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FOREIGN DIRECT INVESTMENT IN PRODUCER SERVICES: THEORY AND EMPIRICAL EVIDENCE

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Abstract

This paper examines the pattern of foreign direct investment (FDI) in producer services. We develop a model of FDI in these services and test its predictions using panel data on U.S.FDI in 25 host countries from 1976 to 1995. We find evidence that, in addition to governmental and cultural barriers, producer-service firms may face informational barriers to entry into foreign markets. The presence of such barriers provides a possible explanation for the observation that producer-service FDI tends to follow FDI by downstream industries.

JEL Classification: F23.

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1 Introduction

Foreign direct investment (FDI) has grown substantially over the last two decades—by most accounts much faster than global output and trade—and there has been a great deal of empirical and theoretical work investigating its determinants and consequences.[1] Research has focused on FDI in manufacturing; remarkably little work has been done examining FDI in services. The relative scarcity of research devoted to FDI in services is surprising for at least two reasons: first, FDI in services has in many cases grown even more rapidly than FDI in manufacturing. In the United States, for instance, service FDI now accounts for nearly 60% of the total stock of outbound FDI. And it is likely to become more important still given the increasing share of services in the GDP of the United States and other developed countries. Second, the liberalization of services trade has become one of the key issues in international trade negotiations. But much of this trade is carried out via FDI [UNCTC (1990)], and so it seems to be a crucial prerequisite for policy analysis to know which factors facilitate or impede FDI in services. The purpose of the current paper is to examine the pattern of FDI in a key category of services, namely producer services. In particular, we seek to investigate which factors attract and which ones deter FDI in this category. We proceed by constructing a model of producer-service FDI that includes what the literature suggests to be essential stylized facts of service production and by checking whether its predictions are consistent with data on U.S. FDI.

How much producer-service FDI there is in total is hard to pin down exactly, since official statistics often do not distinguish between consumer and producer services, at least not in all categories of services. In the United States, for example, the total stock of U.S. service FDI abroad amounted to $341.7 billion in 1995, compared with a stock of outbound manufacturing FDI of $257.6 billion. Table 1 shows how these stocks developed between 1976 and 1995 and breaks service FDI down into wholesale trade (Trade), commercial banking (Banking), financial services, insurance and real estate (FIRE), and other services (Other Services). Estimates by UNCTAD (1989, p. 122; 1994, tables A.1 and B.1) suggest that producer services account for between one-third and 40 percent of total service production. Assuming that this ratio carries over to FDI, this would give us a rough estimate of the stock of U.S. producer-service FDI of between $113.9 billion and $136.68 billion in 1995. Some of the studies cited below treat all of wholesale trade, commercial banking

[1] See Markusen (1995) and Caves (1996) for surveys of the literature.

and FIRE as producer services. The stock of producer-service FDI would then be even higher. Moreover, since producer services serve as intermediate inputs into downstream industries and are not easily substitutable for other inputs, these figures, according to UNCTAD, may understate their overall economic significance.

Table 1: Stock of U.S. FDI Abroad in Selected Industries (in millions)

Year	Manufacturing	Trade	Banking	FIRE	Other Services	Total Services
1976	$61,161	$13,610		$16,715		
1977	$66,033	$14,744		$20,327		
1978	$74,080	$17,340		$24,041		
1979	$78,640	$22,677	$6,501	$25,022		
1980	$89,160	$25,843	$7,331	$27,929		
1981	$92,386	$28,332	$8,513	$26,570		
1982	$90,582	$27,449	$9,712	$19,191		
1983	$90,171	$28,540	$5,280	$17,252		
1984	$85,865	$21,117	$13,516	$15,683	$4,447	$54,763
1985	$94,700	$22,790	$14,461	$22,501	$4,683	$64,435
1986	$105,101	$26,214	$14,510	$36,414	$5,128	$82,266
1987	$131,645	$31,847	$18,027	$53,046	$6,706	$109,626
1988	$138,725	$34,054	$19,109	$63,386	$7,869	$124,418
1989	$147,944	$38,454	$19,378	$101,086	$11,736	$170,654
1990	$170,164	$43,681	$20,670	$109,657	$13,446	$187,454
1991	$179,230	$49,927	$21,263	$120,552	$15,781	$207,532
1992	$186,285	$52,694	$24,653	$137,186	$17,208	$231,741
1993	$192,244	$57,534	$27,074	$174,186	$19,489	$278,781
1994	$217,416	$67,272	$29,224	$186,558	$22,352	$305,406
1995	$257,589	$71,354	$30,441	$212,089	$27,826	$341,710

Source: United States Department of Commerce, Survey of Current Business, various issues from 1977-1996.

Producer service providers face many challenges in serving foreign customers. Services are difficult to export directly, for instance, because they often cannot be stored or because their provision requires frequent contact with the client [UNCTC (1990)]. In fact much of the so-called trade in services is carried out via FDI.[2] This is acknowledged in the General Agreement on Trade in Services, which explicitly defines FDI as one of the modes of service trade. But service FDI, too, is often restricted by host governments, by cultural barriers, etc. However, if one controls for these barriers, one would expect that producer-service firms locate where they find a large customer base. Observed FDI flows appear to reflect this, but with a twist. There is evidence that producer-service FDI follows a distinctive pattern. In particular, producer-service FDI tends to follow FDI by downstream firms from the same home country and only later becomes more responsive to local demand. In other words, service multinationals find it difficult initially to attract local customers. This is suggested by a number of case studies of individual service industries [Terpstra and Yu (1988) for advertising; Davis, Hanlon and Kay (1993) for accounting; and several other case studies cited in Caves (1996)] and by an econometric study carried out by the United Nations Center on Transnational Corporations (UNCTC, 1993). Some of these studies discuss, but none formally investigates, a possible explanation involving information problems that—it is claimed—are particularly severe in service markets. The argument is as follows: The most important factor determining whether a foreign service provider can compete with local rivals, according to UNCTAD (1989, p. 87), is the quality of its product. The quality of a service depends on the company's human capital and on other factors that together may be hard to assess by customers prior to purchase. In other words, "many ... services involve the provision of 'experience' rather than 'inspection' products ..." (UNCTAD, 1989, p. 89). The problem with experience goods is that their provision may be subject to moral hazard. In particular, service providers may be tempted to misrepresent their product as being of higher quality than it actually is in order to fetch a higher price. In light of this, local customers may prefer purchasing services from a familiar provider, whose service quality they can assess, even if a multinational firm promises them higher quality. By the same argument, downstream multinationals from other countries should tend to buy from service firms they know from back home.

[2] This is particularly evident in business services. In accounting, for example, the ratio of affiliate sales to affiliate sales plus export sales is 92 percent; in advertising it is 85 percent (Dunning 1993).

Whether such informational barriers are indeed present, how their impact compares with that of other potential barriers and how persistent they are over time are empirical questions. The only problem is that we cannot directly measure informational barriers. However, we can try to assess their potential impact indirectly. The idea is the following: Downstream firms from back home are on average more familiar with the multinational service provider than potential local customers and hence find it easier to assess quality prior to purchase. The more of these "informed" customers are present in the market the bigger is the incentive of multinational service firms to provide high quality. Hence local customers should also be more likely to buy, provided the high quality is available to all customers. In the model we construct to make this point formally this reasoning translates into the prediction that the stock of producer-service FDI in equilibrium increases more strongly with the number of local customers, if the ratio of downstream investors from the service firm's home country to all potential customers exceeds a critical level. We test this empirically using panel data on U.S. service FDI in 23 host countries from 1976 to 1995, and find some evidence that this is indeed the case.

