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DOES FDI MODE OF ENTRY HAVE AN IMPACT ON THE HOST COUNTRY'S LABOR PRODUCTIVITY?: AN ANALYSIS OF THE EU COUNTRIES

Abstract

Economic growth results from the interplay of labor, capital and technology. In that respect, foreign direct investment (FDI) plays an important role, as it brings not only funds, but also intangible assets (technology and know-how) which contribute to the productivity growth of the recipient country. However, empirical findings on the impact of FDI on the host country's productivity and economic growth are not quite straightforward, as they sometimes indicate not only positive, but also modest, or even negative effects. Hence, the aim of the paper is to investigate the impact of FDI on the host country's productivity with reference to different FDI modes of entry, as well as the level of innovativeness of the FDI recipient countries. Results of the panel data analysis with fixed effects on the sample of the EU countries cast a new light on the expected effects of FDI, since mergers and acquisitions (M&A) prove to have a stronger impact on the local economy's productivity with countries at a higher level of innovativeness, while greenfield investments exert stronger positive effects in the case of technologically less advanced economies.

Keywords: FDI, greenfield investment, M&A, economic growth, innovativeness, EU

1. Introduction

In the neoclassical model, which does not differentiate between domestic and foreign capital, FDI can only achieve a short-term effect on economic growth (Brems, 1970; Sollow, 1957). On the other hand, in endogenous growth models, technology becomes the key element which, together with labor and capital, constitutes an integral part of the growth equation. These models, unlike the neoclassical ones, make it possible to consider FDI as more productive, because of incorporated technological advancement. In endogenous growth models (Lucas, 1993; Scott, 1991; Arrow, 1962;) positive externalities can be a substitute for the effects of diminishing returns on capital, thus contributing to increasing productivity and economic growth. This is done through improvement of the existing level of skills and knowledge in the local economy, but also through the introduction of new organizational and

managerial practice (De Melo, 1997). Hence, capital accumulation and knowledge spillovers make FDI a desirable form of investment in terms of increasing productivity and economic growth. Unlike neoclassical models, which foresaw reaching steady state economies due to diminishing returns on capital, endogenous growth theories focus on the reasons behind different growth dynamics of different countries.

One strand of literature of endogenous growth models considers technological advancement, as a rival good in a monopolistic market setting, the main cause of economic growth resulting from R&D activities and skill improvement as the necessary preconditions for innovation (Romer, 1994; Aghion, Howitt, 1992; Grosman, Helpman, 1991). These theories are complementary to FDI theories on monopolistic power (Kindelberger, 1969) and industrial organization (Hymer, 1969). Common to both of them is the creation of new knowledge through interaction of modern technologies (physical capital) and educated labor force (human capital) which result in a new ownership advantage (innovation) of the investing company. These enable multinational corporations (MNCs) to achieve leading market positions and monopoly profits on the one hand, while contributing to the local economy's economic growth, on the other (Lall, Narula, 2002). Since MNCs are not ready to share their knowledge and technologies through typical non-equity arrangements (e.g. franchising, licensing), they choose to internalize the benefits of the possession of these intangible assets, either through vertical or horizontal investment abroad (Hennart, 1982). However, competitive advantage arising from the possession of new knowledge cannot be fully protected, since new knowledge reaches other economic subjects through spillover effects, thus creating positive externalities in terms of economic efficiency and labor productivity.

Common to all the above models is that investments (both domestic and foreign) constitute a necessary precondition for economic development, with FDI being potentially more productive because of intangible assets (knowledge) which make stronger breakthroughs in labor productivity and economic efficiency possible. Countries which achieve a high level of accumulated knowledge and considerable investment in research and development (R&D) and education – thus improving the quality of their human capital – are able to achieve a more dynamic and sustainable economic growth in the long run[1]. Hence, the main link between theories explaining cross-border capital flows (FDI), on one hand and endogenous growth theories, on the other, is technology and its potentials for acquiring a stable market position of the investor and securing a stable growth path for the recipient country. Thus, countries with larger local capacities for innovation (Dunning, 1993, 1979), being a more desirable destination for FDI, can achieve a stronger impact on productivity through 'imports' of technology incorporated in incoming FDI.

The slowdown of economic growth in the EU, which occurred following the outbreak of the financial crisis (2008), has resulted in income stagnation and an increase in the productivity gap both among the EU member countries and towards the USA[2]. According to Lin (2016), this is mostly due to the slowdown in total factor productivity growth. Therefore, long-term forecasts announce a stagnation of European productivity which possibly increases the risk of economic stagnation, especially in the euro area (Gomez-Salvador et al., 2006). Since FDI can act as a strong generator of economic growth, through diffusion of modern technologies and their contribution to labor productivity, it could contribute to the reduction of the productivity gap within the EU. Therefore, research on the impact of inward FDI on the local economy's productivity is relevant also in the contemporary European context.

Taking into account different motives of foreign investors (Derado, 2013), different time horizons and investors' expectations arising from different FDI modes of entry, different location characteristics (absorption capacity) of the FDI host economy, and the previous empirical findings which do not unanimously confirm a positive impact of FDI on local productivity, we hypothesize that different FDI modes of entry exert different effects on the local economy's labor productivity. Hence, the purpose of this research is to investigate the relationship between different FDI modes of entry (M&A and greenfield investment) and the host country's labor productivity. Practical implications of this research are relevant for economic policy makers, especially those involved in attracting FDI.

The remainder of the paper is organized as follows. The second part gives a critical overview of the relevant empirical literature, while the third part presents the analytical model on the impact of different FDI modes of entry on the local economy's

productivity. The fourth part gives the results of the analysis and provides their critical interpretation. The last part concludes.

2. An overview of the previous empirical research

The majority of empirical studies which deal with the growth impact of FDI come to the conclusion on the positive effects[3]. However, certain studies prove the existence of neutral, or even negative effects on economic growth (Lyroudi et al., 2004; Mencinger, 2003; Carkovic, Levine, 2002).

