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CONVERGENCE AND FDI IN AN ENLARGED EU: WHAT CAN WE LEARN FROM THE EXPERIENCE OF COHESION COUNTRIES FOR THE CEECS ?

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CONVERGENCE AND FDI IN AN ENLARGED EU: WHAT CAN WE LEARN FROM THE EXPERIENCE OF COHESION COUNTRIES FOR THE CEECS?

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Abstract

This paper emphasises that, for the less advanced European Union countries, FDI inflows are an important engine of convergence towards their more advanced counterparts. In general, CEECs and Cohesion countries hosting FDI tend to grow faster than those receiving few FDI. Not only the level but also the sectoral composition of FDI matters. Multinational corporations, by carrying out technically demanding production functions, have contributed to upgrade the production capacities of receiving CEECs and to increase the technological level of goods produced there. Competing on similar markets, but with higher wages and lower human capital endowments than CEECs, Portugal has lost its "comparative advantage" with the entry of CEECs as a possible destination of export-oriented FDI. This "diverting effect" explains a part of the disappointing performances of Portugal in terms of catching up. Thus, the relevant issue is no longer whether CEECs will follow an Irish or a Portuguese convergence scenario, but rather whether Portugal will converge or diverge towards CEECs.

Codes JEL: O1, O4, P3, F2, F4.
Keywords: transition economies, productivity growth, convergence.

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Introduction

"Cohesion" across member states is one of the main goal of the European Community since its creation in 1957 (Treaty of Rome). "Cohesion" in the European Union (EU) means promoting good living standards for all its inhabitants *via* trade of goods, capital and labour, exchange of knowledge, realisation of scale economies etc. Such a goal was firmly reaffirmed after the fall of the Berlin wall when perspectives of EU membership were offered to ten formerly socialist economies, plagued by 40-50 years of planned economy. Since 1st May 2004, eight of them are new members of the EU while Bulgaria and Romania are expected to join EU by 2007[1]. As well known, CEECs are by far poor countries compared to most of other EU countries, even if they have resumed with growth over the last decade. *To which extent (and speed) these less advanced countries of the EU will converge towards EU average* is a crucial issue. A slow convergence would necessitate to increase the European budget beyond the 1.24 % ceiling of the EU GNI to foster their economic development and reduce income inequalities while the more advanced EU countries are currently very reluctant to this perspective.

Assessing the speed of convergence for CEECs is not an easy task: they have only a short experience of market economy, with the first years of transition characterised by disrupted economic relationships. Consequently, from a statistical viewpoint, not more than ten years of "reliable" data are available for CEECs. Nevertheless, some insights can be drawn by using the past experience of the four "Cohesion countries", namely Spain, Portugal, Greece and Ireland. The latter were for a long time the four poorest countries of the EU-15, receiving the bulk of European funds. Over the time, these countries have experimented a very different path of convergence towards EU-15, such as Ireland is currently the second "richest" EU countries − after Luxembourg − in terms of per capita GDP (**Table 1**)[2]. By contrast, Greece and Portugal experimented poor performances in terms of catching up. As a result, considering the enlarged EU, Greece is roughly as rich as Slovenia (the more advanced CEECs among new EU members) and Portugal as rich as the Czech republic (the second one more advanced CEECs among new EU members). While various factors may explain these different paths of per capita GDP growth (including receipts of structural funds and pre-accession funds from the EU), foreign direct investment (FDI, hereafter) is rather a good candidate. Indeed, Cohesion countries and CEECs have received individually very different amounts of FDI. Moreover, the sectoral composition of FDI is rather different from one country to another. In some countries, the bulk of FDI was made in capital and/or skilled intensive industries (*e.g.* Ireland for Cohesion countries; Hungary for CEECs) while in another countries, FDI were predominantly oriented towards unskilled labour and/or resources intensive industries (*e.g.* Portugal for Cohesion countries; Lithuania for CEECs). Since industries exhibit very different productivity growth, it may explain the shaping of previous - and then, future - per capita GDP growth.

To which extent the difference of FDI inflows (both in terms of level and sectoral composition) may explain the difference of per capita GDP growth across countries is the main goal of this study.

[1] In what follows, these ten formerly socialist countries will be labelled CEECs (for Central and Eastern European countries). New EU members are Estonia, the Czech republic, Hungary, Poland, Slovakia, Latvia, Lithuania and Slovenia (hereafter, CEECs-8), plus the two Mediterranean islands, Cyprus and Malta.

[2] Note that the picture is a little bit different if we consider the *gross national product* (GNP) instead of the *gross domestic product* (GDP). Due to net large transfers *to* abroad, GNP in Ireland accounted for around 85 % of its GDP over the last few years. Inversely, due to net large transfers *from* abroad, GNP in Luxembourg stands between 110 and 115 % of its GDP, depending on years. For the other EU-15 countries, GNP and GDP are roughly in line.

The study is structured as follows. **Section 1** presents some evidence on the process of convergence across EU members and on key factors that can help to explain the different paths of per capita GDP growth. **Section 2** proposes a comparative overview of CEECs and Cohesion countries at the sectoral level. **Section 3** consists in an accounting exercise aiming at analysing to which extent productive structures of CEECs are close or far away of those of Ireland. While **section 1** uses the per capita GDP as a measure of convergence, the analysis carried out in **sections 2 and 3** is based on productivity developments since "productivity growth is the basis for improvements in real incomes and welfare" (Schreyer and Pilat, 2001). Finally, **section 4** concludes on the prospects of convergence in the enlarged EU.

Table 1: Per capita GDP* in the enlarged EU and average growth rate of real GDP

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Real GDP growth rate**
UE (25 countries)	100	100	100	100	100	100	100	100	100	100	2.3
UE (15 countries)	110	110	110	110	110	110	110	109	109	109	2.2
Belgium	121	119	117	116	116	117	118	118	119	119	2.2
Danemark	123	124	125	124	127	127	125	121	121	122	1.9
Germany	120	119	116	115	114	113	111	109	109	109	1.4
France	114	113	114	114	114	114	115	113	112	110	2.3
Italy	116	115	113	114	113	112	110	108	106	103	1.5
Luxembourg	175	174	181	190	206	216	210	210	219	227	5.2
Netherlands	118	118	119	119	120	120	128	126	125	125	2.4
Austria	126	127	124	123	126	126	123	121	121	123	2.3
Finlande	104	104	110	113	112	114	113	113	112	113	3.6
Sweden	117	116	115	114	118	120	116	114	116	118	2.7
United Kingdom	108	110	112	112	112	113	114	117	117	117	2.9
Greece	71	70	71	71	71	72	73	77	81	82	3.9
Spain	87	87	87	89	93	93	94	96	98	98	3.5
Ireland	98	103	112	117	123	127	129	134	135	138	7.6
Portugal	75	75	76	78	81	81	80	80	73	72	2.5
Cyprus	81	80	79	79	81	81	83	82	81	84	3.4
Malta**	:	:	:	76	76	76	73	73	72	69	1.7
Czech republic	69	70	68	66	65	64	65	67	68	71	2.1
Estonia	33	35	38	39	39	41	42	45	49	52	6.3
Latvia	29	30	32	33	34	35	37	38	41	43	6.3
Lithuania	34	35	37	39	37	38	40	42	46	48	5.7
Hungary	49	49	50	51	52	53	56	58	60	60	3.8
Poland	41	42	44	45	46	47	46	47	47	49	4.1
Slovenia	68	69	71	72	74	73	74	75	76	80	3.9
Slovakia	44	46	47	47	47	47	48	51	52	52	4.1
Bulgaria	31	28	26	26	26	27	28	28	30	31	1.8
Romania**	:	:	:	27	26	25	26	28	29	31	3.3
Croatia	37	39	41	42	40	41	42	43	45	46	3.9

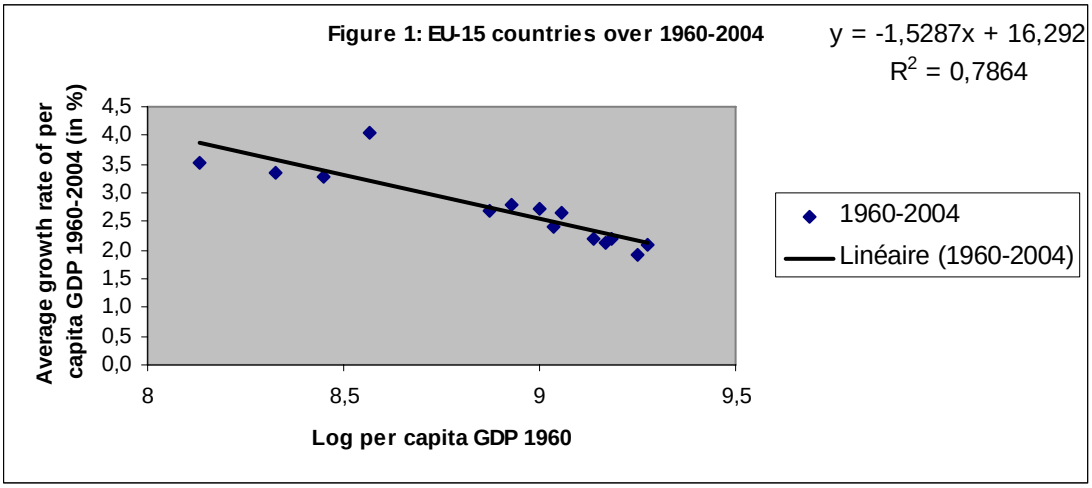
Source: Eurostat.
* Per capita GDP are evaluated in PPPs. ** Over 1995/2004, except Malta and Romania over 1999/2004.

1. Convergence across EU members: an overview

1.1. Key concepts and evidence for EU-15 countries

Convergence across countries refers to the idea that *the less advanced countries grow faster than their more advanced counterparts*, such as the former catch up − or, converge towards − the latter. From a statistical viewpoint, it means that *whether* countries are converging, a *negative relationship* must be observed between their *initial* incomes and *growth rates* in the following years. **Figure 1** presents evidence on per capita GDP convergence for the EU-15 over 1960-2004[3]. The estimation of unconditional β-convergence across EU-15 countries, which measures the speed of convergence *without* controlling for factors which may impact on the speed of convergence (including EU membership), gives a convergence rate of about 2.5 % per year over the 45 last years (**Table 2**). It is worth noting this figure is above the 2 % found in the previous literature for other sets of countries or regions[4]. Thus, at first glance, EU membership would accelerate the convergence across countries[5].

As a rough approximation, let's assume that the initial per capita GDP of CEECs-8 as a whole is equal to 50 % of EU-15 average[6]. Then, based on this 2.5 % speed of convergence across EU-15 over 1960-2004, it means that in 20 years, the CEECs-8 as a whole would reach 75 % of the EU-15 average.



Data sources: Chelem, CEPII; own estimations

[3] Data are taken from Chelem (CEPII) which provides relevant data for all EU-25 countries over a long time period. In this database, Belgium and Luxembourg are merged in a common entity (*i.e.* BLEU). As usual, GDP are evaluated in purchasing power parities (PPPs, here based on dollars) to allow a better international comparability of data. Discrepancies between levels of prices across countries as well as possible under/over-evaluation of currencies call for resort to PPPs rather than market exchange rates. See Nordhaus (2005) for a recent contribution on this point.

[4] See Islam (2003) for a review of empirical literature on β-convergence. See Abreu et al. (2005) for a meta-analysis of β convergence.

[5] At this step of the analysis, this is truly "at first glance" since, among other things, over the full period 1960-2005, not at all EU-15 countries were members of the EU. From 1995 to May 2004, the EU was really composed of 15 countries.

[6] As regard Table 1, this figure fits roughly the per capita GDP of the biggest newcomer in EU in 2004, namely Poland.

Table 2 gives the estimates of unconditional β-convergence across EU-15 countries for different sub-periods. Interestingly, at first look, the process of deeper integration within EU (including the Single Market in 1993, the run-up towards EMU with related constraints for fulfilling Maastricht criteria in the 1990s) seems to have accelerated the speed of convergence across EU-15 members to 4.1 % per year over 1990-2004. But, at the second look, this acceleration was largely driven by the presence of Ireland in the sample. Dropping Ireland, the speed of convergence across EU-15 countries falls dramatically to 2 % per year over 1990-2004, *i.e.* the "standard" convergence rate. Moreover, for the recent sub-period, the significativity of β is better − and the R^2 is correspondingly higher − when we exclude Ireland from the sample. Consequently, Ireland can be viewed as an outlier in term of catching up.

Whether the CEECs will follow an Irish scenario of catching up *or not* is then an important issue. Based on the estimates of convergence rate for 1990-2004, if the answer is "no", the necessary time to reach 75 % of the EU-15 average for the CEECs as a whole is 24 years while it falls to 13 years if the answer is "yes".

Table 2: Unconditional β-convergence of per capita GDP across EU-15

Period	Unconditional β-convergence	Standard error	Convergence rate λ	R^2	Average EU-15 growth rate of per capita GDP
1960-2004	**-1.528*** **	**0.230**	**2.5 %**	**0.786**	**2.4**
Excl. Ireland	-1.349***	0.121	2.0 %	0.917	2.4
1960-1974	**-2.930*** **	**0.486**	**3.7 %**	**0.751**	**3.8**
Excl. Ireland	-3.266***	0.333	4.3 %	0.897	3.8
1975-1989	**-1.161**	**0.658**	**1.3 %**	**0.205**	**2.2**
Excl. Ireland	-1.047	0.767	1.1 %	0.144	2.2
1990-2004	**-3.148** **	**1.343**	**4.1 %**	**0.314**	**1.5**
Excl. Ireland	-1.724*	0.618	2.0 %	0.414	1.4

The computation of convergence rate is based on the preliminary estimation of unconditional β-convergence: $ln\left(y_t / y_{t_0}\right) = \beta\, ln\left(y_{t_0}\right) + C$

where $ln\left(y_t / y_{t_0}\right)$ denotes the annual average per capita GDP growth rate between t_0 and t years and, y_{t_0}, the (log of) initial per capita GDP. C is a constant term.

The equation is estimated using simple Ordinary Least Squares (OLS).
The convergence rate λ is calculated from:

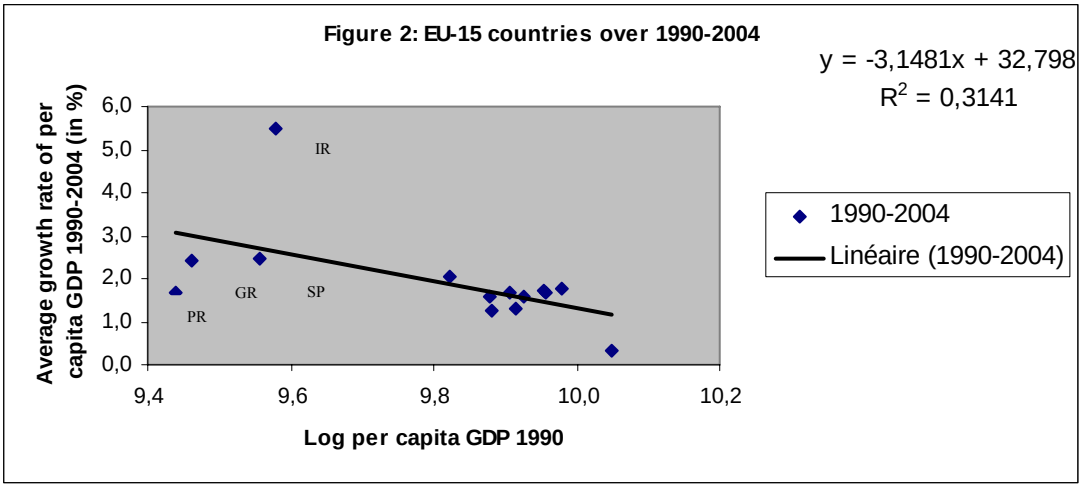
$\beta = -\left(\frac{1-(1-\lambda)^T}{T}\right)$ where β is estimated by MCO and T denotes the number of years on which the estimation is running.