Past research has focused on FDI in manufacturing; relatively little formal work has been done examining FDI in services. Among the exceptions are the empirical studies by the UNCTC (1993)[3], Fukao and Ito (2000), and an empirical paper by Buch (2000) on FDI by German banks. These papers regress service (banking) FDI or sales by foreign affiliates on host GDP, non-service (non-banking) FDI, etc., but do not consider potential informational barriers to entry. Another exception is the paper by Markusen, Rutherford and Tarr (1999). That paper, however, is mainly concerned with the effect of service FDI on the host country's market for skilled labor. Papers on trade in producer-services by Markusen (1989) and Francois (1990a, 1990b, 1990c, 1993, 1995) argue that service production is characterized by economies of scale and that market structure is best described as being monopolistically competitive. How upstream industries, such as producer services, may be attracted by downstream industries (and vice versa) under such a market structure has been explored in the economic-geography literature (see Fujita, Krugman and Venables (1999) for a recent survey). We, too, adopt this market structure and examine the resulting industry equilibrium. The novelty of our paper on the theory side is to investigate how moral hazard may

[3]The UNCTC (1993) study, however, suffers from the fact that regressors are not applied consistently throughout the regressions.

affect this equilibrium. Our paper is also related to the literature on informational barriers to entry. The effects of these barriers on individual firms have been investigated in theoretical papers by Schmalensee (1982), Farrell (1986) and Bagwell (1990). Bagwell (1991), Grossman and Horn (1988) and Raff and Kim (1999) examine these barriers in the context of international trade and explore the usefulness of government intervention. In the current paper we extend the analysis to examine the entry pattern in an entire industry. More importantly, we try to estimate how significant and persistent these barriers might be.

The next section the paper provides a formal model of producer service FDI. In Section 3, we derive the equilibrium stock of producer service FDI in a host country. In Section 4, we construct a reduced-form empirical model that incorporates the key predictions of the model, and tests these predictions using panel-data techniques. Extensions of the model and conclusions are discussed in Section 5. An appendix contains proofs and data sources.

2 The Model

Producer services, according to Markusen (1989), have two important characteristics: they tend to be knowledge-based and differentiated. Acquiring the knowledge to produce a service requires a big initial investment; however, once the investment has been made, the marginal cost of supplying the service tends to be relatively modest. Hence one would expect scale economies to play a big role in the industry. This together with the ability of firms to differentiate their product implies that service companies have some market power and that the industry can be described as being monopolistically competitive. The knowledge intensity of services is also what makes it so hard to judge their quality prior to purchase. New customers, in particular, may not know prior to contracting whether the know-how embodied in the service will ultimately prove useful for them.[4]

Producer services are intermediate inputs in the production of downstream goods, which for

[4] Another implication of the knowledge intensity is that it is difficult to sell services abroad via licensing. Contracts specifying the transfer of knowledge are notoriously hard to write and to enforce. How, for instance, can the licensor demonstrate the value of its know-how without giving it away entirely? And even if a contract could be signed, how can the licensee be prevented from exploiting the know-how he has gained, for instance, by starting his own operation? So we would expect the firm to internalize the provision of services by choosing FDI [see, for instance, Ethier (1986) and Horstmann and Markusen (1987) for formal models of the internalization decision, and both Clegg (1992) and Caves (1996) for an application to service industries].

simplicity we shall subsequently call manufactures. The demand for services is hence determined by the technology used in manufacturing and the demand for manufactures. There are $N + N^*$ manufacturers in the host country; N of these companies are subsidiaries of home-country manufacturers, and N^* are local host-country manufacturers. The manufacturers are completely symmetric, are price-takers in input markets, and their products are sufficiently differentiated so that we can ignore any strategic interaction between them. The market for a given variety of manufactures is characterized by the linear inverse demand function, $P(X) = 1 - X$, where X denotes quantity.

Producer services are horizontally and vertically differentiated. Horizontal differentiation means that there are many symmetric varieties of producer services. Vertical differentiation refers to the assumption that within each variety quality can vary. For simplicity we assume that it can either be high (h) or low (l). We take low quality to be a basic level of service and assume that all customers can verify prior to purchase whether the service they are buying corresponds at least to this level. Local host-country suppliers produce only low-quality services. Home-country service firms alone have the know-how to produce high-quality services. This know-how, according to UNCTAD (1989, p.87), is exactly the ownership-advantage that allows them to become a multinational and compete successfully in foreign markets. But having the knowledge to produce high-quality services is not the same as having an incentive to do so. Local customers, in particular, may find it difficult to evaluate quality prior to purchase and may rightly fear that the seller will offer them low quality in order to cut cost. On the other hand, existing customers of a service firm may have an easier time judging quality. This is especially the case when we think of quality as being in part embodied in the personnel the service firm employs. Existing customers, for instance, may even have had prior personal contact with the service firm's employees. We try to capture this by assuming that there are informed customers who can evaluate quality and uninformed customers who cannot.[5] There are likely to be informed customers among both the home-country manufacturers and the local host-country manufacturers, but we expect the share of informed customers to be larger in the former group. We model this as follows. Let N_I stand for the informed customers and N_U for the uninformed so that $N_I + N_U = N + N^*$. Assume that $N_I = \alpha N + (1 - \alpha)N^*$ and $N_U = (1 - \alpha)N + \alpha N^*$, where $\alpha > 0.5$.

The marginal cost of service production is increasing in quality. Denoting this cost by c_i for

[5] For further references on markets with informed and uninformed customers see Tirole (1988).

$i = h, l$ we have $c_h > c_l$. The fixed cost associated with operating a service subsidiary in the host country is given by F. The multinational service firms are monopolistically competitive; the number of affiliates, n, is hence determined by free entry and exit. As for the local service firms we assume that their fixed cost is zero and that free entry drives their price down to marginal cost.

Next, we introduce the demand for services, initially assuming that quality is fixed. A representative manufacturer produces output X using primary inputs, L, and producer services of quality i, S_i, according to the Leontief production function

$$X = \min\{L, S_i/\beta_i\}, \tag{1}$$

where $\beta_i > 0$ is an efficiency parameter. From the manufacturer's point of view the difference between a high- and a low-quality services is that production of one unit of output requires either β_h units of high-quality services or $\beta_l > \beta_h$ units of low-quality services.

Following Helpman and Krugman (1985) and others, we let S_h be a quantity index that aggregates n symmetric varieties of high-quality services, $s_{h1}, ..., s_{hn}$, according to a constant-elasticity-of-substitution subproduction function

$$S_h = \left[\sum_{j=1}^{n} s_{hj}^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \tag{2}$$

where $\sigma > 1$ is the elasticity of substitution between varieties. By examining a manufacturer's cost-minimizing choice of varieties we can derive the conditional demand function for an individual high-quality service, s_h, and a price index for high-quality services, q_h. Letting p_h denote the price of a given variety of high-quality services and D_h the total demand for high-quality services, we have

$$s_h = p_h^{-\sigma} q_h^{\sigma} D_h, \tag{3}$$

and

$$q_h = \left[n p_h^{1-\sigma}\right]^{\frac{1}{1-\sigma}}. \tag{4}$$

Denoting the price of primary inputs by w and the price of a unit of low-quality services by q_l $(= c_l)$, a manufacturer's cost of producing X units of output when service quality is $i = h, l$ is

$$C_i(X) = (w + \beta_i q_i)X. \tag{5}$$

The manufacturer buys what he believes to be high-quality services, if $\beta_h q_h < \beta_l c_l$; we implicitly assume that this is the case. After paying for the service and taking delivery but before production takes place, the manufacturer learns the true quality of the service he has purchased. If the manufacturer intends to produce X units of output and quality turns out as anticipated, he can continue with production as planned. However, if the manufacturer thought he had bought the required $\beta_h X$ units of the high-quality service but finds out that those were only low-quality units, he must purchase $(\beta_l - \beta_h)X$ additional units of the low-quality service before proceeding to produce X units of output. The risk of incurring the additional cost of $c_l(\beta_l - \beta_h)X$ when buying from a multinational service company constitutes the informational barrier to entry.

