly productive assets.

In contrast to 'labour-biased' FDI, 'skill-biased' FDI are expected to increase the wage gap between skilled and unskilled labour in a transition economy in favour of the former one (Markusen/Venables 1997, Wu 2001). Consequently, if wages are rigid, e.g. due to strong labour unions or strict labour regulations that

are common in Europe, the latter type of foreign investments will be likely to cause the growth of unemployment. Indeed, both a surge in both wage gap and unemployment could be seen in the transition countries (León-Ledesma/McAdam 2004, Jurajda 2005).

On the one hand, FDI are believed to create positive labour-related spillovers for the domestic enterprises. Employees are expected to be trained by the MNEs on-the-job and endowed with the MNEs' specific knowledge (technological or managerial). This knowledge can 'leak out' to the domestic firms by labour rotation (Driffield/Taylor 2000, Blomström/Kokko 2003). On the other hand, only the employees with a sufficient educational background and some prior experience are able to assimilate this knowledge. Employees know that their value grows when they are employed at a foreign subsidiary. So, even at an equal salary (for given skills) MNEs capture the bulk of top-skilled employees and crowd out domestic firms from that segment of a labour market. Additionally, 'poaching' the top-employees reduces the magnitude of any possible positive spillovers because the local firms' 'absorptive capacity' seems to be related to the fraction of highly educated labour in total employment (Cohen/Levinthal 1990). A few models tried to find the equilibrium resulting from the clash between these two counteracting forces (spillovers and 'poaching').

Fosuri et al. (2001) presented a model in which an MNE can use its superior technology in a host country only after training local employees. However, having received training, the employees may demand higher wages because their skills have become higher and the MNE's asset i.e. knowledge has been transferred to them to some extent at least. The employees have also an opportunity to receive a higher than the initial wage from domestic firms which are aware of the knowledge transfer. The trained employees can be useful for the domestic firms only if the technology gap (inversely related to the domestic firms' 'absorptive capacity') between them and an MNE is not too large. The authors identified a condition under which the multinational releases the skilled employees and allows for spillovers: this scenario will take place only if: firstly, domestic and foreign-owned firms do not compete fiercely in the product market being possible only with a high pre-existing differentiation. Secondly, the training will be more general than specific; and thirdly, paradoxically, if the 'absorptive capacity' is large. The last condition means that domestic firms are ready to pay high wages once they employed the 'poached' employees – wages which are too high for the MNE to match. Therefore, FDI-induced differentiation may take place only if there is a sufficiently high initial level of differentiation.

De Backer and Sleuwagen (2003) presented an extended model of Jovanovic (1994), in which entry of MNEs changes local wages. A similar approach was earlier employed by Grossman (1984). The host-country labour supply is

assumed to be non-uniform, since people are endowed with different levels of professional abilities ('worker abilities' and 'entrepreneurial abilities' are distinguished, but they are claimed to be always positively associated so just one 'professional ability' level matters). More capital and more productive technology transferred by FDI increase wages for all skill levels. However, only for the middle-skill-level group, the wages offered by the MNEs are lower compared to the economic profit which can be obtained if these people were entrepreneurs. Entry of an MNE reduces the group of entrepreneurs, and thus the number of domestic enterprises via two effects. Firstly, the economic profit of a domestic enterprise shrinks due to the increased product-market competition and higher wages; secondly, wage offered by an MNE to the former marginal bottom- and top-skilled domestic entrepreneurs exceeds the economic profit of a domestic enterprise. Thus FDI can effectively reduce the differentiation in the market by reducing the number of domestic small and medium enterprises managed by skilled domestic entrepreneurs who become top managers in MNEs.

Barry et al. (2005) examined the hypothesis of 'poaching' best workers from domestic firms by the ones controlled by MNEs in Ireland. They assumed the separation of labour in two groups: skilled and unskilled, the former receiving competitive wages (equal to their marginal product) and the latter receiving fixed wages above equilibrium level and thus suffering unemployment. Still, by assumption, skilled labour is substitutable by unskilled workers in the model. All firms are divided into three groups: foreign, domestic exporters, and domestic non-exporters, each employing different proportions of the two types of labour (besides sector specific capital): foreign – skilled only, exporters – a mix of the two, and non-exporters – unskilled only. Technology imitation-like spillovers are incorporated but product-market competition between MNEs and local enterprises is disregarded because of assumed total export orientation of foreign investors. The economy is small and open, facing exogenous prices of manufactured goods. The authors demonstrated that the emergence of the crowding-out effect depends on the assumed production function, so the final outcome is unclear in their model.

