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Foreign Direct Investment in Southeast Europe

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Foreign Direct Investment in Southeast Europe

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Edward Christie

Foreign Direct Investment in Southeast Europe

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Abstract

This paper applies a gravity model to foreign direct investment (FDI) stocks in five countries of Southeast Europe from nine selected Western European source countries, using five countries of Central Europe as a control group. Basic elements of the economic theory on FDI are shortly reviewed, then the discussion shifts to recent empirical work and the various issues surrounding estimates using the gravity equation.

FDI to Central Europe is mainly of the horizontal, market-seeking type. The evidence for Southeast Europe is less clear. Both types co-exist and, if we exclude Croatia, we are led to conclude that neither the vertical, efficiency-seeking type nor the horizontal type dominates. The countries of Southeast Europe overall are found, unsurprisingly, to have lower than normal stocks of FDI in relation to the countries of the control group, GDPs and geographical distances to investing countries accounted for. Through the estimation of a gravity equation for trade using the residuals of the FDI gravity equation, evidence is found in favour of complementarity, rather than substitutability, between trade and FDI for the control group. No conclusive evidence is found in favour of either for the countries of Southeast Europe.

Keywords: foreign direct investment, gravity model, Southeast Europe, proximity-concentration trade-off, economic geography

JEL classification: F21, F23, P17

Edward Christie

Foreign Direct Investment in Southeast Europe

Introduction

Why do some firms choose to set up a foreign affiliate, thereby generating foreign direct investment (FDI), rather than exporting to the corresponding foreign market or licensing a local firm?

The traditional approach to analysing which factors drive FDI, the Ownership-Location-Internalization (OLI) framework, was introduced by Dunning (1977) and considers three types of advantages for firms that opt for FDI:

- ownership advantages: assets such as patents, trade secrets, reputation and so on mean that the firm has a competitive advantage over foreign producers (without which the firm would not consider the foreign market at all);
- location advantages: through its affiliate, the firm has easier customer access, saves on transport costs and avoids tariffs and other barriers (FDI rather than exporting);
- internalization advantages: owning an affiliate is preferable to licensing another firm so as to keep the firm's knowledge assets inside the firm. Otherwise, a licensee, once it has learned all the firm's technology, may defect and become a direct competitor (FDI rather than licensing/franchising).

In this paper we leave the issues of licensing/franchising aside and focus on the two most important channels through which a firm can sell its goods in a foreign market: exports and FDI.

The OLI framework indicates that choosing between these two channels comes down to assessing the location advantages to see whether they are large enough to motivate FDI. Against this the firm must consider the cost of setting up the affiliate. Furthermore, if one assumes increasing returns to scale, there is a loss due to the fragmentation of production linked to FDI.

The concentration-proximity trade-off

Brainard (1993) exposes a theoretical model that gives rise to the concentration-proximity trade-off. Brainard (1997) is an empirical paper that summarizes the model and expands it, leading to an empirically testable modified gravity model. We first present a brief summary of his model's main features and then compare his approach to Brenton, Di Mauro and Luecke (1999) and Di Mauro (2000), which both use gravity models.

Brainard's model presents features that are familiar from economic geography:

- There are two countries A and B at a geographical distance D from each other
- Factors and consumers are immobile between countries
- There is symmetry in factor endowments and consumer distribution across countries
- There are two types of goods: Homogeneous (say, agricultural), and Differentiated (say, manufactured)
- Wages are determined in the homogeneous goods sector
- In the differentiated goods sector there are increasing returns to scale
- There are strictly positive per-unit transport costs for the differentiated goods, increasing in distance

These two last assumptions are the key as they cause, depending on the values of the model's parameters, firms from a given country either to concentrate production or, on the contrary, to expand across the border.

We refer the reader to Brainard (1993) for the details of the model. Familiar features from economic geography are found, notably the Dixit-Stiglitz type CES sub-utility and monopolistic competition in the differentiated goods sector.

The main point is that firms should expand horizontally across the border ('horizontal FDI') when the advantages of direct access to the foreign market's consumers (which are to avoid the additional variable transport costs, though the firm must pay fixed set-up costs for its affiliate) outweigh the advantages of concentrating production in a single plant in the home country, which are due to increasing returns to scale.

In this case, the firm becomes a Multinational Corporation (MNC) and it accesses the consumers in the foreign market through affiliate sales. When not, it keeps production concentrated and exports to the foreign market.

The overall result of the model is that there are three types of equilibria:

(1) All firms operate as multinationals (multinational equilibrium)

(2) All firms have single-plant production and export (trade equilibrium)

(3) Some firms are multinationals, others export (mixed equilibrium)

In the mixed equilibrium (the most relevant case) a proportion α of firms are single-plant, single-country, the remaining firms are MNCs.

This proportion α is greater the greater are the fixed cost of setting up the foreign affiliate, and it is greater the smaller are transport costs, trade barriers and the size of each market. Brainard (1997) then proceeds to complement this with Helpman's (1984) older, vertical, factor-proportions model:

If relative factor endowments are sufficiently different across countries, factor prices will not equalize through trade. This, firms will wish to exploit. If corporate activity and production have different factor intensities, then 'vertical' multinational firms will arise, with their corporate headquarters in one country and their production in the other.