In the above table, the constant term is not reported.
(***), (**) and (*) denotes statistical significance at 1 %, 5 % and 10 % levels, respectively.

Data sources: Chelem, CEPII; own estimations.

The particular position of Ireland among Cohesion countries is clearly illustrated on **Figure 2**. This figure plots the (log of) per capita GDP in 1990 for each EU-15 country against its average per capita GDP growth rate over 1990-2004. While Ireland was the richest Cohesion countries in 1990, its per capita GDP has grown to the average rate of 5.5 % per year over 1990-2004 against less than 2.5 % for the other Cohesion countries (2.4 % for Greece and Spain, 1.7 % for Portugal). The disappointing performances of Portugal were

mostly concentrated over the last few years, as evidenced in **Table 1**. Among Cohesion countries, Portugal is the sole country to experiment a decrease of its per capita GDP (comparatively to the EU-15 or EU-25 average) since 2000. Some argue (*e.g.* Crespo et al., 2004) that, over last years, Portugal has faced to more competition, especially from the export and FDI sides, as CEECs has entered in a process of deeper integration with EU-15[7].



Mnémoniques: IR (Ireland), SP (Spain), GR (Greece), PR (Portugal).

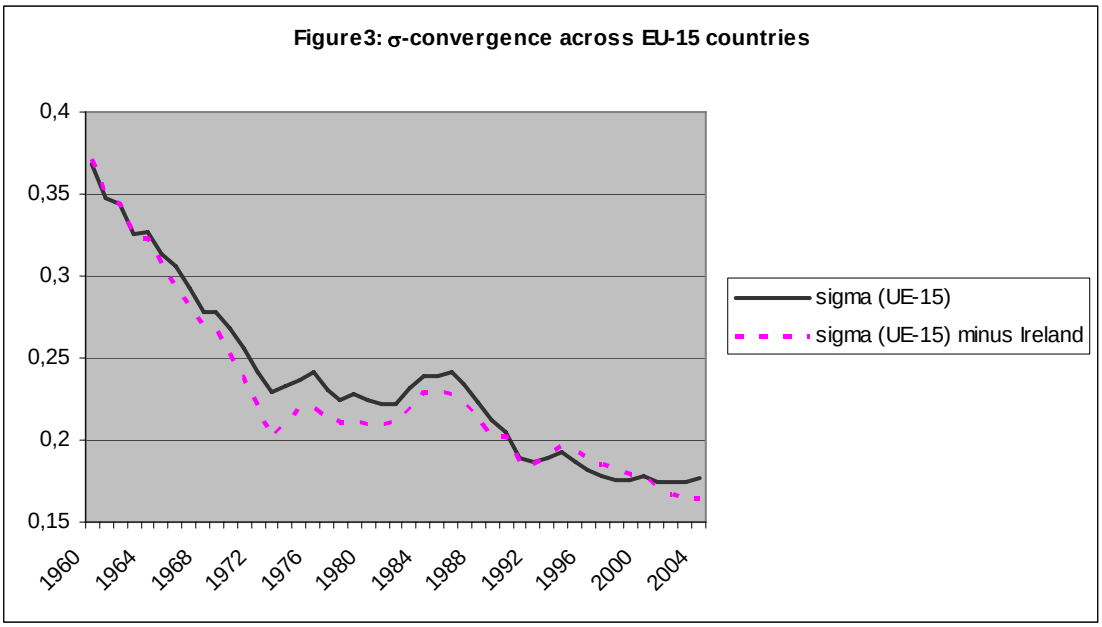
As a result of these different economic performances, the strong reduction in cross-section standard deviations of per capita GDP levels (or the so-called σ-convergence) has came to a halt in the mid-1990s, stabilizing around 0.175 since 1997 (**Figure 3**)[8]. This reflects that per capita GDP levels was getting closer together over time *only* from 1960 to mid-1990s and then ceased. Again dropping Ireland from the sample, the σ-convergence goes on its declining trend over the last decade, meaning that all EU-15 countries, but Ireland, are − presumably − converging towards a common steady state[9].

For summary, the previous results cast doubt on the fact that, for a less advanced country, joining EU means *automatically* higher speed of convergence towards the more advanced countries. In this respect, the experience of Cohesion countries is particularly clear. Moreover, recall that a 2.0 % convergence rate per year was also found on samples which do not include only European countries (Barro and Sala-I-Martin, 1991, 1992). Rather than all EU countries converge towards a common steady-state to a similar speed, we could have some convergence clubs within EU (see Fisher and Stirböck, 2004).

[7] The slowdown of GDP growth in Portugal is a source of concern, giving rise to studies aiming at understanding the causes of its poor economic performances. See among others, Drummond (2005) and Constâncio (2005). While internal factors are put forward (*i.e.* the fall in domestic demand after the credit boom due to EMU membership), external factors (*i.e.* the competition effect from CEECs) may also explained a part of the story. As documented by Crespo et al. (2004), Portuguese exports bear a strong similarity to those of CEECs. Moreover, compared to CEECs, Portugal scores quite poorly in highly educated workforce which constitutes an important factor to attract foreign investors.

[8] The existence of β-convergence is a necessary but not a sufficient condition for σ-convergence. Quah (1993) shows that negative coefficients on β are consistent with a constant cross-section distribution. Combining results of β- and σ-convergence allows us to avoid potential problems associated with Galton's fallacy.

[9] Both β- and σ-convergence assume implicitly that there is a single steady-state for all countries which may be questionable (see next section, Box 1).



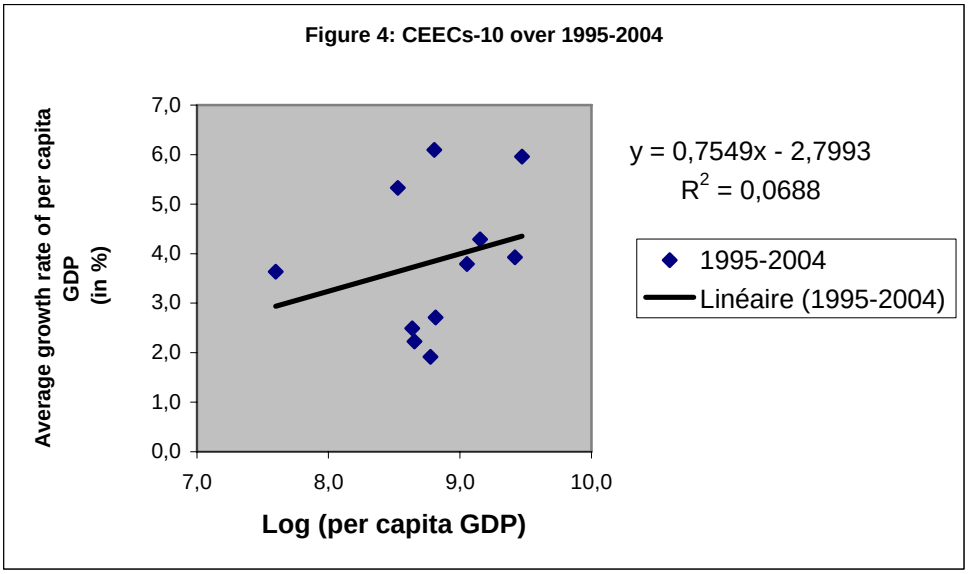
Data sources: Chelem, CEPII; own estimations.

1.2. Evidence for CEECs-10 over 1995-2004

To deal with the "transformational recession" of the first years of transition, all estimations for CEECs are now based on the 1995-2004 period. The "transformational recession" defines the fall of output in post socialist countries in the beginning of the 1990s. Altogether, the loss of traditional export markets, disruption of existing supply chains and decision-making structures, sudden trade liberalization and restrictive macroeconomic policies caused the fall in output in the first years of transition towards market economy. Then, growth resumed in almost CEECs in 1993/1994[10].

When turning to the CEECs, there is no tendency for convergence, *neither* with EU-15 countries *nor* within the CEECs' group. We have even evidence of unconditional β-divergence ($\beta > 0$) within the CEECs' group, albeit statistically insignificant (**Figure 4**). Put differently, while economic recovery gathered pace in most CEECs since 1995, the average GDP growth rates were very different across countries, some of them growing faster than others albeit their initial per capita GDP was, for instance, similar (**Table 1**). In this respect, compare the Baltic States to Bulgaria and Romania. Over the ten last years, we observe differentials of real GDP growth of at least 3 percentage points between the former and the two latter, though they were the five poorest CEECs in terms of per capita GDP in 1995 (*i.e.* less than 30 % of the average EU-25). Arguably, this divergence of per capita GDP over the last decade may be attributed to the process of transition itself and, consequently, may be seen as only a temporary phenomenon (Wagner and Hlouskova, 2002). At the same time, FDI in terms of levels as well as sectoral composition constitutes another good candidate (Havlik, 2003; Hunya, 2002). Lagging behind in terms of attractiveness of FDI or receiving FDI in sector with low potentials of growth may explain the current divergence of per capita GDP within the CEECs' group as well as within the Cohesion group.

[10] See for instance Havlik (2005) on that point.



Data sources: Chelem, CEPII; own estimations.

1.3. Domestic investment *versus* foreign investment as a key determinant of GDP convergence

According to neoclassical models (*e.g.* Solow, 1956), the investment rate is a key determinant of growth and convergence across countries [11]. Both public and private investments contribute to growth. According to Hlouskova and Wagner (2002), an increase of 1 % point of investment in GDP accounts for an increase of 0.04 % point of per capita GDP for EU-15 countries over 1960-1998 after controlling for other factors (population growth, initial per capita GDP etc.). But, no similar positive relation between per capita GDP growth rate and GFCF as a share of GDP holds for a sample including CEECs and Cohesion countries, as evidenced in **Figure 5.** By contrast, FDI has a positive and significant impact − at the 8 % level − on per capita GDP growth rate: a 1 % point increase of FDI inflows in GDP accounts for an increase of 0.3 % point of per capita GDP growth on a sample including CEECs and Cohesion countries **(Figure 6 and Table 3)** [12]. As FDI contributes to GFCF the extent to which it does not consist in acquisition of existing assets, we have deduced brownfield FDI (proxy by the sales of existing companies to foreign investors) from FDI inflows to obtain a measure of greenfield FDI[13]. In that case, FDI has a larger positive and significant impact − at the 3 % level − on per capita GDP growth rate: a 1 % point increase of FDI inflows in GDP accounts for an increase of 0.42 % point of per capita GDP growth **(Figure 7 and Table 3**).

It follows that by providing "fresh cash" for financing investment, FDI boosts the GDP growth of host economy. Alongside "fresh cash", FDI may also have other positive impact on

[11] See Box 1 for an overview on theoretical developments of growth and convergence literature.

[12] Malta and Cyprus which are other lagging behind EU-25 countries in terms of per capita GDP are excluded from our sample, as some of their FDI are off-shore activities.

[13] Greenfield FDI defines a newly created unit of production in a host economy by a foreign investor while brownfield FDI consists in the acquisition of an existing unit of production. Due to privatisation process of state-owned enterprises, brownfield FDI accounted for sizeable amount of total FDI inflows in CEECs. Nevertheless, using our measure based on sales of enterprises to foreign investors, the share of brownfield investment in CEECs stands between 18 % (Estonia and Lithuania) and 55 % (Bulgaria) in average over 1995-2004, with large differences across years related to the timing of privatisation. These figures are quite small, with respect to the widespread view that brownfield FDI are predominant in CEECs. Comparatively to the 1995-1999 period, the share of greenfield FDI has increased in Bulgaria, Romania and to a lesser extent in Estonia to reach respectively 60 %, 75 % and 90 % in Estonia over 2000-2004.

host economy even when FDI takes the form of brownfield investment. Multinational corporations (MNCs) adopt generally more up-to-date technologies than domestic firms[14]. Then, technological spillovers may occur from foreign firms to domestic ones operating within the same sector through imitation of productive process, products, management. Other positive externalities arise from forward/backward linkages (*i.e.* between user and customer firms) or through labour turnover from firms under foreign control to those under domestic control. At the same time, negative effects (*e.g.* market stealing) cannot be excluded.

BOX 1 − Key theoretical developments on growth and convergence literature: from neoclassical to "new growth" determinants

The theoretical literature on growth and convergence across countries evolved considerably in the 1980s and again in the 1990s. A key explanatory factor for that is the empirical observation that *very low* income countries never appear to converge towards the *high* income countries, while only *middle* income countries succeed in catching-up *high* income countries (see references in Ben-David, 1995). Such an empirical finding in the 1980s began to raise doubts about the plausibility of global convergence altogether, as resulting from neoclassical models(1). This was followed by a large number of "new growth" models that endogenized technological progress and predicted very different outcomes concerning the behaviour of income differentials over time. Especially, in the 1980s, emphasis was put on the importance of technological spillovers across countries as a key explanation of convergence across countries and, in the 1990s, on the necessary conditions to absorb those spillovers. In what follows, we present briefly the theoretical developments from neoclassical models to new growth models. By this way, we will put in a better perspective our own basic estimates and our brief overview of other empirical works.

Following the seminal work of Solow (1956), the theoretical literature on growth was typically based on neoclassical models until the 1970s. This kind of models explains growth with accumulation of labour, capital, and other production factors with diminishing returns to scale. In these models, the economy converges towards a steady state equilibrium where the level of per capita income is determined by savings and investment, depreciation, and population growth, but there is no permanent income growth. Any observed per capita income growth occurs because the economy is still converging towards its steady state, or because it is in transition from one steady state to another. The policy implications are then straightforward: increases in savings and investment as well as reductions in the population growth rate shift the economy to a higher steady state income level.

The importance of technical progress was also recognized in the neoclassical growth models (Solow, 1956, 1957), but the determinants of the technological level were not discussed in detail. Instead, technology was seen as an exogenous factor. Yet, it was clear that convergence in per capita income levels could not occur unless technologies converged as well. As already mentioned, faced to the absence of global convergence at the empirical level, growth research has therefore increasingly focused on understanding and endogenizing technical progress in the 1980s and onwards. Contrasting with neoclassical models, almost "new growth" models assume constant or increasing returns of reproductible factors as a result of knowledge accumulation. Since knowledge has generally a nature of public good in these models, all investments in knowledge creation (R&D, education, training, etc.) generate externalities that prevent diminishing returns to scale for labour and physical capital. Taking this into account, an economy may experience positive long-run growth instead of the neoclassical steady state where per capita incomes remain unchanged. *Yet, one characteristic of many such models is the prediction that countries will converge to multiple equilibria rather than to a single target.*

Depending on the economy's starting point, technical progress and growth can be based on creation of entirely new knowledge, or adaptation and transfer of existing foreign technology. Since it is less costly to learn to use existing technology than to generate new technology, less advanced countries have the potential to grow faster than the more advanced economies for any given level of investment or R&D spending. However, this potential for convergence is conditional among other things on the economy's

[14] "Technologies" must be understood here in a broad sense, including machines, process of production, management and so on.