3 Equilibrium

Two conditions must hold in an equilibrium in which we observe FDI in producer services. First, holding the number of service subsidiaries constant, each must have an incentive to produce high quality with positive probability. As we shall see shortly, this occurs when a subsidiary receives a positive markup over marginal cost and there is a sufficiently large presence of informed home-country manufacturers. Second, free entry in the market for high-quality services implies that the markup a firm earns must be exactly offset by the fixed cost of operating a subsidiary.

3.1 Equilibrium Quality and Price

Each manufacturer chooses output to maximize expected profit. The optimal output when it buys its services from multinationals and expects each of them to provide high quality with probability ε is:

$$X(q_h, c_l, \beta_h, \beta_l, w, \varepsilon) = \arg\max_X \left\{(1 - X)X - \left[w + \beta_h q_h + (1 - \varepsilon)(\beta_l - \beta_h)c_l\right] X\right\}. \tag{6}$$

The first-order condition to this maximization problem yields:

$$X(q_h, c_l, \beta_h, \beta_l, w, \varepsilon) = \frac{1 - w - \beta_h q_h - (1 - \varepsilon)(\beta_l - \beta_h)c_l}{2}. \tag{7a}$$

Noting that producing one unit of output requires β_h units of services of quality h, the manufacturer's demand for services that it expects to be of high quality is $\beta_h X(q_h, c_l, \beta_h, \beta_l, w, \varepsilon)$.

Under what circumstances would a manufacturer purchase a service from a multinational's service subsidiary? Informed manufacturers only buy if they receive high quality. Uninformed

manufacturers have rational expectations. So they buy only if they know that the service subsidiary has an incentive to provide high quality. When it provides high quality with probability one, the service subsidiary sells to all $N_I + N_U$ manufacturers. Total demand for its variety then is

$$\bar{s}_h = p_h^{-\sigma} q_h^{\sigma} \beta_h (N_I + N_U) X(q_h, c_l, \beta_h, \beta_l, w, 1). \tag{8}$$

On the other hand, if the subsidiary is believed to offer high quality but only sells low quality in an attempt to save cost, it can only sell to the N_U uninformed customers. Its demand then is given by

$$\underline{s}_h = p_h^{-\sigma} q_h^{\sigma} \beta_h N_U X(q_h, c_l, \beta_h, \beta_l, w, 1). \tag{9}$$

A service subsidiary will produce high quality for sure if the associated profit exceeds the profit it could earn by fooling uninformed customers:

$$(p_h - c_h)\bar{s}_h \geq (p_h - c_l)\underline{s}_h. \tag{10}$$

Using (8) and (9), this inequality can be rewritten as follows:

$$\gamma \geq \frac{c_h - c_l}{p_h - c_l}, \qquad \gamma \equiv \left(\frac{N_I}{N_I + N_U} \right). \tag{11}$$

This inequality is more likely to be satisfied the higher is the ratio of informed customers in the total demand for services.

If (11) is not satisfied, then—as shown in the Appendix—there exists a mixed-strategy equilibrium, in which a service subsidiary offers high quality with probability

$$\hat{\varepsilon} = \frac{\beta_h (q_h - c_l)}{(\beta_l - \beta_h) c_l} \tag{12}$$

and uninformed manufacturers buy with probability

$$\hat{\delta} = \frac{N_I}{N_U} \left(\frac{p_h - c_h}{c_h - c_l} \right), \tag{13}$$

where $\hat{\delta} \in (0, 1)$ provided that N_U is sufficiently bigger than N_I.

A service firm selling or pretending to sell high quality chooses as its profit-maximizing price

$$\hat{p}_h = \arg\max_{p_h} (p_h - c_h)\bar{s}_h. \tag{14}$$

Noting that a monopolistically competitive service firm takes the price index q_h as given, we can use the first-order conditions to obtain

$$\hat{p}_h = \frac{\sigma}{\sigma - 1} c_h. \tag{15}$$

The markup of price over marginal cost is decreasing in the elasticity of substitution between service varieties, σ. Substituting $\hat{p}_h$ for the price in (11), we obtain as incentive constraint for the provision of high quality by a service subsidiary:

$$\gamma \geq \frac{(\sigma - 1)(c_h - c_l)}{\sigma (c_h - c_l) + c_l}. \tag{16}$$

The right-hand side of (16) is increasing in σ and in $(c_h - c_l)$. The following proposition summarizes the equilibrium quality choices by home-country service subsidiaries:

Proposition 1 *If the share of informed manufacturers is sufficiently high so that (16) holds, each service subsidiary provides high quality with probability one. If (16) does not hold, each service subsidiary supplies high quality with probability* $\hat{\varepsilon} \in (0, 1)$.

3.2 Equilibrium FDI

Free entry and exit ensures that in equilibrium each service producer earns zero profit. Consider first the case where (16) holds. The zero-profit condition then reads:

$$\left(\frac{c_h}{\sigma - 1} \right) s_h - F = 0, \tag{17}$$

From (17) we can derive the equilibrium output of a service affiliate:

$$\hat{s}_h = \frac{(\sigma - 1)F}{c_h}. \tag{18}$$

This output is increasing in F and decreasing c_h.

The total supply of high-quality services of all varieties in the host country can be obtained by using $\hat{s}_h$ in (2):

$$\hat{S}_h = (n \hat{s}_h^{\frac{\sigma-1}{\sigma}})^{\frac{\sigma}{\sigma-1}} = \frac{(\sigma - 1)F}{c_h} n^{\frac{\sigma}{\sigma-1}}. \tag{19}$$

In equilibrium this supply must be equal to the total demand:

$$\hat{D}_h = \beta_h (N_I + N_U) X(q_h, c_l, \beta_h, \beta_l, w, 1). \tag{20}$$

Setting $\hat{S}_h = \hat{D}_h$ and solving for q_h yields the following negatively sloped function in n (curve EE in Figure 1):

$$q_h = \frac{1-w}{\beta_h} - \frac{(\sigma-1)F}{\beta_h(N_I+N_U)c_h} n^{\frac{\sigma}{\sigma-1}}. \tag{21}$$

Substituting for p_h from (15) in price index (4), we obtain a second function for q_h that is also decreasing in n (curve CC in Figure 1):

$$q_h = \left[n \left(\frac{\sigma c_h}{\sigma - 1} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}. \tag{22}$$

Together (21) and (22) define the equilibrium number of home-country service subsidiaries in the host country, n, and the equilibrium price index, $\hat{q}_h$. However, as illustrated in Figure 1, there may be multiple equilibria. In the figure, the equilibrium labeled A is unstable and the one labeled B is stable. A simple argument shows that an equilibrium is stable iff curve CC intersects EE from below: along EE, the supply is equal to the demand for services; below this line, demand exceeds supply. Now suppose we are at a point on CC but below EE. Then n must rise to restore the equality of demand and supply. But this process takes us to equilibrium B and away from A. A similar argument shows that when we are on CC but at a point above EE we move to B but away from A.

