Economics Bulletin

Volume 31, Issue 3

The determinants of foreign direct investment outflows from the European Union countries.

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Abstract

This paper employs a panel econometric model, and takes the horizontal and vertical FDI approach into account in the same empirical specification to scrutinize the determinants of FDI outflows from the selected EU countries at the industry level. We show that both cost related factors and potential demand are important and they mostly significantly affect FDI outflows from these selected EU countries.

We would like to thank the editor and anonymous referee(s) for very helpful comments. The usual disclaimer applies.
Citation: Hakan Mıhcı and Selim Çağatay and Onur A. Koska, (2011) "The determinants of foreign direct investment outflows from the European Union countries.", *Economics Bulletin*, Vol. 31 No. 3 pp. 2653-2666.
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Submitted: November 25, 2010. **Published:** September 16, 2011.

1 Introduction

Over the last three decades, the pace, scope and scale of the internationalization of production and consumption of goods and services have been impressive. In particular, since the 1990s, growth rates of foreign direct investment (FDI) have outpaced those of trade. An important aspect of FDI is that it is not evenly distributed across countries such that the majority of FDI is undertaken by developed countries and most FDI takes place within OECD countries. Particularly, the European Union (EU) and the USA have the largest shares of FDI inflows and outflows.[1] The current study examines the determinants of FDI outflows from the selected European countries which we refer to as the EU-12 countries.[2]

Statistical evidence indicates that, until 2001, the main recipient of EU FDI was the USA which was followed by some other OECD countries. By contrast, since the 2000s, some non-OECD countries have been the targeted group by the EU countries. Also, a significant value of EU FDI has been undertaken in Central and Eastern European countries (CEECs) since 2001.[3] In South-East European countries (SEECs), however, the EU countries invest less compared to their investment in CEECs. In general, the SEECs — Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia and Romania — are less developed than the CEECs — Czech Republic, Hungary, Poland, Slovakia and Slovenia — and attract less FDI. In particular, the EU countries, Germany, Netherlands, Austria and Italy, are among the top investors in both SEECs and CEECs (OECD 2000, 2001; UNCTAD 2003).

There is generally a positive trend of FDI flows from the EU to new member countries and/or to candidate countries. Clausing and Dorobantu (2005) focus on the 28 host countries – the EU member countries, candidate countries and non-member countries – over the period 1992-2001 and examine the impact of future membership announcements on FDI received by various Eastern European countries.[4] According to their finding, the EU membership substantially increases the amount of FDI received by those countries. Frenkel *et al.* (2004) analyze the determinants of FDI inflows to emerging countries and,

[1]Data regarding these facts can be obtained from the World Investment Report (UNCTAD, various years). Also, these facts can be found in various studies, e.g., Markusen (2002) and Navaretti and Venables (2004).

[2]In the period 1952-1986, there were 12 member countries — Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden and the United Kingdom — in the EU, and so the EU-12 consists of these 12 member countries. Three more countries, Austria, Finland and Sweden, were granted membership in 1995, so the EU-12 became the EU-15.

[3]For detailed statistical tables see http://ec.europe.eu/eurostat.

[4]Between 1992 and 2001, FDI stocks soared in those countries; FDI stocks increased from two per cent of GDP on average to 40 per cent of GDP.

by using a panel approach, show that the classic explanatory variables in the gravity model (i.e., market size and distance) are significant factors affecting FDI inflows.

Bevan and Estrin (2004) investigate the determinants of FDI outflows particularly from the EU to CEECs. According to their finding, unit labor costs, gravity factors, market size and proximity are the most significant determinants of FDI flows.[5] Also, they find that proposals of potential future member countries for the EU membership significantly affect FDI flows. Similarly, Carstensen and Toubal (2004) examine the determinants of FDI inflows to CEECs and find that traditional factors such as market potential, relatively low unit labor costs, relative factor endowments and a skilled labor force have significant and plausible effects. Bevan et al. (2004) show that the quality of formal institutions in host countries is also important and positively affects FDI flows.

In this study, we are in particular interested in identifying the determinants of FDI outflows from the EU-12 at the industry level. We take two different FDI approaches into account in the same empirical specification, and use a panel econometric model to scrutinize the factors affecting FDI outflows from the EU-12. We mainly focus on mining and quarrying and total manufacturing industries. Our main finding is that both cost related factors and potential demand are important and they mostly significantly affect FDI outflows from the EU-12.

