

THE DETERMINANTS OF SECTORAL INWARD FDI PERFORMANCE INDEX IN OECD COUNTRIES

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—Abstract —

The main aim of this paper is to investigate sectoral aspect of foreign direct investment (FDI) in Organization for Economic Cooperation and Development (OECD) countries. In particular we first create Sectoral Inward FDI performance index which allows us to draw conclusions about comparative advantages of a particular country in a certain sector, and then analyse its main determinants in the period 2005-2010 using panel analysis. The results indicate that the main FDI determinants vary significantly across sectors, and this should be taken into account by policy-makers.

Key Words: *FDI, OECD, sectoral analysis, panel data*

JEL Classification: **F21; L52; C33**

1. INTRODUCTION

The World Investment Report (WIR) published annually by the United Nations Conference on Trade and Development (UNCTAD) reports trends in foreign direct investment (FDI) worldwide, and as such represents one of the main sources of FDI data and analyses. UNCTAD has long compared the absolute values of inflows into host countries, which do not take into account the size of the host economy. Since it is plausible that the larger economies would receive more FDI, a need for a more relevant measure of success in attracting FDI emerged. In 2002, therefore, a new measure was introduced - the Inward FDI Performance Index, which captures a country's relative success in attracting global FDI.

Following the UNCTAD approach, in this paper we create the Sectoral Inward FDI performance index (SIPI) for OECD countries, which captures a country's relative success in attracting global FDI in a certain sector. This has not, to the best of our knowledge, been calculated before. Thereafter we proceed to the next step and investigate the determinants of sectoral inward FDI performance for each sector separately, which allows us to draw conclusions about different factors which play a key role in attracting FDI across sectors, and consequently lead to more specific policy implications.

2. SIPI CALCULATION – DATA AND RESULTS

Sectoral Inward FDI performance index (SIPI) is calculated as follows:

$$SIPI_{ij} = \left(\frac{FDI_{ij}}{FDI_{wj}} \right) \Bigg/ \left(\frac{GDP_{ij}}{GDP_{wj}} \right)$$

where, $SIPI_i$ stands for the Sectoral Inward FDI Performance Index in country i in sector j , FDI_{ij} and FDI_{wj} represent the FDI inflows in sector j in the i^{th} country and the World, respectively, while GDP_{ij} and GDP_{wj} stand for GDP in sector j in the i^{th} country and the World, respectively. SIPI equal to one that indicates that the shares of global FDI flows in sector j and global GDP in sector j are equal. Countries with a value of SIPI higher than one in certain sector attract more FDI in that sector than could be expected on the basis of their relative GDP size in particular sector, while countries with values of the index lower than one receive less FDI than would be expected from their size in the given sector.

The FDI data for OECD member countries is taken from OECD International Direct Investment Database, while the data on FDI for the whole World is obtained from UNCTAD World Investment Report. Although the FDI performance index should be calculated using FDI flows, in our calculations we use FDI stocks. The reasons for this are twofold. Firstly, yearly flows data is not available for the whole World; rather three year averages are accessible. Secondly, since our main interest lies in the current situation as regards geographical concentration and distribution of total FDI, stocks are a more appropriate measure. In addition, stocks are a lot less volatile than flows, hence the conclusions drawn for one year hold in general. Since GDP data is available at the whole economy level only, we approximate it with gross value added (GVA), which is available at the sectoral (industry) level. This data is also obtained from UNCTAD (National Accounts). The number of sectors analysed is dictated by data availability, resulting overall in the following sectors: Agriculture, hunting, forestry and fishing (AGR); Construction (CON); Mining, manufacturing and utilities (MAN); Transport, storage and communications (TRANS); Wholesale, retail trade, restaurants and hotels (SALE) and Other activities (OTH). Although in empirical analysis we use indices calculated for years 2005-2010, in Table 1 SIPI is presented only for 2010 for space preservation.

