Spacey Parents versus Spacey Hosts of Foreign Direct Investment

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Abstract
Empirical trade economists have found that foreign direct investment (FDI) of some parent economy in a host country depends on the same parent country’s FDI in other hosts. Independent of this, there is evidence that a parent country’s FDI in some host economy depends on other parent countries’ FDI there. Either mode of interdependence has been found to decline in distance, on average. In general equilibrium, also other parent countries’ FDI in other hosts affects a given bilateral FDI of a given pair. No attempt has been made so far to allow for dependent bilateral FDI across all parents and hosts in empirical models. One possible reason for this is the lack of econometric tools to analyze that matter. We use a generalized moments estimation framework for spatially correlated panel data to allow for interdependence across all parents and hosts and test for their relative importance. Using data on FDI among 22 OECD countries over the period 1995-2004, we find that interdependence both across parents and hosts are more important such that none of the two modes of interdependence should be omitted from the empirical model.

JEL-code.: C21; C23; F21; F23

Keywords: Foreign direct investment; Spatial econometrics; Generalized method of moments estimation; Panel data analysis
“Although [previous] work has focused on outward investment and the choice among host locations, it is just as important to recognize that third country effects may be important for inbound FDI as well.”
(Blonigen, Davies, Waddell, and Naughton, 2008)

I. Introduction

Two arguments have been put forward about the interdependence or ‘spaceyness’ of bilateral foreign direct investment (FDI): first, a country’s outbound FDI in some host country affects and depends on the same country’s FDI in other host markets; second, a country’s inbound FDI from some parent country affects and depends on inbound FDI from other parents in the same host country.

The first line of reasoning roots in theoretical work on export platform FDI and vertically organized networks of multinational enterprises (MNEs), where the location and output decisions of MNEs are interdependent across host markets and partly depend on the openness to trade in final goods (Yeaple, 2003; Baltagi, Egger, and Pfaffermayr, 2007; Ekholm, Forslid, and Markusen, 2007) or intermediate products across potential host countries (Grossman, Helpman, and Szeidl, 2007; Bergstrand and Egger, 2008). Greater trade openness is typically associated with a smaller geographical distance between host countries. Hence, this literature motivates a Spacey-Hosts Hypothesis for empirical work: smaller geographical distances between host countries should lead to stronger correlations between FDI of a given parent country across hosts.

As to the second line of reasoning, there is a smaller body of work which rightfully suggests that, in multi-country general equilibrium, the location and output decisions of MNEs from different parent countries in a given host economy are interdependent too. Blonigen, Davies, Waddell, and Naughton (2008) illustrate that also the interrelationship of bilateral FDI across parents is related to trade costs among the parent countries. We may refer to the hypothesis flowing from the latter argument as the Spacey-Parents Hypothesis. It is undebated that, in multi-country general equilibrium, there is interdependence of bilateral FDI decisions both across parents and hosts.

Indeed, empirical evidence points to both spacey hosts (Baltagi, Egger, and Pfaffermayr, 2007, 2008; Blonigen, Davies, Waddell, and Naughton, 2007) and spacey parents in bilateral FDI (Blonigen, Davies, Waddell, and Naughton, 2008). However, the two hypotheses have only been assessed independently. This has several fundamental consequences. First, when
allowing for one mode of interdependence but not for the other, there is a danger of misattributing interdependence to one of the two channels. The latter could lead to biased estimates of comparative static effects. Second, in the absence of an endogeneity bias, ignoring one of the two channels in estimation at least causes heteroskedastic error terms, if both modes of interdependence are relevant. This renders maximum likelihood estimates of spatial econometric models inconsistent. Moreover, it renders traditional generalized method of moments estimates of spatial models inefficient and reduces the power of tests against zero-interdependence. Finally, it precludes a quantification of the relative importance of the Spacey-Parents Hypothesis versus the Spacey-Hosts Hypothesis.

