8 Spacey Parents: Spatial Autoregressive Patterns in Inbound FDI

Bruce A. Blonigen, Ronald B. Davies, Helen T. Naughton, and Glen R. Waddell

8.1 Introduction

Of the many directions in the current work on foreign direct investment (FDI), the effort to expand our understanding of multinational enterprises (MNEs) to include the influence of third countries is one of the most promising. Working from a strong base of theory and evidence describing the influence of parent and host country factors on FDI, much of which is summarized in Caves (1996) and Markusen (2002), recent work examines the influence of additional potential host countries on the outbound FDI decision. Papers in this vein include those of Ekholm, Forslid, and Markusen (forthcoming), Yeaple (2003), and Bergstrand and Egger (2004), who analyze what has been termed "export platform FDI." In contrast to Markusen's (1984) horizontal model in which the MNE serves each of its markets through a local plant, in the export platform model, the MNE establishes a single overseas plant in one of the many potential hosts. Output from this centrally located plant is then sold in both the host and other nearby markets. Recent evidence by Blonigen, Davies, Waddell, and Naughton (forthcoming), Baltagi, Egger, and Pfaffermayr (2004), and Ekholm, Forslid, and Markusen (forthcoming), finds compelling evidence for this export platform motivation in outbound FDI data.

Although this 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. In this chapter, we identify two potential channels for such effects using a simple model of the MNE. First, we show that the parent (or home) country's proximity to additional markets alters the margin of whether to service the host market through exports from the parent or through FDI. When the parent country has low-cost access to large markets, this increases the opportunity cost of exporting to the host. Therefore, subsidiary production in the host will rise even though the host itself is not an export platform. We call this the *parent market proximity effect*, which contrasts with host country market proximity effects (often called market potential effects) in previous literature such as Head and Mayer (2004) and Blonigen et al. (forthcoming). Second, when there are MNEs from many countries active in the host, they may influence each other. If the various MNEs compete for scarce resources, then FDI from any single parent country may be crowded out by FDI from other parent countries. Alternatively, if FDI from other parent countries provides positive production externalities in the host country through technological transfer or market linkages, then greater third-country FDI could encourage FDI from the parent country in question.

This then suggests two testable hypotheses. First, we expect that more FDI will come from countries near large third-country markets. Second, more FDI from third countries in the host can mean more or less FDI from the parent depending on whether spillover or crowding-out effects dominate. To analyze these issues, we turn to a data set on U.S. inbound FDI from twenty Organization for Economic Cooperation and Development (OECD) countries over 1983 to 1998. We find strong evidence for parent market proximity effects—evidence that is robust to a variety of specifications. The effect of FDI from third countries, however, depends on the sample. When using our full OECD data set, we find no robust result for this variable. When restricting the analysis to a European subsample, which excludes the geographically distant countries of Australia, Canada, and Japan, we find a fairly robust negative impact of third-country FDI. Thus, at least for the European sample, it seems that FDI from one country may crowd out investment from another.

This chapter proceeds as follows. In section 8.2, we sketch out a simple, partial equilibrium model of the multinational firm in order to frame our predictions. In section 8.3, we discuss our empirical strategy and data. Section 8.4 presents our results and section 8.5 concludes.

8.2 A Simple Model of the Multinational Firm

In this section our goal is to frame our empirical methodology with a simple, partial equilibrium model of a multinational firm. Although this model clearly lacks many of the general equilibrium properties that typify fully specified models such as Markusen (2002) or Helpman, Melitz, and Yeaple (2004), our goal here is simply to elucidate some of the ways in which third-country effects may be important for a country's inbound FDI from a particular parent country.

Consider a firm that produces in two countries, the parent and the host.[1] Countries are numbered such that the host country is country 1 and the parent country is country 2. In addition, there is a third country 3. The output from the parent country 2 is produced at a total variable production cost $C(Q)$ where Q is the total amount produced in the parent country.[2] This output can be sold in any of the three countries, where Q_i is the amount of parent-produced output sold in country i. To do so, the firm must incur a per unit shipping cost $t \geq 0$, where $t_2 = 0$: parent country production can be sold in that country without additional cost. In addition to parent production, the multinational produces in the host, incurring the total variable production cost $C^*(Q^*; \Omega)$ where Q^* is the total host production and Ω is a function of the other (nonmodeled) MNEs active in the host (more on this below). Both production cost functions are increasing, convex functions. Note that this assumption differs from many models in which production is constant returns to scale (CRS). If we assume CRS production in our partial equilibrium model, then host production will not depend on third-country variables, although it would still depend on Ω. We assume that all output from the host plant is sold in the host, that is, that this is a purely horizontal MNE, in order to eliminate any effects that would arise from an export platform motivation for host production. We also assume that in equilibrium, all quantities will be positive, implying that the firm does not import from the host.[3]

Defining q_i as the total amount sold in each country, each country's local price is $P_i(q_i; \beta_i)$. Note that for the host country, $q_1 = Q_1 + Q^*$, whereas the total amount sold in the other two countries is equal to their respective Q_i. We assume that these inverse demand functions are decreasing in their respective quantities and that the associated marginal revenue functions are declining in quantity.[4] The β_i term in the inverse demand is a shift parameter. We assume that, all else equal, an increase in a country's β increases both the price and the slope of the price function, that is, where superscripts denote derivatives, that both P_i^{β} and $P_i^{q_i\beta}$ are positive. These β terms capture effects from an increase in the size of a given market; the bigger the market for a given quantity, the higher and the less sensitive the price will be. Finally, in addition to its variable costs, each plant costs the firm a fixed cost γ_i, and the firm incurs a firm-level fixed cost α.

The MNE's profits are given by

$$\Pi^{MNE} = \sum_{i=1}^{3} P_i(q_i;\beta_i)q_i - C(Q) - C^*(Q^*;\Omega)$$

$$- \sum_{i=1}^{3} t_i Q_i - \gamma_1 - \gamma_2 - \alpha. \tag{8.1}$$

Profit maximization implies that

$$P_i^{q_i}(q_i;\beta_i)q_i + P_i(q_i;\beta_i) = C^Q\left(\sum_{i=1}^{3} Q_i\right) + t_1 \quad \text{for } i = 1,2,3 \tag{8.2}$$

and

$$C^{*Q^*}(Q^*;\Omega) = C^Q\left(\sum_{i=1}^{3} Q_i\right) + t_1. \tag{8.3}$$

Equation 8.2 shows the standard markup conditions for a monopolist in each of the three markets. Note that unlike many other models of FDI, we ignore competition in output markets with other firms (either domestic, foreign, or multinational). We take this partial equilibrium approach for simplicity, since demonstrating these interactions is not the primary goal of our theory, which is instead to highlight the role of third countries. Equation 8.3 highlights the trade-off of this horizontal firm between parent production (and exports) and host production. From the four first-order conditions, we can calculate how host production moves in response to changes in our exogenous parameters. This is given in the following proposition:

Proposition 1. Host production is:

a. Increasing in country 1's transport cost
b. Decreasing in country 3's transport cost
c. Increasing in any country's market size

Proof. It will prove convenient to define some notation. Denote the change in a country's marginal revenue with respect to the quantity sold there by

$$\tilde{P}_i \equiv P_i^{q_i q_i}(q_i;\beta_i)q_i + 2P_i^{q_i}(q_i;\beta_i) < 0. \tag{8.4}$$

Also, define

$$\Phi \equiv C^{QQ}(Q)C^{*Q^*Q^*}(Q^*;\Omega)[\tilde{P}_1\tilde{P}_2 + \tilde{P}_1\tilde{P}_3 + \tilde{P}_2\tilde{P}_3]$$
$$- \tilde{P}_1\tilde{P}_2\tilde{P}_3[C^{QQ}(Q) + C^{*Q^*Q^*}(Q^*;\Omega)] > 0. \tag{8.5}$$

Using equations 8.2 and 8.3, we can calculate the following comparative statics (dropping the arguments of functions):

$$\frac{dQ^*}{dt_1} = \Phi^{-1}\tilde{P}_1[C^{QQ}(\tilde{P}_2 + \tilde{P}_3) - \tilde{P}_2\tilde{P}_3] > 0, \tag{8.6}$$

$$\frac{dQ^*}{dt_3} = \Phi^{-1}[-C^{QQ}\tilde{P}_1\tilde{P}_2] < 0, \tag{8.7}$$

$$\frac{dQ^*}{d\beta_1} = \Phi^{-1}\tilde{P}_2\tilde{P}_3C^{QQ}[P_1^{q_i\beta}q_1 + P_1^{\beta}] > 0 \tag{8.8}$$

$$\frac{dQ^*}{d\beta_2} = \Phi^{-1}\tilde{P}_1\tilde{P}_3C^{QQ}[P_2^{q_i\beta}q_2 + P_2^{\beta}] > 0 \tag{8.9}$$

$$\frac{dQ^*}{d\beta_3} = \Phi^{-1}\tilde{P}_1\tilde{P}_2C^{QQ}[P_3^{q_i\beta}q_3 + P_3^{\beta}] > 0 \tag{8.10}$$

The intuition behind these results is straightforward. When the transport cost to the host rises, this lowers the relative marginal cost of host production compared to producing in the parent country and exporting. Thus, the MNE shifts production to the host. When the transport cost to country 3 rises, it reduces exports from the parent to country 3. This frees up parent-produced output for exporting to the host, leading to a reduction in host output. When the host market size rises, this increases the return to selling there, thereby increasing host production (as well as exports from the parent to the host). When the market size of either of the nonhost countries rises, the MNE will divert parental-produced output toward the expanding market and away from the host. This then leads to higher host-country production to replace a portion of the fall in imports from the parent.[5]

It is worth reiterating the importance of our convex cost assumption for this result. If marginal costs are constant, there is no need to divert parental output from the host to country 3 when its trade costs fall or its market size rises. Thus, with constant returns to scale production, host output is independent of country 3. If marginal costs are decreasing, and production is increasing returns to scale, then when country 3′s trade costs fall or its market size rises, this will lead to an increase in parental production, lowering marginal costs in the parent. Thus, under increasing returns to scale, host production will fall as the size of country 3 increases or as its trade costs fall. These competing alternatives imply the need for empirical analysis to choose among these assumptions.

This illustrates one way in which third countries can affect FDI in the host. When the parent country has easy access to large third markets, the firm′s parent country activities will be geared more heavily toward those markets. As a result, firms from such countries will expand host production to serve that particular market. The second way in which third countries can affect the MNE′s decision is through the effect of their multinationals on the firm′s host production costs, that is, through Ω. Again using the first-order conditions, we find that

$$\frac{dQ^*}{d\Omega} = \Phi^{-1} C^{*Q^*\Omega}[\tilde{P}_1\tilde{P}_2\tilde{P}_3 - C^{QQ}[\tilde{P}_1\tilde{P}_2 + \tilde{P}_1\tilde{P}_3 + \tilde{P}_2\tilde{P}_3]], \tag{8.11}$$

which has the opposite sign of $C^{*Q^*\Omega}$. If $C^{*Q^*\Omega}$ is positive (greater MNE activity by other firms increases this firm′s marginal cost of host production), then more FDI from other countries will reduce the output of MNEs from the parent country. This would be consistent with a situation in which MNEs compete for scarce host resources.

Alternatively, if we were to embed this Ω in the host price function, such an impact could arise due to greater output competition in the host. But more FDI from other countries could lower the marginal cost of host production due to spillovers. As discussed by Blomström and Kokko (1998), a sizable body of evidence suggests that multinationals provide positive production externalities to other firms, benefits that may well extend to other MNEs in the host. Given these conflicting possibilities, we have no a priori expectations on the net effect of third countries′ FDI and therefore turn to the data for additional insights.

8.3 Empirical Methodology and Data

8.3.1 Empirical Specification

Our empirical approach will use U.S. inbound FDI data and apply a modification of the commonly used gravity model of FDI. Ignoring time subscripts for notational purposes and where all nondiscrete variables are measured in natural logs, our primary regression specification is given by

$$FDI = \lambda_0 + \lambda_1\ ParentVariables + \lambda_2\ Trends + \lambda_3\ ParentMarketProximity + \rho \cdot W \cdot FDI + \varepsilon. \quad (8.12)$$

As in other gravity specifications for FDI, including those of Eaton and Tamura (1994) and Brainard (1997), we include several controls for the parent country. Thus, *ParentVariables* in equation 8.12 includes parent-country GDP and parent country population.[6] In addition, following the insights of Carr, Markusen, and Maskus (2001), we include a measure of parent country skill. Typically gravity models include a comparable set of host country variables. In our case, since the United States is always the host country, these variables were insignificant once trends were included.[7] Therefore, we omit these in favor of *Trends*, which is a quadratic time trend.[8]

In addition to the standard set of controls guided by prior literature, the theory also suggests the inclusion of two additional variables. The first of these is a measure of the parent country's proximity to nonhost markets. In their study of Japanese outbound FDI into Europe, Head and Mayer (2004) use several different measures of host country market proximity and find that a distance-weighted sum of proximate countries' GDPs provides the best fit for the data.[9] Taking their lead, we construct a comparable variable, parent market proximity, which for parent country i is equal to $\sum_{j \neq i}(173/d_{ij})GDP_j$ where d_{ij} is the distance between the parent country in question (i) and other non-US countries (j).[10] Note that although the construction of this variable is analogous to the host market potential measure of Head and Mayer (2004) and Blonigen et al. (forthcoming), its interpretation is quite different because of the parent versus host country distinction. In this previous work, we analyzed outbound FDI data, and the variable measures the proximity of the host country to additional surrounding markets that can be served by exports from this host. In this chapter we are constructing a variable that measures proximity of the parent country to other surrounding markets and thus is a measure of the ease with which firms can export from their parent country location. Also note that this variable differs from the distance between the parent country i and the United States, a standard gravity model control variable that we include separately. This parent market proximity variable captures two aspects of the theory. First, third-country GDP (GDP_j) corresponds to the demand shift parameter, β_3, in our theory section. Second, t_3, the trade costs between the parent country and country 3, are captured by the distance between the parent country and this third country. A rise in β_3 or a fall in t_3 would imply an increase in parent market proximity. Since the theory predicts that either change would increase FDI in the host, we expect that $\lambda_3 > 0$.