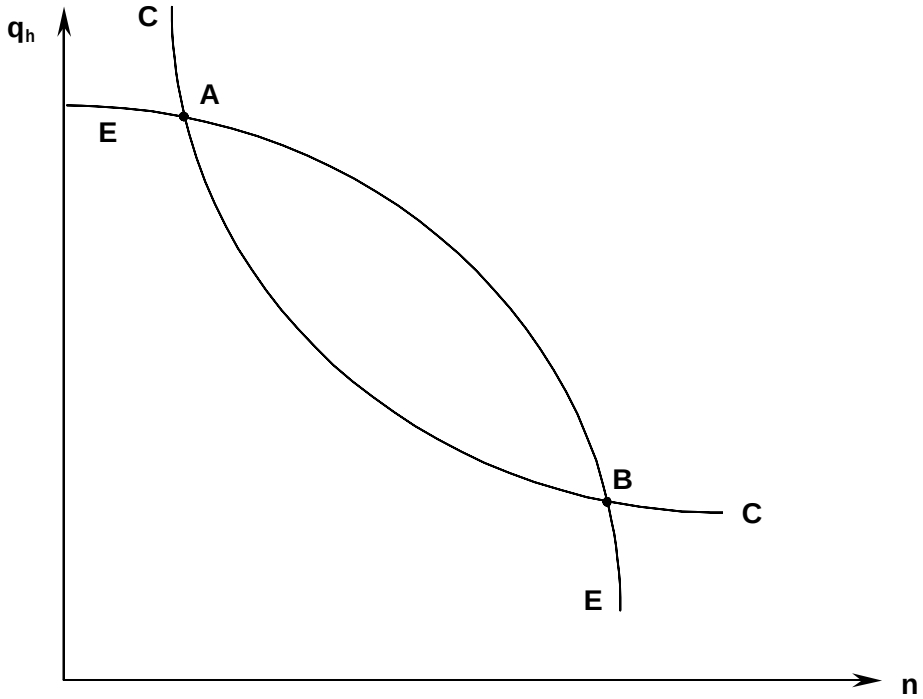
We focus on a stable equilibrium like B, assuming implicitly that there exists only one such equilibrium.[6] In this case we can show that an increase in w lowers the intercept of EE without affecting CC, and hence reduces n. An increase in F makes the slope of EE steeper, thereby also decreasing n. A rise in N_I or N_U reduces the slope of EE, thereby raising n. A rise in c_h has an ambiguous effect on n, since it both reduces demand and output per service firm. These results are summarized in the following proposition:

Proposition 2 *If the share of informed manufacturers is sufficiently large so that (16) is satisfied, then the number of affiliates in the host country is increasing in the total number of manufacturers; it is decreasing in the cost of primary inputs and the fixed cost of investment; it may be increasing or decreasing in the variable cost of producing high-quality services.*

Now consider the case where γ is so small that (16) does not hold. In a mixed-strategy equilibrium, each firm must be indifferent between selling high and low quality. So under free entry

[6] The equilibrium is unique, for instance, if $\sigma = 2$.

Figure 1



its profit from selling high quality (which now equals the profit from selling low quality to some uninformed customers) must again be zero as in (17). This means that total expected supply is still given by (19). But the expected total demand for services now is

$$\tilde{D}_h = \beta_h(\hat{\varepsilon}N_I + \hat{\delta}N_U)X(q_h, c_l, \beta_h, \beta_l, w, \hat{\varepsilon}). \tag{23}$$

Substituting for $\hat{\delta}$ in (23), we find that N_U drops out. In addition, by using (19) and (23) it is straightforward to verify that n is still decreasing in w and F, but may rise or fall with c_h and c_l. This implies:

Proposition 3 *If the share of informed manufacturers is so small that (16) does not hold, then the number of service affiliates in the host country is independent of the number of uninformed manufacturers. It is decreasing in the cost of primary inputs and the fixed cost; it may be increasing or decreasing in the variable cost of service production.*

4 Empirical Analysis

In this section, we first describe how we move from the theoretical model to an empirically testable version and then present the results of our empirical analysis. Propositions 2 and 3 state that the equilibrium number of home-country service affiliates in the host country, n, is a function of the number of informed and uninformed customers, as well as of the different costs, w, F, c_h and c_l:

$$n = n(N_I, N_U, w, F, c_h, c_l). \tag{24}$$

In addition, Proposition 3 tells us that demand from the uninformed manufacturers only matters for service FDI if $N_I/(N_I + N_U)$ exceeds a critical value. Naturally we cannot observe the number of informed and uninformed customers. So in a first step we need to reformulate the model in terms of the (observable) number of home-country investors in the host country (N) and the host-country customer base (N^*). Note that we can write the share of informed manufacturers, $N_I/(N_I + N_U)$, as

$$\frac{N_I}{N_I + N_U} = (2\alpha - 1)\frac{N}{N + N^*} + (1 - \alpha), \tag{25}$$

and then use the ratio $N/(N + N^*)$ to redefine the critical value in (16). If $N/(N + N^*)$ is above this critical value, service FDI should be increasing in both N and N^*. But if the ratio is below the

critical value, local demand should be less important for service FDI, as only a small fraction of the N^* local customers is likely to be informed; in other words, we should get a smaller coefficient on local demand. We can incorporate this change in the magnitude of the coefficient by constructing a dummy variable for $N/(N+N^*)$ that takes the value of one (zero), if the ratio is above (below) a critical value, and that we then interact with N^*.

The second step consists of finding proxies for our dependent and independent variables; a detailed description of the data is provided in the appendix. Since all service affiliates in the model are identical, this number is proportional to the total stock of producer-service FDI. And data on the stock of U.S. service FDI in 23 host countries/regions from 1976 to 1995 is what we want to use for the dependent variable. The Survey of Current Business divides services into four categories: wholesale/retail trade, commercial banking, FIRE (financial services, insurance and real estate), and 'other services'. To be useful for our analysis the data has to satisfy at least two criteria: first, it should reflect producer services and not consumer services; and second, we should be reasonably sure a priori that we didn't ignore important explanatory variables in the model. Hence not all service categories are suitable. FDI in wholesale trade, for instance, should be significantly affected by the level of exports; but our model does not incorporate merchandise exports. The same is true for commercial banking, as has been shown by Buch (2000). Commercial banking presents an additional problem, since FDI figures in this category also include net transfers of loanable funds between parent and subsidiary, which are also likely to be determined by factors outside our model. FIRE is the largest and therefore potentially most interesting service category. But here it is not clear to what extent they represent producer services and to what extent they may be driven by factors outside the model; we nevertheless carry out regressions for this category. This leaves 'other services'. This category includes business and engineering services, which clearly are producer services. In 1982, the Survey of Current Business started listing business services separately from other services in this category, but not on a country-by-country basis. In these global figures, business and engineering services accounted for the largest share of FDI in the 'other services' category. It is this category that we find most useful in our empirical tests. To avoid confusion, we will refer to this category below as 'business services'.