Blomstrom et al. (1992) found a significant impact of FDI on economic growth. Furthermore, analysis showed that a positive impact was mostly realized in high income countries, while in less developed countries that was not the case. They concluded that FDI can be a source of a more dynamic economic growth, but the question remains as to the level of development after which FDI starts giving a more significant contribution to the host country's economic growth. Blomstrom and Wolff (1989) analyzed spillover effects of domestic companies, receivers of FDI, on the entire manufacturing sector productivity. They found that, in the course of time, the productivity gap was reduced and that there was a positive relationship between the presence of foreign capital in the company and the productivity growth of the entire sector. Implicitly, it has been confirmed that MNCs with their cross-border capital flows contribute to the geographical diffusion of technology, thus bridging the productivity gap between countries at different levels of development. However, that paper makes no reference to the channels and modes of technology spillovers.

Similarly, Caves (1999) assumed that the expected positive effects on the local economy are the main reason behind the countries' efforts to attract FDI. He specifically addressed skills, knowledge and management-related spillover effects, which ultimately led to the increase in the local companies' productivity and contributed to eliminating differences between local companies and investing companies from abroad (MNCs). In this respect, the local development of the recipient country considerably determined its absorption capacity for new technologies. However, this study, as many others, did not examine the channels of transfer of these positive externalities on the local economy, and, what is more, it made no distinction between two fundamentally different modes of entry – M&A and greenfield investment. Regarding the above-mentioned positive effects, this differentiation seems to be relevant in order to better understand the real potentials of FDI on local productivity and growth.

In the analysis of FDI flows from developed to less developed countries, Borensztein et al. (1998) found that FDI acts as an important means of technology transfer with a much stronger impact on the host country's economic growth than domestic investment. They also proved dependence of these effects upon the host country's quality of human capital. Similar to other studies in the field, that paper also failed to consider the 'postponed effect' of FDI on the local economy, implicitly assuming that positive effects of FDI occurred in the same year of investment. In doing so, investment in form of M&A becomes profitable earlier, while greenfield investment (building new capacities, setting up new business connections, market positioning, etc.) needs more time to reach its maximum profitability. Additionally, some authors verified that, on average, FDI reaches its full potentials in terms of profitability in roughly three years (Altzinger, 2008; Brada, Tomsik, 2003).

Among scarce literature on FDI, which differentiates between M&A and greenfield investment, Calderón et al. (2004) came to the conclusion that FDI came in two big waves. In the first wave, M&A were dominant, while greenfield investments followed. Although the paper confirmed that the rate of economic growth had positively influenced inward FDI, it however offered no explanation as to the fact that dominant form of entry into developed countries were M&A. Does that mean that less developed countries, after attracting M&A in the first phase (e.g. resulting from the privatization process), could easily become a target destination for the greenfield projects, and that after subsequently reaching a higher level of development, M&A would begin to dominate again?

A more thorough analysis was carried out by Neto et al. (2008) who investigated separate effects of both total FDI and its components (M&A and greenfield investment) on economic growth on a large sample of countries including developed and less developed ones. They found out that FDI has a positive and statistically significant effect on economic growth across both country groups. The same was proved for greenfield investment, but not for M&A, since they did not exhibit any significant

effects on growth with developed countries, while with less developed ones they produced negative effects. Yet, these results add to the dilemma as to ultimate effects of FDI on the local economy.

Wang and Wong (2009) proved that greenfield investments have a positive impact on the host country's GDP, while M&A influence economic growth negatively. Yet, they concluded that M&A have a positive impact on local economic growth if the human factor (average years of education) in the FDI host country is high enough. Although this analysis includes relatively long time series, the main point of discussion might be a heterogeneous sample of countries, as growth effects of different types of FDI ultimately depend upon absorption capacities of individual countries. Therefore, formulation of more homogeneous groups of countries would offer more realistic conclusions. Harms and Meon (2012) came to a similar conclusion as they found a positive growth effect of greenfield investment and no such evidence for M&A.

With less developed countries in focus, Hayali (2014) showed that both types of FDI have a positive impact on economic growth, with greenfield investment having a more pronounced influence. He even proved the existence of the threshold level of education which is necessary for M&A to start producing positive effects[4]. Hence, years of education seem to be one of the key elements which determine the host country's absorption capacity. Since FDI enables the transfer of considerable intangible assets in form of technology and know-how, the level of education proves to be an important factor which determines the local economy's absorption capacity.

In general, empirical papers on the relation between FDI and economic growth and/or productivity come to interesting, yet sometimes mutually contradictory results. These empirical studies show certain weaknesses in the sense that they do not differentiate between M&A and greenfield investment, do not take into account specific characteristics of individual countries (e.g. technological development which determines the local absorption capacity), use relatively short time series, and do not consider the dynamic aspect of the FDI impact on the host country's productivity.

3. An analytical model on the impact of FDI on labor productivity

Increase in efficiency and productivity depends upon many factors, such as education, R&D expenditures, business climate, etc. All these factors generally determine the innovation dynamics as an important characteristic of the FDI host economy. As an indicator of innovativeness in the EU countries, this paper uses the European Commission classification of innovativeness which splits all member countries into four groups[5]:

1. innovation leaders – innovativeness index higher than 20% of the EU average (Sweden, Denmark, Germany, Finland);
2. strong innovators – innovativeness index higher by 20% of the EU average (Luxemburg, the Netherlands, Belgium, the United Kingdom, Ireland, Austria, France, Slovenia, Estonia, Cyprus);
3. moderate innovators – innovativeness index of 50-90% of the EU average (Italy, the Czech Republic, Spain, Portugal, Greece, Hungary, Slovakia, Malta, Croatia, Lithuania, Poland) and
4. modest innovators – innovativeness index below 50% of the EU average (Romania, Latvia, Bulgaria).

