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INWARD AND OUTWARD FOREIGN DIRECT INVESTMENT: THE CASE OF THE EU

Abstract

This study documents the sectoral pattern of inward and outward FDI in the EU. The empirical findings show that intra EU15 FDI stocks (inward and/or outward) grew faster than Extra EU15 stocks in all industries except transport equipment from 1995-2005 indicating that FDI has become a key element of the EU integration process. EU-Industries also differ greatly in their degree of internalisation measured as the FDI inward and outward stock. Financial services, mining and quarrying, chemicals and transport equipment have the highest stock of FDI as a percentage of value added. However, FDI stocks tend to overestimate the degree of internalisation of production since FDI is much less employment intensive in financial intermediation. Foreign affiliate data for the EU15 suggest that a significant proportion of domestic production is now accounted for by foreign owned firms, in particular in transport equipment, chemicals, and electronics. Furthermore, the ranking of FDI intensity across industries in the EU15 is rather similar in the US and in the new EU member states. Regression results suggest that industry effects are much more important than host and home country effects in determining the ratio of FDI stock as a percentage of value added across industries at the cross-section level.

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Key words:

Foreign direct investments, internationalization level, sectoral pattern, gross investment volume, outward FDI, inward FDI.

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1. Introduction[1]

The degree of the internationalisation[2] of enterprises has been growing over the last 20 years. This general trend comes along in all its manifestations, such as increased foreign direct investment (via greenfield FDI, international mergers & acquisitions), intra-firm trade, and strategic cross-border partnerships. A main feature of increased internationalisation is the expansion of the activities of multinational enterprises (MNEs) in turn driving up FDI inflows and outflows. The activities of MNEs are increasingly thought to be important for host countries in terms of generating positive effects for the local industry. For instance, greenfield investment often directly to gross fixed capital formation, and thereby, they stimulate value added and employment in the host market. Foreign direct investment is also an important means to acquire new technology. Overall, foreign direct investment (FDI) is an important source of capital that indicates a country's economic environment and investment climate as perceived by multinational firms, and an important engine of economic growth.

Despite the generally rapid increase of inward FDI, there remain large differences in the degree of internationalisation within the EU and across industries. This rapid, yet uneven, growth of FDI has renewed interest from academics and policy makers in the determinants of FDI inflows. Previous theoretical and empirical studies based on country/industry level data have identified a number of factors that may affect the level of FDI inflows to a country. Host country/industry specific factors of inward FDI include geographical and economic factors, such as the size of the market/industry, proximity to suppliers, geographical distance and trade costs, relative factor endowment, production costs differentials (labour costs differentials), absorptive capacity (e.g. skilled la-

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[2] The terms "degree of internationalisation" and "FDI intensity" are interchangeably used in this paper.

bour force), tax and other fiscal incentives for foreign investment, product and labour market regulations, and clustering of activities (e.g. number of firms already active in the same industry).

The present study seeks to answer the following main questions:

- First, how have intra-EU FDI activities changed in relation to extra-EU FDI activities by industry.
- Second, how does the degree of outward FDI intensity and inward FDI intensity differ across different industries? In particular, which role does FDI play in services compared to manufacturing or natural resource-based FDI?[3]
- Third, how have sectoral FDI activities changed in the past decade?
- Fourth, are there similarities in the sectoral pattern of FDI intensity of the EU15 when compared to those of the NMS10 and the US?
- Fifth, what are the trends and levels of FDI intensity that are based on foreign affiliate employment data instead of FDI stock data?

The main sources of data to be used in calculating FDI based indicators are the New Cronos FDI data series; the OECD International Direct Investment Statistics; UNCTAD World Investment Directory, and the WIIW Database on Foreign Direct Investment in Central, East, and Southeast Europe for FDI inward and outward stocks and flows.

This paper is structured as follows: Section 2 provides summary of the literature. Section 3 gives an overview of the evolution of the FDI stock data at the industry level while Section 4 describes the sectoral pattern of FDI activities based on foreign affiliate data. Finally, Section 5 summarises and concludes.

2. Previous literature on Sectoral FDI

The traditional trade theory (elucidates vertical FDI) and the new trade theory (concentrates on horizontal FDI) is both integrated into the OLI paradigm. The first one is covered by L-Advantages, and the second one by O- and I-advantages. For reference, see the most recent version of the OLI-approach (Dunning, 2000). Ownership advantages are often due to intangible assets such as reputation, brand name (e.g. in food products and clothing), and management

[3] The main indicators used are the ratio of net FDI inflows and stocks to value added. In order to assess the economic impact of FDI in the host country, the study also looks at the data that measures the activities of foreign affiliates and their parent companies. Based on the foreign affiliate statistics, we calculate the share of foreign affiliates in employment in the host country as well as foreign affiliate employment as a percentage of domestic employment in the home country.

practices. Location advantages include production costs and market size. Internationalisation advantages occur when it is more profitable to set up a foreign affiliate instead of licensing (ensuring the quality standards of intermediate inputs; avoiding high co-ordination costs).

According to the traditional trade theory, FDI abroad occurs because of differences in factor costs due to differences in factor endowment across countries. One type of FDI is characterized by the vertical fragmentation of the production. This is called vertical FDI and it often has a cost savings motive. It is likely that the extent of vertical FDI is more prevalent in sectors that are labour intensive.