This paper formulates an integrated spatial econometric panel data model to assess the two hypotheses simultaneously. In particular, our empirical model allows for two modes of interdependence (across parents and across hosts). Furthermore, it allows for heteroskedastic disturbances. For estimation, we use data on bilateral stocks of outward FDI from United Nations Conference on Aid and Development (UNCTAD) and from the Organization for Economic Cooperation and Development (OECD) for the period 1995-2004, constituting a balanced panel data-set for 22 parent and host countries (i.e., 484 country-pairs) and 10 years.

Our results support the following conclusions. First, spaceyness matters for both parents and hosts. For instance, larger and close-by parent countries investing in a particular host country increase the magnitude of a given parent country’s FDI (relative to its GDP) there relative to its FDI in smaller and more distant parent countries. Moreover, larger host countries close-by to a particular host increase a given parent country’s FDI there as well. The latter result is consistent with and may be interpreted as indirect evidence of export platform FDI. Since either type of spaceyness is important, none of them should be excluded from the empirical model for inference.

The remainder of the paper is organized as follows. The next section formulates an empirical specification which allows for both spacey parents and spacey hosts in the light of previous theoretical work. Moreover, that section lays out the estimation procedure. In an appendix, we provide derivations of the econometric model and describe the properties of the estimator. Section III summarizes the empirical analysis based on bilateral outbound FDI stock data from UNCTAD. It describes the data in use and summarizes the empirical findings. The last section provides concluding remarks.
II. Two modes of interdependence in bilateral FDI flows

Existing theoretical work on multinational firms suggests that a change of an exogenous determinant of bilateral FDI in just one economy affects not only the respective parent country’s FDI in the respective host. Rather, it also other parent economies’ FDI in the respective host, as well as the respective parent’s FDI into other host countries. In new trade theory models of multinational firms, interdependence will typically be stronger among large, well integrated countries. Hence, interdependence should increase with country-size and decline in relative distance of countries from each other. Let us denote FDI of parent country $i$ in host country $j$ and year $t$ by $y_{ij,t}$. The total number of parent countries, host countries, and years in the sample is given by $I, J,$ and $T$, respectively.

It is useful to use matrix notation for the exposition of the empirical model. Specifically, denote the $IJ 	imes 1$ vector of bilateral FDI across all parent and host countries in year $t$ by $y_t$.\(^1\)

Let us collect the exogenous determinants of bilateral FDI activity in the $IJ 	imes K$ matrix $X_t$. Each row of $X_t$ contains determinants of bilateral FDI, which are specific to country pair $ij$ and year $t$ (including some time-invariant variables). In most of the previous empirical work on bilateral MNE activity, $y_t$ was modeled as a function of $X_t$ only (see Brainard, 1997; Carr, Markusen, and Maskus, 2001; Markusen and Maskus, 2002; Blonigen, Davies, and Head, 2003; Egger and Pfaffermayr, 2004). Hence, interdependence across country-pairs has been ruled out by assumption. Only recently, empirical work illustrated that this assumption seems contradicted not only by theoretical models with more than two countries but also by data (see Colin and Segev, 2000; Baltagi, Egger, and Pfaffermayr, 2007, 2008; Blonigen, Davies, Waddell, and Naughton, 2007, 2008).

To illustrate the argument, let us define the strength of interdependence in FDI between country-pair $ij$ and country-pair $ij'$ in year $t$ by the scalar $w_{ij,ij',t}$, which depends positively on the size of country pairs $ij$ and $ij'$ and negatively on their relative distance. In general, $w_{ij,ij',t} = 0$, if $ij = ij'$ (this implies that we do not consider a direct feedback of FDI of a given parent-host pair on itself).

\(^1\) We adopt the standard convention to refer to vectors and matrices by letters in boldface.
II.1. Spacey hosts

Blonigen, Davies, Waddell, and Naughton (2007) assume that $w_{ij,t}^H$ is zero for $i \neq i'$, excluding the possibility of spacey parents (i.e., interdependence between different parent countries’ FDI), and that $w_{ij,t}^H$ is nonzero for $j \neq j'$ and $i=i'$ (i.e., for a given $i$). In this case, $w_{ij,t}^H = 0$ if $j \neq j'$ or $i = i'$. The latter ensures that $w_{ij,t}^H$ may be positive only for relationships across (different) hosts for the same parent.