The forthcoming analysis includes 28 EU member countries over the period of 1990-2014, thus making a sample of 515 observations in total[6]. The classification of countries into four groups according to their index of innovativeness enables a broader and more complex insight into ways in which foreign capital (and the embodied technological advancement) influence local labor productivity. Moreover, the 1990s were very dynamic in terms of FDI, mostly due to the opening up of the former Eastern Bloc countries which became a target destination for numerous foreign investment projects. In addition, some of today's post-transition countries have achieved a strong economic growth and a thorough restructuring of their economies thanks to FDI which brought new technologies and allowed productivity growth. Hence, the presence of post-transition countries in the sample should make it possible to easily identify the hypothesized positive impact of FDI on productivity, as well as differences arising from M&A and greenfield investment.

Based on insights from previous empirical studies, analytical variables were defined (Table 1). The dependent variable is labor productivity, approximated by the value of gross value added (GVA) per capita, while the set of independent variables (including target variables describing different forms of foreign investment, and control variables) is meant to approximate the impact of FDI, M&A and greenfield investment on the local economy's labor productivity.

Table 1 Variables of the analytical model

Sign	Name	Indicator	Unit of value	Data source
Y_{GVA}	**Labor Productivity**	**Gross Value Added per Employee**	**USD**	**World Bank**
L	Labor	Employment	Share in Labor Force (%)	World Bank
K_D	Domestic Capital	Gross Fixed Capital Formation	Share in GDP (%)	UNCTAD
FDI	Foreign Direct Investment	Stock of Inward FDI	Share in GDP (%)	UNCTAD
FDI_{GR}	Greenfield Investments	Cumulative Inflow of Inward Greenfield Investment[7]	Share in GDP (%)	UNCTAD
$FDI_{M\&A}$	M&A	Cumulative Inflow of Inward M&A	Share in GDP (%)	UNCTAD
T	Technology	Investment in R&D	Share of Public and Private Investment in R&D in GDP (%)	UNESCO
OP	Trade Openness	Trade Volume	Share of Exports and Imports in GDP (%)	UNCTAD
H	Human Capital	Highly Educated Labor Force	Share of Persons with Tertiary Education in Total Labor Force (%)	World Bank
FDI*H	FDI and Human Capital Composite Variable	Stock of Inward FDI and Highly Educated Labor Force		UNCTAD, World Bank
FDI_{GR}*H	Greenfield Investment and Human Capital Composite Variable	Cumulative Inflow of Inward Greenfield Investment and Highly Educated Labor Force		UNCTAD, World Bank
$FDI_{M\&A}$*H	M&A and Human Capital Composite Variable	Cumulative Inflow of Inward M&A and Highly Educated Labor Force		UNCTAD, World Bank

Source: UNCTAD, 2018[8]; World Bank, 2018[9]; UNESCO; 2018[10]; Authors' own calculation

Panel regression analysis (with fixed effects) includes 'standard growth variables' (labor, domestic and foreign capital), control variables (technology, trade openness, human capital) and composite variables which combine FDI and state of human capital in the FDI host economy. Since certain time is necessary from the initial investment to the realization of the expected effects on labor productivity and economic growth (see: Altzinger, 2008; Brada and Tomsik, 2003), this analysis uses all target variables (FDI, M&A and greenfield investment), and composite variables (interaction with human capital of the FDI recipient country), with a three-year time lag (t-3).

In order to prove the impact of FDI (both total and by its modes of entry) on the host country's productivity two analytical models are formulated. In Model A, foreign capital is represented by total FDI, while Model B differentiates between M&A and greenfield investment and hence estimates their

separate effects on local labor productivity, as follows:

(Model A):

$$Y_{GVA} = \beta_0 + \beta_1(L) + \beta_2(K_D) + \beta_3(FDI) + \beta_4(T) + \beta_5(OP) + \beta_6(H) + \beta_7(FDI*H) + \varepsilon \quad (1)$$

(Model B):

$$Y_{BDV} = \beta_0 + \beta_1(L) + \beta_2(K_D) + \beta_3(FDI_{M\&A}) + \beta_4(FDI_{GR}) + \beta_5(T) + \beta_6(OP) + \beta_7(H) + \beta_8(FDI_{M\&A}*H) + \beta_9(FDI_{GR}*H) + \varepsilon. \quad (2)$$

4. Results of the analysis

Analysis of innovation leaders reveals a positive impact of FDI on local labor productivity, which, in interaction with human capital (FDI*H), becomes statistically significant (Table 2). When focusing on separate effects of M&A and greenfield investment, results become divergent, since M&A produce a strong positive and statistically significant effect on the host country's productivity, while greenfield investment achieves negative effects. When combined with human capital ($FDI_{M\&A}$*H, FDI_{GR}*H) these variables keep the same (positive) sign, though of a lower intensity. This allows us to say that in most advanced nations, in terms of technology development and innovation capacity, inward M&A contribute more to labor productivity. As far as other control variables are concerned, domestic capital (K_D) has a positive effect, while labor (L) proves to have negative effects. Since this group includes the most advanced European economies, it is reasonable to assume that the greatest part of domestic capital in these countries is designated towards activities of higher value added which contribute more to labor productivity. The variable of technology (R&D expenditure) shows a positive effect with total FDI and a negative effect with M&A and greenfield investment; however, the estimated coefficients lack statistical significance. Trade openness (OP) and human capital (H) have both positive effects on productivity of innovation leaders.

Table 2 Impact of FDI, M&A and greenfield investment on labor productivity (innovation leaders), 1990-2014

Innovation Leaders				
Variables	**Model A**	**p**	**Model B**	**p**
L	-5,250.02	0.0052***	-2,592.80	0.3794
K_D	2,008.89	0.0037***	2,250.69	0.1589
$FDI_{(t-3)}$	**210.19**	**0.4788**		
$FDI_{M\&A(t-3)}$			**1,869.14**	**0.0015*** **
$FDI_{GR(t-3)}$			**-864.55**	**0.0109*** **
T	1,885.63	0.8351	-11,747.31	0.1667
OP	1,296.05	0.0001***	792.23	0.0067***
H	3,279.53	0.0055***	3,695.91	0.0001***
$FDI_{(t-3)}$*$H_{(t-3)}$	**30.24**	**0.0001*** **		
$FDI_{M\&A(t-3)}$*$H_{(t-3)}$			**99.21**	**0.0001*** **
$FDI_{GR(t-3)}$*$H_{(t-3)}$			**-18.90**	**0.1186**