3. Model, data, and verification methods

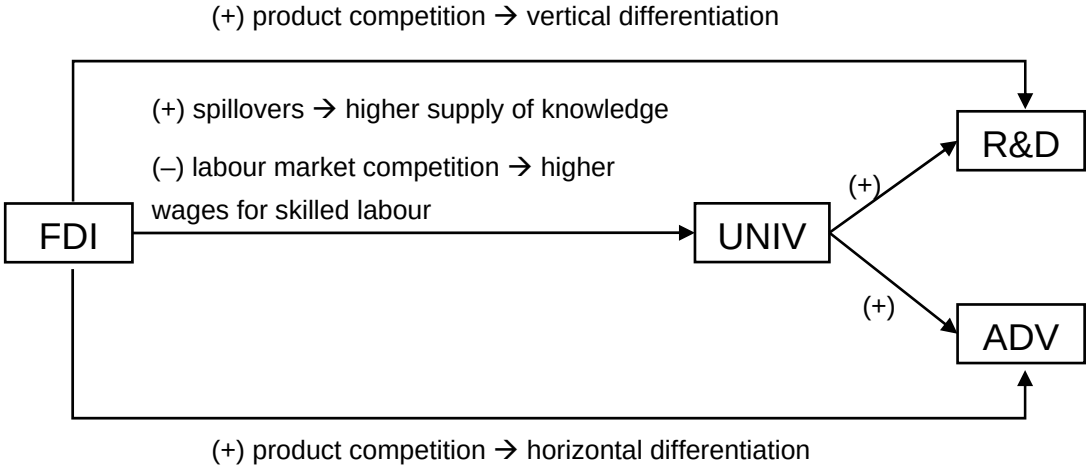
3.1. The model

Based on the presented literature, I come up with an empirical model depicting a possible multi-channel impact of inward foreign direct investments ('foreign penetration' ratio *FDI*, measured as sectoral inward FDI stock relative to the size of a sector in terms of value added, i.e. sectoral GDP).[2] Thereby the variables are

[2] See the formula in section 3.3. for practical implementation.

explored that measure the degree to which an enterprise (domestic or foreign-owned) follows a differentiation strategy in a host economy (chart 1). In this setting, the proportion of expenditure on research and development relative to sales (*R&D*) and a corresponding indicator for advertising (*ADV*) can each be influenced by two channels: via product markets (end products and inputs) and by a market of skilled labour.

Figure 1. The possible relations between FDI, share of employees with higher education (UNIV), share of spending on R&D, and share of spending on advertising (ADV)



The first channel is modelled as a direct impact of *FDI* on the two variables. Firms are, on the one hand, pressed by the increased competition due to entry of MNEs (increased supply of similar products, increased demand for intermediary goods). On the other hand, the competitive pressure is moderated by the product-related positive productivity spillovers (imitation, backward linkages i.e. more and/or higher quality intermediary goods as required by MNEs). Differentiation – vertical, increasing *R&D*, or horizontal, raising *ADV,* – allows for escaping price competition. Alternatively, an incumbent needs to cut costs if it decides not to differentiate: *R&D* and *ADV* should decline.

The second channel is an indirect one. The share of employees with university-level education (*UNIV*), which is believed to determine the level of *R&D* and *ADV*, can be influenced by *FDI*. If firms want to differentiate, they will have to hire more people with university (or corresponding) diplomas. Labour-related FDI spillovers (training and rotation of employees) increase the supply of human capital by increasing the knowledge per employee ratio in a sector. On the other hand, *FDI* boost demand for educated employees who are necessary for MNEs to be able exploit their sophisticated assets locally.

The net outcome, comprising product markets and human capital (skilled-labour) market, may entail either more or less competitive pressure. As seen in

the review, this question cannot easily be answered in general, as it is highly context-related: it depends on many exogenous parameters for specific host economies. It is even more difficult to predict which strategy the foreign-controlled and domestic enterprises decide to choose in response to the increased foreign penetration. I try to answer this question with regression analyses for the CEEC.