The proxies we use for demand are the stock of U.S. manufacturing FDI (lagged by one period)

and host-country GDP (and GDP/capita[7]). These proxies do not only capture the number of establishments, N and N^* respectively, but also their scale, which in the model we control through w. Hence w should not appear as a separate regressor. The dummy variable for $N/(N+N^*)$ is constructed using the ratio of U.S. manufacturing FDI to host GDP at the beginning of our sample period.[8] Finding proxies for the costs of service production abroad poses the biggest challenge. The marginal cost of high-quality services, c_h, has an ambiguous effect on the number of service affiliates, but it has a negative effect on volume of service output. It should hence have a negative effect on the stock of service FDI, as should the fixed cost, F. We do not have good proxies for c_h and F, but we control for factors like cultural similarity, host-country restrictions to FDI, and the degree of corruption (or inversely the degree of transparency of government policy and regulations) in the host country, which can be expected to have a significant effect on the cost of providing high-quality services through FDI; details on the construction of these measures are given in the appendix. Table 2 summarizes the explanatory variables included in our regressions as well as their predicted signs. We choose a log-linear specification for the reduced-form model. This allows us to interpret the coefficients as elasticities, which in turn permits us to make judgements of relative impacts of independent variables.

Table 2: Determinants of FDI

Independent Variable	**Measured By**	**Expected Sign**
Home Business Presence	Stock of Manufacturing FDI at (t-1)	+
Local Customer Base	Real GDP	+
	Real GDP/Capita	+
Host Restrictions to FDI	Subjectively Created Index	-
Cultural Similarity	Subjectively Created Index	+
Transparency	Transparency International Index	+

We begin with the regressions for business services. Please note in interpreting the regression

[7] We include both GDP and GDP per capita to differentiate large countries with high per capita income from small countries with high per capita income (e.g. Luxembourg).

[8] Defining the right critical value is tricky. We consider the ratio of the stock of U.S. manufacturing FDI to local GDP in 1976. The country is said to host a "significant" amount of FDI if this ratio is equal to or greater than two percent. The ratio ranges from nearly zero to 9 percent. Various alternatives and their results are discussed later in the paper.

results that a single asterisk (*) implies that the estimated coefficient is significant at a 10 percent level of significance (LOS), two asterisks (**) imply significance at a 5 percent LOS, and three asterisks (***) imply that the estimated coefficient is significant at a 1 percent (LOS). The results in Table 3 compare OLS regression results with the results for a random effects model (REM). In this case, the fixed effects model (FEM) cannot be calculated because the missing data eliminates observations without which the cultural distance variable no longer varies over time. Since the elimination of these observations leads cultural distance to become a time invariant independent variable, and the fixed effect estimator requires there to be within group variation in all variables for at least some groups, we are left with OLS and REM results. The Lagrange multiplier (LM) test statistic (given in the last line of the REM results) suggests that the REM or FEM results are statistically preferred to the OLS results. However, since there are no FEM results, it suggests that we consider the REM results.

Table 3: Regression Results for Business Services (GDP/C interaction term)

Variable	**OLS**	**REM**
	Coefficient	Coefficient
Past Manufacturing FDI	0.3974***	0.1998 ***
	(0.0767)	(0.0653)
Host GDP	0.4279***	0.5896***
	(0.1014)	(0.0831)
Host GDP per Capita	0.1800*	0.7204**
	(0.0957)	(0.1444)
Host Restrictions to FDI	0.0963	0.4706***
	(0.1579)	(0.1481)
Cultural Similarity	1.4960***	0.0110
	(0.3694)	(0.6889)
Transparency	-0.3591*	0.0709
	(0.2107)	(0.1554)
Interaction Term (GDP/C)	0.1106***	0.0772**
	(0.0177)	(0.0445)
Constant	-12.5403***	-19.0294***
	(2.3721)	(1.6417)
n	202	202
Adjusted R-sqrd	0.73	0.74
Number of cross-sections	20	20
T-max	12	12
T-min	3	3
	F(7,194)=79.79	LM=92.61

Note: * =>Significant at 10% LOS; **=>Significant at 5% LOS , *** =>Significant at 1% LOS

The interaction term is constructed by considering the amount of manufacturing FDI that exists in the host country at the beginning of the sample period (1976). If there exists a critical stock of manufacturing FDI in the host country, defined here as at least two percent of host country GDP, we give the host country a dummy variable equal to one and multiply the dummy variable by host GDP per capita to allow us to estimate a slope dummy variable (interaction variable). We have tried other definitions for the critical level of FDI, but our results were robust to these changes. The REM results in Table 3 suggest that the GDP/C interaction (0.0772) term is positive and statistically significant at a 5 percent LOS. This suggests that multinational service firms are better able to penetrate the foreign market if a significant U.S. manufacturing presence is located in the foreign market. Quantitatively, we see that without adding the effect of the interaction term, a 1 percent increase in local GDP/C suggests a 0.72 percent increase in business service FDI, all else constant. However, when was allow for addition of the interaction term, we see that a 1 percent increase in local GDP/C suggests a 0.79 percent increase in business service FDI, all else constant. The other statistically significant variables have the anticipated signs with the exception of host country restrictions to FDI. Since this is a subjectively created variable, which we admit is a noisy signal of FDI restrictiveness, we are not overly concerned with this.

Table 4 shows a similar comparison, but details the results with an interaction term based on host GDP rather than GDP/C. Again, the LM test statistic indicates the REM specification and we see a coefficient on the slope dummy variable (0.0342) that is significant at a 5 percent LOS. Moreover, we see that measuring host market size by GDP suggests that a significant home presence increases the effect of host GDP on business service FDI from 0.59 percent to 0.62 percent. Again, the statistically significant coefficients are associated with their expected signs with the exception of host country restrictions to FDI.

Table 4: Regression Results for Business Services (GDP interaction term)

	OLS	**REM**
Variable	**Coefficient**	**Coefficient**
Past Manufacturing FDI	0.4018***	0.1966***
	(0.0770)	(0.0662)
Host GDP	0.4068***	0.5876***
	(0.1011)	(0.0838)
Host GDP per Capita	0.2024**	0.7236***
	(0.0961)	(0.1449)
Host Restrictions to FDI	0.0948	0.4756**
	(0.1586)	(0.1500)
Cultural Similarity	1.4333***	-0.0503
	(0.3706)	(0.69720
Transparency	-0.3603***	0.6207
	(0.2121)	(0.1574)
Interaction Term (GDP)	0.0405***	0.0342**
	(0.0066)	(0.0168)
Constant	-12.1387***	-18.9330***
	(2.3707)	(1.6626)
n	202	202
Adjusted R-sqrd	0.73	0.74
Number of cross-sections	20	20
T-max	12	12
T-min	3	3
	F(7,194)=78.87	LM=94.50

Table 5 considers the setup of the regressions in Table 3 (including a GDP/C interaction term), but provides the regression results after testing and correcting for serial correlation (the serial correlation coefficient is listed in the table as "rho"). As before, the LM test statistic suggests that the REM is preferred to the OLS specification. Addressing the problem of serial correlation is particularly difficult with our data in that numerous observations are missing throughout the data set.[9] Thus, testing for and correcting for serial correlation in this sample does not inspire as much confidence as would be the case with a full data set. It is for this reason that we provide the results of our regressions without correcting for serial correlation and after correcting for serial correlation using the Cochrane-Orcutt interactive method. Despite the fact that data are missing, we may still apply the Durbin-Watson (D-W) statistic to our data set (Savin and White, 1978). The D-W statistic for the results in Table 3 is consistently 1.2, suggesting positive serial correlation.[10] The results generated after correcting for serial correlation are given in Table 5 (GLS refers to generalized least squares and may be interpreted as OLS after having been corrected for a serially correlated residual). Quantitatively, we see that without the interaction term, a 1 percent increase in local GDP/C suggests a 0.31 percent increase in business service FDI, all else constant, without accounting for an interaction term. However, when we incorporate the effect of the interaction term, we see that a 1 percent increase in local GDP/C boosts business service FDI by 0.43 percent, a 0.12 percentage points increase. The other statistically significant variables are associated with signs suggested by our prior expectations with the exception again being host country restrictions to FDI.