*Note: *, **, *** stand for the level of statistical significance of 10%, 5% and 1%, respectively.*
Source: Authors' own calculation

With strong innovators (Table 3) FDI has a negative impact on productivity, which becomes statistically significant in combination with human capital (FDI*H). Analysis of separate effects of M&A and greenfield investment indicates their positive, yet not statistically significant impact on productivity. However, the impact of both variables remains positive and becomes statistically significant in combination with human capital. Accordingly, M&A and human capital ($FDI_{M\&A}$*H) produce a significantly stronger positive result than greenfield investment and human capital. This leads us to the conclusion that in order to obtain a positive impact of FDI on labor productivity of countries with a strong innovation capacity, a highly qualified labor force is necessary. This is implicitly confirmed with proven strong statistical effect of labor (L) in the analyzed model. Referring to individual countries within this group, one can say that typical country characteristics (which add to an explanation of the above results) are developed manufacturing and sophisticated services sector which demand a highly qualified and skilled workforce. Unlike innovation leaders, greenfield investment with strong innovators have a positive impact on labor productivity. Other control variables such as domestic capital (K_D), technology (T) and trade openness (OP) have a positive, but not consistent statistical significance throughout the analysis.

Table 3 Impact of FDI, M&A and greenfield investment on labor productivity (strong innovators), 1990-2014

Strong Innovators				
Variables	**Model A**	**p**	**Model B**	**p**
L	2,005.18	0.0035***	1,647.64	0.0245***
K_D	387.59	0.0935*	272.82	0.2428
$FDI_{(t-3)}$	**-54.48**	**0.5006**		
$FDI_{M\&A(t-3)}$			**196.71**	**0.4285**
$FDI_{GR(t-3)}$			**120.04**	**0.3417**
T	2,997.76	0.5732	1,803.86	0.7685
OP	55.67	0.6582	4,254.27	0.0001***
H	4,635.11	0.0001***	3,695.91	0.4260
$FDI_{(t-3)}$*$H_{(t-3)}$	**12.91**	**0.0001*** **		
$FDI_{M\&A(t-3)}$*$H_{(t-3)}$			**46.72**	**0.0001*** **
$FDI_{GR(t-3)}$*$H_{(t-3)}$			**11.00**	**0.0408** **

*Note: *, **, *** stand for the level of statistical significance of 10%, 5% and 1%, respectively.*
Source: Authors' own calculation

In the group of moderate innovators (Table 4) the impact of FDI, both total and by modes of entry, single or in combination with human capital, generally achieves a positive and statistically significant impact on labor productivity. Moreover, positive long-term effects are mostly realized through a lagged (t-3) interaction of FDI and human capital as an approximation of the accumulated knowledge effect. Hereby, the impact of a composite variable which includes M&A and human capital ($FDI_{M\&A}$*H) proves to be stronger than that of greenfield investment and human capital together. Despite a dominant perception that greenfield investment is more useful for the host economy, results of this investigation show that in reality M&A have stronger (and statistically significant) impact on labor productivity. These findings match those of some other authors who dealt with similar questions (Ashraf et al., 2014; Bertrand, 2012).

The majority of countries in the group of moderate innovators constitute the 'new Europe' which attracted a considerable amount of greenfield investment throughout the 1990s and afterwards. These investments, being 'slower' in their effectuation on

local labor productivity, and with dominant economic structure of the then transition countries (labor-intensive, low skill and low value-added sectors with second generation technology), have resulted in lower contribution to local labor productivity[11]. M&A activities largely resulted from privatization of previously state-owned companies, after which production modernization and restructuring followed, resulting in productivity growth. Despite the relevant criterion of grouping countries together (innovativeness), it should be noted that this group (moderate innovators) combines together both developed ('old') member countries and 'new' EU member states – so results need to be interpreted with caution. Human capital (H) and technology (T) have a positive and statistically significant impact on labor productivity, similar to labor (L) and trade openness (OP), which is, however, not statistically significant. Domestic capital (K_D) shows a negative impact on productivity which potentially points at the problematic investment structure.

Table 4 Impact of FDI, M&A and greenfield investment on labor productivity (moderate innovators), 1990-2014

Moderate Innovators				
Variables	**Model 2A**	**p**	**Model 2B**	**p**
L	780.27	0.1107	813.19	0.1235
K_D	-125.25	0.1827	-99.04	0.3135
$FDI_{(t-3)}$	**705.38**	**0.0001*****		
$FDI_{M\&A(t-3)}$			**1,734.86**	**0.0001*****
$FDI_{GR(t-3)}$			**228.14**	**0.3577**
T	10,183.53	0.0097***	12,494.47	0.0041***
OP	72.95	0.4539	182.89	0.0774*
H	512.85	0.0119**	627.90	0.0128**
$FDI_{(t-3)}$*$H_{(t-3)}$	**30.18**	**0.0001*****		
$FDI_{M\&A(t-3)}$*$H_{(t-3)}$			**104.52**	**0.0001*****
$FDI_{GR(t-3)}$*$H_{(t-3)}$			**-3.10**	**0.7265**

*Note: *, **, *** stand for the level of statistical significance of 10%, 5% and 1%, respectively.*
Source: Authors' own calculation

In case of modest innovators (Table 5) total FDI has a positive, yet statistically not significant effect on labor productivity; this effect remains positive and becomes statistically significant only in the interaction of FDI with human capital (FDI*H). A similar pattern can be observed with M&A and greenfield investment, both of which realize their full impact on labor productivity only in combination with human capital. With this country group, it is evident that more time is needed from the initial investment to the productivity growth. Unlike other country groups, investment in R&D produces negative effects on productivity only with modest innovators, while human capital (H) achieves positive influence on productivity. This leads to the conclusion that without sufficient improvements in education, absorption capacity of the new knowledge, available either through FDI or domestic R&D, will remain weak. Domestic capital (K_D), technology (T) and trade openness (OP) have a positive and statistically significant impact on productivity, while labor (L) achieves a negative effect, yet without statistical significance.