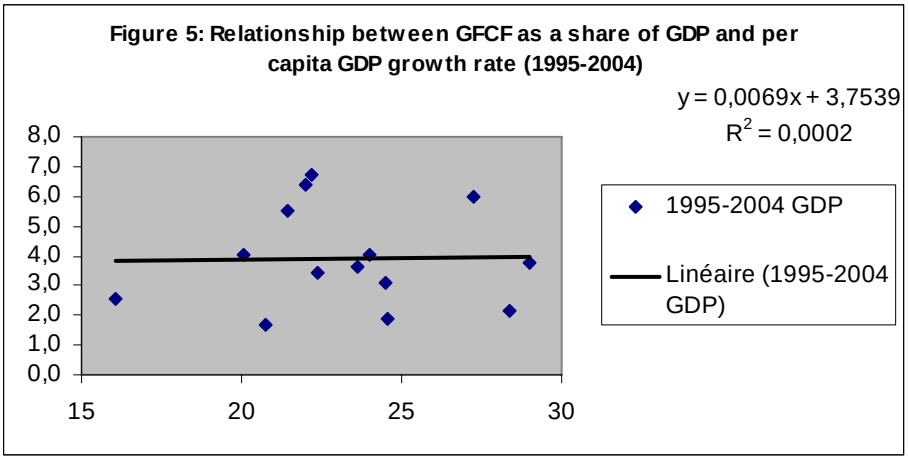
level of human capital. Consequently, improvements in education and human capital are viewed as essential for absorbing and adapting foreign technology, and to generate sustainable long-run growth.

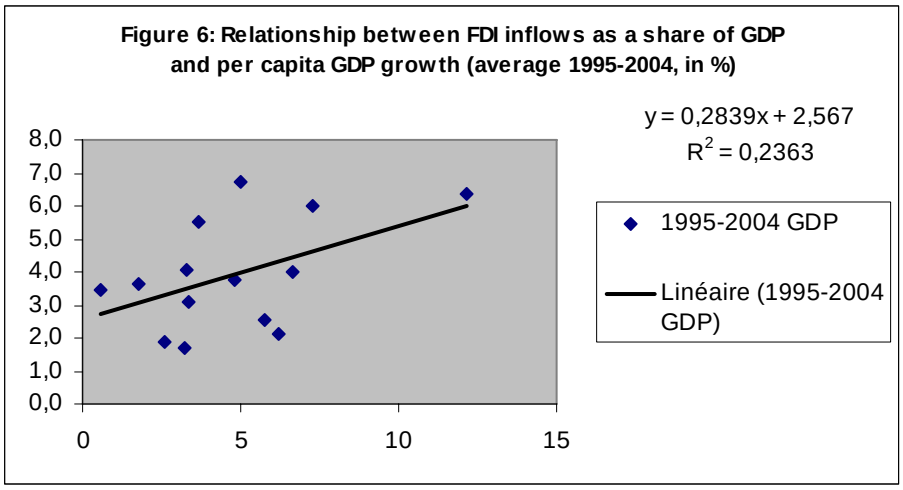
Adaptation and transfer of existing foreign technology necessitates some kind of international "openness". While exports and imports are viewed as an important vehicle for international technology transfer especially in the 1980s, FDI are increasingly judged preferable in the 1990s for a higher and faster acquisition of up-to-date foreign technology in the host economy. As put forward by Blomström and Kokko (2003), multinational corporations (MNCs) undertake a major part of the world's private R&D efforts, producing own and controlling most of the world's advanced technology. When a MNC sets up a foreign affiliate, the affiliate receives some amount of the proprietary technology that constitutes the parent's firm-specific advantage and allows it to compete successfully with local firms that have superior knowledge of local markets, consumer preferences, and business practices. Even if the establishment of a foreign affiliate is almost per definition a decision to internalize the use of core technology, this leads to a geographical diffusion of technology beyond the boundaries of the MNC. Positive technological spillovers occur for local firms within the same sector through imitation of productive process and products. Moreover, MNC technology leaks to the surrounding economy through forward and backward linkages, as MNCs provide training and technical assistance to their local suppliers, subcontractors and customers. The labour market is another important channel for spillovers, as almost all MNCs train operatives and managers who may subsequently take employment in local firms or establish entirely new companies. By this way, FDI may be a particularly valuable source of new technology: while it introduces new ideas, it also strengthens the human capital base needed to adapt these ideas to the local market. At the same time, a minimum level of human capital is needed in the host country for allowing local firms to absorb the potential spillovers benefits while it determines also how much FDI the country can attract. Thus, it is likely that the relationship between FDI and human capital is highly non-linear and that multiple equilibria are possible (Blomström and Kokko, 2003).

Alongside "human capabilities", "financial capacities" of the host economy are another key determinants to fully exploit the positive spillovers from FDI (Alfaro and al., 2003). A low level of financial development in the host economy acts as an impediment to start a new business, to externally finance the adoption of up-to-date technologies etc.

Note: [(1)] In the previous section, none EU-15 incumbent belongs to the group of low income countries. As a result, we find evidence of β-convergence or, put differently, of "localized" convergence.

Figure 5: Relationship between GFCF as a share of GDP and per capita GDP growth rate (1995-2004)





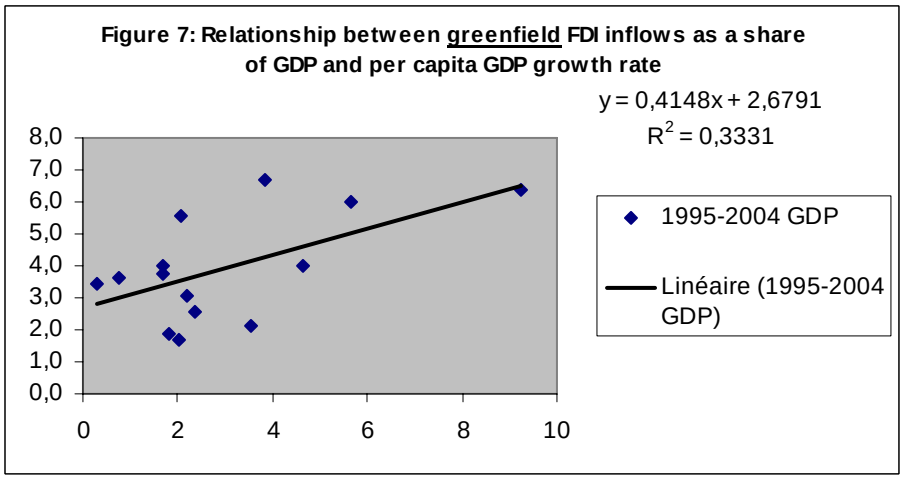


Table 3: Summary of basic estimates for Figures 5-7

Independent variables	**Coefficient b (t- stat)**	**Constant (t-stat)**	**R^2**
GFCF in % of GDP	**0.007** (0.04)	**3.754** (1.14)	**0.000**
FDI inflows in % of GDP	**0.284*** (1.92)	**2.567***** (3.178)	**0.236**
Greenfield FDI inflows in % of GDP	**0.414**** (2.44)	**2.679***** (4.25)	**0.333**

In all estimates, the dependent variable is the average per capita GDP growth of the country over 1995-2004. Independent variables, also taken in average over the period, are reported in the first column left hand side and tested one by one. Formally, we estimate the following equation using simple Ordinary Least Squares (OLS):

$ln\left(y_t / y_{t_0}\right) = bX_t + C$

where $ln\left(y_t / y_{t_0}\right)$ denotes the annual average per capita GDP growth rate over t_0 and t years and, X_t, the annual average of independent variable over t_0 and t years. C is a constant term.
The country sample includes the CEECs-10 and the Cohesion countries.

(***), (**) and (*) denotes statistical significance at 1 %, 5 % and 10 % levels, respectively.

Data sources: Chelem, CEPII; OECD; Cnuced; Eurostat; own estimations.

2. A comparative overview of CEECs and Cohesion countries

2.1. Preliminary remarks

Due to data limitations at the sectoral level, most of this descriptive part is based on four CEECs (hereafter, CEECs-4), namely the Czech republic, Hungary, Poland and Slovakia, which account together for more than 90 % of new EU members absolute GDP and also 86 % of new EU inhabitants (Table A1 in the Appendix). They are compared to Cohesion countries, with a particular focus on Ireland *versus* Portugal[15].

2.2. Productivity: how do they stand?

Main stylised facts are as follows.

First, *the CEECs as a whole are very lagging behind the average EU-15 in terms of labour productivity.* Measured at PPPs, the average level of labour productivity at the macro-level reached just 52 % of the EU-15 average (Havlik, 2005). Thus, *a worker in CEECs produces roughly half of goods and services produced by a EU-15 worker.*

Compared to Ireland, the differentials of labour productivity at the macro-level are even larger (**Table 4**). The GDP per hour worked stands between 27 % (in Latvia) and 53 % (in Slovenia) of the Irish one. As soon as we consider the CEECs-4, their GDP per hour worked do not exceed 46 % when Ireland is taken as a comparator. These figures put CEECs far away from Spain (79 % of GDP per hour worked with respect to Ireland) while, compared to Cohesion countries, their labour productivity gap is the lowest with respect to Portugal. Considering the CEECs-4, their GDP per hour worked stands between 77 % (in Poland) and 91 % (in Hungary) of the Portuguese, as reported in **Table 4**.

Table 4: GDP per hour worked (2003)

	UE-15 = 100	Irlande = 100	Portugal = 100
Czech republic	47	40	80
Estonia	36	31	62
Latvia	31	27	54
Lithuania	39	34	67
Hungary	53	46	91
Poland	44	39	77
Slovenia	61	53	104
Slovakia	52	45	89
Greece	69	60	118
Spain	90	79	156
Ireland	115	100	199
Portugal	58	50	100

Source: Eurostat, except for Hungary (OECD).

[15] A comparison with Portugal rather than Greece as the less advanced among Cohesion countries has a twofold motivation. First, growth marked the pace in Portugal over the last few years as previously mentioned. Second, very large tourism activities in Greece do not make that country a good comparator for CEECs, as soon as we are interested in issues of catching up.

Second, *differentials of labour productivity per worker are much more pronounced in manufacturing sectors than in market services sectors* **(Table 4)**[16]. In 2002, manufacturing labour productivity of CEECs-4 as well as of Portugal does not reach 25 % of the Irish one. Correspondent figures are respectively around 30 and 40 % for Greece and Spain. The Irish lead in manufacturing sector contributes largely to its lead at the macro-level, especially with respect to Spain and Greece. Indeed, Ireland is no longer a leader in terms of market services labour productivity with respect tothese two countries. Compared to remaining countries, Ireland appears still as a leader in market services sector, but at a lesser extent than in manufacturing sectors: market services labour productivity stands between 60 % (in the Czech republic) and near 74 % (in Portugal) of the Irish one.

Table 5: Labour productivity by sectors in CEECs-4 and Cohesion countries
(2002, Ireland = 100)

		Of which:			
	Total market economy*	Manufacturing	Construction	Market services**	**Total****
Poland	33	20	61	63	38
Czceh republic	45	21	46	59	46
Slovakia	46	21	50	67	47
Hungary	47	23	51	69	51
Ireland	100	100	100	100	100
Spain	80	40	92	113	83
Portugal	48	24	55	74	54
Greece	67	29	104	104	74

2002, Ireland =100, value added at current prices and PPPs per person employed.
* Including Agriculture, hunting, forestry & fishing; Electricity, gas & water.
**Market services: Exclusion of community, social and personal services.
*** Including Commnunity, social and personal services.
Source : STAN database; own computations.

Third, *Poland has a clear lag over other CEECs-4 in terms of labour productivity*. Its VA per worker at the level of total market economy reaches only 33 % of the one of Ireland against between 45 and 47 % for Hungary, Slovakia and the Czech republic **(Table 5)** [17]. Considering very broad sectors, Poland appears as a leader in only construction compared to other CEECs-4.

Focusing on manufacturing sectors as in **Table 6**, the lags of Poland with respect to other CEECs-4 tend to be concentrated in sectors of medium/high technology, generally intensive in capital and/or skilled labour and/or R&D (as transport equipment, chemical, machinery). Its leads are rather in sectors of low technology and unskilled labour (as wood, pulp and paper products). Lags of Poland − and also its leads − are in general the greater with respect to Hungary, and to a lesser extent, with respect to Slovakia. Note that Poland tends to be lagging behind the Czech republic also in sectors intensive in unskilled labour (as food and textile

[16] Computations of productivity based on hour worked constitute a better measure than those per worker. Unfortunately, data of hour worked are not available at the sectoral level. Moreover, we are aware that productivity in sector of services gives rise to huge difficulties. Problems arise especially from the difficulty to evaluate production in those sectors. See Appendix: Description on the STAN database.

[17] We consider here only the market economy to drop differentials of productivity across countries due to differences of public sector size. Since efficiency in public services is not a goal *per se*, considering community and social services may then result in a wrong picture of differential of productivity across countries.

products). Compared to other CEECs-4, Poland exhibits thus disappointing labour productivities in almost manufacturing sectors. The sole exception is in the sector of electric and optical equipment. Similar remarks hold also with respect to Portugal. Poland is a leader with respect to Portugal in only electric and optical equipment − and, to a lesser extent in pulp and paper products − while its highest lag is found in transport equipment, as with respect to Hungary, the Czech republic and Slovakia.

As a general feature, Hungary shows strong leads in sectors of medium/high technology (especially, transport equipment but also machinery, electrical and optical equipment) as well as petroleum products. By contrast, all the lags of Hungary are concentrated in sectors of low technology, intensive in unskilled labour. Hungarian leads and lags are found large with respect to other CEECs-4 and as well as Portugal. The sole exception is the sector of machinery where Hungary is lagging behind Portugal.

The Czech republic is a leader in sector of low technology with respect Poland and Hungary (as already mentioned) but also with respect Slovakia. Especially, the Czech republic shows higher productivity in food, textiles, leather and recycling (compared to other CEECs-4) as well as in wood and pulp products (compared to Hungary and Poland). Non negligible leads are also found for the Czech republic in sector of medium/high technology (*i.e*. in machinery, electrical and optical equipment with respect Slovakia; in transport with respect Poland; in chemicals, with respect Hungary). However, the Czech republic is better characterised by leads in sectors of low technology, as soon as comparator countries are the other CEECs-4. Note also that, in low technology sector, the Czech republic is more advanced than other CEECs-4 in terms of productivity catching up towards Portugal. The latter is even lagging behind the Czech republic in food products.

As well-known and documented, the major lead of Slovakia is in transport equipment, but with respect Hungary. To the great exception of this sector, Slovakia exhibits only few leads with respect other CEECs-4 and Portugal. Its manufacturing sector would be very lagging behind the one of other CEECs-4 in terms of labour productivity while it accounts for a large share of total gross output (see next section). That means that services sector would be the main source of per capita GDP growth in Slovakia, as evidenced by the Slovak lead over other CEECs-4 in financial intermediation or transport and telecommunications.

Finally, Portugal is a leader in almost sectors with respect CEECs-4, and its leads tend to be the highest in sectors of low technology. That puts potentially Portugal on a different growth path than CEECs-4, since these sectors have low potentials for productivity growth. The Hungarian manufacturing sector is mainly oriented towards medium/high technology sectors (*e.g*. transport equipment, electrical and optical equipment) in which high productivity growth may be expected. The Czech republic is currently closing the productivity gap with Portugal in sectors of low technology while developing some sectors of medium/high technology. At present, Poland shows a higher labour productivity in electrical and optical sectors than other CEECs-4 as well as Portugal. The Slovak case is more puzzling due to the absence of leads in manufacturing sector contrasting with the presence of leads in services sectors.