3.2. Measuring the degree of product differentiation

Product differentiation is, by definition, a variable of the demand side: uniqueness must be perceived by customers. However, technically, this result is difficult to be measured, since for each product a number of not only existing but also potential buyers should be surveyed. Alternatively, one can utilise some supply-side indicators. Here, the number of necessary observations is the number of products. The issues on R&D or marketing are used typically as proxies of the level of differentiation. Still, they are only input indicators: they measure an effort in making a product unique but they do not measure the effectiveness of this effort (Dutta et al. 1999). Even a high spending on R&D can result in a product which is not really interesting for a consumer. Therefore, the integration of R&D with other functions within an enterprise is necessary, with marketing in particular (Gupta/Rogers 1991). However, such cases of failures are exceptional and theoretical studies assume a positive relationship between different types product differentiation (e.g. both horizontal and vertical differentiation, Ulph/Owen 1994) and different types of R&D spending (e.g. investments concerning both processes and products, Lin/Saggi 2002). Piga and Poyago-Theotoky (2005) examined formally a complex simultaneous relation between horizontal differentiation (with product varieties), vertical differentiation (product quality), and R&D. They derived a model with R&D spillovers between duopolists each responding to a trade-off between producing a similar variety to benefit more from the others' R&D or differentiate more vertically with its own R&D to relax price competition. The authors showed that all three variables (horizontal differentiation, vertical differentiation, and R&D spending) are associated positively: the more vertically-differentiated the product, the more a firm will have to spend on quality-enhancing R&D.

Caves and Williamson (1985), in their factor analysis, referred to two approaches to measuring product differentiation: one rooted in transaction cost theory and the other stemming from technological determinants. The authors used different variables like the ratios of media advertising expenses to sales, other selling and sales-administration expenses to sales, and R&D outlays to sales. Media advertising was supposed to exploit the buyer's inability to use information from sources not controlled by the seller (also if using other sources would be too costly or the information obtained would not be relevant). On the other hand, R&D spending was expected to reflect the complexity of a product or degree it has been customised to individual's buyer's needs. General sales

expenses reflected both product technological complexity and transaction costs. Both factors were found significant.

Not only industrial economics (Caves/Williamson 1985) but also the informal models in the cited marketing literature (Gupta/Rogers 1991) suggest, R&D and marketing activities, such as advertising, are complements. Firstly, customers' needs have to be discovered. Secondly, a suitable product has to be created, and finally, consumers must be informed and persuaded with some signals that the product is what they need. However, using a model of a duopoly, Hertzendorf and Overgaard (2001) suggested that the relation between advertising and vertical differentiation can be non-monotonic, specifically inverted-U-shaped. If the difference in quality between the two products is large, signalling will be supposed to be done by price alone. However, for a degree of vertical differentiation below a certain threshold, advertising takes place too and it increases along the decreasing price difference. That is because price increase reduces profit of a high-quality firm by a smaller amount under large quality discrepancy compared to cost of advertising. The opposite holds in case of a small difference when demand for higher-quality good becomes very elastic and even small price increase results in large loss of revenue. In the model, the low-quality firm never advertises. However, in an alternative model, Tremblay and Polasky (2002) allowed for endogeneity of horizontal as well as vertical differentiation, i.e. creation of customers perception of differentiation – even if not being real – by advertising. They showed, with their duopoly models, that a high-quality firm both advertises more and charges higher prices unequivocally.

High expenditure on R&D and marketing activities is, to large extent, investment in human capital; hence, differentiation should be concurrent with a high fraction of high-skilled employees. The ability to conduct sophisticated market research and promotional campaign and, even more, to design and produce a differentiated product depends strongly on the staff's skills. People were recognised as the fifth 'P' in the 'marketing mix' determining not only product differentiation but also the unique perception of the whole enterprise (Judd 1987). Also general sociological studies demonstrated that industry-level and firm-level product characteristics are strongly associated with specific types of labour employed (Wynn/Mueller 1998).