The main results of the model are as follows:

- FDI is driven only by factor-proportions differences
- FDI flows only arise in a single geographical direction (all flows are either from country A into country B or from country B into country A) for a given industry
- All firms have a single production plant
- FDI only happens between countries that have large factor-proportions differences
- When there is FDI, the firm splits production from management, each in a different country
- However, there is two-way trade in the differentiated goods sector
- And one-way trade in the homogeneous goods sector, according to factor proportions differences

Brainard (1997) combines the two models, allowing both horizontal and vertical types of FDI. When factor proportions differ sufficiently, vertical single-plant MNCs emerge, especially when the proximity-concentration trade-off would lead to a pure trade equilibrium.

This attempt at model combination is desirable, as both types of FDI are known to exist. Di Mauro (2000) also advocates a synthesis of both types of models. She points out, however, that most FDI actually takes place between developed countries (e.g. the car industry) and so is of the horizontal (or market-seeking) type, rather than between developed and less developed countries (vertical, or efficiency-seeking FDI). More than 90% of world FDI is 'North-North'.

When it comes to empirics, Brainard (1997), Di Mauro (2000) and Brenton, Di Mauro and Luecke (1999) all estimate some version of a gravity model on FDI data. We therefore discuss the gravity model in the next section.

The gravity model

The gravity model explains aggregate trade or FDI flows between two countries as a log-linear function of the countries' GDPs and of the geographical distance between the countries' capitals. This model has been used extensively in recent years, both for FDI flows and trade flows, in particular in order to simulate potential trade or FDI flows between Central and Eastern European countries (CEECs) and Western economies. The aim has been to evaluate the (remaining) scope for trade and investment flows following the simultaneous disintegration of the CMEA and the gradual lowering of barriers between East and West (Hamilton and Winters, 1992 is just one example).

The preferred form of the gravity model in this paper is taken from Fidrmuc and Fidrmuc (2000):

$$M = k \cdot GDP_M^b \cdot GDP_X^g \cdot D^d \tag{1}$$

where M is the flow of FDI or imports into country M from country X, and D is the geographical distance between the countries' capitals. β and γ are expected to be positive and in the region of 1, δ is expected to be negative and is generally estimated between –0.7 and –1.5.

This model provides a benchmark as to what FDI or trade flows are in the chosen sample, but one expects deviations from that benchmark due to country-pair or country-group specifics. Some countries may, for instance, be parties to agreements on preferentially lower barriers to trade and FDI (typically, Regional Integration Agreements such as the EU, NAFTA, CEFTA etc.). Other specific effects may include having a common land border, or cultural affinities such as a common language. Negative deviations also exist, for example because of military conflicts or economic sanctions.

To test for p different effects, one expands the model with dummy variables G_1, .., G_p :

$$\ln(M) = a + b\ \ln(GDP_M) + g\ \ln(GDP_X) + d\ \ln(D) + \sum_{s=1}^{p} l_s G_s \tag{2}$$

which is equivalent to:

$$M = \exp(a) \cdot GDP_M^b \cdot GDP_X^g \cdot D^d \cdot \prod_{s=1}^{p} \exp(l_s G_s) \tag{3}$$

In many instances the two countries' populations are included as independent variables alongside the GDPs, or the countries' GDP per capita and their populations, which is equivalent.

Hamilton and Winters (1992) suggest one possible rationale: one needs to proxy for countries' openness to trade, remarking that small countries (say, Belgium) are much more open to trade, as measured by the sum of imports and exports over GDP, than large countries (say, the US). This is broadly true in a world sample. This relationship may break down in restricted samples however. For instance, in Europe, Germany (with a population of 82 million) is more open to trade in goods than the UK or France (both at 59 million), and Greece and Portugal are much less open to trade than Belgium (though all have around 10 million inhabitants). Of course one would want to look at the supply side in more detail to explain this, but it remains that, as in Christie (2002), the population variables within a gravity model (where both supply and demand are modelled using just GDP) are often not significant in comprehensive European samples[1]. Fidrmuc and Fidrmuc (2000) also exclude populations from their chosen specification.

A more important modification to the classical gravity model is presented in Di Mauro (2000), which is to look at the similarity of GDP between partner countries, rather than the individual values of GDP. We present her model (4) below. She argues that, as predicted by the Helpman-Krugman theory of increasing returns, countries of a more similar size should trade more. This should apply to FDI as well. So instead of using the countries' GDPs, she introduces a variable SIMSIZE that ranges from minus infinity (for 'infinitely different' GDPs, i.e. when one of them is zero) to ln(1/2) when they are identical. Of course, the size effect still applies, so she introduces the sum of GDPs as an explanatory variable as well. Finally, to proxy for differences in relative factor endowments, she introduces the log of the ratio of the countries' GDP per capita. This variable is zero if the GDP per capita are identical and is greater in absolute value the greater the difference between the two countries.

$$\ln(M_{ij}) = a + b_1 SIMSIZE_{ij} + b_2 TGDP_{ij} + b_3 RELEND_{ij} + b_4 \ln(D_{ij}) + \sum_{s=1}^{p} l_s G_s \qquad (4)$$

$$SIMSIZE_{ij} = \ln\left(1 - \left(\frac{GDP_i}{GDP_i + GDP_j}\right)^2 - \left(\frac{GDP_j}{GDP_i + GDP_j}\right)^2\right) \qquad (5)$$

$$TGDP_{ij} = \ln\left(GDP_i + GDP_j\right) \qquad (6)$$

[1] Some European samples yield significant population effects, others do not. It depends exactly on which set of countries one includes. The presence of certain dummy variables may also influence the significance of the population variables. GDP and distance are much more robust.