Let us collect the elements $w_{ij,t}^H$ reflecting spacey host relationships in the $IJ \times IJ$ matrix $W_{ij,t}$ for year $t$. Given the set of observable determinants of bilateral FDI collected in $X_t$, we may then define the strength of interdependence across host countries reflected in observable variables by $W_{ij,t}X_t\beta_H$, where $\beta_H$ is a $K \times 1$ vector of unknown parameters that have to be estimated.

If multinational firms are mainly of the horizontal type and set up foreign affiliates only to serve the host country market, we would expect that larger neighboring markets of a given host country reduce MNE activity in that economy. The reason is that the same investment could ceteris paribus serve a larger neighboring market and generate higher profits than an investment in that host country. On the contrary, we would expect export-platform MNE activity to increase in a given host country if neighboring countries are larger. The reason is that export-platform MNEs set up foreign subsidiaries not only to serve the host market but also other surrounding markets.

II.2. Spacey parents

In their work on spacey parents, Blonigen, Davies, Waddell, and Naughton (2008) assume that $w_{ij,t}^P$ is zero for $j \neq j'$, excluding the possibility of spacey hosts (i.e., interdependence between different host countries’ FDI), and that $w_{ij,t}^P$ is nonzero for $i \neq i'$ and $j = j'$ (i.e., for a given $j$). The latter ensures that $w_{ij,t}^P$ may be positive only for relationships across parents for the same host. We may collect the elements $w_{ij,t}^P$ in the spacey parents case into
the $IJ \times IJ$ matrix $\mathbf{W}_{p,t}$ for year $t$ and define the strength of interdependence across parent countries reflected in observable variables by $\mathbf{W}_{p,t}\mathbf{X}\mathbf{\beta}_p$.

There are two main channels through which spaceyness across parents should matter. First, FDI in a particular host country requires the use of resources there. Accordingly, an increase in FDI from other parent countries in a particular host leaves fewer resources available to the parent of interest. Alternatively, an increase in other parent countries' FDI in that host could lower marginal costs there and create positive externalities to a given parent country's outward FDI there (see Blomström and Kokko, 1998). Both channels are discussed in detail in Blonigen, Davies, Waddell, and Naughton (2008, p. 178) so that we may suppress a more detailed discussion here.

II.4. Model specification

Collecting terms, we may then specify an econometric model of bilateral FDI which accounts for both mentioned types of spaceyness:

$$\mathbf{y}_t = \mathbf{X}_t \mathbf{\beta} + \underbrace{\mathbf{W}_{p,t}\mathbf{X}_{p,t}\mathbf{\beta}_p}_{\text{spacey parents}} + \underbrace{\mathbf{W}_{H,t}\mathbf{X}_{H,t}\mathbf{\beta}_H}_{\text{spacey hosts}} + \mathbf{u}_t$$  \hspace{1cm} (1)

where $\mathbf{u}_t$ is an $IJ \times 1$ vector of disturbances which collects all unobservable determinants of FDI. Similar to the observable determinants, the unobservable ones should be interdependent (‘spacey’) in general equilibrium. Accordingly, we may determine

$$\mathbf{u}_t = (\rho_p \mathbf{W}_{p,t} + \rho_H \mathbf{W}_{H,t})\mathbf{u}_t + \mathbf{\mu} + \mathbf{\omega}_t$$  \hspace{1cm} (2)