The proximity concentration hypothesis introduced by Brainard (1993) emphasises the importance of interactions between trade costs and economies of scale. When trade costs are sufficiently high, firms establish a plant in another country. The presence of substantial fixed costs gives rise to economies of scale and a concentration of production tends to occur. The proximity concentration hypothesis, therefore, provides an explanation for market-seeking, horizontal FDI. This type of FDI is more prevalent in industries with high transportation costs or low fixed costs of entry into foreign markets.

More recently, models of «Export-Platform FDI» were introduced where multinational enterprises produce in two countries and serve a third country via trade (see Ekholm et al., 2007 and Baltagi et al. 2006). Thus, most of the output of MNEs in the host country is sold in a third country market and not in the host or home country. Export-Platform FDI has both elements of vertical and horizontal FDI. A typical example of Export-Platform FDI is US-outward FDI to Ireland: MNCs from the US serve the entire European Market but choose Ireland as a low cost location for production. Export platform FDI is often associated with spillovers to nearby regions (see Coughlin and Segev, 2000).

Previous theoretical and empirical studies based on country/industry level data have identified a number of factors that may affect the level of FDI inflows to a country (Brainard and Riker, 1997, Carr et al., 2001; Slaughter, 2003; Barrel and Pain, 1999, among others). The methodological approach is based on a gravity equation that explains FDI with market size and distance between the host and home country. The New Economic Geography (NEG) explains FDI flows with the location of investment (i.e. centre, periphery, bordering with neighbouring country). However, few studies are available that explain the determinants of FDI activities across different sectors. The main result of these studies is that the determinants of FDI differ across different sectors (Resmini, 2000; Walkenhorst, 2004).

3. Sectoral pattern of FDI activities based on stock data

This section presents the empirical evidence on the sectoral pattern of EU Foreign Direct Investment based on stock data for 1995-2004. The New Cronos Foreign direct investment database contains information on FDI inward and outward stocks as well as flows and income. We provide data for ten sectors as well as six industries for manufacturing. Table 1 shows that the majority of the direct investment activity is between EU15 countries: 66% of the stock of inward FDI originates from the EU15 member countries and 59% of the total outward stock of the EU15 is held in other EU15 countries. The variation across industries is substantial. Food & beverages, textiles, and wood activities, transport equipment, and hotels & restaurants receive a larger than average share of inward FDI from Non-EU15 countries. Electricity, gas, and water and transport, storage & communication and trade & repairs receive a low share of inward FDI from non-EU-countries. With respect to outward FDI, food & beverages, petroleum, chemical, rubber, and plastic products, transport equipment, construction and energy, water and gas have a high share of Extra-EU15 FDI in per cent of the total outward EU15 FDI stock. The share of inward Extra-EU15 FDI stocks in the total EU15 FDI stocks decreased from 43% to 34% for 1995-2004. This indicates that inward intra-EU15 FDI stocks are growing faster than inward Extra-EU15 FDI stocks. Similarly, the share of outward Extra-EU15 FDI stocks decreased from 48% to 41%. The increase of the share of both Intra inward and outward FDI indicates a greater economic integration between EU countries (see EC 2005).

It is also noteworthy that there is a rapid increase in the ratio of intra vs. extra FDI in electricity, gas and water, and transport, storage, and communication. In both industries, the share of inward Intra EU15 FDI stock in the total inward EU15 FDI now exceeds 80%. The increasing share of inward Intra EU15 FDI in these industries is partly due to deregulation in the network industries (see Table 1).

Table 2 shows the inward and outward position of the Extra-EU15 as a percentage of value added at the broad sector level. With outward Extra-EU15 FDI stocks exceeding inward Extra-EU15 FDI stocks, the EU15 is traditionally a net investor.

Measuring FDI performance

The first measure of FDI performance is the ratio of inward and outward FDI stock as a percentage of value added. The 'stock' of FDI is a measure of the accumulated effects of all previous FDI activity at a point in time. The stock data are often criticised because they are based on historical costs. In addition, they overstate the degree of internationalisation of the production in capital-intensive industries. Alternatively, one can use the FDI flow data. The second measure of

internationalisation is the sales of foreign affiliates of home-based multinational enterprises and sales of foreign affiliates in a host country both expressed as a percentage of total sales. The third indicator is the ratio of foreign affiliate employment of home-based parent companies to employment in the home market or parent company employment as an indicator of outward FDI. The extent of inward investment can be measured by the share of employment of foreign affiliates in the host market (UNCTAD various issues).

Table 1.

Change in Extra-EU15 FDI inward and outward stock as a percentage of total EU15 inward and outward stocks

	Share of Extra-EU15 to total EU15 FDI stocks in %					
	Inward FDI			Outward FDI		
	1995	2004	change 1995/2004	1995	2004	change 1995/2004
Total	43	34	–9	48	41	–7
Manufacturing	49	38	–11	54	48	–7
Food & beverages	52	43	–9	54	52	–1
textiles and wood activities	47	44	–3	46	26	–20
petroleum, chemical, rubber, plastic products	52	36	–16	62	52	–10
metal and mechanical products	49	33	–16	53	46	–7
office machinery, computers, RTV, communication equipments	41	31	–10	50	49	–1
Transport equipment	49	41	–8	44	57	+13
Electricity, gas and water	52	17	–35	58	65	+7
Construction	24	28	+4	59	65	+6
Total services	38	33	–5	40	37	–3
Trade and repairs	47	28	–19	43	38	–5
Hotels and restaurants	36	49	+13	27	25	–2
Total land, sea and air transport	27	92	+65	47	51	+4
Telecommunications	41[a]	13	–28	38	27[b]	–11
Transport, storage and communication	32	16	–16	29	29	+0
Financial intermediation	45	36	–9	40	41	+1
Real estate and business activities	34	32	–2	49	31	–18

Notes: Change is measured in percentage points.