Fourth, as reported in **Table 7**, the labour productivity growth was higher in CEECs-4 than in Portugal over 1995-2000[18]. Labour productivity growth stood between 4.2 % (in Hungary) and 6.8 % (in Poland) for the CEECs-4 against 3.2 % for Portugal in the manufacturing sector. Labour productivity improvements were particularly strong in sectors like transport equipment with an average of 10 % per year for Poland, Hungary and Portugal

[18] 2000 year is the latest year for which sectoral data are available for Poland.

and, even 22 % and 27.5 % for respectively the Czech republic and Slovakia. In other sectors of medium/high technology where either all or some CEECs-4 have shown large labour productivity growth (chemicals, machinery, electronical and optical equipment), it is worth nothing that Portugal have reported negative growth rate of productivity (in chemicals and, especially, in electrical and optical equipment). No similar development was observed in Greece and Spain while Irish labour productivity have decreased in machinery and equipment and, especially, in rubber and plastics products over 1995-2002. These decreases were largely compensated by labour productivity improvements in other sectors, particularly in the sector of chemicals which contributes largely to the economic performances of the "Celtic Tiger"[19].

[19] See Barry (2003) for the Irish economic development over the last three decades. Interestingly, chemicals already displayed a revealed comparative advantage at the time of EU entry *(i.e.* in 1973), as a result of a favourable law on foreign ownership of companies and a zero tax rate on profits derived from manufactured exports implemented in the 1960s.

Table 5: Manufacturing and market services labour productivity by industries in CEECs-4 and Cohesion countries

(2002, Ireland = 100)

	Poland*	Hungary	Czech rep.	Slovakia**	Portugal	Greece	Spain	Ireland	Technological, factor and knowledge intensity	
	Total manufacturing								Technology	Factor(s)
Food products, Beverages & Tobacco	34	29	30	28	36	37	50	100	Low	Labour
Textiles & Textile products	49	43	55	38	74	92	108	100	Low	Labour
Leather & Footwear	51	20	32	68	48	63	59	100	Low	Labour
Wood & Wood Products & Cork	67	32	42	54	63	44	66	100	Low	Labour
Pulp, Paper, Paper Products, Printing & Publishing	29	28	29	37	45	38	46	100	Low	Labour
Coke, Petroleum products & Nuclear fuel	..	..	..	..	..	..	..	..	Medium/low	
Chemicals &Chemical products	10	11	11	11	9	11	16	100	Medium/high	R&D
Rubber & Plastics Products	82	71	63	75	77	97	147	100	Medium/low	labour
Other non-metallic mineral products	52	73	55	53	75	115	110	100	Medium/low	
Basic metals & Fabricated Metal products	71	61	75	82	73	96	137	100	Medium/low	Labour
Machinery & Equipment NEC	57	74	61	50	73	64	121	100	Medium/high	
Electrical & Optical equipment	31	32	26	20	31	52	59	100	Medium/high tech	R&D
Transport equipment	69	148	121	122	157	167	168	100	Medium/high	R&D/capital
Manufacturing N.E.C; Recycling	36	33	43	43	52	63	74	100	Low	
	Services								Knowledge intensity	
Wholesale & Retail trade	91	60	57	59	71	93	87	100	Low	
Restaurants & Hotels	79	57	67	49	69	187	245	100	Low	
Transport & Storage & Communication	50	60	80	80	127	111	141	100	Low/medium	
Financial intermediation	41	78	71	74	118	129	162	100	Medium/high	
Real estate & Business services	48	79	40	48	53	97	83	100	Medium/high	

* 2000;**2001; 2002 for other countries.

Technological classification of manufacturing industries is based on the Eurostat/OECD classification.

Knowledge classification of market services is based on Eurostat classification.

Source : STAN database; own computations.

Table 6: Leads/lags between CEECs-4 and Portugal

	Leads if positive sign (lags if negative sign) in %*									
Leader (or lagger) country	Poland				Hungary					
Reference country	Hungary	Czech rep.	Slovakia	Portugal	Poland	Czech rep.	Slovakia	Portugal	Technology, factor and knowledge intensity	
	Total manufacturing								Technology	Factor(s)
Food products, Beverages & Tobacco	7%	-26%	-24%	-22%	-7%	-31%	-29%	-27%	Low	Labour
Textiles & Textile products	15%	-15%	9%	-29%	-13%	-26%	-5%	-38%	Low	Labour
Leather & Footwear	41%	-3%	6%	-39%	-29%	-31%	-24%	-57%	Low	Labour
Wood & Wood Products & Cork	50%	21%	59%	-17%	-33%	-19%	6%	-45%	Low	Labour
Pulp, Paper, Paper Products, Printing & Publishing	24%	0%	29%	-37%	-20%	-20%	3%	-50%	Low	Labour
Coke, Petroleum products & Nuclear fuel	-61%	17%	-16%	-54%	158%	201%	117%	17%	Medium/low	
Chemicals &Chemical products	-11%	-27%	-5%	-26%	12%	-18%	6%	-17%	Medium/high	R&D
Rubber & Plastics Products	26%	-3%	-11%	2%	-20%	-23%	-29%	-19%	Medium/low	labour
Other non-metallic mineral products	-24%	-21%	13%	-29%	32%	3%	49%	-6%	Medium/low	
Basic metals & Fabricated Metal products	-3%	1%	13%	-1%	3%	5%	17%	3%	Medium/low	Labour
Machinery & Equipment NEC	-14%	-7%	59%	-26%	17%	9%	86%	-14%	Medium/high	
Electrical & Optical equipment	-2%	25%	112%	13%	2%	28%	118%	16%	Medium/high tech	*R&D*
Transport equipment	-60%	-38%	-53%	-50%	152%	56%	19%	27%	Medium/high	R&D/capital
Manufacturing N.E.C; Recycling	50%	-6%	15%	-16%	-33%	-37%	-24%	-44%	Low	
	Services								Knowledge intensity	
Wholesale & Retail trade	57%	30%	22%	9%	-36%	-17%	-22%	-30%	Low	
Restaurants & Hotels	43%	11%	18%	8%	-30%	-23%	-18%	-25%	Low	
Transport & Storage & Communication	-1%	-22%	-15%	-56%	1%	-21%	-14%	-55%	Low/medium	
Financial intermediation	-40%	-38%	-46%	-69%	67%	3%	-10%	-49%	Medium high	
Real estate & Business services	-43%	13%	-13%	-17%	74%	97%	52%	45%	Medium/high	

*Leads (or lags) are computed as the differential of productivity between leader (or lagger) country and reference country, and expressed in % of the productivity of reference country.

Table 6: …/… (continued)

	Leads if positive sign (lags if negative sign) in %*									
Leader (or lagger) country	Czech republic				Slovakia					
Reference country	Poland	Hungary	Slovakia	Portugal	Poland	Hungary	Czech rep.	Portugal	Technology, factor and knowledge intensity	
	Total manufacturing								Technology	Factor(s)
Food products, Beverages & Tobacco	36%	46%	4%	6%	31%	40%	-4%	2%	Low	Labour
Textiles & Textile products	17%	35%	28%	-17%	-8%	6%	-22%	-35%	Low	Labour
Leather & Footwear	4%	46%	10%	-37%	-6%	32%	-9%	-43%	Low	Labour
Wood & Wood Products & Cork	-17%	24%	32%	-31%	-37%	-6%	-24%	-48%	Low	Labour
Pulp, Paper, Paper Products, Printing & Publishing	0%	25%	29%	-37%	-22%	-3%	-23%	-51%	Low	
Coke, Petroleum products & Nuclear fuel	-14%	-67%	-28%	-61%	19%	-54%	39%	-46%	Medium/low	
Chemicals &Chemical products	37%	22%	30%	1%	5%	-6%	-23%	-22%	Medium/high	R&D
Rubber & Plastics Products	3%	30%	-8%	5%	12%	41%	8%	14%	Medium/low	labour
Other non-metallic mineral products	27%	-3%	44%	-9%	-12%	-33%	-31%	-37%	Medium/low	
Basic metals & Fabricated Metal products	-1%	-4%	12%	-2%	-12%	-15%	-11%	-12%	Medium/low	Labour
Machinery & Equipment NEC	8%	-8%	71%	-21%	-37%	-46%	-42%	-54%	Medium/high	
Electrical & Optical equipment	-20%	-22%	70%	-9%	-53%	-54%	-41%	-47%	Medium/high tech	*R&D*
Transport equipment	61%	-36%	-23%	-19%	111%	-16%	31%	6%	Medium/high	R&D/capital
Manufacturing N.E.C; Recycling	6%	60%	22%	-10%	-13%	31%	-18%	-26%	Low	
	Services								Knowledge intensity	
Wholesale & Retail trade	-23%	21%	-6%	-16%	-18%	28%	6%	-11%	Low	
Restaurants & Hotels	-10%	29%	6%	-2%	-15%	22%	-6%	-8%	Low	
Transport & Storage & Communication	28%	27%	9%	-43%	18%	17%	-8%	-48%	Low/medium	
Financial intermediation	62%	-3%	-13%	-50%	86%	12%	15%	-43%	Medium/high	
Real estate & Business services	-12%	-49%	-23%	-27%	14%	-34%	29%	-5%	Medium/high	

*Leads (or lags) are computed as the differential of productivity between leader (or lagger) country and reference country, and expressed in % of the productivity of reference country.

Table 7: Labour productivity growth in CEECs-4 and Cohesion countries

	Pologne	Hungary	Czech rep	Slovakia	Portugal	Greece	Spain	Ireland	Technological, factor and knowledge intensity	
Total manufacturing	**6.8**	**4.2**	**6,0**	**4.5**	**3.2**	**4,0**	**1.3**	**8.5**	Technology	Factor(s)
Food products, Beverages & Tobacco	6.7	4.3	9,0	11.1	4.5	1,0	1.2	0.6	Low	Labour
Textiles & Textile products	4.6	3.0	6.9	5.6	1.8	-0.6	0.9	6.1	Low	Labour
Leather & Footwear	6.4	-0.2	5.1	18.9	3.6	2.9	0.6	1.4	Low	Labour
Wood & Wood Products & Cork	8.8	1.4	7.7	0.6	5.5	1,0	0.9	2.2	Low	Labour
Pulp, Paper, Paper Products, Printing & Publishing	3.5	6.7	8.5	0.7	2.6	5.6	1.4	13.2	Low	Labour
Coke, Petroleum products & Nuclear fuel	11.5	-0.2	14.2	-2.2	19.8	33.4	10.3	..	Medium/low	
Chemicals &Chemical products	5.3	10.2	10.1	4.3	-0.2	0.5	1.9	15.5	Medium/high	R&D
Rubber & Plastics Products	2.9	3.3	15.0	9.1	1.4	2.3	0.9	-2.7	Medium/low	Labour
Other non-metallic mineral products	10.4	4.1	8.5	7.6	2.6	9.9	1.5	3.7	Medium/low	
Basic metals & Fabricated Metal products	4,0	1.8	-0.4	1.1	2.2	6.3	0.4	1.9	Medium/low	Labour
Machinery & Equipment NEC	7.5	9.6	4.3	3.1	4.9	4,0	1.9	-0.9	Medium/high	
Electrical & Optical equipment	9.7	6.2	9,0	7.5	-1.9	5.8	1.1	4.8	Medium/high	R&D
Transport equipment	10.0	9.5	21.7	27.5	10.5	7.5	1.5	7.5	Medium/high	R&D/capital
Manufacturing N.E.C; Recycling	5.5	-0.4	4.3	7.7	4.4	2.8	2.8	3.4	Low	Labour

Source: STAN database, own computations using current value added and PPPs per person employed.

2.3. Industrialisation *versus* tertiarisation process

As soon as productive structures are measured by production data rather than employment data, CEECs-4 and Cohesion countries as well as other EU-15 exhibits a common trend of "de-agrarianization", meaning that the importance of agriculture in the economy declines over the time **(Table 8)**[20]. Currently, in our country sample, the share of primary sector in total value added (VA) stands between 3 % (in Ireland) and 7 % (in Greece) while the EU-15 average is 2 %. That puts CEECs-4 not to far from the EU-15 average, contrasting with two-digits figures of early 1990s in Hungary, Poland and the Czech republic as a leg of the socialist period. The size of agriculture was always limited in Slovakia, even under the regime of planned economy. More than other former socialist countries, Slovakia was strongly specialized in heavy manufacturing. Consequently, with the fall of Berlin wall and the transition towards market economy, CEECs entered in a "de-industrialization" process until 1995, except Slovakia in which the share of manufacturing in total economy measured by either VA or gross output increased. Concomitantly, CEECs entered in a "tertiarization" process due to the necessity to provide all services that play an important role in market economy[21]. As a general feature, business sector services show an increasing trend in CEECs throughout the period.

However, it is worth noting that countries like *the Czech republic and Hungary are also embarking in a process of "re-industrialisation" since 1995*, particularly perceptible if we look at the share of manufacturing in gross output. By contrast, *a process of tertiarization would better describe Poland*, as evidenced by the growing importance of services in total economy and the fall of manufacturing in either VA or gross output. As a result, manufacturing sector accounts currently for 18 % of VA − and 29 % of gross output − in Poland which are very similar to figures found for Portugal (17 % and 28 % respectively). By contrast, Hungary and the Czech republic are reporting a higher degree of industrialisation than both Poland, Portugal, Greece and Spain. Finally, *the Czech republic, Hungary and to a lesser extent, Slovakia, appear close to Ireland rather than to Portugal in terms of the importance of manufacturing sector in total economy*, as evidenced in **Table 8**. Currently, the share of manufacturing accounts for 31 % of VA in Ireland, 26 % in the Czech republic and 22 % in Hungary. It is worth mentioning that a similar path of "re-industrialisation" is observed for Ireland since early 1990s, contrasting in this respect with all other EU-15 countries. Some argue (*e.g*. Havlik, 2005) that Slovakia may also follow a process of "re-industrialisation" in the very future while others (*e.g*. IMF, 2005) detect already signs of such "re-industrialisation" towards light industry. That would divide the enlarged EU in two country groups: one group with an industrialized economy growing fast as soon as industrialization occurs in sectors with high potentials of productivity growth; and another group with a tertiarised economy growing slowly due to a low potential for productivity growth in almost services.

[20] When measured by employment data, the share of agriculture sector shows a increasing trend in Poland and Romania throughout the period.

[21] Under the previous regime, industry was emphasized at the expense of services which were considered as "unproductive labour". Anyway, many modern services were simply not needed under socialism.