where the unknown parameters $\rho_p, \rho_H$ scale the strength of interdependence, similar to $\mathbf{\beta}_p, \mathbf{\beta}_H$, respectively. $\mathbf{\mu}$ is an $IJ \times 1$ vector of unknown, time-invariant country-pair characteristics, and $\mathbf{\omega}_t$ is an $IJ \times 1$ vector of time-variant idiosyncratic disturbances. Assume that (1) is the true model and at least some of the elements of $\mathbf{\beta}, \mathbf{\beta}_p, \mathbf{\beta}_H$ each are non-zero. $\mathbf{W}_{p,t}\mathbf{X}_{p,t}$ and $\mathbf{W}_{H,t}\mathbf{X}_{H,t}$ reflect spaceyness (with respect to parent and host countries, respectively) of the systematic part of the model. Notice that $\mathbf{W}_{p,t}\mathbf{X}_{p,t}$ and $\mathbf{W}_{H,t}\mathbf{X}_{H,t}$ bear a
parent and host country subscript on \( X_i \), respectively, to allow for a difference of the columns in \( X_i \) and in \( X_{P_i} \) as well as \( X_{H_i} \) (it will become clearer in the next section that the reason is to avoid possibly perfect collinearity of some of the columns in \( X_i \) with those in \( X_{P_i} \) and \( X_{H_i} \)). Omitting either one of the two terms, \( W_{P_i} X_{P_i} \beta_P \) or \( W_{H_i} X_{H_i} \beta_H \) will lead to biased parameter estimates if \( W_{P_i} X_{P_i} \) and \( W_{H_i} X_{H_i} \) are correlated with \( X_i \). Assume now that \( \rho_P, \rho_H \) are non-zero but one of the terms \( \rho_P W_{P_i} \) or \( \rho_H W_{H_i} \) is omitted as in all previous empirical work. Obviously, this will generate heteroskedasticity in the estimates of the parameters of the spatial regressive disturbance process. When applying a spatial maximum-likelihood estimation procedure for estimation, the latter will obtain biased parameter estimates, similar to the omission of relevant, correlated \( W_{P_i} X_i \beta_P \) or \( W_{H_i} X_i \beta_H \).

While this is not the case with generalized method of moments models, omission of a relevant \( \rho_P W_{P_i} \) or \( \rho_H W_{H_i} \) will lead to inefficient parameter estimates and invalid inference about the relative importance of spaceyness with respect to parents versus hosts. For instance, the latter would generate potentially misleading results regarding the joint relevance of \( W_{P_i} X_i \beta_P \) and \( \rho_P W_{P_i} \) or \( W_{H_i} X_i \beta_H \) and \( \rho_H W_{H_i} \).

Our estimation approach is based on Badinger and Egger (2009), who derive a generalized method of moments estimator which allows for the three mentioned modes of spaceyness in the explanatory variables as well as the disturbances. The estimator is robust to arbitrary forms of heteroskedasticity in the time-variant residuals, and it allows for joint hypothesis tests about \( \beta_P, \beta_H, \beta_O \) and \( \rho_P, \rho_H, \rho_O \). In particular, the model specifications in (1) and (2), suggest three tests about the relevance of the alternative dimensions of spaceyness:

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>Parameter restrictions</th>
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<tbody>
<tr>
<td>( H_{P_i,0} ) (spacey parents)</td>
<td>( \beta_P = 0 ) and ( \rho_P = 0 )</td>
</tr>
<tr>
<td>( H_{H_i,0} ) (spacey parents)</td>
<td>( \beta_H = 0 ) and ( \rho_H = 0 )</td>
</tr>
</tbody>
</table>

III. Empirical analysis

III.1. Data
For the description of the data-set, it is useful to distinguish between three types of variables: data on the dependent variable; data on the explanatory variables collected in $X_t$; and data used to construct the matrices of interdependence or spaceyness, $W_{P,t}$ and $W_{H,t}$.