Source: WIFO calculation using EUROSTAT data (New Cronos); [a] refers to the year 1996, [b] refers to the year 2003.

Table 2.

Change in Extra EU15 FDI inward and outward stock as a percentage of total value added

	inward Extra-EU15 FDI stock extra in % of value added			outward Extra-EU15 FDI stock extra in % of value added		
	1995	2004	change 1995/2004 in percentage points	1995	2004	change 1995/2004 in percentage points
Total	6	18	+11	8	25	+17
Agriculture and fishing	0	0	+0	1	1	+0
Mining and quarrying	66	40	–26	94	160	+66
Manufacturing	11	18	+7	17	28	+11
Food products	15	19	+4	30	29	–1
Textiles and wood activities	7	15	+8	7	13	+6
Petroleum, chemical, rubber, plastic products	22	39	+17	39	57	+18
Metal and mechanical products	6	8	+2	7	13	+6
Office machinery, computers, RTV, communication equipments	10	9	–1	11	13	+2
Transport equipment	9	17	+8	10	37	+27
Electricity, gas and water	3	6	+3	4	31	+27
Construction	0	1	+1	1	3	+2
Total services	7	27	+20	8	35	+27
Trade and repairs	7	7	+0	5	9	+4
Hotels and restaurants	2	3	+1	3	4	+1
Transport, storage and communication	1	5	+4	1	20	+19
Financial intermediation	23	144	+121	30	192	+162
Real estate and business activities	6	17	+11	6	14	+9

Source: WIFO calculation using EUROSTAT data (New Cronos).

Table 2 shows that the EU is a net investor in all industries except in textiles, wood activities, real estate, and business activities. It is also apparent that the degree of FDI intensity varies significantly between sectors, with a ratio of Extra-EU15 inward FDI stock of 144% in financial services and 1% in agriculture.

Within manufacturing, inward FDI intensity is highest in chemicals and transport equipment. The high FDI intensity of chemicals is not surprising given the high overall capital intensity in this sector. There is also immense diversity in the time pattern of inward and outward Extra-EU15 FDI stocks as a percentage of value added. One can observe that the inward FDI stock ratio increased in textiles and wood activities, petroleum, chemical, rubber, plastic products, and transport equipment between 8 and 17 percentage points from 1995-2004. In contrast, the relative inward FDI stock ratio does not change much in metals and machinery or in electronics and optical products. The evolution of the relative inward FDI position is also rather heterogeneous across service industries. The change in the inward FDI intensity ranges from 0 percentage points in trade and repairs to 122 percentage points in financial services. This indicates that the increase in the inward FDI ratio in total services is mainly due to the increased inward FDI position in financial services. The increase in inward FDI in the financial sector in the EU15 has several explanations: (i) reduced regulatory barriers, (ii) decreased information and communication costs (e.g. low cost data transmission), (iii) introduction of the Euro in 1999 and (iv) introduction of new innovative financial products such as securities (see Hartman et al., 2003). The large increase of the outward Extra-EU15 FDI stock in financial intermediation can be partly explained by market-driven investments in the banking and insurance sector in the NMS, especially since the EU Enlargement in 2004 (Farouk, 2004). Finally, there are also problems with the measurement of assets in financial services (see IMF's Balance of Payments and International Investment Position Manual, 6th edition).

Sectoral pattern of FDI activities

The pattern of internationalisation of production is likely to be strongly concentrated on certain industries. Multinational enterprises operate in concentrated industries, especially in R&D and advertising intensive industries. The degree of internationalisation of production is also lower in labour-intensive industries than in other industries (Markusen 1995, 1998). According to the OLI paradigm (ownership-specific, locational, and internalisation advantages) of Dunning, countries will attract relatively more inward FDI in those sectors for which it offers comparative locational and ownership advantages (Dunning, 1993, 2000). Using US data for sales of foreign affiliates and transnational corrportations, Ekholm and Midelfart-Knarvik (2004) classifies petroleum, chemicals, electronics and transport equipment as FDI intensive industries.

Overall, one can observe that the change in the degree in financial globalisation clearly exceeds the change in the degree of the internationalisation of production in manufacturing industries. Turning to the outward FDI ratio one can observe some similarities between the change in the inward and outward ratio. Again, there is a strong increase in the FDI intensity measured as the ratio of the outward stock to value added in chemicals and transport equipment. Furthermore, there is an explosive growth of the ratio of outward FDI to value added in financial services from 30% value added to 192% value added.