Table 5 Impact of FDI, M&A and greenfield investment on labor productivity (modest innovators), 1990-2014

Modest innovators				
Variables	**Model 2A**	**p**	**Model 2B**	**p**
L	-65.45	0.7616	-70.05	0.7559
K_D	445.28	0.0107***	456.77	0.0107**
$FDI_{(t-3)}$	**69.20**	**0.1898**		
$FDI_{M\&A(t-3)}$			**73.29**	**0.7417**
$FDI_{GR(t-3)}$			**59.40**	**0.3685**
T	-2,565.31	0.8099	-1,791.36	0.8878
OP	119.06	0.1055	123.88	0.0982*
H	2,353.39	0.0001***	2,388.36	0.0001***
$FDI_{(t-3)}*H_{(t-3)}$	**9.31**	**0.0005*** **		
$FDI_{M\&A(t-3)}*H_{(t-3)}$			**25.96**	**0.0342****
$FDI_{GR(t-3)}*H_{(t-3)}$			**4.42**	**0.2764**

*Note: *, **, *** stand for the level of statistical significance of 10%, 5% and 1%, respectively.*
Source: Authors' own calculation

The above results show that, with all country groups (all levels of innovativeness), the impact of inward M&A with time lag (t-3) on local labor productivity is stronger than that of greenfield investment. This confirms the idea that certain time is necessary from the initial investment until positive effects on local labor productivity are realized. A possible explanation for that is that M&A result in immediate business restructuring and rationalization, which, combined with introduction of new technologies, contribute to increasing business efficiency, and through existing backward and forward linkages enable efficient spillover effects onto the rest of the domestic economy. Such an efficient expansion of new knowledge and know-how is a specific feature of M&A, rather than of greenfield investment. Furthermore, composite variables of interaction of total FDI and M&A, respectively, with local human capital show positive and statistically significant effects on local productivity with all country groups, while greenfield investment, combined with local human capital, produces positive results only with strong innovators. Hence, technology spillovers and consequently productivity growth proved to be much stronger with M&A.

5. Conclusion

This study represents a departure from the mainstream type of research focusing on FDI and its macroeconomic impacts on productivity while making no reference to the structure of incoming foreign capital. Hence, this research belongs to relatively rare studies which take into account two different FDI modes of entry. Their expected different impact on local labor productivity was initially the main motivation for this research and, to the best of the authors' knowledge, this is the first research which analyzes the above effects on homogeneous groups of countries according to their level of innovativeness. The above also represents the main contribution of this paper.

Results of this empirical investigation show the positive effects of total FDI and M&A on the home country's labor productivity, while greenfield investments create a positive and statistically significant effect only with strong innovators. Even when the estimated level of human capital (approximated by the share of highly educated labor force) of each individual country is taken into account (i.e. combined into composite variable with foreign capital),

M&A again prove positive effects on labor productivity with all country groups. Meanwhile, interaction of greenfield investment and human capital is stronger only with modest innovators – a country group with weakest innovative capacities in the EU. This indicates that in countries at higher level of innovativeness M&A contribute more to local labor productivity, while greenfield investment proves to have a relatively stronger effect with countries at lower level of innovativeness. Additionally, greenfield investment needs more time for realization of its positive effects on the local economy.

These findings have confirmed the initial hypothesis which assumed that the impact of FDI on local labor productivity strongly depends upon FDI mode of entry, since M&A and greenfield investment are in their essence quite different from each other (generated by different investor's motives). Hence, they cannot produce completely identical effects on the local economy. While M&A are primarily concerned with the already existing business entity with its market share and established backward and forward linkages, greenfield investment means creating a new company with all the subsequent activities related to building market share, creating business connections, etc. For that reason, greenfield investments have weaker potential for positive externalities, while M&A are more efficient in creating technology spillovers in the recipient economy.

Furthermore, this analysis shows that countries which invest more in education have better human capital which makes them more successful in hosting FDI that incorporates advanced technologies. Greenfield investment opens new jobs in recipient countries and although they can act as an important transmitter of new technologies, their motives can stretch from taking advantage of low labor costs and winning local market share, to extending a product's life cycle by re-allocating production abroad. Hence, since greenfield investment does not necessarily bring up to date technology it can fail to produce a significantly positive impact on local productivity, even in the long run. On the other hand, M&A are motivated by high expectations on profit, which contributes to efficient transfer of technology locally and subsequent expansion of positive spillover effects. These findings are fully in line with endogenous growth theories according to which spillover effects, combined with local R&D investment, can add to technological dynamism of the FDI host country, thus compensating for decreasing returns on capital from the neoclassical models.

This research proved that investment in R&D and education are the key elements for achieving a stronger contribution of FDI to productivity growth and consequently economic growth in the long run. This increases the level of accumulated domestic knowledge which not only makes absorption of 'foreign' technology more efficient, but also attracts new technologically advanced FDIs. This is also a message to economic policy makers. Investments into R&D and constant improvements in the quality of human capital are the necessary conditions for a sustainable economic growth in the future. Countries that fail to do so could easily find themselves in a vicious circle of attracting less technologically advanced FDIs unable to create a significant contribution to labor productivity and economic growth.

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Endnotes

1 Regarding FDI spillover effects, Scott (1991) and Azariadis and Drazen (1990) assert that a threshold exists in the level of accumulated human capital which enables the realization of positive externalities of both FDI and domestic investment on economic growth.

2 In terms of nominal labor productivity per person employed, the gap among the EU countries increased with Romania and Ireland achieving in 2016 app. 60% and 190% of the EU 28 average, respectively. Although country ranking has not considerably changed over time (2005-2016), success of individual member countries in achieving higher productivity is increasingly driving them apart (Eurostat, "European Statistical Office Database", available at: https://ec.europa.eu/eurostat/data/database (Accessed on: December 7, 2017)).