Table 8: Sectoral composition of the economy in four CEECs and Cohesion countries
(in % of VA and total gross output)

Country	Sectors	Share in VA			Share in gross output		
		1991	1995	2003	1991	1995	2003
Czech republic	**Primary sector**	9	7	4	10	6	3
	Manufacturing	26	23	**26**	42	35	**39**
	Electricity and construction	16	14	11	17	17	14
	Services	50	55	59	32	41	43
	of which Business sector services	36	40	43	24	31	33
	Total	100	100	100	100	100	100
Hungary	**Primary sector**	12	7	4	13	9	5
	Manufacturing	21	23	**22**	35	33	**39**
	Electricity and construction	9	8	8	11	9	9
	Services	57	62	66	41	49	47
	of which Business sector services	39	42	42	29	34	33
	Total	100	100	100	100	100	100
Slovakia*	**Primary sector**	7	7	5	8	7	5
	Manufacturing	20	27	**21**	33	38	**35**
	Electricity and construction	14	10	10	16	14	14
	Services	59	56	64	42	42	46
	of which Business sector services	43	42	46	31	32	35
	Total	100	100	100	100	100	100
Poland**	**Primary sector**	10	11	5	12	11	6
	Manufacturing	27	23	**18**	32	34	**29**
	Electricity and construction	12	11	11	13	12	12
	Services	51	56	66	43	43	53
	of which Business sector services	27	36	46	27	30	40
	Total	100	100	100	100	100	100
Spain	**Primary sector**	6	5	4	..	5	4
	Manufacturing	20	19	**16**	..	32	32
	Electricity and construction	12	10	12	..	12	12
	Services	62	66	68	..	51	51
	of which Business sector services	43	45	48	..	36	37
	Total	100	100	100	100	100	100
Portugal	**Primary sector**	*7*	*5*	*4*	*5*	*4*	*3*
	Manufacturing	20	20	**17**	35	33	**28**
	Electricity and construction	9	10	9	12	13	13
	Services	64	65	70	48	50	56
	of which Business sector services	44	42	43	34	35	38
	Total	100	100	100	100	100	100
Ireland	**Primary sector**	9	8	3	..	..	..
	Manufacturing	27	30	**31**	..	..	..
	Electricity and construction	8	7	9	..	..	..
	Services	56	54	56	..	..	..
	of which Business sector services	36	34	39	..	..	..
	Total	100	100	100	..	..	..
Greece	**Primary sector**	12	10	7	..	9	6
	Manufacturing	15	13	**11**	..	24	**20**
	Electricity and construction	10	9	10	..	10	12
	Services	63	68	71	..	57	61
	of which Business sector services	45	48	50	..	41	44
	Total	100	100	100	..	100	100

*For Slovakia, 1993 instead 1991. ** For Poland, 1992 and 2002, instead of, respectively,1991 and 2003.
Source : STAN database, own computations.

2.4. FDI

2.4.1. How sizable they are for the host economies?

As formerly socialist economies, CEECs opened only recently to foreign investors. Almost began to liberalize their long term capital flows around 1995, except Hungary and Slovenia. Hungary opened up its economy to foreign investors ahead while Slovenia maintained until few years ago restrictions on FDI. Ireland followed a FDI-friendly policy as soon as the 1960s[22] while FDI inflows became perceptible in Spain and Portugal with EU membership in mid-1980s. However, even in Cohesion countries, the bulk of FDI inflows was made over the fifteen last years in the context of worldwide FDI.

CEECs and Cohesion countries have received individually very different amounts of FDI over the last decade, as evidenced by the share of inward stock in GDP or per capita (**Table 9**). Considering the CEECs, the inward stock of FDI to GDP stands between 15 % (for Slovenia) and 85 % (for Estonia) in 2004, with an average of 36 % for the group. Within the CEECs-4, it is worth noting the corresponding figures are respectively 60 % and 52.5 % for Hungary and the Czech republic contrasting with those of 35 % and 25 % for respectively Slovakia and Poland.

For a long time, due to an earlier liberalization, Hungary concentrated large amounts of FDI directed towards CEECs, both in terms of GDP and per capita. Then, in the corner of the new millennium, Estonia became "first" among the CEECs' group, going on attracting FDI in a sustained way since. Over the last years, some countries which were lagging behind in terms of FDI has experienced a boom in their inflows. Especially, FDI is better characterised as a recent phenomenon in countries like Romania, Bulgaria and Slovakia. These three latter countries received together 25 % of FDI inflows directed towards CEECs over 2000-2004, against 12 % over 1995-1999. In 2004, Slovenia remains a clear outlier, as a result of its FDI-aversive policy in the 1990s.

Despite the entry of CEECs as host countries of FDI, Cohesion countries continued to attract FDI, even if a "diverting effect" cannot be excluded when comparing FDI over 1995-1999 versus 2000-2004 (**Table 9**). In fact, during the worldwide boom of FDI, beginning in 1995 for dying out in 2000, Cohesion countries received less FDI relative to CEECs than during the more recent period of slowdown in FDI. Particularly astonishing was FDI made in Ireland over the ten last years, such as currently, the FDI inward stock accounts for 125 % of its GDP. Only Greece did not succeed in attracting large amount of FDI. In 2004, inward stock represented only 13 % of its GDP which constitutes the lowest figure in our sample. Corresponding figures are respectively 33 % and 37 % for Spain and Portugal. That puts roughly Slovakia in the same rank than Spain and Portugal, but Poland behind these two Cohesion countries by 10 percent points[23]. By contrast, the Czech republic and, more importantly, Hungary are well above Spain, Portugal and Slovakia, by roughly 17 and 25 percent point respectively.

[22] See Barry (2003) for instance on FDI policy in an historical perspective.

[23] Poland is also behind the EU-15 average by 10 percent point. In 2003, inward FDI stock amounted to 33 % in the EU-15.

Table 9: FDI in CEECs and Cohesion countries

	FDI inward stock						*FDI inflows (cumul over the period)*		
	Per capita			in % of GDP			in % of CEECs' FDI inflows		
	1995	2000	2003	1995	2000	2004	1995-2004	1995-1999	2000-2004
Greece	1120	1266	2452	9	12	13	5	5	4
Ireland	13984	34701	56191	73	134	124	72	44	92
Portugal	1964	3315	6246	18	27	37	17	11	21
Spain	2887	4377	8129	18	28	33	117	77	146
Cyprus	472	4838	9847	4	33	53	4	3	5
Malta	2216	6499	8897	17	67	67	2	2	1
Czech Republic	830	2642	5515	13	39	52	22	20	24
Estonia	579	2329	7138	19	51	85	2	2	3
Hungary	1288	2687	5959	25	49	60	19	25	15
Latvia	380	988	1938	14	29	32	2	2	2
Lithuania	194	766	1855	6	21	28	2	3	2
Poland	297	1068	1593	6	21	24	30	35	27
Slovakia	232	895	2685	4	18	35	6	3	9
Slovenia	1038	1323	2522	10	15	15	2	1	3
Bulgaria	67	347	973	3	18	31	5	3	7
Romania	49	347	826	2	18	25	8	6	10
CEECs	..	..	..	..	26	36	100	100	100

Source : CNUCED; own computations.

2.4.2. The sectoral decomposition

FDI responds to two large motivations. They can be market-seeking (local market-oriented) or efficiency-seeking (export-oriented). Local market-oriented FDI is set up by horizontally integrated MCNs to penetrate a market, increase their market share, diversify the source of sale, and minimize competition risk. Export-oriented subsidiaries are set up by a vertically integrated MNC in a host economy with the aim to lower production costs or to seek, secure and diversify resources[24].

As evidenced from Table 6, a non negligible amount of FDI in CEECs-4, Portugal and Greece is market-driven, as the share of FDI in services sectors stands between around 47 % (in Hungary) and 76 % (in Portugal)[25]. Proxy by the ratio of manufacturing FDI to total FDI, the share of FDI export-oriented is then correspondingly the lowest in countries like Portugal − and also Slovakia − and the highest in Hungary, followed by a group made of the Czech republic, Poland and Greece. Primary sectors have received few FDI compared to other sectors.

As reported in Table 7, the inward FDI stock expressed in VA is particularly impressive in financial intermediation for all countries under study, as a result of massive foreign presence in banking sectors of those countries[26]. Figures are less impressive in manufacturing sectors, reflecting for a part, a lower foreign presence than in banking sector and for another part, low capital intensity of some manufacturing sectors.

A comparison of Tables 5, 7 and 11 shows that labour productivity levels and growth tend to be positively correlated with the share of inward FDI stock in VA. For instance, a sector with high foreign penetration like transport equipment presents also high labour productivity levels and growth. However, relationships between the three variables are more intricated than simply stated above. Compare for instance the couple Poland/Slovakia. While

[24] See Hunya and Geishecker (2005) and quoted references.

[25] Unfortunately, data on sectoral FDI are unavailable for Ireland and Spain. Researchers have recourse instead to sectoral employment in foreign firms to get insights on sectoral decomposition of FDI. See Table 12.

[26] Foreign banks account for around 90 % of total banking assets in the Czech republic, Slovakia and Greece; 70 % in Poland and Portugal; and 50 % in Hungary (ECB, 2005).

inward FDI stock accounts for 35 % of VA in Slovakia against 150 % in Poland, the levels of labour productivity in that sector is twice larger in Slovakia (and, labour productivity growth was higher in Slovakia than in Poland over 1995-2000). That means that while FDI in transport equipment has a positive impact on this sector *as a whole* in the two countries, effects of FDI *within* the sector have been different in Poland and Slovakia. *Either* Slovakian domestic-owned firms operating in this sector have been more able than the Polish ones to absorb positive spillovers due to the presence of foreign investors through imitation of productive process, backward/forward linkages etc. *And/or*, Polish firms operating in that sector were less able than the Slovakian ones to resist additional competitive pressures due to foreign presence, resulting in "market stealing", a deterioration productivity of domestic-owned firms etc. These two factors, nonexclusive one of the other, explain why a non-linear relationship may be observed between foreign penetration and growth in the host economy.

Impact of FDI on local firms is thus an empirical matter, depending on firms' characteristics as well as on sectors' characteristics, in addition to country's characteristics.

Based on micro-data of firms, a large empirical literature have been devoted to disentangle the impact of FDI according to ownership of firms. Focusing on studies based on CEECs, the following results emerge.

All empirical studies find, except for Bulgaria and Romania, that firms under foreign control are more productive than those under domestic control, even after controlling for bias selection[27] (Damijan and al., 2003). Put differently, the higher foreign ownership in CEECs, the higher productivity of the host economy. This finding, robust to different specifications, puts a country like Poland in a bad position, especially compared to Hungary, the Czech republic and Slovakia.

The impact of FDI on domestic firms depends on the absorption capabilities of countries (or of its domestic-owned firms). Put differently, productivity levels of host countries (and/or its domestic-owned firms) must not be too far from those of the home country. Otherwise, "market stealing" effect dominates, as domestically owned firms are unable to face additional competition pressures. However, "market stealing" effect is found to be very sensitive to the specification. Related to that point, positive spillovers occur for firms engaged in R&D (Kinoshita, 2000 for the Czech republic; Bosco, 2001 for Hungary). That put again countries like Poland in a bad position due to its low level of R&D.

This empirical literature shows also that trade contributes to technological transfer from abroad, explaining why Slovenia is not in a bad position in terms of productivity growth even if that country has received few FDI in the last decade compared to other CEECs (Damijan et al., 2003a, 2003b). Firms can gain significant productivity improvements from serving foreign markets, especially those of developed countries. That puts again Poland in a bad position, as regard its low degree of openness to foreign trade.

[27] "Selection bias" refers to the idea that foreign investors tend to acquire more capital intensive and more efficient firms in terms of labour productivity. For instance, using a probit model to determine the probability of foreign investment choices, Damijan and al.(2005) find that labour intensive firms are less likely to be chosen by foreign investors while more capital, more skill intensive and more export oriented firms are found to be preferred.

Table 10: FDI inward stock by main activities
(in%)

	Slovakia (2003)	Rep.tchèque (2002)	Hungary (2002)	Poland (2000)	Greece (2002)	Portugal (2000)
Primary sector	1%	1%	2%	1%	0%	1%
Agriculture & Fishing	0%	0%	1%	0%	0%	1%
Extractive Industries	1%	1%	0%	0%	0%	0%
Manufacturing industries	**28%**	**35%**	**46%**	36%	**38%**	**19%**
of which Food products, Beverages & Tobacco	4%	4%	7%	8%	16%	3%
Total textiles & wood products	1%	4%	2%	5%	2%	3%
Total coke, chemicals, rubber & plastic product	9%	6%	8%	7%	11%	4%
Total metals & fabricated metal products	13%	5%	2%	2%	5%	2%
Total electrical & optical & telecommunication equipment	4%	2%	12%	2%	1%	2%
Total transport equipment	2%	6%	11%	5%	0%	2%
Electricity, gaz and water	11%	7%	4%	3%	0%	1%
Construction	1%	2%	1%	3%	2%	1%
Services sector	**58%**	**54%**	**47%**	**57%**	**61%**	**76%**
Trade & Repairs	20%	12%	9%	17%	10%	13%
Hotels & Restaurants	1%	1%	1%	1%	4%	2%
Transports& Communication	10%	14%	8%	10%	21%	4%
of which Transports	0%	3%	0%	..	2%	0%
Telecommunications	9%	9%	7%	..	19%	3%
Financial Intermediations	22%	16%	8%	21%	21%	21%
of which Monetary intermediation	..	11%	6%	..	13%	10%
Other financial Intermediation	..	1%	0%	..	4%	10%
Insurance	3%	2%	1%	..	4%	1%
Other financial Intermediation & Insurance	3%	4%	2%	..	8%	11%
Real Estate & Business Services	5%	9%	9%	8%	2%	35%
of which Real Estate	4%	4%	4%	..	1%	4%
Other Services	1%	3%	1%	..	2%	0%
Other not classified activities	0%	0%	**1%**	**3%**	0%	3%
TOTAL	100%	100%	100%	100%	100%	100%

Source: OECD, own computations.

Table 11: Stock of inward investment
(in % of VA)

	Czech (2002)	Slovakia (2001)	Hungary (2002)	Poland (2000)	Portugal (2001)	Greece (2002)
Total	52%	30%	62%	26%	29%	38%
Agriculture & Fishing	1%	1%	17%	0%	4%	0%
Extractive Industries	54%	25%	64%	3% ¨		6%
Manufacturig industries	**73%**	**42%**	**120%**	**37%**	**30%**	**96%**
of which 'Food products, Beverages & Tobacco	74%	69%	98%	54%	28%	179%
Total textiles & wood products	81%	42%	46%	24%	18%	14%
Total coke, chemicals, rubber & plastic product	113%	53%	89%	0%	71%	372%
Total metals & fabricated metal products	37%	36%	57%	7%	20%	97%
Total electrical & optical & telecommunication equipment	37%	11%	115%	87%	54%	58%
Total transport equipment	95%	35%	229%	150%	51%	4%
Electricity, Gaz & Water	83%	4%	73%	15%	9%	1%
Construction	15%	3%	10%	13%	4%	8%
Trade & Repairs	51%	47%	46%	*9%*	27%	26%
Hotels et Restaurants	27%	12%	29%	*14%*	19%	24%
Transports, Communication	64%	32%	58%	21%	17%	122%
Financial intermediation	**236%**	**192%**	**127%**	**212%**	**100%**	**351%**
Real estate & business services enterprises	35%	15%	31%	2%	81%	10%
Other services	8%	1%	2%	2%	0%	2%

Source: OECD, own computations.

Table 12: Employment of foreign-owned firms in Ireland (2000)

	In % of total employment in foreign-owned firms	In % of total employment of the sector
Food products, Beverages & Tobacco	11%	27%
Leather & Footwear & Lethar	3%	34%
Wood & Wood Products & Cork	1%	18%
Pulp & Paper Products, Printing & Publishing	6%	31%
Chemicals &Chemical products	15%	77%
Rubber & Plastics Products	3%	36%
Other non-metallic mineral products	1%	14%
Basic metals & Fabricated Metal products	29%	21%
Machinery & Equipment NEC	5%	45%
Office & Data Processing	15%	88%
Electrical machinery & apparatus	8%	62%
Radio, TV and communications	10%	85%
Medical and optical equipment	12%	85%
Transport equipment	4%	56%
Manufacturing N.E.C; Recycling	2%	26%
Total	*100%*	*48%*

Source : Barry (2004).