The New Cronos FDI database also provides information on the inward and outward FDI stock by sector and destination (see Table 3). FDI activities in high-wage countries account for the bulk of the FDI outward stock of the EU15 (Extra plus Intra). For instance in manufacturing 76% of the FDI outward stock is held by other EU15 countries or Non-EU OECD countries. The New Member states account for only 4% of the outward FDI stock of the EU15 in manufacturing. Within manufacturing the share of NMS10 ranges between 2% in chemicals, textiles and wood, and 9% in transport equipment. In services, there is also a high share of the outward FDI stock held by other EU and Non EU OECD countries. Furthermore, 90% or more of the EU15 outward FDI stock in research and development, real estate & business activities, hotels & restaurants, post & telecommunications are held inside high-wage countries (EU15 or other OECD countries). This does not support the view that there is significant offshoring in the service sector to low wage countries.

In order to investigate to what extent industry and country characteristics explain the level of FDI intensity at the cross-section level, one can estimate the following regression model:

$$FDI / Y_i = \alpha + \sum_{m=1}^{M} \beta_m \text{Industry} + \sum_{m=1}^{M} \beta_m \text{country} + \varepsilon ,$$

where the dependent variable measures either the FDI inward or FDI outward position as a percentage of value added in industry i. The regressions results indicate that industry effects account for 33% of the variation of the inward FDI stock, whereas the country effects account for only 10% (see Table 4). This indicates that the degree of internationalisation of production is mainly related to the characteristics of the industries in which the affiliates and parent company operate. The regression results for the ratio of outward FDI also indicate that industry effects are more important than country effects. For the EU15 countries, industry effects account for 50% of the variation of the outward FDI outward stock, whereas the country effects account for only 29% (see Table 4).

Table 3.

Distribution of the EU15 outward FDI stock by region and sector (2004)

	Intra EU15	NMS10	other OECD	other countries
Agriculture and fishing	37	6	6	51
Mining and quarrying	40	1	23	36
Food products	48	5	25	22
Textiles and wood activities	74	2	9	14
Chemicals and chemicals products	61	2	27	10
Petroleum, chemical, rubber, plastic products	48	2	26	24
Metal and mechanical products	54	5	22	18
Office machinery, computers, RTV, communication equipments	51	5	26	19
Vehicles and other transport equipment	43	9	33	14
Manufacturing	52	4	24	19
Electricity, gas and water	35	8	14	44
Construction	35	5	23	37
Total services	63	3	21	14
Trade and repairs	62	5	19	13
Hotels and restaurants	75	1	17	7
Land transport	60	3	35	3
Water transport	42	1	10	47
Air transport	47	1	8	44
Total land, sea and air transport	49	1	15	34
Post and telecommunications	78	2	9	11
Post and courier activities	–5	–5	–13	123
Telecommunications	73	1	8	17
Transport, storage and communication	71	2	11	17
Monetary intermediation	37	6	32	25
Other financial intermediation	63	2	19	16
Financial intermediation	59	3	21	17
Real estate	66	4	19	12
Computer activities	33	2	45	21
Research and development	65	2	37	–4
Real estate and business activities	69	3	24	4
Other business activities	71	3	24	1

Source: WIFO calculation using EUROSTAT data (New Cronos).

Table 4.

Importance of country and sector effects, OLS regression results

	EU25 countries inward FDI in% value added	EU15 countries inward FDI in% value added
R^2 due to host country and sector effects	0,41	0,47
R^2 due to sector effects	0,33	0,31
R^2 due to host country effects	0,10	0,19
# of obs	384	253
	EU25 countries outward FDI in 5 value added	EU15 countries outward FDI in% of value added
R^2 due to home country and sector effects	0,76	0,78
R^2 due to sector effects	0,42	0,50
R^2 due to home country effects	0,33	0,29
# of obs	309	216

Table 5 shows the evolution of the intra-industry FDI (IIFDI) stock index of the Extra EU15 from 1995–2004. Intra-industry FDI accounts of the Extra EU15 account for 79% in manufacturing and 88% in services in 2004.

Measuring intra-industry FDI

The most widely used concept to empirically identify intra-industry FDI is the intra-industry FDI (IIFDI) index introduced by Norman and Dunning (1984):

$$IIFID = [1 - |O - I|/(O + I)] \times 100,$$

where O refers to the outward Extra EU15 FDI stock and I refers to the inward Extra EU15 FDI stock. Alternatively, FDI flows or sales of foreign affiliates can be used. The IIFDI index ranges between a 0 (no) and 100% (complete) overlap. It is well-known that the degree of IIFDI depends on the level of aggregation. The higher the level of aggregation the higher the indices will be.

Table 5.

Intra-industry FDI stock indices of Extra EU15 by industry

	1995	2004	change
Agriculture and fishing	53	70	17
Mining and quarrying	82	40	–42
Food products	66	79	13
Textiles and wood activities	97	92	–5
Total petroleum, chemical, rubber, plastic products	71	81	9
Metal and mechanical products	89	75	–14
Office machinery, computers, RTV, communication equipments	96	82	–14
Transport equipment	93	64	–29
Manufacturing	79	79	1
Electricity, gas and water	89	32	–57
Construction	26	38	12
Total services	97	88	–9
Trade and repairs	82	87	4
Hotels and restaurants	85	92	7
Total land, sea and air transport	52	30	–23
Telecommunications	95	24	–71
Transport, storage and communication	100	38	–62
Financial intermediation	86	86	0
Real estate	81	94	13
Computer activities	96	70	–26
Research and development	87	81	–6
Real estate and business activities	100	92	–8
Other business activities	98	88	–10
Total	87	83	–5

Source: WIFO calculation using EUROSTAT data (New Cronos).