The remainder of the paper is structured as follows. The model is specified in Section 2. In Section 3, we first introduce data and the methodology, then we discuss the results. Finally, Section 4 concludes.

2 Background and the model

In the theoretical literature on multinational enterprises and FDI, there are two benchmark approaches: the transaction cost/internalization paradigm and the OLI paradigm.[6,7] Both the internalization and OLI paradigms are rather informal approaches. A synthesis

[5] Some academic scholars explain the relationship between trade and FDI by a trade-off between proximity — avoiding transport costs by undertaking FDI, and so by locating production close to consumers — and concentration — concentrating production in one location — e.g., see Brainard (1993, 1997).

[6] According to the transaction cost/internalization paradigm, in the presence of market imperfections and transaction costs, it may be more efficient for a firm to use an internal market rather than incurring prohibitive transaction costs of an outside market; see Rugman (1982, 1986) and Hennart (2001).

[7] According to the OLI paradigm, firms must possess specific advantages in order to produce across borders in the presence of transaction costs. In particular, the OLI paradigm articulates three sets of determinants of international production: (i) ownership advantages, (ii) location advantages, and (iii) internalization advantages (Dunning 1977, 1981, 1988, 1998, 2000). Also see Koska (2010) for a review of the literature on FDI theory.

of several approaches that have developed the internalization and OLI approaches into a consistent and formalized analytical framework is referred to as the knowledge-capital model (Markusen 2002). The knowledge-capital model distinguishes between horizontal and vertical FDI.

In horizontal FDI, firms duplicate a subset of activities in foreign countries' markets and produce roughly similar goods and services to those that their headquarters produce. The main motive is to have better market access to exploit demand in large markets and to avoid high trade costs. So factors that reflect market potential as well as trade/transport costs are important in the analysis of horizontal FDI.

Vertical FDI refers to geographically fragmenting the production stages. In vertical FDI, firms locate production processes where they can be performed at the lowest cost. That requires different factor intensities in separable parts of the production process. So firms can benefit international factor price differentials, provided that countries have significantly different relative factor endowments. In contrast to horizontal FDI, (i) market potential is not critical for vertical FDI, and (ii) the fragmentation of production is likely to be encouraged by low trade costs rather than high trade costs.

According to theoretical predictions, horizontal and vertical FDI are affected by different sets of factors.[8] To this end, we follow the main arguments of both the horizontal and vertical FDI approach, and we use potential determinants of horizontal and vertical FDI together in the same specification.[9] We focus, in general, on the indicators of (i) production costs such as gross fixed capital formation, wage rates and total labor costs, long-term and short-term interest rates, and price indices of electricity, petroleum and energy, etc., and of (ii) market size and potential demand such as per-capita income, real GDP and population growth rates, and share prices, etc.[10] Also we consider environmental regula-

[8] See Navaretti and Venables (2004), Redding and Venables (2004), Head and Mayer (2004) and Mayer (2006) for discussions of determinants of horizontal FDI.

[9] We carry out a number of estimations by using either only potential determinants of horizontal FDI or only those of vertical FDI. Neither of these estimations is successful in explaining the variation in FDI flows as our data contains both types of FDI. Therefore, these estimations are excluded from the text.

[10] There are many other country-specific factors that may affect firms' FDI decisions such as (i) economic stability which is often proxied by inflation/exchange rates, foreign debts, trade/budget deficits, and/or government expenditures, etc., (ii) social and political stability which are often proxied by the number of political assassinations, riots and coups, etc., and (iii) physical infrastructure, which is often proxied by urbanization rates, the number of telephone lines, the frequency of power outages, internet usages, railroads/highways/seaports, and (iv) institutional infrastructure, which is often proxied by the depth of financial markets, firms' entry/exit procedures, competition policies, privatization methods, transparency (corruption), and the rule of law, etc. We shall note that, although there are mixed empirical results, such variables are important especially to scrutinize FDI to developing countries, where a sufficient cross-country variation can be captured. This is beyond the scope of this paper. For discussions of such variables, see Chakrabarti (2001), Asiedu (2002), Clausing ve Dorobantu (2005), Blonigen (2005), Moosa ve Cardak (2006), de Mello-Sampayo (2009) and Faeth (2009).

