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DETERMINANTS OF EUROPEAN UNION ENTERPRISES RELOCATION IN BULGARIA*

The article aims at identifying and measuring the determinants of the European union enterprises' relocation in Bulgaria and their impact on the relations between foreign and local enterprises; an area, in which positive effects concerning the recipient country are expected.

The transnational enterprises are engaged with local subsidiary when the costs for technological and another specific transfer are lower than the export costs. The initiatives of the transnational companies depend on the contract enforcement system.

Different practices of foreign investors' entering the country are discussed - through privatization deals as well as through the "Greenfield" investments. The third part of the paper contains the results from covariance and fixed effect models (FEM) for the impact of different sector characteristics on the ratio of FDI and production output of respective manufacturing sector are presented.

JEL: F15; F21; O19

Introduction

Bulgarian transition was influenced by radical events in the winter of 1997. The new economic policy was based on the introduction of the Currency Board and the framing of the reforms by the agreements with the International Monetary Fund in 1998 and 2001. Over the period 1997-2000 massive foreign investments entered the country and were supported by the macroeconomic stability maintained through the Currency Board, the beginning of the radical structural reforms and an active privatization policy. The EU accession perspective and the start of negotiations added a significant external incentive to the vital internal necessities for capital to cover the "resource gap" of the reform policies.

FDI could be beneficial for a host economy due to the following possibilities:

- Creates linkages between foreign affiliates and local firms.
- Domestic competitors may increase their productivity through the working of 'demonstration effects' (imitation of introduced innovations).
- Training of local employees (managerial, marketing and technological knowledge could be later transferred to local firms).

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Factors determining the production location of a multinational company: review of the theories on foreign direct investment

In general, firms that have high quality firm-specific assets (e. g. R&D, marketing and management know-how, product diversification) are expected to have competitive edge on the international market and be willing to expand their production internationally. According to a number of models of multinational firms functioning in imperfectly competitive environment, firms with high quality firm-specific assets (for example 'high tech' firms) tend to become multinational and choose FDI. This theory is supported by Horsmann and Markusen (1992), Brainard (1993), Ethier and Markusen (1996) and Markusen and Venables (1998).

Norbäck (2001) suggests that the *technology transfer costs* were a crucial factor influencing the decision of a multinational firm based in Sweden to shift production to a local affiliate. Norbäck (2001) models theoretically the decision-making process of a multinational firm. Initially, the multinational firm decides on its type of technology (level of R&D intensity), subsequently it decides on the location of the production process (in an affiliate in its home or host country), and finally, on the quantity produced and sold on the market. The firm can choose to either export to a host country (subject to trade costs) or choose FDI and produce in the host country (subject to the cost of implementing the technology there). Norbäck (2001)'s conclusions are that 'high-tech' firms tend to produce in the host country when the technology transfer costs are low. On the opposite, if technologies transfer costs are high (as is usually the case with complex technologies to be transferred from a more developed country to a less developed one), 'high tech' firms tend to produce at home and export abroad. Norbäck (2001) also confirms these results with an empirical study on Swedish manufacturing firms.

Fosfuri, Motta and Ronde (2001) model a situation in which a multinational company can use a more advanced technology in its subsidiary in the domestic country, only after training a representative local worker. The authors study the conditions under which two types of spillovers from FDI arise: technological spillovers (occurring when the worker is later hired by a local firm) and pecuniary spillovers (occurring when the multinational pays the trained worker a higher wage to prevent her/him from switching to a local competitor). They show that the multinational might find it optimal to export to, rather than invest in the domestic firm, in order to avoid both dissipating its intangible assets and payment of a higher wage to the trained workers.

Markusen (2001) emphasizes on another factor influencing the decision of the multinational company, which is the contract enforcement system in the host country. Contract enforcement includes property rights and intellectual property protection (IPP), contract and bankruptcy law and other legal infrastructure. It is generally believed that multinationals prefer strong law contract to exist in the host country. On the opposite, a host country government often opposes this. IPP is seen by a developing country as a source of rent. The literature shows that

instituting IPP, through its effect on the cost of imitation, leads to lower equilibrium imitation rates for less developed countries and lower equilibrium innovation rates in the more developed countries.