$$RELEND_{ij} = \ln\left(\frac{GDP_i}{POP_i}\right) - \ln\left(\frac{GDP_j}{POP_j}\right) \tag{7}$$

The idea is as follows: vertical FDI, in this sense analogous to inter-industry trade, emerges when countries differ more strongly in their factor composition. This may refer to a fragmentation by production stages that is advantageous for a multinational corporation to put in place (e.g. management in the Netherlands, production in Bulgaria). If we mainly have vertical FDI in our sample, we should see a positive correlation with the absolute value of that variable. Horizontal FDI (analogous to intra-industry trade) of the type envisaged by the proximity-concentration trade-off theory emerges more between similar countries. In this case, the multinational corporation is investing because it is interested in a new market. It will in part duplicate in the new country what it was already doing in its home market, rather than specifically split the production process according to factor intensities. We would expect a negative correlation with the RELEND variable if horizontal FDI is more prevalent. As Di Mauro points out, this is only a proxy for relative factor endowments. A slightly better alternative would be to use GDP per worker, which is what I do in the empirical part.

Pooling across country pairs

Brenton et al. (1999) use the classical specification of the gravity equation, however, they opt for a different estimation procedure. A major issue about the econometrics of gravity equations is that of data pooling, i.e. whether one should estimate a single equation for a set of country-pair flows, or whether one should do separate estimations by source or destination country. The latter is what Brenton does.

In fact, separating the estimations is a way around the invalidity of pooling across country pairs. The classical paper cited by Brenton is Matyas (1997).

What Matyas suggested was to 'go back to' the full specification (8), i.e. a triple-indexed model (source country, destination country and time) where there are individual intercepts for each source country (a_i), for each destination country (g_j) as well as for each time period (time effects) (f_t). The gravity model (when modelling flows) should always be applied to a panel data set. Then, once country-specific effects (both as source and as destination countries) and time-specific effects (to account for the business cycle) have been stripped out, one can test additional effects with dummy variables, such as membership of a trade agreement.

$$\ln(M_{ijt}) = a_i + g_j + f_t + b_1 \ln(GDP_{it}) + b_2 \ln(GDP_{jt}) + b_3 \ln(D_{ij}) + e_{ijt} \tag{8}$$

(With dummy variables as appropriate)

The economic rationale for this specification is as follows: the source and destination country effects account for how open countries are in exports and in imports in turn, with regard to all other countries in the sample. The idea is to capture effects such as competitiveness of the export sector on the supply side (source country side) and general openness to trade and investment (such as lower barriers to trade in the case of a trade flows model, or lower corporate tax in the case of an FDI model) on the demand side (destination country side). This is a refinement compared to only using GDP as it allows countries' overall effective supply and demand of traded goods to depart from GDP. This may then provide very interesting results provided one works with a full world sample or, failing that, if a fictitious country representing the rest of the world is introduced.

What Brenton et al. do in their paper is to estimate equations separately by source country, thus getting around the pitfall of pooling revealed by Matyas. In fact, it is a matter of arbitrary choice whether to split the estimations along source or destination countries, whereas doing both at the same time is equivalent to the full fixed-effects approach of Cheng and Howard (1990).

However, Brenton's choice is not equivalent to Matyas: by estimating separate equations for each source country he not only allows different intercepts for each source country but also different coefficients for GDP and distance.

Matyas says that in effect he opts for fixed effects rather than random effects, since his specification labels the effects as additional intercepts to be estimated.

Real fixed effects however is not about having source country and destination country effects, but about having two-way country-pair effects, i.e. having a separate effect for each 'individual', so two effects (one for each direction) for each country-pair. This difference can be seen by bearing in mind that (8) implies 2N+T effects (if one has Ncountries over T periods in a balanced set) whereas the full fixed effects specification implies N^2-N effects (fixed effects including time effects would have N^2-N+T effects).

If one were to do this, the gravity equation would lose most of its meaning, as is shown in Cheng and Howard (1999). The point is that these country-pair effects catch all the information contained by the distance variable, since it is time invariant. As for GDPs, their only role is then to account for the departure of flows from the base level through time.

It rather depends on what one is trying to do: if one wants to focus on a few selected country-pairs through time and if one is rather more interested in forecasting capabilities, then dropping distance through an all-purpose intercept is probably the way forward. But if one is trying to identify and explain patterns in trade flows, that is if one wants to answer

the question 'why do some countries trade more with each other than with others at a given point in time?', it is completely useless.

Cheng and Howard's methodology, however, underlines the serious problem of heterogeneity. Trade flow estimates from a pooled OLS estimated equation are too often far below or far above the true values, i.e. the remaining variance is still high. An interesting paper on this is Breuss and Egger (1999) which computes confidence intervals around flow estimates from a single-year cross-section gravity equation estimated with OLS. They find confidence intervals that are so large that they make interpretations about 'untapped' trade potential between East and West statistically impossible.