tions as they may significantly influence production costs. In particular, we include the *environmental sensitivity index* in the empirical specification.[11] We include also shares of exports and imports in GDP so as to explore the relationship (i.e., substitutability vs. complementarity) between trade and FDI outflows from the EU-12. The implicit form of the estimated equation is given by eq. (1):

$$(FDI/GDP)_{i,\,m} = f\Bigg(\underset{(+)}{Kform_i},\ \underset{(+)}{LCost_{i,\,m}},\ \underset{(+)}{IntR_i},\ \underset{(+)}{ESI_i},\ \underset{(+,\,-)}{[X/GDP]_{i,\,m}},\ \underset{(-)}{\Delta GDP_i} \Bigg) \quad (1)$$

i	:	Country[12]
m	:	Industry[13]
FDI/GDP	:	Ratio of total FDI outflows to GDP
$Kform$	:	Gross fixed capital formation
$LCost$	:	Real labor costs
$IntR$	:	Short-term interest rates on bank loans
ESI	:	Environmental sensitivity index
X/GDP	:	Share of exports in GDP
ΔGDP	:	Real GDP growth

In eq. (1), the dependent variable, denoted FDI/GDP, is the ratio of total FDI outflows from country i — only the selected industries — to country i's gross domestic product (GDP). The expected sign of the coefficient of each variable in eq. (1) is given in parentheses. For instance, in country i, the share of exports in GDP, denoted X/GDP, should be expected to have a coefficient with a negative (positive) sign, if exports and FDI outflows — for country i — are substitutes (complements). As is given by eq. (1), we expect a negative relationship between growth rate of real GDP, denoted ΔGDP, and FDI outflows. The reason is as follows. We expect that an increase in ΔGDP will increase overall domestic demand which may decrease FDI outflows, especially of the type horizontal FDI.

We expect a positive relationship between gross fixed capital formation, denoted $Kform$, and FDI outflows. The larger is $Kform$ — the larger is the amount of domestic capital available for investment — the larger is the amount of capital that a country can invest

[11] The environmental sensitivity index measures and compares the overall environmental stringency of countries; see Çağatay and Mıhcı (2003, 2006) and Mıhcı *et al.* (2005) for details.

[12] Countries consist of Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden and the United Kingdom.

[13] Industries consist of mining & quarrying and total manufacturing.

abroad. Similarly, if there is an increase in domestic production costs, FDI outflows — especially of the type vertical FDI — may increase. Therefore, we expect a positive relationship between FDI outflows and the environmental sensitivity index, denoted ESI, short-term interest rates, denoted $IntR$, and labor costs, denoted $LCost$, which are all the indicators of production costs. In the next section, we first introduce the data and methodology, then we present and discuss the estimation results.

3 The estimation results

The sources used to extract data for each variable are given by Table I (see the Appendix). We treat our data as a panel as we focus on FDI outflows from 12 countries, the EU-12, over the period 1997-2003. The total number of observations in our sample is 148. We use the fixed-effects (FE) model to estimate eq. (1), because we want to discuss particularly the determinants of FDI outflows from a specific set of countries. We shall note that, in the empirical literature on FDI determinants, FE models are commonly used to delineate the causes of changes in FDI flows within a country or region as they produce unbiased/consistent estimated coefficients. To justify the appropriateness of the estimation method, we first estimate eq. (1) by using both the FE and the random-effects (RE) models. Then we run a Hausman test, results of which show that the χ^2 test value is significant with prob. 0.0005, so the null hypothesis suggesting that using the RE model does not lead to any misspecification is rejected; see Table II in the Appendix. Moreover, the differences between the coefficients estimated by the two different estimators are statistically significant, especially for the variables $Kform$, $LCost$, and X/GDP, which eventually leads us to use the FE model.

We examine the data and estimation results for possible issues such as collinearity and heteroskedasticity. We find no evidence of collinearity or of any obvious estimation problem, except heteroskedasticity (see Table III in the Appendix). We use White's (1980) correction for heteroskedasticity. We estimate eq. (1) by using the estimated generalized least squares (EGLS). A summary of the estimation results obtained from estimating eq. (1) is given by Table IV (see the Appendix).