A detailed look at the broad industry groups indicates that intra-industry FDI dominates in most industries. Rugman (1995) and Baldwin and Ottaviano (2001) suggest that industries characterised by a high degree of intra-industry trade also tend to be industries with a high magnitude of intra-industry FDI. The magnitude of intra-industry FDI, however, is uneven across industries. Within manufacturing, chemicals, textiles, wood activities, office machinery, computers, RTV, and communication equipment have higher than average intra-industry indices. In contrast, intra-industry FDI is less important in transport equipment with an index of approximately 64%. Non-manufacturing, such as real estate, hotels and restaurants, financial intermediation, other business activities, research and

development activities, and trade and repairs, are characterised by a high share of intra-industry FDI at 80% and more.

Furthermore, the degree of intra-industry FDI is quite stable over time in both manufacturing and services. The finding of a stable degree of IIFDI in manufacturing largely corresponds to that of intra-industry trade. However, there is a decrease in the magnitude of intra-industry FDI over time in transport equipment, mining, transport and storage, telecommunications and energy, water and gas. However, the results on the degree of intra-industry FDI should be interpreted with caution, since the extent of intra-industry FDI depends on the level of aggregation. Generally, the higher the level of aggregation the greater the intra-industry indices are.

Table 6 shows the extent of the intra-industry FDI activities disaggregated by both industry and host region (Non-EU) OECD countries, NMS10 and other (mainly developing) countries. Bilateral intra-industry indices for the FDI stock of the EU15 with (Non-EU) OECD countries indicate a complete investment overlap with intra-industry indices in manufacturing and services of 96% and 99%, respectively. The large extent of intra-industry FDI among high-wage industrialised countries suggests that market proximity is more important than production costs in explaining FDI abroad. In contrast, there is little investment overlap between EU15 and the New Member States indicating that the vertical FDI is an important element of FDI abroad into these countries.

Table 7 shows the ratio of inward stock as a percentage of value added for the EU15 as well as the NEW Member States. The ranking of industries according to their FDI intensity tends to be rather similar between the NMS10 and EU15.

Figure 1 illustrates the overall evolution of the ratio of inward FDI stock to value added in the NMS8. Again, the increase in inward FDI is dominated by the strong increase of FDI into financial services. Within the manufacturing sector, the ratio of FDI to value added has more than doubled in all industries from 1997-2005 (Figure 2).

Table 8 shows the level of inward and outward FDI stock as a percentage of value added of the (Extra) EU15 in comparison to the US across industries. The ranking of industries from low to high FDI intensity tends to be very similar between the US and EU15. The ratio of the outward FDI stock to value added is highest in the financial sector followed by mining, chemicals, transport equipment, and food products. At the low end, we find trade & repairs, hotels & restaurants, construction and agriculture. This indicates that sector specific factors seem to be more important than home country specific factors in explaining outward FDI. With respect to the ratio of the inward FDI stock to value added the US is ahead of the EU15 in all manufacturing industries, except chemicals. However, the EU15 have a higher inward FDI intensity in business services and financial service.

Table 6.

Intra-industry FDI indices of EU15 by region (2004)

	Extra EU15	other OECD	NMS10	other countries
Agriculture and fishing	70	38	3	30
Mining and quarrying	40	73	6	9
Food products	79	86	6	–2
Total textiles and wood activities	92	82	8	90
Manufacture of chemicals and chemicals products	92	79	14	65
Total petroleum, chemical, rubber, plastic products	81	95	24	43
Total metal and mechanical products	75	95	–2	28
Total office machinery, computers, RTV, communication equipments	82	79	3	–93
Total vehicles and other transport equipment	64	85	1	24
Manufacturing	79	96	7	44
Electricity, gas and water	32	60	1	26
Construction	38	77	8	2
Total services	88	99	17	76
Trade and repairs	87	93	–19	70
Hotels and restaurants	92	87	48	94
Land transport	77	201	3	16
Water transport	35	90	66	–17
Air transport	39	13	0	215
Total land, sea and air transport	53	100	27	15
Telecommunications	24	47	0	9
Transport, storage and communication	34	55	3	18
Monetary intermediation	49	63	6	37
Other financial intermediation	91	97	30	88
Financial intermediation	86	95	22	78
Real estate	94	79	22	86
Computer activities	70	81	75	36
Research and development	81	90	–3	171
Real estate and business activities	92	88	22	81
Other business activities	88	88	21	42

Source: WIFO calculation using EUROSTAT data (New Cronos).

Table 7.

Inward FDI stock as a percentage of value added in Extra EU15 and NMS10 in 2004

	Intra + Extra EU15	Extra EU15	NMS 10
Agriculture and fishing	1	0	4
Mining & quarrying	95	40	15
Food products	44	19	74
Textiles and wood activities	35	15	50
Chemical, rubber, plastic products, petr.	108	39	86
Metal and mechanical products	24	8	54
Office machinery, computers, communication equip	29	9	43
Transport equipment	42	17	149
Manufacturing	48	18	76
Electricity, gas and water	35	6	60
Construction	3	1	12
Total services	82	27	61
Trade and repairs	25	7	42
Hotels and restaurants	7	3	22
Transport, storage and communication	29	5	39
Financial intermediation	402	144	205
Total	52	18	46

Source: WIFO calculation using EUROSTAT data (New Cronos).