In addition to parent market proximity, we include information about concurrent FDI from other parent countries. This is done to investigate whether there is indeed any evidence supporting the Ω effect in the theory. The primary difficulty in doing so is that, due to the fact that FDI from i affects FDI from j and vice versa, there is an endogeneity problem that must be addressed. One possible approach is to construct instruments for the other countries' investment. An alternative, and the one we choose here, is the use of autoregressive spatial estimation. As detailed in Anselin (1988), this maximum-likelihood procedure deals with the endogeneity problem present in ordinary least square. The spatial autocorrelation problem here is similar to the problem of time-series autocorrelation where a structure is specified through which the dependent variable in one time period predicts what occurs in the next time period.[11] Here, though, we specify a richer, two-directional structure through which a country's investment both influences and is influenced by the investment behavior of other countries. This is done using a spatial weighting matrix that assigns a larger weight to country pairs believed to influence each others' decisions more and a smaller weight to country pairs that are less likely to respond to each other.

In equation 8.12, the effect of β is represented by $\rho \cdot W \cdot FDI$, where FDI is a vector of investment into the United States and W is the spatial lag weighting matrix, which is an $n \times n$, block-diagonal matrix, with each block capturing a single year's observations (where n is the number of observations). In our baseline case, we weight FDI using a simple inverse distance function where the shortest distance within the sample (the 173 kilometers separating Brussels and Amsterdam) gets a weight of one and all other distances get a weight that declines with distance. This inverse distance weighting scheme results in a control variable for FDI from country i in year t of $\sum_{j \neq i}(173/d_{ij})FDI_{j,t}$ that is, a distance-weighted average of FDI from the other parent countries in year t. As is standard in spatial econometrics, we then row-standardize so that the sum of these weights equals one for each parent country. The coefficient on this term, ρ, is referred to as the spatial lag. If the spatial lag is negative, this would be consistent with the crowding-out story discussed above in which more FDI from other locations implies less FDI from the parent country in question. A positive spatial lag would be consistent with the spillover story. Note that in either case, the spatial lag only captures the net effect of FDI from other countries and does not rule out coexistence of these mechanisms. Also note that this spatial lag indicates the impact of other countries' inbound FDI and does not consider the interaction of firms from country *i* or capture spillovers or crowding out by U.S. firms (the effect of which is captured by the trend terms). Because the particular choice of weighting scheme is ad hoc, we use several alternative functional forms below. Furthermore, it is not clear that we should weight FDI by distance if what matters for Ω is total FDI from other sources regardless of where it comes from. Therefore, one of our alternative weighting schemes will consider this possibility.

Although spatial studies of outbound FDI have been undertaken by Coughlin and Segev (2000), Baltagi et al. (2004), and Blonigen et al. (forthcoming), to our knowledge this technique has yet to be applied to inbound FDI data. Therefore, we are the first to consider the interaction between FDI from various parent countries. In particular, our use of inbound data implies an important difference in the interpretation of their spatial lag variable and ours. In their estimates, the spatial lag estimates the impact of FDI from a single parent country *i* into third country *k* on its FDI into *j*. In our estimates, the spatial lag captures the impact of FDI from third country *k* into *j* on FDI from parent country *i* into *j*. Note that this also differs from the interpretation of the results of Head, Ries, and Swenson (1995), who find evidence of agglomeration of Japanese subsidiaries in the United States, since there too the estimated effect is how FDI from a single source in one location depends on FDI from the same source in other locations.

8.3.2 Data

For our data set, we use a panel of annual data on U.S. inbound FDI from the major developed countries between 1983 and 1998, as listed in table 8.1. We chose these data for several reasons. First, the FDI from these countries is more likely homogeneous and may be more comparable across parent countries. As noted by Blonigen and Davies (2004), combining rich and poor countries in FDI data can often lead to implausible coefficient estimates. Furthermore, since the motivations behind investment from developed and developing countries may be

Table 8.1
Sample of countries and number of years in the sample

Country	Years in sample	Number of years in the sample
Australia	1984–1998	15
Austria	1984–1998	15
Belgium	1984–1998	15
Canada	1984–1998	15
Denmark	1984–1996, 1998[a]	14
Finland	1986–1996, 1998[a]	12
France	1984–1998	15
Germany	1984–1998	15
Greece	1984–1996[a]	13
Ireland	1984–1996, 1998[a]	14
Italy	1984–1998	15
Japan	1984–1998	15
Netherlands	1984–1998	15
Norway	1984–1996, 1998[a]	14
Portugal	1984–1997[a]	14
Spain	1984–1998	15
Sweden	1984–1998	15
Switzerland	1984–1998	15
Turkey	1991–1998[a]	8
United Kingdom	1984–1998	15

[a] Missing years are due to one of two reasons: either FDI data were censored by the Bureau of Economic Analysis due to confidentiality, or FDI sales reported were zero.

quite different, combining FDI from the two groups may introduce undesirable noise into the data. In addition, as demonstrated by Markusen and Maskus (2001) and Blonigen, Davies, and Head (2003), estimates relying on pooled outbound and inbound data can give very different results for variables such as skill when compared to separate regressions on each subsample. Our second reason for choosing these data is that restricting ourselves to a relatively small sample of countries greatly eases the computation time that spatial autoregressive techniques require. This is a particular issue when the weighting matrix gives positive weight to all countries in the sample, an issue we must grapple with in many of our specifications. Third, utilizing this set of countries allows a better comparison to the results of Blonigen et al. (forthcoming), who consider U.S. outbound FDI to this same set of countries. Despite the limitations utilizing this group of countries causes, it is worth noting that in 1996, the countries in our full sample constituted 91 percent of affiliate sales by foreign MNEs in the United States. Finally, one added benefit of using U.S. inbound data is that compared to European countries, the United States is far less likely to be an export platform since most output by MNEs in the United States is sold in the United States.