3 Hayali (2014), Leitao and Rasekhi (2013), Mehic et al. (2013), Arisoy (2012), Farkas (2012), Kornecki and Raghavan (2012), Krstevska and Petrovska (2012), Agarwal and Khan (2011), Beugelsdijsk et al. (2008), Har et al. (2008), Hunya (2004), Hermes and Lensink (2003).

4 Hayali (2014) found that the threshold is 9.1 years of education (secondary education). Current analysis uses tertiary education as a variable.

5 European Commission, "European Innovation Scoreboard", available at: https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en, (Accessed on: October 9, 2018)

6 The sample is slightly smaller than expected because of the lack of data (transition countries at the beginning of the 1990s), and exclusion of some outliers due to their extremely high share of FDI/GDP (Malta and Luxemburg).

7 Data on inward FDI stock (as an accumulation of annual FDI inflows) is taken from the UNCTAD database (UNCTADstat, available at: http://unctadstat.unctad.org/EN/ (Accessed on: September 6, 2018)). The same database contains annual data on cross-border M&A, but not on greenfield investment. Following the practice of some other papers (e.g. Harms and Meon, 2012; Wang and Wong, 2009; Calderón et al., 2002), for the purpose of this research annual inflows of greenfield investment were calculated as a difference between total annual inflows of FDI and inward M&A. After that, data on annual inward M&A and greenfield investments were accumulated to obtain an approximation of their annual stock.

8 UNCTAD (2018), "World Investment Report 2017", New York, Geneva: United Nations.

9 World Bank, available at: https://data.worldbank.org/ (Accessed on: November 16, 2018)

10 UNESCO, available at: http://data.uis.unesco.org (Accessed on: October 19, 2018)

11 The foreign investors' main motivation in Eastern Europe during the 1990s was market seeking, i.e. better market positioning in newly opened economies. Hence, throughout the 1990s and later, most of these countries hosted predominantly horizontal investment, while vertical investments were mostly driven by local cost advantage.

Dražen Derado

Darko Horvatin

Utječe li način ulaska inozemnih izravnih ulaganja na produktivnost rada zemlje primateljice?: Analiza zemalja članica EU-a

Sažetak

Ekonomski rast rezultat je međudjelovanja rada, kapitala i tehnologije. U tom smislu inozemna izravna ulaganja *(FDI)* imaju značajnu ulogu jer ona osim svježeg kapitala sa sobom donose i vrijednu nematerijalnu imovinu (tehnologiju i znanje) koja zajedno doprinosi rastu produktivnosti rada zemlje primateljice kapitala. Ipak, rezultati empirijskih analiza o utjecaju inozemnih izravnih ulaganja na produktivnost rada nisu jednoznačni, jer ukazuju, ne samo na pozitivne, već ponekad i na vrlo skromne, pa čak i negativne učinke. Stoga je cilj ovoga rada istražiti utjecaj inozemnih izravnih ulaganja na produktivnost rada zemlje primateljice s obzirom na način ulaska inozemnih izravnih ulaganja, kao i stupanj inovativnosti zemalja primateljica kapitala. Rezultati analize panel podataka na uzorku zemalja članica Europske unije dolaze do novih spoznaja o očekivanim učincima inozemnih izravnih ulaganja, budući da preuzimanja i stjecanja *(M&A),* ostvaruju snažniji učinak na lokalnu produktivnost rada kod zemalja na višoj razini inovativnosti, dok *greenfield* ulaganja postižu snažniji pozitivni učinak u slučaju tehnološki manje naprednih ekonomija.

Ključne riječi: inozemna izravna ulaganja, *greenfield* ulaganja, preuzimanja i stjecanja, ekonomski rast, inovativnost, EU

Appendix

Appendix to Table 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	170820.3	90862.56	1.879985	0.0659
$FDI_{(t-3)}$	210.1924	294.5812	0.713530	0.4788
K_D	2008.892	658.8700	3.048995	0.0037
L	-5250.018	1797.322	-2.921023	0.0052
T	1885.625	9013.815	0.209193	0.8351
OP	1296.055	256.0220	5.062281	0.0000
H	3279.527	1129.364	2.903872	0.0055
R-squared	0.782754	Mean dependent var		117253.1
Adjusted R-squared	0.743650	S.D. dependent var		27955.19
S.E. of regression	14154.01	Akaike info criterion		22.10440
Sum squared resid	1.00E+10	Schwarz criterion		22.45345
Log likelihood	-653.1319	Hannan-Quinn criter.		22.24093
F-statistic	20.01707	Durbin-Watson stat		0.716093
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	192736.1	88164.37	2.186100	0.0333
K_D	1212.375	581.9188	2.083409	0.0421
L	-4372.021	1684.988	-2.594689	0.0123
T	12211.76	7479.175	1.632769	0.1086
OP	1165.213	236.0839	4.935590	0.0000
$FDI_{(t-3}*H_{(t-3)}$	30.24408	5.734644	5.273924	0.0000
R-squared	0.791459	Mean dependent var		116867.4
Adjusted R-squared	0.759375	S.D. dependent var		27884.52
S.E. of regression	13678.33	Akaike info criterion		22.02047
Sum squared resid	9.73E+09	Schwarz criterion		22.33191
Log likelihood	-662.6242	Hannan-Quinn criter.		22.14252
F-statistic	24.66889	Durbin-Watson stat		0.812006
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	76863.66	86646.96	0.887090	0.3794
$FDI_{M\&A(t-3)}$	1869.140	556.4723	3.358909	0.0015
$FDI_{GR(t-3)}$	-864.5504	326.6521	-2.646701	0.0109
K_D	2250.693	571.0537	3.941299	0.0003
L	-2592.803	1812.307	-1.430664	0.1589
T	-11747.31	8368.323	-1.403783	0.1667
OP	792.2157	279.5797	2.833596	0.0067
H	3695.912	814.0740	4.540020	0.0000
R-squared	0.824363	Mean dependent var		117253.1
Adjusted R-squared	0.788519	S.D. dependent var		27955.19
S.E. of regression	12855.77	Akaike info criterion		21.92512
Sum squared resid	8.10E+09	Schwarz criterion		22.30908
Log likelihood	-646.7535	Hannan-Quinn criter.		22.07530
F-statistic	22.99851	Durbin-Watson stat		0.873939
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	94752.30	87090.65	1.087973	0.2817
K_D	1497.225	585.3900	2.557654	0.0136
L	-1276.809	1745.205	-0.731610	0.4678
T	-5816.211	8267.204	-0.703528	0.4849
OP	707.4695	264.1144	2.678648	0.0099
$FDI_{M\&A(t-3)}*H_{(t-3)}$	99.20571	18.94850	5.235543	0.0000
$FDI_{GR(t-3)}*H_{(t-3)}$	-18.89712	11.90497	-1.587331	0.1186
R-squared	0.809320	Mean dependent var		116867.4
Adjusted R-squared	0.775670	S.D. dependent var		27884.52
S.E. of regression	13207.07	Akaike info criterion		21.96371
Sum squared resid	8.90E+09	Schwarz criterion		22.30976
Log likelihood	-659.8933	Hannan-Quinn criter.		22.09933
F-statistic	24.05149	Durbin-Watson stat		0.707624
Prob(F-statistic)	0.000000			