Konrad and Lommerund (2001) suggest that in order to explore an *information rent* from producing in the host country and at the same time avoid *hold-ups* specific for the FDI, the multinational companies could set the local affiliate as joint owned with the local agents. The hold-ups are that the government can never perfectly infer the true prices concerning trade between the affiliate and the multinational. Therefore, the affiliate could shift its profits where taxes are lower. There is also a time inconsistency problem. Once investment is made and production is located in the host country, it is in essence sunk cost (also known as irreversible investment). Since the government has incomplete information, it would suspect the local affiliate in tax avoidance and as a countermeasure impose high taxation confiscating the local affiliate's future earnings. This could lead to the multinational freezing its investments. Therefore, under incomplete information both the government and the affiliate could be worse off. A way to alleviate this problem is for the multinational company to sell shares or share the ownership of the local affiliate with local residents. This is known as 'indigenization' of FDI. In this case, the multinational company keeps the control rights of the affiliate and at the same, firstly recapture a part of its initial sunk investment costs, secondly, the multinational still holds its information advantage and enjoys an *information rent*, and thirdly, the government would not be able to impose confiscatory taxation in order not to damage the incomes of the local residents.

Traditional international trade theories stress the importance of labor and other inputs' costs, trade barriers, taxation, exchange rate dynamics etc. In determining the production location decision. Foreign firms might decide to become multinational motivated by the desire to arbitrage costs and profits of two or more countries. This has implications for the labor, capital and goods markets in the two countries. Hatzius (2000) who analyzed empirical data on FDI in the British and German manufacturing industries, showed that due to FDI labor costs became a more important factor influencing domestic investment and long run labor demand.

A special case of that is a situation when foreign firms decide to become multinational because they are losing their competitive edge on their own market. In this case, they might be willing to compensate for their low technological level by importing cheap raw materials or reallocating their production (or parts of it) to a low cost host country. In this case, the positive effects on development and growth in the host country are dubious.

Current state of FDI in Bulgaria

General inflow patterns

Large-scale inflows of FDI are a relatively new phenomenon during the transformation process in Bulgaria. In the period 1997-2000 the total inflows of FDI

amounted to more than 80 % of the FDI inflows for the first ten years of transition. In 2000 the accumulated inflows of FDI reached USD 3,929 mil within a GDP of about USD 12, 500 mil. The figures shown in Table 1 suggest prevailing growth trend of FDI inflows, which according to the preliminary data of the Bulgarian Foreign Investment Agency (BFIA) will not be preserved in 2001. The plunge from USD 1,100 mil in 2000 to USD 688.5 mil could be mainly attributed to low FDI as result of privatization.

Table 1

FDI inflow in Bulgaria during transition (in mil USD)

	Privatization	Capital market Mergers and acquisitions	Greenfield+*	Total for the year
1992			34.4	34.4
1993	22		80.4	102.4
1994	134.2		76.7	210.9
1995	26		136.6	162.6
1996	76.4		180	256.4
1997	421.4	29.7	185.1	636.2
1998	155.8	64.2	400	620
1999	305.7	53.1	447.3	806,1
2000	530	20	550	1,100
Total	1,671.5	167	2,090	3,929

Source. Bulgarian Foreign Investment Agency, 2001.

* Greenfield investment includes: foreign investment in new companies through own resources and credits of the foreign investor.

Despite the positive developments, the share of FDI in the overall investment process in the country - 3.3 per cent of GDP in 1998 and 6.1 per cent in 1999 (IME, 2000) has been far behind the level of domestic investment (15.1 per cent and 17.1 per cent for the same years). Facing the crucial dilemma of coping simultaneously with external debt payments, poverty reduction and investment within a Currency Board Arrangement, governments will have to maintain interest among foreign investors as high as possible and provide substantial flows of external capital. During the transition period there were 3 types of methods for the realization of FDI inflows of different magnitude can be identified: privatization, stock market operations and greenfield investment.

Privatization

Given the considerable amount and state owned assets at the beginning of the transition process in Bulgaria, the methods and government policies of

privatization had major impact on foreign investment. Until 2000 43% of the FDI inflows were accomplished through privatization.

The Bulgarian model of privatization explored a variety of methods and techniques of reaching and executing privatization deals. Until this moment investors could use Brady bonds, from the restructured external debt, traded on the international financial markets and ZUNK bonds, covering accumulated "bad credits" of enterprises taken over by the state. In addition, the so called 'compensatory notes' could be used, which are relatively easily issued by governments to meet state obligations to individual losses in the nationalization or other personal misfortunes caused by the previous regime. Those financial instruments could cover up to 50% of the price of the assets under privatization. According to a KPMG survey, this opportunity has had larger effect on the investors' motivation than future benefits from profit tax holiday (KPMG, 2000, p. 6).

Another advantage achieved through privatization is that early market entrants have had the chance to operate in a favorable environment of indirectly subsidized economic activities (through energy, raw materials, softer budget constraints etc.) and could inherit strong market positions if the business networks are preserved but transformed into private ones. Such was the rather successful experience of companies as American Standard, ABB, Amylum, Interbrew, Solvay, Union Miniere, KNAUF GmbH, etc. that effectively adapted and restructured the privatized enterprises.