**The dependent variable:** Stocks of bilateral outbound foreign direct investment (FDI)

Data on annual aggregate stocks of outward FDI in nominal U.S. dollars at the bilateral level for a large set of parent countries, host countries, and years are available from the United Nations Conference on Aid and Development (UNCTAD) and from the Organization for Economic Cooperation and Development (OECD). While OECD provides data on inward as well as outward FDI of OECD countries only, UNCTAD reports data for a larger set of economies. Data on FDI tend to be incomplete from either source. Our aim is to focus on the largest possible set of countries for which we can gather a complete panel of FDI stocks. When using data from both UNCTAD and OECD and interpolating missing values of outward FDI stocks by using inward FDI stocks from mirror statistics of the same sources, we obtain a panel data-set of annual bilateral stocks of outward FDI for 22 European OECD countries excluding Iceland\(^2\) or $22 \cdot 21 = 462$ country-pairs and the period 1995-2004. Apart from obtaining a balanced data-set, the focus on European OECD countries has two advantages. First, criteria of FDI data collection are more homogeneous than in a broader set of economies. Second, motives of FDI should be more similar than in a larger set countries (with more pronounced differences in, e.g., factors costs, endowments).

-- Figure 1 --

We provide a kernel density plot of the dependent variable in Figure 1 for the data across all country-pairs and years. Three features of the plot are worth mentioning. First, most country-pairs are characterized by a small, positive stock of outward FDI. Second, outward FDI stocks may be negative for some country-pairs. The reason for that are large disinvestments or shifting of profits in certain periods. Obviously, a log-transformation of the data would lead to a loss of such observations. The latter would artificially cause econometric problems with interdependent data and it would likely lead to a sample selection bias. Accordingly, it seems preferable to normalize outward FDI stocks by GDP or some other variable rather than log-transforming it in empirical applications. Third, some country-pairs exhibit a large ratio of

\(^2\) See Appendix B for details.
outward FDI stocks relative to the parent country’s GDP. This may be the case simply because GDP is measured as a flow while outward FDI are measured as a stock.

**Bilateral determinants of FDI: The components of X.**

A number of determinants have been proposed and found to influence bilateral activity of multinationals. Among those, host and parent country size in terms of GDP, relative factor endowments, as well as trade and investment costs feature prominently (see Markusen, 2002; Blonigen, Davies, and Head, 2003; Barba Navaretti and Venables, 2004; among others). A variety of applications seems to point to a relative dominance of the importance of market size (host and parent country GDP) as compared to relative factor endowments (such as skilled labor ratios of capital labor ratios). In general, FDI seems to respond to changes in market size even in the short run while inference on the role of factor endowments and that of trade and investment costs for FDI has been provided mainly from the cross-sectional data dimension and it seems hard to discern their effects from those of other time-invariant factors.

For this reason, we focus on a parsimonious specification which includes key economic variables as well as some geographical and institutional factors. Among the economic fundamentals, we include (the log of) parent and host country GDP. According to theoretical work on FDI, medium-sized parent countries have a greater incentive to invest abroad than very small or very large ones. The reason is that very small parent countries do not have the resources to invest abroad and very large ones lack the incentive of doing so. Moreover, larger host countries typically attract more FDI, since firms may find small host countries unattractive where it is harder to cover fixed investment costs there (see Markusen, 2002; Barba Navaretti and Venables, 2004). However, market size of a host country itself is relevant mostly for horizontal FDI. If foreign subsidiaries engage in trade (such as the ones of vertical or export-platform multinationals), a host country's market potential -- i.e., weighted size of accessible markets from there -- is what matters.

Multinational firms tend to invest also in relatively rich (high-income) host countries since investment does not only involve skilled labor endowment of the parent country but also that of the host country. Evidence for this argument is easy to provide: the bulk of FDI is undertaken within the OECD rather than of OECD countries outside the OECD area. Economic theory rationalizes this feature by assuming that multinationals use factors such as skilled labor or capital for subsidiary set-up not only from the parent country but also from the
host (see Markusen and Venables, 2000; Markusen, 2002; Egger and Pfaffermayr, 2005). One reason for why we observe many non-OECD countries with negligible inward FDI is that they lack the necessary factors to be attractive for foreign subsidiary set-up. Empirically, skilled labor or capital endowments and other factors of attraction for FDI are hard to measure and they are highly correlated with per-capita income. Rather than using estimated stocks of capital endowments or proxies of skilled labor endowments or human capital stocks, we include the log-difference in host-to-parent country real GDP per capita (in constant U.S. dollars of the year 2000), using data from the World Bank’s World Development Indicators. According to previous evidence we would expect a coefficient on this variable which is either positive or at least not largely negative.