A final comment should be made on zero flows. A full world sample (as advocated by Matyas) would contain a very large number of flows that are nil (typically when countries are small and far away from each other, say Guatemala importing from Latvia). In practice, samples are restricted and country pairs with zero flows are excluded. Is this econometrically valid? The problem is that the gravity equation is by nature misspecified, since the functional form does not enable zero flows between countries unless one of the GDPs is zero or the distance between the countries is infinite. However, an empirical model does not necessarily have to cover the full range of possible values to be useful. The point is that the specification of the gravity model requires a jump from the very small to zero but it is not that region of the range of possible values that is of interest, so that in effect this is a non-issue. Indeed, this problem is not mentioned at all by most researchers.

FDI and exports: complements or substitutes?

One of the major issues about FDI and trade is whether they are complements or substitutes. Brainard's framework seems to imply substitutability, FDI being used to 'jump over' barriers to trade (his model is easily expanded beyond transport costs to include tariffs and non-tariff barriers), thus reducing trade. However, in practice FDI is also trade-creating because of the demand for intermediate goods by the affiliate firms.[2] In effect, the overall effect of FDI on trade is unclear and so the question becomes an empirical one.

As Di Mauro points out, there are basically two ways to address this question, a direct one and an indirect one. The direct way is to look at how the export share of total foreign sales is related to barriers to trade, which is what Brainard does in his empirical paper, as he has access to data on affiliate sales since he looks at US firms.

[2] Another trade creating effect which is not discussed in this paper – because it concerns imports instead of exports - is that of trade reversal, i.e. when a firm relocates production to another country and then exports back to its country of origin. However in this case trade creation as exports in intermediate goods from the source country of FDI is also possible.

In the framework of this paper, as with Di Mauro (2000) and Brenton et al. (1998) this is not possible so we use the indirect method, which is to estimate separate gravity equations for FDI and for exports. Di Mauro advocates regressing the residuals of each equation against each other, whereas Brenton uses the residuals of the FDI equation as an additional variable in the exports equation. We apply Brenton's methodology in this paper. If the correlation is positive, we have evidence of complementarity, and the opposite if the correlation is negative. However, as Di Mauro explains, this is an aggregate result, and more detailed sectoral analysis should be made if possible.

One further issue is that in this paper we look at the FDI stock at a single point in time, so that this concept of complementarity / substitutability is tested across countries for a given year, saying in essence that a positive correlation means that generally when FDI is high (respectively low) then so are exports. The additional test one should do would be to look through time at fixed country-pairs' exports and FDI stocks. But even if one were to do this, one should bear in mind how difficult it is to decode from aggregate trade what is really happening. Ideally, one would have access not only to affiliate sales but also to affiliate purchases from their home countries and contrast the latter with export levels of the final goods before the foreign investment happened.

Data and methodological issues

Southeast Europe poses a challenge in that up-to-date and reliable data are not always easy to find. Given the limited resources of national institutions in the region, certain series either do not exist or are rather poor. For these reasons, we have been forced to leave out Serbia and Montenegro (at that time, the Federal Republic of Yugoslavia) and Albania.

Given the nature of the data, and following Di Mauro (2000), we opt for using the FDI end-of-year 1998 stock levels, rather than FDI inflows over several years. For Bosnia-Herzegovina the stock refers to July 1998. More recent FDI stock data were available for Romania, Bulgaria and Croatia but not for Macedonia, which is why we chose December 1998 as the reference date, assuming no big changes for Bosnia in the remaining six-month period.

A proper testing of the proximity-concentration trade-off would in fact require data on affiliate sales. In practice such data are only available for the US and Sweden. In consequence we follow Di Mauro's idea that FDI stock can be seen as a proxy for foreign affiliate sales since the FDI stock is a basis for affiliate production.

There are practical objections to the use of FDI flows as well. Except for very 'stable' investor countries, yearly country-to-country FDI flows vary quite strongly through time in a way that is not explainable using the economic theory referred to in this paper. This is

especially the case for small recipient countries with secondary source countries. One large investment may take place in one particular year, and then one can have a few years during which FDI is nil.

Looking at the stock level (which in practice for all transition economies is the cumulative value of inflows between 1990 and 1998) has the advantage of stripping out the business cycle and any other 'time anomalies'.

Another justification for this choice is linked to the functional form of the gravity equation. FDI inflows can be nil or even negative, which is something that the gravity equation cannot account for. Stocks at least can never be negative. Zero stocks do persist even after ten years between countries that are simultaneously small and remote from each other, but in practice they are not included in the sample, which is not a problem as discussed in the section on the gravity model.

A difficult issue is that of identifying the source countries of FDI. Although this is not unheard of elsewhere, FDI data for Southeast Europe display large flows from 'exotic countries' (tax havens) such as Cyprus, Liechtenstein, Cayman Islands etc. Greek firms are keen to save money by going through Cyprus (Panagiotou, 2000) and Yugoslav firms used tax havens (in particular Cyprus and Liechtenstein) especially in 1999 in order to get around international sanctions. Russian businesses are also rumoured to like this kind of practice. Finally, even certain domestic investors may choose to use tax havens to invest in their own countries (e.g. money-laundering).

It pays to do some detective work in order to reallocate some flows back to their original source countries, preferably with some help from regional sources who know 'where the money really came from'. We did manage to find out some bits of information concerning the most problematic data. We assume that some correction is better than none at all, as the tax havens themselves are not selected source countries, so that reallocating part of their stocks to some of the chosen source countries should not generate a bias.