Higher education provides a broad spectrum of skills and flexibility: ability to adapt and re-train quickly. Park (1996) proposed a model in which multi-skilled workers were more productive than specialized workers for producing a new product but less productive for producing an existing product i.e. more mature and more standard one. His assumptions were inspired by an empirical observation from Korea, where some companies significantly invested in their employees' multi-skill training. Nevertheless, employing highly skilled people, i.e. scarce human capital, is costly (Gabszewicz/Turrini 1999). Hence, the fraction of skilled labour should be lower in those firms which do not need

skilled employees that much: those producing standardised products and pursuing cost leadership strategy. Therefore, one can assume there is a link also between the share of employees with higher education and differentiation. Firms which pursue differentiation can be expected to seek locations abundant with skilled labour. Hence, the scarcity or the abundance of potential educated employees should be one of the determinants of the degree of differentiation reflected in R&D and marketing activities.

Empirical studies evinced that employee and product development strategies came before just-in-time or automation strategies in the US manufacturing (Fawcett/Myers 2001) and confirmed the link between the share of employees with higher education and R&D; the link between the human capital and advertising was less certain (Peneder 2002).

3.3. Data

Both the three dependent variables as well as a number of control variables (table 1) were received from the publicly available dataset of the second round of the World Bank's and the EBRD's Business Environment and Enterprise Performance Survey (BEEPS II) conducted in 2002. The entire dataset covers over 6300 enterprises from 27 CEEC and post-soviet countries (plus Turkey). The sample structure for the BEEPS II was designed to be as representative as possible to the population of firms within eight industry and service sectors (table 2) subject to various minimum quotas to guarantee sufficient weights in the distribution of firms by the most relevant parameters such as sector, size, location, and ownership (MEMRB 2002). The accessibility of industry-level inward FDI data allowed for conducting this research for 13 CEEC only.[3] To assign specific *FDI* impact ratios (see the formula below, where *E* denotes an enterprise, *S* is a sector, and *C* is a country) to each firm, this study utilises the sectoral inward FDI stocks[4] for the year 2000[5] provided by the UNCTAD country profiles (UNCTAD WID). The denominators for the *FDI* ratios – sectoral GDPs – were obtained from Global Market Information Database (GMID).

$$FDI_{E,S,C} = \sum_{S=1}^{7} \left(SALES\_SHARE_{E,S,C} \frac{INWARD\_FDI\_STOCK_{S,C}}{GDP_{S,C}} \right)$$

[3] Armenia, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Russia, Slovakia, and Slovenia.

[4] See Rutkowski (2006) for the reasons.

[5] With two exceptions: 1999 for Bulgaria and 2001 for Kazakhstan because of the data gap.

3.4. Verification methods

Empirical verification of the presented model should provide an answer to the following question: how did host-country firms (domestic and foreign-owned) react to more inward FDI, net of all other possible factors? Specifically, did they increase or decrease the degree of their product differentiation and was the impact from FDI caused by skilled-labour market or product markets (or both)?

Table 1. The list of variables obtained from BEEPS II

Variable	Description	Corresponding BEEPS II question (Q or S) and method of calculation*
ADV	Spending on advertising and marketing/sales 1999–2001 (between 0 and 1)	Q83c/100
Caputt	Capacity utilisation (between 0 and 1)	Q90a/100
Export	Fraction of non-domestic sales	(100 – Q14a1)/100
Foreign	Foreign ownership dummy	FOREIGN = 1 if Q4a contains "4", else FOREIGN = 0
Import	Perceived importance of competition from imports in the market for main product line or main line of services (6 grades)	IMPORT = Q19 if $1 \leq Q19 \leq 5$, else STATE = 0 if Q19 = 6
Pelast	Perceived price elasticity of demand (in absolute terms, 4 grades)	Q21
Profit	Profit/sales in 2001	Q84a1a
R&D	Spending on R&D/sales 1999–2001 (between 0 and 1)	Q83b/100
Size	Size (number of employees, 3 grades)	S4a2
State	State ownership dummy	STATE = 1 if $6 < S2a < 10$, else STATE = 0
Tech	Perceived level of own technology relative to competitors (3 grades)	Q86
Traine	Dummy for the supply of training for 'experts' (e.g. accountants, engineers, or scientists)	–(Q96a2 – 2)
Trainm	Dummy for the supply of managerial training	–(Q96a1 – 2)
Univ	Fraction of the workforce having a university degree (between 0 and 1)	Q94f/100
Year	Year in which a firm began operations in a specific country	S1a

* Q denotes main questions and S denotes 'screener' questions. In the original dataset the "don't know" and similar answers encoded with the numbers indicated in the questionnaire have been eliminated, so the calculation formulas do not have to consider them.