Table 6 repeats the regressions first done in Table 4, but corrects for serial correlation also. Again, the D-W statistic for the original results in Table 4 is 1.2, suggesting positive serial correlation. Quantitatively, we see that a significant presence of U.S. manufacturers in the foreign market boosts the coefficient on local market size from 0.82 to 0.87 after correcting for serial correlation.

[9] Note that, despite the fact that our time series is 20 years long, the maximum number of observations for any given cross section is 11 years, many cross sections have fewer than 10 observations, and the existing observations tend not to be contiguous.

[10] Note, however, that the lower critical value at a 5 percent LOS with n=179 and six regressors is 1.55; therefore we can see that we are close to the cut-off for the inconclusive region of the D-W test.

Table 5: Regression Results for Business Services (GDP/C interaction term, serial correlation correction)

	GLS	REM
Variable	Coefficient	Coefficient
Past Manufacturing FDI	0.3127***	0.1140
	(0.0908)	(0.1154)
Host GDP	0.5685***	0.8384***
	(0.1260)	(0.1598)
Host GDP per Capita	0.2562**	0.3161*
	(0.1237)	(0.1950)
Host Restrictions to FDI	0.0869	0.5113*
	(0.1851)	(0.2763)
Cultural Similarity	1.4361***	1.4551*
	(0.4562)	(0.7943)
Transparency	-0.5878**	-0.4241
	(0.2927)	(0.3346)
Interaction Term (slope dummy),	0.1233***	0.1210***
(GDP/C)	(0.0226)	(0.0436)
Constant	-15.7788***	-22.3734***
	(1.7609)	(3.4808)
rho	0.3999***	0.3999***
	(0.0703)	(0.0703)
n	179	179
Adjusted R-sqrd	0.66	0.68
Number of cross-sections	19	19
T-max	11	11
T-min	2	2
	F(7,194)=51.10	LM=100.83

Table 6: Regression Results for Business Services (GDP interaction term, serial correlation correction)

	GLS	**REM**
Variable	**Coefficient**	**Coefficient**
Past Manufacturing FDI	0.3159***	0.1155
	(0.0909)	(0.1157)
Host GDP	0.5446***	0.8229***
	(0.1252)	(0.1569)
Host GDP per Capita	0.2858**	0.3426*
	(0.1244)	(0.1946)
Host Restrictions to FDI	0.0880	0.5134*
	(0.1856)	(0.2771)
Cultural Similarity	1.3618**	1.3959*
	(0.4573)	(0.7975)
Transparency	-0.6032**	-0.4303
	(0.2948)	(0.3359)
Interaction Term (slope dummy)	0.0455***	0.0443***
(GDP)	(0.0084)	(0.0163)
Constant	-15.3199***	-22.1255***
	(1.7591)	(3.4872)
rho	0.3999***	0.3992***
	(0.0703)	(0.0703)
n	179	179
Adjusted R-sqrd	0.66	0.68
Number of cross-sections	19	19
T-max	11	11
T-min	2	2
	F(7,171)=50.80	LM=14.42

Another question that arises in our analysis is whether the magnitude and/or significance of the interaction term changes if it is constructed for a point in time later in the sample period (say, 1989 instead of 1976). We would expect that its effect will become smaller and/or insignificant over time, reflecting the gradual disappearance of informational barriers to entry as local firms become familiar with the multinational service providers. Indeed, this view is supported by the data. Table 7 lists the coefficients and their significance of local market size and the interaction term (the other coefficients do not substantively change) when we construct the interaction term in other years (but do not correct for serial correlation). We begin with 1989 since that is the year in which service FDI grew most drastically in our sample period, thereby making it a good starting point to see whether our hypothesis holds. We repeat the analysis constructing interaction terms through 1993. The results after correcting for serial correlation are given in Table 8. In each case we find evidence that home customers in the foreign market play a smaller role over time.[11]

Finally we examine the FIRE category. The result are reported in Table 9 to 10. The only variables that are significant are host GDP and GDP per capita, both of which have the expected sign, as well as host restrictions to FDI, which have the wrong sign. Obviously, further research is needed to examine this service category.

[11] Another issue one may wonder about is the impact of local competition in the market for services. Unfortunately, the best measure we have to capture this influence is local service-industry value added as a percent of GDP (Source: World Bank Development Indicators). Unfortunately, this measure fails to distinguish between indigenous service providers and foreign service providers located in the host market, which is an important distinction in our research. Additionally, it is highly correlated with host GDP. The estimation results (before correcting for serial correlation) allow only OLS specifications. Given the panel nature of the data, this result is highly suspect. When we do correct for serial correlation, the coefficient on services as a percent of GDP is insignificant. Compared to the previous results, other important outcomes also change. In particular, the coefficients on U.S. manufacturing and host GDP/C are insignificant. This is rather disturbing given the model's predictions. The high correlation between local GDP and services as a percent of GDP lead us to suspect multicollinearity as one potential culprit for the lack of significance associated with the estimated coefficients of U.S. manufacturing and host GDP/C. When we re-run the regressions keeping all the explanatory variables except GDP the results are much more along the lines of our a priori expectations: U.S. manufacturing FDI and host GDP per capita, and the interaction terms are consistently positive and significant. The measure of local service provision, however, is never statistically significant. Furhtermore, when we re-run the regressions using increasingly later and later dates for defining the dummy variable we again find that the value of the interaction term steadily decreases as we pick cut-off dates later in the sample period.

Table 7: Value and Significance of Various Interaction Terms (no correction for serial correlation)

Year#	GDP/C	Int. term (GDP/C)	GDP	Int. Term (GDP)
1976	0.7204**	0.0772**	0.5876***	0.0342**
	(0.1444)	(0.0445)	(0.0838)	(0.0168)
1989	1.3374***	0.0635***	0.1615***	0.0229***
	(0.0766)	(0.0033)	(0.0528)	(0.0015)
1990	1.1767***	0.0483***	0.2835***	0.0167***
	(0.1161)	(0.0055)	(0.0746)	(0.0022)
1991	1.1951***	0.0478***	0.2927***	0.0159***
	(0.1193)	(0.0057)	(0.0757)	(0.0022)
1992	1.0992***	0.0400***	0.3641***	0.0130***
	(0.1285)	(0.0064)	(0.0804)	(0.0025)
1993	0.9944***	0.0392***	0.4103***	0.0124***
	(0.1438)	(0.0082)	(0.0860)	(0.0029)

Table 8: Value and Significance of Various Interaction Terms (correction for serial correlation)