3. Accounting the overall labour productivity differences

To which extent the *current* productive structures are favourable to a process of convergence towards Ireland? This is an important issue, since the convergence rate across countries is found much larger in service sectors than in manufacturing ones by Nicoletti and Scarpetta (2003) over the 1980-1998 period. Bernard and Jones (1996) report even evidence of β-divergence, complemented by σ-divergence, in manufacturing sectors, robust to various measures of productivity over 1974-1992. Consequently, Bernard and Jones (1996) explain the findings of β-convergence at the macro-level (*i.e.* GDP level) by the growing share of service sectors in the total economy of OECD countries over the last decade. Focusing on manufacturing sectors, Moomaw and Yang (2004) find evidence of β-convergence as well as evidence of σ-convergence for almost manufacturing sectors over the last twenty years, similarly to Scarpetta and Nicoletti and (2003) [28]. In fact, the absence of convergence in manufacturing sectors found by Bernard and Jones (1996) might be due to the fact that their time period covers coincidently the sub-period with no convergence, as evidenced at the macro-level in **Table 2** for the EU-15 countries. Then, taken as granted the convergence of productivity in both manufacturing as well as services sector, the lower the differences of productive structures between CEECs and Ireland, the higher the prospect of an Irish catching up scenario.

In this section, we assume implicitly that most of structural changes in CEECs have already occurred, such as current productive structures are rather a good predictor of future ones[29]. The argument is that the liberalising measures contained in the European Agreements have already encouraged the deployment of subsidiaries of EU-15 multinationals in the majority of the CEECs[30]. Due to sunk costs associated with FDI, no important reversals in FDI inflows are expected. Then, no substantial changes in productive structures will occur in the future.

A simple way to answer the introductive question consists in adopting a decomposition of productive structures in the line of Nordhaus (1972).

Assume that A^u denotes the overall labour productivity level in country *u*; Y_i^u, the output in industry *i* in country *u*; L_i^u, the labour in industry *i* in country *u* and s_i^u, the share of employment in sector *i* in total employment of country *u*.

The overall labour productivity level in country *u* is then :

$$A^u = \sum_i \frac{Y_i^u}{L_i^u} s_i^u \qquad (1)$$

[28] In their basic estimates, the convergence rate across countries stands between 1.7 % (in food, beverages & tobacco) and 7.0 % (in pulp, paper and printing & publishing) with a corresponding figure of roughly 5 % for machinery & equipment as well as transport equipment.

[29] See Stephan (2002) for a similar assumption in evaluating catching up. Hunya and Geishecker (2005) argue that the bulk of FDI in CEECs already occurred.

[30] The "European Agreements" consist in a progressive trade liberalization between the signatory country and the EU. Beginning with Poland and Hungary late 1980s, all CEECs have signed such agreements around 1993/1994. At the end of the 1990s, there were no longer tariffs on industrial products (though impediments to trade in agriculture and food processing remained).

where $\frac{Y_i^u}{L_i^u}$ is the labour productivity in industry *i*, weighted by the share of employment in industry *i*.

With symmetric notations for country *k*, the difference of overall productivity level between countries *u* and *k* is given by $A^u - A^k$.

The percent point contribution of each industry *i* to the overall labour productivity gap between countries *u* and *k* is given by:

$$C_i = A_i^u - A_i^k = \frac{Y_i^u}{L_i^u} s_i^u - \frac{Y_i^k}{L_i^k} s_i^k$$

Using a Nordhaus (1972)'s decomposition, this contribution may be rewritten as:

$$C_i = \left(\frac{Y_i^u}{L_i^u} - \frac{Y_i^k}{L_i^k} \right) s_i^u - \frac{Y_i^k}{L_i^k} \left(s_i^k - s_i^u \right) \qquad (2)$$

Summing across industries, we have then:

$$A^u - A^k = \sum_i \left(\frac{Y_i^u}{L_i^u} - \frac{Y_i^k}{L_i^k} \right) s_i^u - \sum_i \frac{Y_i^k}{L_i^k} \left(s_i^k - s_i^u \right)$$

Rearranging, the difference of overall productivity level between countries *u* and *k* is :

$$A^u - A^k = \sum_i \left(\frac{Y_i^u}{L_i^u} - \frac{Y_i^k}{L_i^k} \right) s_i^u - \sum_i \left(\frac{Y_i^k}{L_i^k} - \frac{Y^k}{L^k} \right) \left(s_i^k - s_i^u \right) - \sum_i \frac{Y^k}{L^k} \left(s_i^k - s_i^u \right)$$

$$\{Total\ effect\} = \{Level\ effect\} - \{Structural\ share\ effect\} - \{Average\ share\ effect\}$$

The first sum or the "level effect" measures the impact of different labour productivity levels in a sector when the shares of that sector are assumed to be the same in the two countries.

The second sum or the "structural share effect" captures the extent to which the productivity deficit in industry *i* in country *u* is dampened (or exacerbated) by the fact of having a higher (or lower) share in industries with above average productivity levels.

The third sum is the residual "average share effect", ensuring that the total contribution of each industry is equal to that given in equation (2) above. It is not very interesting for evaluating whether the industrial structure of a country is favourable or unfavourable to productivity performances, compared to another country.

Then, following O'Mahony and de Boer (2002), an alternative consists in defining the contribution of each industry as:

$$C_i^* = \left(\frac{Y_i^u}{L_i^u} - \frac{Y_i^k}{L_i^k} \right) s_i^u - \left(\frac{Y_i^k}{L_i^k} - \frac{Y^k}{L^k} \right) \left(s_i^k - s_i^u \right)$$

Note that summing across industries, this alternative gives also $\sum_i C_i^* = A^u - A^k$.

But now, with C_i^*, we get a better measurement of the extent to which the industrial structure of a country is favourable or unfavourable to its relative productivity performance, with the two last terms right hand side encompassed within a single "share effect". Thus, an industry *i* has a lower impact on the overall productivity gap if *either* that industry presents a productivity level which is close to the one of the comparator country *or* if it accounts for a high share in industries with above average productivity, *or* both. Moreover, the lower the "share effect", the more similar the industrial structure of the two countries.

The next charts show this decomposition, comparing Ireland to four individual CEECs and the remaining Cohesion countries, using the STAN database. Appendix presents data of the decompositions by sector. In this accounting exercise, we consider only the market economy which has been decomposed in 20 sectors, of which 13 manufacturing sectors and 4 services sectors. Remaining sectors correspond to primary sector and then include agriculture.

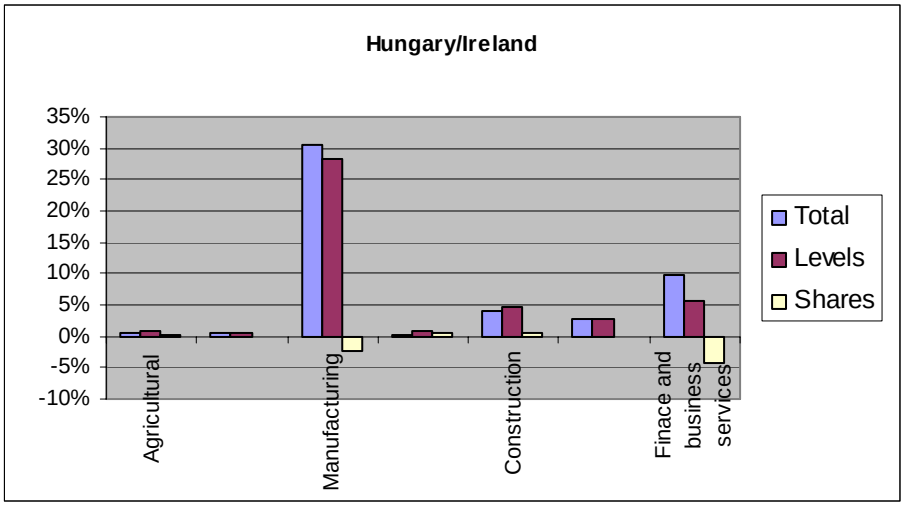
Considering Ireland as the basis country, it is worth noting the following points.

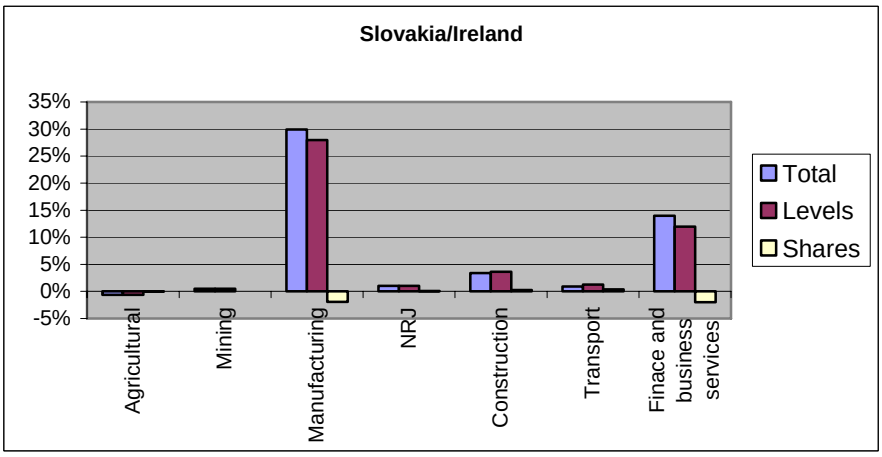
• As a general feature, manufacturing sectors explain predominantly the market economy productivity gap with respect to Ireland, followed by finance & business services sectors. For instance, manufacturing accounts for 57 % of the total Irish lead with respect to Hungary and finance & business services, for 18 % (see Tables A2 in the Annex).
In general, other sectors do not contribute largely to productivity gap with respect to Ireland. The sole notable exception is agriculture for Poland and Greece, accounting for respectively 16% and 15 % of the total Irish lead.

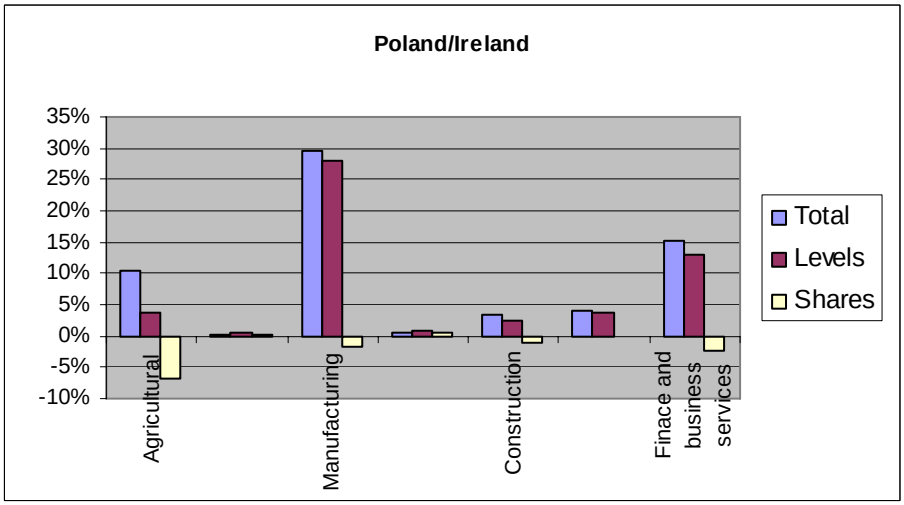
• Albeit the "share effect" is found smaller than the "level effect", the "share effect" is unevenly distributed across countries, lying between 1 % and 35 %. In this respect, countries may be classified in three groups. The first one with a "share effect" below 8 % of the "total effect" includes the Czech republic (1 %), Slovakia (4 %) and Hungary (9 %). Poland and Portugal constitutes the second group with a very close "share effect" in "total effect" of respectively 17 % and 16 %. Finally, the third group includes Spain and Greece accounting for 1/3 of the "total share".

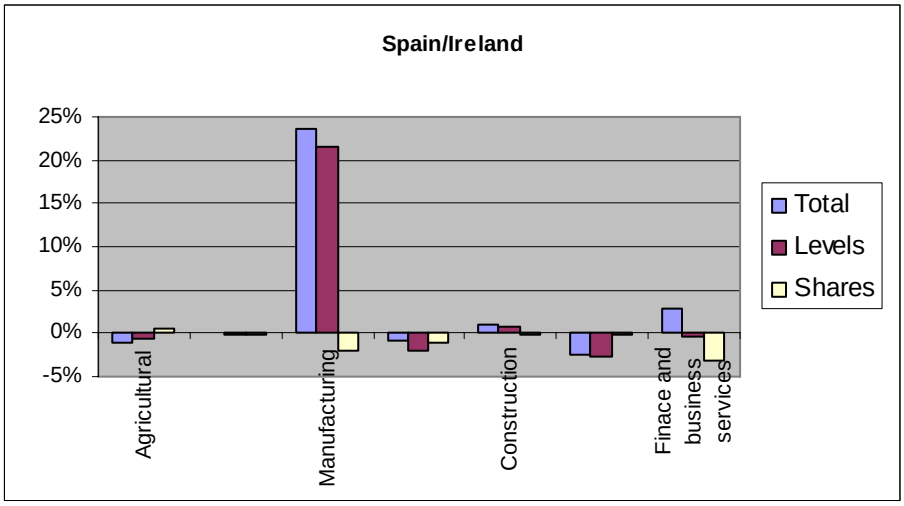
• The finance & business services sectors contribute to a non negligible extent to the "share term", especially in Spain and Greece. In these two countries, the "share term" of finance & business services sectors explain 50 % of the total "share term".

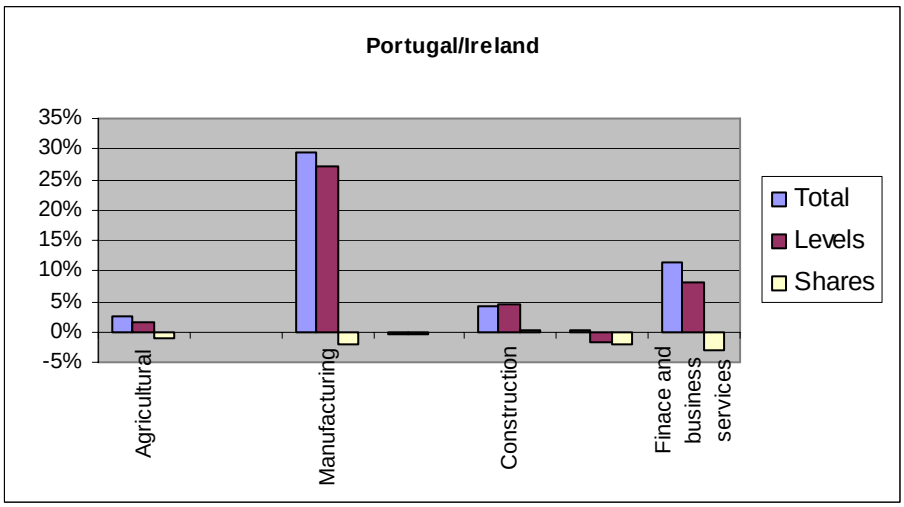
• Finally, it is worth noting that agriculture accounts for a large share of the "share term" in Poland and Greece. Combined with a higher lag in the "level term" for that sector, the total contribution of agriculture to the market economy productivity gap with respect to Ireland is then higher for Poland than for Greece. Importantly, without a so high share of employment in agriculture, Poland would not differ substantially from other CEECs-4 in terms of productive structures.