Table 2. Classification of sectors in BEEPS II and corresponding ISIC codes

ISIC code	BEEPS sector name
C	Mining and quarrying
F	Construction
D	Manufacturing
I	Transport storage and communication
G	Trade (wholesale and retail), and repairs(1)
H	Hotels and restaurants(1)
K	Real estate, renting and business activities
O(2)	Other

(1) Two sectors aggregated to comply with GMID classification.

(2) Included groups 92.1–92.4 and 93; excluded groups 92.5–92.7. Excluded: Sewage and refuse disposal, sanitation and similar activities, activities of membership organizations (not classified elsewhere); included recreational, cultural and sporting activities and other service activities.

Data sources: MEMRB 2002: 4 and ISIC.

In the first step, I took a general look at the impact of *FDI* on *UNIV*, *ADV*, and *R&D* without isolating different channels of their relationship. Because of the skewed distribution of the dependent variables, square-root transformation was performed to ensure the normality of the residuals' distribution. To preserve observations with zero values under this transformation, an intercept of 0.01 was added to each dependent variable. Ordinary least squares (OLS) estimation was supplemented with Eicker-Huber-White 'sandwich' estimator of variance to calculate heteroscedasticity-robust standard errors. Besides, in additional specifications, I applied the adjustment of standard errors assuming the correlation of observations within each country (country clustering) to eliminate the pure country effects and to see if the cross-sector effects are still significant (Gutierrez and Drukker 2005).

A dummy variable for foreign ownership (*FOREIGN*) was used to detect possible differences in the levels of dependent variables between foreign-controlled and domestic enterprises. The interaction term *FOREIGN* × *FDI* was included in the specifications to allow for different impact of the degree of foreign penetration (*FDI*) on the two aforementioned groups of firms.

Control variables should capture influence of some short-run factors as well as make the ratios comparable for firms of different industries and with different ownership and other exogenous characteristics. For financially-constrained companies, higher capacity utilisation (*CAPUTI*) might have crowded out some spending on R&D or advertising since need for investment in fixed assets was more pressing. In case of financially-unconstrained firms, higher capacity utilisation deprives the company of an entry deterrent and implies a higher risk of the entry of a competitor; differentiation may be one of the reactions. Financial constraints are related to cash flow which is captured by the profit-to-

sales ratio (*PROFIT*) that may limit the financing of longer-run investments or non-essential spending such as those on R&D and advertising (Bloch 2005), but this fact can be country-specific (Hunoley et al. 1996). Foreign consumers may be more demanding, or they may be 'home biased' in their preferences. Therefore, foreign producers find it difficult to enter and keep a foreign market. Consequently, in some countries, exporting enterprises will also innovate and advertise more if they follow the differentiation strategy (Basile 2001, Bleaney/Wakelin 2002, Manez et al. 2004). Therefore, the fraction of exported sales (*EXPORT*) was included in the specifications. In addition, interaction term *FOREIGN* × *EXPORT* may capture, to some extent, differences between vertically and horizontally differentiated MNEs. Horizontal MNEs maintain the whole value chain in one country; vertical MNEs distribute the value chain among a number of countries. Thus, foreign-controlled enterprises in vertical MNEs should be more export-intensive (Venables 1999) and perform less R&D and advertising which is left to other firms belonging to the same MNE. To eliminate the impact of competitive pressure from imports rather than FDI, I took account of the importance of competition from imports declared by a respondent (*IMPORT*). Considering the two most fundamental industry and product-specific factors (Morris 1979: 65), such as price elasticity (*PELAST*) and economies of scale (captured by *SIZE* of an enterprise related to the number of employees), should contribute to comparability of the ratios of the degree of differentiation across sectors. To capture other industry-specific features, the share of sales in each sector in total sales of an enterprise was also inserted. *TECH* – the perceived own technological edge (or disadvantage) – is likely to reveal industry leaders and laggards: those who lead in differentiation relative to their nearest competitors and those who lag behind similar firms (e.g. due to suboptimal management and temporary mistakes). Thus, the problem of outlying companies should be reduced. *YEAR* denotes the year of establishment of an enterprise (in a host country). It is supposed to capture the impact of the age of a firm: young firms start with small market shares so their products must usually be more differentiated to make their business profitable. Besides, young enterprises emerge often as a result of inventing new product concepts by their founders; these innovative goods were also dynamically developed shortly after the introduction. This view is supported by different kinds of empirical research (Smith et al. 2002). State ownership (*STATE*) controls special cases of companies in regulated sectors, usually implying some degree of monopoly, where advertising is useless for a firm, and so the latter has less will to invest in R&D. Finally, in the regressions explaining the fraction of employees with university education, I included dummies for the enterprises supplying training to their employees (*TRAINM* for managerial training and *TRAINE* for specialised 'experts' such as "accountants, engineers, scientists" as formulated in the BEEPS II). Firms providing such training are more attractive for the employees and can be expected to have a higher fraction of the scarce human