Appendix to Table 3

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-157742.4	36037.07	-4.377228	0.0000
$FDI_{(t-3)}$	-54.47616	80.63278	-0.675608	0.5006
K_D	387.5897	229.2750	1.690501	0.0935
L	2005.183	672.3956	2.982148	0.0035
T	2997.764	5307.117	0.564857	0.5732
OP	55.67093	125.5120	0.443551	0.6582
H	4635.107	401.5455	11.54317	0.0000
R-squared	0.927660	Mean dependent var		97570.80
Adjusted R-squared	0.919149	S.D. dependent var		47061.64
S.E. of regression	13381.63	Akaike info criterion		21.94632
Sum squared resid	2.13E+10	Schwarz criterion		22.27070
Log likelihood	-1455.403	Hannan-Quinn criter.		22.07814
F-statistic	109.0005	Durbin-Watson stat		0.658635
Prob(F-statistic)	0.000000			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-98641.00	46999.18	-2.098781	0.0379
K_D	345.4478	303.4467	1.138413	0.2572
L	1518.719	869.9338	1.745787	0.0833
T	16151.70	6927.472	2.331543	0.0214
OP	565.6617	159.9635	3.536193	0.0006
$FDI_{(t-3}*H_{(t-3)}$	12.91388	2.485377	5.195946	0.0000
R-squared	0.860494	Mean dependent var		97057.15
Adjusted R-squared	0.845749	S.D. dependent var		46770.75
S.E. of regression	18369.09	Akaike info criterion		22.57131
Sum squared resid	4.15E+10	Schwarz criterion		22.86970
Log likelihood	-1532.135	Hannan-Quinn criter.		22.69257
F-statistic	58.36020	Durbin-Watson stat		0.523143
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-133879.9	39816.61	-3.362412	0.0010
$FDI_{M\&A(t-3)}$	196.7050	247.6258	0.794364	0.4285
$FDI_{GR(t-3)}$	120.0433	125.7687	0.954476	0.3417
K_D	272.8160	232.4401	1.173704	0.2428
L	1647.639	723.7155	2.276639	0.0245
T	1803.855	6113.996	0.295037	0.7685
OP	104.7138	131.1172	0.798627	0.4260
H	4254.265	500.5740	8.498774	0.0000
R-squared	0.925331	Mean dependent var		99783.87
Adjusted R-squared	0.916298	S.D. dependent var		47430.89
S.E. of regression	13722.37	Akaike info criterion		21.99865
Sum squared resid	2.33E+10	Schwarz criterion		22.33484
Log likelihood	-1523.906	Hannan-Quinn criter.		22.13527
F-statistic	102.4436	Durbin-Watson stat		0.650522
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-85305.41	44604.64	-1.912479	0.0580
K_D	157.4818	270.8349	0.581468	0.5619
L	1684.997	822.0129	2.049842	0.0424
T	23523.13	6688.622	3.516887	0.0006
OP	284.0580	156.2041	1.818506	0.0713
$FDI_{M\&A(t-3)}*H_{(t-3)}$	46.72295	6.801188	6.869822	0.0000
$FDI_{GR(t-3)}*H_{(t-3)}$	10.99547	3.827227	2.872961	0.0048
R-squared	0.888131	Mean dependent var		99245.34
Adjusted R-squared	0.875895	S.D. dependent var		47170.64
S.E. of regression	16617.50	Akaike info criterion		22.37328
Sum squared resid	3.53E+10	Schwarz criterion		22.68406
Log likelihood	-1584.689	Hannan-Quinn criter.		22.49957
F-statistic	72.58547	Durbin-Watson stat		0.506731
Prob(F-statistic)	0.000000			