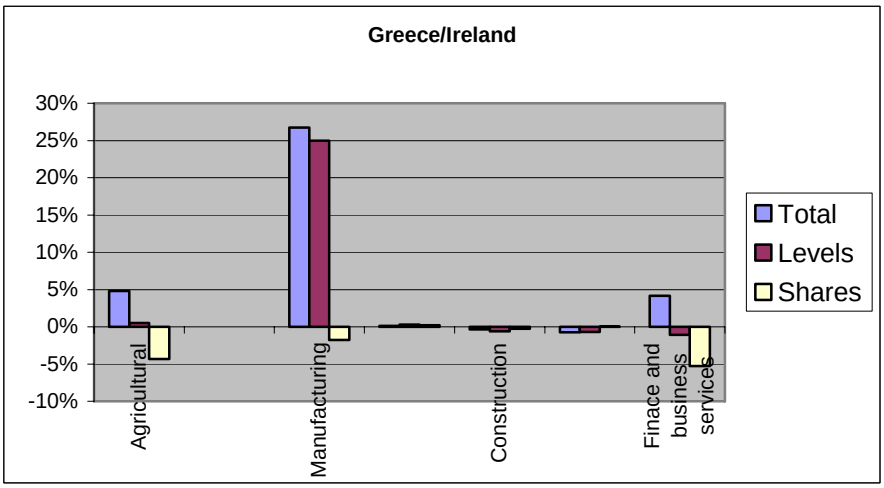

Hungary/Ireland
35%
30%
25%
20%
15%
10%
5%
0%
-5%
-10%
Agricultural
Manufacturing
Construction
Finace and business services
Total
Levels
Shares


Slovakia/Ireland
35%
30%
25%
20%
15%
10%
5%
0%
-5%
Agricultural
Mining
Manufacturing
NRJ
Construction
Transport
Finace and business services
Total
Levels
Shares


Poland/Ireland
35%
30%
25%
20%
15%
10%
5%
0%
-5%
-10%
Agricultural
Manufacturing
Construction
Finace and business services
Total
Levels
Shares


Spain/Ireland
25%
20%
15%
10%
5%
0%
-5%
Agricultural
Manufacturing
Construction
Finace and business services
Total
Levels
Shares


Portugal/Ireland
35%
30%
25%
20%
15%
10%
5%
0%
-5%
Agricultural
Manufacturing
Construction
Finace and business services
Total
Levels
Shares


Greece/Ireland
30%
25%
20%
15%
10%
5%
0%
-5%
-10%
Agricultural
Manufacturing
Construction
Finace and business services
Total
Levels
Shares

Similar decomposition can be done for manufacturing sectors according to their level of technological intensity.

The percent point contribution of each technological level *v* to the manufacturing labour productivity gap between countries *u* and *k* is given by:

$$C_v = A_v^u - A_v^k = \frac{Y_v^u}{L_v^u} s_v^u - \frac{Y_v^k}{L_v^k} s_v^k$$

or, using the alternative decomposition of O'Mahony and de Boer (2002), by:

$$C_v^* = \left(\frac{Y_v^u}{L_v^u} - \frac{Y_v^k}{L_v^k} \right) s_v^u - \left(\frac{Y_v^k}{L_v^k} - \frac{Y^k}{L^k} \right) \left(s_v^k - s_v^u \right)$$

with $\sum_v C_v^* = A_v^k - A_v^u$

The interpretation is as follows. Manufacturing industries of technological level *v* have a lower impact on the manufacturing productivity gap if *either* those industries present productivity level which is close to the one of the comparator country *or* if they account for a high share of industries with above average manufacturing productivity, *or* both. Moreover, the lower the "share effect", the more similar the technological structure of the two countries.

Due to data availability, we consider only three levels of technological intensity, namely "low", "medium/low" and "medium/high". Put differently, $v = 1, 2, 3$.

The next charts show this decomposition based on technological intensity, comparing Ireland to each CEECs-4 and remaining Cohesion countries (see also Table A3 in the appendix).

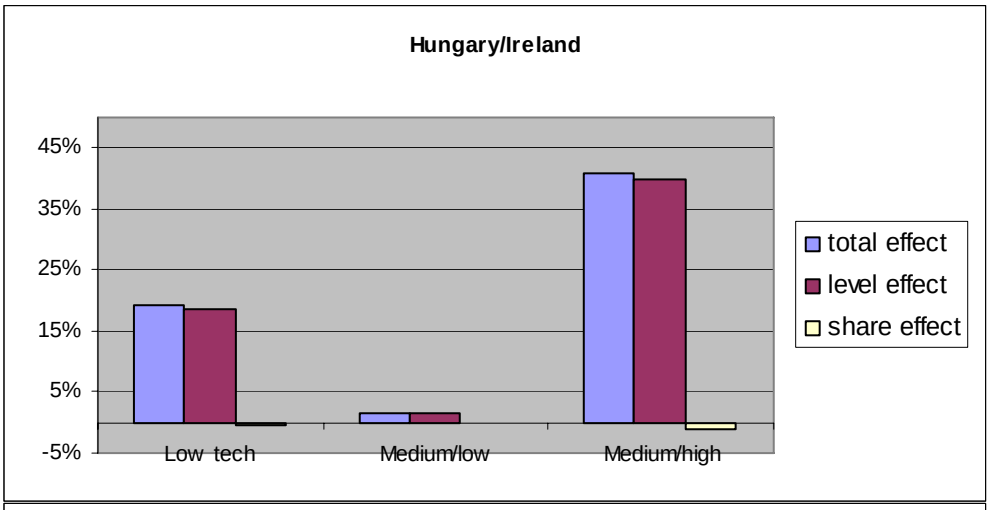
At this quite high level of aggregation, the following results emerge.

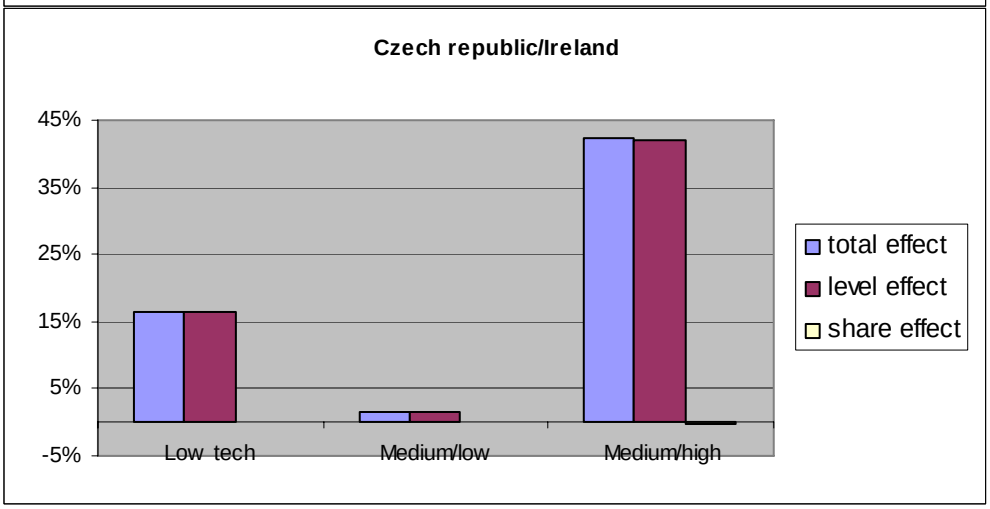
The "share effect" is found very negligible for all countries, including CEECs-4 and Cohesion countries. This is rather a surprising result, especially for manufacturing with medium/high technological intensity[31]. For the CEECs-4, the contribution of the "share term" to manufacturing productivity gap with respect to Ireland in medium/high technological intensity industries stands between 0 % (Slovakia and the Czech republic) and 2 % (Hungary). For other Cohesion countries, the correspondent figure is found the highest for Spain (4 %). These are very small figures.

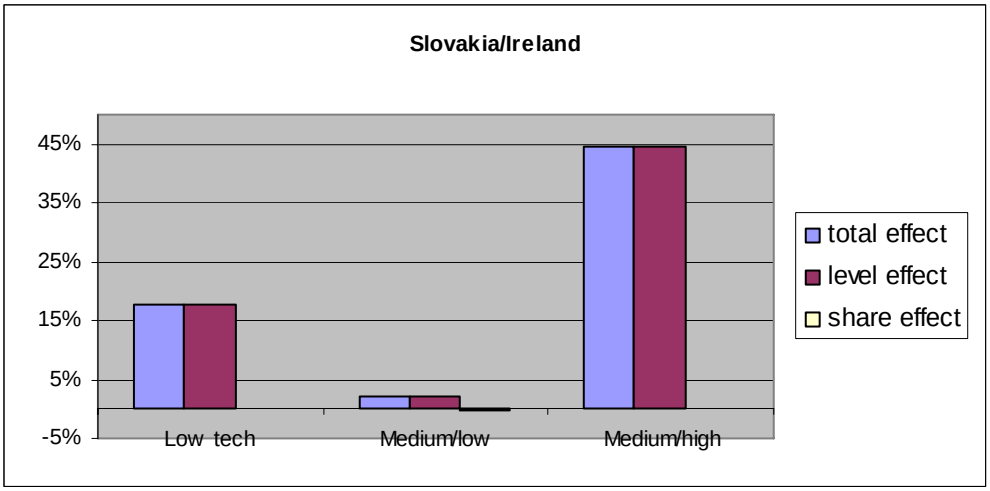
Another important result is that almost labour productivity gaps with respect to Ireland in medium/low technological industries no longer exist in CEECs-4 and other Cohesion countries. These gaps are not very high in low technological industries while those in medium/high technological industries are more sizable. For the CEECs-4, Portugal and Greece, the productivity gap in low technological industries with respect to Ireland is around 15-20 %, meaning that their labour productivity in low technological industries reaches around 80-85 % of the one of Ireland. In medium/high technological industries, their labour productivity stands between 55 % and 65 %. Labour productivity gaps of Spain with respect

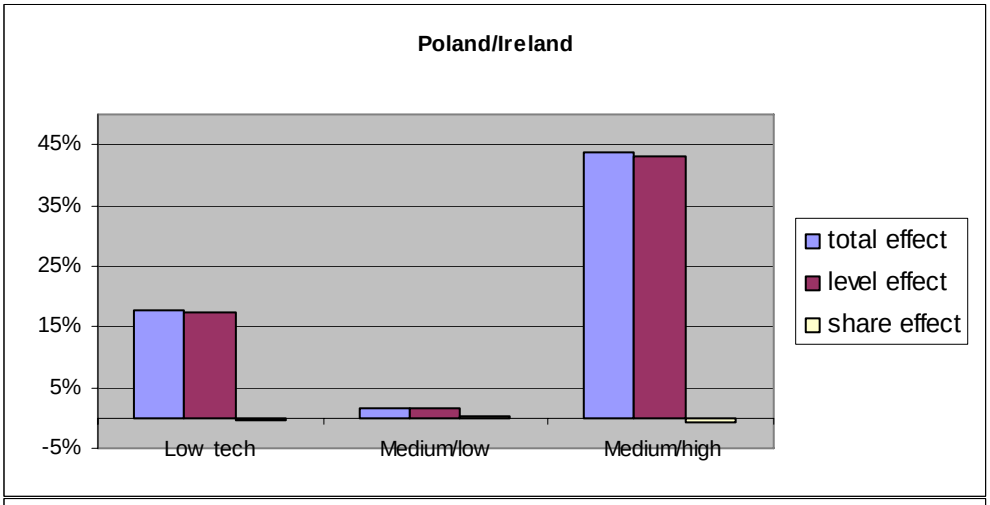
[31] Note this may be due to the high level of aggregation.

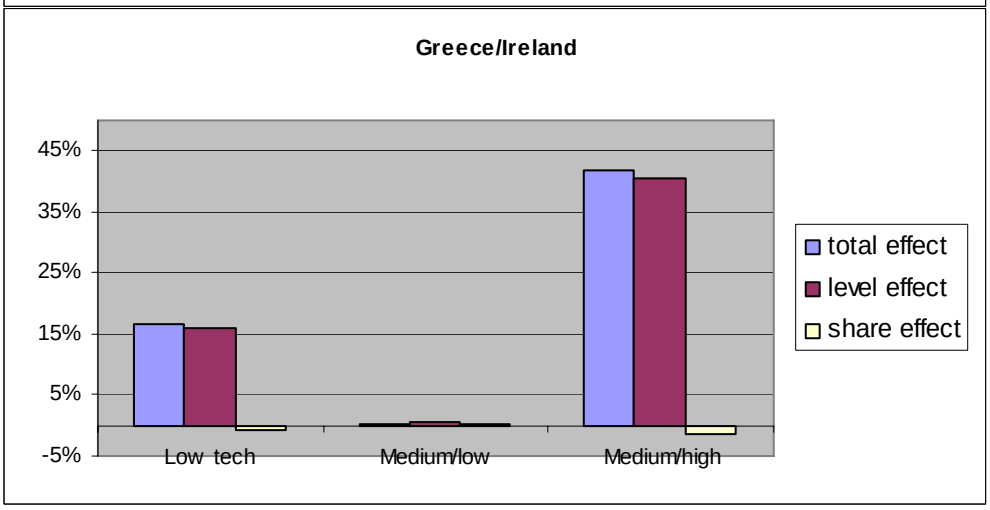
to Ireland are more reduced than in the cases of CEECs-4, Portugal and Greece, whatever the level of technological intensity turning even in favour of Spain in the case of medium/low technological intensity.

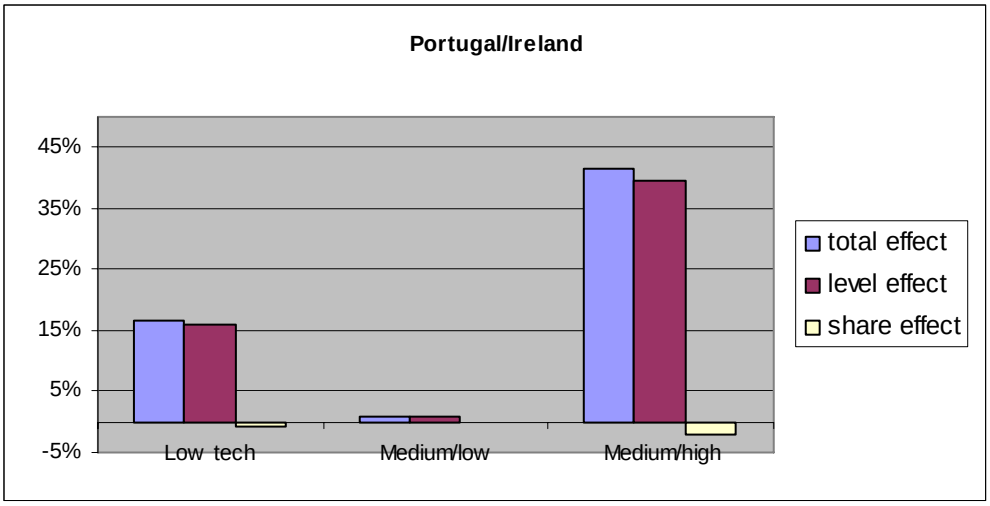


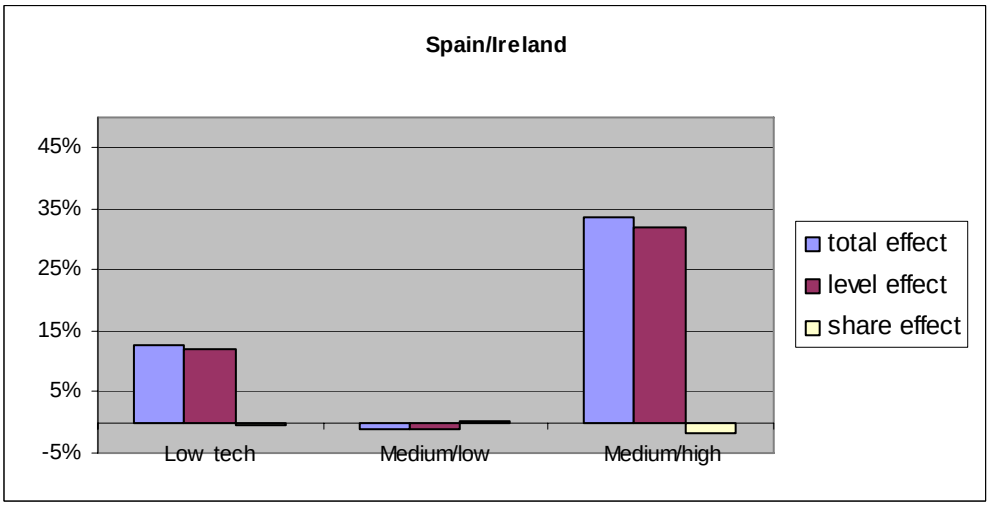



Slovakia/Ireland
45%
35%
25%
15%
5%
-5%
Low tech
Medium/low
Medium/high
total effect
level effect
share effect


Poland/Ireland
45%
35%
25%
15%
5%
-5%
Low tech
Medium/low
Medium/high
total effect
level effect
share effect


Greece/Ireland
45%
35%
25%
15%
5%
-5%
Low tech
Medium/low
Medium/high
total effect
level effect
share effect





Conclusion

Based on descriptive statistics, very simple econometrical work as well as a pickup in previous empirical literature, this paper puts forward that FDI inflows are an important engine for catching up. In general, CEECs and Cohesion countries hosting FDI tend to grow faster than those receiving few FDI. Surely, our basic estimations (as in **Section 1**) do not control for other factors which may impact on growth like structural reforms and macroeconomic policies. These two latter factors had strong impact on economic performances of CEECs in the 1990s, whatever the degree of foreign ownership in the economy. Moreover, our basic estimates do not solve for causality issues. Higher growth due, for instance, to earlier structural reforms may attract FDI rather than FDI inflows causes higher growth. However, independently of this econometrical issue, we think that the Irish case is particularly illustrative of how FDI inflows may boost growth of a country as soon as its labour force is well-educated. It is worth noting that, following the post-world war II, a poorly educated Irish labour force, combined with protectionist policies, locked Ireland in a low agriculture-based growth while other Western Europe countries were resuming with higher growth. Then, a state funding of secondary-level education, associated with openness to trade and FDI,

succeed in attracting foreign investors which paved the way for industrialisation of Ireland (Barry, 2002).