In eq. (1), we estimate FDI outflows from the EU-12 to the rest of the world at the industry level. Our data does not allow us to include all industries in the estimation, so we confine our analysis to only two industries, mining & quarrying, and manufacturing. We select these industries for the following reasons. Statistical evidence shows that (i) within the primary sector, mining & quarrying have the largest share in FDI, which is, on average, 95 per cent, and (ii) the total share of the primary sector and manufacturing in FDI is approximately $40-45$ per cent, on average; see UNCTAD (2005). Also we would

like to find out about the impact of ESI on FDI outflows from the EU-12, and we expect that the higher is ESI, the higher is FDI outflows, especially in the polluting industries such as mining & quarrying and manufacturing.

The estimation results given by Table IV show that the explanatory variables explain 79 per cent of the variation in FDI outflows from the EU-12. Apart from the variable $IntR$ — which is statistically significant at the 5 per cent significance level — and the variable $LCost$ — which is not statistically significant at any significance level — all the coefficients are statistically significant at the 1 per cent significance level. The signs of all the coefficients are consistent with *a priori* expectations.

The empirical results obtained from estimating eq. (1) show that both cost related factors and potential demand significantly affect FDI outflows from the EU-12. The variable ΔGDP — real GDP growth — for instance, has a significant negative impact on FDI outflows from the EU-12. The higher is ΔGDP in a country, the lesser is its FDI outflows. The result partly stems from the fact that our data includes both horizontal and vertical FDI, and that the study focuses on FDI outflows particularly from the EU-12, where market-seeking (horizontal) FDI is mostly undertaken.[14]

As for the cost related factors, we find a significant positive impact of the variable ESI — the environmental sensitivity index — on FDI outflows from the EU-12. This result supports the argument that the higher is the country's overall environmental sensitivity index, the higher is the country's FDI outflows. This result prevails especially in the polluting industries, mining and manufacturing industries, that may support the *industrial flight* hypothesis.[15] The intuition is the following. An increase in the relative environmental sensitivity index of a country may reflect an increase in production costs and a deterioration in domestic firms' competitive position — a deterioration especially in the competitive position of firms operating in polluting industries — that may lead to a decrease in domestic production — due to relocating production in countries with laxer environmental standards — and so to an increase in the country's FDI outflows.

According to the estimation results, the variable $Kform$ — gross fixed capital formation — that reflects the availability of capital for investment positively affects FDI outflows from the EU-12. Similarly, the variable $IntR$ reflecting the return on capital when it is diverted from FDI to elsewhere — the opportunity cost of spending capital on FDI

[14] Statistical evidence show that horizontal FDI accounts for the dominant share of FDI, and that the EU and the US have the largest shares in both FDI inflows and outflows; see Markusen (2002), and Navaretti and Venables (2004).

[15] Mıhcı *et al.* (2005) find also some empirical evidence that ESI has a significant impact on the OECD countries' FDI outflows. Co *et al.* (2004) and Kolstad and Xing (2002) find similar results in the case of US FDI outflows.

— negatively affects FDI outflows from the EU-12. We were expecting to find a similar result for the variable $LCost$, real labor costs. Although the sign of its coefficient is consistent with *a priori* expectations, we find that $LCost$ is not statistically significant. We shall note that there is a number of studies that find mixed results (negative, positive, or insignificant) when measuring the impact of labor costs on FDI (see Chakrabarti 2001). Also the following remarks are in order. FDI is mostly undertaken by developed countries, and most FDI goes to developed countries (see Markusen 2002, and Navaretti and Venables 2004). As is predicted by traditional models of international trade, skilled labor is abundant in developed countries, and earns similar wages. So a statistically insignificant $LCost$ should not be so surprising.

In eq. (1), we include X/GDP to find out about the relationship between trade and FDI outflows from the EU-12. The result shows that FDI outflows from the EU-12 is the substitute for trade in mining and manufacturing industries as the coefficient of X/GDP is statistically significant and has a negative sign. Similarities in factor endowments of the countries in our sample as well as the above facts must have led to this result. Also we find that FDI outflows from the EU-12 are more responsive to the changes in X/GDP, ESI, and $Kform$ than they are to the changes in ΔGDP, $IntR$, and $LCost$.