Finally, we include a number of proxies for investment costs which are taken from the International Country Risk Guide (using averages of the first three months for each year). In particular, we use source data for the investment profile index, the bureaucracy index, and the corruption index. We log-transform these bounded index values and compute the host-to-parent country difference of the log-transformed values. A higher host-to-parent log investment profile index difference indicates a better investment profile in the host relative to the parent country. A higher host-to-parent log bureaucracy index difference suggests a better quality of the bureaucratic system in the host relative to the parent country. Finally, the corruption index is defined such that a higher host-to-parent country log index difference reflects a higher level of corruption in the host relative to the parent country.

Altogether, the empirical model of bilateral FDI stocks as a fraction of parent country GDP depends on six time-variant fundamental variables which capture characteristics of a parent country (log parent country GDP), of a host country (log host country GDP), or a country-pair (host-to-parent country log differences in real per-capita income, the investment profile index, the bureaucracy index, and the corruption index). These six variables represent \( \mathbf{X}_t \).

**Determinants of interdependence or spaceyness**

Apart from \( \mathbf{X}_t \), some of our models will include \( \mathbf{W}_{P,t} \mathbf{X}_{P,t} \) and \( \mathbf{W}_{H,t} \mathbf{X}_{H,t} \), which consist of five variables each. Recall that the column rank of \( \mathbf{X}_t \) is six, but the definitions of \( \mathbf{W}_{P,t} \) and \( \mathbf{W}_{H,t} \) entail that we can not include \( \mathbf{W}_{P,t} \mathbf{X}_t \) and \( \mathbf{W}_{H,t} \mathbf{X}_t \) together with \( \mathbf{X}_t \) in the model: the reason is that premultiplying the vector containing log parent country GDP with \( \mathbf{W}_{H,t} \) would
render that variable perfectly collinear with log parent country GDP in $X_i$. Similarly, premultiplying the variable log host country GDP with $W_{p,t}$ would render that variable perfectly collinear with log host country GDP in $X_i$. Accordingly, $X_{p,t}$ excludes log host country GDP while $X_{H,t}$ excludes log parent country GDP.

Apart from the systematic part of the model accounting for spaceyness, we allow for spacey hosts and spacey parents in terms of the time-invariant as well as the remainder unobservable variables contained in the disturbance term as indicated in equation (2).

III.2. Results

We estimate alternative versions of the model given in equations (1) and (2). One version assumes that any form of interdependence is absent from the data, $\beta_p = \beta_H = 0$ and $\rho_p = \rho_H = 0$. We refer to this benchmark regression as Model A. In Model B, we allow $\beta_p$ to differ from zero but assume $\beta_H = \rho_p = \rho_H = 0$. In Model C, $\beta_H$ may differ from zero but we assume that $\beta_p = \rho_p = \rho_H = 0$. In Model D, both $\beta_p, \beta_H$ may differ from zero. Table 1 summarizes our findings.3

< Table 1 >

The results based on the four Models A, B, C, and D may be interpreted as follows. First of all, spaceyness contributes non-trivially to the explanatory power of the estimated models. For instance, the within-$R^2$ rises by almost 18% when accounting for spacey hosts in Model C as compared to the non-spatial Model A. It increases by more than 35% when accounting for spacey parents in Model B as compared to the non-spatial Model A. Moreover, evidence from Model D suggests that both spacey hosts and spacey parents play an important role. All of that would be confirmed also by means of Wald test statistics based on Model D.