capital; there is both empirical and theoretical support for this belief (Morris 2000, Gersbach/Schmutzler 2003, Barrat 2004).

In the second step, three-stage least squares (3SLS) estimation of the system of simultaneous regressions was conducted to observe the isolated channels predicted by the model: labour market, on the one hand, and product markets, on the other hand. The regressors for the system were chosen among the independent variables which were significant (at 0.1) in the first step (direct OLS regressions). To take into account possible pure country effects, country dummies were employed in each regression of the system.

4. The econometric results

The full set of independent variables has been checked against possible multicollinearity. Most of the correlation ratios were far below 0.4 (in absolute terms) for all but four pairs of variables: 0.63 for *TRAINM* and *TRAINE*, –0.46 for *FDI* and dummy for the construction industry, 0.43 for *EXPORT* and manufacturing dummy and –0.42 for *SIZE* and *YEAR*. Consequently, there is no risk of multicollinearity.

The first-step (OLS) regressions (table 3) show that the impact of FDI on all the dependent variables was negative and statistically very significant. More FDI appear to have caused less product differentiation both in foreign-controlled and domestic enterprises (the coefficient of *FOREIGN* × *FDI* interaction term is not significant). Consistently, the level of employment of highly educated employees is significantly higher for the firms controlled by foreign entities relative to the ratio for domestic enterprises. As expected, based on the distinction between direct and indirect impacts presented in the model, the impact of *FDI* on *UNIV* is over three times stronger compared to the influence on *R&D* and almost twice as strong as the impact on *ADV*. Besides, the model explaining *UNIV* has a much higher R-squared ratio compared to the ratios of regressions explaining *R&D* and *ADV*.

Table 3. Results of the first-step regression analysis

	(1) **sqrt(R&D)**	(2) **sqrt(ADV)**	(3) **sqrt(UNIV)**	(4) **sqrt(R&D)**	(5) **sqrt(ADV)**	(6) **sqrt(UNIV)**
FDI	–0.1035	–0.0626	–0.1967	–0.1035	–0.0626	–0.1967
	(0.000)	(0.002)	(0.000)	(0.029)	(0.015)	(0.018)
Foreigh x FDI	0.0655	–0.0384	–0.0294	0.0655	–0.0384	–0.0294
	(0.431)	(0.525)	(0.828)	(0.556)	(0.348)	(0.839)
Caputt	0.0168	0.0042	–0.0370	0.0168	0.0042	–0.0370
	(0.528)	(0.808)	(0.411)	(0.462)	(0.846)	(0.463)
Export	0.0114	–0.0015	0.0107	0.0114	–0.0015	0.0107
	(0.572)	(0.918)	(0.779)	(0.555)	(0.918)	(0.801)
Foreign x Export	0.0001	–0.0256	–0.0646	0.0001	–0.0256	–0.0646
	(0.997)	(0.438)	(0.410)	(0.996)	(0.386)	(0.342)