Finding reliable strategic investors for the big, often debt-ridden and continuously de-capitalized flagship companies of the "planned economy", has turned to be a serious challenge. Some of those enterprises had been sold for 1 Bulgarian Lev (USD 0.5) in exchange for debt servicing and new investment. The complexity of the problem resulted in failures even of international consultant companies hired to act as intermediaries in the process like Arthur Andersen, KPMG, Price Waterhouse Coopers .

A number of foreign investors managed to obtain bargaining power exercising substantial pressure on government to tailor privatization contracts to their interests. For example, the notorious deal with the Greek-Dutch consortium OTE/KPN for the sale of the telecommunications company in 1999/2000 involved demands for state guarantees for some elements of the financial strategy of the privatized company plus changes in the laws regulating the sector favoring it. Naturally that is behavior afforded only by big, powerful and leading foreign investors (incl. EU based enterprises), and observed in countries of slow and painful transition that leaves less opportunities to the national governments.

Another peculiarity of Bulgarian privatization has been the substantial share of management-employee buyouts, which are entitled to a ten year deferred payment scheme with grace period. MEBOs account for 48 % of all privatization deals in the period 1997-2000 and aimed at compensating for the lack of investor

interests. Over time MEBOs have been increasingly used as a cover screen for third party interests - political/business networks to buy cheaply. With the mounting financial difficulties of MEBO type companies, in an environment of lack of fresh financial resources, formal owners might be displaced through mergers by foreign investors.

With all its contribution, the current role of privatization is phasing out. The FDI inflows received through privatization peaked in 1997 at USD 421 mil. In 2000, more than 76 per cent of the state assets marked for privatization had been already transferred to the private sector and the remaining 400 enterprises were expected to follow in 2001. In the new context FDI are expected to enter the country increasingly through mergers and acquisitions of local private companies, e. g. credit starved MEBOs.

Greenfield investment

In the category "greenfield+" FDI the BFIA includes – shares, reinvested profits, new credits, i.e. items from the liability side of the balance sheet of the new companies. Due to that definition the 'genuine' inflows of greenfield investment can vary substantially. For example in 1998 the level of FDI was USD 620 mil according to BFIA but its 'genuine' level was only USD 401 mil according to the World Bank data; accordingly the 'genuine' greenfield FDI inflows amounted to only about USD 180 mil instead of USD 400 mil as indicated on Table 1.

Greenfield FDI is an important indicator for specific interests and motivation of foreign investors to do business in Bulgaria. Greenfield FDI are predominantly invested in small and medium enterprise (SME) although in the last couple of years large affiliates have appeared as well - the German chain METRO (still the biggest single investment), Liebher (Germany), Astro BILLA (Austria), Ideal Standard (USA), etc. Foreign investment presence in the SME sector seems especially widespread in textiles and clothing, shoes, wood processing, etc. Transition has been difficult for local SMEs but not necessarily foreign ones. While the local companies have been locked in a largely unfriendly banking system, the foreign companies have a wider access to the more favorable financial markets.

Ownership structure

In the shaping of the ownership structures of the companies there is a definite drive among foreign investors to achieve full ownership (100 percent) over the new companies. A survey reveals that 2/3 of the investors own more than 90 per cent of the shares of their companies. The case studies, additional interviews and documentation provide strong additional evidence to that tendency. The strategy followed by foreign investors of establishing effective control over the management of the companies they invest in might be due to their disbelief in the country's legal system, capital markets, and the system of corporate governance.