Our dependent variable is the real sales by foreign affiliates in the United States as reported by the Bureau of Economic Analysis. In unreported results, FDI stocks were used instead of affiliate sales. These yielded qualitatively identical results to the sales results: significantly positive parent market potential and significantly negative spatial lags for the European subsample. (These alternative estimates are available upon request.) We convert affiliate sales into real millions of dollars using the chain-type price index for gross domestic investment from the Economic Report of the President.[12] Availability of these data limits our time period to 1983–1998. Parent country real GDP per capita and population data come from Penn World Tables (PWT). These data run up to 2000.[13] As is standard in gravity regressions, we included the distance between the United States and the parent country. One interpretation of this variable is as a proxy for trade costs between the United States and the parent, which in our model would yield a positive coefficient. It should be noted, however, that this distance can also capture the difficulty in managing a distant subsidiary and may therefore capture the impact of such a barrier to FDI. Distance is measured using great circle distances between capital cities, denominated in kilometers.[14] Parent country skill is measured by the average years of schooling for those over age twenty-five, reported every five years for 1960–2000.[15] We used linear interpolation to construct values for other years. Summary statistics for our data are found in table 8.2.

One admitted shortcoming of this data set is that it utilizes country-level data, a potential issue since the theory of section 8.2 does not provide clear guidelines in the mapping between an individual firm's decisions and a country's aggregate amount of FDI. This shortcoming plagues many studies of FDI, particularly those that seek to identify effects generated in firm-level models. Although firm-level studies do exist (e.g., Head and Mayer 2004), the use of country-level data is still popular in the literature. To the extent that more aggregate country-level data mask heterogeneous patterns at the firm or industry level, it will bias our analysis toward not finding any statistically significant effects. For example, crowding out effects may outweigh positive

Table 8.2
Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
FDI ($millions)	59,658	90,461	1	500,400
Parent GDP ($billions)	510	617	27	3,121
Parent population (thousands)	30,411	32,159	3,506	126,486
Parent skill	8.5	1.8	3.5	11.8
Parent distance from United States (km)	6,967	2,791	734	15,958
Parent market proximity ($billions)	1,107	711	78	3,332

production externalities in some industries, with the opposite true in other industries. Such patterns in the data would make an estimate of the spatial lag likely insignificant when using country-level data. As we next show, despite this aggregation bias, we find generally statistically significant results using country-level data.

8.4 Results

In our estimation, we begin with the full OECD sample. Following this, we restrict ourselves to a European subsample in order to test the sensitivity of our results. In Blonigen et al. (forthcoming), which used U.S. outbound FDI, the results on the spatial lag term depend somewhat on whether geographic outliers such as Japan and Australia are included. Therefore it is important to look for comparable sensitivity in U.S. inbound FDI.

8.4.1 OECD Results

Table 8.3 presents our initial results from the OECD sample. Column 1 provides the standard OLS gravity estimates so that we can determine to what extent they are sensitive to the inclusion of third-country effects. As is common in gravity models of FDI, we find that most U.S. inbound FDI comes from large, skilled economies. We also find that more FDI tends to come from countries with small populations. Under the log specification, this would be consistent with more FDI from wealthy countries (i.e., holding GDP equal, those with smaller populations). In column 1 we also find that more FDI comes from countries near the United States.

Table 8.3
Spatial analysis of U.S. inbound FDI

	OLS		ML	
Independent variable	(1)	(2)	(3)	(4)
Ln(Parent GDP)	2.660 (0.392)***	2.045 (0.347)***	2.403 (0.360)***	1.996 (0.337)***
Ln(Parent Population)	−1.279 (0.406)***	−0.485 (0.363)	−0.985 (0.374)***	−0.441 (0.353)
Ln(Parent Skill)	6.627 (0.444)***	7.539 (0.398)***	6.586 (0.406)***	7.391 (0.390)***
Ln(Distance from US in km)	−0.133 (0.117)	−0.098 (0.102)	−0.188 (0.108)*	−0.132 (0.100)
Trend	−0.190 (0.068)***	−0.216 (0.060)***	−0.167 (0.063)***	−0.201 (0.058)***
Trend^2	0.006 (0.004)	0.007 (0.003)*	0.002 (0.004)	0.004 (0.003)
Spatially weighted FDI (i.e., *W*FDI*)			0.594 (0.085)***	0.311 (0.117)***
Parent market proximity		0.683 (0.072)***		0.588 (0.079)***
Constant	−41.826 (3.199)***	−53.722 (3.052)***	−44.555 (2.954)***	−53.495 (2.965)***
Observations	284	284	284	284
Adjusted R^2/log likelihood	0.84	0.88	−410.21	−382.99

Note: Standard errors in parentheses. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

In column 2, we add parent market proximity to the baseline gravity specification. We find that it is both positive and significant, consistent with our hypothesis that a larger market surrounding the parent country increases the opportunity cost of exporting to the host, thus increasing FDI and affiliate production in the host country. It is important to note that this is only one reason that parent market proximity may be positively correlated with FDI. An alternative explanation is that, as in many general equilibrium models of FDI with fixed costs, scale matters. Here, with a larger notion of parent market size, this positive coefficient could instead be evidence that greater parent market size, which includes nearby markets as well as the actual source country, makes it possible for a parent country to sustain more firms, increasing the number of MNEs and therefore the amount of FDI. Our other coefficients change little in terms of either significance or magnitude. In column 3, we omit the parent market proximity but include the spatial lag in the baseline gravity specification. We find that the spatial lag is positive and significant. Nevertheless, it is important to note that its inclusion does not greatly change our estimates relative to column 1. Finally, column 4 includes both the spatial lag and parent market proximity. Again, parent market proximity is significantly positive. This result is useful because it is consistent with our modeling assumption of increasing marginal production costs. Furthermore, the spatial lag is again significantly positive, although this is sensitive to the weighting scheme used.