3 Apart from the variables in $X_i$, we include dummy variables for all observations with a disturbance term which is larger than three times the standard error. For convenience of notation, we did not include them in $X_i$ in the previous section, but they are always present in the estimated models.
IV. Concluding remarks

This paper provides an empirical analysis of the importance of two dimensions of interdependence or ‘spaceyness’ of bilateral foreign direct investment (FDI) across country-pairs: interdependence across parent countries with respect to FDI in a given host country (‘spacey parents’); and interdependence across host countries with respect to FDI from a given parent country (‘spacey hosts’).

General equilibrium theory on multinational firm activity suggests that both forms of interdependence in bilateral FDI should matter simultaneously. Yet, previous empirical work only allowed for either spacey parents or spacey hosts. One important consequence of this could be parameter bias with respect to the included determinants of FDI. A relevant second consequence is the mis-characterization of comparative static effects of explanatory variables on bilateral FDI.

In a panel of 22 countries across 10 years, we illustrate that there is evidence for both models of interdependence. According to our findings, interdependence across host countries – such as one brought about by trading export platform foreign subsidiaries – as well as interdependence of parent countries – associated with competition for investment projects across parents in specific host countries – are important and non of them should be excluded from the empirical analyses a priori.

References


Appendix. Data description

List of parent and host countries

Our sample consists of 22 European OECD countries which enter the data-set as both parents and hosts of outward FDI. The countries are: Austria, Belgium-Luxembourg, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, and United Kingdom.

Altogether, there are $22 \cdot 21 = 462$ possible dyads. The data-set consists of annual data for the ten-year period 1995-2004.

Descriptive statistics of main variables

< Table B >

![Figure 1 - Kernel density plot of dependent variable](image)
Table 1 - Spacey parents versus spacey hosts in the systematic part of a model of bilateral FDI stocks

<table>
<thead>
<tr>
<th>Determinants of FDI</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
<th>Model D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements of $X_t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log parent country GDP</td>
<td>0.0037</td>
<td>-0.0001</td>
<td>0.0043 *</td>
<td>-0.0038</td>
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<tr>
<td>Log host country GDP</td>
<td>0.0023</td>
<td>0.0023</td>
<td>0.0024</td>
<td>0.0027</td>
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<tr>
<td>Log host-to-parent real per-capita GDP</td>
<td>0.0049</td>
<td>0.0051</td>
<td>0.0052</td>
<td>0.0056</td>
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<tr>
<td>Log host-to-parent investment profile index</td>
<td>0.0010</td>
<td>0.0036 ***</td>
<td>-0.0005</td>
<td>0.0038 **</td>
</tr>
<tr>
<td>Log host-to-parent bureaucracy index</td>
<td>0.0034</td>
<td>-0.0078 ***</td>
<td>0.0107 ***</td>
<td>-0.0020</td>
</tr>
<tr>
<td>Log host-to-parent corruption index</td>
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<td>-0.0011</td>
<td>-0.0032 ***</td>
<td>-0.0026 **</td>
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<td>Elements of $W_{pi}, X_{p,t}$</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log parent country GDP</td>
<td>-</td>
<td>0.0107 ***</td>
<td></td>
<td>0.0181 ***</td>
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<tr>
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<td>0.0037</td>
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<td></td>
<td>0.0229 ***</td>
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<td>-0.0022</td>
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<td>Log host-to-parent bureaucracy index</td>
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<td>0.0024</td>
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<tr>
<td>Log host-to-parent corruption index</td>
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<td>0.0421 ***</td>
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<td>Log parent country GDP</td>
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<td>0.0309 ***</td>
<td>-0.0180 ***</td>
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</table>

Notes: All models include 21 outlier dummies for observations with a residual whose absolute value is larger than three times the root mean squared error of Model A. ***, **, and * indicate that coefficients are significantly different from zero at 1%, 5%, and 10%, respectively.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std.dev.</th>
<th>Minimum</th>
<th>Maximum</th>
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<tr>
<td>Dependent variable</td>
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<td>Bilateral stocks of outward FDI/parent GDP</td>
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<td>Explanatory variables (elements of $X_t$)</td>
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<td>1.2414</td>
<td>23.3905</td>
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