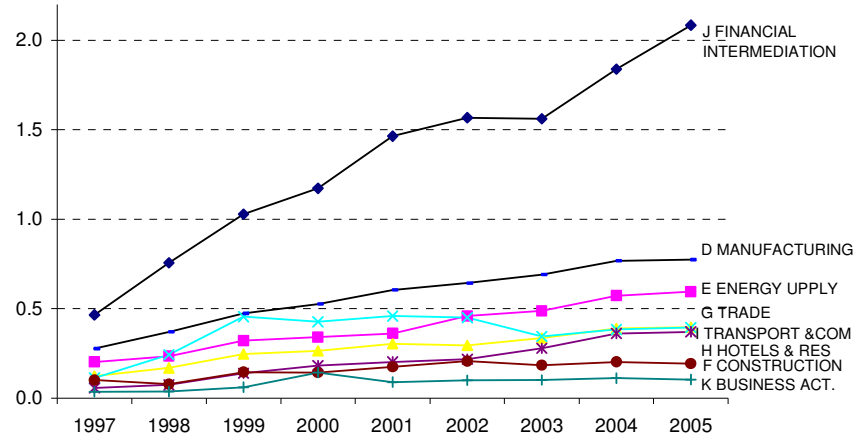
Table 8 also shows the concentration index for the outward FDI stock of Extra-EU15 and the US. Concentration indices are 0.107 and 0.094 for the US and Extra EU15, respectively. This indicates that the level of concentration in the US is similar to the EU15. However, the coefficient of variation is smaller on average in the EU15 than in the US, demonstrating that FDI stocks are more equally spread across industries.

Measurement of sectoral concentration

Sectoral concentration of inward FDI in the EU can be measured by the sectoral concentration index: $CI = \sum_{i=1}^{n} \alpha_{j,i}^2$, *where n denotes the number of sectors and* $\alpha_{j,i}$ *is the share of the inward or outward FDI stock of sector i in country j. The index is bounded between 0 and 1, where 1 indicates that one single sector held the total FDI stock (Görg and Ruane, 2000).*

Figure 1.

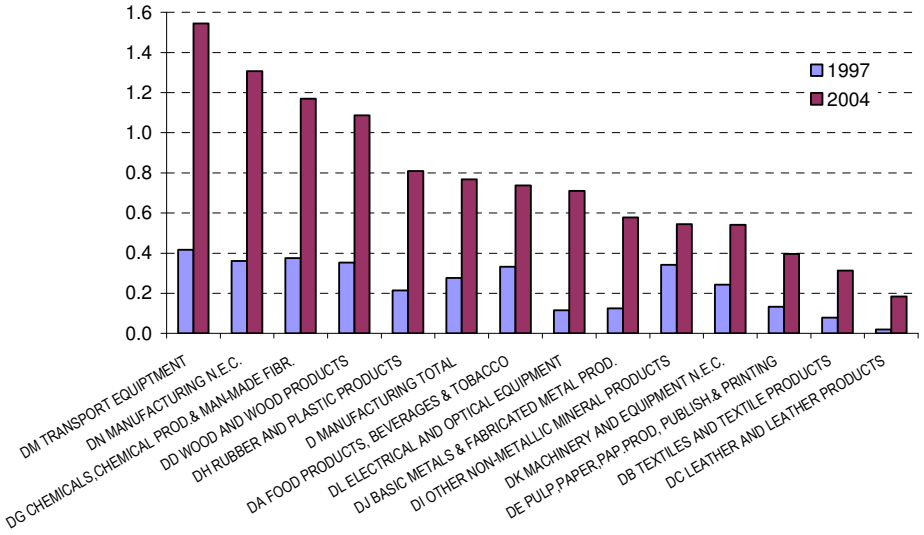
Evolution of the ratio of inward FDI stock to value added in the NMS8



Source: WIFO calculation using WIIW Foreign direct investment database.

Figure 2.

Ratio of inward FDI stock to value added in NMS8 manufacturing



Source: WIFO calculation using WIIW Foreign direct investment database.

Table 8.

Comparison of inward and outward FDI stock as a percentage of value added between Extra EU15 and the US (2004)

	outward		inward		inward & outward	
	U.S.	Extra EU15	U.S.	Extra EU15	U.S.	Extra EU15
Agriculture and fishing	0	1	2	0	2	1
Mining and quarrying	69	160	28	40	97	201
Food products	28	29	17	19	46	48
textiles and wood activities	14	13	16	15	30	29
chemicals	39	57	53	39	92	96
electrical and optical equipment	15	13	13	9	28	22
transport equipment	24	37	31	17	55	54
Manufacturing	25	28	30	18	55	46
Electricity, gas and water	6	31	16	6	22	37
Construction	1	3	1	1	2	4
services	22	35	13	27	36	62
Trade and repairs	11	9	15	7	26	16
Hotels and restaurants	7	4	7	3	15	7
Transport, storage and communication	3	20	10	5	13	25
Financial intermediation	43	192	31	144	75	336
Real estate and business activities	27	14	3	17	30	31
Total	16	25	12	18	29	42
coefficient of variation	1.17	0.73	1.31	0.68	1.35	0.74
sectoral concentration index	.107	.094				

Source: WIFO calculation using EUROSTAT data (New Cronos).