8.4.2 Robustness to Alternative Weighting Schemes

One potential issue with the spatial lag estimates in table 8.3 is that the weighting matrix construction is ad hoc. In the theory, the term Ω represents the influence that FDI from third countries exerts on FDI from another country. There is no a priori reason to expect that this influence is an inverse function of geographic distance. Furthermore, the inverse distance weights used in table 8.3 assign positive weight to all countries, regardless of their distance from the parent country in question. Finally, it seems just as possible that distance between parent countries should not factor into Ω at all and that what matters is simply the total FDI from third countries. To examine whether these alternatives provide a different picture of the effect of third country FDI, in table 8.4 we use several alternative specifications for the weighting matrix used to construct the spatial lag term.[16]

The first alternative (the results are in column 1), uses a negative exponential weight, that is, for an observation from country i, the weight on FDI into the United States from country j is

$$w_y(d_{i,j}) = e^{-d_{i,j}/1000} \quad \forall \quad i \neq j. \tag{8.13}$$

As with the inverse distance, this too assigns positive weight to all other parent countries. Therefore, the next alternative assigns zero weight to other parent countries j beyond a certain distance from parent country i. In column 2, we use the weights

$$w_y(d_{i,j}) = \left(1 - \left(\frac{d_{i,j}}{11{,}155}\right)^2\right)^2 \quad \forall i \neq j \text{ if } d_{i,j} \leq 11{,}155;\ 0 \text{ otherwise.} \tag{8.14}$$

Table 8.4
Spatial analysis of U.S. inbound FDI: Sensitivity Tests

Independent variable	Table 8.3 (4)	Alternative weighting matrices (1)	(2)	(3)	(4)
Ln(Parent GDP)	1.996 (0.337)***	1.957 (0.343)***	2.033 (0.342)***	2.058 (0.341)***	1.952 (0.338)***
Ln(Parent Population)	−0.441 (0.353)	−0.375 (0.360)	−0.465 (0.360)	−0.521 (0.358)	−0.433 (0.353)
Ln(Parent Skill)	7.391 (0.390)***	7.456 (0.392)***	7.541 (0.392)***	7.491 (0.393)***	7.432 (0.388)***
Ln(Distance from US)	−0.132 (0.100)	−0.194 (0.112)*	−0.126 (0.114)	−0.048 (0.110)	−0.094 (0.099)
Trend	−0.201 (0.058)***	−0.213 (0.058)***	−0.217 (0.059)***	−0.218 (0.059)***	−0.057 (0.079)
$Trend^2$	0.004 (0.003)	0.006 (0.003)	0.006 (0.003)*	0.008 (0.004)**	−0.001 (0.004)
Spatially weighted FDI (i.e., *W*FDI*)	0.311 (0.117)***	0.147 (0.079)*	0.046 (0.091)	−0.185 (0.164)	−0.022 (0.007)***
Parent market proximity	0.588 (0.079)***	0.725 (0.074)***	0.714 (0.094)***	0.624 (0.088)***	0.671 (0.070)***
Constant	−53.495 (2.965)***	−54.313 (3.005)***	−54.479 (3.361)***	−51.157 (3.761)***	−49.055 (3.365)***
Observations	284	284	284	284	284
Adjusted R^2/log likelihood	−382.99	−384.41	−386.00	−385.47	−381.89

Note: The nondiagonal weights used for the spatially weighted FDI are as follows: Table 8.3(4), $W_{i,j} = 173/d_{i,j}$; Table 8.4(1), $W_{i,j} = e^{-d_{i,j}/1000}$; Table 8.4(2), $W_{i,j} = (1-(d_{i,j}/11{,}155)^2)^2$ if $d_{i,j} \le 11{,}155$; Table 8.4(3), $W_{i,j} = (1-(d_{i,j}/18{,}074)^2)^2$ if $d_{i,j} \le 18{,}074$; Table 8.4(4), $W_{i,j} = 1/19$ (when all 20 countries are in the sample). All W_{ii} are set equal to zero.

Standard errors in parentheses. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

In our sample, the smallest maximum separation of any country pair (the distance between Lisbon and Tokyo) is 11,155 kilometers, whereas the largest maximum separation is 18,074 kilometers (the distance between Lisbon and Sydney). As such, this scheme gives positive weight only to pairings closer than 11,155. Because this weighting scheme uses the minimum maximum distance as a cutoff, with apologies to game theorists everywhere, we refer to this as the minmax weight. The third weighting scheme, found in column 3, is similar to the minmax weight in form but assigns positive weights to all countries except the pair with the greatest distance. This scheme is is given by

$$w_y(d_{i,j}) = \left(1 - \left(\frac{d_{i,j}}{18{,}074}\right)^2\right)^2 \quad \forall i \neq j \text{ if } d_{i,j} \leq 18{,}074;\ 0 \text{ otherwise.} \quad (8.15)$$

Since this weighting scheme uses the maximum maximum distance between countries as the cutoff point, we refer to it as the "maxmax" weight. Finally, column 4 does not weight by distance at all. Here, the weight is

$$w_y(d_{i,j}) = 1 \quad \forall i \neq j;\ 0 \text{ otherwise} \quad (8.16)$$

implying that the spatial lag is the total FDI from all other countries j.[17] We refer to this as equal weights.

As table 8.4 shows, similar to table 8.3's column 4, which is repeated in table 8.4, the magnitude and significance of the standard gravity model variables change little across the various weighting matrix specifications. Parent market proximity also does not change greatly across the various specifications and is significantly positive across specifications. Thus, it appears that this too is reasonably robust to the way in which third-country FDI is included in the regression. The spatial lag term, however, is rather dependent on the choice of weighting matrix. Across the five weighting matrices, the spatial lag is negative once, insignificant twice, and positive twice. It is worth noting that the one negative coefficient is the one that assigns the greatest relative weight to distant countries, suggesting lines of possible future exploration. Thus, no clear-cut conclusions can be drawn regarding the potential impact or importance of third-country FDI in the OECD data. Although the specification with the highest log likelihood is the negative exponential weight where the spatial lag is positive and significant, the difference in log likelihoods is small. Unfortunately, as discussed by Anselin (1988), there is no good mechanism for choosing a preferred

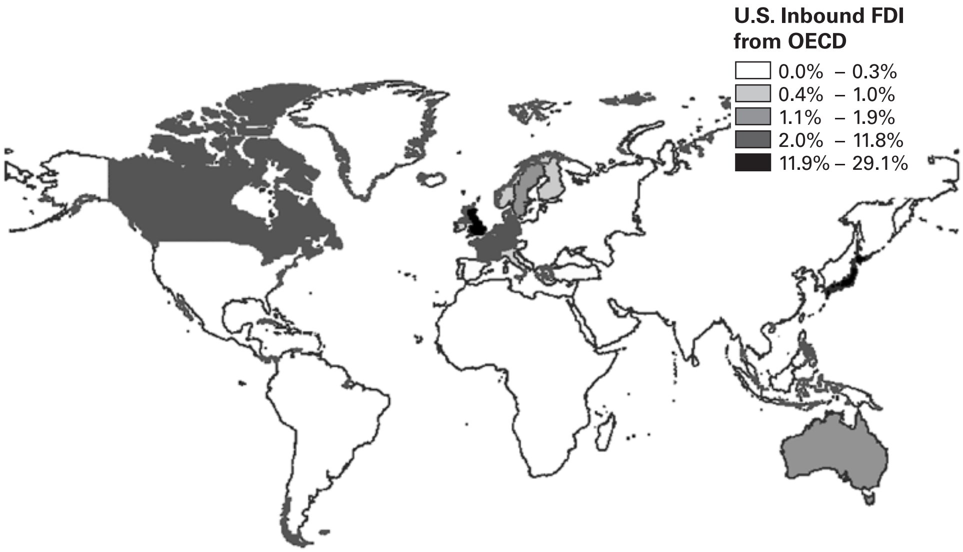

Figure 8.1
Sample of OECD in 1996
Note: Sample countries were Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

weighting matrix.[18] We must therefore conclude that although the parent market proximity effect is reasonably robust in the OECD data, the same is not true for the spatial lag.