Import	0.0047	0.0039	0.0098	0.0047	0.0039	0.0098
	(0.120)	(0.127)	(0.091)	(0.043)	(0.189)	(0.268)
Pelast	–0.0088	–0.0049	–0.0153	–0.0088	–0.0049	–0.0153
	(0.073)	(0.163)	(0.050)	(0.053)	(0.032)	(0.196)
Profit	–0.0001	–0.0001	–0.0003	–0.0001	–0.0001	–0.0003
	(0.731)	(0.575)	(0.434)	(0.809)	(0.665)	(0.498)
Size	–0.0076	–0.0082	–0.0701	–0.0076	–0.0082	–0.0701
	(0.195)	(0.066)	(0.000)	(0.015)	(0.224)	(0.000)
State	0.0042	–0.0271	0.0100	0.0042	–0.0271	0.0100
	(0.809)	(0.002)	(0.680)	(0.800)	(0.007)	(0.586)
Tech	0.0151	0.0114	0.0222	0.0151	0.0114	0.0222
	(0.033)	(0.058)	(0.063)	(0.055)	(0.079)	(0.042)
Year	0.0000	0.0003	0.0009	0.0000	0.0003	0.0009
	(0.871)	(0.039)	(0.004)	(0.895)	(0.128)	(0.062)
Foreign	–0.0341	0.0450	0.1131	–0.0341	0.0450	0.1131
	(0.246)	(0.129)	(0.045)	(0.360)	(0.118)	(0.047)
Mining and Quarrying	0.0050	–0.0283	–0.1569	0.0050	–0.0283	–0.1569
	(0.951)	(0.481)	(0.109)	(0.934)	(0.572)	(0.013)
Construction	0.0069	–0.0257	–0.1133	0.0069	–0.0257	–0.1133
	(0.899)	(0.385)	(0.179)	(0.850)	(0.522)	(0.017)
Manufacturing	0.0494	0.0197	–0.0527	0.0494	0.0197	–0.0527
	(0.367)	(0.519)	(0.539)	(0.298)	(0.658)	(0.334)
Transport Storage, and Communication	0.0227	0.0301	0.0226	0.0227	0.0301	0.0226
	(0.678)	(0.345)	(0.800)	(0.653)	(0.513)	(0.685)
Wholesale, Retail, and Repairs	0.0080	0.0122	0.0166	0.0080	0.0122	0.0166
	(0.883)	(0.697)	(0.846)	(0.845)	(0.775)	(0.788)
Real Estate, Renting, and Business Service	0.0324	0.0110	0.1015	0.0324	0.0110	0.1015
	(0.577)	(0.733)	(0.250)	(0.612)	(0.795)	(0.019)
Hotels and Restaurants	0.0109	0.0015	–0.0443	0.0109	0.0015	–0.0443
	(0.853)	(0.963)	(0.618)	(0.808)	(0.976)	(0.403)
Traine			–0.0046			–0.0046
			(0.819)			(0.850)
Trainm			0.0242			0.0242
			(0.231)			(0.192)
Constant	0.1104	–0.3473	–1.2034	0.1104	–0.3473	–1.2034
	(0.780)	(0.189)	(0.062)	(0.824)	(0.279)	(0.202)
Observations	442	702	659	442	702	659
R-Squared	0.088	0.086	0.251	0.088	0.086	0.251

Heteroscedasticity-robust p values in parentheses.
Regressions 4–6 use country clustering.

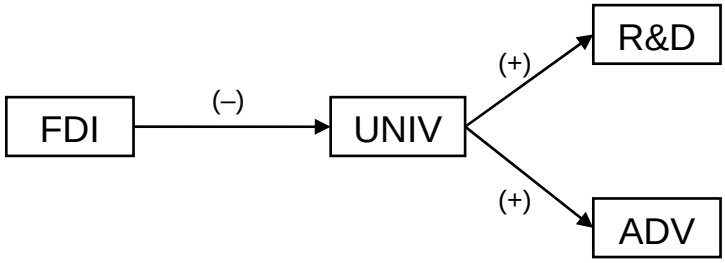
The second-step (3SLS) regressions make it evident, that the product-market channel was insignificant compared to the skilled-labour-market channel. Firms responded to more FDI with less differentiation because of the dominance of demand effects over supply effects in the markets of educated labour. *FDI* is no longer significant in directly explaining *R&D* or *ADV*, but *FDI* reliably explains *UNIV* which is, simultaneously, positively associated with both *R&D* and *ADV* as expected.