In particular, for Macedonia, the two largest investing countries in 1998 were Cyprus and Liechtenstein. In reality it was a Greek-Swiss consortium formed by Titan Cement and Holderbank registered in Cyprus that bought an 84% stake (half each) of the USJE cement factory (Skopje) and a Serbian multinational, Balkan Steel, registered in Liechtenstein, that bought Skopje Steel Mill.

Balkanbrew Holding of Greece bought Pivara Skopje[3], but it was unclear how, if at all, this was recorded in FDI data.[4] It was not in the flows from Greece, so we added it there.

Another investment from Liechtenstein by Duferco Ltd[5] was rather difficult to decompose by original source country so we ignored it.

Finally, Romania has a large FDI stock from Cyprus. This, we were told, is from several different countries and also includes Romanian equity. Simultaneously, Russia's Lukoil buying a 51% stake in Romania's refinery Petrotel seems to have gone unrecorded in the FDI data we had, but we were unable to conclusively link the two so we ignored it (in any case Russia is not a selected source country in this paper).

Concerning data sources, we took GDPs (nominal at current prices in billions of USD) from the OECD for western countries and from wiiw for transition countries. Export data came from the IMF-DOT database (trade in goods, nominal prices in millions of USD) and from wiiw, FDI stocks from wiiw. Employment data came from wiiw and the OECD.

Empirical results

We decided to focus on nine key European source countries: Germany, Italy, Greece, Austria, Belgium, The Netherlands, Switzerland, the UK and France. For the reasons explained above, there remained only five Southeast European destination countries (Romania, Bulgaria, Macedonia, Bosnia-Herzegovina and Croatia). In order to assess whether the FDI levels in those countries were at their potential values at the end of 1998, we selected the five more advanced Central European economies of Hungary, Poland, the Czech Republic, Slovakia and Slovenia to serve as a control group. We tested two specifications of the gravity equation, Di Mauro's and a modification of the classical equation that includes source country effects (dummy variables not stated).

$$\ln(FDI_{ij}) = a + b_1 SIMSIZE_{ij} + b_2 TGDP_{ij} + b_3 RELEND_{ij} + b_4 \ln(D_{ij}) + e_{ij} \qquad (9)$$

$$\ln(FDI_{ij}) = a_i + b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln(D_{ij}) + e_{ij} \qquad (10)$$

[3] Source: Privatization Agency of the Republic of Macedonia. http://www.mpa.org.mk/fdi2.htm

[4] The FDI data used were compiled by The Vienna Institute for International Economic Studies (WIIW) using national sources. In other words there are discrepancies between the privatization agency and the national statistical office and national bank.

[5] Duferco Ltd started off as an independent exporter of Brazilian steel, then rapidly expanded into the Pacific Rim area, and later started activities in Europe. Its headquarters are now in Switzerland.

We chose (10) as our main workhorse for measuring the regional effect as we believe that it is econometrically more solid (Matyas, 1997). However, we present the conclusions from the Di Mauro equation (9) first. Here the fit is slightly better than that of the classical specification without source country effects. The RELEND variable is not significant, so that there is no evidence of dominance from vertical FDI.

Dependent Variable: LOG(STOCK1298)
Method: Least Squares
Sample: 1 90
Included observations: 76
Excluded observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.841338	1.439317	1.974088	0.0523
SIMSIZE	1.496988	0.123986	12.07383	0.0000
TGDP	1.599871	0.181966	8.792135	0.0000
RELEND	0.181224	0.257153	0.704732	0.4833
LOG(DIST)	-0.645772	0.228522	-2.825858	0.0061
R-squared	0.701747	Mean dependent var		5.000337
Adjusted R-squared	0.684944	S.D. dependent var		1.825566
S.E. of regression	1.024688	Akaike info criterion		2.950179
Sum squared resid	74.54895	Schwarz criterion		3.103516
Log likelihood	-107.1068	F-statistic		41.76315
Durbin-Watson stat	1.877398	Prob(F-statistic)		0.000000

However, if one estimates the same equation separately for the two country groups a different picture emerges. For Southeast Europe:

Dependent Variable: LOG(SEE5*STOCK1298)
Method: Least Squares
Sample(adjusted): 1 72
Included observations: 38
Excluded observations: 34 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.942369	2.299357	1.714553	0.0958
SIMSIZE	1.268538	0.184625	6.870893	0.0000
TGDP	1.124427	0.268269	4.191423	0.0002
RELEND	0.756450	0.362284	2.088006	0.0446
LOG(DIST)	-0.670607	0.403896	-1.660346	0.1063
R-squared	0.600885	Mean dependent var		3.849437
Adjusted R-squared	0.552507	S.D. dependent var		1.471309
S.E. of regression	0.984231	Akaike info criterion		2.928168
Sum squared resid	31.96747	Schwarz criterion		3.143639
Log likelihood	-50.63518	F-statistic		12.42071
Durbin-Watson stat	2.336530	Prob(F-statistic)		0.000003

We see that RELEND is significant at the 5% level and positive, indicating evidence in favour of vertical (efficiency-seeking) FDI.