8.4.3 European Results

As illustrated in figure 8.1, nearly 40 percent of U.S. inbound FDI in our sample comes from three countries: Australia, Canada, and Japan in 1996. One factor that sets these three countries apart from the others is their geographic isolation; the others are relatively tightly packed into Europe. To examine the extent to which these geographic outliers influence our results, we next restrict our data set to the European countries as illustrated in figure 8.2.[19] In table 8.5, we repeat our regressions from table 8.3 using this subsample. In column 1, we include only the standard set of gravity model variables. As in the full sample, we find that most FDI comes from large, skilled parent countries. Also like the OECD results, we find that as in most other studies of FDI, distance from the United States is a detriment to FDI. Unlike the OECD results, parent population is insignificant.

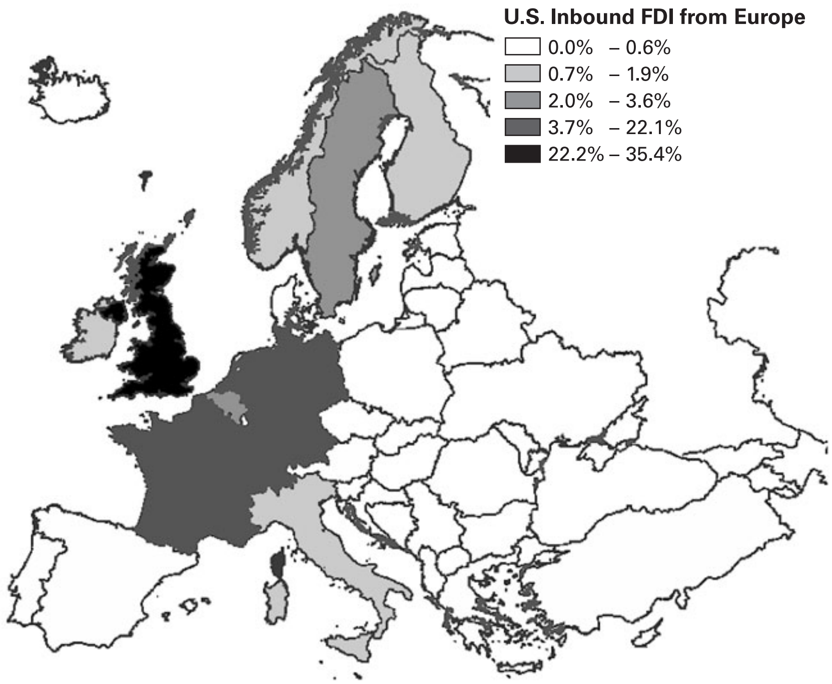

Figure 8.2
Sample of European OECD in 1996
Note: Sample countries were Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

Turning to the parent market proximity variable, as in OECD regressions, it is positive and significant. A key difference between the European and OECD results, however, is that including parent market proximity does affect the coefficients of two gravity model variables: parent country GDP and parent country population. In both columns 2 and 4, including parent market proximity reduces the point estimate of parent country GDP by about half. This suggests that at least in this sample, excluding this variable tends to overstate the importance of the parent country's size. In addition, including parent market proximity switches the sign of parent country population from negative to positive (although it remains insignificant).

Like the OECD results, the European data yield a significantly positive spatial lag in column 3. However, as the results of column 4 demonstrate, this is sensitive to the inclusion of parent market proximity.

Table 8.5
Spatial analysis of U.S. inbound FDI from European OECD

	OLS		Spatial ML	
Independent variable	(1)	(2)	(3)	(4)
Ln(Parent GDP)	1.778 (0.413)***	0.993 (0.365)***	1.707 (0.392)***	0.954 (0.360)***
Ln(Parent Population)	−0.220 (0.431)	0.369 (0.375)	−0.168 (0.408)	0.400 (0.369)
Ln(Parent Skill)	7.953 (0.470)***	7.132 (0.414)***	7.680 (0.451)***	7.165 (0.406)***
Ln(Distance from U.S. in km)	−3.665 (0.696)***	−0.833 (0.673)	−3.070 (0.675)***	−0.817 (0.659)
Trend	−0.172 (0.073)**	−0.244 (0.063)***	−0.160 (0.069)**	−0.254 (0.063)***
$Trend^2$	0.007 (0.004)	0.009 (0.004)**	0.004 (0.004)	0.010 (0.004)***
Spatially weighted FDI (i.e., *W*FDI*)			0.435 (0.106)***	−0.162 (0.157)
Parent market proximity		1.713 (0.187)***		1.857 (0.230)***
Constant	−6.859 (7.755)	−55.772 (8.534)***	−14.590 (7.589)*	−57.009 (8.447)***
Observations	239	239	239	239
Adjusted R^2/log likelihood	0.85	0.89	−345.44	−314.56

Note: Standard errors in parentheses. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

This omitted variable bias suggests that parent market proximity and the FDI from third countries are positively correlated, a finding reinforced by the rise in the coefficient on parent market proximity when the spatial lag is included. Since, as our estimates indicate, large countries tend to undertake more FDI, it is not surprising that proximity to large countries also tends to mean proximity to large sources of FDI. In any case, the results of the preferred specification in column 4 suggest at most a crowding-out story in which the presence of multinationals from other countries decreases the net benefit of FDI from the country in question. Note that this is quite different from the results in columns 3 and 4. Thus, as in Blonigen et al. (forthcoming), the exclusion of the geographic outliers tends to increase the estimated coefficient of the spatial lag.[20]

In table 8.6, we again use four alternative weighting matrices for the spatial lag.[21] Note that both the minmax and the maxmax weights were adjusted to reflect changes in the maximum distances the sample change created. Here, our results change little across the various weighting matrices. In each, parent market proximity is significantly positive. The spatial lag is negative in each specification, although again it is significant only when using weighting schemes that give relatively greater importance to distant countries. Using the results of column 4, we find that a 1 percent rise in FDI by all other parent countries decreases FDI by the remaining parent country by 0.02 percent.[22] This suggests that to the extent that crowding out occurs, it happens on a less than one-to-one basis. Thus, regardless of how we combine third countries' FDI, we find that more FDI comes from countries nearer to other large markets. Furthermore, our estimates suggest that more FDI from one European country appears to crowd out FDI from another and that this effect is less than one-to-one.