Year#	GDP/C	Int. term (GDP/C)	GDP	Int. Term (GDP)	rho
1976	0.3161*	0.1210***	0.8229***	0.0443***	0.3992***
	(0.1950)	(0.0436)	(0.1569)	(0.0163)	(0.0703)
1989	0.4156**	0.0657***	0.3931***	0.0295***	0.3996***
	(0.2059)	(0.0150)	(0.1254)	(0.0071)	(0.0687)
1990	0.4272**	0.0226*	0.7606***	0.0076	0.3808***
	(0.2089)	(0.0158)	(0.1666)	(0.0657)	(0.0693)
1991	0.4497**	0.0288**	0.7435***	0.0094*	0.3858***
	(0.2105)	(0.0161)	(0.1686)	(0.0059)	(0.0691)
1992	0.4393**	0.0302**	0.7520***	0.0098*	0.3979***
	(0.2118)	(0.0162)	(0.1699)	(0.0059)	(0.0687)
1993	0.4440**	0.0213	0.7918***	0.0065	0.3957***
	(0.2148)	(0.0173)	(0.1687)	(0.0062)	(0.0608)

Table 9: Regression Results for F.I.R.E. (GDP/C interaction term)

	FEM	**FEM**
Variable	**Coefficient**	**Coefficient**
Past Manufacturing FDI	0.1707	0.0920
	(0.1371)	(0.1608)
Host GDP	1.1660***	1.2223***
	(0.1255)	(0.2207)
Host GDP per Capita	0.5280**	0.3313
	(0.2474)	(0.3952)
Host Restrictions to FDI	0.4710**	0.1960
	(0.2426)	(0.3007)
Cultural Similarity	1.4139	0.8431
	(1.0488)	(1.3855)
Transparency	-0.1535*	-0.2077
	(0.2267)	(0.2584)
Interaction Term (GDP/C)	0.0522)	0.2909
	(0.4187	(0.5514)
rho		0.3332***
		(0.0723)
n	293	270
Adjusted R-sqrd	0.90	0.74
Number of cross-sections	23	23
T-max	16	15
T-min	2	1
Lagrange Multiplier	462.16	187.45
Hausman	11.56	12.35

Table 10: Regression Results for F.I.R.E. (GDP interaction term)

	FEM	**FEM**
Variable	**Coefficient**	**Coefficient**
Past Manufacturing FDI	0.1640	0.0892
	(0.1374)	(0.1611)
Host GDP	1.1910***	1.2421***
	(0.1386)	(0.2390)
Host GDP per Capita	0.5339**	0.3576
	(0.2414)	(0.3955)
Host Restrictions to FDI	0.4860**	0.2124
	(0.2431)	(0.2390)
Cultural Similarity	1.3346	0.7934
	(1.0592)	(1.3924)
Transparency	-0.1523	-0.2078
	(0.2297)	(0.2586)
Interaction Term (GDP)	0.0485	0.0282
	(0.1659)	(0.2435)
rho		0.3333***
		(0.0723)
n	293	270
Adjusted R-sqrd	0.90	0.62
Number of cross-sections	23	23
T-max	16	15
T-min	2	1
Lagrange Multiplier	473.20	192.11
Hausman	12.57	13.02

5 Conclusion

This paper developed a model of foreign direct investment in producer services and tested its predictions using panel data on U.S. FDI. The model was based on two key characteristics of producer services, namely that their production involves economies of scale and that their quality is difficult to ascertain prior to purchase. The inability especially of new local customers to verify quality gives rise to a moral hazard problem: to save costs producer service providers may be tempted to lower quality without informing customers. Anticipating this problem and not knowing quality, customers may purchase locally provided low-quality services even if they would not do so under complete information. The paper shows that this informational barrier to entry is easier to overcome in markets in which there is a significant presence of downstream investors from the service firms's own country. These firms are more likely to be able to ascertain quality and thus raise the incentive for service providers to offer high quality. This in turn makes local firms more likely to buy, too. For our sample of U.S. FDI this means that host market size should have a larger effect on U.S. producer-service FDI if the ratio of U.S. manufacturing FDI to host market size exceeds a critical level. We found that this and other predictions of the model are consistent with the data for "business services".

The current paper examined the "demand" linkage between manufacturing FDI and producer service FDI. However, in the model the price index for producer services is decreasing in the number of multinational service providers, reflecting the fact that diversity in high-quality services is desirable from a manufacturer's point of view. This suggests that there should also be a "cost" linkage from producer service FDI to manufacturing: an increase in the variety of producer services available in the host country reduces a manufacturer's cost there and hence makes the country a more attractive location for further manufacturing investment. Whether this investment takes the form of manufacturing FDI or an expansion of the host-country industry, or both [see Markusen and Venables (1999) for a related paper] is an issue left for future research.

6 Appendix

The probability that an uninformed manufacturer buys from a service subsidiary is δ. A service subsidiary is indifferent between selling high and low quality, if

$$(p_h - c_h)p_h^{-\sigma}q_h^{\sigma}\beta_h(N_I + \delta N_U)X(q_h, \beta_h, w) = (p_h - c_l)p_h^{-\sigma}q_h^{\sigma}\beta_h\delta N_U X(q_h, \beta_h, w). \tag{26}$$

Solving for δ and using (15) gives the $\hat{\delta}$ in (13). The probability that a service subsidiary provides high quality is given by ε. An uninformed manufacturer is indifferent between buying a service from a multinational and buying from a local firm, if

$$[X(q_h, \beta_h, \beta_l, w, \varepsilon)]^2 = [X(c_l, \beta_l, w)]^2, \tag{27}$$

where $X(c_l, \beta_l, w) = \arg\max_X\{(1 - X)X - (w + \beta_l c_l)X\}$. We can rewrite this equation as:

$$(1 - w - \beta_h q_h - (1 - \varepsilon)(\beta_l - \beta_h)c_l)^2 = (1 - w - \beta_l c_l)^2. \tag{28}$$

It is easily verified that there exists a unique $\hat{\varepsilon} \in (0, 1)$ for which (28) holds. Solving for this value, we obtain (12).

7 Data Appendix

The data is drawn from the Survey of Current Business (SCB), The Department of Commerce Annual Reports on the Operations of U.S. Parent Companies and Their Foreign Affiliates, International Financial Statistics (IFS), the World Development Index (WDI), and Transparency International's Corruption Index. The SCB and Annual Report provide all of our FDI data. Though these data sources suffer from missing data (some data are suppressed to avoid disclosure of individual companies), we still benefit by using the same sources for all of our FDI data. We rely on the IFS and the WDI for other data on exchange rates, price indices, GDP and GDP per capita. Finally, the corruption index measures how transparent a country's policies and regulations are.

We construct the variables as follows:

- The Survey of Current Business (SCB) publishes the stock of service and manufacturing FDI in current U.S. dollars. We use the U.S. GDP price deflator to deflate these amounts to 1990 U.S. dollars.

- Host income is measured by GDP and GDP per capita in 1990 U.S. dollars by the WDI atlas method, which smooths exchange rate fluctuations, in order to allow better comparisons of GDP per capita over time.

- Investment restrictions to FDI is a subjective measure that we construct from discussions of countries' direct investment regulations published in the IMF's Annual Reports on Exchange Arrangements and Restrictions. We establish general criteria by which we judge the FDI restrictions of each country in terms of whether FDI has to be reviewed and accepted or just reported, whether there are limits on initial investments, and whether there are restrictions on repatriation of the capital investment or profits. Lower values are associated with fewer restrictions and higher values are associated with more restrictions. The restrictions examined were not specific to service industries. Instead, they applied to all FDI. Data is not available for service industries alone.