Table 2

FDI in Bulgaria by countries and years 1992 - 2000

		1992	1993	1994	1995	1996	1997	1998	1999	2000	Total by countries In mln. USD
	Total by years	34.42	102.37	210.86	162.63	256.36	636.96	619.96	806.10 (818.8)	1100.0 (1001.5)	3928.9
1	Germany	0.11	56.63	111.43	16.16	53.1	31.44	55.7	101.30	72.30	498.2
2	Belgium	0	0.14	0.3	10.02	0.79	264.39	31.22	66.22	39.80	412.9
3	Italy	0.01	0.22	5.17	2.27	1.19	0.42	2.06	23.02	339.70	374.1
4	Greece	0.16	5.08	2.97	29.79	14.55	16.1	3.33	14.91	241.1	328.0
5	Cyprus	0.33	1.19	0.39	1.4	7.51	20.55	109.09	108.91	-11.30	238.1
6	USA	0	10.49	16.15	16.1	20.66	46.61	38.6	49.80	37.1	235.5
7	Austria	13.03	1.02	14.66	1.39	12.07	12.46	46.91	23.39	88.8	213.7
8	Russia	0.31	1.35	2.27	15.05	14.37	2.01	14.84	103.74	50.8	204.7
9	Netherlands	0.07	0.52	37.94	0.85	46.27	10.8	41.28	27.96	17.4	183.1
10	UK	6.21	5.55	2.43	13.74	7.26	15.83	58.85	48	22.6	180.5
11	Turkey	0	9.84	1.26	13.74	7.26	9.87	23.76	39.39	19.5	124.5
12	France	0	0.22	4.19	4.99	6.51	0.82	3.35	62.72	28.9	111.7
13	Spain	0.04	0.06	0.01	0	0	49.55	56.8	3.21	0.7	110.4
14	Switzerland	0.38	6.69	0.24	7.87	23.08	31.36	6.58	13.13	15.08	104.3
15	Korea	0	0	0.26	0.2	22.31	22.9	1.78	2.81	6.6	56.9
16	Bahamas	0	0	0	0	0	0	22.76	10.36	14.22	47.3
17	Luxembourg	0	0.58	0.58	0.36	0.23	11.75	22.71	3.81	0	40.4
18	Ireland	0	0	0.02	17.4	0.18	5.21	0.97	3.72	1	28.8
19	Hungary	12.26	0.05	0	0	0.07	0	0.68	0.53 (1.7)	2	16.7
20	Israel	0	0.03	0.93	0.02	1.45	0.01	0.03	13.84	0 (1.9)	10.0
21	Czech	0	0	0.05	2.34	2.28	4.68	0.58	0.09	0	10.0
22	Malta	0	0	0.01	0.12	0.09	0.09	8.9	0	0.5	9.7
23	Liechtenstein	0	1.11	0.13	0.01	0	2.53	0.79	1.28	3	8.9
24	Sweden	0	0	0.01	0.03	1.42	2.36	0.94	1.57	0.3	6.6
25	Japan	0.01	0	0.08	0.5	0.6	1.9	1.89	0	1.3	6.3
26	Denmark	0	0	1.07	0.02	0	1.12	1.58	0.33	1.3	5.4

Source. Bulgarian Foreign Investment Agency, March 2001.

Origin of capital

Concerning the origin of FDI in Bulgaria for the period 1992-2000, Germany was the unchallenged leader, followed by Belgium, Italy and Greece. However, ranking fluctuates over the years since any of the big

privatization deals tends to lead to a significant rearrangement. For example until 1999 Italy contributed only modestly to the FDI inflows. In 2000 though Bulbank, the largest Bulgarian bank was privatized and bought by Unicredito Italiano and consequently Italian FDI from 15-th position jumped to 3-rd. Similarly Greek FDI moved from twelve to fourth position.

FDI inflows are heavily concentrated in terms of origin: in both 2000 and 1999 the first 10 countries contributed to 73% of accumulated FDI inflows. At the same time until 2000 the share of investment originating from the EU comprised 63% of total FDI compared to 56% in the previous year. Disaggregating these figures at company level, 91 of the largest 152 investors were EU companies.

The relatively significant level of investments from countries that are off-shore territories (also known as tax havens), as Cyprus, the Bahamas, Malta suggest intentions of the international capital to test the business conditions in an emerging market such as Bulgaria and define their strategies for the future. In today's globalized world origins are deceiving.

Allocation of FDI by economic sectors

The sectors distribution of FDI over the years has been changing dynamically again with every big privatization deal reshaping the allocation pattern.

The sectors trade and transport were most attractive for FDI in the period 1992-1994. Starting from 1995 investments in industry registered relatively steady growth and by the end of 1999 foreign investment in industry reached USD 1556.53 mil or nearly 55% of the total (Table 3). Trade attracted USD 542.96 (19.2%); finance – USD 324.04 mil. (11.4%), tourism – USD 142.83 (5%). The sale of Bulbank in 2000 has already pushed the share of finance to USD 597 mil and the sector has been almost completely privatized by foreign banks with EU capitals holding about 70 per cent of it. The entering of more serious FDI into the Bulgarian economy is connected with the increase of interest of the foreign investors in the industrial sectors – after 1995 the share of investments in the industry is settled at a level around 60%. Far more insignificant are the shares of the considered perspective sectors, tourism and transport, and the share of investments in the financial sector vary at level around 15%. Entering of some major foreign trade chains since 1998 keeps the share of the trade at a considerably higher level (around 20%). So far the seemingly most unattractive sectors have been telecommunications and agriculture. The expected sale of the Bulgarian Telecommunication Company (BTC) in 2001 can lift the sector to the second position but investment in agriculture most probably will develop at a slow pace due to the actual ban on land purchase by foreign persons.