Finally, in unreported results, we in turn dropped Belgium, the Netherlands, and the Scandinavian countries.[23] In each of these, we found a positive parent market proximity coefficient and a negative spatial lag. This indicates that the European results are robust to subsamples within Europe and that the exclusion of the three geographic outliers is the driving force of the difference between the OECD and European samples.

8.5 Conclusion

The goal of this chapter has been to provide some initial insights into how the presence of other parent countries might affect how much FDI a particular parent country undertakes into a given host country. This line of thought is intended to complement the existing work on how the presence of additional host countries affects how much FDI a given host receives. Using a simple model, we suggest two avenues for such effects: parent market proximity and interaction between FDI from different parents. Using data of OECD and European FDI into the United States, we find strong evidence for a positive effect of parent market proximity. However, only in the European subsample do we find a consistent effect of FDI from other countries. There, we find that the more FDI that other countries have in the United States, the less FDI a given parent country will have. This would be consistent with increased competition in input or output markets by these other coun-

Table 8.6
Spatial analysis of U.S. inbound FDI: Sensitivity tests from European OECD

Independent variable	Table 5 (4)	Alternative weighting matrices (1)	(2)	(3)	(4)
Ln(Parent GDP)	0.954 (0.360)***	1.020 (0.357)***	1.224 (0.403)***	1.156 (0.345)***	0.930 (0.354)***
Ln(Parent Population)	0.400 (0.369)	0.319 (0.369)	0.121 (0.418)	0.080 (0.360)	0.396 (0.364)
Ln(Parent Skill)	7.165 (0.406)***	7.160 (0.405)***	7.125 (0.405)***	6.960 (0.390)***	7.036 (0.402)***
Ln(Distance from US)	−0.817 (0.659)	−0.971 (0.665)	−1.231 (0.732)*	−1.662 (0.668)**	−0.814 (0.651)
Trend	−0.254 (0.063)***	−0.254 (0.062)***	−0.262 (0.063)***	−0.228 (0.059)***	−0.105 (0.080)
Trend^2	0.010 (0.004)***	0.010 (0.004)***	0.010 (0.004)***	0.013 (0.004)***	0.002 (0.004)
Spatially weighted FDI (i.e., *W*FDI*)	−0.162 (0.157)	−0.227 (0.167)	−0.153 (0.123)	−0.849 (0.229)***	−0.021 (0.008)***
Parent market proximity	1.857 (0.230)***	1.805 (0.195)***	1.727 (0.183)***	1.456 (0.188)***	1.676 (0.182)***
Constant	−57.009 (8.447)***	−54.496 (8.394)***	−53.127 (8.620)***	−35.836 (9.629)***	−51.839 (8.395)***
Observations	239	239	239	239	239
Adjusted R^2/log likelihood	−314.56	−314.16	−314.33	−307.85	−311.56

Note: The nondiagonal weights used for the spatially weighted FDI are as follows: Table 8.5(4), $W_{i,j} = 173/d_{i,j}$; Table 8.6(1), $W_{i,j} = e^{-d_{i,j}/1000}$; Table 8.6(2), $W_{i,j} = (1-(d_{i,j}/11{,}155)^2)^2$ if $d_{i,j} \leq 11{,}155$; Table 8.6(3), $W_{i,j} = (1-(d_{i,j}/18{,}074)^2)^2$ if $d_{i,j} \leq$ 18,074; Table 8.6(4), $W_{i,j} = 1/19$ (when all twenty countries are in the sample). All W_{ii} are set equal to zero.

Standard errors in parentheses. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

tries' multinationals. An alternative explanation is that this represents the fact that the bulk of FDI occurs through mergers and acquisitions. If the supply of acquisition targets is limited, acquisition of a target by one country naturally reduces opportunities for acquisition FDI by other countries. We leave further investigation of this intriguing possibility for future research.

This latter effect suggests that such crowding out appears to be the dominant force at play in the European sample. However, two critical caveats must be noted. First, this is only the net effect from third-country FDI. As such it should not be interpreted as implying that no positive production externalities exist. Second, we are dealing with highly aggregated data for the purpose of comparing our results to the bulk of the literature. This level of aggregation may mask important interactions at the industry or firm level that we do not capture. In addition to the obvious possibility that spillovers dominate crowding out in some industries but not others, there is the possibility for reincorporation issues. For example, suppose that due to a favorable tax environment in a country j proximate to a given parent country i, firms initially located in i will find it beneficial to reincorporate in country j. Thus, as FDI from j rises, FDI from i would fall. Nevertheless, our hope is that our results here highlight the potential usefulness of considering the impact of other parent countries on FDI and that they spur both more detailed theory and empirical work in this area.

Notes

We thank participants at the CES-Ifo's Venice Summer Institute's Workshop, "Recent Developments in International Trade: Globalization and the Multinational Enterprise." In particular, we thank Maarten Bosker, Joseph François, James Markusen, and three anonymous referees for useful comments. Any errors or omissions are our responsibilities.

1. In the interest of brevity, we assume that the firm is a multinational. Such decisions lie at the heart of many models of FDI as discussed by Markusen (2002). Our model could easily be broadened to include the choice of whether to go multinational. There, because of the need to cover additional fixed costs when setting up the host plant, this choice would depend on host market size and the relative cost savings (avoiding transport costs and the increasing parent country marginal cost). Since formal presentation of this possibility does not significantly contribute to our goals for this section, we omit it.

2. In the rest of this section we refer to parent country 2 as simply the "parent country."

3. Our theory can certainly encompass this possibility, however. The primary change is that an increase in trade costs between 1 and 2 would decrease the need for overseas production.

4. This latter assumption is guaranteed if the inverse demand functions are concave.

5. In an alternative model, suppose that the MNE has a fixed supply of a factor that it must allocate between production facilities in each of the three countries. In this case, an increase in the size of country 3 would lead the firm to reallocate this limited resource away from country 1 toward country 3. This would yield an opposite effect from the one here. In any case, our results reject such an effect in the data.

6. In unreported results, we also included the inverse of parent openness, measured as Parent GDP/(Parent imports + Parent exports) to proxy for parent trade costs. However, since the theory treats parent country trade as an endogenous variable, using this as a control variable created some problematic interpretative issues. In any case, when this was included, we found qualitatively identical results for our variables of interest. The only notable change is that when including this additional variable (which was typically significantly negative in the regressions), the distance between the parent and the United States was typically insignificant in the OECD results. These alternative estimates are available on request.

7. These alternative results are available on request. The omitted variables include U.S. GDP, population, openness, skill, and an index of investment barriers.

8. In unreported specifications, we replace *Trends* with a set of year dummies. This did not alter the qualitative results of our estimation.

9. Since our host country is the United States in all observations, as with the other U.S. variables, we exclude host market potential in favor of quadratic trends.