As a legacy of the socialist period, CEECs do not suffer from a deficit in well-educated labour force. Consequently, when CEECs opened up their economies to foreign investors, large capital inflows occurred, probably diverting some of them from Portugal[32]. The current slowdown of Portuguese may be explained in part by this diversion effect from CEECs, both on exports and FDI sides. Competing on similar markets, but with higher wages and lower human capital endowments than CEECs, Portugal has lost its "comparative advantage" with the entry of CEECs as a possible destination of export-oriented FDI while its EMU membership forbids a currency depreciation. Consequently, labour productivity growth has been lower in Portugal than in CEECs, as reported in **Table 7**. *It follows that the relevant issue is not whether CEECs will follow an Irish or a Portuguese convergence scenario, but rather whether Portugal will converge or diverge towards CEECs.*

The level but also the sectoral composition of FDI are crucial to accelerate catching up. Especially, MNCs, by carrying out technically demanding production functions and engaging in higher VA activities such as R&D, upgrade the production capacities of CEECs and increase the share of technological goods produced by host countries. This latter point is clearly evidenced by the sector of transport equipment which received sizable amounts of FDI as a share of VA and shown dynamic labour productivity growth over the last decade (**Tables 11 and 7**).

At the same time, *FDI is not a necessary condition for boosting growth, as illustrated by Slovenia.* Indeed, as comparative data indicate, FDI in Slovenia so far has played a restrained role in comparison to other CEECs. This suggests that despite its primary importance, FDI acts as a substitute for domestic firms if the latter are not able to carry out restructuring sufficiently. In that country, openness to trade rather to FDI was the key factor to benefit from international spillovers. Especially, deeper trade integration with the EU allowed Slovenia to resume with sustained growth.

[32] Braconier and Ekholm (2001) find a diversion effect of FDI flows from Southern Europe towards CEECs using a firm-level dataset on the operations of Swedish multinational companies. They show that the expansion of employment in CEECs affiliates, which totalled 15,000 over 1990-1998, came at the expense of employment in Southern affiliates where employment fell by 14,000.

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Appendix

Table A1: Key statistics on new EU-members (compared to old members)

	Population in 2004		GDP (at market price) in 2004	
	Thousands	In % of EU-25	EUR millions	In % of EU-25
European Union (UE-25)	460,278	100.0	10,359,732	100.0
New members (UE-10)	74,101	16.1	475,946	4.6
Czech republic	10,202	2.2	86,239	0.8
Estonia	1,356	0.3	9,043	0.1
Cyprus	737	0.2	12,402	0.1
Latvia	2,313	0.5	11,024	0.1
Lithuania	3,439	0.7	17,926	0.2
Hungary	10,107	2.2	80,816	0.8
Malta	401	0.1	4,277	0.0
Poland	38,167	8.3	195,205	1.9
Slovenia	1,997	0.4	25,895	0.2
Slovakia	5,382	1.2	33,119	0.3
Sources: ECB, Eurostat.				

Tableau A2: Decomposition of overall labour productivity by sectors (with respect Ireland)

	Labour productivity gap		
Hungary (in % point)	Total	Levels	Shares
Agricultural	0.5	0.7	0.2
Mining	0.4	0.5	0.0
Manufacturing	29.9	29.2	-0.8
Energy	0.4	0.8	0.4
Construction	4.2	4.7	0.6
Transport	2.6	2.6	0.0
Finance & Business services	9.9	5.0	-4.9
Total	53.9	49.1	-4.7
	Labour productivity gap		
Czech republic (in % point)	Total	Levels	Shares
Agricultural	-0.5	0.0	0.5
Mining	0.2	0.3	0.1
Manufacturing	30.1	29.2	-0.8
Energy	-0.5	0.2	0.7
Construction	4.0	4.4	0.4
Transport	0.7	0.8	0.1
Finance and business services	15.2	14.6	-0.6
Total	54.6	53.9	-0.6
	Labour productivity gap		
Slovakia (in % point)	Total	Levels	Shares
Agricultural	-0.6	-0.6	0.0
Mining	0.4	0.4	0.0
Manufacturing	27.1	26.4	-0.7
Energy	0.9	1.0	0.0
Construction	3.1	3.3	0.2
Transport	0.8	1.2	0.3
Finance and business services	12.9	11.0	-1.8
Total	50.2	48.1	-2.1
	Labour productivity gap		
Poland (in % point)	Total	Levels	Shares
Agricultural	8.9	3.2	-5.8
Mining	0.2	0.5	0.3
Manufacturing	25.2	25.2	0.0
Energy	0.4	0.7	0.3
Construction	2.8	2.0	-0.8
Transport	3.4	3.2	-0.1
Finance and business services	13.2	10.9	-2.4
Total	55.8	46.2	-9.5

	Contribution to total		
Hungary	Sectors	"Level effect "	"Share effect"
Agricultural	1%	1%	0%
Mining	1%	1%	0%
Manufacturing	57%	53%	-4%
Energy	1%	1%	1%
Construction	8%	9%	1%
Transport	5%	5%	0%
Finance and business	18%	10%	-8%
Total	100%	91%	-9%
	Contribution to total		
Czech republic	Sectors	"Level effect "	"Share effect"
Agricultural	-1%	0%	1%
Mining	0%	1%	0%
Manufacturing	55%	54%	-2%
Energy	-1%	0%	1%
Construction	7%	8%	1%
Transport	1%	2%	0%
Finance and business	28%	27%	-1%
Total	100%	99%	-1%
	Contribution to total		
Slovakia	Sectors	"Level effect "	"Share effect"
Agricultural	-1%	-1%	0%
Mining	1%	1%	0%
Manufacturing	55%	51%	-4%
Energy	2%	2%	0%
Construction	6%	7%	0%
Transport	2%	2%	1%
Finace and business s	26%	22%	-4%
Total	100%	96%	-4%
	Contribution to total		
Poland	Sectors	"Level effect "	"Share effect"
Agricultural	16%	6%	-10%
Mining	0%	1%	1%
Manufacturing	45%	43%	-2%
Energy	1%	1%	1%
Construction	5%	4%	-2%
Transport	6%	6%	0%
Finance and business	24%	20%	-4%
Total	100%	83%	-17%

Tableau A2: …/ … (continued)

	Labour productivity gap		
Spain (in % point)	Total	Levels	Shares
Agricultural	-1	-0.5	0.5
Mining	0.0	-0.1	-0.1
Manufacturing	23.5	21.5	-2
Energy	-1	-2	-1
Construction	0.9	0.8	-0.2
Transport	-2.6	-2.7	-0.1
Finance and business services	2.9	-0.3	-3.2
Total	20.0	13.3	-6.7
	Labour productivity gap		
Portugal (in % point)	Total	Levels	Shares
Agricultural	2.7	1.6	-1.1
Mining	..	..	..
Manufacturing	29.4	27.2	-2.2
Energy	-0.3	-0.4	-0.1
Construction	4.3	4.4	0.1
Transport	0.3	-1.8	-2.1
Finance and business services	11.4	8.3	-3.1
Total	52.0	43.6	-8.4
	Labour productivity gap		
Greece (in % point)	Total	Levels	Shares
Agricultural	4.8	0.5	-4.3
Mining	0.0	0.1	0.2
Manufacturing	26.7	25.0	-1.8
Energy	0.1	0.3	0.2
Construction	-0.3	-0.6	-0.3
Transport	-0.7	-0.7	0.0
Finance and business services	4.2	-1.1	-5.3
Total	32.8	21.4	-11.4

		Contribution to total	
Spain	Sectors	"Level effect "	"Share effect"
Agricultural	-5%	-3%	2%
Mining	0%	-1%	-1%
Manufacturing	118%	107%	-10%
Energy	-5%	-10%	-5%
Construction	5%	4%	-1%
Transport	-13%	-13%	0%
Finance and business	14%	-2%	-16%
Total	100%	67%	-33%
		Contribution to total	
Portugal	Sectors	"Level effect "	"Share effect"
Agricultural	5%	3%	-2%
Mining	..	..	..
Manufacturing	57%	52%	-4%
Energy	-1%	-1%	0%
Construction	8%	8%	0%
Transport	1%	-3%	-4%
Finance and business	22%	16%	-6%
Total	100%	84%	-16%
		Contribution to total	
Greece	Sectors	"Level effect "	"Share effect"
Agricultural	15%	2%	-13%
Mining	0%	0%	0%
Manufacturing	82%	76%	-5%
Energy	0%	1%	1%
Construction	-1%	-2%	-1%
Transport	-2%	-2%	0%
Finace and business s	13%	-3%	-16%
Total	100%	65%	-35%

Reading the table:
Consider for instance the couple Hungary/Ireland. The figure 53.9 means that Ireland has a overall lead of 53.9 percentage points over Hungary in terms of overall productivity. But. the Irish lead is only 0.5 percentage point for agriculture.
The overall lead of 53.9 percentage points is the (absolute) sum of 49.1 percentage points due to the "level term" and of 4.7 percentage points du to the "the share term". The total contribution of the "level term" to the overall Irish lead is then 91 % and the one of the "share term" 9 %.
Considering sectors, the total contribution of agriculture to overall Irish lead is 1 % and exclusively due to the "level term".
Source : STAN database; own computations.

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Tableau A3: Decomposition of manufacturing labour productivity by technological intensity (2002)

	Gap in % points of Ireland			Contribution:		
Hungary	Total	Level	Share	Sectors	Level	Share
Low tech	19.2	18.7	-0.5	31%	30%	-1%
Medium/low	1.6	1.6	0	3%	3%	0%
Medium/high	40.8	39.8	-1	66%	65%	-2%
Total manufacturing	61.6	60.1	-1.5	100%	98%	-2%
	Gap in % points of Ireland			**Contribution:**		
Czech republic	Total	level	share	Total	level	share
Low tech	16.5	16.5	0	27%	27%	0%
Medium/low	1.5	1.5	0	2%	2%	0%
Medium/high	42.4	42.2	-0.3	70%	70%	0%
Total manufacturing	60.4	60.2	0.2	100%	100%	0%
	Gap in % points of Ireland			**Contribution:**		
Slovakia	Total	Level	Share	Sectors	Level	Share
Low tech	17.6	17.7	0.1	27%	28%	0%
Medium/low	2.1	2.0	-0.1	3%	3%	0%
Medium/high	44.5	44.6	0.2	69%	70%	0%
Total manufacturing	64.2	64.3	0.1	100%	100%	0%
	Gap in % points of Ireland			**Contribution:**		
Poland	Total	Level	Share	Sectors	Level	Share
Low tech	17.7	17.4	-0.3	28%	28%	0%
Medium/low	1.6	1.7	0.1	2%	3%	0%
Medium/high	43.7	43.1	-0.6	69%	69%	-1%
Total manufacturing	62.9	62.2	-0.7	100%	99%	-1%
	Gap in % points of Ireland			**Contribution:**		
Greece	Total	Level	Share	Sectors	Level	Share
Low tech	16.7	16.0	-0.7	28%	27%	-1%
Medium/low	0.3	0.4	0.1	1%	1%	0%
Medium/high	41.9	40.5	-1.4	71%	69%	-2%
Total manufacturing	58.9	56.9	-1.9	100%	97%	-3%
	Gap in % points of Ireland			**Contribution:**		
Portugal	Total	Level	Share	Sectors	Level	Share
Low tech	16.7	16.0	-0.6	28%	27%	-1%
Medium/low	0.9	1.0	0.0	2%	2%	0%
Medium/high	41.6	39.5	-2	70%	67%	-3%
Total manufacturing	59.2	56.6	2,6	100%	96%	-4%
	Gap in % points of Ireland			**Contribution:**		
Spain	Total	Level	Share	Sectors	Level	Share
Low tech	12.6	12,2	-0,5	28%	27%	-1%
Medium/low	-1.2	-1	0.2	-3%	-2%	0%
Medium/high	33.8	32.1	-1.7	75%	71%	-4%
Total manufacturing	45.2	43.3	-2	100%	96%	-4%

Source: STAN database; own computations.

Description of the STAN database

Our primary data at the sectoral level are from the new OECD STAN (Structural Analysis) database. This database has been revised using new industrial classifications. While providing data on value added, employment, labour compensation, GFCF, imports, exports and so on at the sectoral level, this database limits our sample of CEECs to OECD members, namely the Czech republic, Hungary, Slovakia and Poland.

One drawback of STAN database for own analysis is the absence of sectoral data on prices and gross output for Ireland and Portugal, which are our two main comparator countries. Consequently, the GDP deflator was used for both CEECs and Cohesion countries. GDP deflator provides then an inexact picture of sectoral productivity, as GDP deflator refers to prices of final manufactured goods which include distribution margins and are affected by international trade. GDP deflator is then no longer relevant for sectors or industries engaged in intermediate production. Especially, in agriculture and manufacturing industries, basic prices of output are preferable since the latter are those faced by producers (see O'Mahony and de Boer, 2002 for instance).

Another main drawback is the absence of hour worked at sectoral level. As a result, we use data of employment (total number of persons engaged in production) for both CEECs and Cohesion countries to compute sectoral productivity. It follows that the latter are probably underestimated for CEECs where a significant proportion of the labour force is engaged in more than one job. For instance, 28 % of the Czech labour force still declared a supplementary activity in 1998, albeit the “transformational recession” of the early 1990s was far away (Cazes and Nesporova, 2004). Multiple-job holding may also account for high share of economically active population in other CEECs.

One difficulty arises also from labour productivity in the services sector (even if non-market sector are excluded), as assessment of production is not an easy task and is not yet fully harmonised across countries.