Table 3

FDI by sectors and by years 1992- 1999, in mil USD

	Sectors/ Years	1992	1993	1994	1995	1996	1997	1998	1999	Total by sectors
1	Industry	0.16	20.82	28.2	94.53	172.48	458.46	310.64	471.24	1,556.53
2	Trade	13.5	70	59.89	20.06	32.37	45.72	177.37	124.05	542.96
3	Finance	0	1.85	18.82	32.34	15.4	64.34	72.23	119.06	324.04
4	Tourism	0.55	0.86	43.31	10.22	23.31	5.7	18.37	40.51	142.83
5	Transport	12.76	2.06	55.21	1.2	4.78	3.11	6.22	-11.73	73.61
6	Telecommuni- cations	6.08	3.97	0	0	0.9	3.58	23.23	14.13	51.89
7	Construction	0.17	0.31	4.77	1.11	1.11	6.19	6.34	6.47	26.47
8	Agriculture	0	0	0	0.06	1.38	4.63	0.06	2.36	8.49
9	Others	1.2	2.5	0.65	3.11	4.62	44.44	5.52	40.01	102.05
	Total by years	34.42	102.37	210.85	162.63	256.35	636.17	619.98	806.10	2,828.87

Source: BFIA, March 2000.

Determinants of the Foreign Direct Investments in Bulgaria: Characteristic and Models of the Impact

In this section an attempt is made to statistically analyze the available empirical data in order to find the determinants and their impact on the decision to commit to FDI (incl. FDI from the EU based companies) in Bulgaria. When a multinational company considers relocating its production to a country, it is concerned with the general political and macro-economic environment in the country, but more importantly the production and market conditions in the specific industry they plan to place their affiliate. A specific external factor or policy decision affects various industries differently, which compels analyzing the FDI data disaggregated by industry. The analysis was accompanied by the usual for a country in transition data availability constraints, such as short series of comparable¹ data and lack of systematic data expressing the quantity and dynamics of certain qualitative factors. In addition, disaggregated statistical data on many economic indicators are available only for the industrial sectors. Considering the complexity of the task, we undertake an impact analysis of the factors in the industrial sectors.

¹ The data series before and after 1990, are not comparable since only during the second period international standards for statistical data collection were introduced.

The Branch Determinants of FDI

The factors whose influence on industrial FDI we study here are those directly related to ensure a foreign investor's comparative advantage on the territory of the host country. According to the international economics theory, if a country offers lower production costs and more market opportunities, *ceteris paribus*, allows for higher profitability and draws higher foreign investments.

A set of specific economic characteristics of industrial sectors could be identified as major determinants for FDI inflow.

1. The *export orientation* of the sector: The *export orientation* of the sector is measured through the ratio between export and total production of the sector. In some typical cases FDI are theoretically considered to utilize the export potential advantages of the host country and sell the products in the home country or third countries markets (Chunlai, 1997, p.20).

2. The *import substitution* of the sector: The *import dependency* of the sector is measured through the ratio between the import of an industry's final product and the total production of the sector. It is assumed that the establishment of an enterprise, producing analogue production in the country, would realize certain comparative advantages displacing the imported production. In other cases, MNCs tend to support imports of finished goods from the parent company when elements of complementarity as well as substitutability among imports and FDI could be identified. The higher the import dependency, the higher is expected to be investment in the industry. (Anastassopoulos, 2000, p.120).

3. The *labor intensity* of production in the industry, measured as the share of the labor costs in the structure of the production costs, is identified as an undoubted stimulating factor for foreign investors to relocate their production. The idea is that the more labor and resource intensive and the less equipment intensive a production is, the less technology transfer costs will be incurred by the multinational company in relocation. At the same time the more labor intensive a production is, the more attractive for FDI will be lower *average wages of full time employees* in the sector.

4. The *material intensity* of the production in the sector is measured through the share of the costs for raw materials, materials and energy in the structure of the production costs of the sector. The access to considerably cheaper local sources of raw materials, as well as cheap energy for production needs is expected also to be a serious incentive for reallocation of production powers.

The intensity of use of the production equipment could be measured through many alternative ways. Here compelled by the data availability, we use as such indicator the amortization costs in the structure of the production costs. The growth of production in the given sector is measured through the indexes of the physical volume of the production toward chosen basic year (1995). It is assumed that these indexes are indicators for the perspectives for eventual favorable development of the branch.