In brief, the indices in Table 1 suggest the following. Only France in Manufacturing, mining and utilities and Greece in Transport, storage and communications have SIPI equal to one, which means that the shares of global FDI stock and global GVA in these sectors for these two countries are equal. Furthermore, Czech Republic, Estonia, Hungary, Netherlands, Poland, Slovakia and Spain have the sectoral FDI performance index higher than one in all the sectors, which suggest that these countries attract more FDI in all sectors than could be expected on the basis of their relative GVA size. Interestingly, most of these countries are ex transition countries. Countries whose SIPI is lower than one in all sectors include: Germany, Ireland, Israel, Japan and Korea. An analysis of each sector separately reveals that Estonia has the highest index in Agriculture, hunting, forestry and fishing. Two other countries also achieved a high value of the index in this sector, and these are Chile and United Kingdom. As far as Construction is concerned, Poland seems to be the most successful in this sector, attracting more FDI than suggested by its GVA. As for the other sectors, Iceland attracts the most FDI in Mining, manufacturing and utilities, Belgium in Other services, United Kingdom in Transport, storage and communications and Estonia once again in Wholesale, retail trade, restaurants and hotels.

Table 1 Sectoral Inward FDI performance index in 2010 for OECD members

	AGR	CON	MAN	TRANS	SALE	OTH
Australia	1.05	2.84	2.21	1.44	1.64	0.55
Austria	0.24	-0.10	0.41	0.60	1.60	2.43
Belgium				3.66		8.55
Canada	2.44	0.45	1.95			
Chile	13.40	0.86	2.38	2.04	1.27	2.64
Czech Republic	3.08	3.05	2.11	1.59	1.73	
Denmark		0.48	1.46	2.96		1.66
Estonia	16.09	2.61	1.90	1.94	3.92	4.41
Finland		0.48	1.39	1.13	1.48	1.30
France	0.58	0.41	1.00	0.51	0.94	1.72
Germany	0.30	0.16		0.73	0.79	
Greece	0.12	0.56	0.81	1.00	0.51	0.27
Hungary	3.98	2.46	2.05	2.74	3.74	2.54
Iceland	0.45	0.90	7.61	0.63	0.70	2.79
Ireland					3.60	
Israel		0.01	0.61		0.08	0.35
Italy	2.01	0.47	0.55	0.90	0.63	0.48
Japan	0.10	0.01		0.05		
Korea	0.29	0.08	0.38	0.18	0.90	0.42
Luxembourg						
Mexico						
Netherlands	1.07	1.32	4.80	1.49	2.51	1.88
New Zealand						
Norway	5.18	0.61	1.31	1.56	1.46	0.91
Poland	2.61	4.81	1.58	1.08	1.81	1.71
Portugal		1.03		0.51	1.20	
Slovakia	1.55	1.28	2.64	1.36	1.59	1.82
Slovenia	0.69	0.19	0.81	0.29	1.64	1.45
Spain	1.48	2.31	2.49	1.85	1.20	1.08
Sweden		2.01		2.04	2.56	1.58
Switzerland				1.34		
Turkey	0.40	0.90	1.03	1.15	0.97	0.87
United Kingdom	10.23	0.89	2.92	4.28	1.83	
United States	1.11	0.24	0.80	0.58	0.67	0.32

Source: OECD, UNCTAD and author's calculations

We next turn to empirical investigation of the determinants of these indices.

3. EMPIRICAL ANALYSIS OF SIPI DETERMINANTS

The issue of FDI determinants has not been theoretically resolved as yet. Empirical studies that investigate these determinants are numerous, and so is the list of the used determinants. In order to resolve this issue Chakrabarti (2001) undertook a variant of Leamer's Extreme Bound Analysis to investigate which coefficients of the explanatory variables studied in the existing cross-country studies on FDI determinants are 'robust' and which are 'fragile' to small changes in the conditioning information set.