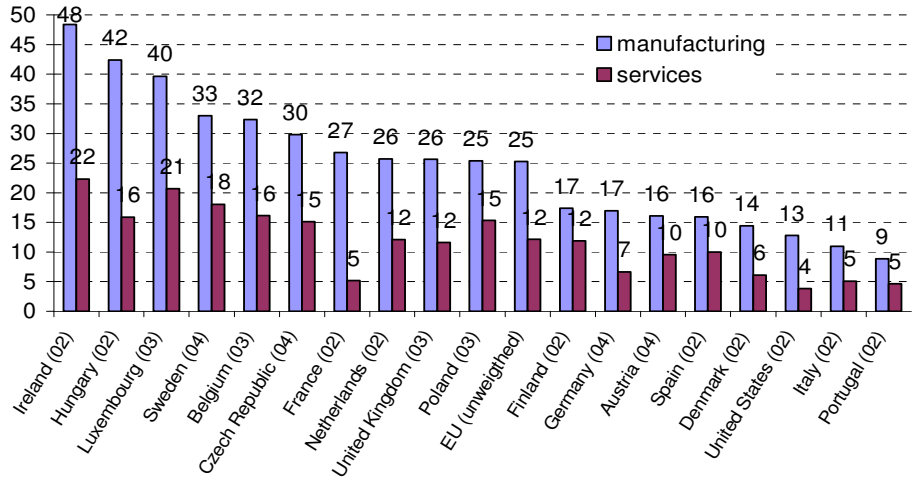
The last two columns contain the inward and outward FDI stock divided by value added. The index measures the intensity of global investment integration at the industry level. In the EU, financial intermediation, mining and quarrying, chemicals, transport equipment, and food products are the most globalised industries. It is noteworthy that the ranking of industries is similar to that in the US.

4. Sectoral pattern of FDI activities based on employment data

In the manufacturing sector of the EU15 countries, the share of employment under foreign control is 19% on average. However, there are wide differences between countries (Table 9 and Figure 3). The share of foreign affiliates in manufacturing employment is highest in Ireland (41%) and Hungary (38%).[4] The employment share of foreign affiliates in the NMS is significantly higher than that of the Extra EU15 but still lower than that of Ireland or Sweden. Furthermore, there is rather significant variation across industries, although a broad pattern exists across industries. Chemicals, transport equipment, and electrical & optical equipment have much higher than average employment shares of foreign affiliates. In particular, electrical & optical equipment is ranked more FDI intensive, based on employment data when compared to the FDI stock data. Service industries tend to be less internationally integrated in terms of foreign affiliate employment than manufacturing industries.

Figure 3.

Employment in manufacturing and services of affiliates under foreign control as a percentage of total employment in 2004 (or latest available year)



Notes: Services do not include NACE 75-93.

Source: OECD 2006, Unctad, German national bank, ITPS Sweden.

[4] For Hungary, the employment share of foreign affiliates in the host country is not consistent across data sources. Based on OECD FATS data, the share of employment of foreign affiliates in Hungary is 63%.

Table 9.

**Share of foreign affiliate employment in the host economy in%
(2004 or latest available year)**

	EU15	selected EU15 countries		selected New Member states			
		Ireland	Swe-den	Czech Republic	Slo-venia	Hun-gary	Po-land
1l0/14 Mining and quarrying	9		15				
15/37 Total manufactur-ing	19	41	33	24	12	38	17
15/16 Food, beverages and tobacco	15	21	35	16	6	30	14
17/19 Textiles, wearing apparel, leather, foot-wear	11		20	16	9	28	10
20 Wood and wood products	11	15	20	10	16	37	11
21/22 Paper & publish-ing	14	25	27	23	14	23	18
23/25 All chemical products	34	58	57	34	14	56	22
26 Non-metallic mineral products	18	14	48	24	11	37	19
27/28 Basic and fabri-cated metal products	15	19	48	15	10	22	9
29 Machinery	24	39	29	21	22	42	13
30/33 Electrical & optical equipment	32	70	39	39	16	60	33
34/35 Transport equipment	30	48	47	53	31	47	35
40/45 Electricity, gas and water supply; con-struction	9		11	9	1	8	2
50/55 Trade, repair; hotels & restaurants	8		18	10	7	15	9
65/74 Finance, insur-ance, real estate, busi-ness act.	8		16	15	3	20	5