The Bulgarian Foreign Investments Agency provides the distribution of FDI in Bulgarian manufacturing sectors and branches for a four-year period since 1998 up to 2001. Limited ranges of these sectors characteristics are obtained from the official industrial statistics for the same period and the same set of sectors.²

Description of variables

Disaggregated statistical data for the relevant sectors characteristics are available only for manufacturing sectors, which limits the options for using wider range of existing FDI data for econometric modeling. The following set of sectors are used in the study:

1.	Food products and tobacco
2.	Textile and clothing
3.	Leather and leather products
4.	Wood products
5.	Publishing
6.	Petroleum, rubber, plastic and other chemical products
7.	Mineral products (cement, glass, etc.)
8.	Metallurgy
9.	Mechanical products
10.	Electronics, computers and communication equipment
11.	Vehicles and other transport equipment

The variables necessary for the empirical models are as follows:

FDI	Foreign direct investments (million USD)
OUTPUT	Annual output of manufacturing sector (million USD)
EXPORT	Annual export of the sector (million USD)
IMPORT	Annual import of the sector (million USD)
RATEFDI	Ratio of FDI and output of the sector (rate)
RATEEXP	Ratio between export and production of the sector (rate)
RATEIMP	Ratio between import and production of the sector (rate)
LABSHARE	Share of labor costs in total production costs (rate)
MATSHARE	Share of materials and energy costs in total production costs (rate)

² Bulgarian Foreign Investment Agency provides official FDI data on its website: www.bfia.org. The data for manufacturing sectors is obtained by Statistical Yearbooks and Statistical Reference Books for the period 1998-2001, which are official publications of National Statistical Institute of Republic of Bulgaria (the data for year 2001 are preliminary).

In this article we assume that higher rates of export (import) to total production will reflect higher export potential (import dependency) of the sector. It is expected that the variation of these indicators would attract FDI in a systematic pattern. The expected sign of RATEEXP is positive while both directions for RATEIMP are acceptable reflecting different goals targeted by FDI inflow. High shares of inputs are expected to stimulate foreign investment in the sector since the prices of these resources are still relatively low with sufficient quality provided.

Empirical models

Having in mind the data limitations problems we adopt in this study a simplified approach for building and estimation some empirical models of FDI determinants in order to assess their impact on investments allocation in manufacturing sectors. Since the data consists of time series of cross-sections (a panel type of data) the study employed first a *covariance model* accounting for sector-specific and time effects:

$$Y_{it} = \alpha + \sum_{j=1}^K \beta_j X_{jit} + \sum_{i=2}^N \gamma_{it} S_{it} + \sum_{t=2}^T \delta_{it} M_{it} + \varepsilon_{it}$$

where two sets of dummy variables are introduced (Pyndick, Rubinfeld, 1991, p. 225):

$S_{it} = 1$, for i-th sector (i = 2, ..., N=11); 0, otherwise;

$M_{it} = 1$, for t-th year (t = 2, ..., T=4); 0, otherwise.

In this model the dummy variables coefficients should measure the change in the intercepts from sector to sector and from year to year with respect to the first sector in first year (the absence of γ_{11} and δ_{11} is compensated by the constant intercept α).

Pyndick and Rubinfeld (1991, p.226) suggest as well testing the significance of the introduction of these two types of dummy variables based on F criterion. The choice of the unrestricted (covariance) over restricted (all $\gamma_{it}=\delta_{it}=0$) model would be justified if the expected decrease in the residual sums of squares, provided by the covariance model, is significantly larger than the RSS of this model. Otherwise the restrictions are justified and OLS estimation method could be used over the pooled cross-section and time series data.

Another type of regression analysis using panel data, namely the fixed effects model, was also involved in the study³. This approach assumes the existence of an individual effect for each sector; the model is of the following type:

³ W. Greene (2000, p. 559-560) points out that a fundamental advantage of a panel data set over a cross-section is that it allows greater flexibility to the researcher in modeling behavioral differences across individuals. The choice between fixed (FEM) and random (REM) effects model should be subject to statistical testing, but an important remarks could be taken into account. First, the FEM "... might be viewed as applying only to the cross-sectional units in the study, not to additional ones outside the sample" (Greene, 2000, p. 567). This view would not be appropriate if the sampled cross-sectional units were drawn from a large population, but this is not the case we have here. The

$$Y_{it} = \alpha_i + \sum_{j=1}^K \beta_j X_{jit} + \varepsilon_{it}$$

where α_i is considered as constant over time and specific to the particular cross-sectional unit (the i -th sector). After introduction of a series of 10 dummy variables, the OLS method was used to provide estimates of all $N+K$ coefficients of this model.

Results of models estimation

A block-wise procedure was conducted in order to estimate the parameters of different models. The dependent variable is RATFDI and the vector of $K=5$ independent variables X consists of RATEEXP, RATEIMP, LABSHARE, MATSHARE and OUTPUT. The latter is expected to capture possible size effects originating from the manufacturing sector scale. The main results from the covariance model are presented in Table 4.