Table 4. Simultaneous equations estimated with three-stage least squares

	(1) **sqrt(UNIV)**	**(2)** **sqrt(R&D)**	**(3)** **sqrt(ADV)**
FDI	–0.1501 (0.007)	–0.0042 (0.865)	0.0127 (0.505)
Import	0.0133 (0.015)	–0.0012 (0.679)	
Pelast	–0.0099 (0.183)	–0.0036 (0.366)	0.0004 (0.888)
Size	–0.0629 (0.000)	0.0106 (0.126)	0.0108 (0.055)
State			–0.0234 (0.008)
Tech	0.0051 (0.678)	0.0052 (0.420)	–0.0020 (0.691)
Univ		0.2166 (0.000)	0.1336 (0.002)
Year	0.0005 (0.148)		0.0003 (0.032)
Foreign	0.0718 (0.001)	–0.0252 (0.045)	0.0146 (0.144)
Mining and Quarring	–0.0594 (0.522)		
Construction	–0.0966 (0.000)		
Real Estate Renting, and Business Services	0.1327 (0.000)		
Observation R-Squared	664 0.887	664 0.783	664 0.863

p values in parentheses
In each regression, country dummies included (not reported).

Figure 2. The estimated significant relationships



So, product markets do not seem to be important relative to the skilled-labour-market channel. In addition, consistently with the explanation of the impact from *FDI*, a/ the dummy variable for foreign ownership (*FOREIGN*) is very significant and shows that foreign-owned firms employed a higher fraction of university graduates. Foreign-owned firms reacted to more foreign investment, i.e. further growing demand for skilled labour, similarly to domestic firms: they reduced the level of differentiation too. The R-squared ratios of each of the three simultaneous regressions of the system are satisfactorily high.

5. Conclusions

Based on an extensive literature review, I proposed an empirical model of multi-channel impact of inward FDI on the strategy of enterprises in the host economies. The fraction of employees with university diploma as well as the ratios of issues on R&D to sales and issues on advertising and marketing to sales were interpreted, accordingly, as indirect and direct determinants of the degree of product differentiation. The main feature of the model was a division between skilled-labour-market channel and product-market channels. The model was empirically verified with direct regressions and the system of simultaneous regressions using the firm-level BEEPS II and sector-level UNCTAD data for the CEEC. The econometric results suggested that the increased demand for skilled labour (human capital) was greater than any FDI-induced labour market spillovers. This contributed to less differentiation which became more costly. In consistence with this interpretation, foreign-owned enterprises employed more highly-skilled employees but they reacted to more foreign investment similarly to domestic firms (reducing the level of differentiation). Moreover, the impact via product markets was insignificant in determining the degree of differentiation.

Possible endogeneity between degree of product differentiation and FDI could be suggested as a limitation of this study. MNEs are mainly active in sectors with differentiated products i.e. R&D- and advertising-intensive (Barry/Hannan 2003) because they possess highly valuable intangible assets (knowledge) which, by definition, offer very high economies of scale (once created,

knowledge is replicable relatively easy and exploitable by an unrestricted number of individuals, like public goods) and, therefore, only global market is the limit. However, such endogeneity would only reinforce the conclusions of this study which suggests that the more FDI the lower degree of product differentiation in a sector. Therefore, the results obtained can only be underestimated.

The empirical findings indicate that higher foreign penetration intensified price competition rather than competition based on establishing uniqueness of products, objective or perceived. This development can be influenced by a still low level of income per capita in the CEEC: less affluent consumers care more about price than highest quality or brand name. The econometric results also imply that further theoretical and empirical research could concentrate on explaining spillovers from FDI through skilled-labour market in transition countries. This channel appears to be most significant. Policy-making could benefit from indications what type of regulation facilitates such spillovers in the strongest way. Besides, the research shows that transition countries should increase the supply of still scarce skilled labour, e.g. through developing their education systems or attracting skilled immigrants, to support the establishment of local brands and domestic R&D. The internationalisation of R&D activities by multinational corporations is a global trend (UNCTAD 2005) which appreciates the value of skilled workers also in the CEEC. Nevertheless, any kind of reversal in this trend or unfavourable reallocation of resources between regions could render this human endowment vulnerable to shifts in FDI, unless domestic economies are capable of absorbing this capacity in the long run.

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