For the control group countries, things are very different:

Dependent Variable: LOG(CEC5*STOCK1298)
Method: Least Squares
Sample(adjusted): 19 90
Included observations: 38
Excluded observations: 34 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.910113	1.701860	1.709960	0.0967
SIMSIZE	1.775103	0.256712	6.914765	0.0000
TGDP	2.099749	0.301625	6.961443	0.0000
RELEND	-0.976562	0.486234	-2.008417	0.0528
LOG(DIST)	-0.762730	0.256720	-2.971063	0.0055
R-squared	0.626150	Mean dependent var		6.151236
Adjusted R-squared	0.580834	S.D. dependent var		1.367466
S.E. of regression	0.885338	Akaike info criterion		2.716385
Sum squared resid	25.86618	Schwarz criterion		2.931857
Log likelihood	-46.61132	F-statistic		13.81766
Durbin-Watson stat	2.381604	Prob(F-statistic)		0.000001

Here on the contrary RELEND is negative and the p-value is only a touch above 5%. In effect, the two regions are symmetrical when it comes to the RELEND variable which explains its non-significance in the joint estimation.

If one considers RELEND here to be significant and negative, we conclude that FDI is higher when GDPs per worker are closer, i.e. there is more FDI the more similarity there is between countries and so this points to a domination of horizontal, market-seeking FDI.

What about the evidence of vertical FDI in Southeast Europe?

Prima facie we should conclude that FDI to that region is mainly efficiency-seeking, given our positive and significant result for the RELEND variable. However Croatia is an anomaly in the region, having a very high GDP per worker and being geographically close to Western countries but attracting only modest levels of FDI. This is changing today but in 1998 there was still some way to go and there were clearly some political factors at play.

We re-estimated the same equation on a reduced sample, taking each country out of the sample in turn, and indeed it is Croatia that is responsible for our result. We give below the successive lines corresponding to the RELEND variable only:

Excluded Country	RELEND Coefficient	RELEND Std Err	RELEND T-Stat	RELEND P-Value
Croatia	0.413377	0.826636	0.500071	0.6214
Romania	0.875528	0.407432	2.148891	0.0419
Bulgaria	0.617241	0.376677	1.638649	0.1143
Bosnia	0.891664	0.372764	2.392035	0.0235
Macedonia	0.741239	0.402432	1.841901	0.0774

We see that excluding Croatia yields a non-significant RELEND variable. All in all, the evidence is mixed. Clearly, both types of FDI are well represented in Southeast Europe (as regional sources confirm), and if we accept the exclusion of Croatia, we conclude that neither type dominates.

The classical equation

The estimation of the classical equation was done using OLS and by allowing separate intercepts for each source country on the FDI stock. In this way, time effects are stripped out, while source country effects are also taken care of. Naturally, the GDP of the source country is no longer included since there is only one time period and therefore the source country effects include the source country GDP effect.

This specification is therefore correct according to the Matyas methodology and follows Di Mauro's reasoning as to the choice of stocks instead of flows.

Dependent Variable: LOG(STOCK1298)
Method: Least Squares
Sample: 1 90
Included observations: 76
Excluded observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOURCEDE	4.931927	1.561860	3.157728	0.0024
SOURCEAT	4.203806	1.407994	2.985671	0.0040
SOURCEIT	3.360582	1.555664	2.160223	0.0344
SOURCENL	4.667952	1.650390	2.828393	0.0062
SOURCEBE	3.363512	1.666746	2.018012	0.0477
SOURCECH	3.508772	1.581258	2.218976	0.0300
SOURCEUK	4.322837	1.697957	2.545905	0.0133
SOURCEFR	3.981032	1.658556	2.400300	0.0193
SOURCEGR	4.181053	1.583608	2.640207	0.0104
LOG(YM98)	1.397134	0.103640	13.48067	0.0000
LOG(DIST)	-0.501319	0.215441	-2.326937	0.0231

R-squared	0.772039	Mean dependent var	5.000337
Adjusted R-squared	0.736968	S.D. dependent var	1.825566
S.E. of regression	0.936272	Akaike info criterion	2.839307
Sum squared resid	56.97937	Schwarz criterion	3.176650
Log likelihood	-96.89365	Durbin-Watson stat	1.533658

It is then possible to test with the SEE5 dummy variable whether, overall, the countries of Southeast Europe have 'abnormally low' levels of FDI stock. Unsurprisingly, the SEE5 dummy is negative and significant, meaning that FDI stocks in the SEE-5 countries are lower than what they should be with regard to the countries of the control group, destination country GDP and geographical distance accounted for.

One should note the effect of the introduction of that dummy variable on the distance variable which is then no longer significant. The issue here is that there is some correlation between distance and the SEE5 dummy variable because overall the countries of that region are further away from the source countries than those of the control group.

Regarding both equations, one cannot comment on the differences between the source country effects because the differences in the coefficients are too small compared to the standard errors (i.e. none of the country effects are significantly different from any other).

The SEE5 dummy variable estimate indicates that the distortion to the SEE countries' FDI stocks was exp(-0.757603)=0.468789. In other words, these results indicate that the FDI stocks in the region were 46.88% of what they 'should have been'. We use the inverted commas here as we are limited to a bare-bones gravity model that accounts only for GDP and distance.