1. The introduction of dummy variables accounting for time effects does not improve significantly either the pooled or the unrestricted only for sector effects model (the F-test for the change in RSS for both models does not give positive results at the usual significance levels). Unlike this, the involvement of sector dummies could be considered, in some extent, to have some reliable improvement effect on the overall performance of the model. The test for significant change in RSS is in favor of the alternative hypothesis at quite high level (Sig<0.104) but for the purposes of this study we find it acceptable. The model that would be most appropriate for the analysis should account only for sector-specific effects captured by the dummy variables S_i .

2. LABSHARE variable demonstrated acceptable significance in all four models; analogue result was obtained for MATSHARE although just by the first two models. This can be outlined as a confirmation of the initial hypothesis for FDI orientation to resource-intensive industries, for both labor and material resources.

3. The estimate of RATEEXP coefficient was not obtained significant at the usual level but Model 2 provides an acceptable Type I error risk (Sig.<0,105) accounting for the importance of this variable. The impact of the export potential of manufacturing sectors could be found (in some extent) valid. It should be noted here that the volatility of FDI inflow in some sectors is quite high and subjected to shock-like changes. For example, the large investment in *oil processing branch* in 1999 (the takeover of Neftochim Bourgas Plc. by Lukoil Corp.) contrasts significantly with the data for the other years whilst the economic indicators of this

adopted set of manufacturing sectors can in no way be treated as a random sample since they cover almost the entire classification range, and are selected on the basis of available statistical data for FDI inflows. Besides, "... the fixed effects approach has one considerable virtue. There is no justification for treating the individual effects as uncorrelated with the other regressors, as is assumed in the REM..." (Greene, 2000, p.576).

branch remained quite stable during the period, especially the export potential of the chemical branch which is considered as quite high.

4. The insignificant results for RATEIMP escorted by changes in the coefficient sign gave evidence for the lack of substantial net relation between the import ratio and FDI inflow relative to the level of output. The contradictory behavior of this variable supports underline that there are not an empirical prove for clear theoretical insight about the import-FDI relation.

5. There is no scale effect on the FDI inflow distribution since the OUTPUT coefficient is insignificant both in the second and third model where sector-specific effects were accounted for. If formally the pooled data model has to be preferred, the size effect appears as significant. This signals for a potential existence of an interrelation between the sector's scale and FDI inflow where causality could be valid in both directions.

Table 4

Empirical results from the covariance model

Variables	Model 1		Model 2		Model 3		Model 4	
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
(Constant)	-0,6894	0,0400	-1,1407	0,0770	-0,9014	0,2552	-0,8129	0,0609
RATEEXP	0,0137	0,6976	0,1773	0,1045	0,1536	0,2613	0,0015	0,9721
RATEIMP	-0,0095	0,3847	0,0246	0,1597	0,0310	0,0848	-0,0114	0,3397
MATSHARE	1,0977	0,0110	1,4253	0,0506	1,1806	0,1747	1,1218	0,1132
LABSHARE	0,8809	0,0814	1,7234	0,0234	2,6275	0,0758	1,2280	0,0206
OUTPUT	-0,0001	0,0011	-0,0001	0,6824	-0,0001	0,3576	-0,0001	0,0016
S2			-0,2591	0,3157	-0,6139	0,0708		
S3			-0,3312	0,2921	-0,6637	0,0819		
S4			0,0369	0,8826	-0,1467	0,5896		
S5			0,0346	0,8815	-0,1731	0,5036		
S6			-0,0554	0,5007	-0,0657	0,4217		
S7			0,1007	0,6405	-0,0985	0,6863		
S8			-0,1259	0,3354	-0,1792	0,2020		
S9			-0,1308	0,5318	-0,4268	0,1287		
S10			-0,1370	0,5364	-0,3940	0,1517		
S11			-0,1838	0,4772	-0,5346	0,1123		
T99					-0,0864	0,0899	-0,0110	0,7784
T00					-0,0117	0,7829	0,0290	0,4758
T01					-0,0217	0,7328	0,0147	0,7677
RSS	0,2866		0,1737		0,1509		0,2788	
D.f. for RSS	38		28		25		35	
Sig.F	0,016		0,017		0,024		0,072	
R Square	0,297		0,574		0,630		0,317	
Adj. R sq.	0,205		0,346		0,363		0,160	

Analogous block-wise procedure was conducted for FEM parameter estimation. The dependent variable is the same (RATFDI) and two sets of regressors were used: the first set involved the same five variables from the covariance model, but in the second one the scale controlling variable (OUTPUT) was dropped in order to search for any significant changes in the results. The latter are presented on Table 5.