At last but not least, we show that there are variations in the constant term across the cross-section units (see Table IV in the Appendix). We find that the constant term varies significantly across the twelve EU countries, that is, the twelve EU countries are not homogeneous. The difference in the characteristics of the countries in our sample affects the significance of the explanatory variables, given by eq. (1), in explaining FDI outflows from the EU-12. For instance, Belgium, Finland, Netherlands and the United Kingdom are likely to have similar characteristics, but the rest is probably different from these four countries. Similarly, the constant term varies significantly across the two industries. Each of the two industries probably has different characteristics affecting the significance of the explanatory variables.

4 Concluding remarks

The main objective of this study is to identify the determinants of FDI outflows from the EU-12. We have used two different approaches, the horizontal and vertical FDI approach, in the same empirical specification. The main emphasis has been placed on the factors affecting FDI outflows, especially from the EU-12, in pollution-intensive industries. In particular, we wanted to make progress on discussions whether EU FDI is driven by only cost related factors, or by factors related to potential demand of the host countries. The main finding of this study is that both cost related factors and potential demand are

important and mostly significantly affect FDI outflows from the EU-12. We have shown that FDI outflows from the EU-12 are responsive to the stringency of environmental regulations, especially in pollution-intensive industries. Also we have found that FDI outflows from the EU-12 are the substitutes for exports in these industries.

Appendix

A.1 Data Sources

Table I: The sources of data

	OECD	**WEF**	**Eurostat**
FDI	2001 2004a	x	x
Kform	1999a 2004b	x	x
GDP	1999a 2004b	x	x
X	1999a,b 2004b,c	x	x
ESI	x	2000 2001 2002 2005	x
LCost	x	x	2006
IntR	x	x	2006

A.2 The Hausman Test

Table II: Hausman Test Results

Correlated Random Effects (RE)			
Test cross-section RE			
Test Summary	**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	**Prob.**
Cross-section RE	24.322092	6	0.0005
Cross-section RE test comparisons			
Variables	**FE**	**RE**	**Prob.**
Kform	0.01	0.017	0.0450
X/GDP	-1.52	0.52	0.0037
ΔGDP	-0.02	-0.025	0.1472
IntR	0.05	-0.032	0.1847
LCost	0.005	0.013	0.0002
ESI	0.01	0.039	0.7561

A.3 The correlation matrix

Table III: Correlation Matrix — Total FDI Outflows by Industry

	FDI/GDP	*X/GDP*	*Kform*	*Lcost*	*ΔGDP*	*IntR*	*ESI*
FDI/GDP	1.0000	0.2873	0.0588	-0.1724	-0.1710	-0.1651	0.2647
X/GDP	0.2873	1.0000	-0.0562	0.0513	-0.0009	0.1103	-0.1613
Kform	0.0588	-0.0562	1.0000	0.3350	0.2639	-0.2241	-0.1231
Lcost	-0.1724	0.0513	0.3350	1.0000	0.5073	0.0156	-0.5376
ΔGDP	-0.1710	-0.0009	0.2639	0.5073	1.0000	-0.1331	-0.4497
IntR	-0.1651	0.1103	-0.2241	0.0156	-0.1331	1.0000	-0.1168
ESI	0.2647	-0.1613	-0.1231	-0.5376	-0.4497	-0.1168	1.0000

A.4 Summary statistics

Table IV: Estimation Results — FDI Outflows by Industry

Sample: 1997-2003					
Total panel (unbalanced) observations: 148					
Dependent Variable: FDI/GDP					
Estimation results					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity
Kform	0.01	0.00	7.32	0.00	1.25
X/GDP	-1.52	0.65	-2.35	0.02	-1.40
ΔGDP	-0.02	0.00	-5.87	0.00	-0.08
IntR	0.05	0.03	1.91	0.06	0.39
Lcost	0.005	0.01	0.71	0.48	0.65
ESI	0.01	0.00	3.54	0.00	1.28
C	-0.79	1.13	-0.70	0.49	
Diagnostics					
R-squared	0.83	Durbin-Watson statistic			2.11
Adjusted R-squared	0.79				
S.E. of regression	0.86				
F-statistic	20.09				
Prob(F-statistic)	0.00				

Variations in the constant term			
Across countries		Across industries	
Austria	-1.48	Mining and Quarrying	-17.80
Belgium	3.26		
Denmark	-1.27	Total Manufacturing	17.27
Finland	3.06		
France	-1.47		
Germany	-1.20		
Italy	-1.32		
Netherlands	3.37		
Portugal	-2.05		
Spain	-1.08		
Sweden	-0.47		
United Kingdom	0.12		

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