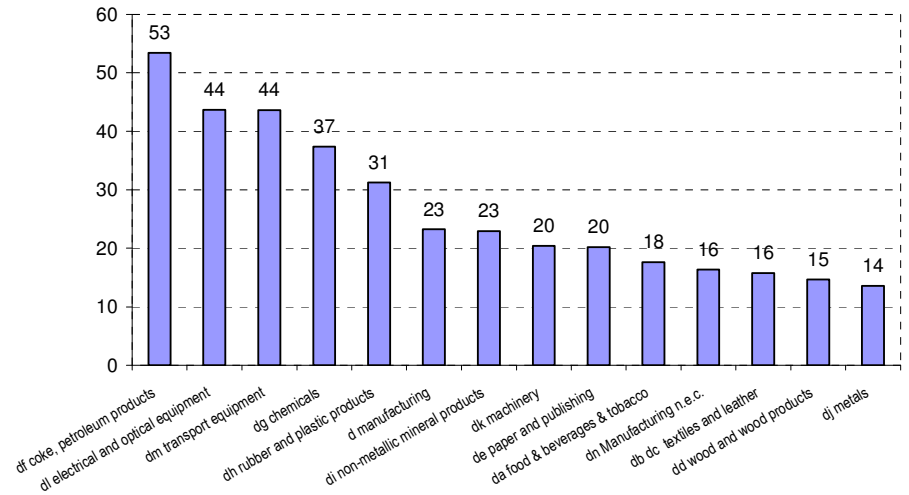
Notes: unweighted average across EU countries. Data refers to 2004 (or latest available year).

Source: UNCTAD, NEW CRONOS, OECD.

Figure 4 provides more detailed sectoral data on the share of foreign affiliate employment in the NMS. Employment in foreign affiliates accounts for over one-half of the total domestic employment in coke and petroleum and 44% of total domestic employment in electrical and optical equipment and transport equipment. Turning to outward FDI, the ratio of foreign affiliate employment of home-based MNEs to employment in the home market is much higher in manufacturing than in services (Figure 5).

Figure 4.

Ratio of employment of foreign affiliates in the host economy to total domestic employment in NMS3, 2004 or latest available year

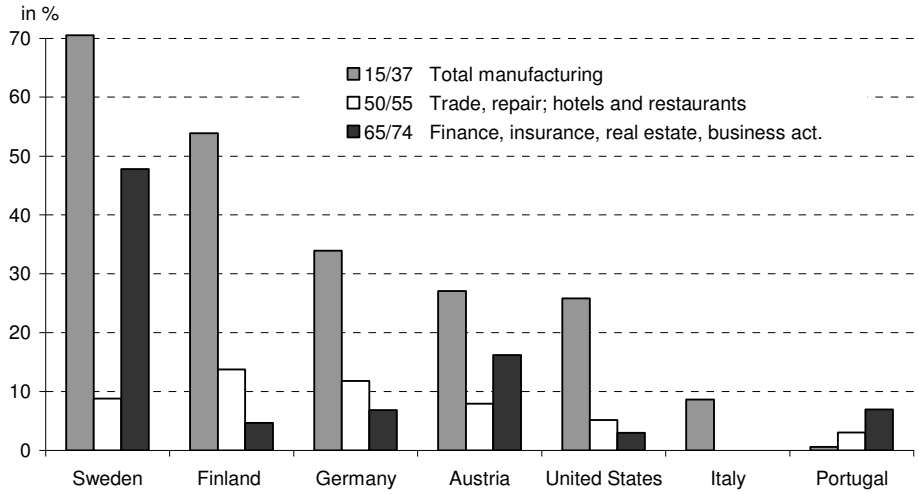


Notes: NMS3 refers to Czech Republic, Hungary and Poland.

Source: OECD FATS, UNCTAD.

Figure 5.

Ratio of foreign affiliate employment of home-based MNEs to employment in the home country, 2004 (or latest available year)



Notes: Data refers to 2004 (or latest available year).

Source: UNCTAD, NEW CRONOS, OECD.

5. Summary and conclusions

It is generally believed that FDI is a source of expertise and new technology and thereby contributes to productivity growth. For this reason, it is not surprising that all governments in the EU offer incentives to attract FDI. Moreover, most governments devote special attention to some target industries into which they would like to attract FDI. Furthermore, the benefits of FDI may not be equal across industries. It is generally expected that the linkages between foreign affiliates and domestic suppliers are more pronounced in manufacturing than in services and/or the primary sector. All of these arguments indicate the importance of the sectoral dimension in the study of the pattern of FDI in the EU. This study documents the sectoral pattern of inward and outward FDI in the EU.

The empirical findings can be summarised as follows:

- Intra EU15 FDI stocks (inward and/or outward) grew faster than Extra EU15 stocks in all industries except transport equipment from 1995-2005. This indicates that FDI has become a key element of the EU integration process, in particular, by making significant progress towards the completion of the internal market programme.

- In the EU, industries differ greatly in their degree of internalisation measured as the FDI inward and outward stock. Financial services, mining and quarrying, chemicals and transport equipment have the highest stock of FDI as a percentage of value added. However, FDI stocks tend to overestimate the degree of internalisation of production since FDI is much less employment intensive in financial intermediation.
- Foreign affiliate data for the EU15 suggest that a significant proportion of domestic production is now accounted for by foreign owned firms, in particular in transport equipment, chemicals, and electronics. Furthermore, the ranking of FDI intensity across industries in the EU15 is rather similar in the US and NMS. Indeed, regression results suggest that industry effects are much more important than host and home country effects in determining the ratio of FDI stock as a percentage of value added across industries at the cross-section level.

A detailed investigation of the sectoral pattern of FDI in the NMS indicates that the intensity of outward FDI is highest in chemicals, transport equipment, and electronic and optical equipment. These industries have a higher than average skill intensity, in turn indicating that outward affiliate production is skilled labour seeking.

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