Table 5

Empirical results from FEM

Variables	Model 1		Model 2		Model 3		Model 4	
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
RATEEXP	0.0166	0.6516	0.1773	0.1045	0.0118	0.7666	0.1734	0.1054
RATEIMP	-0.0161	0.1444	0.0246	0.1597	-0.0131	0.2663	0.0258	0.1287
MATSHARE	-0.0608	0.7877	1.7234	0.0234	0.1098	0.6406	1.7600	0.0182
LABSHARE	0.2378	0.0030	1.4253	0.0506	0.0840	0.1391	1.4252	0.0472
OUTPUT	-0.0001	0.0079	-0.0001	0.6824				
S1			-1.1407	0.0770			-1.2491	0.0322
S2			-1.3998	0.0205			-1.4403	0.0144
S3			-1.4718	0.0199			-1.4825	0.0173
S4			-1.1038	0.0592			-1.1152	0.0529
S5			-1.1061	0.0309			-1.1305	0.0244
S6			-1.1960	0.0797			-1.3224	0.0286
S7			-1.0399	0.0591			-1.0668	0.0481
S8			-1.2666	0.0471			-1.3337	0.0287
S9			-1.2715	0.0289			-1.3138	0.0202
S10			-1.2777	0.0301			-1.3058	0.0237
S11			-1.3245	0.0207			-1.3473	0.0166
RSS	0,3207		0,1737		0,3852		0,1748	
D.f. for RSS	39		28		40		29	
Sig.F	0,0001		0,0004		0,0013		0,0002	
R Square	0,463		0,709		0,355		0,707	
Adj. R sq.	0,394		0,543		0,291		0,556	

1. All 11 dummy variables introduced both in Model 2 and 4 proved to be statistically significant which showed the existence of fixed sector-specific effects. The involvement of these dummies provided also significant improvement of the explanatory power of these models. We thus conclude that FEM results (by Model 2) should be preferred for the analysis since its adjusted coefficient of determination (54,3%) is much higher than those of the covariance model (34,6%).

2. It is obvious however that the main results obtained by the Covariance Model 2 are confirmed by FEM 2 concerning the effects of resource intensity and export orientation; the insignificance of import substitution impact and the contradictory changes in the sign of its coefficient took place as well.

3. The previously obtained result for the scale factor insignificance, when accounting for fixed effects, was also confirmed by FEM. If the pooled data model is estimated (without constant term), however, the size effect appears again as significant.

Because of the significant volatility of the dynamics of the FDI in manufacturing sectors, relatively low levels for the adjusted coefficients of determinations were obtained. These unsatisfactory characteristics could be due to formally technical reasons (short data series and respectively small numbers for the degrees of freedom) or, in some extent, to model misspecification problems. It should be noted however that omitted variables problem is very likely to have been realized due to the lack of highly relevant regressors. In this line, a more elaborated study is necessary to incorporate data on larger set of economic indicators for a wider range of economic sectors, including finance and insurance, trade, transport, etc.

Main Conclusions

In the end of the 90s an increase of the total volume as well as increase of the average level of a unit of foreign investment (and especially of EU based international companies) was observed. The FDI inflows are directed mainly towards industry, financial sector and to some extent the trade. As main stimulating macroeconomic factors can be identified:

- Macro-economic and financial stabilization – low inflation rates and fixed rate of the national currency to the Euro;
- Acceleration of the privatization process and the increase of private sector share in Bulgarian economy;
- Opening new sectors to foreign investors;
- Harmonization of Bulgarian tax system to international standards, as well as improving the tax administration operations.

Typical of the FDI in manufacturing sectors is the resource-seeking motivation irrespective of the sector size. These results give a justification of the initial hypothesis that resource-intensity determinants influence the European union enterprises relocation and the foreign investment decision-making. Accounting for the limitations of this study we conclude that the territorial closeness and other location advantages concerning material resource inputs proved to be of significant matter about EU-based FDI inflows.

The hypothesis for the export-platform orientation of European investments was confirmed at an acceptable level of significance. The export potential of different manufacturing sectors has had a stimulating impact on EU investors' interest in Bulgarian industry. Further analysis however is necessary in order to reveal a possible bi-directional character of FDI-export relation.

The expected correlation between EU investments and import substitution did not prove to be valid according to the empirical results obtained from the available data for the period 1998-2001. In some cases high FDI inflow could be considered as supporting sales of imported finished goods but it contrasts with other sectors where the import-output ratio is relatively low. In other cases low relative levels of FDI are associated with high imports ratio.

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