Chakrabarti's (2001) quite extensive literature review identified the following potential FDI determinants: market size, labour costs, trade barriers, growth rate, openness, trade deficit, exchange rate and taxes. The rationale is as follows. Market size is important since a larger market means more efficient resource utilisation and exploitation of economies of scale, and should therefore result in more FDI. Market size is typically approximated with GDP per capita of the host country. Labour costs play a role in determining FDI through the influence of cheap labour on attracting multinational corporations. Host country wages or unit labour costs are usually used as the main indicators. The results from various studies remain inconclusive, however, with respect to the direction of influence of wages on FDI. Openness, measured as a share of exports plus imports in GDP, should matter for FDI because most investment goes into tradable sector. Furthermore, the exchange rate is often considered one of the main FDI determinants, which can affect FDI in either direction. Namely, a real depreciation may stimulate FDI by increasing the relative wealth of potential investors and by lowering costs in the host country, while a real appreciation can be associated with increased FDI if it reflects a general surge in capital flows or if it increases protectionist pressures. Since, according to Mundell (1957), trade liberalisation, which allows goods to move freely, should reduce international investment, the existence of trade barriers should also play an important role in determining the amount of FDI. According to Torissi (1985) trade surplus usually indicates dynamic and healthy economy with export potential, which should encourage FDI. Trade deficit, on the other hand, should work in the opposite direction and as such represent an important FDI determinant. The role of growth in attracting FDI has been the subject of controversy. A fast growing economy should provide better opportunities for making profits and therefore encourage FDI. Taxes are also a controversial variable, exerting a positive, a negative and a neutral effect on FDI in various empirical investigations.

Chakrabarti's (2001) analysis dictates the list of potential determinants of Sectoral Inward FDI performance index. Since this index already contains the information on a country's (sectoral) GDP, we do not use GDP per capita as a determinant. Our final list of the used determinants and their sources is given in Table 2 below.

Table 2 Data definitions and sources

Independent variable	Indicator	Source
Labour costs	Unit labour cost index (2005=100), ULC	OECD
Trade barriers	Tariff rate, applied, simple mean, all products (%), TAR	WDI
Growth rate	Gross domestic product (GDP), volume, annual growth rates in percentage, GRGDP	OECD
Openness	Trade (% of GDP), OP	WDI
Trade deficit	Current account balance in percentage of GDP, NX	OECD
Exchange rate	Real effective exchange rate index (2005 = 100), REX	WDI
Taxes	Average rate of income tax and employees' social security contributions (%), TAX	OECD

Note: OECD stands for OECD Statistics and WDI for World Development Indicators published by the World Bank

The dependent variable in our model is SIPI for each of the chosen six sectors, so the final model is given as:

$$SIPI_{ijt} = \alpha_0 + \alpha_1 ULC_{it} + \alpha_2 TAR_{it} + \alpha_3 GRGDP_{it} + \alpha_4 OP_{it} + \alpha_5 NX_{it} + \alpha_6 REX_{it} + \alpha_7 TAX_{it} + e_{ijt}$$

Our sample consists of 34 OECD countries and 6 years (2005-2010). We use panel data analysis to take advantage of greater variation in the data. This also enables more efficient estimation. Since the Hausman's null hypothesis - that the random effects (RE) estimator is consistent - is rejected, we use the fixed effect (FE) model. The results are given in Table 3.

The results indicate that FDI determinants vary across sectors. In Agriculture, hunting, forestry and fishing (AGR) only tariffs are statistically significant and positive indicating that an increase in tariff rate positively influences inward FDI in this sector. In Construction (CON) unit labour costs, tariffs, openness and the current account balance are found to be significant. All except openness exert a negative impact on sectoral inward FDI. As for Mining, manufacturing and

utilities (MAN), tariffs, real effective exchange rate and current account balance are significant in their impact on SIPI, whereby the influence of tariffs and real effective exchange rate is found to be negative and that of current account balance positive. GDP growth rate and taxes, furthermore, exert a positive impact on SIPI in the sector of Transport, storage and communications (TRANS), while the impact of current account balance is negative. In the sector of Wholesale, retail trade, restaurants and hotels (SALE) unit labour costs and real effective exchange rate are found to be negative and significant, while no determinants are significant when it comes to Other activities (OTH).