Appendix to Table 4

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18423.15	24226.36	-0.760459	0.4481
$FDI_{(t-3)}$	705.3789	103.7654	6.797823	0.0000
K_D	-125.2472	93.61212	-1.337938	0.1827
L	780.2711	486.6164	1.603462	0.1107
T	10183.53	3891.371	2.616952	0.0097
OP	72.94648	97.17584	0.750665	0.4539
H	512.8539	201.7912	2.541508	0.0119
R-squared	0.884170	Mean dependent var		59286.29
Adjusted R-squared	0.873766	S.D. dependent var		40827.74
S.E. of regression	14505.84	Akaike info criterion		22.08586
Sum squared resid	3.51E+10	Schwarz criterion		22.36647
Log likelihood	-2004.856	Hannan-Quinn criter.		22.19961
F-statistic	84.98471	Durbin-Watson stat		0.421859
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27829.79	23277.65	1.195558	0.2334
K_D	-132.1134	96.95647	-1.362605	0.1746
L	-18.88474	455.8786	-0.041425	0.9670
T	7645.310	3008.452	2.541277	0.0119
OP	164.1399	85.14120	1.927855	0.0554
$FDI_{(t-3)}*H_{(t-3)}$	30.18460	3.909759	7.720323	0.0000
R-squared	0.872186	Mean dependent var		58119.62
Adjusted R-squared	0.862668	S.D. dependent var		41360.98
S.E. of regression	15327.68	Akaike info criterion		22.18373
Sum squared resid	4.42E+10	Schwarz criterion		22.42855
Log likelihood	-2236.648	Hannan-Quinn criter.		22.28277
F-statistic	91.63498	Durbin-Watson stat		0.417278
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-29384.07	26081.41	-1.126629	0.2616
$FDI_{M\&A(t-3)}$	1734.861	429.1248	4.042790	0.0001
$FDI_{GR(t-3)}$	228.1396	247.3670	0.922272	0.3577
K_D	-99.04255	97.95515	-1.011101	0.3135
L	813.1898	525.2454	1.548209	0.1235
T	12494.47	4286.998	2.914503	0.0041
OP	182.8879	102.8993	1.777349	0.0774
H	627.9014	249.4600	2.517042	0.0128
R-squared	0.874636	Mean dependent var		59996.69
Adjusted R-squared	0.862330	S.D. dependent var		40790.12
S.E. of regression	15134.70	Akaike info criterion		22.17705
Sum squared resid	3.73E+10	Schwarz criterion		22.47861
Log likelihood	-1978.935	Hannan-Quinn criter.		22.29932
F-statistic	71.07592	Durbin-Watson stat		0.334337
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-20081.97	24885.78	-0.806966	0.4207
K_D	-124.3610	99.14241	-1.254367	0.2113
L	767.7768	494.5305	1.552537	0.1223
T	7679.913	3177.663	2.416843	0.0166
OP	322.3817	85.69483	3.761973	0.0002
$FDI_{M\&A(t-3)}*H_{(t-3)}$	104.5211	18.96858	5.510224	0.0000
$FDI_{GR(t-3)}*H_{(t-3)}$	-3.099701	8.848451	-0.350310	0.7265
R-squared	0.868572	Mean dependent var		59579.55
Adjusted R-squared	0.857681	S.D. dependent var		41095.84
S.E. of regression	15503.51	Akaike info criterion		22.21325
Sum squared resid	4.35E+10	Schwarz criterion		22.47991
Log likelihood	-2172.005	Hannan-Quinn criter.		22.32119
F-statistic	79.74555	Durbin-Watson stat		0.381438
Prob(F-statistic)	0.000000			

Appendix to Table 5

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-41637.44	13591.43	-3.063507	0.0039
$FDI_{(t-3)}$	69.20412	51.87729	1.333997	0.1898
K_D	445.2801	166.3768	2.676336	0.0107
L	-65.45494	214.3225	-0.305404	0.7616
T	-2565.314	10593.83	-0.242152	0.8099
OP	119.0558	71.88161	1.656276	0.1055
H	2353.393	339.0159	6.941836	0.0000
R-squared	0.889109	Mean dependent var		20386.77
Adjusted R-squared	0.866931	S.D. dependent var		12731.56
S.E. of regression	4644.301	Akaike info criterion		19.88908
Sum squared resid	8.63E+08	Schwarz criterion		20.23655
Log likelihood	-478.2824	Hannan-Quinn criter.		20.02091
F-statistic	40.08933	Durbin-Watson stat		1.320059
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8067.205	18281.02	0.441289	0.6612
K_D	578.2126	225.0342	2.569444	0.0137
L	-759.0501	295.8187	-2.565930	0.0139
T	34026.40	12556.04	2.709963	0.0096
OP	192.8299	89.84697	2.146204	0.0375
$FDI_{(t-3}*H_{(t-3)}$	9.312707	2.477203	3.759364	0.0005
R-squared	0.756757	Mean dependent var		19900.02
Adjusted R-squared	0.717160	S.D. dependent var		12709.44
S.E. of regression	6759.224	Akaike info criterion		20.61830
Sum squared resid	1.96E+09	Schwarz criterion		20.92134
Log likelihood	-517.7667	Hannan-Quinn criter.		20.73410
F-statistic	19.11118	Durbin-Watson stat		0.631522
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-42892.22	13739.06	-3.121918	0.0034
$FDI_{M\&A(t-3)}$	73.28564	220.7785	0.331942	0.7417
$FDI_{GR(t-3)}$	59.40287	65.29465	0.909766	0.3685
K_D	456.7737	170.3513	2.681363	0.0107
L	-70.04515	223.7848	-0.313002	0.7559
T	-1791.355	12617.01	-0.141979	0.8878
OP	123.8831	73.11346	1.694395	0.0982
H	2388.359	366.5807	6.515234	0.0000
R-squared	0.887860	Mean dependent var		20386.77
Adjusted R-squared	0.861981	S.D. dependent var		12731.56
S.E. of regression	4729.882	Akaike info criterion		19.94109
Sum squared resid	8.72E+08	Schwarz criterion		20.32718
Log likelihood	-478.5568	Hannan-Quinn criter.		20.08757
F-statistic	34.30883	Durbin-Watson stat		1.284746
Prob(F-statistic)	0.000000			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11220.19	18830.73	0.595845	0.5545
K_D	586.3123	228.1654	2.569681	0.0138
L	-922.7718	315.0661	-2.928819	0.0055
T	47222.58	13833.74	3.413581	0.0014
OP	173.8649	93.05425	1.868425	0.0687
$FDI_{M\&A(t-3)}*H_{(t-3)}$	25.95823	11.85905	2.188895	0.0342
$FDI_{GR(t-3)}*H_{(t-3)}$	4.416919	4.005513	1.102710	0.2764
R-squared	0.757435	Mean dependent var		19900.02
Adjusted R-squared	0.711232	S.D. dependent var		12709.44
S.E. of regression	6829.683	Akaike info criterion		20.65473
Sum squared resid	1.96E+09	Schwarz criterion		20.99564
Log likelihood	-517.6956	Hannan-Quinn criter.		20.78500
F-statistic	16.39370	Durbin-Watson stat		0.738811
Prob(F-statistic)	0.000000			