10. In line with the FDI weighting matrix discussed below, the 173 is the shortest distance between country pairs, implying that Belgium's GDP gets a weight of one for the Netherlands and vice versa. Since this is a constant, this simply scales the estimated coefficient on parent market proximity.

11. This similarity is the root of the term *spatial lag*.

12. The Bureau of Economic Analysis FDI data can be found at http://www.bea.gov/bea/di/home/directinv.htm. The price deflator can be found at http://www.gpoaccess.gov/usbudget/fy05/sheets/b7.xls.

13. The PWT Version 6.1 data are available online at http://pwt.econ.upenn.edu/php_site/pwt_index.php.

14. With the exception of Belgium, these data were provided by Raymond Robertson at his Web site. Belgian distances were acquired from http://www.indo.com. Alternatives to measuring distance between capital cities may result in different estimates for our spatial lag, particularly for geographically large countries such as Canada. This is an additional benefit to investigating the European subsample as this is presumably less of a problem in these geographically smaller countries.

15. Acquired from Barro and Lee (2001), International Data on Educational Attainment.

16. Throughout table 8.4 we use the same inverse-distance weighting scheme for parent market proximity. We do this to isolate the impact the weighting matrix has on the spatial lag's estimated coefficient.

17. Note that with this scheme, unlike the others, we do not row-standardize. This is because doing so converts this term into average FDI from countries other than *i*. By construction, this average is going to be bigger for countries with small amounts of FDI and

smaller for countries with large amounts of FDI. This then will tend to lead to a negative coefficient on the spatial lag simply as a result of the variable's construction.

18. As Anselin (1988) discusses in chapter 14, depending on the criterion used, the relative ranking of weighting matrices can change dramatically. Furthermore, since choosing a different weighting matrix is tantamount to choosing a different control variable, such comparisons do not have analogies to comparisons between restricted and unrestricted estimations.

19. In 1996, this subsample was 55 percent of total U.S. inbound FDI; therefore, we are still discussing a large share of overall U.S. inbound FDI.

20. It is worth noting that in the OECD results with equal weights, the results look similar to the European results. Thus, in the one regression using the OECD data in which space does not affect the spatial lag (the one in which spatial outliers do not appear as such), we find similar results in the two samples.

21. As in table 8.2, throughout table 8.6 we use the same inverse-distance weighting scheme for parent market proximity.

22. Note that this is a partial equilibrium effect since this decrease in FDI from the parent in question would feed back into the FDI from the other parent countries creating a multiplier effect. In this case, the comparative static would depend on the parent country in question because the particular weighting matrix to calculate this "spatial externality" varies by country. For details on this, see Anselin (2003).

23. The Scandinavian countries excluded were Denmark, Norway, Sweden, and Finland. When we drop those countries that in 1996 composed less than 1 percent of U.S. inbound FDI, from Europe the results using sales data do not converge.

References

Anselin, Luc. (1988). *Spatial Econometrics: Methods and Models*. Norwood, Mass.: Kluwer.

Anselin, Luc. (2003). Spatial Externalities, Spatial Mulipliers, and Spatial Econometrics. *International Regional Science Review* 26, 153–166.

Baltagi, Badi H., Peter Egger, and Michael Pfaffermayr. (2004). Estimating Models of Complex FDI: Are There Third-Country Effects? Mimeo.

Barro, R., and J. W. Lee. (2001). International Data on Educational Attainment: Updates and Implications. *Oxford Economic Papers* 53(3), 541–563.

Bergstrand, Jeffrey H., and Peter Egger. (2004). A Theoretical and Empirical Model of International Trade and Foreign Direct Investment with Outsourcing: Part I, Developed Countries. Mimeo.

Blomström, Magnus, and Ari Kokko. (1998). Multinational Corporations and Spillovers. *Journal of Economic Surveys* 12, 247–277.

Blonigen, Bruce A., and Ronald B. Davies. (2004). The Effects of Bilateral Tax Treaties on US FDI Activity. *International Tax and Public Finance* 11(5), 601–622.

Blonigen, Bruce A., Ronald B. Davies, and Keith Head. (2003). Estimating the Knowledge-Capital Model of the Multinational Enterprise: Comment. *American Economic Review* 93, 980–994.

Blonigen, Bruce A., Ronald B. Davies, Glen R. Waddell, and Helen T. Naughton. (2007). FDI in Space: Spatial Autoregressive Relationships in Foreign Direct Investment. *European Economic Review* 51, 1303–1325.

Brainard, S. Lael. (1997). An Empirical Assessment of the Proximity-Concentration Trade-off Between Multinational Sales and Trade. *American Economic Review* 87(4), 520–544.

Carr, David L., James R. Markusen, and Keith E. Maskus. (2001). Estimating the Knowledge-Capital Model of the Multinational Enterprise. *American Economic Review* 91(3), 693–708.

Caves, Richard E. (1996). *Multinational Enterprise and Economic Analysis*. Cambridge: Cambridge University Press.

Coughlin, Cletus, and Eran Segev. (2000). Foreign Direct Investment in China: A Spatial Econometric Study. *World Economy* 23(1), 1–23.

Eaton, Jonathan, and Akiko Tamura. (1994). Bilateralism and Regionalism in Japanese and US Trade and Direct Foreign Investment Patterns. *Journal of the Japanese and International Economies* 8(4), 478–510.

Ekholm, Karolina, Rikard Forslid, and James R. Markusen. (2007). Export-Platform Foreign Direct Investment. *Journal of the European Economics Association* 5, 776–795.

Head, Keith, and Thierry Mayer. (2004). Market Potential and the Location of Japanese Investment in the European Union. *Review of Economics and Statistics* 86, 959–972.

Head, Keith, John Ries, and Deborah Swenson. (1995). Agglomeration Benefits and Location Choice: Evidence from Japanese Manufacturing Investments in the United States. *Journal of International Economics* 38(3–4), 223–247.

Helpman, Elhanan, Marc J. Melitz, and Stephen R. Yeaple. (2004). Export Versus FDI with Heterogeneous Firms. *American Economic Review* 94(1), 300–316.

Markusen, James R. (1984). Multinationals, Multi-Plant Economies, and the Gains from Trade. *Journal of International Economics* 16(3–4), 205–226.

Markusen, James R. (2002). *Multinational Firms and the Theory of International Trade*. Cambridge, Mass.: MIT Press.

Markusen, James R., and Keith E. Maskus. (2001). Multinational Firms: Reconciling Theory and Evidence. In Magnus Blomström and Linda S. Goldberg (eds.), *Topics in Empirical International Economics: A Festschrift in Honor of Robert E. Lipsey*. Chicago: University of Chicago Press.

Yeaple, Stephen R. (2003). The Complex Integration Strategies of Multinationals and Cross Country Dependencies in the Structure of Foreign Direct Investment. *Journal of International Economics* 60(2), 293–314.