Table 3 Results for each of the six sectors

	SIPI in AGR	SIPI in CON	SIPI in MAN	SIPI in TRANS	SIPI in SALE	SIPI in OTH
ULC	-0.046	-0.031**	0.002	0.003	-0.018***	-0.016
	(0.339)	(0.046)	(0.883)	(0.751)	(0.006)	(0.175)
GRGDP	-0.064	-0.020	0.009	0.042**	-0.005	-0.006
	(0.453)	(0.441)	(0.700)	(0.022)	(0.695)	(0.777)
TAX	-0.026	-0.041	-0.044	0.052*	0.022	0.012
	(0.826)	(0.300)	(0.174)	(0.083)	(0.203)	(0.682)
TAR	1.693***	-0.275*	-0.388***	0.033	-0.070	0.092
	(0.000)	(0.092)	(0.006)	(0.729)	(0.248)	(0.377)
REX	-0.029	-0.012	-0.013*	-0.004	-0.008*	0.007
	(0.267)	(0.193)	(0.085)	(0.593)	(0.061)	(0.375)
OP	0.045	0.026**	0.010	-0.010	0.002	-0.003
	(0.203)	(0.021)	(0.285)	(0.182)	(0.642)	(0.728)
NX	-0.001	-0.061**	0.042*	-0.041**	0.011	0.009
	(0.991)	(0.026)	(0.057)	(0.028)	(0.370)	(0.662)
_cons	2.875	5.357**	4.205	1.049	3.836***	2.781
	(0.679)	(0.027)	(0.031)	(0.542)	(0.000)	(0.121)
N	106	127	114	137	117	113

*Notes: Numbers in parenthesis are p-values, while ***, ** and * denote significance at 1, 5 and 10 percent, respectively.*

4. CONCLUSION

The aim of this paper is twofold. First we create Sectoral Inward FDI Performance indices for six sectors for OECD member countries, and secondly we use these indices as a dependent variable in empirical investigation and analyse their determinants.

The results of our analysis reveal that the determinants of inward FDI vary across sectors. High unit labour costs discourage inward FDI in Construction as well as in Wholesale, retail trade, restaurants and hotels. This result is in line with expectations as these are labour-intensive sectors where labour costs embody a large fraction of overall costs, and as such may stand as an indicator of competitiveness.

GDP growth rate is found to exert a significant positive effect only in the sector of Transport, storage and communications. Given the potential free-rider problems with cross-border infrastructure projects (i.e. FDI in Transport, storage and communications), there is likely to be under-investment in this sector when left to the market (Beato, 2008). It is therefore necessary for national governments to be important contributors to the financing of such investment. To the extent that GDP growth rate is used as a proxy for the ability of government to finance these investments as well as for potential demand of future users of infrastructure projects, the positive coefficient on this variable comes as no surprise.

Taxes are also found to be positive and significant in their effect only in the sector of Transport, storage and communications. As noted by Blonigen (2005), the impact of taxes on FDI can vary depending on the type of taxes, measurement of FDI activity, and tax treatment in the host and parent countries. In our case this is additionally made complicated by the fact that taxes can vary by sector.

Tariffs are an important determinant of FDI in Agriculture, hunting, forestry and fishing, Construction and Mining, manufacturing and utilities sector. The sign on this variable is positive for the sector of Agriculture, hunting, forestry and fishing, which is in line with tariff-jumping, whereby firms tend to invest in a foreign country (establish a production facility) precisely in order to avoid a tariff. Given

that tariff rates for primary products are, in most countries, higher than for average product, this positive impact is to be expected. Tariffs are, however, found to exert a negative influence on FDI in Construction and Mining, manufacturing and utilities sector indicating that they discourage FDI, i.e. we find no evidence of tariff-jumping in this sector.

Real exchange rate exerts a negative and significant impact on FDI in two sectors only: Mining, manufacturing and utilities sector and Wholesale, retail trade, restaurants and hotels. As argued previously, the literature on this variable is ambiguous, indicating that the impact could go either way, while our data seems to be supporting the view that real appreciation lowers FDI in these sectors.

Finally, openness is found to be significant and positive only in Construction sector, while current account deficits seem to encourage FDI in Construction as well as Transport, storage and communications, but put off FDI in Mining, manufacturing and utilities.

Overall our results indicate that a unified approach to FDI across industries is not satisfactory, as the main determinants vary by sector. Policies aiming at attracting FDI should, therefore, keep these differences in mind.

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