Dependent Variable: LOG(STOCK1298)
Method: Least Squares
Sample: 1 90
Included observations: 76
Excluded observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOURCEDE	3.755255	1.577136	2.381060	0.0202
SOURCEAT	3.263183	1.407887	2.317787	0.0237
SOURCEIT	2.193372	1.570297	1.396788	0.1673
SOURCENL	3.364888	1.673965	2.010130	0.0486
SOURCEBE	2.122140	1.681312	1.262193	0.2115
SOURCECH	2.311487	1.597457	1.446979	0.1528
SOURCEUK	2.947213	1.726715	1.706833	0.0927
SOURCEFR	2.657063	1.684095	1.577739	0.1196
SOURCEGR	3.309031	1.564873	2.114569	0.0384
LOG(YM98)	1.200009	0.127685	9.398173	0.0000
LOG(DIST)	-0.185379	0.243574	-0.761080	0.4494
SEE5	-0.757603	0.306184	-2.474336	0.0160

R-squared	0.791942	Mean dependent var	5.000337
Adjusted R-squared	0.756182	S.D. dependent var	1.825566
S.E. of regression	0.901427	Akaike info criterion	2.774264
Sum squared resid	52.00453	Schwarz criterion	3.142275
Log likelihood	-93.42204	Durbin-Watson stat	1.752025

It may be possible to find other variables that explain in whole or in part the observed distortion, which is why, in keeping with Brenton's paper, we also experimented with the Index for Economic Freedom of the Heritage Foundation. This index is the average of scores from 1 (very free) to 5 (very restricted) attributed to countries on ten key aspects[6] of 'business and investment climate'. Ultimately, the lower the index the better for foreign investors. It was necessary to exclude Macedonia from the sample for lack of availability.

The result is that although the index is significant and of the expected negative sign, the SEE5 dummy is a superior variable. The two are of course correlated, but when estimating the same equation with each in turn, the equation with the SEE5 dummy yields a slightly higher R-squared. This result reinforces the idea that the countries of Southeast Europe are similar and have similar problems. They have similar scores for economic freedom, but it turns out it is more accurate to lump them together in the same category rather than use the index. Having said that, at least we do have an economic variable that explains in part the region's shortfall in FDI.

Now as to the issue of complementarity between FDI and trade, we use the same approach as Brenton: estimating a gravity model on exports including the residuals of the equation on FDI as an additional dependent variable. Contrary to Brenton however, we choose to estimate the equation on exports for the year 1999, with the GDP of 1999. We agree with Brenton on the consistency issue, from the point of view of the variables in the model (his point is that the remaining dependent variables should be the same). However, our argument is that the FDI stock proxies affiliate production after December 1998 so that the interaction between the FDI stock and exports is played out in 1999.

The FDI RESIDUAL variable used here is the difference between the log of the FDI stock and the estimate of that same quantity from the first equation in this section.

Dependent Variable: LOG(IMP99)
Method: Least Squares
Sample: 1 90
Included observations: 76
Excluded observations: 14

(continued)

[6] Trade policy, Fiscal burden of government, Government intervention in the economy, Monetary policy, Capital flows and foreign investment, Banking and finance, Wages and prices, Property rights, Regulation, Black market (1: none, 5: enormous).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOURCEDE	7.991297	0.597793	13.36800	0.0000
SOURCEAT	6.111266	0.539105	11.33595	0.0000
SOURCEIT	7.238909	0.595430	12.15745	0.0000
SOURCENL	5.953698	0.631512	9.427684	0.0000
SOURCEBE	5.771423	0.637582	9.052041	0.0000
SOURCECH	5.401565	0.605138	8.926173	0.0000
SOURCEUK	6.332847	0.649659	9.747951	0.0000
SOURCEFR	6.769826	0.634677	10.66658	0.0000
SOURCEGR	6.312559	0.605112	10.43206	0.0000
LOG(YM99)	0.986890	0.040472	24.38433	0.0000
LOG(DIST)	-0.496487	0.082203	-6.039750	0.0000
FDI-RESIDUAL	0.213695	0.047288	4.518956	0.0000
R-squared	0.941640	Mean dependent var		6.122242
Adjusted R-squared	0.931609	S.D. dependent var		1.364739
S.E. of regression	0.356901	Akaike info criterion		0.921225
Sum squared resid	8.152234	Schwarz criterion		1.289236
Log likelihood	-23.00656	Durbin-Watson stat		1.718029

As we can see, the FDI RESIDUAL variable is positive and significant. This indicates evidence of complementarity between exports and FDI stocks. In other words, where FDI stocks are lower than the estimate, exports are generally also lower than the estimate, and when FDI stocks are higher than the estimate, then so are exports.

However this applies to the whole sample. It may be that most of that effect is a 'between' rather than a 'within' effect, so it is necessary to repeat the estimation on the two country groups separately. The full tables are available in the annex. The estimates are:

For the CEC-5 sub-sample:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
…….	……..	……..	…….	……..
FDI-RESIDUAL	0.364462	0.069525	5.242136	0.0000

For the SEE-5 sub-sample:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
…….	…….	……..	……..	……
FDI-RESIDUAL	0.044346	0.099650	0.445011	0.6599

In other words we see evidence of complementarity in the control group of Central European economies but no evidence in favour of complementarity or substitutability for the SEE group.

Conclusion

FDI stocks (at the end of 1998) in the more advanced economies of Central Europe are mainly of the horizontal, market-seeking type. For Southeast Europe we conclude that both market-seeking FDI and efficiency-seeking FDI co-exist, with neither type dominating.