- Cultural similarity is measured by how the host country compares to the U.S. in four cultural aspects (language, religion, ethnicity, and political system). Each country is given an integer value reflecting how many similarities it has with the U.S. based on these criteria. Again, higher values indicate more similarities.

- The corruption index is taken directly from the tables published by Transparency International. This index attaches a higher value to scrupulous countries and lower values to corrupt countries.

References

[1] Bagwell, K. (1990), "Informational product differentiation as a barrier to entry," *International Journal of Industrial Organization* 8, 207–223.

[2] Bagwell, K. (1991), "Optimal export policy for a new-product monopoly," *American Economic Review* 81, 1156–1169.

[3] Bain, J., 1956, *Barriers to New Competition*, , Cambridge, MA: Harvard University Press.

[4] Bandera, V.N. and J.T. White (1992), "U.S. Direct Investments and Domestic Markets in Europe." in: United Nations Centre on Transnational Corporations (UNCTC), *Determinants of Foreign Direct Investment: A Survey of the Evidence*.

[5] Buch, Claudia M. (2000), "Why do Banks Go Abroad? Evidence from German Data," *Financial Markets, Institutions and Instruments*, forthcoming.

[6] Caves, Richard E. (1996), *Multinational Enterprise and Economic Analysis*, 2nd ed. Cambridge University Press, Cambridge.

[7] Clegg, Jeremy (1992), "Explaining Foreign Direct Investment Flows," in: P.J. Buckley and M. Casson (eds.), *Multinational Enterprises in the World Economy, Essays in Honor of John Dunning*, Edward Elgar Publishing, Limited.

[8] Davis, Evan, Gerald Hanlon, and John Kay."What Internationalisation in Services Means: the Case of Accountancy in the U.K. and Ireland." in: Howard Cox, Jeremy Clegg, and Grazia Ietto-Gillies (eds.), *The Growth of Global Business*, Routledge, New York, 1993.

[9] Dunning, John H. (1993), "Multinational Enterprises and the Growth of Services: Some Conceptual and Theoretical Issues." *Transnational Corporations in Services*. Ed. Karl P. Savant and Padma Mullampally. Routledge.

[10] Ethier, W.J. (1986), "The Multinational Firm." *Quarterly Journal of Economics* 101.

[11] Farrell, J. (1986), "Moral hazard as an entry barrier," *Rand Journal of Economics* 17, 440–449.

[12] Francois, Joseph, F. (1990a), "Producer Services, Scale, and the Division of Labor," *Oxford Economic Papers*, 42, 715-729.

[13] Francois, Joseph, F. (1990b), "Trade in Producer Services and Returns Due to Specialization Under Monopolistic Competition," *Canadian Journal of Economics*, 23(1), 109-124.

[14] Francois, Joseph, F. (1990c), "Trade in Nontradables: Proximity Requirements in the Pattern of Trade in Services," *Journal of International Economic Integration*, 5(1), 31-46.

[15] Francois, Joseph, F. (1993), "Explaining the Pattern of Trade in Producer Services. *International Economic Journal*," 7(3), 23-31.

[16] Francois, Joseph, F. (1995), "Dynamic Effects of Trade in Financial Services,". *International Economic Journal*, 9(3), 1-14.

[17] Fujita, M., P. Krugman and A. Venables (1999), *The Spatial Economy: Cities, Regions, and International Trade*, Cambridge, MA: MIT Press.

[18] Fukao, Kyoji and Keiko Ito (2000), "Foreign Direct Investment and Service Trade: The Case of Japan," Hitotsubashi University, mimeo.

[19] Grossman, G.M. and H. Horn (1988), "Infant-industry protection reconsidered: The case of informational barriers to entry," *Quarterly Journal of Economics*, 103, 767–787.

[20] Head, K., J. Ries and D. Swenson (1995), "Agglomeration benefits and location choice: Evidence from Japanese manufacturing investments in the United States," Journal of International Economics 38, 223–247.

[21] Helpman, E. and P.R. Krugman (1985), *Market Structure and Foreign Trade*, Cambridge, MA: MIT Press.

[22] Horstmann, I. and J.R. Markusen (1987a), "Strategic Investments in the Development of Multinationals," *International Economic Review* 28(1), 109-21.

[23] Horstmann, I. and J.R. Markusen (1987b), "Licensing vs. Foreign Direct Investment: a Model of Internationalization by the Multinational Enterprise," *Canadian Journal of Economics* 20.

[24] International Monetary Fund. Annual Report on Exchange Arrangements and Restrictions, 1977–1995.

[25] International Monetary Fund (1997), International Financial Statistics, CD-Rom.

[26] Markusen, J.R. (1989), "Trade in Producer Services and Other Specialized Intermediate Inputs," *American Economic Review* 79, 85–95.

[27] Markusen, J.R. (1995), "The Boundaries of Multinational Enterprises and the Theory of International Trade," *Journal of Economic Perspectives* 9, 169–189.

[28] Markusen, J.R. and A.J. Venables (1999), "Foreign Direct Investment as a Catalyst for Industrial Development," *European Economic Review* 43, 335–356.

[29] Markusen, J.R., T.F. Rutherford and D. Tarr (1999), "Foreign Direct Investment in Services and the Domestic Market for Expertise," mimeo.

[30] Raff, H. and Y. Kim (1999), "Optimal Export Policy in the Presence of Informational Barriers to Entry and Imperfect Competition," *Journal of International Economics* 49, 99–123.

[31] Savin, N.E. and K.J. White (1978), "Testing for Autocorrelation with Missing Observations," *Econometrica* 59–67.

[32] Schmalensee, R. (1982), "Product Differentiation Advantages of Pioneering Brands," *American Economic Review* 72, 349–365.

[33] Terpstra, V. and C.M. Yu (1988), "Determinants of Foreign Investment of U.S. Advertising Agencies," *Journal of International Business Studies* 19, 33–46.

[34] Tirole, J. (1988), *The Theory of Industrial Organization* (MIT Press, Cambridge MA).

[35] Transparency International Corruption Index, http://www.transparency.de/

[36] United Nations Centre on Transnational Corporations (UNCTC) (1989), Foreign Direct Investment and Transnational Corporations in Services.

[37] United Nations Centre on Transnational Corporations (1992), Determinants of Foreign Direct Investment: A Survey of the Evidence.

[38] United Nations Centre on Transnational Corporations (UNCTC) (1990), Transnational Corporations, Services, and the Uruguay Round.

[39] United Nations Centre on Transnational Corporations (UNCTC) (1993), The Transnationalization of Service Industries.

[40] United Nations Conference on Trade and Development (UNCTAD) (1994), Liberalizing Trade in Services: A Handbook (United Nations, New York and Geneva)

[41] United States Department of Commerce, Survey of Current Business, various issues from 1977-1996.

[42] United States Department of Commerce, Operations of U.S. Parent Companies and Their Foreign Affiliates, 1983-1995.

[43] United States Department of the Treasury. Report to Congress on Foreign Government Treatment of U.S. Commercial Banking Organizations. Washington D.C.: Government Printing Office. 1979.

[44] United States Department of the Treasury (1986), Report to Congress on Foreign Government Treatment of U.S. Commercial Banking Organizations: 1986 Update. Washington D.C.: Government Printing Office.

[45] United States Department of the Treasury (1990). Report to Congress on Foreign Government Treatment of U.S. Commercial Banking Organizations: 1990 Update. Washington D.C.: Government Printing Office.