Unsurprisingly, Southeast Europe is found to attract somewhat lower levels of FDI than gravity variables would indicate. The index for economic freedom is found to be a significant economic variable in explaining the shortfall. The case of Croatia is particularly striking, given its relatively high GDP and (from a gravity model point of view) favourable geographic location. One should add at this stage that recent figures show a marked increase in Croatia's FDI stock. This recent development is thus compatible with the spirit of the gravity model.

Whereas evidence is found in favour of complementarity between trade and FDI for the countries of the control group (Central Europe), meaning that FDI and trade are positively correlated across country pairs, neither complementarity or substitutability were found for Southeast Europe. In other words, high FDI stocks in the sample are not significantly often coupled with either high or low trade volumes. This could mean that both effects co-exist, depending on which country pair one looks at.

Generally speaking FDI into Southeast Europe is such that it is only a weak trade creator in the relevant intermediate goods, so that the extra trade thus generated is small when compared to total exports. Technology matters at this stage. FDI to the region is mainly 'bricks and mortar', i.e. rather low-tech, as we saw with the examples quoted for Macedonia such as cement factories or breweries. Therefore the corresponding demand for intermediate goods from the investor countries is low, as the small number of varieties of goods used can mostly be found at a cheaper price in the destination country. This does not exclude trade creation effects completely though, as we did not investigate possible increases to recipient countries' export capacity brought on by foreign investment. The case of Bulgaria for the textile and clothing industry is a clear example. Analysing this type of trade creation constitutes a separate area of research interest.

One should note here that the technological level of investments has already changed as the economies of the region have progressed and as more high-technology sectors have developed and have been targeted by investors. Deutsche Telekom's acquisitions in Croatia in 2001 are one example, though acquisitions in the telecommunications sector subsequently experienced a clear slowdown across transition countries.

Regarding future prospects for FDI into the region, the index for economic freedom should give a good indication of which problems should be dealt with from an institutional and economic policy point of view. The fact that the regional dummy actually had more explanatory power than the index is quite stunning. However more recent and more complete data, including FDI for Albania and Serbia and Montenegro, both still very low, would show a different picture. In effect, according to the most recent data, the region may be split in two: a 'periphery', made up of Croatia, Romania and Bulgaria, which are relatively more advanced and whose FDI stocks have substantially increased since 1998, and a 'core', made up of Bosnia-Herzegovina, Serbia and Montenegro, and Albania, which are only just beginning to attract substantial interest from strategic investors.

Regarding future investigations, it would be most interesting to have access to firm-level data to determine to what extent affiliates of western multinational corporations import goods from their country of origin ('affiliate purchases'). This would constitute a direct method that would refine the empirics on trade creation effects and the debate on complementarity versus substitutability.

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APPENDIX

Exports equation on CEC-5 sub-sample

Dependent Variable: LOG(CEC5*IMP99)
Method: Least Squares
Sample(adjusted): 19 90
Included observations: 38
Excluded observations: 34 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOURCEDE	8.273694	0.824059	10.04018	0.0000
SOURCEAT	6.237140	0.684845	9.107367	0.0000
SOURCEIT	7.365311	0.857609	8.588193	0.0000
SOURCENL	6.180367	0.889703	6.946553	0.0000
SOURCEBE	6.315947	0.894315	7.062329	0.0000
SOURCECH	5.814282	0.843402	6.893848	0.0000
SOURCEUK	6.635675	0.927061	7.157752	0.0000
SOURCEFR	7.034418	0.909568	7.733800	0.0000
LOG(YM99)	0.945486	0.074093	12.76078	0.0000
LOG(DIST)	-0.510825	0.144599	-3.532700	0.0015
FDI-RESIDUAL	0.364462	0.069525	5.242136	0.0000

R-squared	0.955674	Mean dependent var	6.924044
Adjusted R-squared	0.939257	S.D. dependent var	1.103984
S.E. of regression	0.272089	Akaike info criterion	0.471825
Sum squared resid	1.998879	Schwarz criterion	0.945863
Log likelihood	2.035333	Durbin-Watson stat	1.715695

Exports equation on SEE-5 sub-sample

Dependent Variable: LOG(SEE5*IMP99)
Method: Least Squares
Sample(adjusted): 1 72
Included observations: 38
Excluded observations: 34 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOURCEDE	1.376850	0.420529	3.274095	0.0029
SOURCEAT	0.177312	0.398639	0.444793	0.6600
SOURCEIT	1.152049	0.405314	2.842359	0.0084
SOURCENL	-0.862104	0.448895	-1.920501	0.0654
SOURCEBE	-1.173559	0.475172	-2.469754	0.0201
SOURCECH	-1.123263	0.434350	-2.586080	0.0154
SOURCEUK	-0.716354	0.455115	-1.574004	0.1271
SOURCEFR	-0.154628	0.436049	-0.354611	0.7256
LOG(YM99)	0.946858	0.111168	8.517367	0.0000
LOG(DIST)	0.418446	0.061247	6.832164	0.0000
FDI-RESIDUAL	0.044346	0.099650	0.445011	0.6599

R-squared	0.817286	Mean dependent var	5.320439
Adjusted R-squared	0.749614	S.D. dependent var	1.111780
S.E. of regression	0.556319	Akaike info criterion	1.902249
Sum squared resid	8.356260	Schwarz criterion	2.376287
Log likelihood	-25.14273	Durbin-Watson stat	2.146802

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